An IMO project under the **Technical Cooperation and Implementation Division**

GloNoise Partnership

Gap Analysis of Policies and Recommendations for the Mitigation of Underwater Radiated Noise from Shipping

INTERNATIONAL MARITIME ORGANIZATION

UNDP

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The present study comprises a gap analysis of legal instruments, policies, strategies and other relevant documents associated with the reduction of of underwater radiated noise from shipping at the global and regional levels, as well as at the national level, with a focus on the six Lead Pilot Countries (LPCs).

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ACRONYMS AND ABBREVIATIONS

ABIDJAN CONVENTION	Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West and Central African Region
ABMTs	Area-based management tools
ABNJ	Areas beyond national jurisdiction
ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AFS	Anti-fouling systems
AFS CONVENTION	International Convention on the Control of Harmful Anti-fouling Systems on Ships
2030 AGENDA	2030 Agenda for Sustainable Development
AIS	Automatic Identification System
AMSA	Arctic Marine Shipping Assessment
ANC	Academy of Sciences
ANSI	American National Standards Institute
ANTIGUA CONVENTION	Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific
APEI	Areas of Particular Environmental Interest
APM	Associated protective measure
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, North-East Atlantic, Irish and North Seas
BALTFISH	Baltic Sea Fisheries Forum
BARCELONA CONVENTION	Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean
BAT	Best available technology
BBNJ AGREEMENT	Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction
BCC	Benguela Current Convention
BCLME	Benguela Current Large Marine Ecosystem
BCLMIII	Improving Ocean Governance in the Benguela Current Large Marine Ecosystem

BERN CONVENTION	Convention on the Conservation of European Wildlife and Natural Habitats
BEP	Best Environmental Practices
BIAS	Baltic Sea Information on the Acoustic Soundscape
BIOFOULING GUIDELINES	2023 IMO Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species
BSAP	Baltic Sea Action Plan
BUCHAREST CONVENTION	Convention for the Protection of the Black Sea Against Pollution
CADIC-CONICET	Centre for Scientific Research of the National Scientific and Technical Research Council
CARTAGENA CONVENTION	Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region
CBD	Convention on Biological Diversity
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CCI	Candidate common indicators
CEAZA	Center for Advanced Studies in Arid Zones
CEHID	Hydrodynamic Testing Centre at the National Technological University
CENPAT	National Patagonian Centre
CESIMAR	Centre for Marine Systems Studies
CESIMAR-UCR	Centre for Research in Marine Sciences and Limnology of the University of Costa Rica
CHM	Clearing-house mechanism
CII	Carbon intensity indicator
CP	Contact point
CIS	Cavitation Inception Speed (technical/URN context)
CIS	Common Implementation Strategy (EU policy)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals

CMS FAMILY GUIDELINES	CMS Family Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities
COBSEA	Coordinating Body on the Seas of East Asia
COCATRAM	Central American Maritime Transport Commission
COLREG	Convention on the International Regulations for Preventing Collisions at Sea
CONA	National Oceanographic Committee
CONPASCE	Coordinated Programme of Research, Surveillance and Control of Marine Pollution in the Pacific Southeast
COP	Conference of the Parties
COPAS COASTAL	Oceanographic Research Center in the South-Eastern Pacific
CP	Contact Point
CPPS	Permanent Commission for the South Pacific
CRZ	Coastal Regulation Zone
DGS	Directorate General of Shipping
DIRECTEMAR	Directorate of Maritime Territory and Merchant Marine
DOALOS	Division for Ocean Affairs and the Law of the Sea of the Office of Legal Affairs, United Nations
DVMP	Maritime Port Division
EBP	Experience-building Phase
EBP GUIDANCE	Guidance on the Experience-Building Phase (EBP) for the Revised guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life
EBSA	Ecologically or biologically significant areas
ECHO	Enhancing Cetacean Habitat and Observation
EEDI	Energy Efficiency Design Index
EEXI	Energy Efficiency Existing Ship Index
EEZ	Exclusive economic zone
EIA	Environmental impact assessment
EMSA	European Maritime Safety Agency
EO	Ecological Objectives
ESPOO CONVENTION	Convention on Environmental Impact Assessment in a Transboundary Context
EU	European Union

EU TG NOISE	European Union Technical Expert Group on Noise
FAO	Food and Agriculture Organization of the United Nations
FP	Focal point
GEF	Global Environment Facility
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
GHG	Greenhouse gas
GLOBAL BIODIVERSITY FRAMEWORK	Kunming-Montreal Global Biodiversity Framework
GLONOISE PARTNERSHIP	Global Partnership for Mitigation of Underwater Noise from Shipping
HABITATS DIRECTIVE	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
HELCOM	Baltic Marine Environment Protection Commission
HELSINKI CONVENTION	Convention on the Protection of the Marine Environment of the Baltic Sea Area
HOLAS	HELCOM holistic health assessment of the Baltic Sea
HSC CODES	1994 International Code of Safety for High-Speed Craft and 2000 International Code of Safety for High Speed Craft
IACS	International Association of Classification Societies
ICES	International Council for the Exploration of the Sea
ICZM	Integrated Coastal Zone Management
IDEAL	Centre for Dynamic Research on High Latitude Marine Ecosystems
IFB	Legal instruments and frameworks and global, regional and subregional and sectoral bodies
ILA	International Law Association
IMARES-UCR	Maritime Engineering Unit for Rivers and Estuaries of the University of Costa Ric
IMAP	Integrated Monitoring and Assessment Programme
IMMA	Important Marine Mammal Area
IMO	International Maritime Organization
IMP	Integrated Maritime Policy for the European Union
INIDEP	National Institute for Fisheries Research and Development

IRS	Indian Register of Shipping
IUCN	International Union for Conservation of Nature
IQOE	International Quiet Ocean Experiment
ISA	International Seabed Authority
ISO	International Organization for Standardization
ITLOS	International Tribunal for the Law of the Sea
IUSM	University Institute of Maritime Security
IWC	International Whaling Commission
IWG	Intersessional Working Group
JASCO	JASCO Applied Sciences – involved in underwater acoustics research and consulting
JEDDAH CONVENTION	Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment
JOMOPANS	Joint Monitoring Programme for Ambient Noise in the North Sea
JONAS	Joint Framework for Ocean Noise in the Atlantic Seas
KUWAIT CONVENTION	Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution
LabHiNO	Naval and Oceanic Hydrodynamics Laboratory
LIMA CONVENTION	Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific
LME	Large Marine Ecosystem
LOBE	Level of Onset Biological Effect
LONDON CONVENTION	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
LONDON PROTOCOL	Protocol of 1996 to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
LPC	Lead Pilot Country
MAB	Intergovernmental Man and the Biosphere Programme
MADRID PROTOCOL	Protocol on Environmental Protection to the Antarctic Treaty
MAP	UNEP/Mediterranean Action Plan
MARINE STRATEGY FRAMEWORK DIRECTIVE	Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy

MARISMA	Marine Spatial Management and Governance Project
MARPOL	International Convention for the Prevention of Pollution from Ships
MARSUR	Maritime Surveillance project of the European Defence Agency
MCE	Marine and Coastal Ecosystems
MEPC	Marine Environment Protection Committee
META	US Department of Transportation's Marine Environmental Technical Assistance Program
MINAE	Ministry of Environment and Energy
MINAET	Ministry of Environment, Energy and Telecommunications
MMA	Ministry of the Environment
MOP	Meeting of the Parties
MOPT	Ministry of Public Works and Transport
MPA	Marine protected area
MRCC	Maritime Rescue Coordination Centre
MSC	Maritime Safety Committee
MSP	Marine spatial planning
NAIROBI CONVENTION	Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean
NATURE RESTORATION LAW	Regulation (EU) 2024/1991 of the European Parliament and the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869
NAVISON	Navis Sonus project
NEAES 2030	North-East Atlantic Environment Strategy
NGO	Non-governmental organization
NIOT	National Institute of Ocean Technology
NMU	Nelson Mandela University
NOAA	National Oceanic and Atmospheric Administration
NOUMEA CONVENTION	Convention for the Protection of Natural Resources and Environment of the South Pacific Region
NOWPAP	Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (Northwest Pacific Action Plan)
NPA	National Port Act

ONDAS	Panacetacea-led initiative Acoustic Surveillance of Central American Soundscapes and Marine Life, a multi-site acoustic monitoring project
OPESCA	Central America Fisheries and Aquaculture Organization
OPS	Onshore power supply
OSICON	Ocean Society of India Conference
OSPAR CONVENTION	Convention for the Protection of the Marine Environment of the North-East Atlantic
PART XI AGREEMENT	Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982
PERGSA	The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
PNA	Argentine Naval Prefecture
POINTE-NOIRE PROTOCOL	Protocol on integrated coastal zone management
POLAR CODE	International Code for Ships Operating in Polar Waters
PSSA	Particularly Sensitive Sea Area
PSSA GUIDELINES	IMO Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas
QVI	Quiet Vessel Initiative
RAC	Regional Activity Centers
RAC-REMPEITC	Regional Marine Pollution Emergency, Information and Training Centre – Caribe
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat
RAP NOISE	HELCOM Regional Action Plan on Underwater Noise
REGINAVE	Maritime River and Lake Navigation Regime
REMP	Regional Environmental Management Plan
REMPEC	Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea
REVISED URN GUIDELINES	Revised Guidelines for the Reduction of Underwater Noise from Commercial Shipping to address Adverse Impacts on Marine Life
RMFO/AS	Regional fisheries management organizations and arrangements
SAC	Scientific Advisory Committee on Fisheries
SACEP	South Asia Cooperative Environment Programme
SAMSA	South African Maritime Safety Authority
SBAP	Biodiversity and Protected Areas Service

SDC	Sub-Committee on Ship Design and Construction (IMO)
SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
SEIA	Environmental Impact Assessment System of Chile
SERNAPESCA	National Fisheries and Aquaculture Service
SHIP-SOURCE POLLUTION DIRECTIVE	Directive 2005/35/EC of the European Parliament and of the Council of 7 September 2005 on ship-source pollution and on the introduction of penalties for infringements
SHOA	Hydrographic and Oceanographic Service of the Chilean Navy
SICA	Central American Integration System
SINAC	National System of Conservation Areas
SOLAS	International Convention for the Safety of Life at Sea
SMA	Superintendency for the Environment
SNAP	National System of Protected Areas
SOUNDS REPORT	SOUNDS – Status of Underwater noise from Shipping
SPA/BD PROTOCOL	Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean
SPAW	Protocol Concerning Specially Protected Areas and Wildlife
SPL	Sound Pressure Level
SPREP	Secretariat of the Pacific Regional Environment Programme
STB	Scientific and Technical Body
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
STCW-F	Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel
STOCKHOLM CONVENTION	Stockholm Convention on Persistent Organic Pollutants
SUBPESCA	Undersecretariat for Fisheries and Aquaculture
TANGO	A joint research project between Denmark, Estonia and Sweden on re-routing in Kattegat
TC	AEWA Technical Committee
TEHRAN CONVENTION	Convention for the Protection of the Marine Environment of the Caspian Sea
TFEU	Treaty on the Functioning of the European Union
TSS	Traffic separation scheme

TV	Threshold value
UN	United Nations
UN FISH STOCKS AGREEMENT	Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
UNCLOS	United Nations Convention on the Law of the Sea
UDA	Underwater Domain Awareness
ULS	Underwater listening station
UNA	Faculty of Marine Biology of the National University
UNDP	United Nations Development Programme
UNEP/MAP	United Nations Environment Programme/Mediterranean Action Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNGA INFORMAL CONSULTATIVE PROCESS	United Nations General Assembly Open-ended Informal Consultative Process on Oceans and the Law of the Sea
URN	Underwater Radiated Noise
URN ACTION PLAN	Action Plan to further prevent and reduce underwater radiated noise (URN) from ships
2014 URN GUIDELINES	2014 Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life
US	United States
UTN	National Technological University
UVNRT	Underwater Vessel Noise Reduction Target
VME	Vulnerable marine ecosystem
WKNOISE	GFCM/OceanCare workshop on anthropogenic underwater noise and impacts on fish, invertebrates and fish resources
WORLD HERITAGE CONVENTION	Convention concerning the Protection of the World Cultural and Natural Heritage
WODA	World Organization of Dredging Associations
WSC	World Shipping Council
ZPAP	Zero Pollution Action Plan

EXECUTIVE SUMMARY

The present study has been prepared under the GloNoise Partnership in order to provide a gap analysis of existing global, regional and national legal instruments, including treaties, laws, policies and strategies, associated with the reduction of underwater radiated noise from shipping, with an emphasis on the IMO *Revised Guidelines for the reduction of underwater radiated noise (URN) from commercial shipping to address adverse impacts on marine life (Revised URN Guidelines)* (MEPC.1/Circ.906/Rev.1). The analysis of the national legal instruments is focussed on the LPCs, Argentina, Chile, Costa Rica, India, South Africa and Trinidad and Tobago.

The study reveals a number of gaps and other challenges of a governance, scientific, technological, human, and financial nature which can hinder action to reduce underwater radiated noise from shipping. As indicated in sections 2 and 3, a number of these gaps and other challenges and the recommended or suggested actions which have been made to address them at the global and regional levels focus on anthropogenic underwater noise generally. Shipping-related identified gaps and other challenges, as well as recommended actions and proposed potential global policy options within the framework of IMO are presented in section 2.3.2 and section 5, respectively. Recommended actions for LPCs are set out in section 4.

GIVE PRIORITY ATTENTION TO THE REDUCTION OF ANTHROPOGENIC UNDERWATER NOISE

Section 1 underscores that anthropogenic underwater noise can have potential significant/severe impacts on marine life and can also adversely impact seabirds, with consequential environmental and socioeconomic impacts. Shipping is one of the main sources of anthropogenic noise in the marine environment. However, the reduction of anthropogenic underwater noise has not been given the priority attention it deserves at the international and national levels. Also, regulatory activity addressing anthropogenic underwater noise has been mostly foccused within developed countries.

In light of the obligations in the United Nations Convention on the Law of the Sea (UNCLOS), the deadline of 2025 in Target 14.1 of the 2030 Agenda for Sustainable Development by which States committed to prevent and significantly reduce marine pollution of all kinds, and in light of the commitment in Target 7 of the Kunming-Montreal Global Biodiversity Framework (Global Biodiversity Framework), it is important for States and intergovernmental bodies to give priority attention to the reduction of anthropogenic underwater noise if they have not already done so.

RECOGNIZE THAT ANTHROPOGENIC UNDERWATER NOISE CAN BE A POLLUTANT AND CONSIDER THE DEVELOPMENT OF MANDATORY INTERNATIONAL RULES AND STANDARDS FOR UNDERWATER RADIATED NOISE FROM SHIPS THROUGH IMO

The analysis of existing global legal instruments in section 2 indicates that underwater radiated noise, a form of energy, which results in or is likely to result in such deleterious effects as harm to living resources and marine life is a pollutant according to the definition of "pollution of the marine environment" in UNCLOS, as also recognized by several global intergovernmental bodies. The provisions in UNCLOS are also applicable to the Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 (Part XI Agreement); the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UN Fish Stocks Agreement); and the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement).

Many regional treaties also include "energy" in their definition of pollution as indicated in section 3. But as indicated in section 4, all LPCs have not yet defined "underwater radiated noise " as a type of marine pollution in their national legislation.

Furthermore, although States are required under UNCLOS to prevent, reduce and control pollution of the marine environment from vessels and other sources, most of the actions at the global level to address anthropogenic underwater noise have been of a policy and non-legally binding nature. IMO, as the competent international organisation under UNCLOS through which States must establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels, has not formally recognized URN as a form of pollution in IMO mandatory instruments, and no regulation currently exists among IMO instruments that would require Member States to implement, comply with, and enforce obligations relating to the prevention, reduction and control of underwater radiated noise pollution from ships, as required by UNCLOS. Such a regulatory gap also limits the ability of a number of regional bodies and their members to effectively prevent, reduce and control underwater radiated noise pollution from ships. As mentioned in section 3, many of the analysed regional environment treaties include obligations to prevent, reduce and control pollution of the marine environment from vessels in accordance with "generally accepted" or "applicable" international rules and standards, but these have not yet been developed by IMO. Moreover, several of those regional treaties limit the scope of the obligation to prevent, reduce and control pollution of the marine environment from vessels to "intentional or accidental discharges from ships" which implies that this obligation would apply to URN from shipping only if its introduction into the marine environment is considered a "discharge". Furthermore, mandatory international rules and standards would have to be established by IMO for this form of discharge.

> NO REGULATION CURRENTLY EXISTS AMONG IMO INSTRUMENTS THAT WOULD REQUIRE MEMBER STATES TO IMPLEMENT, COMPLY WITH, AND ENFORCE OBLIGATIONS RELATING TO THE PREVENTION, REDUCTION AND CONTROL OF UNDERWATER NOISE POLLUTION FROM SHIPS

To address these implementation gaps and challenges, it would be important for States and intergovernmental bodies to recognize anthropogenic underwater noise as a form of pollution of the marine environment in accordance with the definition of pollution of the marine environment in UNCLOS, if they have not yet done so. Furthermore, the development of mandatory "international rules and standards" to prevent, reduce and control underwater radiated noise pollution of the marine environment from vessels could be considered by Member States and international organizations at IMO.

CONSIDER URN REDUCTION APPROACHES FOR SHIPPING THROUGH IMO

Apart from the lack of "generally accepted international rules and standards", other identified gaps and challenges include limited awareness of the *Revised URN Guidelines*; capacity, technological and financial constraints; and insufficient cooperation and coordination. Other gaps and challenges relate to the establishment of baselines and targets; limited blending of the requirements on greenhouse gas (GHG) reduction and URN; maintenance approaches; and operational approaches; and insufficient guidance in the *Revised URN Guidelines* as to the relevance of other instruments for its application. Recommendations as to how these could be addressed within the framework of IMO are set out in section 2.3.2 and proposed potential global policy options are presented in section 5.

At the regional and national levels, in addition to the recommendations for the LPCs in section 4, States could consider regulating the use of pleasure craft by either prohibiting their use or imposing speed reduction requirements in order to protect rare and endangered species and their critical habitats.

Overall, it is important for intergovernmental bodies and States that are already taking measures to reduce URN from ships to engage in the IMO Experience-Building Phase (EBP) for the *Revised URN Guidelines* and submit lessons learned/best practices to the relevant IMO bodies.

CONSIDER OTHER MEASURES AND APPROACHES TO REDUCE UNDERWATER RADIATED NOISE FROM SHIPPING

Enhance research, knowledge and data

While a substantial body of scientific studies already demonstrates the potential severe/significant impact of URN on marine ecosystems, additional research is essential to deepen our understanding, as indicated in sections 2 and 3. Research and studies also need to be undertaken by a broader range of States. Most ship-source and continuous noise data collection and measurement projects have been taking place in developed countries.

There is a need for ongoing and further internationally coordinated research on the effects of anthropogenic underwater noise on: ecosystems; marine species and their prey, in particular fishes, invertebrates and turtles; the migration routes of marine species; and ecological connectivity and coherence. Research and scientific studies are also required to study the impact of underwater radiated noise on seabirds. There is data paucity on baseline conditions (including populations, behaviours and ecological connectivity). There is also currently no detailed map of the distribution of economically and ecologically important marine species, especially endangered species, apart from the ones provided and under further research by some regional bodies. Other knowledge gaps relate to the characteristics of major sound sources.

There is also a lack of common internationally agreed standards of acceptable noise levels and a lack of common measurements standards. Uncertainties in the estimation of ship source levels from measurements have also been identified. The lack of data from vessels navigating without Automatic Identification Systems poses a difficulty for researchers and policy makers. Furthermore, there is a need to compile and share data, knowledge, best practices and best available technology (BAT). Further research into, and testing of, technologies to reduce the impact of underwater radiated noise on marine life is also required. Harmonized reporting procedures are also essential. There is also a need to assess and minimize the cumulative impacts of various types of pollution when they co-occur in marine and coastal areas.

It will be important to, inter alia, define and differentiate different types of intensities of underwater radiated noise where there are adverse impacts and to characterise noise by source; to include areas that are affected by different levels of sound when mapping the spatial and temporal distribution of sound; to combine acoustic mapping with habitat mapping of sound-sensitive species with regard to spatial risk assessments; to define a baseline of ambient noise; and to establish a threshold. In the absence of common internationally agreed standards of acceptable noise levels, support standards by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) could be used.

Other potential actions include the need to develop harmonized reporting procedures, including a standardized classification for the various types of vessels and the information to be reported; establish national noise registries, ensuring that data standards are compatible with regional noise registries where these exist; establish a common repository for data and research on underwater radiated noise from shipping; establish an open-access independent scientific network dedicated to data sharing and monitoring continuous underwater radiated noise to facilitate knowledge exchange and information sharing; strengthen regional cooperation and joint research and development projects related to URN; and consider replicating or expanding in other regions, through the regional intergovernmental bodies based on the lessons learned, research projects investigating the co-benefits of energy efficiency and underwater radiated noise measures.

It is also critical to organize workshops and periodic meetings related to underwater radiated noise involving relevant stakeholders, not only promote knowledge, but also help raise awareness. At the national level, research institutes can serve as capacity-building centres to carry out research, innovation, and data collection and analysis.

Increase awareness-raising

As noted in the gap analysis, there is currently insufficient awareness and understanding of the potential significant/severe adverse impacts of underwater radiated noise on marine life and the associated environmental, social and economic impacts, as well as of the obligations and available measures to reduce underwater radiated noise.

There is a role for intergovernmental organizations to organise or engage in awareness-raising activities regarding the environmental, social and economic impacts of underwater radiated noise and available reduction measures. Also, Governments, intergovernmental organizations, research institutes, non-governmental organizations (NGOs) and other stakeholders could consider facilitating training initiatives involving specialized professionals with previous experience in developing and implementing URN management planning and URN reduction approaches for various stakeholders engaged in activities associated with the reduction of underwater radiated noise, including national administrations and national representatives at IMO. Awareness-raising activities for the public about the impact of underwater radiated noise on marine life, including as a result of pleasure craft activities, are also required.

Apply relevant principles and approaches

As indicated in sections 2 and 3, many treaties and policy outcomes of intergovernmental organizations require the application of principles and approaches. However not all principles and approaches which are relevant for the reduction of underwater radiated noise are being applied or applied effectively. As indicated in section 3, underwater radiated noise in general has not been addressed in a number of regional intergovernmental bodies dealing with environmental and fisheries issues.

It is important that relevant principles and approaches in relevant global and regional treaties and policy outcomes are applied by States and intergovernmental organizations, if they have not yet done so.

"OTHER POTENTIAL ACTIONS INCLUDE THE NEED TO DEVELOP HARMONIZED REPORTING PROCEDURES, INCLUDING A STANDARDIZED CLASSIFICATION FOR THE VARIOUS TYPES OF VESSELS AND THE INFORMATION TO BE REPORTED"

13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

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9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

14 LIFE BELOW WATER

5 GENDER EQUALITY

Protect noise-sensitive species, including through area-based management tools (ABMTs), including marine protected areas

Notwithstanding the obligations in relevant global and regional treaties and the recommendations in policy outcomes to establish ABMTs, including marine protected areas (MPAs), as indicated in sections 2 and 3, there is currently limited coverage in the world's ocean. In many regions, underwater radiated noise has also not been considered in the development and management plans for MPAs. Although States have established MPAs in areas within national jurisdiction, underwater radiated noise pollution from shipping has not yet been recognized as a threat to MPAs and therefore measures have not been taken to address it.

It is important, inter alia, that obligations in relevant treaties in relation to the protection of species, in particular those that are endangered or threatened with extinction, are implemented, complied with, and enforced by States, and that relevant measures in policy outcomes are applied. There is a critical need to establish MPAs and/or other ABMTs in order to protect habitats and migratory routes of marine species sensitive to noise and to include noise considerations in management plans for MPAs and other ABMTs. It would also be beneficial to create a detailed map of the distribution of economically and ecologically important marine species, especially species which are endangered or threatened with extinction, making use of available lists compiled by intergovernmental organizations and States. It would be important for States to provide the necessary data in order to develop noise hotspot maps for ocean areas that currently do not have such maps and to identify critical habitats or high-risk zones where there is a need for quiet zones which require URN reduction measures, such as speed reduction or re-routeing of ships. The potential benefits of establishing "noise protection areas" and/or "buffer zones" for MPAs merit consideration.

Carry out environmental impact assessments (EIAs)

Global and regional treaties include obligations to carry out an environmental impact assessment (EIA). Some treaties also include additional requirements to conduct an EIA if there are possible transboundary effects or effects within MPAs. Identified gaps and challenges with respect to EIAs relate primarily to the voluntary nature of the EIA guidelines that have been developed up to now and insufficient awareness of these in some regions/States. The building of capacity in order to, inter alia, increase awareness of the obligation to conduct EIAs and of relevant procedures, as well as of the availability of related guidelines in countries/regions where there is no legislation and/or guidelines addressing this issue, is also critical. The need to take shipping and vessel traffic into account in the EIA may not always be understood as indicated in section 3. Also, EIAs do not always adhere to best practices, and stakeholders and decision-makers involved in the EIA process are often unfamiliar with the essential concepts and terminology needed to interpret noise exposure predictions effectively.

It is important that obligations in treaties in relation to the conduct of EIAs are implemented, complied with, and enforced by States, and that greater use is made of EIAs as a management approach to address underwater radiated noise. The effective application of the voluntary guidelines that have been developed for EIAs, in particular those that address activities generating underwater radiated noise, including shipping and vessel traffic, like the CMS Family Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities, is also essential. It is critical to raise awareness and build capacity in regions where required and to train regulators on the application of the relevant voluntary EIA guidelines prior to the approval of projects.

"THE VARIOUS ASPECTS OF INCENTIVIZATION PROGRAMMES HAVE NOT BEEN COMMUNICATED AND THERE IS LIMITED KNOWLEDGE ABOUT THE POSSIBILITIES"

Capacity-building, transfer of technology and financial resources

Capacity-building, transfer of technology and adequate and predictable financial resources are critical for effective implementation, compliance with, and enforcement of UNCLOS and other treaties, as well as for the application of non-legally binding instruments. The urgent need for capacity-building and transfer of knowledge and marine technology to address gaps in knowledge and scientific data and uncertainties and to alleviate the adverse impacts of underwater radiated noise and the importance of cooperation to that effect has also been underscored. For example, as indicated in section 4, maritime authorities are not in a position to take actions that enable and promote URN management planning.

The provision of capacity-building activities and initiatives to strengthen awareness and assist developing States in sustainably managing marine resources, developing management strategies, building national programmes to monitor and study the possible effects of underwater radiated noise and make well-informed policy decisions is critical. The availability of technology to monitor and reduce URN and the development and enhancement of skills, processes and resources in order to adapt to the new technology is also crucial. Increased funding is also needed to support, for example monitoring studies to assess the impact of URN on marine life.

There is a role for competent intergovernmental organizations, including the CMS, IMO and the International Whaling Commission (IWC), to take measures within their mandates, to assist States in taking measures to avoid, minimize and mitigate the potential significant/severe adverse impacts of underwater radiated noise. In particular, the GloNoise Partnership provides an opportunity to engage other intergovernmental organizations, developed States and the private sector, among other partners, in a common endeavour to assist developing countries.

Promote incentivization

Incentivization as a potential tool to support compliance with measures to mitigate underwater radiated noise has not been promoted sufficiently. Moreover, the various aspects of incentivization programmes have not been communicated and there is limited knowledge about the possibilities. A significant gap in most developing countries, is the absence of any incentives to support compliance with the *Revised URN Guidelines.* As indicated in section 4, incentives are for many LPCs the least feasible measure under their legislation.

It is important to encourage port authorities to develop incentive programmes. It has also been suggested to introduce worldwide port incentives, such as discounted docking fees and harbour dues for ships which have been certified as "quiet" by an international classification society. In that regard, it is also necessary to consider the capacity, technological and financial constraints of developing countries.

Strengthen cooperation and coordination

The gap analysis indicates that there is a need for concerted international cooperation to assess and reduce the effects of anthropogenic underwater noise in all ocean areas, owing to the interconnected nature of the ocean and the transboundary nature of the impacts of the noise. The importance of international cooperation to enhance research and the collection of data, in particular in data-deficient regions, has been particularly highlighted. Other identified gaps and challenges include the need to strengthen cross-sectoral coordination and cooperation and coordination between and among States, organizations and with other relevant stakeholders, including industry, the scientific community, Indigenous Peoples and local communities. A major common gap in the LPCs is limited national coordination between relevant stakeholders. Collaboration and communication among relevant global and regional bodies in order to achieve synergies also needs to be enhanced.

It is important to increase international cooperation in order to: enhance research, knowledge and data; to build robust and comprehensive international partnerships, enabling enhanced sharing of best practices and BAT; and to support capacity-building initiatives, such as the GloNoise Partnership. The development of practical guidance and toolkits on measures to mitigate underwater radiated noise with the involvement of various stakeholders would also be beneficial.

It is also important to strengthen cooperation and coordination between IMO and those regional bodies that have not yet taken any action in relation to URN from shipping. Cross-sectoral cooperation and coordination with IMO could be fostered through the regional marine pollution emergency response centres, including that of the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (Northwest Pacific Action Plan – NOWPAP). Other regional bodies, such as the Permanent Commission for the South Pacific (CPPS), the Central American Commission for Maritime Transportation (COCATRAM) and the Secretariat of the Pacific Regional Environment Programme, could also offer the possibility to involve a broad range of stakeholders and foster cross-sectoral cooperation and coordination. The development of technical guidelines and best practices that would support the work of the regional bodies in relation to the application of the *Revised URN Guidelines* could be considered.

Cross-sectoral coordination at the national level is also critical and could, for example be facilitated through the creation of national coordination working groups involving all relevant stakeholders, followed by the development of a joint ocean noise strategy. The use of management tools, such as marine spatial planning and integrated coastal zone/area management can also support cross-sectoral coordination. Processes for the involvement of Indigenous Peoples and local communities, as and where appropriate, are also essential.

In the Member States where quiet ships are already being built, it is important to strengthen cooperation and coordination between designers, shipbuilders, suppliers and manufacturers, based on the *Revised URN Guidelines.*

Strengthen implementation, compliance and enforcement

A general major challenge is the ineffective implementation of, compliance with and enforcement of the provisions in UNCLOS and in other treaties relevant for the reduction of underwater radiated noise at the global and regional levels, the protection and preservation of the marine environment, including the conservation and sustainable use of marine biological diversity. As indicated above, the lack of "generally accepted international rules and standards" to prevent, reduce and control underwater radiated noise pollution from ships is an obstacle to the development of effective reduction measures at the regional level as well.

Furthermore, although regional treaties have been developed for several ocean/sea areas and their provisions can support the reduction of underwater radiated noise, including URN from ships, not all treaties are in force and not every State is a Party to the relevant regional instruments. In addition, the lack of or inadequate knowledge about the various impacts of underwater radiated noise specifically also on fish, invertebrates, turtles and seabirds has jeopardized underwater noise to be addressed in regional treaties and by intergovernmental bodies in their strategies and policies, even though their framework conventions would be applicable to underwater radiated noise and obligations to mitigate its effects are established therein.

Also, the applicability of the *URN Guidelines* to activities in the Area requires further consideration, especially since the International Seabed Authority (ISA) and IMO identified the need for a comprehensive study of specific IMO regulations and generally accepted practices that will apply side-by-side with ISA regulations.

Other challenges have arisen in the context of policy outcomes, as demonstrated in particular by the status of action towards the achievement of Goal 14 of the 2030 Agenda.

While the guidelines that have been developed and measures in policy outcomes can support States in implementing their commitments under treaties that contain obligations associated with the reduction of underwater radiated noise from shipping, for example with respect to EIAs, the voluntary nature of the global legal instruments has not necessarily compelled States to take action.

It is important that States consider becoming parties to relevant treaties. Full and effective implementation of, compliance with, and enforcement of the obligations in global and regional treaties associated with the reduction of underwater radiated noise and the protection and preservation of the marine environment, in particular those contained in UNCLOS and other relevant global and regional treaties, is crucial. Concerted and effective action to achieve the commitments in Goal 14 of the 2030 Agenda, in the Global Biodiversity Framework, and other relevant policy outcomes is also required. The application of the *Revised URN Guidelines* is critical. It is also important to prevent, reduce and control underwater radiated noise pollution from currently unregulated sources.

Improve monitoring and evaluation

The study indicates that there is, inter alia, an urgent need for methods to standardize the monitoring of noise, and data sets, so that both spatial and temporal differences can be evaluated and priorities established, and research outputs can be harmonized and compared. The adoption of existing international terminology standards and the development of standardized, agreed-upon terminology are also essential prerequisites for effective communication, monitoring and reduction efforts worldwide.

Also, monitoring and evaluating the combined and cumulative effects of underwater radiated noise on individual species and on species interaction poses a major challenge and hampers the adoption of a more holistic policy approach, including for the conservation and management of living marine resources. Another challenge relates to the cost of monitoring projects which has limited their scope to developed countries.

It is important to, inter alia, undertake comprehensive baseline studies and real-time, as well as long-term monitoring to track future changes in underwater radiated noise; to establish monitoring programmes for underwater radiated noise and develop indicators; to establish in situ acoustic listening stations, including in MPAs; to include acoustic data in global ocean observing systems; to follow the same international best practices (e.g. noise measurement, baseline of ambient noise sound analysis and reporting) as well as existing international standards for underwater acoustics terminology and quantities and procedures for URN measurement from ships; and to develop harmonized procedures for verification and validation of ambient sound modelling, enabling the quantification of the uncertainty and accuracy of the sound maps. Capacity, technological and financial constraints of developing countries also require consideration.

Conclusion

The gap analysis and the potential actions that could be taken to address the identified gaps and other challenges in the present study are not intended to be exhaustive. The actions, including the policy options for consideration by IMO as summarized above and presented in detail in section 2.3.2 and section 5, are aligned with global efforts towards strengthening implementation and compliance with international law and achieving the objectives of Sustainable Development Goal (SDG) 14 of the 2030 Agenda and other ocean-related SDGs. Their implementation and compliance will strengthen the protection and preservation of the marine environment and marine biodiversity conservation and sustainable use. Reducing the impact of URN from shipping on marine life and seabirds will also result in socioeconomic benefits, not only for the fisheries, tourism and other relevant sectors, but in particular for coastal communities, including Indigenous Peoples, that depend on living marine resources for food security and livelihoods.

SECTION

1

OVERVIEW AND CONTEXT

1.1 INTRODUCTION

Underwater radiated noise and its impacts has been receiving increasing attention in recent years, including at the intergovernmental level. With respect to underwater radiated noise from shipping, action has been taken at the global level mainly by IMO and by other global bodies, such as the United Nations General Assembly (UNGA), the Conference of the Parties (COP) to the CBD, the COP to the Convention on the CMS and the IWC.

Regional efforts to address underwater radiated noise from shipping have also increased under several legal instruments and frameworks. While such efforts are currently concentrated in developed countries, there are legal instruments and management approaches in other regions of the world which can also support the reduction of underwater radiated noise from shipping, although they do not address this source of noise directly.

As explained in more detail in section 1.3 below, action taken by IMO comprises the development and approval of Guidelines, the most recent instrument being the *Revised URN Guidelines*[1]; an Action Plan to further prevent and reduce underwater radiated noise (URN) from ships[2] (URN Action Plan); and Guidance on the EBP for the Revised Guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life[3] (EBP Guidance).

Furthermore, IMO has launched the GloNoise Partnership that is a part of the broader efforts by IMO, in collaboration with the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF), to address the impacts of underwater radiated noise on marine life.

The GloNoise Partnership is designed to demonstrate practical approaches to support overcoming key barriers including inconsistent risk assessment methodologies, lack of a common policy framework and dedicated structures for multi-stakeholder partnerships, limited awareness and capacities in developing countries and insufficient data and knowledge sharing on the impacts of URN from shipping.

Moreover, the GloNoise Partnership aims at establishing a truly global partnership to engage and assist developing countries to raise awareness, build capacity, define baselines and promote international policy dialogue on the mitigation of URN from shipping. This effort contributes to the uptake and implementation of the *Revised URN Guidelines*, the URN Action Plan and the EBP Guidance with the ultimate goal of mitigating underwater radiated noise from shipping and its adverse impacts on marine ecosystems and their living resources.

1 IMO Doc MEPC.1/Circ.906/Rev.1 (2024).
2 IMO "Report of the Marine Environment Protection Committee on its eighty-second session" IMO Doc MEPC 82/17/Add.1 (2024) annex 8.
3 ibid annex 9.

The specific objective of the Project is to create a partnership of LPCs, and support them, via engagement with IMO, the private sector and global strategic partners including from developed countries, to tackle the major environmental issue of underwater radiated noise pollution from shipping. The Member States of IMO participating as the LPCs include Argentina, Chile, Costa Rica, India, South Africa, Trinidad and Tobago. India and South Africa are twinned with Georgia, Madagascar and Malaysia, respectively.

The Project is structured into four key components: (i) global toolkit development and policy analyses, (ii) capacity-building and awareness-raising in participating developing countries, (iii) fostering partnerships on URN mitigation from shipping and (iv) monitoring, learning, adaptive feedback and evaluation[4].

This study has been prepared under the GloNoise Partnership Project and provides a gap analysis of existing global, regional, as well as national LPC legal instruments, including treaties, national laws, policies, and strategies associated with the reduction of underwater radiated noise from shipping, with an emphasis on the *Revised URN Guidelines*, and proposed potential global policy options within the framework of IMO following a strategic environmental and social assessment approach.

This study, structured in a tree-tier approach, contains five sections:

SECTION 1	Overview and Context
SECTION 2	Analysis of Existing Global Legal Instruments
SECTION 3	Analysis of Existing Regional Legal Instruments
SECTION 4	Analysis of Existing National Legal Instruments (LPCs)
SECTION 5	Policy Options for the IMO Regulatory Framework

4 IMO 'Reduction of Underwater Radiated Noise from Commercial Shipping. Information on IMO's GloNoise Partnership Project. Note by the Secretariat' IMO Doc MEPC 82/INF.9 (2024).

Every effort has been made to include those legal instruments, including policies and strategies at the national, regional and global levels that existed at the time of writing the analysis, based on the most current and available information, while bearing in mind that policymaking is an inherently dynamic process, continuously evolving to address emerging challenges and opportunities.

1.2 UNDERWATER RADIATED NOISE (URN) FROM SHIPPING

The Second World Ocean Assessment[5] which was adopted by UNGA in 2020,[6] indicates that increasing amounts of anthropogenic noise are among the many pressures from human activities that continue to degrade the ocean.[7] While some efforts are being made to reduce such noise created by a variety of sources, increasing use of the ocean is likely to offset such efforts.[8] The Second World Ocean Assessment which was welcomed by UNGA, [9] identifies vessels as one of the main sources of anthropogenic noise in the marine environment, the others being industrial activity and sonars[10] (see Figure 1).

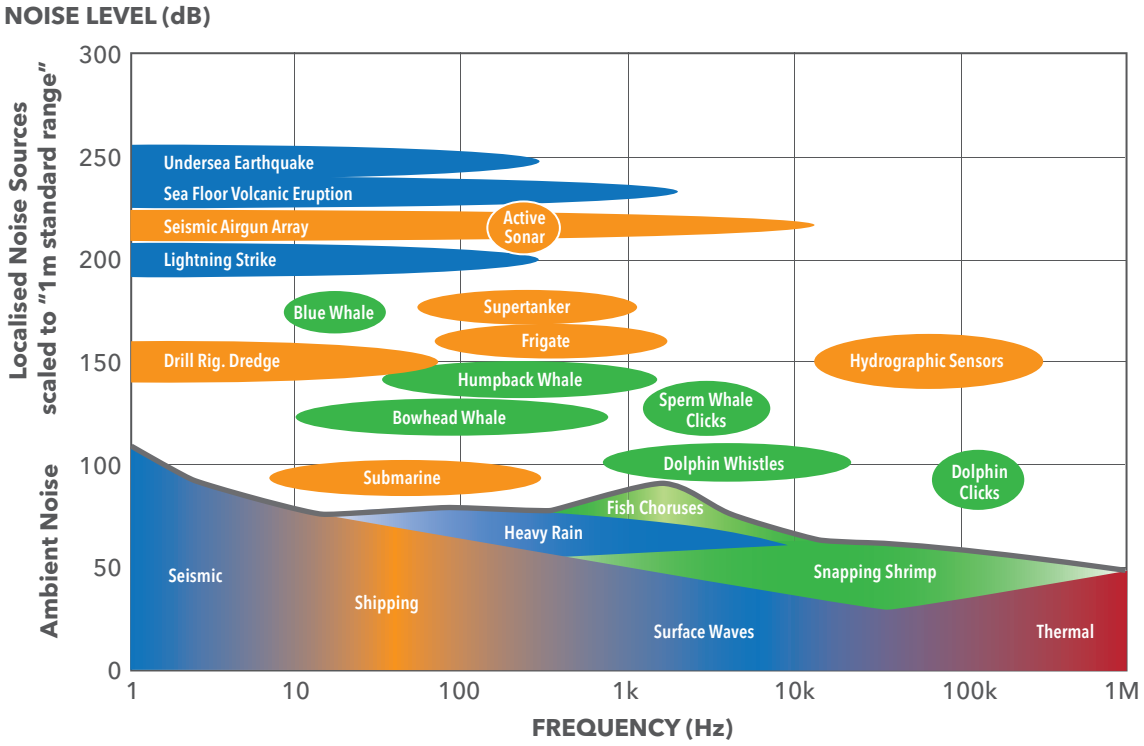


Figure 1: Levels and frequencies of anthropogenic and naturally occurring sound sources in the marine environment. Specturum Noise Level ("Acoustic intensity per Hertz") versus Frequency (measured in Hertz or "cycles per second"). Source: https://www.ospar.org/work-areas/eiha/noise.

5 The summary of the Second World Ocean Assessment is contained in UN Doc A/75/232/Rev.1* (2020). It is also incorporated in UN *Second World Ocean Assessment: World Ocean Assessment II* vol I <https://www.un.org/regularprocess> accessed 10 November 2024.

6 UNGA Res 75/239 (30 December 2020). UN Doc A/RES/75/239.

7 Summary of the Second World Ocean Assessment *(n 5) p 4.

8 Ibid p 9. 9 UNGA Res 75/239 (n 6).

10 UN *Second World Ocean Assessment: World Ocean Assessment II* vol II, chapter 'Trends in Inputs of Anthropogenic Noise to the Marine Environment' (n 5) pp 297-320.

Ships of different sizes produce varied frequencies of sound from about 8 Hz extending up to and above 1 kHz. Sound levels referenced to a distance of 1 metre from the source vary between approximately 160 and well above 200 dB re 1 µPa re 1 metre.[11] The exact characteristics of sound emissions depend on variables such as vessel type, size and operational mode, but the location of the vessel and the properties of the environment also affect sound propagation.[12] The propulsion systems of large (e.g. container/cargo ships, very large crude carriers, cruise liners) and mid-sized (e.g. support and supply ships, many research vessels) vessels are a dominant source of continuous underwater sound at low frequencies.[13] The dominant sources of sound emanating from marine vessels are cavitation and turbulence generated by propellers, but machinery is also a substantial component of the acoustic energy contribution, transmitted and radiated through the ship's hull.[14] The flow noise generated as a ship advances through the water adds, at a lower level, to the vessel's contribution to ambient noise.[15] Cavitation at the propeller blade tips is a significant source of noise across all frequencies.[16] Additional sources of ship noise include rotational machinery, which produces tones, and reciprocating machines which produce sharp pulses at a constant repetition rate.[17] Large vessels dominate low-frequency background noise in many marine environments worldwide.[18] Ice-breaking ships are a source of sound in polar regions through the use of bubbler systems and high-speed propelling to push floating ice away. Smaller vessels (e.g. recreational craft, jet skis, speed boats, operational work boats) produce sound that is generally highest in the mid-frequency range and at moderate source levels, although this depends on speed.[19] Owing to the generally higher acoustic frequency and near-shore operation, noise from smaller vessels does not extend far from the source.[20]

11 Christine Erbe et al "The Effects of Ship Noise on Marine Mammals – A Review" (2019) 6 Front. Mar. Sci 606. Martin Gassmann, Sean M. Wiggins, and John A. Hildebrand "Deep-water measurements of container ship radiated noise signatures and directionality" (2017) 142(3) *The Journal of the Acoustical Society of America* pp 1563–1574.
12 UN *Second World Ocean Assessment: World Ocean Assessment II* vol II (n 10) pp 300–302.
13 UNGA "Oceans and the law of the sea. Report of the Secretary-General" UN Doc A/73//68 (2018) para 19.
14 Donald Ross *Mechanics of Underwater Noise* (New York, Pergamon Press 1976).
15 UN Second World Ocean Assessment: World Ocean Assessment II vol II (n 10) p 301.
16 ibid.
17 ibid.
18 bid; Erbe et al (n 11).
19 UN Second World Ocean Assessment: World Ocean Assessment II vol II (n 10) p 301.
20 ibid; Erbe et al (n 11).

As recognized in the Revised URN Guidelines, sound is the primary sensory mechanism used by aquatic fauna for social interaction, reproduction, navigation and detection of obstacles, prey, predators and other threats.[21] The most relevant noise sources from ships overlap with hearing ranges and the use of sound by different species.[22] Depending on the species, documented impacts of shipping noise on marine mammals, fish and invertebrates from URN include developmental impairment, poor body condition, increased predation, decreased offspring survival, less feeding, DNA fragmentation, behavioural changes, masking issues and physiological responses.[23] Seabirds and turtles can also be adversely impacted by underwater radiated noise from shipping. For example, a recent study[24] found a strong correlation between an exponential increase in vessel-derived noise associated with ship-to-ship bunkering activities (i.e. offshore fuel transfers) in proximity to St Croix Island and the decrease in the African Penguin population. In the case of turtles, a peer-reviewed study[25] suggests that continued exposure to existing high levels of anthropogenic noise in vital sea turtle habitats and any increase in URN noise from boating and recreational activity could impact sea turtle behaviour and ecology. The impacts of underwater sound on specific species have, to a large extent, been studied in controlled settings.[26] However, the actual impact on marine species and ecosystems will depend on the cumulative impacts of multiple stressors, including other forms of marine pollution, ocean acidification, climate change, overexploitation, by-catch and alien invasive species.[27] For example, a link has been drawn between ocean acidification and underwater sound propagation, whereby acidification could increase the range of effect of underwater radiated noise. [28]

21 See note 1, para 1.3.
22 ibid.
23 ibid.
24 Lorien Pichegru, Laëtitia Vibert, Andréa Thiebault, Isabelle Charrier, Nicky Stander, Katta Ludynia, Melissa Lewis, Tegan Carpenter-Kling, Alistair McInnes (2022) "Maritime traffic trends around the southern tip of Africa–Did marine noise pollution contribute to the local penguins' collapse?" (2022) Science of the Total Environment 849, 157878.
25 SSamuel, Y., Morreale, S. J., Clark, C. W, Greene, C. H. and Richmond, M. E. "Underwater, low-frequency noise in a coastal sea turtle habitat" (2005 Mar) 117(3) *The Journal of the Acoustical Society of America* pp 1465–1472.
26 UNGA "Oceans and the law of the sea. Report of the Secretary-General" (n 13) para 33.
27 ibid.
28 UNGA "Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its nineteenth meeting" (18 to 22 June 2018). UN Doc A/73/124 (2018) para 53.

Underwater radiated noise from shipping can also adversely impact the ecosystem as the weakening or elimination of a particular species from an ecosystem could have impacts on associated or dependent species and affect the overall balance of the ecosystem due to the impacts on the food chain.[29]

Studies demonstrate that chronic underwater radiated noise from shipping is affecting the marine acoustic environment in many regions.[30] The Scientific Committee of the IWC agreed that the impacts of increased ocean noise are: (a) largely chronic rather than acute, (b) on a large rather than small scale and (c) occur across multiple species, with some populations likely losing large portions (>50%) of their acoustic habitats for many months of the year over many years.[31]

Although further studies are required, it has been recognized that anthropogenic underwater noise can have socioeconomic impacts, including impacts on tourism, fishing,[32] transportation, the provision of goods and services, livelihoods and food security.[33] Some social groups may be more affected by noise-induced impacts on marine life, for example displacement and redistribution of marine mammals may affect traditional and cultural practices of Indigenous Peoples and local communities that rely on artisanal fishing and subsistence hunting.[34] Limitations on the ability to use, develop and conserve living marine resources may also adversely impact the achievement of gender equality and women's empowerment.

Addressing underwater noise pollution is challenging and necessitates cooperation among States and action at the international level since many of the activities which generate such pollution can have significant transboundary impacts, including on species which migrate across different maritime zones.

"STUDIES DEMONSTRATE THAT CHRONIC UNDERWATER NOISE FROM SHIPPING IS AFFECTING THE MARINE ACOUSTIC ENVIRONMENT IN MANY REGIONS"

29 UNGA "Oceans and the law of the sea. Report of the Secretary-General" (n 13) para 32; and Arthur N. Popper, Anthony D. Hawkins and Frank Thomsen "Taking the Animals' Perspective Regarding Anthropogenic Underwater Sound" (2020) 35(9) *Trends in Ecology & Evolution* pp 787–794.

30 See for example, Work Programme of the Committee and Subsidiary Bodies. Comments on document MEPC 75/14. Submitted by the International Whaling Commission. IMO Doc MEPC 76/12 (2021).

31 IMO 'Any other business. Further information related to impacts of underwater noise on marine life. Submitted by International Whaling Commission' IMO Doc MEPC 72/INF.9 (2018) para 4.

32 Linda Weilgart "The impact of ocean noise pollution on fish and invertebrates" Report for OceanCare, Switzerland (2018) 34.

33 UNGA "Report on the work of the United Nations Open-ended Informal Consultative Process ..." (n 28) paras 14, 15 and 54. See also UNGA Res 79/145 "Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments" (12 December 2024) UN Doc A/RES/79/145.

34 Second World Ocean Assessment vol II (n 10) p 308; UNGA "Oceans and the law of the sea. Report of the Secretary-General" (n 13) para 36.

1.3 REGULATORY FRAMEWORK OF THE INTERNATIONAL MARITIME ORGANIZATION

IMO published in 2014 the *Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life*[35] (2014 URN Guidelines). This followed the identification of underwater noise from shipping by the Marine Environment Protection Committee (MEPC) as a high priority work item already back in 2008.

However, a 2019 study by Environics Research and the World Maritime University concluded that there has been limited uptake of the *2014 URN Guidelines* and that they were considered not effective in achieving their intended outcome.[36] The non-regulatory/non-mandatory nature of this instrument was identified among the key barriers to the uptake in its application and use.[37] At a 2019 International Symposium on Anthropogenic Underwater Noise, in Hamburg, Germany, it was noted that to ensure a level playing field regarding any commercial activity in a competitive industry like maritime transport, especially if mitigation and reduction measures require additional investments, it is essential that mandatory requirements and restrictions apply equally to all.[38] At the same time, the introduction and implementation of economic incentives, to encourage users to reduce and mitigate underwater noise, were also seen as key drivers to change the current state of play.[39]

In 2021, MEPC agreed with a revision of the *2014 URN Guidelines* and identified next steps to further prevent and reduce URN, and to encourage action. Following an instruction by MEPC, the Sub-Committee on Ship Design and Construction (SDC) prepared a draft revision of the *2014 URN Guidelines* and an Action Plan to further prevent and reduce URN from ships. Following this comprehensive revision work of the 2014 URN Guidelines by the Sub-Committee, with a view to increasing awareness, uptake and implementation, MEPC approved in 2023 the *Revised URN Guidelines*. Following approval and publication on 22 August 2023, the *Revised URN Guidelines* took effect on 1 October 2023. An amendment to the Guidelines was approved by the MEPC in October 2024 to include an URN management planning reference chart.[40] This revision has taken effect as of 1 December 2024. A summary of the key elements in the *Revised URN Guidelines* is presented in section 2.3.1 below. Additionally, MEPC 82 approved the EBP Guidance.

35 **IMO Doc MEPC.1/Circ.833 (2014).**

36 **IMO "Work Programme of the Committee and Subsidiary Bodies. Proposal for a new output concerning a review of the 2014 Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life (MEPC.1/Circ.833) and identification of next steps. Submitted by Australia, Canada and United States" IMO Doc MEPC 75/14 para 31 (2019).**

37 **ibid para 17.**

38 **IMO "Work Programme of the Committee and Subsidiary Bodies. Comments on document MEPC 75/14 and information on the WMU and Schlüter-Foundation International Symposium on Anthropogenic Underwater Noise. Submitted by the World Maritime University" IMO Doc MEPC 75/14/3 (2020) para 9.**

39 **ibid.**

40 **See note 1; IMO "Report of the Marine Environment Protection Committee on its eighty-second session" IMO Doc MEPC 82/17 (2024) para. 9.7.**

In the cover note of MEPC.1/Circ.906/Rev.1, containing the *Revised URN Guidelines*, MEPC has invited Member States and international organizations to submit information, observations, comments and recommendations based on the practical experience gained through the application of that instrument to MEPC.[41] In October 2024, the Committee approved the URN Action Plan to be reviewed and revised as necessary. The URN Action Plan outlines a number of tasks to be carried out by Member States through the relevant IMO organs. These include initiatives such as the establishment of an EBP during which Member States and international organizations are invited to share lessons learned and best practices that have emerged in the implementation of the *Revised URN Guidelines*. While the three-year long EBP is expected to conclude at MEPC 85 in 2026, there is still a possibility of an extension of up to two years, if necessary, for experience to be gained and best practices in the use of the *Revised URN Guidelines* to be developed, followed by a review to make any necessary amendments to the Guidelines.[42]

The following factors are considered of special relevance for a successful outcome of the EBP:

1. Participation from Member States and International Organizations, with submissions including relevant information and data resulting from the implementation of the *Revised URN Guidelines.*
2. Close observation of the EBP Guidance, with a focus on the identified key areas for the EBP:
   a. URN Management Planning, including URN baselining, management plan development, and target setting;
   b. design and technical noise reduction approaches;
   c. maintenance and operational approaches;
   d. energy efficiency and URN reduction;
   e. evaluation and monitoring;
   f. incentivization; and
   g. training and raising awareness.
3. Expert collaborative work involving Member States and international organizations, e.g. through the Correspondence Group on URN established at SDC 11, in January 2025.

Other initiatives included in the URN Action Plan include:

- enhancing public awareness; education and seafarer training;
- developing targets and policies for underwater radiated noise reduction;
- developing tools to collect data and share information; and
- encouraging more research on underwater radiated noise and its impacts on the marine environment. [43]

41 See note 1, para 4.
42 IMO "Report of the Marine Environment Protection Committee ..." (n 2) paras 9.15.3 and 9.21.
43 See note 3.

1.4 UNDERWATER RADIATED NOISE FROM SHIPPING AND THE MARINE ENVIRONMENT

Major global intergovernmental policy-making bodies have underscored the potential severe/significant adverse impact of underwater radiated noise on the marine environment, such as UNGA in its annual resolutions on oceans and the law of the sea.[44]

In 2018, pursuant to a decision of UNGA, the UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNGA Informal Consultative Process) considered the topic of "anthropogenic underwater noise" at its nineteenth meeting. At that meeting, many delegations recalled the obligation under the UNCLOS[45] to protect and preserve the marine environment while respecting the rights and freedoms enshrined therein. Other obligations in Part XII of the Convention were also referred to, including article 197[46,47] Many delegations expressed the view that anthropogenic underwater noise was a form of marine pollution and recalled the relevant provisions of the Convention, including articles 1 and 194[48] (see also section 2.1.1).

Furthermore, many delegations pointed out that anthropogenic underwater noise, as a form of pollution, was covered by SDG 14, target 14.1 of the 2030 Agenda for Sustainable Development[49] (2030 Agenda). Several delegations also underscored the importance more generally of addressing the effects of the noise for the implementation of the 2030 Agenda, in particular SDG 14.[50]

During the discussions at UNGA Informal Consultative Process, many delegations recognized the important work undertaken by competent international organizations on anthropogenic underwater noise. In that context, reference was made to: the *2014 URN Guidelines*; the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter[51] (London Convention) and its 1996 Protocol[52] (London Protocol); the initial IMO strategy on reduction of greenhouse gas emissions from ships; the 2011 *Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species;* the Code on Noise Levels on Board Ships under the International Convention for the Safety of Life at Sea[53] (SOLAS); and other IMO measures, including routing measures and particularly sensitive sea areas (PSSAs). Reference was also made to the Family Guidelines on environmental impact assessments for marine noise-generating activities of the CMS[54] (Family Guidelines),[55] as well as the role of COP to the CBD[56] and the role of the IWC, including in convening expert workshops on the effects of anthropogenic underwater noise and in sharing information regarding the impacts of the noise on marine biodiversity.[57]

> SEVERAL DELEGATIONS ALSO UNDERSCORED THE IMPORTANCE MORE GENERALLY OF ADDRESSING THE EFFECTS OF THE NOISE FOR THE IMPLEMENTATION OF THE 2030 AGENDA, IN PARTICULAR **SDG 14**

44 See for example, UNGA Res 79/144 "Oceans and the law of the sea" (12 December 2024) UN Doc A/RES/79/144, paras 287 and 280.
45 United Nations Convention on the Law of the Sea (adopted on 10 December 1982, entered into force on 16 November 1994) 1833 UNTS 3.
46 ibid., article 197 (Cooperation on a global basis or regional basis) provides as follows: "States shall cooperate on a global basis and, as appropriate, on a regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features."
47 UNGA "Report on the work of the United Nations Open-ended Informal Consultative Process ... " (n 28) para 19.
48 ibid.
49 UNGA Res 70/1 (25 September 2015) UN Doc A/RES/70/1.
50 UNGA "Report on the work of the United Nations Open-ended Informal Consultative Process ..." (n 28) para. 20.
51 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (adopted on 29 December 1972, entered into force on 30 August 1975). For a list of amendments to the Convention, see <https://www.imo.org/en/About/Conventions/Pages/StatusofConventions.aspx> last accessed 11 September 2024.
52 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (adopted on 7 November 1996, entered into force on 24 March 2006). For a list of amendments to the Protocol, see <https://www.imo.org/en/About/Conventions/Pages/StatusofConventions.aspx> last accessed 12 October 2024.
53 International Convention for the Safety of Life at Sea (SOLAS) (adopted on 1 November 1974, entered into force on 25 May 1980). For a list of amendments to SOLAS, see <https://www.imo.org/en/About/Conventions/Pages/StatusOfConventions.aspx> last accessed 9 September 2024.
54 Convention on the Conservation of Migratory Species of Wild Animals (adopted on 23 June 1979, entered into force on 1 November 1983) 1651 UNTS 333.
55 CMS COP Res 12.14 "Adverse Impacts of Anthropogenic Noise on Cetaceans and other Migratory Species" (October 2017) UNEP Doc UNEP/CMS/Resolution 12.14 annex.
56 Convention on Biological Diversity (adopted on 5 June 1992, entered into force on 29 December 1993) 1760 UNTS 79.
57 UNGA "Report on the work of the United Nations Open-ended Informal Consultative Process ... " (n 28) para 25.

SECTION

ANALYSIS OF EXISTING GLOBAL LEGAL INSTRUMENTS

Section 2 provides an analysis of existing global legal instruments, including policies and strategies associated with the reduction of URN from shipping. An overview of the obligations in global treaties to reduce underwater noise from shipping is provided in section 2.1 with a focus on UNCLOS. Global policy outcomes reflecting States' commitments to reduce anthropogenic underwater noise, including shipping, are presented in section 2.2.

Section 2.3 then focusses on specific measures and approaches to reduce ship-based underwater radiated noise. The *Revised URN Guidelines* are presented in section 2.3.1 together with other IMO instruments that provide ship-based reduction measures. Section 2.3.2 then presents possible gaps and other identified challenges in the *URN Guidelines* and in other relevant IMO instruments as well as potential recommendations.

Section 2.4 is devoted to an analysis of legal and management measures in global legal instruments which do not address underwater radiated noise from shipping directly, but which can nonetheless support its reduction. Possible gaps and other identified challenges as well as potential recommendations as to how to address such gaps and other identified challenges are also included in that section.

2.1 OBLIGATIONS IN GLOBAL TREATIES TO REDUCE UNDERWATER RADIATED NOISE FROM SHIPPING

As explained in section 2.1.1 below, the most comprehensive global treaty relevant to the reduction of underwater radiated noise from shipping is UNCLOS. The provisions in UNCLOS are further complemented by the Part XI Agreement[58], the UN Fish Stocks Agreement[59] and the BBNJ Agreement[60]. UNCLOS is also complemented by other complementary legal instruments developed under the auspices of other organizations. While other legally binding instruments do not directly deal with underwater radiated noise from shipping, they nonetheless contain obligations which, if implemented effectively, complied with and enforced, can support the reduction of such noise. Those obligations, which are described in section 2.4, relate in particular to area-based management tools (ABMTs) such as MPAs and EIAs.

2.1.1 UNCLOS

UNCLOS is widely accepted as the constitution for the ocean. As of 14 October 2024, it has 170 Parties, including the European Union (EU), and many of its provisions are also regarded as constituting customary international law, including those relating to the protection and preservation of the marine environment. UNGA also annually reaffirms that the Convention sets out the legal framework within which all activities in the oceans and seas must be carried out.[61]

58 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982 (adopted on 28 July 1994, entered into force on 16 November 1994) 1836 UNTS 3.

59 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (adopted on 4 August 1995, entered into force on 11 December 2001) 2167 UNTS 3.

60 Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (adopted 19 June 2023). The Agreement will enter into force 120 days after the deposit of the 60th instrument of ratification, acceptance, approval or accession. It provides for the possibility of States to apply it provisionally pending its entry into force.

61 UNGA Res 79/144 (n 44) preamble.

UNCLOS definition of pollution of the marine environment

Underwater radiated noise is not specifically mentioned in UNCLOS. However, its article 1(1)(4) includes "energy" as part of the definition of "pollution of the marine environment".[62] Sound is a form of energy and so is noise which is an unwanted and unpleasant sound.[63] Therefore, underwater radiated noise which results in or is likely to result in such deleterious effects as harm to living resources and marine life is a form of pollution of the marine environment. Such an interpretation is in conformity with article 31(1) of the Vienna Convention on the Law of Treaties, which requires interpretation "in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose".[64] Moreover, this interpretation also satisfies all of the three criteria set out in the definition in article 1(1)(4) of UNCLOS, which, as stated in an Advisory Opinion of the International Tribunal for the Law of the Sea (ITLOS), must be satisfied to meet the definition of pollution of the marine environment: (1) there must be a substance or energy; (2) this substance or energy must be introduced by humans, directly or indirectly, into the marine environment; and (3) such introduction must result or be likely to result in deleterious effects.[65]

The definition of pollution in UNCLOS does not require that underwater noise pollution is introduced in a certain manner; it can be introduced into the marine environment directly or indirectly, and it does not matter whether such introduction occurs deliberately or incidentally, nor is the occurrence of a deleterious effect required; it is enough that there is likelihood that it results in such effects. The jurisprudence of the ITLOS has clarified that the living resources of the sea and marine life are part of the marine environment.[66]

General obligations relating to the protection and preservation of the marine environment

If the level of underwater radiated noise from shipping that is introduced into the marine environment is determined to constitute pollution of the marine environment according to the definition of "pollution" under UNCLOS, then its provisions on pollution from vessels apply (articles 211, 217–221. An overview of these provisions is provided below.

In addition, there are also a number of general obligations set out in Part XII of UNCLOS which are applicable to underwater radiated noise from shipping. States are required in accordance with Part XII to take, individually or jointly as appropriate, all measures consistent with the Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they are required to endeavour to harmonize their policies in this connection (article 194(1)). States must also take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they

62 Article 1(4) provides as follows: "Pollution of the marine environment" means the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities".

63 Harm M. Dotinga and Alex G. Oude Elferink, "Acoustic Pollution in the Oceans: The Search for Legal Standards" (2000) 31(1-2) *Ocean Development & International Law* 151-182.

64 Vienna Convention on the Law of Treaties (adopted on 23 May 1969, entered into force on 27 January 1980) 1155 UNTS 331 at article 31(1).

65 *Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law (Request for Advisory Opinion submitted to the Tribunal) Case No. 31;* available at <https://www.itlos.org/fileadmin/itlos/documents/cases/31/Advisory_Opinion/C31_Adv_Op_21.05.2024_orig.pdf> last accessed 19 September 2024.

66 *Request for Advisory Opinion submitted by the Sub-Regional Fisheries Commission, Advisory Opinion, 2 April 2015,* ITLOS Reports 2015, 4 at p 61 para 216.

> UNDERWATER NOISE WHICH RESULTS IN OR IS LIKELY TO RESULT IN SUCH DELETERIOUS EFFECTS AS HARM TO LIVING RESOURCES AND MARINE LIFE IS A FORM OF POLLUTION OF THE MARINE ENVIRONMENT

exercise sovereign rights in accordance with the Convention (article 194(2)). These obligations apply to shipping activities which can or are likely to generate underwater radiated noise pollution that is trans-boundary in nature.

The Seabed Disputes Chamber of ITLOS has clarified the nature of the obligation "to ensure" in two of its Advisory Opinions, namely that it may be characterized as an obligation "of conduct"and not "of result", and as an obligation of "due diligence".[67]

UNCLOS also requires States to take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control (article 196).

The measures that States are required to take in accordance with Part XII must include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life (article 194(5)). Indeed, the adoption of measures such as ABMTs, including MPAs, can support the reduction of underwater radiated noise.

UNCLOS also contains requirements regarding monitoring of the risks or effects of pollution and assessment of the potential effects of planned activities under the jurisdiction or control of States which may cause substantial pollution of or significant and harmful changes to the marine environment (articles 204 to 206). Furthermore, UNCLOS requires States to cooperate, including for the purpose of promoting studies, research programmes and the exchange of information and data about pollution and in order to establish scientific criteria for regulations (articles 200 and 201). Part XII also contains requirements regarding scientific and technical assistance to developing States (articles 202 and 203).

Obligations with respect to the prevention, reduction and control of pollution from vessels

With regard to the prevention, reduction and control of pollution from vessels, article 211(1) of UNCLOS provides that States, acting through the competent international organization or general diplomatic conference, shall establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels and promote the adoption, in the same manner, wherever appropriate, of routeing systems designed to minimize the threat of accidents which might cause pollution of the marine environment, including the coastline, and pollution damage to the related interests of coastal States. It is generally recognized that the competent international organization referred to in article 211 is IMO.

67 ***Responsibilities and obligations of States with Respect to activities in the Area, Advisory Opinion, 1 February 2011, ITLOS Reports 2011*** **10, pp 40-44, paras 107-123.**

"International rules and standards" established pursuant to article 211(1) which are "generally accepted" represent the minimum standard for flag States' prescriptive jurisdiction (article 211(2)) and "applicable international rules and standards" for flag States' enforcement jurisdiction (articles 94 and 217) irrespective of where a violation occurs.

The expression "generally accepted international rules and standards" is not defined in UNCLOS and has been the subject of different interpretations.[68] The International Law Association (ILA) has expressed the view that "generally accepted international rules and standards" cannot be equated with customary law nor with legal instruments in force for the States concerned. Such rules and standards, instead, are primarily based on State practice, attaching only secondary importance to the nature and status of the instrument containing the respective rule or standard".[69] However, the ILA also acknowledged that "a widely accepted international instrument containing the specific rule or standard will enhance the chances of later general acceptance, especially if such treaties require the member States to take specific action on the national level ... the MARPOL 73/78 Convention is usually believed to fit this category ... [a]lso the SOLAS Convention and a few others ...".[70]

The study by IMO on the "Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization"[71] indicates that: the degree of international acceptance of the "generally accepted" or "applicable" standards is decisive in establishing the extent to which Parties to UNCLOS are under an obligation to implement them. This factor will also be important in determining the extent to which any obligation under UNCLOS to comply with generally accepted safety and anti-pollution shipping standards can bind Parties to the Convention even if they are not Parties to IMO treaties containing those rules and standards.[72]

The study only identifies the International Convention for the Prevention of Pollution from Ships (MARPOL) as containing the "generally accepted international rules and standards" referred to in articles 211(2) and 211(5) of UNCLOS.[73]

68 Some scholars consider that the international rules and standards have to attain the status of customary international law before they can be considered "generally accepted", others link the concept to international instruments to which a State is a contracting Party. A second group of scholars have linked the concept to IMO conventions in force, to whether the State to which the rule or standard is applied is itself a Party to that particular IMO convention. A third group favours a more liberal interpretation, namely that by accepting UNCLOS, States have agreed beforehand to apply a less strict standard of acceptance than the ones suggested so far. See International Law Association "London Conference (2000): Committee on Coastal State Jurisdiction relating to Marine Pollution. Final report" pp 34–36.

69 ibid at p 33.

70 ibid at p 39.

71 The IMO study was originally prepared in 1987 and issued as IMO Doc LEG/MISC.1. It was substantially revised and updated over the years by the IMO Secretariat in consultation with DOALOS. The most recent version available on the website of the IMO is IMO Doc LEG/MISC.8 which reflects developments that have taken place up to December 2013 <https://www.imo.org/en/OurWork/Legal/Pages/UnitedNationsConventionOnTheLawOfTheSea.aspx> last accessed 3 November 2021.

72 ibid at pp 11–12.

73 ibid, annex pp 123–124.

The prescriptive and enforcement jurisdiction of coastal States with respect to the prevention, reduction and control of pollution from vessels varies depending on the maritime zone involved and the distance from the shore. The greater the distance the more emphasis on international rules and standards. Thus, in the exclusive economic zone (EEZ) "generally accepted international rules and standards" and "applicable international rules and standards" represent the main applicable standards for the prescriptive and enforcement jurisdiction of coastal States with regard to the prevention, reduction and control of pollution from vessels (articles 211(5) and 220). However, UNCLOS permits coastal States to adopt more stringent measures for a clearly defined area of their EEZ if special mandatory measures are required and agreed to by the competent international organization (article 211(6)). Also, coastal States are not required to apply generally accepted international rules and standards for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the EEZ (article 234).

With respect to innocent passage through the territorial sea, coastal States and archipelagic States are entitled to adopt laws and regulations, in conformity with UNCLOS and other rules of international law, in respect of, inter alia: the safety of navigation and the regulation of maritime traffic; the conservation of the living resources of the sea; and the preservation of the environment and the prevention, reduction and control of pollution thereof. However, such laws and regulations shall not apply to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards (articles 21 and 52). Also, the innocent passage of foreign ships cannot be hampered except in accordance with UNCLOS (articles 24 and 52). Nonetheless, the coastal State may designate sea lanes and prescribe traffic separation schemes (TSS) for the regulation of the passage of ships taking into account, inter alia, the recommendations of the competent international organization (article 22). In practice, States have submitted routeing measures to IMO for adoption. In the case of straits used for international navigation and archipelagic sea lanes, TSS and sea lanes must conform to generally accepted international regulations and be adopted by the competent international organization (articles 41, 42(1)(a), 53 and 54).

A coastal State and archipelagic State can take enforcement measures in the territorial sea and archipelagic waters to prevent passage by a foreign ship which is not innocent (articles 19, 25(1) and 52). Furthermore, a coastal State has the right to undertake physical inspection of a vessel navigating in its territorial sea where there are clear grounds for believing that the vessel has, during its passage therein, violated laws and regulations of that State adopted in accordance with UNCLOS or applicable international rules and standards for the prevention, reduction and control of pollution from vessels and where the evidence so warrants, the coastal State may institute proceedings, including detention of the vessel in accordance with its laws (article 220(2).

In addition, the hot pursuit of a foreign ship may be undertaken when the competent authorities of the coastal State have good reason to believe that the ship violated the laws and regulations of that State (article 111).

UNCLOS provides that in the case of ships proceeding to internal waters or a call at a port facility outside internal waters, the coastal State and archipelagic State have the right to take the necessary steps to prevent the breach of the conditions to which admission of those ships to internal waters or such call is subject (articles 25(2) and 52). States establish particular requirements for the prevention, reduction and control of pollution of the marine environment as a condition for the entry of foreign vessels into their ports or internal waters or for a call at their offshore terminals which must give due publicity to such requirements and communicate them to the competent international organization (article 211(3)). UNCLOS does not place any restrictions on the nature of requirements which a port State could adopt. [74]

A coastal State can institute proceedings when a vessel is voluntarily within its port or at an offshore terminal when the violation has occurred either within the territorial sea or the EEZ of that State (article 220(1)). Moreover, a port State can take enforcement measures in respect of a discharge in violation of applicable international rules and standards which occurred on the high seas (article 218(1)) or in the internal waters, territorial sea or EEZ of another State if requested by that State, the flag State, or a State damaged or threatened by the discharge violation, or if the violation has caused or is likely to cause pollution in the internal waters, territorial sea or EEZ of the port State (article 218(2)). UNCLOS sets out safeguards regarding the exercise of enforcement powers, including with respect to the investigation of foreign vessels (section 7 of Part XII).

In the case of the Area, that is the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction, States are obligated to adopt laws and regulations to prevent, reduce and control pollution of the marine environment from activities in the Area undertaken by vessels, installations, structures and other devices flying their flag or of their registry or operating under their authority, as the case may be. Such laws and regulations must be no less effective than the international rules, regulations and procedures which are to be established by the ISA to prevent, reduce and control pollution of the marine environment from activities in the Area (articles 145 and 209 and the Part XI Agreement).

The provisions regarding the protection and preservation of the marine environment in UNCLOS do not apply to any vessels entitled to sovereign immunity although each State must ensure, by the adoption of appropriate measures, that such vessels act in a consistent manner, so far as is reasonable and practicable, with UNCLOS (article 236). Non-compliance by a foreign ship entitled to sovereign immunity in the territorial sea is addressed in articles 30 and 31 of UNCLOS and in articles 42 and 54 in straits used for international navigation and in archipelagic sea lanes.

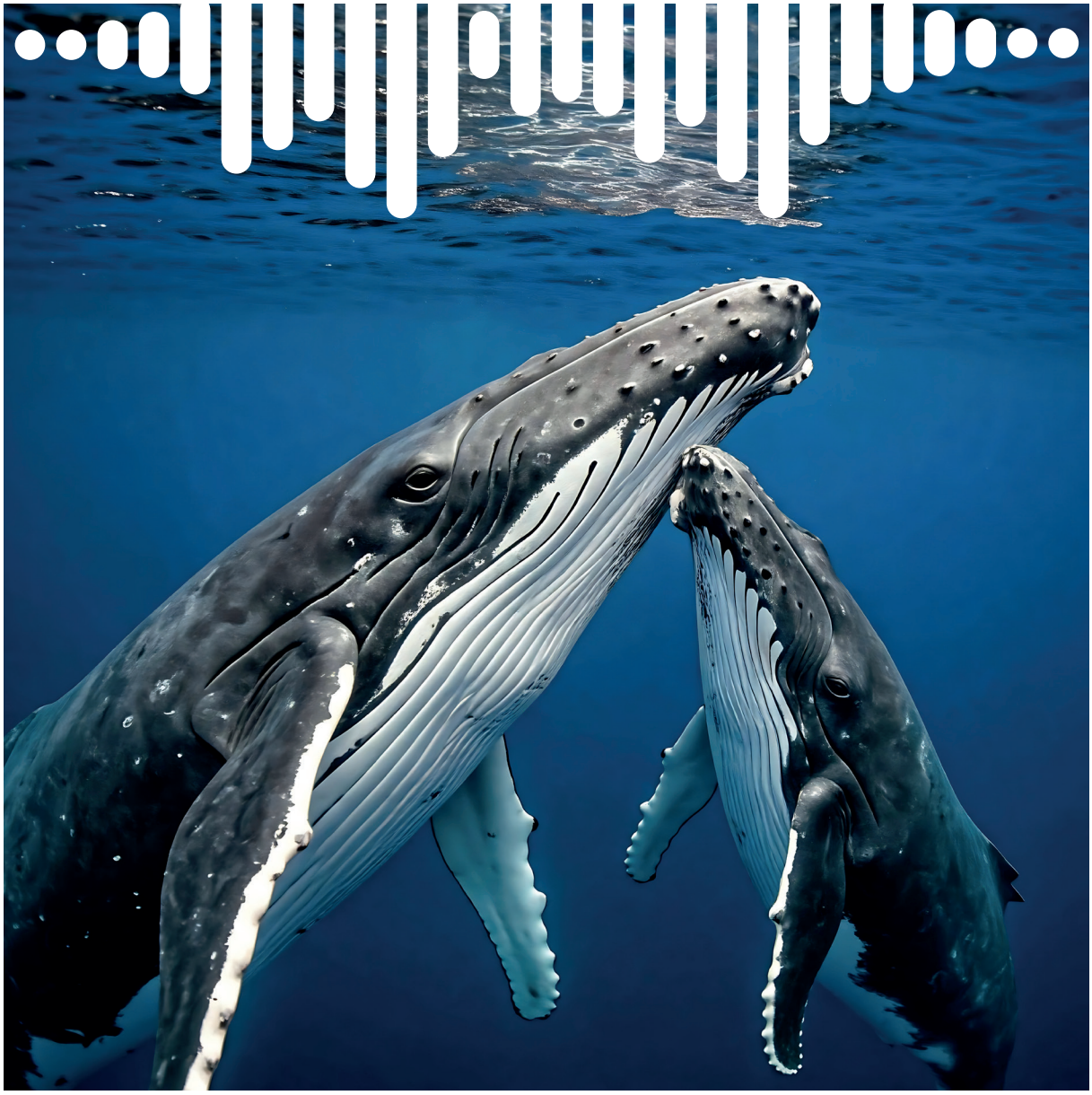
UNCLOS holds States responsible and liable for the fulfilment of their international obligations concerning the protection and preservation of the marine environment (article 235). The Convention furthermore provides for the submission of certain disputes relating specifically to the protection and preservation of the marine environment to compulsory dispute-settlement procedures set out in its Part XV. The relationship between UNCLOS and other conventions is addressed in articles 237 and 311.

74 Erik Jaap Molenaar, *Coastal State Jurisdiction Over Vessel-Source Pollution* (The Hague: Kluwer Law International, 1998) 632.

Obligations relating to the conservation and management of living marine resources

UNCLOS sets out obligations relating to the conservation and management of living marine resources for various maritime zones, in particular the EEZ and the high seas. Although the obligations of States relating to conservation and management are mainly aimed at ensuring sustainability of fish stocks, they can also provide the basis for the adoption of other measures which could mitigate the impacts of underwater radiated noise on such stocks. States also have the right to adopt laws and regulations consistent with UNCLOS relating, inter alia, to fishing vessels and equipment, seasons and areas of fishing and the types, sizes and number of fishing vessels that may be used, which nationals of other States fishing in the EEZ must comply with (article 62(4)(a) and (c)).

In the case of straddling fish stocks and highly migratory fish stocks, the duty of States in UNCLOS to cooperate in their conservation and management (articles 63 and 64) has been further developed by the UN Fish Stocks Agreement (see section 2.4.1).



2.2 POLICY INSTRUMENTS CONTAINING COMMITMENTS TO REDUCE UNDERWATER RADIATED NOISE FROM SHIPPING

Apart from IMO, there are also several global bodies, including UNGA, the CBD COP, the CMS COP and the IWC, which have adopted policies, guidelines, guidance, strategies, or recommended pathways or approaches etc. which can, if effectively applied, also support the reduction of underwater radiated noise from shipping. This section will present an overview of the general commitments contained in the major policy outcomes of these bodies, in particular those that directly address the reduction of underwater radiated nois from shipping. Several of these bodies have in their policy outcomes specifically referred to anthropogenic underwater radiated noise as a form of pollution and to the obligations of States under UNCLOS to protect and preserve the marine environment, as described below.

2.2.1 Major policy outcomes of the United Nations

(a) 2030 Agenda

As noted in section 2.1.1 above, if the level of underwater radiated noise that is introduced into the marine environment from shipping is determined to constitute pollution of the marine environment, according to the definition of pollution in UNCLOS, then it must be prevented, reduced and controlled. A commitment to prevent and significantly reduce marine pollution of all kinds by 2025 is set out in target 14.1 of the 2030 Agenda.

In addition, there are also other SDG targets whose achievement are important for the reduction of underwater radiated noise from shipping. These include SDG target 14.2, which aims to, inter alia, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts; target 14.5, which aims to conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information; and target 14.c which aims to enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS.

Conversely, the reduction of underwater radiated noise from shipping can also support the achievement of SDG 14 and other SDGs. While failure to effectively address anthropogenic underwater noise affects the achievement of those SDGs. For example, the impacts of noise on species that are of particular social, economic and cultural relevance may have socioeconomic effects on coastal communities, in particular if they alter the availability of commercially or recreationally important marine species.[75] A similar decline of social and economic benefits may also be expected in association with the displacement of marine mammals that are the focus of tourism activities.[76] In addition, the displacement of marine animals may affect traditional and cultural practices of Indigenous communities that rely on artisanal fishing and subsistence hunting.[77]

> UNGA NOTED WITH APPRECIATION "THE GLONOISE PARTNERSHIP PROJECT WITHIN IMO, WHICH FOCUSES ON ASSISTING DEVELOPING STATES TO RAISE AWARENESS, BUILD CAPACITY AND COLLECT INFORMATION TO ASSIST THE POLICY DIALOGUE ON MITIGATION OF ANTHROPOGENIC UNDERWATER NOISE FROM SHIPPING"

(b) UNGA resolutions

In 2017, UNGA endorsed the declaration adopted at the UN Ocean Conference to Support the Implementation of Sustainable Development Goal 14 of the 2030 Agenda for Sustainable Development (UN Ocean Conference) held at UN Headquarters.[78] It included a call on all stakeholders to conserve and sustainably use the oceans, seas and marine resources for sustainable development by taking, inter alia, the following actions on an urgent basis, including by building on existing institutions and partnerships: ... (g) Accelerate actions to prevent and significantly reduce marine pollution of all kinds, particularly from ... pollution from ships ... as well as to address, as appropriate, the adverse impacts of other human-related activities on the ocean and on marine life, such as ship strikes, underwater noise ... [79]

In 2022, UNGA endorsed the declaration adopted at the UN Ocean Conference, held in Lisbon, Portugal, in which anthropogenic underwater noise was for the first time specifically listed among the sources of marine pollution.[80]

UNGA has addressed anthropogenic underwater noise in its annual resolutions on oceans and the law of the sea since 2006 and expanded its consideration of the topic over time. In particular, as noted in section 1.4 above, it mandated the UNGA Informal Consultative Process, to consider the topic of "anthropogenic underwater noise". In recent years, UNGA has addressed anthropogenic underwater noise, including shipping in its resolutions on oceans and the law of the sea and on sustainable fisheries,[81] as indicated below and also in section 2.4. UNGA has called upon States to identify appropriate measures and approaches to assess and address the potential socioeconomic and environmental impacts of anthropogenic underwater noise, taking into account the precautionary approach and ecosystem approaches and the best available scientific information.[82] With respect to underwater radiated noise from shipping, UNGA has encouraged States to continue their work at the IMO to enhance understanding of the extent to which improved ship technology, including efficient propeller design, could lead to reduced introduction of underwater noise in the oceans.[83]

UNGA has also recalled the approval of the *Revised URN Guidelines* in July 2023 and has noted the endorsement by MEPC of a draft action plan for the reduction of underwater radiated noise from commercial shipping. It has also noted with appreciation the GloNoise Partnership project within IMO, which focuses on assisting developing States to raise awareness, build capacity and collect information to assist the policy dialogue on mitigation of underwater radiated noise from shipping.[84] UNGA has encouraged States, acting through the IMO or individually, to participate in and share knowledge during the EBP for the *Revised URN Guidelines* and implement the recommended solutions to address adequately the barriers that have prevented the uptake and implementation of the 2014 *URN Guidelines* by the industry.[85]

2.2.2 Major outcomes of the CBD

Anthropogenic underwater noise is considered a form of pollution by the Parties to the CBD. In a submission to IMO MEPC,[86] the CBD Secretariat highlighted the goals and targets of the Global Biodiversity Framework[87] and its linked decisions adopted by the CBD COP in December 2022. Of particular relevance to international shipping are Goals A to D (to be achieved by 2050) and Targets 1, 3, 4, 6, 7, 8, 14, 15, 16 and 18 (to be achieved by 2030). With respect to Target 7, which aims to reduce pollution risks and

the negative impact of pollution from all sources to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, underwater noise is considered as one of the pollution risks and in relation to reducing the negative impact of pollution from activities associated with shipping. With respect to Target 4, which aims to halt extinction of known threatened species, protect genetic diversity and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence, the CBD Secretariat indicated as of potential relevance for international shipping the minimization of human-wildlife conflict by reducing the risk and impacts of ship strikes on marine species.

Apart from the Global Biodiversity Framework, the CBD has also adopted voluntary guidelines on biodiversity-inclusive impact assessment,[88] draft guidance on biodiversity-inclusive strategic environmental assessment[89] (SEA) and voluntary guidelines for the consideration of biodiversity in EIAs and SEAs annotated specifically for biodiversity in marine and coastal areas, including in areas beyond national jurisdiction[90] (see section 2.3.3.2). It has also adopted several decisions relating to anthropogenic underwater noise, most notably decision XII/23. In that decision, the CBD COP addressed underwater noise generally without focusing on a particular source and recommended specific measures which are presented in section 2.3.3.2. Furthermore, the CBD Secretariat has published the "Review of the impacts of anthropogenic underwater noise on marine biodiversity and approaches to manage and mitigate them" (CBD Technical Series No. 99), which advances the understanding of the potential impacts and guides CBD Parties and other stakeholders to take appropriate measures to mitigate the potential significant adverse effects of anthropogenic underwater noise.[91] The CBD COP has repeatedly encouraged Parties and other Governments, as well as Indigenous and local communities and other relevant stakeholders, to take appropriate measures, as appropriate and within their competencies, and in accordance with national and international laws, to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity.[92]

2.2.3 Major outcomes of the CMS

The CMS COP has consistently recognized that anthropogenic marine noise, depending on source and intensity, is a form of pollution, composed of energy, that may degrade the habitat and have adverse effects on marine life ranging from disturbance of communication or group cohesion to injury and mortality.[93] It has also recalled the obligations of Parties to UNCLOS to protect and preserve the marine environment and to cooperate on a global and regional basis concerning marine mammals, paying special attention to highly migratory species, including cetaceans listed in annex I to UNCLOS.[94]

The CMS COP has adopted several resolutions on anthropogenic underwater noise. The CMS Secretariat highlighted resolution 12.14 and the annexed CMS Family Guidelines in its response to the questionnaire. The Family Guidelines also cover underwater radiated noise from shipping as described in section 2.3.3.2.

In its resolution 12.14, the CMS COP urged Parties and invited non-Parties that exercise jurisdiction over any part of the range of marine species listed on the appendices of CMS, or over flag vessels that are engaged within or beyond national jurisdictional limits, to take special care and, where appropriate and practical, to endeavour to control the impact of anthropogenic marine noise pollution in habitats of vulnerable species and in areas where marine species that are vulnerable to the impact of anthropogenic marine noise may be concentrated. It also urged Parties and invited non-Parties to undertake relevant environmental assessments on the introduction of activities that may lead to noise-associated risks for CMS-listed marine species and their prey.[95] It also strongly urged Parties to prevent adverse effects on CMS-listed marine species and

their prey by restricting the emission of underwater noise; and where noise cannot be avoided, further urged Parties to develop an appropriate regulatory framework or implement relevant measures to ensure a reduction or mitigation of anthropogenic marine noise.[96] The COP furthermore urged Parties to contribute to the work of IMO MEPC on noise from commercial shipping.[97]

In its resolution 14.9, the CMS COP urged Parties to inter alia, promote the application of vessel speed reductions within IMO as an operational measure within important habitats, such as MPAs and Important Marine Mammal Areas (IMMAs).[98]

In its decision 14.44, the CMS COP requested Parties to make use of the publication on "Best Available Techniques (BAT) and Best Environmental Practice (BEP) for Three Noise Sources: Shipping, Seismic Airgun Surveys, and Pile Driving"[99] (CMS Technical Series No. 46).[100] The publication provides an up-to-date overview of the currently available BAT and BEP for mitigating noise from some shipping, among other sources (see sections 2.3.2.3 and 2.3.3.2 (c) below).

2.2.4 Major outcomes of the IWC

The IWC agreed on a consensus resolution on anthropogenic underwater noise at its 2018 annual meeting. Resolution 2018-4 recalls that UNCLOS sets out the obligation on States to protect and preserve the marine environment and, to assess the potential effects of activities that may cause substantial pollution or significant and harmful changes to the marine environment, including marine mammals.[101] Recalling Target 14.1 of the 2030 Agenda, the IWC agreed that considering anthropogenic underwater noise will contribute towards achieving Goal 14.[102] Other relevant recommendations in resolution 2018-4 are presented in section 2.3.3.2.

In 2020, a workshop held as a pre-meeting to the IWC Scientific Committee evaluated and reviewed the 2010 target which the IWC had set for reducing shipping noise, namely "to reduce the contributions of shipping to ambient noise energy in the 10-300Hz band by 3dB in 10 years and by 10 dB in 30 years relative to current levels".[103] There was broad agreement at the workshop that there is a need for a clear target on lowering ship noise to facilitate regulation, and that the target should not be too complex.[104] It was also recognized that there is a need to make progress on developing practical indicators and targets.[105] At its meeting following the workshop, the Scientific Committee, inter alia, encouraged the development of databases of ship source levels.[106]

At its meeting in 2024, the IWC Scientific Committee recommended, inter alia, to continue collaborations with international bodies that have work programmes to reduce underwater noise, including the IMO Action Plan to further prevent and reduce URN from ships.[107]

IWC is a Strategic Partner in the GloNoise Partnership project and has indicated that it could contribute to the analysis of existing underwater noise risk assessment methodologies identified by the IMO Secretariat.[108, 109]

75 UN *Second World Ocean Assessment: World Ocean Assessment II*, vol. II (n 10) p 308.
76 ibid.
77 ibid.
78 The Conference was held from 5 to 9 June 2017 at United Nations Headquarters in New York. UNGA Res 71/312 (6 July 2017) UN Doc A/RES/71/312.
79 ibid para 13.
80 The Conference was held from 27 June to 1 July 2022. UNGA Res 76/296 (21 July 2022) UN Doc A/RES/76/296, para 13(d).
81 See, for example UNGA Res 79/144 (n 44) and UNGA Res 79/145 (n 33).
82 UNGA Res 79/144 (n 44) para 281.
83 ibid para 283.
84 ibid para 284.
85 ibid para 285.
86 IMO Doc MEPC 82/INF.35 (2024).
87 CBD COP decision 15/4 "Kunming-Montreal Global Biodiversity Framework" (December 2022) CBD Doc CBD/COP/DEC/15/4.
88 CBD COP decision VIII/28 "Impact assessment: Voluntary guidelines on biodiversity-inclusive impact assessment" (March 2006) annex.
89 CBD "Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment. Note by the Executive Secretary" UNEP Doc UNEP/CBD/ COP/8/27/Add.2 (2006) annex II.
90 CBD "Voluntary guidelines for the consideration of biodiversity in environmental impact assessments and strategic environmental assessments in marine and coastal areas" CBD COP decision XI/18 (December 2012), Part B, UNEP Doc UNEP/CBD/COP/DEC/XI/18 and CBD "Marine and coastal biodiversity: Revised voluntary guidelines for the consideration of biodiversity in environmental impact assessments and strategic environmental assessments in marine and coastal areas. Note by the Executive Secretary" UNEP Doc UNEP/CBD/COP/11/23 (2012), annex.
91 Simon Harding and Neil Cousins "Review of the Impacts of Anthropogenic Underwater Noise on Marine Biodiversity and Approaches to Manage and Mitigate them" CBD Technical Series No. 99 (Secretariat of the CBD, Montreal 2022)145 available at https://www.cbd.int/doc/publications/cbd-ts-99-en.pdf; accessed 14 November 2024.
92 CBD COP decision XII/23 "Marine and coastal biodiversity: Impacts on marine and coastal biodiversity of anthropogenic underwater noise and ocean acidification, priority actions to achieve Aichi Biodiversity Target 10 for coral reefs and closely associated ecosystems, and marine spatial planning and training initiatives" (October 2014), para 3; and CBD COP decision 15/24 "Conservation and sustainable use of marine and coastal biodiversity" (December 2022) CBD Doc CBD/COP/DEC/15/24 para 14.
93 CMS COP Res 9.19 "Adverse Anthropogenic Marine/Ocean Noise Impacts on Cetaceans and Other Biota" (December 2008) UNEP Doc UNEP/CMS/resolution 9.19; and CMS COP Res 12.14 (n 55).
94 CMS COP Res 12.14 (n 55).
95 ibid para 3.
96 ibid para 4.
97 ibid para 24.
98 CMS COP Res 14.9 "Conservation Priorities for Cetaceans" (February 2024) UNEP Doc UNEP/CMS/resolution 14.9 para 4 (f).
99 Lindy Weilgart, "Best Available Technology (BAT) and Best Environmental Practice (BEP) for Mitigating Three Noise Sources: Shipping, Seismic Airgun Surveys, and Pile Driving" (2023) CMS Technical Series No. 46.
100 CMS COP decision 14.44 "Marine Noise" (February 2024) UNEP Doc UNEP/CMS/COP14/Decisions <https://www.cms.int/sites/default/files/document/cms_cop14_decisions_e.pdf> last accessed 12 October 2024.
101 IWC Res 2018-4 (September 2018) available at <https://archive.iwc.int/?r=7607> last accessed 12 September 2024.
102 ibid para 1.
103 IWC "Report of the Scientific Committee" (2009) 11 *Journal of Cetacean Research and Management* (SUPPL.) 47.
104 IWC "Report of the Workshop on Advancing Efforts to Address Underwater Noise from Shipping" (virtual meeting 11 May 2020) IWC Doc SC/68B/REP/06.
105 ibid.
106 IWC "Report of the Scientific Committee" (virtual meeting 11–26 May 2020), (2021) 22 Journal of Cetacean Research and Management (SUPPL) 78.
107 IWC, "Report of the Scientific Committee (SC69B)" (22 April – 3 May 2024) para 14.5, available at <https://archive.iwc.int/pages/search.php?search=%21collection73&k=#> last accessed 16 September 2024.
108 IMO Doc MEPC 82/INF.9 (n 4).
109 IMO "Support statement for the Revised guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life. Submitted by the International Whaling Commission" IMO Doc MEPC 82/9/3 (2024).

2.3 SHIP-BASED MEASURES AND APPROACHES TO REDUCE UNDERWATER RADIATED NOISE (URN)

This section presents ship-based measures and approaches to the reduction of underwater radiated noise from shipping. Section 2.3.1 introduces the global legal instruments which provide ship-based reduction measures and approaches. Potential gaps and other identified challenges in relation to such measures and approaches, as well as possible recommendations as to how they could be addressed are presented in section 2.3.2. They are also summarized and included in a table in section 5 on policy options for the IMO regulatory framework.

2.3.1 Legal instruments providing ship-based reduction measures

This section is focused on global legal instruments, binding and non-binding, which provide ship-based reduction approaches to reduce underwater radiated noise from shipping. Apart from the framework provisions in UNCLOS, as described in section 2.2.1 above, most of the global legal instruments focused on ship-based reduction have been developed under the auspices of IMO. However, as indicated in sections 2.2, the policy outcomes of UNGA, the CMS COP and the IWC also specifically mention underwater radiated noise from shipping. Also relevant are the CMS Family Guidelines and CMS Technical Series No. 46 which presents BAT and Best Environmental Practices (BEP).

The *Revised URN Guidelines,* referred to in section 1.3 above, despite being non-mandatory, is the only global instrument that directly addresses URN from shipping and provides comprehensive guidance on URN reduction approaches.

The *Revised URN Guidelines* indicate that a successful strategy to reduce URN should be a process that includes, to the extent possible, the design stage, the baselining of URN measurements (predicted or actual), the development of URN targets and the implementation, monitoring and assessment of technical and operational measures to achieve those targets.

The interactions between the implementation of URN reduction measures and other objectives, such as, but not limited to, energy efficiency, biofouling reduction and ship safety, and the resulting contributions should, according to the *Revised URN Guidelines*, be carefully considered (paragraph 1.4[110]).

The *Revised URN Guidelines* can be applied to any ship (paragraph 2.1). However, they do not address the introduction of noise from naval and warships and the deliberate introduction of noise for other purposes, such as sonar or seismic activities (paragraph 2.2).

According to the *Revised URN Guidelines*, the primary sources of URN generated by ships are associated with propellers, hull form, onboard machinery, wake flow, as well as operational and maintenance aspects. It is further indicated that the optimal URN reduction strategy for any ship should, at least, consider all relevant noise sources and reduction strategies, including any that are not covered in the *Revised URN Guidelines,* which may be more appropriate for specific applications (paragraph 6.1).

110 Paragraph numbers refer to those in MEPC.1/Circ.906/Rev.1.

Relevant provisions in the *Revised URN Guidelines* and those under other IMO instruments which provide URN reduction approaches, are highlighted below under the following subheadings: (a) establishment of baselines and targets (section 2.3.1.1); (b) design and technical noise reduction approaches (section 2.3.1.2); (c) maintenance approaches (section 2.3.1.3); (d) operational approaches (section 2.3.1.4); and (e) monitoring and evaluation (section 2.3.1.5).

2.3.1.1 Establishment of baselines and targets

The *Revised URN Guidelines* recommend Management Planning, which may include: (1) the establishment of a baseline (predicted or actual) for a ship's URN; (2) setting URN targets which should be specific and, where possible quantitative; and (3) evaluating, alone and in combination, various technological, operational and maintenance approaches to reduce URN (paragraph 5.3).

It is further recommended, in relation to (1), that baselining the predicted and/or measured URN ship condition should be conducted under the ship's normal operating conditions, including typical speed. Furthermore, URN should be measured to an objective standard. International URN measurement standards, recommendations and classification society rules are referenced in appendix 1 of the *Revised URN Guidelines.* Also referenced are examples of computational models for optimizing ship design and technical noise reduction approaches (appendix 2).

No specified noise reduction target is required (appendix 3). Instead, individual ship-based noise targets can be established. When setting such URN reduction targets, the *Revised URN Guidelines* recommend consideration of the following: the ship's purpose, type, URN prediction and baseline measurement, as well as operational considerations. URN reduction targets can also be established by adopting one of the classification societies' sets of URN-related rules. Alternatively, shipowners can establish URN reduction targets by, inter alia, reducing noise levels by a certain percentage.

Noise has also been discussed in the context of the work of the London Convention, which has 87 Contracting States, and its 1996 Protocol, which has 55 Contracting States as of 14 October 2024.[111] The Contracting Parties to those treaties have noted that dredging activities, being the main source of wastes dumped at sea under these treaties, are also a source of anthropogenic noise.[112] In 2013, the Scientific Group to the London Convention and the Scientific Group to the London Protocol noted that most studies suggested that it would be premature to prescribe any action in relation to dredging activities at this stage, and that it would be beneficial to ascertain the full extent and impact of noise emanating from such activities before action could be considered.[113] Since then, delegations have submitted information to the annual joint sessions of the Scientific Groups, with a view to building a better understanding of the issue.[114] In 2014, the Scientific Groups considered technical guidance on underwater sound in relation to dredging developed by the World Organization of Dredging Associations (WODA).[115] The Groups noted that the guidance provided decision-makers, stakeholders and scientists with advice on how to manage impacts of underwater sound primarily from dredging.[116]

2.3.1.2 Design and technical noise reduction approaches

The *Revised URN Guidelines* indicate that the greatest opportunities for reduction of URN will be during the initial design and build stages of the ship. For existing ships, it is unlikely to be practical to match the URN performance achievable by new designs, with the exception of possible modification of propellers in some cases (paragraph 6.2).

(a) Ship hull and propeller design and modification

The *Revised URN Guidelines* provide recommendations with respect to:

- design of the form of the ship's hull (paragraph 6.3);
- reduction of hull URN (paragraph 6.4);
- design of propellers (paragraphs 6.5-6.6);
- available technologies to reduce propulsion power (paragraph 6.7); and
- improvement of wake flow (paragraphs 6.8-6.9).

(b) Machinery design and modification

The *Revised URN Guidelines* also recommend that consideration should be given to the selection of propulsion and onboard machinery along with appropriate structure-borne control measures, proper location of equipment in the hull and optimization of foundation structures that may contribute to reducing underwater radiated and onboard noise affecting passengers and crew (paragraph 6.10). The Guidelines further recommend the use of vibration control measures (paragraphs 6.12-6.13) and alternative power and propulsion systems (paragraph 6.14).

Other IMO instruments that regulate noise levels on board ships which could potentially also contribute to the reduction of underwater radiated noise from shipping are SOLAS, which has 168 Contracting States,[117] and its Code on Noise Levels on Board Ships, its 1994 International Code of Safety for High-Speed Craft (1994 HSC Code), as amended, and its 2000 International Code of Safety for High-Speed Craft (2000 HSC Code), as amended.

The Code on Noise Levels on Board Ships[118] (the Code) was adopted in 2012 together with amendments to SOLAS, regulation II-1/3-12.[119] The latter require ships to be constructed to reduce machinery noise in machinery spaces to acceptable levels as determined by the Administration. If the noise cannot be sufficiently reduced the source of excessive noise must be suitably insulated or isolated or, alternatively, refuge from noise to be desirably provided if the space is required to be continuously manned (paragraph 6.2).

111 For the status of the amendments to the London Convention and its Protocol, see <https://www.imo.org/en/About/Conventions/Pages/StatusofConventions.aspx> last accessed 4 October 2024.

112 IMO "Submission on IMO's work to the 2018 nineteenth meeting of the UN Open-ended Informal Consultative Process on Ocean and the Law of the Sea, on'Anthropogenic underwater noise', available at <https://www.un.org/depts/los/consultative_process/contributions_19cp/IMO.pdf> last accessed 11 September 2024.

113 IMO "Report of the thirty-sixth meeting of the Scientific Group of the London Convention and the seventh meeting of the Scientific Group of the London Protocol" (27 May – 31 May 2013) IMO Doc LC/SG 36/16, para 8.40.

114 See note 112.

115 World Organization of Dredging Associations (WODA), 'Technical Guidance on: Underwater Sound in Relation to Dredging' (WODA, June 2013), available at <http://www.dredging.org/media/ceda/org/documents/resources/cedaonline/2013-06-woda-technicalguidance-underwatersound_lr.pdf> last accessed 9 September 2024.

116 IMO "Report of the thirty-seventh meeting of the Scientific Group of the London Convention and the seventh meeting of the Scientific Group of the London Protocol" (26 May – 30 May 2014) IMO Doc LC/SG 37/16, para 8.38.

117 See note 53.

118 IMO Res MSC.337(91) on "Adoption of the Code on noise levels on board ships" (30 November 2012) IMO Doc MSC 91/22/Add.1 annex 1.

119 IMO Res MSC.338 (91) on "Adoption of Amendments to the International Convention for the Safety of Life at Sea, 1974, as amended" (30 November 2012) IMO Doc MSC 91/22/Add.1 annex 2.

The Code provides an international standard to: (1) prevent the occurrence of potentially hazardous noise levels on board ships; and (2) promote an acceptable environment for seafarers. It applies to ships in port or at sea with seafarers on board (paragraph 1.3.5). Although the Code is legally treated as a mandatory instrument under SOLAS, certain provisions of the Code remain recommendatory or informative. The Code standards were developed to address passenger and cargo ships and are mandatory for new ships of a gross tonnage of 1,600 and above (paragraph 1.3.1). The specific provisions relating to potentially hazardous noise levels, reduction and personal protective gear contained in the Code may be applied to existing ships of a gross tonnage of 1,600 and above and to new ships of a gross tonnage of less than 1,600, as far as is reasonable and practical, to the satisfaction of the Administration (paragraphs 1.3.2 and 1.3.3). Since some sizes and certain service types of ships have been exempted from the requirements, including: dynamically supported craft; high-speed craft; fishing vessels; mobile offshore drilling units; pleasure yachts not engaged in trade; ships of war and troopships; ships not propelled by mechanical means; pile driving vessels; and dredgers, the Code recognizes that full application of the Code to ships that differ appreciably from conventional ships will require special considerations (Preamble, paragraphs 3 and 1.3.4).

The Code defines sound as "energy that is transmitted by pressure waves in air or other materials and is the objective cause of the sensation of hearing" (paragraph 1.4.32). It regulates measurements of noise levels (chapter 3); prescribes the maximum acceptable sound pressure levels for all spaces to which seafarers normally have access (chapter 4); recommends noise exposure limits (chapter 5); and requires acoustic insulation between accommodation spaces (chapter 6). The Code includes a format for noise survey reports which is mandatory (appendix 1); and guidance on the inclusion of noise issues in safety management systems (appendix 2); suggested methods of attenuating noise (appendix 3); and a simplified procedure for determining noise exposure (appendix 4) which are recommendatory.

Regulations to reduce noise on board high-speed craft can also support the reduction of underwater radiated noise. The 1994 HSC Code, as amended, is applicable to high-speed craft constructed before 1 July 2002, and the 2000 HSC Code, as amended, is applicable to all high-speed craft built on or after that date. Both Codes are mandatory under SOLAS chapter X following amendments to chapter X in 2000 which entered into force on 1 July 2002.[120] Special limits for noise levels on high-speed craft are laid down in both HSC Codes. They stipulate that the noise level in public spaces and crew accommodation shall be kept as low as possible to enable the public address system to be heard and shall not in general exceed 75 dB(A) (paragraph 4.10).

(c) Energy efficiency and URN reduction

The work of IMO on addressing climate change through improving ships' energy efficiency and reduction of GHG emissions from ships may also have co-benefits in mitigating underwater radiated noise.

120 The 1994 HSC Code was adopted by IMO Res MSC.36(63) (20 May 1994) and made mandatory by Res 1 of the 1994 SOLAS Conference (24 May 1994). The 2000 HSC Code was adopted by IMO Res MSC.97(73) (5 December 2000) and made mandatory under SOLAS by IMO Res MSC.99(73) (5 December 2000). Both Codes have been amended.

The *Revised URN Guidelines* recommend that many of the energy efficiency improvement options to meet energy efficiency regulations (Energy Efficiency Design Index – EEDI, Energy Efficiency Existing Ship Index – EEXI and Carbon Intensity Indicator – CII) may result in an improvement in URN performance and could provide positive synergies between URN and climate policies. Careful consideration should be given to the interrelationships between energy efficiency, GHG emissions and URN reduction while adhering to regulatory obligations and ensuring that the level of URN will meet set targets as established in the URN Management Plan. The *Revised URN Guidelines* point out that URN measures should not come at the expense of IMO requirements on GHG reduction and energy efficiency or other IMO requirements affecting the ship safety as for example manoeuvrability (paragraph 7.1). At the same time, designers, builders, shipowners and operators should investigate and consider the risk of increasing URN with ship design to achieve lower EEDI, EEXI and/or CII (paragraph 7.2). The *Revised URN Guidelines* also indicate that the reduction of propeller cavitation will increase energy efficiency, reduce emissions (paragraph 7.3) and reduce URN (paragraph 7.4).

The Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto[121] (MARPOL PROT 1997),[122] which has 107 Contracting States, requires that new ships be built and designed to be more energy efficient based on the EEDI – applicable to new ships and the requirements under the Ship Energy Efficiency Management Plan – applicable to all ships).[123] The implementation of such obligations provides valuable opportunities to address the specific ship design and machinery requirements to reduce URN.

Since 1 January 2023, all ships are required to calculate their EEXI to improve their energy efficiency and to establish their annual operational CII and CII rating. A mandatory A–E rating system to incentivize shipowners to improve the carbon efficiency of their ships has been introduced. A ship rated D for three consecutive years, or E, is required to submit a corrective action plan to show how the required index (C or above) would be achieved. IMO will review the effectiveness of the implementation of the CII and EEXI requirements, by 1 January 2026 at the latest, and, if necessary, develop and adopt further amendments.

The goal is to reduce the carbon intensity of international shipping, working towards the levels of ambition set out in the 2023 IMO Strategy on Reduction of GHG Emissions from Ships.[124] That Strategy aims to reduce carbon intensity by 40% by 2030, compared to 2008 as an average across international shipping. It also aims to reach net-zero GHG emissions by or around, i.e. close to, 2050.

121 International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL). For a list of amendments to MARPOL and its annexes, see <https://www.imo.org/en/About/Conventions/Pages/StatusOfConventions.aspx> last accessed 9 September 2024.

122 The 1997 Protocol to MARPOL which amended MARPOL by adding Annex VI to the Convention was adopted in September 1997 and entered into force on 19 May 2005. IMO Doc MP/CONF.3/34 (1997) annex. A revised Annex VI was adopted 10 October 2008 and entered into force on 1 July 2010. Annex VI has been revised several times. For a list of all amendments to Annex VI, see <https://www.imo.org/en/About/Conventions/Pages/StatusOfConventions.aspx> last accessed 9 September 2024.

123 IMO Res MEPC.203(62) (15 July 2011) IMO Doc MEPC 62/64/Add.1, annex 19. Amendments to MARPOL Annex VI entered into force on 1 January 2013.

124 IMO Res MEPC.377(80) (7 July 2023) IMO Doc MEPC 80/17/Add.1 annex 15.

2.3.1.3 Maintenance approaches

The *Revised URN Guidelines* also recommend regular maintenance of propellers and hull cleaning as effective measures for mitigating URN and emissions in new and existing ships (paragraphs 6.15 and 7.4). Maintaining the surface quality/finish of propellers, such as when polishing ship propellers properly to remove marine fouling, and maintaining a smooth underwater hull surface by utilizing proper coatings, cleanings and proactive in-water hull maintenance are recommended (paragraphs 6.16 and 6.17). While acknowledging the importance of adequately maintained anti-fouling systems (AFS), the *Revised URN Guidelines* caution that ultrasonic anti-fouling systems, by emission of high-frequency sound energy in frequency ranges and at amplitudes that can be harmful to aquatic species, should be avoided where possible in national and international designated protected areas (paragraph 6.17). The *Revised URN Guidelines* also recommend proper maintenance of the moving parts and machinery, as well as vibration isolation mounts (paragraph 6.18).

The World Dredging Association has also underscored that well-maintained dredgers are much less likely to be "loud" dredgers.[125]

Other IMO instruments that could support some of the maintenance approaches in the Guidelines and thereby support the reduction of URN from shipping are the International Convention on the Control of Harmful Anti-fouling Systems on Ships[126] (AFS Convention), which has 99 Contracting States, and the 2023 IMO *Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species*[127] *(Biofouling Guidelines).*

The use of permitted AFS under the AFS Convention can reduce marine biofouling on propellers and help maintain a smooth hull surface, thereby supporting the reduction of URN from ships. AFS are defined as "a coating, paint, surface treatment, surface or device that is used on a ship to control or prevent attachment of unwanted organisms" (article 2(2)). Parties to the AFS Convention are required to prohibit and/or restrict the use of harmful AFS on ships flying their flag, as well as ships not entitled to fly their flag, but which operate under their authority and all ships that enter a port, shipyard or offshore terminal of a Party (articles 3 and 4). AFS that are prohibited or controlled are listed in annex 1 to the Convention, which can be updated as and when necessary (article 6). Currently, the AFS Convention prohibits the use of organotin compounds which act as biocides and cybutryne, a herbicide, in AFS.

The controls on such organotin compounds and cybutryne apply to all ships over 400 gross tonnage engaged in international voyages. They also apply to fixed and floating platforms, floating storage units, and floating production storage and off-loading units if they used organotin compounds after 1 January 2003 (annex 1), and cybutryne after 1 January 2023.[128] Ships have to carry a certificate (if 400 gross tonnage and above engaged in international voyages) or a declaration (if more than 24 metres in length but less than 400 gross tonnage engaged in international voyages) and a log to demonstrate that the ship complies with the Convention (AFS, annex 4, regulations).

125 World Organization of Dredging Associations (WODA) (n 115) p 8.
126 The International Convention on the Control of Harmful Anti-fouling Systems on Ships (adopted on 5 October 2001, entered into force on 17 September 2008). IMO Doc AFS/CONF/26 (2001). The Convention was amended in 2021 by IMO Res MEPC.331(76) (17 June 2021) in IMO Doc MEPC 76/15/Add.2 annex 4.
127 IMO Res MEPC.378(80) (7 July 2023) IMO Doc MEPC 80/17Add.1 annex 17.
128 IMO Res MEPC.331(76) (n 126) annex.

The *Biofouling Guidelines,* a non-mandatory instrument can, if effectively applied, result in the removal of marine fouling from propellers and the maintenance of a smooth underwater hull surface and smooth anti-fouling paints permitted by the AFS Convention, thereby mitigating URN from ships.

The *Biofouling Guidelines* indicate that initial ship design and construction offers the most comprehensive, effective and long-lasting means to minimize ship biofouling risks (paragraph 5.1). The Guidelines recommend that a ship should implement biofouling management practices, including the use of AFS (paragraphs 1.6 and 6.1). Although the Guidelines focus on ships using AFS, the management practices are equally recommended for ships using coatings or surfaces that are not used to control or prevent attachment of organisms, as may be applicable (paragraph 1.6).

The *Biofouling Guidelines* also provide guidance regarding AFS installation and maintenance (paragraph 6). They recommend that performance monitoring of the AFS is included in the ship-specific Biofouling Management Plan (BFMP) and that the BFMP also include a ship-specific contingency action plan based on specific triggers from monitoring of biofouling parameters (paragraph 7). Inspections are also recommended (paragraph 8 and appendix 1), and the Guidelines contain a rating scale to assess the extent of fouling in inspection areas (paragraph 8.10). The Guidelines also include recommendations regarding cleaning and maintenance (paragraph 9 and appendix 2): the BFMP (paragraph 10 and appendix 3), the Biofouling Record Book (paragraph 11 and appendix 4), documentation and dissemination of information (paragraph 12), training and education (paragraph 13) and other measures (paragraph 14).

A separate guidance document, based on the *Biofouling Guidelines,* titled *Guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft,*[129] provides advice relevant to owners and/or operators of recreational craft less than 24 metres in length.

2.3.1.4 Operational approaches

The *Revised URN Guidelines* indicate that operational approaches could be particularly important for ships that lack design features or technologies to reduce noise, or for all ships that operate in national and international designated protected areas where additional measures need to be taken to decrease the adverse impacts of shipping noise on marine wildlife (paragraph 6.15).

Operational approaches recommended are:

- optimizing the ship's trim and draught to reduce the required power and therefore propeller cavitation noise (paragraph 6.19); and
- adjustment and optimization of ships' routeing, speed and sail time to reduce time at anchor and the URN in port and coastal areas (paragraph 6.20).

The *Revised URN Guidelines* also recommend: 1) voyage planning which can facilitate the use of alternate routes to avoid protected areas; and 2) slowdown, when it can be safely done, in national and international designated protected areas and during critical times of the year to decrease impacts of URN on marine life and communities which depend on them (paragraph 6.20). Best practices include

129 The Guidance was approved by the MEPC in 2012 and circulated as IMO Doc MEPC.1/Circ.792 (2012).

reviewing information on national and international designated protected areas to determine whether ships transit through or have operations in such areas. These may include but are not limited to sea-ice covered regions, including Inuit Nunaat, busy ports and shipping lanes overlapping with important or critical habitat for endangered, threatened, or protected species, IMMAs, MPAs as characterized by the CBD and other national/regional area-based protection (paragraph 6.21). The Revised URN Guidelines highlight that in Inuit Nunaat, a number of characteristics of the region and the activities within them could increase the impacts from URN. This includes potential for icebreaking activities, presence of noise-sensitive species, and potential interference with Indigenous hunting rights. Additionally, the Revised URN Guidelines state that additional efforts to decrease impacts on marine wildlife are advisable for ships that operate in these areas, including particular attention to reducing the noise impact from icebreaking and implementation of operational approaches and monitoring (paragraph 6.22).

In general, for ships equipped with fixed pitch propellers, the *Revised URN Guidelines* recommend reducing ship speed, shaft revolutions per minute and/or engine output as very effective operational measures for reducing underwater radiated noise, mainly due to their reduced cavitation. This is especially the case when speeds are slower than the cavitation inception speed, but even small reductions in power can greatly reduce cavitation (paragraph 6.23).

The *Revised URN Guidelines* recommend measuring and understanding the ship's Cavitation Inception Speed (CIS) and then operating below CIS in national and international designated protected areas when practicable (paragraph 6.24).

However, the *Revised URN Guidelines* also recognize that there may be other overriding reasons for a particular speed to be maintained, such as safety, operation and energy efficiency. They recommend that consideration be given, in general, to any critical speeds of an individual ship with respect to cavitation and resulting increases in URN (paragraph 6.25).

As noted above, the *Revised URN Guidelines* had highlighted that the characteristics of Inuit Nunaat and the activities in the region could increase the impacts from URN. In that regard, it can be noted that *Guidelines for underwater radiated noise reduction in Inuit Nunaat and the Arctic* were developed by the Inuit Circumpolar Council and disseminated by IMO following consideration by MEPC in July 2023.[130] They are intended to provide additional information and guidance to operators transiting Inuit Nunaat and the Arctic and also enable engagement of Inuit and other Indigenous communities and the incorporation of Indigenous knowledge in the review of the *Revised URN Guidelines.* They recommend that mariners use the extensive knowledge of Inuit and Indigenous Peoples about URN impacts on marine wildlife and its impacts in sensitive areas in voyage planning and operations to minimize impacts to sensitive marine species and local communities (paragraph 9). They point out that operational approaches could be particularly important for ships to reduce shipping noise in Inuit Nunaat and the Arctic (e.g. icebreakers) and for all ships that operate in national and international designated protected areas, Indigenous Conserved and Protected Areas, areas with concentrations of wildlife that are noise-sensitive and areas of importance to Inuit communities where additional measures need to be taken to decrease the adverse impacts of shipping noise on marine wildlife. They indicate that ship speed reduction has been proven to significantly decrease a ship's URN emissions and recommend that it be adopted more broadly in Inuit Nunaat and Arctic waters, where it is safe to do so (paragraph 10).

130 IMO Doc MEPC.1/Circ.907 (3 October 2023).

Other IMO instruments that could contribute to the reduction of URN from shipping through operational approaches are: SOLAS, chapter V, the General Provisions on Ships' Routeing[131] and the *Guidelines and Criteria for Ship Reporting Systems;*[132] the Convention on the International Regulations for Preventing Collisions at Sea, 1972[133] (COLREG 1972), which has 164 Contracting States as of 14 October 2024; the Guidance document for minimizing the risk of ship strikes with cetaceans;[134] the International Code for Ships Operating in Polar Waters (Polar Code);[135] and the IMO *Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas*[136] *(PSSA Guidelines).*

(a) Ships' routeing and ship reporting systems under IMO instruments

Ships' routeing systems can contribute effectively to the reduction of URN from shipping if used to divert traffic away from key feeding, breeding and nursery habitats or areas with high density of marine species or migratory pathways, and/or to recommend ship speed reductions when crossing those areas. Ship reporting systems can also support those objectives as they can result in ship speed reductions to mitigate the risks of collisions, or ship strikes against cetaceans, for example.

The legal basis for the adoption of ships' routeing and ship reporting systems is SOLAS regulations V/10 and 11, the General Provisions on Ships' Routeing and the Guidelines and Criteria for Ship Reporting Systems. Chapter V of SOLAS applies to all ships on all voyages. But it does not apply to "warships, naval auxiliaries and other ships owned or operated by a Contracting Government and used only on government non-commercial service" among other ships. However, these ships are encouraged to act in a consistent manner, so far as is reasonable and practicable, with Chapter V (regulation 1).

SOLAS regulation V/10 enables the establishment of ships' routeing systems which, inter alia, contribute to the protection of the marine environment. Ships' routeing systems are recommended for use by, and may be made mandatory for, all ships, certain categories of ships or ships carrying certain cargoes, when adopted and implemented in accordance with the guidelines and criteria developed by IMO, i.e. the General Provisions on Ships' Routeing.[137] Ships' routeing systems should be submitted to IMO for adoption. However, a Government or Governments implementing ships' routeing systems not intended to be submitted to IMO for adoption or which have not been adopted by the Organization are encouraged to take into account, wherever possible, the guidelines and criteria developed by IMO. All adopted ships' routeing systems and actions taken to enforce compliance with those systems are required to be consistent with international law, including the relevant provisions of UNCLOS. SOLAS regulation V/10 takes into account the rights and obligations of coastal States under UNCLOS, including its requirement that in the designation of sea lanes and the prescription of TSS, the coastal State is required to take into account the recommendations of the competent international organization, which is understood to be IMO.

131 IMO Assembly Res A.572(14) (20 November 1985) as amended.
132 IMO Res MSC.433(98) (16 June 2017).
133 Convention on the International Regulations for Preventing Collisions at Sea, 1972 (adopted on 20 October 1972, entered into force on 15 July 1977). For a list of amendments see <https://www.imo.org/en/About/Conventions/Pages/StatusOfConventions.aspx> last accessed 9 September 2024.
134 IMO "Guidance Document for Minimizing the Risk of Ship Strikes with Cetaceans". IMO Doc MEPC.1/Circ.674 (2009).
135 The Code and amendments to SOLAS were adopted on 21 November 2014 by IMO Res MSC.385(94) and MSC.386(94) respectively. IMO Doc MSC 94/21/Add.1, annexes 6 and 7. The environmental provisions and amendments to MARPOL were adopted on 15 May 2015 by IMO Res MEPC.264(68) and MEPC.265(68) respectively. IMO Doc MEPC 68/21/Add.1, annexes 10 and 11. The Code entered into force on 1 January 2017.
136 IMO Assembly Res A.982(24) (1 December 2005) as amended by IMO Res MEPC.267(68) (15 May 2015).
137 IMO study (n 71) at p 32.

The General Provisions on Ships' Routeing indicate that the purpose of ships' routeing is to improve the safety of navigation, but that routeing may also be used for the purpose of preventing or reducing the risk of pollution or other damage to the marine environment caused by ships colliding or grounding or anchoring in or near environmentally sensitive areas (paragraph 1.1). The different ships' routeing measures include the following: TSS, separation zones or lines, traffic lanes, two-way routes, recommended routes, recommended tracks, areas to be avoided,[138] no anchoring areas, inshore traffic zones, roundabouts, precautionary areas, deep-water routes and established or recommended direction of traffic flow.

SOLAS regulation V/11, provides for the establishment of ship reporting systems which, inter alia, contribute to the protection of the marine environment. The regulation establishes that ship reporting systems, when adopted and implemented in accordance with the Guidelines and Criteria developed by IMO, shall be used by all ships, or certain categories of ships or ships carrying certain cargoes in accordance with the provisions of each system so adopted. Ship reporting systems not submitted to IMO for adoption do not necessarily need to comply with regulation 11. However, Governments implementing ship reporting systems are encouraged to follow, wherever possible, the *Guidelines and Criteria for Ship Reporting Systems* developed by IMO. Contracting Governments may submit such systems to IMO for recognition. The master of a ship, subject to the requirement of reporting, must comply with the requirements of adopted ship reporting systems and report to the appropriate authority the information required in accordance with the provisions of each such system. All adopted ship reporting systems and actions taken to enforce compliance with those systems shall be consistent with international law, including the relevant provisions of UNCLOS.

COLREG, Rule 10, provides that the observance of all TSSs is mandatory and prescribes the conduct of vessels within or near TSSs adopted by IMO. For example, COLREG prescribes that every vessel shall at all times proceed at a safe speed so that it can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions (Rule 5). COLREG also sets out a non-exhaustive list of factors that shall be taken into account by all vessels, though these do not include environmental factors. COLREG applies to "all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels" (Rule 1). Within the general framework established by the provisions of UNCLOS, COLREG thus applies on the high seas, to the EEZ, the territorial sea, archipelagic waters, straits used for international navigation and archipelagic sea lanes and internal waters.

The *Guidance document for minimizing the risk of ship strikes with cetaceans*[139] enumerates among the possible actions that could be taken at the national level to reduce and minimize the risk of ship strikes with cetaceans, operational measures which may include ships' routeing and reporting measures or speed restrictions (paragraph 12.1). The Guidance document specifies that any measure must be fully consistent with international law (paragraphs 8 and 12). With regard to possible actions to be taken at the international level, the Guidance document highlights coordination with other States which may include where possible and appropriate, development of proposals for specific measures at international organizations such as IMO (paragraph 13.4).

138 An area to be avoided is defined in the General Provisions on Ships' Routeing as a routeing measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or certain classes of ships.

139 See note 134.

(b) Particularly sensitive sea areas (PSSAs)

A particularly sensitive sea area (PSSA) is an area that needs special protection through action by IMO because of its significance for recognized ecological, socioeconomic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities. The identification and designation of an area as particularly sensitive pursuant to the *IMO PSSA Guidelines* coupled with the adoption of international associated protective measures (APMs), such as ships' routeing systems, e.g. areas to be avoided, ship reporting systems and/or speed limit restrictions not confined to TSSs, can reduce exposing sensitive marine areas to noise from shipping, thereby contributing to the reduction of underwater radiated noise. Moreover, the mere designation of a PSSA raises international awareness of the area which can also be effective in protecting marine life.[140] A PSSA marked on navigational charts raises awareness among ships navigating the area to take additional care.[141]

The *PSSA Guidelines* set out the process for the identification and designation of a PSSA within and beyond the territorial sea. An application for a PSSA designation must demonstrate that it meets at least one of the following criteria: ecological, socioeconomic or scientific attributes (paragraph 4), as well as the vulnerability of the area to impacts from international shipping (paragraph 5). The application must also include a proposal for relevant APMs which are aimed at preventing, reducing or eliminating the threat or identified vulnerability (paragraph 7). The *Guidelines* include the following among the environmental hazards associated with shipping: operational discharges; accidental or intentional pollution; and physical damage to marine habitats or organisms. The Guidelines recognize that noise from ships can adversely affect the marine environment and living resources of the sea. The Guidelines state in paragraph 2.2 that: in the course of routine operations, accidents, and wilful acts of pollution, ships may release a wide variety of substances either directly into the marine environment or indirectly through the atmosphere. Such releases include oil and oily mixtures, noxious liquid substances, sewage, garbage, noxious solid substances, anti-fouling systems, harmful aquatic organisms and pathogens, and even noise.

APMs for PSSAs are limited to actions that are to be, or have been, approved and adopted by IMO and include the following options: (1) designation of an area as a Special Area under Annexes I, II or V to MARPOL[142] or a SOx emission control area under MARPOL Annex VI,[143] or application of special discharge restrictions to vessels operating in a PSSA; (2) adoption of ships' routeing and reporting systems near or in the area, under SOLAS and in accordance with the General Provisions on Ships' Routeing and the *Guidelines and Criteria for Ship Reporting Systems*; and (3) development and adoption of other measures aimed at protecting specific sea areas against environmental damage from ships, provided that they have an identified legal basis (paragraph 6).

140 Markus Kachel, ***Particularly Sensitive Sea Areas: The IMO's Role in Protecting Vulnerable Marine Areas*** (Springer, Cham, 2008).

141 James Harrison, ***Saving the Oceans Through Law: the International Legal Framework for the Protection of the Marine Environment*** (Oxford University Press, Oxford, 2017) 136, at 129.

142 Guidelines for the designation of Special Areas under MARPOL are contained in IMO Assembly Res A.927(22) (adopted 29 November 2001) annex I.

143 Criteria and procedures for the designation of SOx emission control areas are set forth in appendix 3 to MARPOL Annex VI.

The *Guidelines* recommend that if the measure is not already available under an IMO instrument, the proposal should set forth the steps that the proposing Member Government has taken or will take to have the measure approved or adopted by IMO pursuant to an identified legal basis. The application should identify the legal basis for each measure. The legal bases for such measures are: (i) any measure that is already available under an existing IMO instrument; or (ii) any measure that does not yet exist but could become available through amendment of an IMO instrument or adoption of a new IMO instrument. The legal basis for any such measure would only be available after the IMO instrument was amended or adopted, as appropriate; or (iii) any measure proposed for adoption in the territorial sea, or pursuant to article 211(6) of UNCLOS (see section 3.2.1.3 above) where existing measures or a generally applicable measure set forth in (ii) would not adequately address the particularized need of the proposed area (paragraph 7.5.3).

The *Guidelines* also recognize that in some circumstances, a proposed PSSA may include within its boundaries a buffer zone, in other words, an area contiguous to the site-specific feature (core area) for which specific protection from shipping is sought. However, the need for such a buffer zone should be justified in terms of how it would directly contribute to the adequate protection of the core area (paragraph 6.3).

The Polar Code,[144] parts of which are mandatory under both SOLAS and MARPOL, does not contain any special measures to prevent, reduce and control URN from shipping, notwithstanding the unique and vulnerable marine environment of the polar areas. Nonetheless, implementation of the requirements of the Code regarding safety of navigation and voyage planning has the potential to contribute to the reduction of URN from shipping.

The Polar Code includes mandatory measures in its Parts I-A and II-A and recommendatory provisions for both parts in Parts I-B and II-B. The mandatory provisions relating to safety measures are set out in Part I-A and include those covering safety of navigation (chapter 9) and voyage planning (chapter 11). Chapter 11 requires the master of a ship to take into account a number of factors when considering a route through polar waters including current information and measures to be taken when marine mammals are encountered relating to known areas with densities of marine mammals, including seasonal migration areas; and current information on relevant ships' routeing systems, speed recommendations and vessel traffic services relating to known areas with densities of marine mammals, including seasonal migration areas (Part I-A, chapter 11, paragraphs 3.6 and 3.7). In that regard, reference is made in the Code to the Guidance Document for Minimizing the Risk of Ship Strikes with Cetaceans (see subsection (a) above). The master must also, inter alia, consider national and international designated protected areas along the route (chapter 11, paragraph 3.8). The Code recommends that in developing and executing a voyage plan, ships should also, inter alia, consider in the event that marine mammals are encountered, any existing best practices to minimize unnecessary disturbance (Part I-B, chapter 12 of the Code).

144 **The Code and amendments to SOLAS were adopted on 21 November 2014 by IMO Res MSC.385(94) and MSC.386(94), respectively, IMO Doc MSC 94/21/Add.1, annexes 6 and 7. The environmental provisions and amendments to MARPOL were adopted on 15 May 2015 by IMO Res MEPC.264(68) and Res MEPC.265(68), respectively, IMO Doc MEPC 68/21/Add.1, annexes 10 and 11. The Code entered into force on 1 January 2017. The Code was amended by IMO Res. MSC.538(107) (8 June 2023). The amendments will enter into force on 1 January 2026.**

Mandatory pollution prevention measures are set out in Part II-A of the Code, but are not applicable to underwater radiated noise from shipping since they only address substances regulated by MARPOL Annexes I to V. In its recommendatory part, the Code provides additional guidance under other IMO environmental conventions and guidelines and refers to the International Convention for the Control and Management of Ships' Ballast Water and Sediments[145] (Ballast Water Convention), the Guidelines for Ballast Water *Exchange in the Antarctic Treaty Area,*[146] and the 2011 *Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species* and the AFS Convention (Part II-B of the Code).

(c) Voyage Planning

As indicated in the *Revised URN Guidelines*, effective voyage planning can support the reduction of URN from shipping.

SOLAS regulation V/34.2, on voyage planning, requires the master to ensure that the voyage has been planned taking into account the *IMO Guidelines for Voyage Planning.*[147] The voyage plan must identify a route which takes into account, inter alia, any relevant ships' routeing systems, and the marine environmental protection measures that apply, and avoids, as far as possible actions and activities which could cause damage to the environment.

The *IMO Guidelines for Voyage Planning identify* and analyze the required components of voyage/passage planning. Such components include appraisal, i.e. gathering all information relevant to the contemplated voyage or passage; detailed planning of the whole voyage or passage from berth to berth, including those areas necessitating the presence of a pilot; execution of the plan; and the monitoring of the progress of the vessel in the implementation of the plan.

The *Guidelines for Voyage Planning* have been supplemented by *Guidelines on Voyage Planning for Passenger Ships Operating in Remote Areas.*[148] But the latter Guidelines are focused on the safety of the passenger ships and do not refer to the need to protect the marine environment, including marine life.

(d) Onshore power supply service in ports

Measures aimed at reducing GHG emissions from ships in ports, such as the application of onshore power supply (OPS) (alternative maritime power, cold ironing, shore-side electricity, high- or low-voltage shore connection, respectively) can also support the reduction of URN from shipping.

In 2023, IMO adopted *Interim guidelines on safe operation of onshore power supply (OPS) service in port for ships engaged on international voyages*[149] with a view to promoting safe operation of OPS service in port on ships. The introduction to the Guidelines notes that with increasing requirements on marine environmental protection, the application of onboard clean energy solutions has been continuously promoted.

145 International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted on 13 February 2004, entered into force on 8 September 2017) IMO Doc BWM/CONF/36 (2004).
146 IMO Res MEPC.163(56) (adopted 13 July 2007) IMO Doc MEPC 56/23 annex 4.
147 IMO Assembly Res A.893(21) (25 November 1999) IMO Doc A 2/Res.893.
148 IMO Assembly Res A.999(15) (29 November 2007) IMO Doc A 25/Res.999.
149 IMO Doc MSC.1/Circ.1675 (2023).

"MONITORING CAPACITY DEVELOPED IN PARTNERSHIP WITH INTERESTED PORTS SHOULD BE ENCOURAGED ALONG SHIPPING LANES AND USED IN INCENTIVE PROGRAMMES TO COMPLEMENT OTHER URN MONITORING PROGRAMMES, WHERE POSSIBLE"

2.3.1.5 Evaluation and monitoring

The *Revised URN Guidelines* recommend that as part of URN Management Planning, shipowners and operators should develop a monitoring approach to evaluate periodically the effectiveness of ship noise reduction efforts in comparison with baseline measurements and URN targets and to guide and enhance activities aimed at noise reduction (appendix 3). Evaluation and ongoing monitoring of URN may be done through actual measurement of ship URN, or through the modelling of ship URN based on its characteristics and design parameters, as well as environmental conditions (paragraph 8.1). Modelling of URN needs to take into account sound propagation loss as this is influenced by several environmental parameters (e.g. sea state, sea ice, sound speed profile, seawater temperature, sound absorption, currents, bathymetry, the properties of the sea bottom). The Guidelines indicate that a variety of underwater sound propagation models exist to address the objectives of the specific application (paragraph 8.2).

It is recommended in the Revised URN Guidelines that efforts should be made to better understand status and changes in URN (paragraph 8.3). Monitoring capacity developed in partnership with interested ports should be encouraged along shipping lanes and used in incentive programmes to complement other URN monitoring programmes, where possible. Efforts should be made to support community-led efforts to understand underwater radiated noise from shipping and its impacts on marine species and coastal communities (paragraph 8.4). Member States and other stakeholders, including classification societies, designers, shipbuilders, shipowners and ship operators, suppliers and manufacturers may contribute data, where possible, to the global understanding of ship noise emissions, including through established monitoring programmes of ship source levels and/or ambient noise (paragraph 8.5). The URN data gathered, and results of applied measures may be shared by submitting information, observations, suggestions, comments and recommendations based on the practical experience gained through the application of these Guidelines to the MEPC (paragraph 8.6).

2.3.1.6 Incentivization

The *Revised URN Guidelines* encourage maritime authorities, financial and insurance institutions and others to promote establishing incentive schemes to support the implementation of URN monitoring programmes and noise reduction efforts by suppliers, designers, shipbuilders, shipowners and operators, where considered appropriate (paragraph 9.1). It is further noted that incentives can also support the collection and sharing of data about ship URN generally. Incentivization could be, for instance, based on relevant URN ship class notations, recognition of a URN Management Plan, URN reduction targets, ship and engine technologies and maintenance or ship speed reduction programmes. It could also, for example be based on Onshore Power Supply for ships at berth or other voluntary sustainability certifications which include evidence of URN reduction or complementary benefits on efficiency and maintenance (e.g. preventing biofouling by in-water cleaning of ship hull and propeller could increase efficiency and minimize the transfer of invasive species) (paragraph 9.2). Examples of incentives are discounts on the port dues, fairway fees, or extra services or products, promotion, among others (paragraph 9.3). It is recommended that suppliers, designers, builders, shipowners and operators should make themselves aware of and strive to achieve incentives related to URN reduction (paragraph 9.4).

2.3.2 Gaps and other identified challenges in the IMO Revised Guidelines for the Reduction of URN and in other relevant IMO instruments and recommendations

An analysis of the global ship-based reduction approaches mentioned in section 2.3.1 has resulted in the identification of possible gaps and challenges which could hinder the effective reduction of URN from shipping. These are presented below followed by potential recommendations as to how to address such gaps and identified challenges at the global level, especially within the framework of IMO. They are also summarized and included in a table in section 5.

Possible gaps and other identified challenges, as well as recommendations of a general nature relating to the *Revised URN Guidelines* are presented in section 2.3.2.1, while those of a more specific nature relating to either the *Revised URN Guidelines* or other relevant IMO instruments are presented in section 2.3.2.2.

2.3.2.1 General identified gaps and other challenges, as well as recommendations

Notwithstanding the recent approval of the *Revised URN Guidelines* and the ongoing three-year EBP phase, some gaps and other challenges have been identified with respect to the *Guidelines* relating to: (a) legal status; (b) guidance on the relevance of other instruments; (c) awareness raising; (d) capacity-building and transfer of technology; and (e) cooperation and coordination. Notwithstanding the lack of a reference in the *Revised URN Guidelines* to the need for awareness raising, education and training, and the need to assist developing countries, as required, with potential application challenges, these issues are now addressed in the URN Action Plan.

This section presents gaps and other identified challenges in the *Revised URN Guidelines* in relation to the aforementioned elements followed by potential recommendations (see also Table 13 in section 5). They are not intended to be exhaustive and to pre-empt any other additional gaps, challenges and recommendations thereon.

(a) Legal status

Gaps and other identified challenges: As indicated in section 2.1.1, under UNCLOS, anthropogenic underwater noise can be a form of pollution of the marine environment which must be prevented, reduced and controlled. Such interpretation is supported by several major global policy outcomes as indicated in section 2.2. Moreover, UNCLOS requires the development of international rules and standards through IMO or through a general diplomatic conference, to prevent, reduce and control pollution of the marine environment from vessels, as well as the implementation of "generally accepted international rules and standards" by flag States.

No regulation currently exists among IMO instruments that would require Member States to implement, comply with, and enforce obligations relating to the prevention, reduction and control of underwater radiated noise pollution from ships. The *Revised URN Guidelines* provide recommendations about the reduction of underwater radiated noise from shipping. This, however, is still a voluntary instrument which also does not describe URN from shipping as a form of pollution. Despite representing an important instrument for the prevention of URN from ships, it does not yet qualify as a mandatory set of "generally accepted international rules and standards" in place to prevent, reduce and control anthropogenic underwater noise pollution as required by UNCLOS. However, there are IMO instruments that can

contribute to the reduction of URN, and some are deemed to be "generally accepted", in particular SOLAS, COLREG and MARPOL.[150] But the IMO measures, legally binding and non-binding, which can contribute indirectly and in varying degrees to the reduction of URN from shipping, neither refer to, nor were developed with the reduction of underwater radiated noise in mind.

Moreover, IMO instruments categorize noise differently. While the Code on Noise Levels on Board Ships also defines sound as "energy" (similar to UNCLOS), the *PSSA Guidelines* treat noise as a substance.

Recommendations: In view of the fact that noise can be a form of pollution of the marine environment, and the inclusion in UNCLOS of an obligation to develop "international rules and standards" and to implement "generally accepted international rules and standards" to prevent, reduce and control pollution of the marine environment from vessels, Member States and international organizations of IMO, considering e.g. the results of the URN EBP, may wish to consider formally recognizing URN from shipping as a form of pollution and consider the development of mandatory international rules and standards. In doing so, consideration could also be given to other possible gaps and challenges with respect to the *Revised URN Guidelines* identified in this section, and potential recommendations relating thereto.

(b) Guidance on the relevance of other instruments

Gaps and other challenges: Possible challenges relating to the application of the *Revised URN Guidelines* include insufficient guidance as to the relevance of other instruments. While the *Revised URN Guidelines* indicate that the implementation of URN reduction measures and other objectives, such as, but not limited to, energy efficiency, biofouling reduction and ship safety, and the resulting contributions should be carefully considered, only a document citation for one IMO instrument is included in a footnote in the *Guidelines*.[151] Thus, for example the relevance of the recommendations in the 2023 *Biofouling Guidelines* for reducing URN has not been established in the *Revised URN Guidelines* nor warranted any consideration. Apart from a reference to the CBD, the *Guidelines* also do not refer to any other international instrument, including policy outcomes, which could support the reduction of URN from shipping, such as, for example the CMS Family Guidelines. Also, the *Revised URN Guidelines* do not mention international instruments that provide for the possibility to establish areas with important or critical habitat for endangered, threatened, or protected species, other than IMMAs and MPAs as characterized by the CBD. For example, they do not mention the possibility to establish ABMTs, including MPAs, under the BBNJ Agreement when it enters into force.

Recommendations: Member States and international organizations of IMO may wish to consider the introduction in the *Revised URN Guidelines* of references to other IMO instruments and international instruments potentially contributing to URN reduction from shipping, together with guidance on the relevance and applicability of those instruments (see sections 2 and 3 for a description of these instruments).

150 IMO study (n 71) at pp 15 and 58.

151 IMO document MEPC.1/Circ.850/Rev.3 (7 July 2021) on "Guidelines for determining minimum propulsion power to maintain the manoeuvrability of ships in adverse conditions".

(c) Awareness-raising

Gaps and other identified challenges: Awareness raising of the impact of URN from shipping on the marine environment and the importance of the *Revised URN Guidelines* is imperative. Information which can assist in the application of the *Revised URN Guidelines* is also required. For example, shipowners, ship builders and designers, and other stakeholders regularly ask where to find available resources and information to assist the industry in the application of the *Revised URN Guidelines*.[152]

Recommendations: Member States and international organizations of IMO may wish to consider providing additional information to encourage and facilitate the application of the *Revised URN Guidelines*. Information sharing through the Noise Assessment Toolkit could be considered by the IMO Secretariat.

In addition, Member States and international organizations of IMO may wish to consider what additional actions they could take to raise awareness and build political will, including within the framework of other IMO instruments. In view of the lack of specific references to any other relevant IMO instruments which could support the reduction of URN from shipping, Member States and international organizations at IMO may wish to consider drawing the attention of the relevant IMO bodies that are dealing with issues arising under those instruments to the relevance of the *Revised URN Guidelines* for their work, e.g. the Sub-Committee on Human Element, Training and Watchkeeping.

It is important to raise awareness of the Revised URN Guidelines among seafarers and fishing vessel personnel. Depending on the outcomes of the EBP and potential follow-up proposals and/or documents providing comments by Member States and international organizations, the development of training provisions in relation to the reduction of URN in the marine environment awareness training of seafarers and of fishing vessel personnel could be considered. In this context, training guidance for seafarers to raise broader awareness of URN, its adverse impacts on the marine environment, in particular in sensitive areas, together with best practices for reducing URN could be developed, as well as potential amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers[153] (STCW) and the International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel[154] (STCW-F) may be considered.

The STCW Convention, which has 167 Parties as of 14 October 2024, provides a comprehensive set of international regulations intended to ensure that the highest standards of seafarer competence are maintained globally. The Manila amendments to the STCW Convention and Code[155] include requirements for marine environment awareness training (STCW Code, sections A-II/1, A-III/1and A-III/6).

152 IMO "Reduction of Underwater Radiated Noise from Commercial Shipping: Comments on document MEPC 82/9/7. Submission by FOEI, WWF, IFAW, Pacific Environment and CSC" IMO Doc MEPC 82/9/7(2024).

153 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (adopted on 7 July 1978, entered into force on 28 April 1994). Seafarers' Training Certification and Watchkeeping (STCW) Code (adopted on 7 July 1995, entered into force on 1 February 1997). For a list of amendments to the Convention and the STCW Code, see <https://www.imo.org/en/About/Conventions/Pages/StatusofConventions.aspx> last accessed 12 October 2024.

154 International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995 (adopted on 7 July 1995, entered into force on 29 September 2012). For a list of amendments to the Convention, see <https://www.imo.org/en/About/Conventions/Pages/StatusofConventions.aspx> last accessed 12 October 2024.

155 The Manila amendments were adopted on 25 June 2010 and entered into force on 1 January 2012.

The STCW-F Convention, which has 35 Parties as of 14 October 2024, provides certification and minimum training requirements for crews of seagoing fishing vessels with the aim to promote the safety of life at sea and the protection of the marine environment. Minimum training requirements include knowledge relating to the prevention of pollution of the marine environment.

(d) Capacity-building and transfer of technology

Gaps and other identified challenges: Awareness about anthropogenic underwater radiated noise and its impacts on the marine environment in developing countries is generally limited. As a result, institutional, policy and legal arrangements are often insufficient to address URN from shipping. There is also a lack of mechanisms for fostering multi-stakeholder partnerships. Furthermore, there is insufficient data and knowledge on the impacts of URN from shipping on most marine species in some regions. There are also technological needs. Funding opportunities are disproportionately available to developed countries.

Recommendations: Conferences, workshops and other events are important tools to foster information sharing and cooperation, and so is the GEF-UNDP-IMO GloNoise Partnership. There is an obvious need for assisting developing countries to raise awareness and build capacities regarding the assessment and reduction measures of URN.

(e) Cooperation and coordination

Gaps and other identified challenges: International cooperation between States in the reduction of URN from shipping requires strengthening. In particular, there is a need to engage with developing countries.

Strengthening cooperation and coordination with and among intergovernmental bodies that provide measures associated with the reduction of URN from shipping or that have work programmes relating thereto or in relation to other sources of underwater radiated noise is also critical.

As mentioned above, apart from the reference to the CBD, the *Revised URN Guidelines* do not refer to any other international instrument, including policy outcomes that could contribute to the reduction of underwater radiated noise from shipping.

Recommendations: Member States and international organizations of IMO may wish to consider the provisions of relevant treaties and the measures that have been recommended by other intergovernmental bodies to mitigate URN from shipping and identify areas for enhanced cooperation and coordination. Relevant intergovernmental bodies that are addressing the reduction of URN from shipping could be invited to join the GloNoise Partnership. The IMO Secretariat could collaborate with other secretariats of intergovernmental bodies in raising awareness of the *Revised URN Guidelines* and relevant IMO instruments, and of the global and regional legal and management approaches which can support the reduction of URN from shipping.

2.3.2.2 Specific identified gaps and other challenges, as well as recommendations

Specific possible gaps and challenges which have been identified, including with respect to other IMO instruments in relation to: (a) baselines and targets; (b) design and technical noise reduction approaches; (c) maintenance approaches; and (d) operational approaches, are presented below, followed by some potential recommendations on these and other issues (see also Table 13 in section 5).

(a) Baselines and targets

Gaps and other identified challenges: With regard to the establishment of baselines and targets and as indicated in section 2.2.4, the need for a clear target on lowering URN from ships in order to facilitate regulation, as well as the establishment of indicators has been emphasized by the IWC. It has also encouraged the development of databases of ship source levels. The need for international standardization of underwater acoustic terminology and measurement procedures to assess the exposure of marine life to the underwater sound of dredgers in shallow waters has also been identified.[156]

Recommendations: Depending on the outcome of the EBP and potential follow-up proposals and/or documents providing comments by the Member States and international organizations, they may wish to consider the establishment of mandatory threshold values for ships that do not meet the design and technical reduction approaches set out in the Revised URN Guidelines.

Member States and international organizations may also wish to consider the need for international standardization of underwater acoustic terminology and common measurement standards. There is also a need for measurement procedures to assess the exposure of marine life to the underwater sound of dredgers in shallow waters, including within the framework of the London Convention and Protocol.

(b) Design and technical noise reduction approaches

Gaps and other identified challenges: The implementation of the design reduction approaches in the *Revised URN Guidelines* is challenging. In addition, the implementation of IMO instruments prescribing a reduction of noise on board ships, may have a limited impact on the reduction of underwater radiated noise from ships. The scope of application of the Code on Noise Levels on Board Ships to URN is limited, since only new ships of 1,600 GT and above are subject to the mandatory regulations in the Code and SOLAS (see section 2.3.1.2(b)). Furthermore, some ship types and sizes have been exempted from the requirements, for example, high-speed craft. Notwithstanding their mandatory application, the contribution of the HSC Codes to the reduction of underwater radiated noise is even more limited since they only regulate the reduction of noise levels in public spaces and crew accommodations.

156 **See Frank Thomsen's and Christ de Jong's presentations at the World Organization of Dredging Associations (WODA) Workshop Underwater Sound in Relation to Dredging: Translating Science into First-Hand Practice, Paris, France, 26 March 2015, available at <https://dredging.org/woda-workshop-underwater-sound-in-relation-to-dredging-translating-science-into-first-hand-practice/158> accessed 11 September 2024.**

(c) Energy efficiency

Gaps and other identified challenges: There are challenges to 'blending' in requirements on GHG reduction and URN. Moreover, the potential contribution of energy efficiency measures to the reduction of URN has only been mentioned in the *Revised URN Guidelines.*

Recommendations: It would be critical for new ships being built and designed to be not only more energy efficient, but also to address specific ship design and machinery requirements to reduce URN. Further studies on how IMO's adopted measures for the reduction of GHG emissions from ships have contributed thus far or will contribute to the reduction of URN, would be beneficial. Such studies have shown that speed reductions can reduce both GHG emissions and URN. [157]

(d) Maintenance approaches

Gaps and other identified challenges: With regard to maintenance approaches, it can be noted that currently the use of ultrasonic AFS, which the *Revised URN Guidelines* have cautioned to avoid, where possible in national and international designated protected areas, is not regulated by the AFS Convention.

Also, the *2023 Biofouling Guidelines* are not mandatory. While it is too early to assess any gaps and challenges in the 2023 Guidelines, it will be important to not repeat the experience with the *2011 Biofouling Guidelines.* In reviewing the *2011 Biofouling Guidelines,* the IMO Sub-Committee on Pollution Prevention and Response had identified as one of the main objectives of the revision the need to increase the uptake and effectiveness of the *Guidelines*.[158]

Recommendations: Member States and international organizations of IMO may wish to consider regulating ultrasonic AFS internationally, ideally within the framework of the AFS Convention. They may also wish to consider emphasizing the link between the effective application of the 2023 Biofouling Guidelines and URN reduction, and also monitor and evaluate the effectiveness of the 2023 Biofouling Guidelines in that regard.

(e) Operational approaches

No link has been made in the Revised URN Guidelines to other IMO instruments relating to ships' routeing and ship reporting systems, PSSAs, Polar Areas, and onshore power supply.

(i) Ship routeing and ship reporting systems under IMO instruments

Gaps and other identified challenges: Few countries have availed of the available IMO measures in order to move traffic away from key feeding, breeding and nursery habitats, migratory routes or areas of high density of cetaceans and/or other marine life.[159] Since 1998, around 17 proposals for TSSs and/or ship routeing or ship reporting measures have been submitted to IMO to protect cetaceans and other marine life. Ship routeing measures in the EEZ have generally been adopted as recommendatory measures, but mandatory ship reporting systems have been adopted to prevent ship strikes with cetaceans. In some of the cases, the TSS, ship routeing measure or ship reporting measure, was adopted as an APM for a PSSA. Apart from one APM for a PSSA,[160] all other measures had been requested for application in marine areas which were already protected by ABMTs, such as MPAs, at the national level and/or were internationally recognized. Furthermore, many of the proposals emphasized the endangered status of the species they were seeking to protect. One proposal referred specifically to the endangered status of the species as listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora[161] (CITES), appendix 1 (see section 2.4 for further information about CITES).

Over the years, ships' routeing and ship reporting systems have remained focused predominantly on improving safety of navigation and safety of ships. In 2019, the IMO Maritime Safety Committee (MSC) decided to no longer consider proposals on routeing measures for environmental reasons directly, but to first require their submission to MEPC with a view to establishing PSSAs, and/or APMs, as appropriate.[162] This suggests that such measures may only be adopted if a PSSA has first been designated. This could have the effect of narrowing down the situations when a ships' routeing or ship reporting system can be used primarily related to matters of protection of the marine environment. It could also slow down the process for the consideration of such proposals. The identification and designation of a PSSA can be a lengthy process requiring approval by MEPC and the adoption of APMs by MEPC and/or MSC. A PSSA can only be designated once an APMs has been adopted. Although, as indicated in section 2.3.1.4(b) above, SOLAS regulations V/10 and V/11 allow coastal States, which are Parties, under certain conditions, to establish ship routeing systems and ship reporting systems in the territorial sea which may contribute to the protection of the marine environment, without IMO adopting them. In such circumstances, SOLAS Parties are encouraged to follow the applicable IMO guidelines and criteria, whenever possible, when establishing national measures.

Recommendations: The CMS Technical Series No. 49 recommends re-routing shipping lanes around areas with important habitats and avoiding times and areas of high sound propagation. It indicates that avoiding or reducing time at colder and higher latitude waters when sound travels further could help lessen noise propagation.

Member States and international organization of IMO may wish to consider encouraging the establishment of ships' routeing systems which can contribute effectively to the reduction of URN from shipping by moving maritime traffic away from key feeding, breeding and nursery habitats or areas of high density of marine species or migratory pathways. They may also wish to consider providing for the possibility to adopt seasonal measures without first requiring the prior designation of an area as a PSSA. Since climate change is impacting the migration patterns of marine species,[163] a more flexible approach with respect to proposals for ships' routeing and ship reporting systems might be warranted. In some cases, where only a seasonal measure might be required, Member States and international organizations of IMO may wish to consider whether the MSC could consider the proposed measure without first waiting for the MEPC to identify the area where the measure will apply as a PSSA.

In 2020, an IWC Scientific Committee workshop noted that underwater noise from shipping and ship strikes should be considered together where appropriate as many issues are common to both threats and some of the same reduction actions such as reduced speed and routeing measures can be effective.[164] Member States and international organization of IMO may wish to consider including in the *Revised URN Guidelines* not only a specific reference to the available ship routeing and reporting measures under SOLAS, but also a reference to the *Guidance document for minimizing the risk of ship strikes with cetaceans.*

Member States and international organizations of IMO may also wish to consider inviting States to provide information on whether ship routeing and/or ship speed reduction measures that have been adopted thus far, in particular voluntary measures, have been effective in moving traffic away from key feeding, breeding and nursery habitats, migratory routes or areas of high density of cetaceans and/or other marine life. If the responses received indicate that the voluntary measures have generally not been effective, then Member States and international organizations may wish to consider the adoption of mandatory routeing systems and/or speed restrictions, provided that such mandatory measures and actions taken to enforce compliance with such measures are not inconsistent with international law, including the relevant provisions of UNCLOS (see section 2.1.1).

"UNDERWATER NOISE FROM SHIPPING AND SHIP STRIKES SHOULD BE CONSIDERED TOGETHER WHERE APPROPRIATE AS MANY ISSUES ARE COMMON TO BOTH THREATS AND SOME OF THE SAME REDUCTION ACTIONS SUCH AS REDUCED SPEED AND ROUTEING MEASURES CAN BE EFFECTIVE"

(ii) Ship speed

Gaps and other identified challenges: Speed limit restrictions have thus far been adopted in very limited circumstances and only on a voluntary basis. Only twice has IMO adopted a speed limit restriction in order to protect cetaceans. In 2014, it adopted a recommended seasonal speed restriction in a TSS in parts of the territorial sea of Panama, which is also a site listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat[165] (Ramsar Convention) and the Convention Concerning the Protection of the World Cultural and Natural Heritage[166] (World Heritage Convention) (see also section 2.4.1), to reduce the risk of lethal strikes from 1 August to 30 November every year.[167] In 2023, IMO designated the North-Western Mediterranean Sea as a PSSA with a recommendatory APM which it described as aiming at information-sharing primarily for contributing to the protection of the marine environment.[168] The APM recommends that mariners navigate with particular caution within the PSSA, in areas where large and medium cetaceans are detected or reported, and reduce their speed to between 10 and 13 knots a voluntary speed reduction. However, it recommends that a safe speed be kept, so that proper and effective action could be taken to avoid collision and any possible negative impacts on a ship's manoeuvrability. It also, inter alia, recommends that mariners keep an appropriate safety distance or speed reduction measure from any large and medium cetaceans observed or detected in a close quarter situation. Furthermore, it recommends that the safety distance or speed reduction measure be adapted to the actual navigation circumstances and conditions of the ship.[169]

The practice of IMO with respect to speed limit restrictions therefore suggests that if the intended purpose is to protect cetaceans or other marine life, such measure is only available as a voluntary measure in the territorial sea. But as previously indicated, speed limit restrictions could be considered for mandatory application in the territorial sea and in the EEZ, provided they are in conformity with UNCLOS.

Recommendations: Member States and international organizations of IMO may wish to consider encouraging ship speed reductions in key feeding, breeding and nursery habitats or areas of high density of marine species or migratory pathways. The IWC has informed IMO that it welcomed the consideration in the draft action plan for the reduction of underwater radiated noise from commercial shipping (SDC 10/17, annex 2) of measures such as speed reductions which have multiple environmental benefits.[170] In addition, as indicated in section 2.2.3, the CMS COP has specifically urged Parties to promote the application of vessel speed reductions within IMO as an operational measure within important habitats, such as MPAs and IMMAs. CMS Technical Series No. 46 also primarily emphasizes slow steaming or reducing ship speed as a measure to reduce underwater noise from shipping; highlighting also how it is an effective short-term measure to reduce GHG emissions. The *Guidelines for underwater radiated noise reduction in Inuit Nunaat and the Arctic* recommend ship speed reduction on a broad scale in Inuit Nunaat and Arctic waters, where it is safe to do so.

While speed reduction can be a very effective measure, further consideration may be needed as to what measures would be the most appropriate for those ships where speed reduction does not directly result in a reduction of URN.

The process for the adoption of a speed restriction might also require consideration where a seasonal measure is being proposed and a more flexible approach may be warranted to address the impacts of climate change on the migration patterns of marine species. In such cases, Member States and international organizations of IMO may wish to consider providing for the possibility to adopt seasonal measures without first requiring the prior designation of an area as a PSSA. Moreover, the possibility to adopt mandatory speed limit restrictions in the territorial sea and in the EEZ, provided the measure is in conformity with UNCLOS, should not be ruled out.

(iii) PSSA Guidelines

Gaps and other identified challenges: As noted above, the PSSA Guidelines is the only IMO instrument where noise is included among a list of polluting substances. Notwithstanding this reference to noise, the criteria for the identification and designation of PSSAs do not take underwater noise pollution into account and have not been designed for transboundary pollution, such as underwater noise. The CMS Technical Series No. 46 suggests that noise could be applied as a criterion in the designation of PSSAs and that such sensitive areas need to be larger to address noise compared to other impacts, because noise can travel long distances.[171]

The mention of noise in the PSSA Guidelines indicates that it is possible to adopt measures in order to protect a PSSA with species or habitats that are vulnerable to URN,[172] as also demonstrated by the APM for the North-Western Mediterranean Sea. Although, no specific APM for noise is mentioned in the *PSSA Guidelines.* The development of a specific mandatory measure is complicated by the reference in the *PSSA Guidelines* to noise as a substance. While most of the other substances mentioned in the *Guidelines* are currently regulated by MARPOL, URN is not regulated since MARPOL only covers discharge of substances and effluents and not energy. Furthermore, it is not possible to adopt a ship design or construction measure as an APM for application in a PSSA in accordance with the terms of the Guidelines and also UNCLOS (see section 2.1.1 above).

Most of the adopted APMs for PSSAs echo existing IMO measures and exhibit similar kinds of ships' routeing and reporting systems, including areas to be avoided, TSSs, two-way routes and precautionary areas.[173]

Recommendations: If the establishment of a PSSA is required in order to apply an APM to mitigate URN from shipping and the area is not an international designated protected area, coastal States and archipelagic States may wish to first consider establishing an MPA or other ABMT at the national level for key feeding, breeding and nursery habitats or areas of high density of marine species or migratory pathways and thereafter submit a proposal to IMO for the establishment of a PSSA in that area with proposed APMs, such as ship routeing measures and/or speed restrictions or other measures.

Member States and international organizations of IMO may wish to consider what APMs in PSSAs apply to the reduction of URN from shipping. It would also be advisable to indicate that "noise" is a form of energy which can result in pollution of the marine environment rather than a "substance". Furthermore, consideration could also be given to providing for the possibility of having a large buffer zone within the boundaries of the PSSA since URN is not localized and can have a wide transboundary impact.

(iv) Voyage planning

Gaps and other identified challenges: Effective voyage planning could support the reduction of URN from shipping, as indicated in the *Revised URN Guidelines.* However, there may not be a common understanding as to what areas are included under the "international designated protected areas" mentioned in the *Revised URN Guidelines*, as indicated above.

Recommendations: Member States and international organizations of IMO may wish to consider fostering a common understanding as to what areas are included under the "international designated protected areas" mentioned in the *Revised URN Guidelines* in view of the recommended operational approaches.

The analysis of global instruments in section 2.4 indicates there are a number of treaties and policy outcomes that provide for the establishment of protected areas with different terminologies used, including ABMTs, MPAs, Ramar Sites, World Heritage Sites, IMMAs, Areas of Particular Environmental Interest (APEIs), Biosphere Reserves and vulnerable marine ecosystems (VMEs). The *Revised URN Guidelines* would also need to provide for the possibility of ABMTs, including MPAs, being adopted under the BBNJ Agreement when it enters into force. Furthermore, protected areas have also been established under regional instruments as indicated in section 3.

The World Database of Protected Areas, a joint effort between the UN Environment Programme (UNEP) and the International Union for Conservation of Nature (IUCN) and managed by the UNEP World Conservation Monitoring Centre, compiles information on MPAs and other area-based conservation measures which have been established pursuant to some legal instruments.[174] Such information might be helpful for ship operators for use in voyage planning in order to facilitate the use of alternate routes to avoid MPAs or other area-based conservation measures and/or slowdown. Information on species which are endangered, or threatened with extinction or species with an unfavourable conservation status are set out in the appendices of CITES and CMS. Information is also available through the IMMA database, as well as the ACCOBAMS ASI Project (see section 3).

In addition to national and international designated protected areas, the *Guidelines for underwater radiated noise reduction in Inuit Nunaat and the Arctic* also draw attention to the particular importance for ships to reduce shipping noise in Indigenous Conserved and Protected Areas and areas of importance to Inuit communities, among other areas. The provision and centralization of information on the location of these areas would be essential.

It is important to also take into account that some industry bodies are also collecting and disseminating information to support effective voyage planning. For example, the World Shipping Council (WSC) has produced a WSC Whale Chart – a global voyage planning aid to protect whales.[175]

(v) Polar Code

Gaps and other identified challenges: The Polar Code does not address URN and does not include a reference to the *Revised URN Guidelines.* The mandatory pollution prevention measures set out in Part II-A of the Code are not applicable to URN from shipping. However, the ambient noise environment in Polar areas is more complex and variable than in many other ocean areas due to the seasonal variability in ice cover. Ship noise could harm or displace marine mammal populations from their preferred habitat or feeding grounds.[176] Ice-breakers in particular generate intense sounds when moving through ice, and often produce louder and more variable sound in the open sea than most large commercial vessels due to the propulsion systems required for their intended function (repeated ramming of ice, backing up, and ramming).[177]

Shipping has increased and is expected to increase even further in the Arctic.[178] IMO has, since the entry into force of the Polar Code, only adopted three recommendatory areas to be avoided. It adopted these areas to protect the fragile and unique environment, including the national and international recognized habitats and species, in the Bering Sea located in the territorial sea and EEZ of the United States, and also adopted safety-related new and amended ships' routeing measures in the Bering Sea and Bering Strait.[179]

Recommendations: Member States and international organizations of IMO may wish to consider including special measures with respect to the reduction of URN in the Polar Code. The Arctic Council's Arctic Marine Shipping Assessment 2009 report (AMSA) had suggested that: many environmental effects resulting from ship disturbances can be effectively mitigated through the use of best practices and the implementation of management measures. With regard to noise disturbances, such measures could include rerouting to avoid some areas in sensitive periods, lower speed, and alternative engine and hull designs to make ships more silent. There may be a need to plan potential future shipping lanes in the Arctic so as to avoid large seabird colonies, marine mammal haul-outs and other areas where animals are aggregated.[180]

It has been suggested that the points raised in the AMSA also have some relevance in the Antarctic, and that in order to ensure adequate levels of protection of marine life in Polar waters other measures or tools should be considered for inclusion in the Polar Code including the use of areas to be avoided to bypass marine mammal aggregation areas, vessel monitoring and reporting schemes, and environmentally appropriate technologies.[181]

Member States and international organizations of IMO may also wish to consider referencing the *Guidelines for URN reduction in Inuit Nunaat and the Arctic* in the Polar Code and consider the measures proposed therein.

(vi) Other measures

Recommendations: The CMS Technical Series No. 49 recommends addressing the increased noise from a tanker or bulk carrier in ballast by installing air injection to a propeller in ballast conditions or Ship Trim Optimization software; and onshore power supply. Member States and international organizations of IMO may wish to consider including in the *Revised URN Guidelines* a reference to the *Interim guidelines on safe operation of onshore power supply (OPS) service in port for ships engaged on international voyages.*

157 See, for example Russel Leaper, "The Role of Slower Vessel Speeds in Reducing Greenhouse Gas Emissions, Underwater Noise and Collision Risk to Whales" (2019) 6 Front. Mar. Sci.: 505.

158 IMO "Report to the Marine Environment Protection Committee" IMO Doc PPR 10/18 (2023) para 5.39.

159 As of 14 October 2024, Australia, France, Italy and the United States of America had submitted more than one proposal to IMO. Whereas Canada, Costa Rica, Monaco, Panama, Papua New Guinea, the Philippines and Spain had submitted one proposal either alone or together with another State(s).

160 The Jomard Entrance, Papua New Guinea.

161 Convention on International Trade in Endangered Species of Wild Fauna and Flora (adopted on 3 March 1973, entered into force on 1 July 1975) 993 UNTS 243

162 IMO"Procedure for the Submission of Documents Containing Proposals for the Establishment of, or Amendments to, Ships' Routeing Systems or Ship Reporting Systems" IMO Doc MSC.1/Circ.1608 (2019); IMO "Report of the Maritime Safety Committee on its hundred and first session" IMO Doc MSC 101/24 (2019) para 11.6.

163 UNGA "Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its eighteenth meeting" (15 to 19 May 2017) UN Doc A/72/95 paras 80 to 83.

164 IWC "Report of the Workshop on Advancing Efforts to Address Underwater Noise from Shipping" (n 104).

165 Convention on Wetlands of International Importance especially as Waterfowl Habitat (adopted on 2 February 1971, entered into force on 21 December 1975) 996 UNTS 245. The Convention was amended by the Protocol of 3 December 1982 and the Amendments of 28 May 1987.

166 Convention Concerning the Protection of the World Cultural and Natural Heritage (adopted on 16 November 1972, entered into force on 17 December 1975) 1037 UNTS 151.

167 IMO "Report of the Maritime Safety Committee on its ninety-third session" IMO Doc MSC.93/22 (2014), paras 8.2 and 8.4 and IMO Doc MSC.93/22/Add.1(2014) annexes 16 and 17.

168 IMO Res MEPC.380(80) (7 July 2023) IMO Doc MEP.80/17/Add.1(2023) annex 20.

169 ibid annex 20, annex 4.

170 IMO Doc MEPC 82/9/3 (n 109).

171 Weilgart (n 99) at p 14.

172 Harrison (n 141).

173 So Yeon Kim, "Problems and Processes of Restricting Navigation in Particularly Sensitive Sea Areas" (2021) 36 *The International Journal of Marine and Coastal Law* 438-463.

174 See the Protected Planet website at <https://www.protectedplanet.net/en> last accessed 21 September 2024.

175 See <https://www.worldshipping.org/whales> last accessed 17 November 2024.

176 ibid.

177 ibid.

178 Protection of the Arctic Marine Environment Working Group, *Underwater Noise Pollution from Shipping in the Arctic* (PAME 2021).

179 IMO "Report of the Maritime Safety Committee on its ninety-ninth session" IMO Doc MSC 99/22 (2018) para 12.3 and IMO Doc SN.1/Circ.336 (2018). The measures entered into force on 1 December 2018.

180 Arctic Marine Shipping Assessment 2009 Report, available at <https://oaarchive.arctic-council.org/items/b01465f9-413d-4555-af59-07ddc7b7499a> last accessed 12 October 2024.

181 Submission to IMO by FOEI, IFAW, WWF, Pacific Environment and CSC (n 152).

2.4 OTHER MEASURES AND APPROACHES SUPPORTING URN FROM SHIPPING

This section presents measures in global legal instruments and approaches which do not directly address underwater radiated noise from shipping, but which support its reduction, together with potential gaps and other identified challenges in relation to such instruments and approaches, as well as potential recommendations as to how they could be addressed.

In addition to UNCLOS, several treaties have been adopted which do not address underwater radiated noise from shipping directly, but which can nonetheless support its reduction. An overview of these treaties is provided in section 2.4.1 below. Some specific provisions of those treaties are presented, together with the non-binding legal instruments of relevant global intergovernmental bodies, for example resolutions and decisions, guidelines, etc. and other approaches, in section 2.4.2. Possible gaps and other identified challenges, as well as potential recommendations as to how to address such gaps and challenges are also presented.

2.4.1 Overview of relevant treaties

As indicated in section 2.1, the provisions in UNCLOS are further supported by three Agreements that have been developed under the Convention. Since the Agreements were adopted under UNCLOS the definition of pollution of the marine environment in the Convention is also applicable to those Agreements.

Beyond the law of the sea treaties there are also global treaties that provide legally binding obligations to protect marine biological diversity generally, such as the CBD, or particular marine species, such as the CMS and the International Convention for the Regulation of Whaling, and/or particular marine areas, such as the Ramsar Convention and the World Heritage Convention. While all of these treaties do not directly deal with underwater radiated noise from shipping, nor from any other source, they nonetheless contain obligations which if implemented effectively, complied with, and enforced, can support the reduction of such noise. A general overview of the obligations in the relevant treaties is provided below. Those obligations which relate to the establishment of conservation measures, for example ABMTs, including MPAs, as well as EIAs, are presented in section 2.4.2 below.

While not dealt with in detail in this section, it can also be noted that the trade regulations by CITES, which has 184 Parties as of 14 October 2024, can complement efforts in the protection and preservation of marine biodiversity. Several marine species are grouped in the three CITES appendices according to how threatened they are by international trade.[182]

182 Appendix I includes species, such as 334 species of marine mammals, including 21 populations, threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. Appendix II includes species, such as 523 species of marine mammals, including 22 populations, not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. Appendix III contains species, such as 46 species of marine mammals, that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade. For a list of CITES species, see <https://cites.org/eng/disc/species.php> last accessed 19 September 2024.

The Part XI Agreement has 153 Parties as of 14 October 2024. The Agreement provides, inter alia, that between the entry into force of UNCLOS and the approval of the first work plan for exploitation, the ISA shall concentrate on, inter alia, the "adoption of rules, regulations and procedures incorporating applicable standards for the protection and preservation of the marine environment" (section 1(5))(g). It must also concentrate on the "promotion and encouragement of the conduct of marine scientific research with respect to activities in the Area and the collection and dissemination of the results of such research and analysis, when available, with particular emphasis on research related to the environmental impact of activities in the Area" (section 1(5)(h); the "acquisition of scientific knowledge and monitoring of the development of marine technology relevant to activities in the Area, in particular technology relating to the protection and preservation of the marine environment" (section 1(5)(i)); and the "timely elaboration of rules, regulations and procedures for exploitation, including those relating to the protection and preservation of the marine environment" (section 1(5)(j)).

The Agreement requires that an application for approval of a plan of work be accompanied by an assessment of the potential environmental impacts of the proposed activities and by a description of a programme for oceanographic and baseline environmental studies in accordance with ISA's rules, regulations and procedures (section 1(7)).

Based on UNCLOS, Part XI and the 1994 Agreement, ISA developed detailed and substantive provisions, regulations and recommendations related to the assessment of possible environmental impacts arising from exploration for marine minerals in the Area, which define the sort of activities that require EIAs, the form and content of such EIAs when required, as well as guidance on baseline studies, monitoring and reporting.[183] This guidance addresses impacts on marine biodiversity on the seabed and in the water column above it. [184]

ISA is also working on draft regulations for the exploitation of mineral resources in the Area, including detailed and sophisticated provisions relating to EIAs. These regulations will be supplemented by a set of environmental standards and guidelines (see also section 2.4.2.4).

The UN Fish Stocks Agreement has 93 Parties as of 14 October 2024. The Agreement specifically requires coastal States and States fishing on the high seas to, inter alia, "assess the impacts of fishing, other human activities and environmental factors on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks" (article 5(d)). In addition, coastal States and States fishing on the high seas must also minimize pollution (article 5(f)), thus including anthropogenic underwater noise pollution, since the Agreement is under UNCLOS. Coastal States and States fishing on the high seas must also minimize impacts on associated or dependent species, in particular endangered species through measures, which are not limited to those stipulated in the Agreement (article 5(f)). They must also protect biodiversity in the marine environment (article 5(g)). Furthermore, in applying the precautionary approach States must take into account also existing and predicted environmental conditions (article 6(3)(c)).

183 ISA "Recommendations for the guidance of contractors for the assessment of the possible environmental impacts arising from exploration for marine minerals in the Area: Issued by the Legal and Technical Commission" ISA Doc ISBA/25/LTC/6/Rev.2 (July 2022).

184 See website of the ISA <https://www.isa.org.jm/protection-of-the-marine-environment/environmental-impact-assessments/> last accessed 2 December 2024.

The BBNJ Agreement is not yet in force. The Preamble states, inter alia, that the Parties to the Agreement are "conscious of the need for the comprehensive global regime under the Convention [UNCLOS] to better address the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction". The definition of pollution of the marine environment in UNCLOS will apply in the context of the implementation of the BBNJ Agreement.

The Preamble of the BBNJ Agreement specifically mentions pollution among the causes of biodiversity loss and degradation of ecosystems of the ocean which Parties to the Agreement recognize the need to address, in a coherent and cooperative manner. While the Agreement does not specifically deal with underwater noise pollution, it contains several provisions which are relevant for the prevention, reduction and control of underwater noise pollution of the marine environment. Particularly notable are the provisions of the BBNJ Agreement setting out the general principles and approaches that Parties should be guided by in achieving the conservation and sustainable use of marine biological diversity of ABNJ (article 7); the EIA requirements (Part IV); and the provisions on measures such as ABMTs, including MPAs (Part III and annex I); and on capacity-building and the transfer of marine technology (Part V and annex II). Reference will be made to several of those requirements and provisions in section 2.4.2 below.

The Agreement provides for the establishment of robust institutional arrangements to support the achievement of its objectives, including a COP, a Scientific and Technical Body (STB), a Capacity-building and Transfer of Marine Technology Committee, an Implementation and Compliance Committee and a Clearing-House Mechanism (CHM). With respect to the many organizations which regulate some of the activities in ABNJ, including IMO, the Agreement includes several provisions to promote coherence and coordination with relevant legal instruments and frameworks and relevant global, regional, subregional and sectoral bodies (IFBs). The COP is specifically mandated to promote, including by establishing appropriate processes, cooperation and coordination with and among relevant IFBs, with a view to promoting coherence among efforts towards the conservation and sustainable use of marine biological diversity of ABNJ.

The Agreement requires parties to settle their disputes by peaceful means and sets out procedures in that regard, including for compulsory dispute settlement (Part IX).

As of 14 October 2024, there are 196 Parties to the CBD. In the preamble to the Convention, the Parties affirm that the conservation of biological diversity is a common concern of humankind. The objectives of the CBD are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources (article 1). States have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction (article 3). Obligations of a Party in relation to components of biological diversity extend to areas within the limits of its national jurisdiction; and in the case of processes and activities, regardless of where their effects occur, carried out under its jurisdiction or control, within the area of its national jurisdiction or beyond the limits of national jurisdiction (article 4). A Party is required, as far as possible and as appropriate, to cooperate with other Parties, directly or through competent international organizations, with respect to ABNJ for the conservation and sustainable use of biodiversity (article 5). A Party must, inter alia, identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects through sampling and other techniques (article 7(c)). The CBD requires each Party, as far as possible and as appropriate, to establish

> THE PREAMBLE OF THE BBNJ AGREEMENT SPECIFICALLY MENTIONS POLLUTION AMONG THE CAUSES OF BIODIVERSITY LOSS AND DEGRADATION OF ECOSYSTEMS OF THE OCEAN WHICH PARTIES TO THE AGREEMENT RECOGNIZE THE NEED TO ADDRESS, IN A COHERENT AND COOPERATIVE MANNER

a system of protected areas or areas where special measures need to be taken to conserve biological diversity (article 8(a)). A Party is also required to regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use (article 8(c)). Each Party is obligated, as far as possible and as appropriate, to introduce appropriate procedures requiring an EIA of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures (article 14(1)(a)). Each Party is also required to promote, on the basis of reciprocity, notification, exchange of information and consultation on activities under its jurisdiction or control which are likely to significantly affect adversely the biological diversity of other States or ABNJ, by encouraging the conclusion of bilateral, regional or multilateral arrangements, as appropriate (article 14(1)(c)). The Convention also includes obligations relating to transfer of technology, exchange of information, technical and scientific cooperation and finances (articles 16–18, 20 and 21). Parties to the CBD are required to implement the Convention with respect to the marine environment consistently with the rights and obligations of States under the law of the sea (article 22).

The CMS, which has 133 Parties, as of 14 October 2024, is largely a framework instrument that relies for its implementation on the creation of regulatory instruments at the regional level (see section 4). In the CMS, Parties acknowledge the importance of migratory species being conserved (article 2(1)). The Convention requires Parties to endeavour to provide immediate protection for migratory species included in appendix I, which lists all migratory species which are endangered[185] (article II(3)(b) and article III(1)), including several marine species and some species of waterbirds. Parties that are Range States of a migratory species listed in appendix I are required to endeavour to prevent, remove, compensate for or minimize, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species; and to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic species (article III(4)(b) and (c)). They must also prohibit the taking of animals belonging to such species, subject to scientific and other exemptions (article III(5)). The definition of "taking" includes "harassment" (article I(i)). It has been suggested that the emission of loud noise should be classified as "harassment".[186] appendix II lists migratory species which have an unfavourable conservation status and which require international agreements for their conservation and management (article IV(1)).

185 The Conference of the Parties has further interpreted the term "endangered" as meaning "facing a very high risk of extinction in the wild in the near future". See CMS COP Res. 11.33 (November 2014) para 1.

186 Karen N. Scott, "International Regulation of Undersea Noise" (2004) 53 ICLQ 287-324.

The International Convention for the Regulation of Whaling has 88 Parties, as of 14 October 2024. It aims to "establish a system of international regulation for the whale fisheries to ensure proper and effective conservation and development of whale stocks". The Convention provides for the establishment of the IWC which may adopt regulations relating to the conservation and utilization of whale resources (article V(1)) and, inter alia, encourage, recommend, or if necessary, organize studies and investigations relating to whales (articles III and IV(1)(a)).

The Schedule to the Convention, which is also legally binding, sets out the coordinates of two sanctuaries designated by the IWC: the Indian Ocean Sanctuary and the Southern Ocean around Antarctica (paragraphs 7(a) and (b)).

The Ramsar Convention, as amended, has 172 Parties, as of 14 October 2024. The Convention requires a Party to designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance (article 2(1)). Wetlands include areas of marine water the depth of which at low tide does not exceed 6 metres (article 1(1)). The boundaries of each wetland must be precisely described and also delimited on a map. Wetlands may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than 6 metre at low tide lying within the wetlands, especially where these have importance as waterfowl habitat (article 2(1)). The Parties are required to formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use[187] of wetlands in their territory (article 3(1)). Each Party must arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to change as the result of technological developments, pollution or other human interference (article 3(2)). The Parties are obligated to consult with each other about implementing obligations arising from the Convention especially in the case of a wetland extending over the territories of more than one Party or where a water system is shared by Parties. They must at the same time endeavour to coordinate and support present and future policies and regulations concerning the conservation of wetlands and their flora and fauna (article 5).

The World Heritage Convention, which has 196 Parties as of 14 October 2024, defines the kind of sites which can be considered for inscription in the World Heritage List (articles 1 and 2). It sets out the duties of Parties in identifying potential sites and their role in protecting and conserving them (article 4) and sets out measures in that regard (article 5). Each Party undertakes not to take any deliberate measures which might damage directly or indirectly the cultural and natural heritage situated on the territory of other Parties (article 6). The Convention requires Parties to submit an inventory of property forming part of the cultural and natural heritage to the World Heritage Committee which selects the properties with the consent of the State concerned (article 11). The Committee is also required to establish, keep up to date and publish, whenever circumstances so require, under the title of "list of World Heritage in Danger", a list of the property appearing in the World Heritage List for the conservation of which major operations are necessary and for which assistance has been requested under the Convention (article 11).

187 A definition of "wise use" was recommended by the Ramsar Convention COP in its Recommendation 3.3 (June 1987).

2.4.2 Specific measures in treaties, non-binding legal instruments and approaches, including identified gaps and other challenges as well as recommendations

This section presents specific provisions of the treaties introduced in section 2.4.1, together with relevant non-binding legal instruments, for example resolutions and decisions and guidelines, as well as approaches, adopted by a number of global intergovernmental bodies. The information is presented under the following subheadings: (1) addressing gaps in knowledge and data; (2) application of relevant principles and approaches; (3) ABMTs, including MPAs; (4) EIAs; (5) awareness raising; (6) education and training; (7) incentivization; (8) capacity-building, transfer of technology and financial resources; (9) cooperation and coordination; (10) implementation, compliance and enforcement; and (11) monitoring and evaluation.

2.4.2.1 Addressing gaps in knowledge and data

Major global intergovernmental bodies have highlighted the need to address knowledge gaps associated with anthropogenic underwater noise and have identified measures required to address such gaps and other identified challenges. For example, in its response to the questionnaire, DOALOS, highlighted among the challenges in regulating sound-producing activities at the global level, research gaps, a lack of common internationally agreed standards of acceptable noise levels and mitigation techniques, and a lack of common measurements standards.

UNGA has affirmed the importance of sound scientific studies in addressing anthropogenic underwater noise generally, encouraged further research, studies and consideration of the impacts of ocean noise on living marine resources and noted the work of States and competent international organizations in that regard. It, inter alia, requested DOALOS to continue to compile the peer-reviewed scientific studies it receives from Member States and intergovernmental organizations pursuant to paragraph 107 of UNGA resolution 61/222 and, as appropriate, to make them, or references and links to them, available on its website.[188] UNGA has also encouraged further research into, and testing of, technologies to reduce the impact of underwater noise on marine life. [189]

UNGA has acknowledged that anthropogenic underwater noise could have impacts on different marine species, which could also have consequent socioeconomic impacts, including on fishing.[190] It has specifically encouraged further studies, including by the FAO on the impacts of underwater noise on fish stocks and fishing catch rates, as well as associated socioeconomic effects, and has welcomed in this respect the action taken by the FAO Committee on Fisheries (COFI) at its thirty-fourth session.[191]

188 UNGA Res 79/144 (n 44) para 280. See also the website of the Division for Ocean Affairs and the Law of the Sea of the Office of Legal Affairs, United Nations <https://www.un.org/Depts/los/general_assembly/noise/noise.htm> last accessed 1 December 2024.
189 ibid. para 282.
190 UNGA Res 79/145 (n 33) preamble.
191 ibid preamble and para 253.

At its thirty-fourth session, in 2021, the FAO COFI reiterated its concern over the possible negative effects of anthropogenic underwater noise and encouraged FAO to continue supporting members with evidence and science-based approaches.[192] It recognized the increased science-based knowledge on anthropogenic underwater noise and encouraged FAO to assess its possible impacts, including its socio-economic consequences, on marine resources in collaboration with relevant international organizations, such as IMO.[193] Subsequent sessions of the COFI have not addressed the issue. The FAO Secretariat publication "State of World Fisheries and Aquaculture 2024" notes that fragmented legal frameworks have left biodiversity in ABNJ vulnerable to ever-growing threats, including underwater noise, among others.[194] However, it is important to note that the General Fisheries Commission for the Mediterranean (GFCM), a regional fisheries management organization established under article XIV of the FAO Constitution, has been studying the impacts of underwater noise on fish resources, in response to the concerns raised at the thirty-fourth session of the FAO COFI (see section 4 below).

In its decision XII/23, the CBD COP identified as the largest gaps in knowledge, those relating to fishes, invertebrates, turtles and birds, and additional knowledge gaps relating to the characteristics of major sound sources, trends in the prevalence and magnitude, as well as the intensity and spatial distribution of underwater noise and the potential impacts of underwater noise on ecosystems and animal populations, including implications of cumulative and synergistic impacts of multiple sources of noise and other stressors.

At its sixteenth meeting in 2024, the need to assess and prevent, mitigate or minimize the individual and cumulative impacts of all types of pollution, including transboundary pollution, when they co-occur in marine and coastal areas, which is most relevant to Target 7 of the Global Biodiversity Framework, and the need to prevent, mitigate or minimize human-wildlife conflict in marine and coastal areas, in particular with regard to threatened, endangered and vulnerable species (most relevant to Target 4) was also identified by the CBD COP, among the gaps and areas in need of additional focus under the CBD to support the implementation of the Global Biodiversity Framework with regard to marine and coastal biodiversity.[195] With respect to island biodiversity, the CBD COP identified the need for further efforts to improve the understanding of pollution risks on islands and levels of pollution, including transboundary pollution, that are harmful to island biodiversity and ecosystem functions and services, taking into account food security and livelihoods, and to prevent, mitigate or minimize the cumulative impacts of various types of pollution when they co-occur in island ecosystems.[196] Other gaps that have been identified in CBD publications include data paucity on baseline conditions (including populations, behaviours and ecological connectivity/wide-ranging movements).[197] Even where there is evidence of potential adverse impacts among some wildlife groups, research does not cover all species that may be affected.[198]

192 FAO, *Report of the Thirty-fourth Session of the Committee on Fisheries, Rome, 1–5 February 2021*, FAO Fisheries and Aquaculture Report No. 1336 (Rome, 2022) para 16(f).
193 ibid para 16(i).
194 FAO, *The State of World Fisheries and Aquaculture 2024 – Blue Transformation in action* (Rome, 2024) at p 206.
195 CBD COP draft decision submitted by the Chair of Working Group II "Conservation and sustainable use of marine and coastal biodiversity and of island biodiversity" CBD Doc CBD/COP/16/L.17 (1 November 2024) annex para 1.
196 ibid annex, para 2.
197 Simon Harding and Neil Cousins (n 91) at p 17.
198 ibid. See also UN Group of Experts of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects "Brief on the Second World Ocean Assessment and Sustainable Development Goal 14: Life Below Water" (UN, 2022) <www.un.org/regularprocess/woa2-policybriefs> last accessed 17 September 2024.

In its decision XII/23, the CBD COP encouraged Parties and other Governments as well as Indigenous and local communities and other relevant stakeholders, to take appropriate measures, as appropriate and within their competencies, and in accordance with national and international laws, to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity.[199] The measures listed in the COP decision include the following: defining and differentiating types or intensities of underwater noise where there are adverse impacts, and characterizing noise by source; conducting further research on the remaining significant knowledge gaps; including areas that are affected by different levels of sound when mapping the spatial and temporal distribution of sound; combining acoustic mapping with habitat mapping of sound-sensitive species with regard to spatial risk assessments in order to identify areas where those species may be exposed to noise impacts; considering thresholds as a tool to protect sound-sensitive species, taking into account their locations during critical life cycle stages as well as relevant results of research and additional information; and standardizing metrics and sound measurements so that there are similar measures and approaches for all sounds and in all places.[200] A CBD Workshop recommended support standards by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO).[201] That Workshop also noted that existing work under the CBD on the description of ecologically or biologically significant marine areas (EBSAs) and work by IMO on PSSAs could provide useful scientific information (e.g., feeding, breeding, spawning and nursery habitats, and migratory routes) for States or competent intergovernmental organizations to identify areas of priority concern, with regard to linking relevant scientific information on the impacts of underwater noise.[202] With respect to EBSAs, at its sixteenth meeting in 2024, the CBD COP adopted a decision on further work on EBSAs, outlining a new process to identify EBSAs and update existing areas with new scientific information.[203] The decision further invites Parties, other Governments, competent intergovernmental organizations, Indigenous Peoples and local communities and other relevant stakeholders to collaborate in the implementation of the modalities.[204]

In subsequent decisions (following decision XII/23), the CBD COP invited Parties, other Governments and competent organizations, including IMO, ISA, CMS, IWC, other relevant stakeholders, and Indigenous Peoples and local communities, as appropriate, within their competencies, and in accordance with national and international law, to further collaborate and share their experiences on the application of measures, in line with the precautionary approach, in line with the preamble to the CBD, to avoid, minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including the measures specified in decision XII/23.[205]

199 CBD COP decision XII/23 (n 92) para 3.

200 ibid.

201 CBD "Report of the Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity" (25-27 February 2014) UNEP Doc UNEP/CBD/MCB/EM/2014/1/2 annex IV, para 32.

202 ibid., annex IV, para 6.

203 CBD COP draft decision submitted by the Chair of Working Group II "Further work on ecologically or biologically significant marine areas" (30 October 2024) CBD/COP/16/L.8, annex.

204 ibid, para 8.

205 CBD COP decision XIII/10 "Addressing impacts of marine debris and anthropogenic underwater noise on marine and coastal biodiversity" (December 2016) CBD Doc CBD/COP/DEC/XIII/10.

The COP has also been requesting the CBD Executive Secretary to compile and synthesize relevant scientific and technical information, as well as information on related measures taken by Parties, other Governments and competent organizations, and to make this compilation available with a view to disseminating the results of the synthesis, including successful experiences through the CHM or other means.[206] Experiences are also to include scientific research on the adverse impacts of underwater noise on marine and coastal biodiversity. Based on scientifically identified needs, the Executive Secretary has been requested to develop and share, in collaboration with Parties, other Governments and relevant organizations, practical guidance and toolkits on measures to avoid, minimize and mitigate these impacts. [207]

The COP has encouraged Parties and invited other Governments and relevant organizations to use the information, including in their efforts to avoid, minimize and mitigate the impacts of anthropogenic underwater noise.[208] Such information has included an updated report titled "Scientific synthesis of the impacts of underwater noise on marine and coastal biodiversity and habitats" [209].[210]

In its resolution 12.14, the CMS COP reaffirmed the need for ongoing and further internationally coordinated research on the impact of underwater noise on CMS-listed marine species and their prey, their migration routes and ecological coherence, in order to give adequate protection to cetaceans and other marine migratory species. It recommended that Parties that have not yet done so establish national noise registries to collect and display data on noise-generating activities in the marine area to help assess exposure levels and the likely impacts on the marine environment, and that data standards are made compatible with regional noise registries, such as the ones developed by the International Council for the Exploration of the Sea (ICES) and the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS)[211].

In its resolution 2018-4, the IWC also recommended that contracting governments consider that cetacean research and conservation management efforts include the protection of the acoustic habitat and the impacts of anthropogenic underwater noise on lower trophic levels, including fish, invertebrates and other marine mammal prey species and support the adoption of measures, such as noise standards, by relevant national and international authorities that reduce the risk of harmful impacts occurring on cetaceans from the introduction of anthropogenic underwater noise. The IWC instructed the Scientific Committee to particularly focus on: (1) evaluation of the extent and degree of exposure of cetaceans to different types of noise; (2) obtaining a better understanding of the effects of noise on cetaceans at the individual and population level, including chronic and acute effects; (3) reviewing the effectiveness of different approaches to reducing cetacean exposure to noise; and (4) reviewing work on the impacts of noise on cetacean prey and considering any implications of this for cetacean populations via the food-chain.

At its meeting in 2024, the IWC Scientific Committee,[212] recommended, inter alia, to expand the scientometric review of the IWC documents, focusing on acoustics and underwater noise since 2004. The IWC Scientific Committee's Environmental Concerns Subcommittee has noted that the United Nations Decade of Ocean Science for Sustainable Development (2021 to 2030) has a substantial number of projects on underwater noise that would be particularly relevant to the work of the Subcommittee, such as the Ocean Decade Research Program on the Maritime Acoustic Environment and the Ocean Sound Atlas. It has indicated that as the IWC Secretariat is currently liaising with the UN Ocean Decade Steering Committee, this could be an area where they aid collaboration and communication with these programmes.[213]

As indicated in section 2.2.4, the IWC has emphasized the need for a clear target on lowering ship noise, the establishment of indicators and encouraged the development of databases of ship source levels. With regard to defining baselines and setting threshold values to define binding reduction targets, it has been suggested to focus on areas that are currently suffering from high levels of anthropogenic noise.[214] It has also been suggested to define a baseline of ambient noise to support risk assessment and modelling.[215]

During the nineteenth meeting of the UNGA Informal Consultative Process (see section 1.4), several delegations stated that comprehensive baseline studies and long-term monitoring to track future changes in anthropogenic underwater noise would be of great value and suggested that acoustic data be included in global ocean observing systems[216] They also proposed the establishment of in situ acoustic listening stations.[217] In that regard, it has been suggested that agreement on the continued maintenance and financing of long-term stations for measuring ambient underwater sound needs to be reached on a regional level to define baselines and allow for comprehensive assessments.[218]

2.4.2.2 Application of relevant principles and approaches

Other relevant measures that have been recommended by global intergovernmental bodies to mitigate anthropogenic underwater noise include the application of relevant principles and approaches, such as the precautionary principle/approach, an ecosystem approach, the use of best available scientific information and the use of relevant traditional knowledge of Indigenous Peoples and local communities (see, for example, the *Guidelines for underwater radiated noise reduction in Inuit Nunaat and the Arctic* referred to in section 3.3.1.4 above), where available, as indicated below. During the nineteenth meeting of the UNGA Informal Consultative Process (see section 1.4), some delegations also considered that the "polluter pays" principle was applicable.[219]

Several general principles and approaches are set out in the BBNJ Agreement and are to guide Parties in achieving the conservation and sustainable use of marine biological diversity of ABNJ. Included among these and of particular relevance to this analysis are the following: "the polluter-pays principle"; "the precautionary principle or approach, as appropriate"; "an ecosystem approach"; "an integrated approach to ocean management"; "the use of the best available science and scientific information"; "the use of relevant traditional knowledge of Indigenous Peoples and local communities"; "the respect, promotion and consideration of their respective obligations, as applicable, relating to the rights of Indigenous Peoples or of, as appropriate, local communities when taking action to address the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction"; "the non-transfer directly or indirectly, of damage or hazards from one area to another and the non-transformation of one type of pollution into another, in taking measures to prevent, reduce and control pollution of the marine environment"; and "full recognition of the special circumstances of small island developing States and least developed countries" (article 7).

UNGA has called upon States to identify appropriate measures and approaches to assess, address and mitigate the potential socioeconomic and environmental impacts of anthropogenic underwater noise, taking into account the precautionary approach and ecosystem approaches and the best available scientific information.[220]

The precautionary approach, which is also, inter alia, reflected in Principle 15 of the Rio Declaration on Environment and Development,[221] the United Nations Fish Stocks Agreement, and in customary international law,[222] is particularly relevant in light of data and knowledge gaps with respect to the impact of underwater noise on the marine environment. On the basis of Principle 15 and in the context of underwater noise, it implies that where there are threats of serious or irreversible damage from underwater noise, lack of full scientific certainty shall not be used by States as a reason for postponing cost-effective measures to prevent environmental degradation.[223]

The CBD COP Voluntary guidelines for the consideration of biodiversity in EIAs and SEAs in marine and coastal areas also note with respect to EIAs in ABNJ that the application of a precautionary approach will be a particularly important consideration in decision-making.[224] Moreover, an ecosystem approach has been recognized as the primary framework for the implementation of the CBD[225] as well as of the Global Biodiversity Framework.[226] CBD COP decisions addressing the conservation and sustainable use of marine and coastal biodiversity have also recognized the need to apply the ecosystem approach and the precautionary approach.[227]

In its resolution 12.14, the CMS COP reaffirmed that the difficulty of proving possible negative impacts of acoustic disturbance on CMS-listed marine species and their prey necessitated a precautionary approach in cases where such impact is likely.[228]

The IWC in its resolution 2018-4 recommended the development and implementation of mitigation strategies and best practices that protect cetaceans in line with an ecosystem approach and the precautionary approach.[229]

2.4.2.3 Area-based management tools, including MPAs

Temporal and spatial restrictions can be used alone or as complements to other measures and are particularly appropriate when source reduction is more challenging and for areas/times that may be more sensitive to noise.[230] Sensitive areas include fish spawning grounds, marine mammal calving/breeding grounds and areas of persistent high densities of marine mammals, while temporal restrictions can be either year-round or seasonal.[231]

ABMTs, in particular MPAs, can mitigate the cumulative and synergistic impacts of underwater noise from shipping,[232] although low-frequency noise which generally travels furthest, is the most difficult to mitigate, because of the large areas required to keep noise out, compared with mid- and high-frequency noise.[233] Nevertheless, it has been suggested that lowering noise levels in MPAs is better than not regulating noise around MPAs at all.[234] Moreover, MPAs have the advantage that various other (non-acoustic) kinds of stressors or threats are restricted.[235]

Furthermore, monitoring shipping and related URN impacts across a network of protected areas can help managers ensure the quality of habitats used by a wide range of marine species[236] and also assists in the collection of baseline information on species and their distribution which in turn can assist in the identification of areas which are particularly critical for feeding, breeding or calving of populations or that provide habitat to endangered populations of marine animals.

However, there is currently a limited coverage of ABMTs, including MPAs, in the world's ocean. Less than 10% of the ocean is covered by MPAs.[237] Moreover, the MPAs that have been established are not necessarily well managed. A recent assessment of the world's largest 100 MPAs by area, representing nearly 90% of reported global MPA coverage and 7.3% of the global ocean area, by a group of scientists, indicated that many reported MPAs lack regulations and/or management, and some MPAs allowed high-impact activities.[238] Apart from the Baltic Marine Environment Protection Commission (HELCOM) (see section 3), noise has generally not been considered in the management of MPAs. Therefore, notwithstanding the merits of establishing ABMTs, including MPAs, if they are not properly managed, they remain "paper parks".

As indicated in section 2.4.1, the establishment of ABMTs, including MPAs, is an obligation under a number of global treaties, including the CBD, the Ramsar Convention and the World Heritage Convention. Moreover, sanctuaries for whales have been designated by the IWC and are included in the Schedule to the International Convention for the Regulation of Whaling. The BBNJ Agreement provides a framework and process for the establishment of ABMTs, including MPAs, in ABNJ.

Other ABMTs have been established pursuant to policy instruments, including PSSAs (see section 2.3.1.4), regional management plans (REMP) and APEIs, marine and coastal biosphere reserves and VMEs, as described below. Several policy making bodies have also recommended the use of marine spatial planning as a management tool as it represents a useful methodology and policy framework to manage noise producing human activities with an ecosystem-based approach.[239]

Relevant treaty provisions and relevant policy approaches and recommendations of various global intergovernmental bodies relating to the use of ABMTs, including MPAs, which could support the reduction of the adverse impacts of anthropogenic underwater noise are presented below.

(a) Treaty provisions

The BBNJ Agreement provides for the possibility to establish ABMTs, including MPAs, in ABNJ. ABMTs can have conservation and sustainable use objectives, while MPAs which are to be designated and managed to achieve specific long-term biodiversity conservation objectives may allow, where appropriate, sustainable use provided it is consistent with the conservation objectives (article 1). The Agreement sets out a list of indicative criteria for the identification of areas (article 19 and annex I).

Proposals submitted by States regarding the establishment of ABMTs, including MPAs, will be reviewed by the BBNJ STB (articles 20 and 21) and are opened up for consultations with a broad range of stakeholders, including relevant IFBs, Indigenous Peoples and local communities, the scientific community, civil society and other relevant stakeholders (article 21). The COP, on the basis of the final proposal and the draft management plan, taking into account the contributions and scientific inputs received during the consultation process and the recommendations of the STB: (i) shall take decisions on the establishment of ABMTs, including MPAs and related measures; (ii) may take decisions on measures compatible with those adopted by relevant IFBs, in cooperation and coordination with those IFBs; (iii) may, where proposed measures are within the competences of other IFBs make recommendations to Parties to the BBNJ Agreement and to IFBs to promote the adoption of relevant measures through such IFBs in accordance with

their respective mandates (article 22(1)). While not specifically mentioned in the Agreement, the related measures which the COP could decide on or recommend to Parties when establishing an ABMT, including an MPA, could include measures to address stressors and sources of transboundary pollution in accordance with UNCLOS and the Agreement, in particular if the area was identified by reference to the indicative criteria set out in annex I to the Agreement, which include cumulative and transboundary impacts. As underwater noise pollution is a source of cumulative and transboundary impacts, there appears to be a possibility to identify and establish ABMTs and MPAs in areas which are particularly vulnerable and impacted by underwater noise pollution, among other stressors.

The COP is to make arrangements for regular consultations to enhance cooperation and coordination with and among IFBs (article 22(3)). It may also decide, as appropriate, to develop a mechanism regarding existing ABMTs, including MPAs, adopted by relevant IFBs (article 22(4)).

Parties are responsible for implementation and can adopt more stringent measures with respect to their nationals and vessels or with regard to activities under their jurisdiction or control in addition to those in the Agreement (article 25). Parties must report to the COP on the implementation of ABMTs, including MPAs (article 26). Relevant IFBs will be invited to provide information to the COP on the implementation of measures they have adopted to achieve the objectives of ABMTs, including MPAs, established under the BBNJ Agreement (article 26). The STB shall monitor and review ABMTs, including MPAs, including related measures taking into account reports of Parties and IFBs, assess the effectiveness of ABMTs, including MPAs, including related measures and progress made in achieving their objectives and provide advice and recommendations to the COP (article 26).

The Agreement recognizes the need to support developing countries through capacity-building and the development and transfer of marine technology in developing, implementing, monitoring, managing and enforcing ABMTs, including MPAs (article 17, and annex II).

The Ramsar Convention, as amended requires Parties to designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance (see section 2.4.1). According to the criteria for identifying a Wetland of International Importance, a wetland should be considered internationally important if it supports a significant proportion of indigenous fish or is an important source of food for fishes (criterion 7), spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend (criterion 8).[240] Marine and coastal Wetlands of International Importance currently include 1023 sites.[241] The list of sites indicates that 193 sites (of which, e.g. 74 are classified as being located in marine subtidal aquatic beds and 48 are classified as being located in coral reefs) have been designated on the basis of criteria 7 and 8.

The World Heritage Convention defines the kind of sites which can be considered for inscription in the World Heritage List (see section 2.4.1). This List of cultural properties and natural sites of outstanding universal value currently includes 50 marine sites across 37 countries.[242] It includes the breeding grounds of the world's last healthy population of grey whales, the highest density of ancestral polar-bear dens, and the home of the world's most ancient fish and the inimitable marine iguana.[243]

(b) Non-legally binding measures and approaches

Non-legally binding measures and approaches which have been developed by various global intergovernmental bodies in relation to ABMTs, including MPAs, are presented below.

206 CBD COP decision XII/23 (n 92) para 5. See also CBD COP decision XIII/10 (n 205) and CBD COP decision 14/10 'Other matters related to marine and coastal biodiversity' (November 2018) CBD Doc CBD/COP/DEC/14/10 para 5.
207 CBD COP decision XIII/10 (n 205).
208 ibid para 6.
209 CBD SBSTTA "Scientific synthesis of the impacts of underwater noise on marine and coastal biodiversity and habitats: Note by the Executive Secretary" UNEP Doc UNEP/CBD/SBSTTA/20/INF/8 (2016).
210 CBD COP decision XIII/10 (n 205).
211 CMS COP Res 12.14 (n 55) paras 1 and 20.
212 IWC "Report of the Scientific Committee (SC69B)" (n 107).
213 IWC "Report of the Environmental Concerns Subcommittee" (2024) <https://archive.iwc.int/pages/download.php?ref=22181&ext=pdf&alternative=6756&noattach=true&k=4328e9b854> last accessed 16 September 2024.
214 Denise Risch, A. Belin, Nicolas Entrup, Russel Leaper, Eleonora Panella, Bettina Taylor, Linda Weilgart, Stefanie Werner, Nadja Ziebarth, "Underwater Noise – The neglected threat to marine life" (2020) 14. <https://www.bund.net/meere/unterwasserlaerm/> last accessed 13 October 2024.
215 UN Group of Experts of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects (n 198).
216 UNGA, Report on the work of the UN Open-ended Informal Consultative Process ..." (n 28) para 16.
217 ibid.
218 Risch et al (n 214).
219 UNGA '"Report on the work of the UN Open-ended Informal Consultative Process ..." (n 28) para 22.
220 UNGA Res 79/144 (n 44) para 281; UNGA Res 79/145 (n 33) para 52.
221 UN "Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992" (1993) UN Doc A/CONF.151/26/Rev.1 vol I and Corr 1 annex I.
222 *Responsibilities and obligations of States with respect to activities in the Area, Advisory Opinion, 1 February 2011* (n 67) at p 51, para 148; *Request for an Advisory Opinion submitted by the Commission of Small Island States on Climate Change and International Law (Request for Advisory Opinion submitted to the Tribunal)* Case No. 31 (n 65) at p 77, para 213.
223 Rio Declaration (n 221).
224 CBD "Voluntary guidelines for the consideration of biodiversity in environmental impact assessments and strategic environmental assessments in marine and coastal areas" (n 90).
225 See CBD COP decision V/6 'Ecosystem approach' (November 1999). See also <https://www.cbd.int/programmes/cross-cutting/ecosystem/cs.aspx> last accessed 24 September 2024.
226 CBD COP decision 15/4 (n 87) annex, para 7(m).
227 E.g., CBD COP decision 15/24 (n 92); CBD COP draft decision submitted by the Chair of Working Group II CBD/COP/16/L.17 (n 195).
228 CMS COP Res 12.14 (n 55).
229 IWC Res 2018-4 (n 101).
230 Frank Thomsen et al., 'Addressing underwater noise in Europe: Current state of knowledge and future priorities' in P. van den Brand Kellett et al (eds) *Future Science Brief 7 of the European Marine Board* (Ostend, Belgium 2021).
231 ibid.
232 Lindy Weilgart, "Keeping the Noise Down: Approaches to the Mitigation and Regulation of Human-Caused Ocean Noise" in the International Ocean Institute – Canada (eds) *The Future of Ocean Governance and Capacity Development* (Leiden, The Netherlands Brill | Nijhoff 2019).
233 ibid.
234 ibid.
235 ibid.
236 Megan F McKenna et al., "Understanding vessel noise across a network of marine protected areas" (2024) 196 *Environmental Monitoring and Assessment* 369.
237 UN, *The Sustainable Development Goals Report 2024* <https://unstats.un.org/sdgs/report/2024/> last accessed 6 October 2024.
238 Elizabeth P. Pike et al., "Ocean protection quality is lagging behind quantity: Applying a scientific framework to assess real marine protected area progress against the 30 by 30 target" (2024) 17 *Conservation Letters* e13020.
239 Sofia Bosi et al, "Is Maritime Spatial Planning a tool to mitigate the impacts of underwater noise? A review of adopted and upcoming maritime spatial plans in Europe" (2023) 155 Marine Policy.
240 See <https://www.ramsar.org/sites/default/files/documents/library/ramsarsites_criteria_eng.pdf> last accessed 13 October 2024.
241 See RAMSAR Sites Information Service <https://rsis.ramsar.org/> last accessed 15 September 2024.
242 For the current list of marine sites, see the World Heritage List <https://whc.unesco.org/en/list/?search=&themes=7> last accessed 19 September 2024.
243 World Heritage Convention "Marine World Heritage managers unite at the Wadden Sea in effort to accelerate conservation success" (World Heritage Convention News, 10 October 2023) <https://whc.unesco.org/en/news/2617/> last accessed 19 September 2024.

A REMP is one of the tools developed by the ISA to give effect to its mandate to adopt appropriate rules, regulations and procedures to ensure the effective protection of the marine environment from the harmful effects of activities in the Area, including to protect and conserve the natural resources of the Area in accordance with article 145 of UNCLOS.[244] A central component of a REMP is the identification of areas that represent the range of habitats, biological communities and ecosystems within the management area and to provide those areas with appropriate levels of protection, including through the designation of APEIs.[245] It has been suggested, both in relevant workshops and in ISA Council discussions on the draft exploitation regulations, that REMPs should be in place before any applications for exploitation contracts are considered. [246] A REMP for the Clarion-Clipperton Zone has been adopted and a network of nine APEIs has been designated in which no application for approval of a plan of work for exploration or exploitation would be granted for at least five years.[247] The designated APEIs are large areas of approximately 160,000 square kilometres, each designed to cover self-sustaining populations of the range of habitats, including buffer zones designed to protect against any impact from adjacent activities.[248] Work has begun on the development of REMPs for other regions.[249]

Coastal and marine biosphere reserves can be designated under the Intergovernmental Man and the Biosphere Programme (MAB) by the Director-General of the United Nations Educational, Scientific and Cultural Organization (UNESCO) following the decisions of the MAB International Coordinating Council.[250] Their status is internationally recognized and they promote solutions reconciling the conservation of biodiversity with its sustainable use.[251] UNESCO's General Conference approved the Seville Strategy for Biosphere Reserves and the Statutory Framework of the World Network of Biosphere Reserves in 1995; the latter functions as the "soft legal framework" for the development and formal recognition of biosphere reserves.[252]

A VME is a tool which originated from an UNGA resolution in which States and regional fisheries management organisations or arrangements (RFMO/As) were called upon to apply the precautionary approach for the interim prohibition of destructive fishing practices, including bottom trawling that has adverse impacts on VMEs.[253] Criteria for the identification of VMEs are set out in the FAO International Guidelines for the Management Deep-sea Fisheries in the High Seas.[254] The Guidelines are voluntary and are designed to provide guidance on management factors ranging from an appropriate regulatory framework to the components of a good data collection programme, and include the identification of key management considerations and measures necessary to ensure the conservation of target and non-target species, as well as affected habitats. [255]

As indicated in section 2.4.1 above, the CBD requires its Parties to establish protected areas. Target 3 of the Global Biodiversity Framework includes a commitment to: ensure and enable that by 2030 at least 30 per cent of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of Indigenous Peoples and local communities, including over their traditional territories.[256]

The need to improve the understanding and promote the effective implementation of MPAs and other effective area-based conservation measures in various sectors active in marine and coastal areas, in line

with decision 14/8, ensuring that such measures deliver tangible outcomes beneficial for biodiversity has been identified by the CBD COP, at its sixteenth meeting in 2024, among the gaps and areas in need of additional focus under the CBD to support the implementation of the Global Biodiversity Framework with regard to marine and coastal biodiversity.[257]

Measures which the CBD COP has suggested to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity include spatio-temporal management of activities, relying on sufficiently detailed temporal and spatial knowledge of species or population distribution patterns combined with the ability to avoid generating noise in the area at those times.[258] The COP has also suggested including noise considerations in the establishment and development of management plans for MPAs within national jurisdiction and other relevant plans, as appropriate; and linking relevant information on the adverse impacts of underwater noise on sound-sensitive species when harmonizing different processes related to marine spatial planning and area-based management.[259] The CBD COP has also encouraged Parties and invited other Governments and relevant organizations to apply marine spatial planning, in line with its decision XIII/9.[260]

In its resolution 12.14, the CMS COP, like the CBD COP, also encouraged Parties to integrate the issue of anthropogenic noise into the management plans of MPAs where appropriate, in accordance with international law, including UNCLOS.[261] It also encouraged Parties to facilitate, inter alia, studies reviewing the potential benefits of "noise protection areas", where the emission of underwater noise can be controlled and minimized for the protection of cetaceans and other biota.[262]

In its resolution 14.9, the CMS COP urged Parties to, inter alia, to utilise the database of IMMAs of the IUCN as a key resource for considering the protection of habitats of critical importance for CMS-listed cetaceans, in line with and building on the provisions of its resolution 12.13 on IMMAs.[263] It also urged Parties when identifying areas of importance to cetaceans, to take into account the relationship between those areas and other areas which may be ecologically linked to them, for example as connecting corridors, or as breeding areas, stopover sites, feeding and resting places, in line with the provisions of resolution 14.16 on Ecological Connectivity.[264]

Furthermore, the CMS COP urged Parties to effectively mitigate marine noise impacts, in line with its 2017 resolution, with specific attention to applying the CMS Family Guidelines for all marine noise-generating activities, in particular within important habitat areas, such as MPAs and IMMAs, and avoiding or minimizing the introduction of potentially harmful impulsive noise within these areas, including noise-related considerations in marine spatial planning procedures, applying BAT and BEP, and promoting the application of vessel speed reductions within IMO as an operational measure.[265]

In its decision 14.44, the CMS COP requested Parties to make use of the CMS Technical Series no. 46[266] and to bring it to the attention of appropriate regulatory bodies concerned with marine spatial planning and licencing processes relating to underwater noise-generating activities.[267] The publication, an output of the Joint Noise Working Group of CMS and ACCOBAMS and the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS), aims to assist Parties and industry by providing an up-to-date overview of the currently available BAT and BEP for mitigating noise from some sources. The BAT and BEP for shipping are addressed in section 2.3.2.2.

During the nineteenth meeting of the UNGA Informal Consultative Process (see section 1.4) several delegations highlighted various management approaches that could be used to address anthropogenic underwater noise, including greater use of ABMTs.[268] Several delegations proposed to create a detailed map of the distribution of economically and ecologically important marine species, especially endangered species and the establishment of MPAs for habitats and for migratory routes of marine species sensitive to noise. Quiet zones along migratory corridors were also proposed by several observer delegations.[269]

The establishment of noise buffer zones around MPAs has also been suggested by civil society.[270] It has been suggested that buffer zone distances could vary depending on species characteristics (i.e. seasonality, distribution, sensitivity, where fully known) and sound source characteristics (i.e. distribution, incidence, intensity, frequency, etc.).

At a CBD Workshop, the idea of developing MPAs with appropriate buffer zones during critical life cycle stages (e.g. migration corridors) was discussed and it was suggested that this is an area that needs further study in the future.[271] It was suggested that areas that are particularly critical for a short period of time could be protected from underwater noise spatially and/or temporally. Such areas might include a spawning site for haddock or a seasonal feeding site for whales. During these sensitive periods, efforts should be made to lower anthropogenic noise and to avoid interference with the organisms. These spatial and temporal tools for specific situations may be used at different times and places to accommodate different events.[272]

It has been suggested that noise reduction in MPAs where noise-sensitive species are protected should be realised through re-routing and speed reductions for shipping where appropriate.[273] The CMS COP has also specifically recommended speed reductions within important habitats, such as MPAs and IMMAs (see section 2.2.3). The IWC has also highlighted the multiple environmental benefits of speed reductions (see section 2.3.2.2).

2.4.2.4 EIAs

An EIA is a process to identify and evaluate the potential impacts of an activity to inform decision-making.[274] An assessment of potential impacts of underwater noise from shipping on marine life can prevent, reduce or control adverse impacts from such activity. Among the requirements for an effective EIA is also an assessment of the cumulative impacts of other anthropogenic activities on marine life.

As noted in sections 2.1.1 and 2.4.1, UNCLOS, the Part XI Agreement, the BBNJ Agreement and the CBD include specific legally binding obligations to conduct EIAs. The reduction of URN from shipping would therefore be supported by the effective implementation of, compliance with, and enforcement of the EIA provisions in the relevant treaties. It would also be supported by the effective application of the voluntary guidelines that have been developed for EIAs and the recommended measures in the policy outcomes of various global intergovernmental bodies as described in section 2.2 and below.

As noted in section 2.4.1, the BBNJ Agreement operationalizes the provisions of UNCLOS on EIA for ABNJ by establishing processes, thresholds and other requirements for conducting and reporting assessments by Parties. It also provides for the possibility to conduct SEAs. It sets out a two-tiered EIA process (article 30). If a project might cause more than a minor or transitory effect on the marine environment or if the effects of the activity are unknown or poorly understood, a Party must conduct an initial screening that has to be sufficiently detailed, and include an initial analysis of potential impacts, including cumulative effects

(article 30(1)). Based on this, if the Party determines that it has reasonable grounds for believing that the activity may cause substantial pollution of or significant and harmful changes to the marine environment an EIA will need to be conducted. It is the State with jurisdiction or control over a planned activity which decides whether to proceed with the activity based on the EIA it conducted (article 34). However, there are requirements in the EIA process set out in the Agreement which promote transparency and engagement with a broad range of stakeholders, including through a public notification and consultation process (article 32), and the publication of reports, documents and information through the CHM (article 33). Furthermore, the Agreement provides for the possibility for a Party to register its concerns in two scenarios: first, if another Party determines after conducting a screening, that an EIA is not required (article 31) and second, in relation to authorized activities that may have significant adverse impacts that were either not foreseen in the EIA or that arise from a breach of any conditions of approval of the authorized activity (article 37). The Agreement also sets out the possibility for the STB to provide comments and/or make recommendations in various stages of the EIA process (article 31, 33 and 37). For example, once the Party has made its EIA draft report available in the CHM during the public consultation process, the BBNJ STB may make comments on the report which must be considered by the Party (article 33). At the request of a Party, the COP may provide advice and assistance to a Party when determining whether a planned activity under its jurisdiction or control may proceed (article 34).

The Agreement recognizes the need to build and strengthen the capacity of Parties, particularly developing States Parties to prepare, conduct and evaluate EIAs and SEAs (articles 27, 31, Part V and annex II). In addition, it sets out a mechanism for ensuring the monitoring, reporting and review of authorized activities and their impacts.

The Agreement not only addresses the EIA process for planned activities to be conducted in ABNJ, but also requires a Party with jurisdiction or control over a planned activity that is to be conducted in marine areas within national jurisdiction which determines that the activity may cause substantial pollution of or significant and harmful changes to the marine environment in ABNJs to ensure that an EIA is conducted either in accordance with the Agreement or under its national process. If the EIA is conducted under its national process, the Party must make relevant information on the EIA available to the CHM. The STB can provide comments to the Party in relation to that information (article 28).

The STB is required to develop standards and/or guidelines on a number of aspects related to EIAs for consideration and adoption by the COP, including on the assessment of impacts in areas within national jurisdiction, the assessment of cumulative impacts in ABNJ and how those impacts should be taken into account in the process for conducting EIAs, and on the conduct of SEAs (article 38(1)). Parties to the Agreement must promote the use of EIAs and the adoption and implementation of the standards and/or guidelines, developed by the STB in relevant IFBs (article 29(1)). The COP is required to develop a mechanism for the STB to collaborate with relevant IFBs (article 29(2)).

The Agreement clarifies its relationship with EIA processes under other relevant IFBs (article 29) and provides that no screening or EIA needs to be conducted under the Agreement if the potential impacts of the planned activity or category of activity have been assessed in accordance with the requirements of another relevant IFB, and one of the following additional requirements is met: (1) the assessment already undertaken is equivalent to the one required under the Agreement, and its results are taken into account; or (2) the regulations or standards of the IFB arising from the assessment were designed to prevent, mitigate or manage potential impacts below the threshold for environmental impact assessments under the

Agreement, and have been complied with (article 29(4)). If there is no monitoring and review process under the IFB then Parties to the Agreement must monitor and review the activities and ensure that monitoring and review reports are published through the BBNJ CHM. If an EIA was conducted under another IFB, the report of that EIA is to be published through the CHM. It will be important for all relevant IFBs to review their EIA process and assess whether it can be considered equivalent to the EIA process under the BBNJ Agreement.

In 2017, the CMS COP endorsed the CMS Family Guidelines and welcomed the Technical Support Information.[275] In 2020, the COP instructed the Secretariat to add the "Advisory Note: Further guidance on independent, scientific modelling of noise propagation" [276] to the Technical Support Information. The CMS Family Guidelines aim to ensure that decision-makers are presented with sufficient evidence to make an informed judgement of impacts of a proposed activity. [277] A range of anthropogenic noise generating activities are covered, including shipping and vessel traffic. The CMS Secretariat indicated in its response to the questionnaire that the Family Guidelines touch on almost all of the key elements in the *URN Guidelines*.

The Family Guidelines advise that cumulative impact of shipping and identifying appropriate exclusion zones and shipping lanes should be the focus. They also cover not only cetaceans, but also other species, including prey species.[278] For shipping and vessel traffic, the Guidelines set out the details required for the following components: (1) Spatial extent and nature of the activity, as well as the spatial area that will experience anthropogenic noise generated by the proposed shipping; typical weather conditions and day length for the area; and existence and location of any MPAs. (2) Description of vessels and equipment. Details also include an identification of other activities having an impact in the region accompanied by the analysis and review of potential cumulative or synergistic impacts. (3) Modelling of noise propagation loss. Details also include identification and mapping of proposed species exclusion zones and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features. (4) Species impact: details include identification and density of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels; specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts on prey species; information on the behaviour of each species group, and the ability to detect each of the species for mitigation purposes. The Guidelines recommend that for each species group the following details would be required: species vulnerability, habitat and scientific assessment of impact. (5) Mitigation and monitoring plans. The plans would provide an explanation of access to the evaluation of ongoing scientific monitoring data to assess impacts; quantification of the effectiveness of proposed mitigation methods; and spatio-temporal restrictions. (6) Consultation and independent review.

In its resolution 14.9 adopted in 2024, the CMS COP urged Parties to effectively mitigate marine noise impacts, in line with its 2017 resolution, with specific attention to applying the CMS Family Guidelines for all marine noise-generating activities, in particular within important habitat areas, such as MPAs and IMMAs.[279]

The COP also requested Parties to inform the Scientific Council at the seventh meeting of the Sessional Committee about experiences and lessons learned in the application of the Guidelines, and the need for additional guidance on assessment and mitigation of marine noise.[280] The COP requested the Joint Noise Working Group of CMS, ACCOBAMS and ASCOBANS, subject to the availability of external resources, to inter alia: provide a peer review of the updated Technical Support Information to the CMS Family Guidelines; prepare a gap analysis of guidance available from CMS and other forums and identify where further guidance is needed on mitigation of the effects of marine noise in order to address the needs of

migratory species and their prey; and report to the Scientific Council at the eighth meeting of its Sessional Committee on progress in implementing the decision.[281]

In its resolution 2018-4, the IWC recommended that governments take into account best practice guidelines to ensure robust, comprehensive, and transparent assessment, such as the *2014 URN Guidelines* and the CMS Family Guidelines.[282]

As indicated in section 2.2.2, voluntary guidelines on biodiversity-inclusive impact assessment and voluntary guidelines for the consideration of biodiversity in EIAs and SEAs in marine and coastal areas have also been developed by the CBD COP to complement the EIA requirement in article 14 of the CBD.

In its decision VIII/28, the CBD COP endorsed the voluntary guidelines on biodiversity-inclusive impact assessment and the draft guidance on biodiversity-inclusive SEA. It urged Parties, other Governments and relevant organizations to apply the guidelines and encouraged them to take the guidance into account in the context of their implementation of article 14 of the CBD.[283]

The guidelines set out biodiversity issues at different stages of the EIA process: screening; scoping; assessment and evaluation of impacts and development of alternatives; reporting: the EIA statement or EIA report, including an environmental management plan, and a non-technical summary for the general audience; review of the EIA statement or EIA report; decision-making; and monitoring, compliance, enforcement and environmental auditing. The guidelines also include an indicative set of screening criteria including in relation to noise emissions to be further elaborated at the national level, as explained further below.

Voluntary guidelines for the consideration of biodiversity in EIAs and SEAs annotated specifically for biodiversity in marine and coastal areas, including in ABNJ, were subsequently developed.[284] The annotated guidelines note that different history and culture of organizations with interests in the same area may have three important implications for EIAs beyond ABNJ. First, the application of a precautionary approach will be a particularly important consideration in decision-making. Secondly, there may be greater need for information gathering through scientific assessments, surveys and modelling to describe EBSAs and other important features as part of the assessment process. And thirdly, there will necessarily be greater dependence on incremental and iterative "test-based" approaches to permitting activities, given the outcome of an EIA. To increase the very limited knowledge available on the impacts of a particular activity, it may need to be allowed at a small scale with stringent conditions for monitoring and surveillance, so that the permitted activity becomes the source of better information for a more complete assessment of the impacts at potentially larger scales. Where possible, information from other areas of the world where this activity has taken place would be used to ascertain likely risk and impacts before allowing a small-scale activity to occur. The guidelines indicate that there is usually a paucity of data on marine ecosystems with data coverage for coastal ecosystems usually better than for offshore marine areas. Consequently, knowledge of what ecosystem components may be at risk is poorer, and the ability to assess potential risks is weaker. In ABNJ, the proponent of the activity to be assessed may be based far from the site of the proposed activity, as may also be the governmental and administrative authorities of the flag State. These issues may make the likely cost of conducting an EIA for activities affecting marine biodiversity in ABNJ much higher than an EIA for a comparable activity in coastal or terrestrial areas.

With respect to the development of biodiversity-inclusive screening criteria, the annotated guidelines indicate that the extent and diversity of marine and coastal areas, including open-ocean waters and deep-sea habitats, make the notion of a single threshold value for the diversity of habitats and ecosystems unlikely

to be appropriate. Different threshold values would have to be considered for different deep-sea areas and ecosystem features. For marine biodiversity in ABNJ, it will also be necessary to develop some prioritization of screening methodologies, to provide guidance on which ones deliver the most reliable and cost-effective results. According to the indicative set of screening criteria set out in the guidelines for further elaboration at the national level an EIA would be mandatory, for example for activities in protected areas (e.g. fisheries closed areas, PSSAs and APEIs). It would also be mandatory in threatened ecosystems outside protected areas (including VMEs and EBSAs) and for activities resulting in, for example noise emissions in areas providing key ecosystem services.[285] Where areas provide relevant ecosystem services, the need for, or the level of EIA is to be determined for activities resulting in noise emissions, for example.[286]

In its decision XI/18, the CBD COP encouraged Parties, other Governments and competent organizations to use those voluntary guidelines on EIAs and SEAs recognizing that these annotated voluntary guidelines will be most useful for activities that are currently unregulated, with no procedures for assessing impacts.

In its decision XII/23, the CBD COP encouraged Parties and other Governments as well as Indigenous and local communities and other relevant stakeholders, to take appropriate measures, as appropriate and within their competencies, and in accordance with national and international laws, to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, such as conducting impact assessments, where appropriate, for activities that may have significant adverse impacts on noise-sensitive species, and carrying out monitoring, where appropriate.[287]

The CBD voluntary guidelines on biodiversity-inclusive impact assessment have served as a model for the Ramsar voluntary EIA guidelines.

By its resolution X.17,[288] the Ramsar COP welcomed the CBD voluntary guidelines on biodiversity-inclusive impact assessment and draft guidance on biodiversity-inclusive strategic environmental assessment, with the additional observations on their applicability to implementation of the Ramsar Convention prepared by its Scientific and Technical Review Panel. The COP invited Ramsar parties to make good use of them. The Ramsar annotated version includes the same references to noise emissions as the CBD voluntary guidelines.

The draft regulations on exploitation of mineral resources in the Area under consideration by the ISA also require the preparation of an EIA and environmental management and monitoring plan.[289] Noise is specifically mentioned as a potential impact resulting from mining operations.

In 2022, the Council of the ISA decided that binding environmental threshold values for deep seabed mining should be developed to contribute substantially to the determination of what is required to ensure effective protection of the marine environment pursuant to article 145 of UNCLOS.[290] Underwater noise and light pollution are among the first sets of threshold values to be developed under the lead of the ISA Legal and Technical Commission and supported by an intersessional expert group of the Council.[291] The first in-person meeting of the expert group was held in June 2024.[292]

As regards threshold values applicable to mining ships, the Advisory Opinion of the Seabed Disputes Chamber of the ITLOS had concluded that only transportation *in situ* is included in activities in the Area.[293] The consequence is that IMO rather than ISA enjoys regulatory competence over *ex situ* transportation systems. In a joint report, ISA and IMO set out a preliminary roadmap for understanding their respective competencies concerning activities in the Area and identified several matters which merit further studies as indicated in section 2.4.2.10 below.[294]

"

EDUCATION AND TRAINING OF SEAFARERS AND CREWS OF SEAGOING FISHING VESSELS CAN ALSO SUPPORT EFFORTS TOWARDS MITIGATING URN FROM SHIPPING

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2.4.2.5 Awareness-raising

At the nineteenth meeting of the UNGA Informal Consultative Process (see section 1.4), delegations emphasized the need to raise awareness of anthropogenic underwater noise through action in intergovernmental processes. Several delegations referred to UNGA resolutions on oceans and the law of the sea and on sustainable fisheries that already addressed the issue.[295] Clearly more effort is needed to build awareness and understanding of the importance of addressing anthropogenic underwater noise and of the environmental, social and economic impacts. Political will is of course also required.

A CBD workshop also underlined the need to build capacity in developing regions in order to, inter alia, increase awareness on EIAs and related guidelines in countries/regions where relevant legislations and/or guidelines addressing this issue are not available.[296]

2.4.2.6 Education and training

As noted in section 2.3.2.2, education and training of seafarers and crews of seagoing fishing vessels can also support efforts towards mitigating URN from shipping. Training opportunities for other stakeholders that are engaged in activities associated with the reduction of anthropogenic underwater noise would also be beneficial.

2.4.2.7 Incentives

Incentive schemes can support the reduction of underwater radiated noise from shipping, as also recognized in the *Revised URN Guidelines.*

The CBD requires each Party, as far as possible and as appropriate, to adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity (article 11). Furthermore, Target 18 of the Global Biodiversity Framework aims to scale up positive incentives for the conservation and sustainable use of biodiversity, in addition to reducing harmful incentives.[297] The CMS Technical Series No. 46[298] has recommended worldwide port incentives, citing as an example the Vancouver Fraser Port Authority and the Port of Prince Rupert reductions in docking fees and harbour dues of up to almost 50% for ships with quiet ship certification from an international ship classification society. A combination of various methods has been recommended for measuring and certifying noise from ships, such as computational predictions validated by onboard measurements over a range of speeds, with perhaps one or two at-sea measurements to verify these.

The IWC in its resolution 2018-4 recommended that contracting governments incentivize the development, adoption and voluntary transfer, on mutually agreed terms, of technologies and strategies that mitigate the impacts of anthropogenic underwater noise on cetaceans from various activities that produce the noise.[299]

244 ISA "A review of the contribution of ISA to the objectives of the 2023 Agreement under UNCLOS on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction" (ISA, 2024) pp 54–57.
245 ibid.
246 ibid.
247 ibid.
248 ibid.
249 See the website of ISA <www.isa.org.jm/protection-of-the-marine-environment/regional-environmental-management-plans/> last accessed 12 September 2024.
250 See the website of UNESCO <https://www.unesco.org/en/mab/wnbr/designation> last accessed 30 September 2024.
251 ibid.
252 ibid.
253 UNGA Res. 59/25 (17 November 2004) UN Doc A/RES/59/25 para 66.
254 FAO "International Guidelines for the Management of Deep-sea Fisheries in the High Seas. Directives internationales sur la gestion de la pêche profonde en haute mer. Directrices Internacionales para la Ordenación de las Pesquerías de Aguas Profundas en Alta Mar" (Rome/Roma FAO 2009) 73.
255 See the website of FAO <https://www.fao.org/4/i0816t/i0816t00.htm> last accessed 30 September 2024.
256 CBD COP decision 15/4 (n 87).
257 CBD COP draft decision submitted by the Chair of Working Group II (n 195) annex, para 1(b).
258 CBD COP decision XII/23 (n 92) para 3.
259 ibid.
260 CBD COP decision 14/10 (n 206) para 6.
261 CMS COP Res 12.14 (n 55) para 17.
262 ibid para 19.
263 CMS COP Res 14.9 (n 98) para 5(c).
264 ibid para 5(d).
265 ibid para 4(f).
266 Weilgart (n 99).
267 CMS COP decision 14.44 (n 100).
268 UNGA "Report on the work of the UN Open-ended Informal Consultative Process ..." (n 28) para 21.
269 ibid.
270 Risch et al (n 214).
271 CBD "Report of the Expert Workshop ..." (n 201) annex IV, para 19.
272 ibid.
273 Risch et al (n 214).
274 Definition in article 1(7) of the BBNJ Agreement.
275 UNEP Doc UNEP/CMS/COP12/Inf.11/Rev.1 (2017) <https://www.cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise> last accessed 13 September 2024.
276 CMS COP decision 13.59 (February 2020) and UNEP Doc UNEP/CMS/COP13/Inf.8 (2019).
277 CMS Secretariat "CMS Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities – a tool for decision-makers", Presentation at the nineteenth meeting of the UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (18-22 June 2018) <http://www.un.org/depts/los/consultative_process/icp19_presentations/4. CMS - Heidrun Frisch-Nwakanma.pdf> last accessed 13 September 2024.
278 CMS webpage on Marine Noise <https://www.cms.int/en/topics/marine-noise> last accessed 13 September 2024.
279 CMS COP Res 14.9 (n 98) para 4 (f).
280 CMS COP decision 14.44 (n 100) and CMS Scientific Council, "Responses to Decision 14.44 on Marine Noise (Prepared by the Secretariat)" UNEP Doc UNEP/CMS/ScC-SC7/Inf.14 (2024).
281 CMS COP decision 14.45 (February 2024) in UNEP Doc UNEP/CMS/COP14/Decisions.
282 IWC Res 2018-4 (n 101).
283 CBD COP decision VIII/28 (n 88).
284 CBD "Marine and coastal biodiversity: Revised voluntary guidelines for the consideration of biodiversity in environmental impact assessments and strategic environmental assessments in marine and coastal areas" (n 90).
285 ibid Appendix, Category A.
286 ibid Category B.

287 CBD COP decision XII/23 (n 92) para 3.

288 RAMSAR COP Res X.17 "Environmental Impact Assessment and Strategic Environmental Assessment: updated scientific and technical guidance" (November 2008) <https://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_x_17_e.pdf> last accessed 13 October 2024.

289 ISA "Draft regulations on exploitation of mineral resources in the Area. Prepared by the Legal and Technical Commission" ISA Doc ISBA/25/C/WP.1 (2019). The draft exploitation regulations have been under consideration by the Council of the ISA. The current negotiations of the draft regulations by the Council, and in particular a compilation of work carried out in the informal working groups of the Council is available in a consolidated text in ISA Doc ISBA/29/C/CRP.1 (16 February 2024) <https://www.isa.org.jm/wp-content/uploads/2024/02/Consolidated_text.pdf> last accessed 12 September 2024.

290 ISA "Decision of the Council of the International Seabed Authority relating to the development of binding environmental threshold values" ISA Doc ISBA/27/C/42 (2022) para (a).

291 ibid. para (d).

292 ISA hosts the first in-person meeting of international experts selected to develop environmental threshold values for deep-seabed mining (ISA Press Release 28 June 2024) <https://www.isa.org.jm/news/isa-hosts-the-first-in-person-meeting-of-international-experts-selected-to-develop-environmental-threshold-values-for-deep-seabed-mining/> last accessed 12 September 2024.

293 *Responsibilities and obligations of States with respect to activities in the Area, Advisory Opinion, 1 February 2011* (n 67) at pp 36 and 37.

294 ISA and IMO "Competence of the International Seabed Authority and the International Maritime Organization in the context of activities in the Area / prepared by the International Seabed Authority and International Maritime Organization" (ISA Technical study no. 25, 2019).

295 UNGA "Report on the work of the UN Open-ended Informal Consultative Process ..." (n 28) para 24.

296 CBD, "Report of the Expert Workshop ... " (n 201) annex IV, para 27.

297 CBD COP decision 15/4 (n 87).

298 Weilgart (n 99).

299 IWC Res 2018-4 (n 101).

2.4.2.8 Capacity-building, transfer of technology and financial resources

Capacity-building, transfer of technology and financial resources can support implementation, compliance with, and enforcement of UNCLOS and other treaties, as well as the application of non-legally binding instruments, including the *Revised URN Guidelines*.

At the nineteenth meeting of the UNGA Informal Consultative Process (see section 1.4), the urgent need for capacity-building and transfer of knowledge and marine technology to address knowledge gaps and uncertainties and alleviate the negative impacts of anthropogenic underwater noise and the importance of cooperation to that effect was underlined by several delegations.[300] Several delegations specifically emphasized the need for capacity-building activities and initiatives to assist developing States in sustainably managing marine resources, developing management strategies, building national programmes to monitor and study the possible effects of anthropogenic underwater noise and making well-informed policy decisions.[301]

The need to build capacity in developing regions, where awareness and scientific capacity in addressing anthropogenic underwater noise have yet to be strengthened was also emphasized at a CBD workshop.[302]

UNCLOS and the BBNJ Agreement include extensive obligations relating to capacity-building and the transfer of marine technology. The objectives of the BBNJ Agreement in relation to capacity-building and the transfer of marine technology as set out in Part V of the Agreement include to: assist Parties in implementing the Agreement, to achieve its objectives; enable inclusive, equitable and effective cooperation and participation in the activities undertaken under the Agreement; develop the marine scientific and technological capacity, including with respect to research, of Parties, with regard to the conservation and sustainable use of marine biological diversity of ABNJ; increase, disseminate and share knowledge on the conservation and sustainable use of marine biological diversity of ABNJ; and support developing States Parties in achieving the objectives of the Agreement relating to: marine genetic resources, including the fair and equitable sharing of benefits; measures such as ABMTs, including MPAs; and EIAs (article 40). In giving effect to Part V, Parties are required to give full recognition to the special requirements of developing States Parties to the Agreement, in particular the least developed countries, landlocked developing countries, geographically disadvantaged States, small island developing States, coastal African States, archipelagic States and developing middle-income countries (article 41(3)).

The BBNJ Agreement also provides a non-exhaustive list of types of capacity-building and of the transfer of marine technology, including: sharing and use of relevant data, information, knowledge and research results; information dissemination and awareness-raising, including with respect to relevant traditional knowledge of Indigenous Peoples and local communities; development and strengthening of relevant infrastructure, including equipment and capacity of personnel for its use and maintenance; development and strengthening of institutional capacity and national regulatory frameworks or mechanisms; development and strengthening of human and financial management resource capabilities and of technical expertise through exchanges, research collaboration, technical support, education and training and the transfer of marine technology; development and sharing of manuals, guidelines and standards; development of technical, scientific and research and development programmes; and development and strengthening of capacities and technological tools for effective monitoring, control and surveillance of activities within the scope of the Agreement (article 44). Further details concerning the types of capacity-building and of the transfer of marine technology are elaborated in annex II to the Agreement.

The Agreement also includes provisions on cooperation in capacity-building and the transfer of marine technology (article 41), modalities for capacity-building and for the transfer of marine technology (article 42), additional modalities for the transfer of marine technology (article 43), monitoring and review (article 45) and on the Capacity-building and Transfer of Marine Technology Committee (article46). [303]

Policy instruments which specifically address capacity-building and the transfer of technology to support the reduction of anthropogenic underwater noise, include the policy outcomes of the CBD COP and the IWC.

In its decision XII/23, the CBD COP encouraged Parties and other Governments as well as Indigenous and local communities and other relevant stakeholders, to take appropriate measures, as appropriate and within their competencies, and in accordance with national and international laws, to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, such as developing and transferring quieter technologies, and applying the best available practice in all relevant activities; and building capacity in developing regions where the awareness and scientific capacity to address this issue has yet to be strengthened.[304] The COP also invited competent intergovernmental organizations, including IMO, CMS and IWC, to take measures within their mandates, if applicable, and to assist States in taking measures, limited to those that are within the mandates of the respective competent intergovernmental organization, to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity.[305]

As indicated in section 2.4.2.7 above, the IWC in its resolution 2018-4 recommended that contracting governments incentivize the development, adoption and voluntary transfer, on mutually agreed terms, of technologies and strategies that mitigate the impacts of anthropogenic underwater noise on cetaceans from various activities that produce the noise. It indicated that if appropriate, this could be carried out through regulatory measures.[306]

The work plan of the IWC Conservation Committee's Strategic Plan 2016–2026[307] includes actions to further identify and engage with appropriate regional and international bodies addressing anthropogenic noise and progress any opportunities for capacity-building, in particular with regard to IMO.

2.4.2.9 Cooperation and coordination

Cooperation and coordination at various levels and between and among a broad range of stakeholders can also support the reduction of underwater radiated noise from shipping.

At the nineteenth meeting of the UNGA Informal Consultative Process (see section 1.4), delegations underlined the need for concerted international action to assess and mitigate the effects of anthropogenic underwater noise in all ocean areas, owing to the interconnected nature of the ocean and the transboundary nature of the impacts of the noise.[308] Several delegations also highlighted the importance of international cooperation to enhance research and the collection of data, in particular in data-deficient regions.[309] Furthermore, a general need for effective cooperation and coordination at the global level was emphasized and the role of UNGA in supporting such cooperation and coordination was highlighted in that regard. [310]

The need to develop cross-sectoral coordination was also underscored at the UNGA Informal Consultative Process.[311] Such coordination is important in view of the different sectors that are engaged in activities which produce anthropogenic underwater noise, or which are affected by the impacts of such noise on marine life. It is also critical to strengthen cooperation and coordination between and among States, organizations and with other relevant stakeholders, including industry, the scientific community, Indigenous Peoples and local communities.

Delegations at the UNGA Informal Consultative Process identified a need for increased cooperation and collaboration between States, intergovernmental organizations and civil society to improve responses to anthropogenic underwater noise.[312] The need for different types of cooperation to allow for the most robust and comprehensive partnerships, enabling enhanced sharing of best practices and the BATs was also underlined.[313] All relevant global and regional organizations, Member States and civil society were encouraged to share their knowledge and exchange experiences.[314]

Other global intergovernmental bodies have also addressed the need to promote cooperation among relevant global intergovernmental bodies. A CBD workshop encouraged collaboration and communication among relevant international bodies for synergies.[315]

In response to the questionnaire, DOALOS indicated that in 2018, it prepared the report of the Secretary-General on oceans and the law of the sea focusing on anthropogenic underwater noise for the nineteenth meeting of the UNGA Informal Consultative Process (A/73/68), which incorporated input from a variety of States and intergovernmental organizations, including IMO. Twice a year, the Division seeks contributions from various UN agencies, programmes and bodies, including IMO, as well as other intergovernmental organizations, to provide contributions to the reports of the Secretary-General on oceans and the law of the sea.

UNCLOS, the UN Fish Stocks Agreement and the BBNJ Agreement, in particular, include extensive obligations relating to cooperation and coordination.

Policy outcomes of global intergovernmental bodies which include specific references to cooperation and coordination to reduce the adverse impacts of anthropogenic underwater noise generally are presented below. Section 2.2 above also includes some recommendations from policy-making bodies in relation to cooperation and coordination with respect to the reduction of underwater noise from shipping.

As noted in section 2.4.2.1 above, UNGA has called upon States and competent international organizations to cooperate and coordinate their research efforts with regard to underwater noise so as to prevent and reduce its impacts and preserve the integrity of the whole marine ecosystem, while fully respecting the mandates of relevant international organizations. [316]

The CBD COP has encouraged Parties and other Governments as well as Indigenous and local communities and other relevant stakeholders, to take appropriate measures, as appropriate and within their competencies, and in accordance with national and international laws, to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity. Such measures include encouraging collaboration and communication among relevant international bodies to enhance synergies in addressing this issue and engaging industry and other relevant sectors, including the naval and mining sectors, when developing guidelines in order to increase their ownership and participation in the implementation of the guidelines.[317]

In its resolution 14.9, the CMS COP urged Parties to, inter alia, establish processes for the involvement of Indigenous Peoples and local communities with cetacean-related activities and decisions, as well as within national jurisdictions, as and where appropriate. [318] It also called on Parties and non-Parties to promote the integration of cetacean conservation into all relevant sectors by coordinating their national positions among various conventions, agreements and other international fora.[319] It requested the Scientific Council and the Secretariat to continue and increase collaborative efforts with other relevant international fora, including the IWC and its Scientific and Conservation Committees and the IUCN Species Survival Commission Cetacean Specialist Group, with a view to avoiding duplication, increasing synergies and raising the profile of CMS and its cetacean-related agreements in these fora.[320]

In its resolution 2018-4, the IWC recommended that contracting governments consider engaging with industries, academia, NGOs, and other stakeholders to support the development and implementation of mitigation strategies and best practices that protect cetaceans in line with an ecosystem approach and the precautionary approach.

The IWC agreed that the provisions in its resolution 2018-4 should not duplicate the work of other organizations and requested the IWC Secretariat to forward a copy of its resolution to the Secretariats of the CBD, CMS, FAO, IMO and other relevant specialized agencies and programmes of the UN, including DOALOS; and to encourage actions by and promote cooperation between these forums, consistent with their mandates, to address anthropogenic underwater noise in recognition of the impacts it can have on cetaceans.

At its meeting in 2024, the IWC Scientific Committee,[321] recommended, inter alia, to continue networking with other international bodies in identifying priorities on underwater noise to avoid duplicative work; to introduce, whenever needed, or reinforce the importance of marine mammal stewardship in the agenda of these bodies to strengthen the synergy; and continue collaborations with international bodies that have work programmes to reduce underwater noise, including the IMO Action Plan to further prevent and reduce URN from ships. IWC's work on underwater noise has been presented to IMO.[322]

The ISA and IMO have set out a preliminary roadmap for understanding their respective competencies concerning activities in the Area and identified several matters which merit further studies (see section 2.4.2.10 below).

2.4.2.10 Implementation, compliance and enforcement

The achievement of the objectives in UNCLOS and in all of the treaties mentioned in section 2.4.1 are dependent on the full and effective implementation of, compliance with, and enforcement of the obligations of States under those treaties.

The BBNJ Agreement established an Implementation and Compliance Committee which will be facilitative in nature and function in a transparent, non-adversarial and non-punitive manner. The Committee may draw on appropriate information from bodies established under the Agreement and from relevant IFBs, as may be required (article 55).

As indicated in section 1.4, at the nineteenth meeting of the **UNGA Informal Consultative Process,** many delegations highlighted the need for effective implementation of UNCLOS. Several delegations also underscored the importance of addressing the effects of noise for the implementation of the 2030 Agenda, in particular SDG 14.

Although UNCLOS requires States to prevent, reduce and control pollution of the marine environment from any source and to cooperate in the establishment of international rules and standards in the case of pollution from vessels or global and regional rules, standards and recommended practices and procedures to prevent pollution from seabed activities subject to national jurisdiction, States have not developed such rules, standards and recommended practices to prevent, reduce and control anthropogenic underwater noise pollution. DOALOS, in its response to the questionnaire, indicated that there was an absence of intergovernmental forums for certain sound-producing activities.

In addition, the applicability of the *Revised URN Guidelines* to activities in the Area requires further consideration, especially since ISA and IMO identified in a joint report the need for a comprehensive study of specific IMO regulations and generally accepted practices that will apply side-by-side with ISA regulations.[323] Also a determination of what installations and structures employed in activities in the Area may be characterized as "ships" is necessary to facilitate coordination between the applicable inspection regimes for seabed mining and international shipping.[324] ISA also considered that a further identification of IMO codes, guidelines and generally accepted practices that could serve to inform, supplement or assist the development of ISA regulations and guidelines would be helpful.[325]

There are also implementation challenges which need to be addressed. These include the limited action to support the achievement of Goal 14 of the 2030 Agenda.[326] As indicated in section 2.4.2.3 above, implementation challenges have also arisen in relation to ABMTs, including MPAs.

Furthermore, while the guidelines that have been developed and the policy outcomes that have been adopted can support States in implementing their commitments under treaties that contain obligations associated with the reduction of underwater noise from shipping, for example with respect to EIAs, the voluntary nature of such instruments has not necessarily compelled States to take action.

2.4.2.11 Monitoring and evaluation

Evaluation and ongoing monitoring are essential steps towards assessing the effectiveness of efforts to reduce noise in the oceans, as indicated in the *Revised URN Guidelines.* The urgent need for methods for standardizing the monitoring of noise, and data sets, so that both spatial and temporal differences can be evaluated and priorities established,[327] and research outputs can be harmonized and compared, has been identified.[328] It is important that each URN monitoring programme follows the same international best practices[329] and ISO metrics[330] for URN measurement and reporting.[331]

As indicated in section 2.4.2.4 above and in section 2.1.1, monitoring and review and/or evaluation are also essential steps in the EIA process.

In its decision XI/18, the **CBD COP** encouraged Parties, other Governments and relevant organizations, according to their priorities to, inter alia, develop indicators and explore frameworks for monitoring underwater noise for the conservation and sustainable use of marine biodiversity.[332]

In its decision XII/23, the CBD COP urged Parties and invited other Governments and competent organizations, including IMO, the CMS, and the IWC, as well as Indigenous and local communities and other relevant stakeholders, to take appropriate measures within their mandates to avoid, minimize and mitigate the potential significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including through, inter alia, conducting EIAs and carrying out appropriate monitoring.[333]

In its resolution 2018-4, the IWC recommended that contracting governments consider working with appropriate stakeholders to establish national and regional anthropogenic noise registers and monitoring programmes, as appropriate, to support the assessment of anthropogenic underwater noise impacts on cetaceans.[334] The IWC instructed its Conservation Committee to review progress in implementing the IWC recommendations on the mitigation and management of anthropogenic underwater noise and, based on this review, develop advice on priority actions to implement to address the impacts of anthropogenic underwater noise on cetaceans.[335]

300 UNGA "Report on the work of the UN Open-ended Informal Consultative Process ..." (n 28) para 33.
301 ibid.
302 CBD "Report of the Expert Workshop ..." (n 201) annex IV, para 27.
303 For further information see <https://www.un.org/bbnjagreement/sites/default/files/2024-08/BBNJAgreementFactsheet5CBTMT.pdf> last accessed 1 December 2024.
304 CBD COP decision XII/23 (n 92) para 3.
305 ibid para 4.
306 IWC Res 2018-4 (n 101).
307 See <https://iwc.int/conservation-committee> last accessed 16 September 2024.
308 UNGA "Report on the work of the UN Open-ended Informal Consultative Process ..." (n 28) para 30.
309 ibid.
310 ibid para 31.
311 ibid.
312 ibid.
313 ibid para 32.
314 ibid.
315 CBD "Report of the Expert Workshop ..." (n 201) annex IV, para 33.
316 UNGA Res 79/144 (n 44) para 287.
317 CBD COP decision XII/23 (n 92) para 3.
318 CMS COP Res 14.9 (n 98) para 5(a).
319 ibid para 2.
320 ibid para 6.
321 IWC "Report of the Scientific Committee (SC69B)" (n 107).
322 Most recently in IMO Doc MEPC 82/9/3 (n 109).
323 ISA and IMO (n 294).
324 ibid.
325 ibid.
326 UN *The Sustainable Development Goals Report 2024* (n 237).
327 UN Group of Experts of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects (n 198).
328 CBD "Report of the Expert Workshop ..." (n 201) annex IV, para 2.
329 Stephen P Robinson, Paul A Lepper, Richard A. Hazelwood *Good Practice Guide for Underwater Noise Measurement* (National Measurement Office, Marine Scotland, The Crown Estate, 2014: 95 <https://repository.oceanbestpractices.org/handle/11329/435> last accessed 27 November 2024.
330 ISO 17208-1:2016 Underwater acoustics – Quantities and procedures for description and measurement of underwater sound from ships – Part 1: Requirements for precision measurements in deep water used for comparison purposes <https://www.iso.org/standard/62408.html> last accessed 27 November 2024.
331 N. C. Van Geel, D. Risch, A. Wittich "A brief overview of current approaches for underwater sound analysis and reporting" (2022) *Marine Pollution Bulletin*, 178, 113610.
332 CBD COP decision XI/18 (n 90) para 18.
333 CBD COP decision XII/23 (n 92).
334 IWC Res 2018-04 (n 101).
335 ibid.

SECTION

3

ANALYSIS OF EXISTING REGIONAL LEGAL INSTRUMENTS

3.1 INTRODUCTION

The obligations under UNCLOS, the CBD and the CMS and the significant policy outcomes from UNGA, the CBD COP, and the CMS COP (see section 2), as well as the *Revised URN Guidelines* have exerted a diverse influence on regional legal frameworks.

While all regions, that have regional treaties or other legally binding instruments in place, could take some action to prevent, reduce and control pollution of the marine environment from underwater radiated noise from ships, efforts in that regard have been concentrated in only some regional bodies that have a significant number of Member States from developed countries and in North America.

With the exception of one regional treaty which does not define "pollution", all other regional seas treaties include, like UNCLOS, the introduction of energy in their definitions of "pollution". This means that anthropogenic underwater noise, if it results, or is likely to result in such deleterious effects as harm to living resources and marine life, is considered pollution of the marine environment. All regional seas treaties include obligations to prevent, reduce and control pollution of the marine environment.

Efforts of the EU and of regional bodies, such as HELCOM and OSPAR, as well as efforts within the framework of ACCOBAMS, ASCOBANS, and the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), have been instrumental in the assessment of pressures and impacts of URN from shipping. There is a clear focus on research and monitoring, which are crucial foundations for developing targets and measures to achieve those goals. While current reduction efforts remain limited, various strategies for the reduction of underwater radiated noise from shipping are available and applicable to a number of regional bodies, including their members, and the Parties to regional legally binding instruments.

This part of the Gap Analysis will focus on regional legal instruments which either provide a legal basis for the reduction of underwater radiated noise from shipping and/or legal instruments which do not address underwater radiated noise from shipping directly, but which can nonetheless support its reduction. The analysed framework comprises Species Conservation Agreements, regional seas Conventions, including pertinent Protocols and relevant non-legally binding instruments. Table 1 below provides a list of these regional instruments organized under the various regional ocean/sea areas. In addition to developments within the framework of regional conventions and regional bodies, reference will also be made to recent developments in relation to underwater radiated noise on the North American continent.

Section 3.2 presents the obligations in regional instruments which address specific fauna. Section 3.3 provides an analysis of, and brief summary of the provisions of relevant regional legal instruments applicable in various ocean/sea areas that provide a legal basis for the reduction of underwater radiated noise from shipping. Some of the regional instruments which are applicable in more than one ocean/sea area, for example EU legislation, will be addressed first. Other instruments, organized according to the various ocean/sea areas, will then be presented.

Section 3.4 will focus on specific measures in treaties and non-binding legal instruments, as well as other approaches, which do not address anthropogenic underwater noise, but can support the reduction of URN from ships.

Identified gaps and other challenges within the regional framework, as well as potential recommendations and suggestions to address these are included in section 3.

Table 1: List of regional treaties and some non-binding legal instruments applicable in the various ocean/sea areas

BODIES OF WATER	LEGAL INSTRUMENTS ASSOCIATED WITH THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING
Asian Seas (East)	Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the East Asian Region (the East Asian Seas Action Plan) revised in 1994 Coordinating Body on the Seas of East Asia (COBSEA) Marine and Coastal Ecosystems (MCE) Framework, 2023
Asian Seas (South)	The Colombo Declaration on the South Asia Co-operative Environment Programme (SACEP) and Articles of Association of SACEP, 1981 SACEP Marine and Coastal Biodiversity Strategy for the South Asian Seas Region, 2019
Atlantic (Central, West, and South African region)	Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West and Central African Region (Abidjan Convention) Protocol on integrated coastal zone management (Pointe-Noire Protocol) Agreement on the Conservation of the African-Eurasian Migratory Waterbirds (AEWA)
Atlantic (North-East)	Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) North-East Atlantic Environment Strategy (NEAS) 2030 Agreement on the Conservation of Small Cetaceans of the Baltic, North-East Atlantic, Irish and North Seas (ASCOBANS) Agreement on the Conservation of the African-Eurasian Migratory Waterbirds (AEWA) Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (Protocol on SEA) EU legislation (applicable to EU Member States)
Atlantic (North-West)	Inter-American Agreement for the Protection and Conservation of Sea Turtles Canada and United States legislation
Baltic Sea	Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) HELCOM Copenhagen Ministerial Declaration Baltic Sea Action Plan (BSAP), 2021 Regional Action Plan on Underwater Noise (RAP Noise), 2021 Agreement on the Conservation of Small Cetaceans of the Baltic, North-East Atlantic, Irish and North Seas Agreement on the Conservation of the African-Eurasian Migratory Waterbirds (AEWA) Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (Protocol on SEA) EU legislation (applicable to EU Member States)

BODIES OF WATER	LEGAL INSTRUMENTS ASSOCIATED WITH THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING
Black Sea	Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention) The Black Sea Biodiversity and Landscape Conservation Protocol Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOMBAMS) Agreement on the Conservation of the African-Eurasian Migratory Waterbirds Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) General Fisheries Commission for the Mediterranean Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (Protocol on SEA) EU legislation (applicable to EU Member States)
Caribbean Sea, Gulf of Mexico and adjacent Atlantic area	Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (SPAW Protocol) Inter-American Agreement for the Protection and Conservation of Sea Turtles
Caspian Sea	Convention for the Protection of the Marine Environment of the Caspian Sea (Tehran Convention) Protocol for the Conservation of Biological Diversity (Ashgabat Protocol) Protocol on Environment Impact Assessment in a Transboundary Context
Indian Ocean (West)	Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean (Nairobi Convention) and Amended Nairobi Convention for the Protection, Management, and Development of the Marine and Coastal Environment of the Western Indian Ocean (Amended Nairobi Convention) Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region Protocol on Integrated Coastal Zone Management (ICZM) Agreement on the Conservation of the African-Eurasian Migratory Waterbirds (AEWA)

BODIES OF WATER	LEGAL INSTRUMENTS ASSOCIATED WITH THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING
Mediterranean Sea	Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention) Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean Protocol on Integrated Coastal Zone Management in the Mediterranean Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOMBAMS) Agreement on the Conservation of the African-Eurasian Migratory Waterbirds (AEWA) Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) General Fisheries Commission for the Mediterranean (GFCM) Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) Protocol on Strategic Environmental Assessment EU legislation (applicable to EU Member States)
Pacific (North)	Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua Convention) Inter-American Agreement for the Protection and Conservation of Sea Turtles Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (NOWPAP), 1994 Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean
Pacific (South)	Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (Noumea Convention) SPREP [Secretariat of the Pacific Regional Environment Programme] Strategic Plan 2017-2026
Pacific (South-East)	Convention for the Protection of the Marine Environment and Coastal Zones of the South-East Pacific (Lima Convention) Protocol for the Conservation and Management of the Marine and Coastal Protected Areas of the Southeast Pacific Inter-American Agreement for the Protection and Conservation of Sea Turtles
Red Sea and Gulf of Aden	Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention) Protocol Concerning the Conservation of Biological Diversity and the Establishment of Network of Protected Areas in the Red Sea and Gulf of Aden
ROPME Sea Area	Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution (Kuwait Convention)
Antarctic, Southern Ocean	Antarctic Treaty Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) Convention for the Conservation of Antarctic Seals

BODIES OF WATER	LEGAL INSTRUMENTS ASSOCIATED WITH THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING
Arctic Ocean	Declaration on the establishment of the Arctic Council (Ottawa Declaration) Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (Protocol on SEA) EU legislation (applicable to EU Member States)

3.2 REGIONAL INSTRUMENTS WHICH ADDRESS SPECIFIC FAUNA

A number of regional agreements have been adopted to provide obligations to conserve specific fauna which are migratory, such as cetaceans, turtles and waterbirds, or which are in a vulnerable state due to commercial exploitation, such as Antarctic seals. An overview of these agreements and relevant policy outcomes and other developments in relation to anthropogenic underwater noise are presented in section 3.2.1 below.

Regional agreements in relation to fish stocks, in particular highly migratory fish stocks, cover not only conservation measures, but also management and sustainable use of the stocks. Section 3.2.2 below focusses on the GFCM because it is the only regional fisheries body that has undertaken work in relation to anthropogenic underwater noise thus far.

3.2.1 Regional instruments focused on the conservation of specific fauna

The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS),[336] adopted in 1996, has 24 Parties as of 14 October 2024. It was established under the auspices of the CMS. ACCOBAMS recognizes "that cetaceans are an integral part of the marine ecosystem which must be conserved for the benefit of present and future generations, and that their conservation is a common concern" (Preamble). ACCOBAMS is geographically applicable 'to all the maritime waters of the Black Sea and the Mediterranean and their gulfs and seas' (article I(1)a)). It is further applicable to "all cetaceans that have a range which lies entirely or partly within the Agreement area or that accidentally or occasionally frequent the Agreement area" (article I(2)). An indicative list of species is set out in annex I.

The Agreement establishes a series of conservation obligations, specifically through coordinated measures to achieve and maintain a favourable conservation status for cetaceans (article II(1)). To this end, Parties are required to cooperate to, inter alia, create and maintain a network of specially protected areas to conserve cetaceans (article II(1)). The Agreement provides that Parties shall 'endeavour to establish and manage specially protected areas for cetaceans corresponding to the areas which serve as habitats of cetaceans and/or which provide important food resources for them. Such specially protected areas should be established within the framework of the Regional Seas Conventions (OSPAR, Barcelona and Bucharest Conventions), or within the framework of other appropriate instruments' (annex 2).

Within the limits of their national jurisdiction and in accordance with their international obligations, Parties are further required to apply the conservation, research and management measures included in annex 2 addressing, inter alia, the adoption and enforcement of national legislation; assessment and management of humancetacean interactions; habitat protection; research and monitoring as well as capacity building, collection and dissemination of information, training and education (article II(3)). ACCOBAMS establishes the positive obligation for Parties to apply the precautionary principle in the implementation of those measures (article II(4)).

336 Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) (adopted 24 November 1996; entered into force on 1 June 2001) 2183 UNTS 303.

> REGIONAL AGREEMENTS IN RELATION TO FISH STOCKS, IN PARTICULAR HIGHLY MIGRATORY FISH STOCKS, COVER NOT ONLY CONSERVATION MEASURES, BUT ALSO MANAGEMENT AND SUSTAINABLE USE OF THE STOCKS

Other articles include those relating to institutional arrangements (articles III, IV, V, VI and VII), communication and reporting (article VIII) and settlement of disputes (article XII).

In the framework of ACCOBAMS, several resolutions have been adopted by the Meeting of the Parties (MOP) to encourage and support the implementation of underwater noise reduction measures, specifically due to its impacts on cetacean species (resolutions 2.16 (2004);[337] 3.10 (2007):[338] 4.17 (2010);[339] 5.15 (2013); [340] 6.17[341] & 6.18 (2016);[342] 7.13 (2019);[343] 8.17 (2022)[344]).

Resolution 2.16 already recognized "that anthropogenic ocean noise is a form of pollution, comprised of energy, that can have adverse effects on marine life ranging from disturbance to injury and mortality". The subsequent resolutions on noise reaffirmed the qualification of anthropogenic underwater noise as a pollutant. The resolutions repeatedly highlight that the Agreement area has particularly seen an increasing noise level due to human activities, including commercial shipping and foresees a continuation of this trend.

ACCOBAMS MOP resolutions 7.13 and 8.17 both reference the 2014 *URN Guidelines*. The latter resolution encourages Parties to engage in the review process and to promote the evolution of the Guidelines status to improve their uptake by IMO Parties.

One of ACCOBAMS's main policy outcomes has been the development of the "ACCOBAMS Methodological Guide: Guidance on Underwater Noise Mitigation Measures" from 2013, revised in 2016 and in 2019.[345] The Guidance document applies to underwater noise emitting activities in general and outlines some measures specifically relevant to shipping. The ACCOBAMS MOP resolutions further reference the CMS Family Guidelines and encourage all national departments to disseminate both documents involved in deciding on noise-generating activities.

ACCOBAMS MOP resolution 8.17 notes that underwater noise pollution from ships can only be effectively addressed through IMO measures and international cooperation, highlighting the potential of mandatory measures to provide an equal playing field level for the private sector (paragraph 5(e)). It further encourages Parties "to ask IMO to implement mitigation measures, such as speed reduction or re-routing in order to reduce shipping noise, especially in critical habitat or high-risk zones, considering the information available from NETCCOBAMS"[346] (paragraph 5(j)). Moreover, it encourages Parties 'to consider implementing mitigation measures, such as speed reduction or re-routing, in order to reduce shipping noise in their exclusive economic zone or territorial sea, especially in critical habitats or high-risk zones, considering the information available from NETCCOBAMS' (paragraph 5(k)).

In addition, resolution 8.17 recommends that Parties engage in trials measuring the impact of speed reduction and other operational measures aiming at reducing underwater noise and to consider implementing these measures in their EEZ or territorial sea, especially in critical habitats or high-risk zones, considering the information available from NETCCOBAMS. The same resolution also recommends the further development with the Secretariat and the Scientific Committee of the concept of "quiet zones" as outlined in Recommendation 10.5 of the Scientific Committee, with a focus on a quantitative elaboration and evaluation of scientific evidence for establishing "quiet zones" both in space and time.

ACCOBAMS resolution 8.17 encourages the Parties to mandate national responsible institutions to provide the necessary data to update risk maps and generate maps for the Black Sea by considering relevant target species, especially recalling resolution 7.13, which foresees that noise hotspot maps shall be developed for the Black Sea, reflecting impulsive and continuous noise generating activities.

In 2012, the ACCOBAMS and ASCOBANS working groups on underwater noise were combined. The CMS joined the group in 2014, resulting in the Joint ACCOBAMS/ASCOBANS/CMS Working Group on Noise. This Working Group assists in developing the Mediterranean Strategy on Underwater Noise monitoring under the Barcelona Convention.[347] Moreover, the Joint Working Group guides the development of the underwater noise indicator in the framework of the UNEP/MAP [Mediterranean Action Plan] Ecosystem Approach-based Implementation Strategy on the indicator for underwater noise.[348]

ASCOBANS,[349] adopted in 1992, has 10 Parties as of 14 October 2024. It was established under the auspices of the CMS. ASCOBANS covers the marine environment of the Baltic and North Seas and contiguous area of the North-East Atlantic as indicated by the coordinates in the Agreement (article 1(2)(b)). Parties to the Agreement undertake to cooperate closely in order to achieve and maintain a favourable conservation status for small cetaceans (article 2(1)). In particular, each Party is required to apply within the limits of its jurisdiction and in accordance with its international obligations, the conservation, research and management measures prescribed in the annex to the Agreement (article 2(2)). Those measures relate to habitat conservation and management; surveys and research; use of by-catches and strandings; legislation, and information and education (annex). With regard to habitat conservation, Parties are required to work towards the effective regulation, to reduce the impact on the animals, of activities which seriously affect their food resources, and the prevention of other significant disturbance, especially of an acoustic nature, among other measures (annex, paragraph 1).

Other articles in the Agreement relate, inter alia, to reporting (article 2(5)) and institutional arrangements (articles 2(4), 4, 5 and 6).

Shipping noise was recognized as a significant disturbance to small cetaceans in 1995, during the First ASCOBANS Advisory Committee (AC) Meeting. Resolution No. 5, adopted at the ASCOBANS MOP in 2003, specifically addressed the "Effects of Noise and Vessels".[350] It invited Parties and Range States to develop, with military and other relevant authorities, effective mitigation measures including EIAs and relevant standing orders to reduce disturbance of, and potential physical damage to, small cetaceans. The MOP also invited those States to research the effects on small cetaceans of vessels, particularly high-speed ferries, among other noise sources. It provided that research on the physical and behavioural effects, at individual and population levels, should be included. Parties and Range States were also invited to develop management measures, guidelines and technological adaptations to minimize any adverse effects on small cetaceans of the sound sources and to develop and implement procedures to assess their effectiveness.

The invitation to Parties and Range States contained in the 2003 ASCOBANS MOP resolution is reiterated in resolution No. 4, titled "Adverse Effects of Sound, Vessels, and Other Forms of Disturbance on Small Cetaceans",[351] adopted by the MOP in 2006. In 2008, an Intersessional Working Group on the Assessment of Acoustic Disturbance was established to evaluate human activities causing noise disturbance and review best practices in noise management relevant to ASCOBANS. The Group has been focusing on assessing noise-related activities, but its examination of underwater noise from shipping is limited to considering the issue only "where appropriate", acknowledging that it falls under the purview of IMO.

ASCOBANS is part of the Joint ACCOBAMS/ASCOBANS/CMS Working Group on Noise, as indicated above.

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA),[352] adopted in 1996, has 85 Parties, as of 14 October 2024. It was developed under the framework of the CMS. The Agreement area, defined by a list of coordinates in annex 1, stretches from the northern reaches of Canada and the Russian Federation to the southernmost tip of Africa and includes marine areas. Species covered by the Agreement cross international boundaries during their migrations and are listed in annex 2. They include the South African penguin.

Parties are required to take coordinated measures to maintain migratory waterbird species in a favourable conservation status or to restore them to such a status. To this end, they must apply within the limits of their national jurisdiction general conservation measures prescribed in the Agreement (article II), giving special attention to endangered species as well as to those with an unfavourable conservation status (article III(1)). The measures set out in the Agreement relate to species conservation; habitat conservation; management of human activities; research and monitoring; education and information; and implementation (article III(2)). The Agreement also includes an Action Plan which specifies the action Parties are required to undertake in relation to priority species and issues consistent with the general conservation measures (article IV and annex 3). Table 1 of the Action Plan assigns categories according to the status of populations of migratory waterbirds.

The Action Plan indicates that special attention should be given to the problem of human disturbance at breeding colonies of colonially-nesting waterbirds, especially when they are situated in the areas which are popular for outdoor recreation. Appropriate measures might include, inter alia, the establishment of disturbance-free zones in protected areas where public access is not permitted (section 4.3.6). In cases where human disturbance threatens the conservation status of waterbird populations listed in appendix I to the CMS; listed as threatened on the IUCN Red list of Threatened Species; or which populations number less than around 10,000 individuals, Parties should endeavour to take measures to limit the level of threat (section 2.1.1(b)).

Parties are required to establish and effectively enforce adequate statutory pollution controls in accordance with international norms and legal agreements, particularly as related to oil spills, discharge and dumping of solid wastes, for the purpose of minimizing their impacts on the populations listed in Table 1 (section 4.3.9). Parties are required to assess the impact of proposed projects which are likely to lead to conflicts between populations listed in Table 1 that are in protected areas and human interests and must make the results of the assessment publicly available (section 4.3.1). Parties must endeavour to continue establishing protected areas to conserve habitats important for the populations listed in Table 1, and to

develop and implement management plans for these areas (section 3.2.2). Parties must also endeavour to give special protection to those wetlands which meet internationally accepted criteria of international importance (section 3.2.3). Parties are also required to endeavour to develop strategies, according to an ecosystem approach, for the conservation of the habitats of all populations listed in Table 1, including the habitats of those populations that are dispersed (section 3.2.4).

Other articles relate, inter alia, to rehabilitation (article 3(3)), management of human activities (article 4), research and monitoring (article 5), education and information (article 6), and implementation (article 7).

In 2023, the AEWA Technical Committee (TC), a subsidiary body established under the AEWA (article VII), received information from South Africa that a study indicated a strong correlation between an exponential increase in vessel-derived noise associated with ship-to-ship bunkering activities (i.e. offshore fuel transfers) in the proximity to St Croix Island (Algoa Bay) and the impacts on the African Penguin colony at St Croix Island. South African indicated that there had been an unprecedented short-term decline of 80% in that population of African Penguin between 2015 and 2022. It also informed the TC that an environmental risk assessment for ship-to-ship bunkering in Algoa Bay recently commenced and was intended to consider the full range of environmental risks associated with this activity.[353]

South Africa also informed the AEWA TC that the project 'Acoustic Foraging Network of African Penguins' (AFNAP) led by the University of Paris-Saclay, in collaboration with Business Leadership South Africa (BLSA) and the Nelson Mandela University (NMU), was initiated in 2021 to understand the behavioural responses of African Penguins to marine noise and how this may affect their communication network at sea. To date, miniature hydrophones and accelerometers had been deployed on African Penguins in Algoa Bay to facilitate this. In addition to this monitoring, in situ hydrophones were deployed at two locations in Algoa Bay in 2022. BLSA and the Southern African Foundation for the Conservation of Coastal Birds installed an Automated Penguin Monitoring System (APMS) on Bird Island, Algoa Bay, in 2022. Data from the APMS will be used to assess the response of birds to various potential threats including marine noise (using in situ hydrophone data) and resource competition. NMU researchers will be monitoring noise levels in close proximity to bunkering and transiting vessels in 2023 to improve the understanding of the noise levels associated with bunkering activities. Neither the AEWA TC nor the AEWA MOP have recommended any action to address the impact of underwater noise from shipping on migratory waterbirds.

The Inter-American Agreement for the Protection and Conservation of Sea Turtles,[354] adopted in 1996, has 16 Parties as of 14 October 2024. The Convention applies in the Americas of each of the Parties, as well as the maritime areas of the Atlantic Ocean, the Caribbean Sea and the Pacific Ocean, with respect to which each of the Parties exercises sovereignty, sovereign rights or jurisdiction over living marine resources in accordance with international law, as reflected in UNCLOS (article III). The Convention promotes the protection, conservation, and recovery of the populations of sea turtles and those habitats on which they depend, on the basis of the best available data and taking into consideration the environmental, socio-economic and cultural characteristics of the Parties (article II). Each Party is required to take measures, in accordance with international law and on the basis of the best available scientific evidence, in its maritime areas with respect to which it exercises sovereignty, sovereign rights or jurisdiction, and with respect to vessels flying its flag on the high seas. A range of measures that Parties are required to take are set out in the Convention. They include, to the extent practicable, the restriction of human activities that could seriously affect sea turtles, especially during the periods of reproduction, nesting and migration (article

IV(2)(c)). They also include the protection, conservation and, if necessary, the restoration of sea turtle habitats and nesting areas, as well as the establishment of necessary restrictions on the use of such zones, including the designation of protected areas, as provided in annex II (article IV(2)(d)). Furthermore, they include the promotion of scientific research relating to sea turtles and their habitats, as well as to other relevant matters that will provide reliable information useful for the adoption of the measures referred to in article IV (article IV(2)(e)). Exceptions may be granted to satisfy the economic subsistence needs of traditional communities (article IV(3)). The Agreement establishes, inter alia, a Scientific Council to conduct research on sea turtles and their habitats and to make recommendations for their protection and conservation (article VIII).

Annex II to the Agreement provides that each Party shall consider and may adopt, as necessary and in accordance with its laws, regulations, policies, plans and programmes, measures to protect and conserve sea turtle habitats within its territory and in maritime areas with respect to which it exercises sovereignty, sovereign rights or jurisdiction, such as: requiring assessments of the environmental impact of marine and coastal development activities that may affect sea turtle habitats. Other obligations include the establishment of protected areas and the taking of other measures to regulate the use of areas where sea turtles nest or regularly occur, including permanent or temporary closures, modification of fishing gear, and, to the greatest extent practicable, restrictions on vessel traffic.

Other articles in the Agreement relate to, inter alia, institutional arrangements (articles V-VIII), monitoring programmes (article IX), compliance (article X), annual reports (article XI) and international cooperation (article XII), coordination (article XIV), settlement of disputes (article XVI) and implementation at the national level (XVIII).

Underwater radiated noise from shipping has, thus far, not been taken into account by the Parties to the Agreement.

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention),[355] adopted in 1979, has 51 Parties as of 14 October 2024, among them four African States and the EU. The Bern Convention was established by the Member States of the Council of Europe to protect wild flora, fauna, and their natural habitats. It focuses particularly on species and habitats whose conservation requires international cooperation, promoting collaboration between States (article 1). Special attention is given to endangered and vulnerable species, including migratory species at risk. The Convention is especially relevant for non-EU countries, as its provisions and objectives are incorporated into EU legislation through the EU's Habitats Directive.

The Bern Convention requires Parties to conserve both wildlife species and habitat by integrating conservation into national development and planning policies and promoting national policy frameworks, focusing on the protection of wild flora, fauna, and natural habitats, particularly of endangered and vulnerable species, especially endemic ones, as well as endangered habitats (article 3.1). It establishes a list of protected (annex III) and strictly protected species (annex II). For the latter, Contracting Parties must prohibit the deliberate disturbance of wild fauna, particularly during the period of breeding, rearing, and hibernation (articles 4.1 and 6 (c)).

The Convention further requires each Contracting Party to consider the conservation of wild flora and fauna in its anti-pollution measures; however, it does not provide a specific definition of pollution, nor

does it detail further obligations related to pollution control (article 3(2)). It requires its Parties to take appropriate and necessary legislative and administrative measures to ensure the conservation of the habitats of the wild fauna species, especially the strictly protected species in appendix II, with a special mention of migratory species (article 4).

Other articles in the Bern Convention relate, inter alia, to the protection of species (articles 5-9), the protection of migratory species (article 10), institutional arrangements (articles 13-15), and settlement of disputes (article 18).

The Bern Convention's Standing Committee agreed on the following statement for Vision 2030: "By 2030, declines in biodiversity are halted, leading to recovery of wildlife and habitats, improving the lives of people and contributing to the health of the planet".[356]

To meet this Vision, a Strategic Plan was developed defining four main goals: establishing a protected area network, improving the conservation status of threatened species and their habitats, and guaranteeing that sufficient resources are allocated to meet the Strategic Plan.[357]

On this basis, the Parties designate and manage through their national legislation the so-called Areas of Special Conservation Interest (ASCIs),[358] which can be protected areas on land and sea, and are intended to be included in the Network of Areas of Special Conservation Interest (Emerald Network).[359] These sites are considered equivalent to the Natura 2000 sites under the EU Habitats Directive for EU Member States. The aim of these sites is to ensure long-term protection from external threats and are subject to an appropriate regime for achieving a satisfactory conservation status involving, if and where appropriate, management plans, administrative measures and contractual measures.[360] Conservation in the sense of Article 4 of the Bern Convention not only requires addressing obvious and immediate threats to the habitats concerned but also encompasses "the control of activities which may indirectly result in the deterioration"of habitats.

One of the goals of the Strategic Plan to achieve the Vision 2030 of the Bern Convention is to increase the connectivity, integrity and resilience of natural and semi-natural ecosystems, including through protected areas and other effective area-based conservation measures covering at least 30% of the land and of the sea areas, which also includes the effective management of those sites.[361] Neither URN nor shipping has been considered specifically in the Bern Convention's policy.

The Convention for the Conservation of Antarctic Seals,[362] adopted in 1972, has 15 Parties as of 14 October 2024. The Convention addresses the vulnerable state of the Antarctic seal due to commercial exploitation. But it also aims to provide more general conservation measures not limited to the impacts from commercial exploitation. It therefore provides a list of measures in its annex to be implemented and foresees the future adoption of other measures "with respect to the conservation, scientific study and rational and humane use of seal resources". These include, inter alia, the designation of special areas where there shall be no disturbance of seals, procedures for facilitating the review and assessment of scientific information, and other regulatory measures including an effective system of inspection (article 3). The Convention does not define which activities qualify as disturbing, thereby, not excluding the possibility to consider underwater noise from shipping.

Other articles in the Convention relate, inter alia, to exchange of information and scientific advice (article 5).

337 ACCOBAMS Res 2.16 "Assessment and Impact Assessment of Man-Made Noise" (9 November 2004) Doc ACCOBAMS-MOP2/2004/Res.2.16, 2004.

338 ACCOBAMS Res 3.10 "Guidelines to Address the Impact of Anthropogenic Noise on Marine Mammals in the ACCOBAMS Area" (22 October 2007) Doc ACCOBAMS-MOP3/2007/Res.3.10, 2007.

339 ACCOBAMS Res 4.17 "Guidelines to Address the Impact of Anthropogenic Noise on Cetaceans in the ACCOBAMS Area" (9 November 2010) Doc ACCOBAMS-MOP4/2010/Res.4.17, 2010.

340 ACCOBAMS Res 5.15 "Addressing the Impact of Anthropogenic Noise" (5 November 2013) Doc ACCOBAMS-MOP5/2013/Res.5.15, 2013.

341 ACCOBAMS Res 6.17 "Anthropogenic Noise" (22 November 2016) Doc ACCOBAMS-MOP6/2016/Res.6.17, 2016.

342 ACCOBAMS Res 6.18 "Implementation of an ACCOBAMS Certification for Highly Qualified Marine Mammal Observers" (22 November 2016) Doc ACCOBAMS-MOP6/2016/Res.6.18, 2016.

343 ACCOBAMS Res 7.13 "Anthropogenic Noise" (5 November 2019) Doc ACCOBAMS-MOP7/2019/Doc38/Annex15/Res.7.13, 2019.

344 ACCOBAMS Res 8.17 "Anthropogenic Noise" (29 November 2022) Doc ACCOBAMS-MOP8/2022/Doc31/Annex13/Res8.1, 2022.

345 ACCOBAMS *Methodological Guide: Guidance on Underwater Noise Mitigation Measures* (ACCOBAMS-MOP7/2019/Doc 31Rev1, 21 October 2019).

346 NETCCOBAMS is the Network on the Conservation of Cetaceans of the Black Sea, the Mediterranean and the Adjacent Atlantic Area, that was developed by the ACCOBAMS Permanent Secretariat in collaboration with WWF France and the GIS 3M.

347 EU TG Noise *Management and monitoring of underwater noise in European Seas Overview of main European-funded projects and other relevant initiatives. 2nd Communication Report*. MSFD Common Implementation Strategy Technical Group on Underwater Noise (TG Noise) (2019).

348 ibid p 6.

349 Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) (adopted on 17 March 1992, entered into force on 29 March 1994) 1772 UNTS 217.

350 ASCOBANS Res 5 "Effects of Noise and of Vessels" (22 August 2003) <https://www.ascobans.org/en/document/effects-noise-and-vessels> last accessed 29 November 2024.

351 ASCOBANS Res 4 (12 December 2006) <https://www.ascobans.org/en/document/adverse-effects-sound-vessels-and-other-forms-disturbance-small-cetaceans> last accessed 29 November 2024.

352 Agreement on the Conservation of African-Eurasian Migratory Waterbirds (adopted 15 August 1996 entered into force on 1 November 1999). It was amended in September 2022. See <https://www.unep-aewa.org/en/documents/agreement-text> last accessed 30 November 2024.

353 Report of the 18th Meeting of the Technical Committee (14–16 March 2023) <https://www.unep-aewa.org/sites/default/files/document/aewa_tc19_inf_1_tc18_report.docx> last accessed 30 November 2024.

354 The Inter-American Agreement for the Protection and Conservation of Sea Turtles (adopted on 1 December 1996, entered into force on 2 May 2001) <http://www.iacseaturtle.org/acerca-eng.htm> last accessed 27 November 2024.

355 Convention on the Conservation of European Wildlife and Natural Habitats (adopted 19 September 1979, entered into force on 1 June 1982) 1284 UNTS 209.

356 Bern Convention Standing Committee "Vision for the Bern Convention for the Period to 2030" (2021).

357 Bern Convention Standing Committee "Strategic Plan for the Bern Convention for the Period to 2030" (2023).

358 Bern Convention Standing Committee Recommendation No. 16 "Areas of Special Conservation Interest" (1989).

359 Bern Convention Standing Committee Res No. 8 "National Designation of Adopted Emerald Sites and the Implementation of Management, Monitoring and Reporting Measures" (30 November 2012).

360 ibid. para 2.1.

361 Bern Convention Standing Committee "Strategic Plan ..." (n 357), Goal 1.

362 Convention for the Conservation of Antarctic Seals (adopted 1 June 1972, entered into force on 11 March 1978).

3.2.2 Regional fisheries management organizations and arrangements

As noted in section 2.4.1, the UN Fish Stocks Agreement includes under the general principles the obligation to minimize pollution and to protect biodiversity. Therefore, an ecosystem approach is reflected as a general principle in the UN Fish Stocks Agreement (article 5) and incorporated in the application of the precautionary approach (article 6). Coastal States and States fishing on the high seas and regional fisheries management organizations and arrangements (RFMO/As) are required to implement ecosystem and precautionary approaches in the conservation and management of straddling fish stocks and highly migratory fish stocks. Information on progress made in the implementation of an ecosystem approach by States and RFMO/As was presented to the fifteenth round of Informal Consultations of States Parties to the UN Fish Stocks Agreement when it considered the topic "Implementation of an ecosystem approach to fisheries management" in 2022.[363] Apart from the UN Fish Stocks Agreement, an ecosystem approach to fisheries is also contained in a number of treaties or voluntary arrangements (global and regional) of direct or indirect relevance to fisheries. These instruments include UNCLOS, the BBNJ Agreement, the CBD, the Ramsar Convention, and the 1995 FAO Code of Conduct for Responsible Fisheries and its International Plans of Action.[364]

An ecosystem approach requires an integrated consideration of the conservation and management of fishery resources in the context of the functioning of the wider marine ecosystem in which they occur to ensure the long-term conservation and sustainable use of those resources while safeguarding ecosystems. The broad application of ecosystem and precautionary approaches, along with the obligation to minimize pollution and protect biodiversity in the marine environment as set out in the UN Fish Stocks Agreement, necessitates considering all sources of pollution from fishing vessels. The definition of "pollution" in UNCLOS also applies to the UN Fish Stocks Agreement and therefore can include anthropogenic underwater noise if such noise results in or is likely to result in such deleterious effects as harm to living resources and marine life.

In its response to the questionnaire, the North Pacific Fisheries Commission (NPFC) indicated that the Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean[365] is applicable to underwater noise as it specifically outlines ecosystem considerations and thus covers the impact of fishing activities on the marine environment beyond the target fisheries, including benthic species such as corals/sponges. However, the NPFC noted that, to date, underwater noise from fishing operations has not been an issue for its Members.

Thus far, only the GFCM has undertaken work in relation to anthropogenic underwater noise (see also section 2.4.2.1). GFCM is an RFMO. It has 23 members, 19 Mediterranean States and 3 Black Sea States and the EU. It aims to ensure the long-term conservation and sustainable use of living marine resources and marine ecosystems in the Mediterranean Sea and the Black Sea. The GFCM has the mandate to adopt recommendations on conservation and management measures aimed at ensuring the long-term sustainability of fishing activities, in order to preserve the marine living resources, and the economic

363 See website of the Division for Ocean Affairs and the Law of the Sea of the Office of Legal Affairs, United Nations <https://www.un.org/Depts/los/convention_agreements/fish_stocks_agreement_states_parties.htm> last accessed 29 November 2024.

364 S.M. Garcia, A. Zerbi, C. Aliaume, T. Do Chi, G. Lasserre *The ecosystem approach to fisheries. Issues, terminology, principles, institutional foundations, implementation and outlook*. FAO Fisheries Technical Paper. No. 443 (Rome, FAO, 2003) 71 p.

365 Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean (adopted on 24 February 2012, entered into force on 19 July 2015) <https://www.npfc.int/system/files/2017-01/Convention%20Text.pdf> last accessed 2 January 2025.

> THE DEFINITION OF "POLLUTION" IN UNCLOS ALSO APPLIES TO THE UN FISH STOCKS AGREEMENT AND THEREFORE CAN INCLUDE ANTHROPOGENIC UNDERWATER NOISE IF SUCH NOISE RESULTS IN OR IS LIKELY TO RESULT IN SUCH DELETERIOUS EFFECTS AS HARM TO LIVING RESOURCES AND MARINE LIFE

and social viability of fisheries. It also has the mandate to formulate appropriate measures based on the best scientific advice available, taking into account relevant environmental, economic and social factors and in doing so it must apply the precautionary principle (article 5). To this end, the Commission must formulate and recommend appropriate measures, inter alia, for the conservation and management of living marine resources found in the area of application and to minimize impacts of fishing activities on living marine resources and their ecosystems. It must also establish fisheries restricted areas for the protection of vulnerable marine ecosystems, including but not limited to nursery and spawning areas, in addition to or to complement similar measures that may already be included in management plans (article 8).

A GFCM/OceanCare workshop on anthropogenic underwater noise and impacts on fish, invertebrates and fish resources (WKNOISE) in 2019 reviewed the effects of anthropogenic underwater noise effects on fish and invertebrates as reported from the literature and identified areas in the GFCM area of application, including in GFCM fisheries restricted areas. The WKNOISE's main conclusions were for GFCM to foster coordination with CBD, CMS, IMO, and other relevant international organisations to ensure coherence in the implementation at the regional level of existing policies addressing, inter alia, the impacts of anthropogenic underwater noise on marine biodiversity. It also recommended that potential impacts of anthropogenic underwater noise on marine biodiversity, especially those affecting fisheries, should be taken into consideration by the GFCM through its Scientific Advisory Committee on Fisheries (SAC) in coordination with relevant organisations (i.e. UNEP/Mediterranean Action Plan (MAP), ACCOBAMS, etc.) to the best extent possible.[366]

Drawing on the findings and recommendations from this workshop, the GFCM SAC agreed to conduct a preliminary study on the potential impact of underwater noise pollution on fish resources and fisheries "in order to start addressing this issue in the context of the Mediterranean Sea and to provide decision-makers and other relevant stakeholders with better insights into the impacts of noise on fisheries, including potential socio-economic consequences".[367]

366 Report of the Joint GFCM/OceanCare Workshop on anthropogenic underwater noise and impacts on fish, invertebrates and fish resources (21 – 22 February 2019) <https://www.fao.org/gfcm/technical-meetings/detail/en/c/1194253/> last accessed 29 November 2024.

367 GFCM/FAO Study on the potential effects of underwater noise on demersal fisheries in the fisheries restricted area of the Jabuka/Pomo Pit in the Adriatic Sea (2021) <https://www.oceancare.org/wp-content/uploads/2023/11/GFCM_OceanCare_Study_Ocean-Noise_Adriatic-Sea_2021.pdf> last accessed 29 November 2024.

368 ibid.

The study on the potential effects of underwater noise on demersal fisheries in the fisheries-restricted area of the Jabuka/Pomo Pit in the Adriatic Sea seeks to contribute to the understanding of the effects of underwater noise on fish and invertebrates in the Adriatic Sea.[368] The study was carried out by an ad hoc and independent Advisory Group comprised of experts with backgrounds in bioacoustics, noise pollution and marine biodiversity. It presents an underwater noise modelling assessment of fishing activities in the Pomo/Jabuka Pit Fisheries Restricted Area designated by the GFCM in 2017 off the coasts of Croatia and Italy. Calculations of propagation distance and resulting acoustic levels are presented in the study, including scenarios under various fishing efforts for an evaluation of cumulative noise levels. The potential impacts of calculated noise levels on fish and invertebrates are also described.

The GFCM/FAO study recommends improving the state of knowledge on the noise-footprint of the marine transit of larger ships in the fishing restricted areas, among others.[369] It further recommends collecting and analysing data and information on the level of catch rates and any potential fluctuations over the years in conjunction to exposure to underwater noise sources. It recommends that this effort could be supported by a proactive stakeholder engagement and could include, for example requests to fishers in given coastal communities to report variations they observed in catch rates following anthropogenic underwater noise activities. Also, an analysis of the associated socioeconomic impacts of decreased fish catch rates, as a result of underwater noise pollution, on the coastal communities concerned is recommended in the study. This includes mapping all stakeholders which would be potentially affected.[370]

The GFCM/FAO study also recommends the application of the precautionary principle whenever gaps in knowledge and understanding would prevent the prompt taking of measures aimed at addressing the impacts of anthropogenic underwater noise pollution on fisheries.[371]

Furthermore, the study recommends encouraging other RFMOs to engage in the study and assess the impacts of anthropogenic underwater noise pollution on fisheries.[372]

369 ibid p 72.
370 ibid.
371 ibid.
372 ibid.

3.3 REGIONAL TREATIES AND COMMITMENTS IN POLICY INSTRUMENTS TO REDUCE UNDERWATER RADIATED NOISE FROM SHIPPING

This section will provide an analysis of, and overview of regional treaties and commitments in policy instruments that provide a legal basis for the reduction of underwater radiated noise from shipping, and which are applicable in various ocean/sea areas. Regional instruments applicable to more than one ocean/sea area are presented first. The summary of the various regional instruments is not intended to be exhaustive but is merely intended to highlight some of the pertinent provisions. Furthermore, emphasis has been placed on binding legal instruments and as a result an analysis of regional action plans has only been included where no regional convention has been adopted.

Specific provisions and/or approaches contained in regional instruments which can support the reduction of underwater radiated noise from shipping, even though they may not address such reduction directly, are presented in section 3.4.

3.3.1 Regional instruments applicable to more than one ocean/sea area

3.3.1.1 EU Legislation

Europe's coastline extends along the Atlantic and Arctic Oceans, the Baltic Sea, the North Sea, the Mediterranean, and the Black Sea.[373] Therefore, the EU legal framework is applicable to parts of these marine areas. Its Integrated Maritime Policy provides that underwater noise is an environmental stressor. Obligations to mitigate underwater noise from shipping are found across multiple binding and non-binding legal instruments within the EU Framework. Relevant legal instruments, policies, strategies and other relevant documents are presented in this and other sections of the present study (see sections 3.4.1.1, 3.4.3.1(a), 3.4.3.2, 3.4.4.1, 3.4.8 and 3.4.9).

The EU has followed an Integrated Maritime Policy (IMP)[374] framework since 2007. In 2002, the European Commission issued the Communication "Towards a Strategy to Protect and Conserve the Marine Environment", highlighting that EU legislation on preventing pollution from maritime transport is grounded in the harmonised implementation and enforcement of IMO legislation across the EU.[375] The Communication emphasises the need to strengthen international legislation at the Community level, address policy gaps in IMO regulations, and accelerate the implementation of international legislation. While acknowledging the global nature of shipping and generally favouring global legislation, it also indicates that specific Community measures can be adopted where international regulations fall short of EU expectations on maritime safety and environmental protection.[376]

373 European Commission "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: An Integrated Maritime Policy for the European Union" COM(2007) 574 final (10 October 2007).

374 ibid.

375 European Commission "Communication from the Commission to the Council and the European Parliament – Towards a strategy to protect and conserve the marine environment"COM(2002)0539 Final) (2 October 2002) annex 2, sect 1.5.

376 ibid.

One of the objectives of the IMP is to unlock the full potential of Europe's shipping industry by improving its efficiency and ensuring its long-term competitiveness, which includes the preparation of a periodic Maritime Transport Strategy.[377] To achieve the IMP objectives, new planning tools were implemented to support policy-making, including a European network for maritime surveillance (MARSUR), maritime spatial planning, integrated coastal zone management, and a comprehensive and accessible source of data and information.[378] Since its establishment, the IMP has been complemented by policy instruments, such as the Sea Basin Strategies for the Atlantic, the Baltic Sea, the Western Mediterranean and the Black Sea.

The Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)[379] establishes a legislative framework for managing human activities while enabling sustainable use of marine goods and services giving priority to achieving or maintaining Good Environmental Status (GES) in the Community's marine environment. A Common Implementation Strategy (CIS) has also been adopted. [380]

To achieve the Directive's objective, and based on the need for diverse conditions, problems and needs of the various marine regions, each Member State develops a marine strategy according to article 5 and chapter II for its marine waters, which should culminate in the execution of programmes of measures designed to achieve or maintain GES until 2020.

The Marine Framework Strategy Directive requires EU Member States to take the necessary measures to achieve or maintain GES in the marine environment by the year 2020 at the latest (article 1). It defines GES as "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions. The use of the marine environment at a sustainable level, thus safeguarding the potential for uses and activities by current and future generations." This includes, among other things, that "anthropogenic inputs of substances and energy, including noise, into the marine environment do not cause pollution effects" (article 3(5)(b)). Pollution is defined as "direct or indirect introduction into the marine environment, as a result of human activity, of substances or energy, including human-induced marine underwater noise, which results or is likely to result in deleterious effects such as harm to living resources and marine ecosystems, including loss of biodiversity, hazards to human health, the hindering of marine activities, including fishing [...]" (article 3(8)). To this end, a set of 11 qualitative descriptors was included in annex I to the Directive. Descriptor 11 covers energy including underwater noise.

The descriptors aim to establish a set of attributes for GES and develop criteria and methodological standards to ensure consistency and allow for comparison between marine regions or subregions of the extent to which GES is being achieved. Through the establishment of environmental targets and monitoring programmes for ongoing assessment, Member States are obliged to evaluate the state of the marine waters concerned regularly and submit their Marine Strategies to achieve GES in their marine waters accordingly.

377 European Commission "An Integrated Maritime Policy for the European Union" (n 373) sect 4.1.
378 ibid sect 3.2.
379 Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) OJ L 164, 25.6.2008, pp 19–40.
380 See <https://environment.ec.europa.eu/topics/marine-environment/implementation-marine-strategy-framework-directive_en#common-implementation-strategy> last accessed 12 January 2025.

The obligation regarding underwater noise mitigation consists of achieving the target of *Descriptor* 11, which reads: "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment." In 2017, the Commission decided[381] to separate the Descriptor into "anthropogenic impulsive sound in water" (descriptor 11, Criteria 1, D11C1) and "anthropogenic continuous low-frequency sound in water" (descriptor 11, Criteria 2, DC11C2) and used a threshold-based instead of a trend-based indicator definition,[382] elaborated by the EU Technical Expert Group on Noise (EU TG Noise):

> The spatial distribution, temporal extent and levels of anthropogenic [impulsive sound sources/continuous low-frequency sound] do not exceed levels that adversely affect populations of marine animals. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.[383]

Since Commission Decision 2017, a significant achievement has been made with the adoption of threshold limits for continuous underwater noise levels at Union level in 2023. They result from the work of TG Noise.[384] However, it can be noted that the threshold value (TV) for continuous noise defines shipping as one of the activities generating continuous noise:

> Tolerable status relative to D11C2 is achieved if for all single months over a year the tolerable exposed area is equal to or below 20%. This value for the extent of exposure (20% of habitat) is considered as having scientific foundation (see rationale above), however, lower TVs might be set according to regional to local specificities. Some regions are faced by constant high levels of shipping. For these regions it may be (almost) impossible to reach a tolerable status in the foreseeable future.[385]

According to Commission Notice (C/2024/2078),[386] the Member States must apply the thresholds set at the Union level within the subsequent updates of their Marine Strategies, specifically the initial assessment and the determination of GES as well as the establishment of the environmental targets (section IV). The Marine Strategy Framework Directive, however, offers a special procedure in case one or more States identify an impact on the environmental status of their marine waters which cannot be tackled through measures adopted at the national level, or which are linked to another Community policy or international agreement (article 15).

381 EU Commission decision 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU.

382 Athan D Merchant, Rosalyn L Putland, Michel André, Eric Baudin, Mario Felli, Hans Slabbekoorn, and René Dekeling "A Decade of Underwater Noise Research in Support of the European Marine Strategy Framework Directive" (2022) 228 Ocean & Coastal Management.

383 EU Commission decision 2017/848 (n 381).

384 J.F. Borsani, M. Andersson, M. André, A. Azzellino, M. Bou, M. Castellote, L. Ceyrac, D. Dellong, T. Folegot, D. Hedgeland, C. Juretzek, A. Klauson, R. Leaper, F. Le Courtois, A. Liebschner, A. Maglio, A. Mueller, A. Norro, A. Novellino, O. Outinen, A. Popit, A. Prospathopoulos, P. Sigray, F. Thomsen, J. Tougaard, P. Vukadin and L. Weilgart *Setting EU Threshold Values for continuous underwater sound, Technical Group on Underwater Noise (TG NOISE), MSFD Common Implementation Strategy*, Edited by Jean-Noël Druon, Georg Hanke and Maud Casier (Publications Office of the European Union, Luxembourg, 2023) doi:10.2760/690123, JRC133476.

385 ibid.

386 European Commission "Commission Notice on the threshold values set under the Marine Strategy Framework Directive 2008/56/EC and Commission Decision (EU) 2017/848" (C/2024/2078) OJ C, C/2024/2078, 11.3.2024.

The Marine Strategy Framework Directive does not establish direct obligations for the shipping industry but does establish binding requirements for the EU Member States to achieve GES, which specifically address anthropogenic noise as a pollutant.

The EU's Zero Pollution Action Plan (ZPAP),[387] adopted in 2021, identifies underwater noise as a key pollution source among others, which needs to be reduced.[388] The ZPAP envisions a zero-pollution target for 2050, which is met when "Air, water and soil pollution is reduced to levels no longer considered harmful to health and natural ecosystems, and that respect the boundaries our planet can cope with, thus creating a toxic-free environment". The established "zero pollution hierarchy" prioritises preventive action, reduction and control, and elimination and remediation. Concerning marine pollution, it refers to the Marine Strategy Framework Directive as the achievement of GES would bring the Member States close to their zero pollution ambitions concerning all marine ecosystems (paragraph 2(3)).

The ZPAP notes that thresholds for underwater noise will be included in the Marine Strategy Framework Directive's revision. The Action Plan further mentions the Horizon Europe project and specifically the proposed missions for "Healthy oceans, seas, coastal and inland waters", which will address, among other things, underwater noise.

In 2021, EMSA published a study providing an inventory of existing policy, research and impacts of continuous underwater noise in Europe titled "SOUNDS – Status of Underwater noise from Shipping" (SOUNDS Report).[389] It examines noise sources, environmental impacts, policy, mitigation and data management. In the context of shipping important conclusions were provided in regards to measurements and modelling of ship noise confirming that "[b]oth measurements and modelling of ship noise are important for effective mitigation, with the standardisation of terminology and procedures, as well as uncertainty quantification, being the focus of recent and ongoing work."[390] It also detected the difficulty of including vessels, not navigating under Automatic Identification System (AIS), within the monitoring programmes, even though recreational vessel "might be the dominant noise generators in certain EU coastal waters".[391] This led to the conclusion "that future efforts on policy and mitigation take a wide range of frequencies into account".[392] Also the simplification of ship noise measurements were identified to be important in light of the increasing data available to researchers and policy makers in the future.[393] In terms of policy work, the SOUNDS Report recommends to "work on the establishment of Underwater Noise Emissions Control Areas similar to the work done for air emissions from marine fuels".[394] Furthermore it encourages mandatory regulation to be implemented "transferring the lessons learned regarding the adoption of mandatory regulation applied to other descriptors, such as GHG emissions".[395] Also training courses for national administrations and national representatives at IMO are recommended and a strong emphasis is put on stakeholder participation in working groups.[396]

The Navis Sonus (NAVISON) project, sponsored by EMSA, aims to predict URN from vessels in European seas. The project takes into account the newly adopted underwater noise thresholds and its report was published in October 2024 [397] (see section 3.4.1.1).

None of the EU's legislation relating to the reduction of carbon dioxide emissions from maritime transport,[398] mentions the interlinkages between energy efficiency measures and underwater radiated noise reduction. The EU Parliament has called on the EU Commission to adopt a new Port Strategy[399] in light of the green transition of the maritime sector. Although it does not address underwater radiated noise explicitly, it emphasizes more broadly the essential role "for the decarbonisation of waterborne transport, taking

into account the Green Deal and pollution reduction goals and the essential role of offshore renewable energy; whereas it is important to reduce air pollution from ships in port areas, including black carbon emissions" (letter M).

The EU's efforts for green shipping are further materialized in its Sustainable and Smart Mobility Strategy.[400] It does not mention underwater radiated noise under maritime transport emissions although it refers to mitigating noise from transport.

3.3.1.2 Central American cooperation

COCATRAM[401] has six Member States as of 14 October 2024. It is a specialized organization that is a permanent part of the institutional structure of the Central American Integration System (SICA). It addresses issues related to maritime and port development in Central America, with its primary function is to advise the Council of Ministers Responsible for Transportation in Central America (COMITRAN) and Member Governments on the adoption of policies and decisions aimed at achieving a harmonious development of the sector. The COCATRAM has established partnerships with IMO, the Central America Fisheries and Aquaculture Organization (OSPESCA), the Association of Caribbean States and the Caribbean Shipping Association. With respect to issues related to the environment, efforts of COCATRAM are focused on ensuring the protection, preservation, conservation and sustainable exploitation of coastal areas, maritime spaces and natural resources in the sea, with an emphasis on coordinating joint work with the different national sectors involved in the task of marine protection, incorporating into that work shipping companies, maritime tanker terminal operators, classification societies, shipyards, shipowners' associations, industrial fishing associations, public and private bodies, tourism, the Ministry of the Environment, and universities, among others.[402] It also attracts and facilitates international cooperation with Central America to support the efforts being made in the region for marine protection and to resolve the global environmental crisis. Thus far, no efforts in relation to anthropogenic underwater noise reduction are indicated.

3.3.2 Regional instruments applicable to one ocean/sea area

3.3.2.1 Asian Seas (East)

There is no regional convention applicable to the entire East Asian Seas. **The Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the East Asian Region (the East Asian Seas Action Plan)**[403] is a non-binding instrument which aims at protecting the marine and coastal environment in the region for the health and well-being of present and future generations. The Action Plan indicates with respect to the prevention, reduction and control of degradation of the marine environment from sea-based activities, that States will be encouraged to enhance cooperation in marine environment management and adhere to the provisions of the appropriate international conventions and agreements, including UNCLOS, MARPOL and the London Convention.[404] An important component of the Action Plan is strengthening capabilities in EIA in the region in order to prevent or minimize adverse impacts on the marine and coastal environment, leading to sustainable development

The Coordinating Body on the Seas of East Asia (COBSEA) oversees the implementation of the East Asian Seas Action Plan and brings together nine States in the region.

The COBSEA Marine and Coastal Ecosystems (MCE) Framework, adopted in 2023, integrates all programmes, projects, and activities for the conservation and management of the marine and coastal environment of the East Asian Seas. Anchored on the overarching theme of Blue Economy, the MCE

Framework provides a clear direction to achieving the relevant targets from the Sustainable Development Goals and the Global Biodiversity Framework.

The COBSEA Strategic Directions 2023–2027 guides COBSEA initiatives across three thematic programmes; (1) marine pollution prevention, reduction and control; (2) marine and coastal biodiversity, ecosystem conservation and management; and (3) climate action. It indicates that "COBSEA will share any emerging insights and research on substantial effects of marine activities, such as tourism (underwater crowding and noise pollution) on ecosystems for a country's consideration".[405] Therefore, the possibility exists for COBSEA to also research the impact of URN from shipping on marine life in the East Asian Seas.

3.3.2.2 Asian Seas (South)

There is no regional treaty applicable to the entire South Asian Seas. The Colombo Declaration on the South Asia Co-operative Environment Programme (SACEP)[406] and Articles of Association of SACEP were both adopted on 25 February 1981.

"A healthy environment, resilient society and regional prosperity for the present and future generations" is the vision of SACEP through the 2020 to 2030 decade.[407]

The SACEP Marine and Coastal Biodiversity Strategy for the South Asian Seas Region[408] recalls CBD Aichi Biodiversity Target 12 "[B]y 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained".[409] The Strategy indicates that within the Northern Indian Ocean no systematic assessment of the coastal and marine biodiversity has been carried out so far and there is a considerable data and information gap both in spatial and temporal coverage. It identifies among the main threats to cetaceans and dugongs in the region: stranding due to shipping, naval exercises etc. (especially the larger species), and noise pollution from military and seismic sonar, and haphazardly developed tourism (especially in whale and dolphin watching).[410]

The Strategy also indicates that at national levels, marine species have varying degrees of legal protection in all five countries, but enforcement of these legal provisions is not as effective as it should ideally be for various reasons.[411] While listing species in appendices of fishery and wildlife legislation, as well as the "declaration of protected areas" are two main actions undertaken by national governments,[412] a major drawback to national conservation efforts in all countries of the region is a lack of knowledge and scientific data upon which conservation strategies and measures can be designed effectively.[413]

Furthermore, the Strategy indicates that although all South Asian nations have expressed their commitment to sustainable harvesting of marine and coastal resources and to conserving biodiversity, the implementation of these policies is varied and differ in effectiveness. The reasons include overlapping jurisdictions, conflicting mandates, inadequate coordination, socio-economic and poverty issues and capacity constraints.[414]

The Strategy includes the following specific recommendations for the region: improving the knowledge base through joint research, collaborative assessments and long-term monitoring, strengthening taxonomic capacity and formulating standard format for data collection and analysis; identify migratory routes of species as well as resident and transboundary stocks; and assessing upwellings and salinity changes, and the impact of climate change. Other recommendations for the region include coordinating research,

harmonizing legislation; protecting marine species at national and regional level; training enforcement staff of different agencies; developing MPAs to cover migratory routes, promoting collaboration between different stakeholders; regularly updating the IUCN Red List assessments at the national level, or developing a regional level Red list; introducing eco-labelling and certification systems for sustainable fishery; and securing funding.[415]

3.3.2.3 Atlantic Ocean (Central, West and South African region)

The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West and Central African Region (Abidjan Convention)[416] adopted in 1981, has 19 Parties as of 14 October 2024. It applies to the marine environment coastal zones and related inland waters falling within the jurisdiction of the States of the West and Central African Region, from Mauritania to Namibia inclusive (article 1).

The Abidjan Convention establishes the obligation for Contracting Parties to "individually or jointly, take all appropriate measures under international law" and the Convention to prevent, reduce and combat pollution of the Convention area (article 4(1)). Its definition of pollution, the "introduction by man, directly or indirectly, of substances or energy into the marine environment ... resulting in such deleterious effects as harm to living resources ..." (article 2) is similar to the UNCLOS definition. It includes "energy" and consequently also underwater noise.

Parties under the Abidjan Convention are required to "take all appropriate measures in conformity with international law to prevent, reduce, combat and control pollution in the Convention area caused by normal or accidental discharges from ships, and shall ensure the effective application in the Convention area of the internationally recognized rules and standards relating to the control of this type of pollution". (article 5). Therefore, this obligation applies to underwater noise from shipping only if its introduction into the marine environment is considered a "discharge". Furthermore, internationally recognized rules and standards would have to be available through IMO for this form of discharge.

Other articles in the Convention include those relating to specially protected areas (article 11) see section 3.4.3.1(b)(i)), EIAs (art. 13) (see section 3.4.4.2(a)), scientific and technological cooperation (article 14) (see section 3.4.1), liability and compensation article 15), institutional arrangements (articles 16 and 17), reports (article 22), compliance control (article 23) (see section 3.4.9), and settlement of disputes (article 24). Five Protocols complement the Abidjan Convention,[417] including the Protocol on integrated coastal zone management (Pointe-Noire Protocol).[418]

The Benguela Current Convention (BCC)[419] is a formal treaty between the governments of Angola, Namibia and South Africa that was signed by them on 18 March 2013.

> "ACCORDING TO THE ABIDJAN CONVENTION, "THIS OBLIGATION APPLIES TO UNDERWATER NOISE FROM SHIPPING ONLY IF ITS INTRODUCTION INTO THE MARINE ENVIRONMENT IS CONSIDERED A 'DISCHARGE'."

387 European Commission "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the Regions Pathway to a Healthy Planet for All EU Action Plan: "Towards Zero Pollution for Air, Water and Soil" COM/2021/400 final, 12 May 2021.

388 ibid sect 2.3.

389 Erica Cruz, Thomas P Lloyd, Johan Bosschers, Frans Hendrik Lafeber, Pedro Almeida Vinagre, Guilherme Vaz "SOUNDS: Status of Underwater Noise from Shipping Study on inventory of existing policy, research and impacts of continuous underwater noise in Europe" EMSA report EMSA/NEG/21/2020 (August 2021). WavEC Offshore Renewables and Maritime Research Institute Netherlands.

390 Ibid. Executive Summary p 1.

391 ibid.

392 ibid.

393 ibid.

394 Ibid sect 10 of the report at p 69.

395 ibid.

396 ibid.

397 EMSA *NAVISON Final Report: Calculation and analysis of shipping sound maps for all European seas from 2016 to 2050* (EMSA, Lisbon, 2024).

398 "Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC" OJ L 123, 19.5.2015 pp 55–76; "Regulation (EU) 2023/957 of the European Parliament and of the Council of 10 May 2023 amending Regulation (EU) 2015/757 in order to provide for the inclusion of maritime transport activities in the EU Emissions Trading System and for the monitoring, reporting and verification of emissions of additional greenhouse gases and emissions from additional ship types" OJ L 130, 16.5.2023, pp 105–114; and "Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC" OJ L 234, 22.9.2023, pp 48–100.

399 European Parliament Res "Building a Comprehensive European Port Strategy" (17 January 2024) P9_TA(2024)0025 OJC, C/2024/5716, 17.10.2024.

400 European Commission "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Sustainable and Smart Mobility Strategy – putting European transport on track for the future" COM/2020/789 final, 9 December 2020.

401 See the website of COCATRAM <https://www.cocatram.org> last accessed 29 November 2024.

402 ibid.

403 Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the East Asian Region (the East Asian Seas Action Plan) (adopted 1981 and revised in 1994) UNEP Doc UNEP(OCA)/EAS IG5/6, annex IV (1994).

404 ibid.

405 Coordinating Body on the Seas of East Asia (COBSEA)"COBSEA Strategic Directions 2023-2027" (Bangkok, Thailand: United Nations Environment Programme (UNEP) (2023) p 14.

406 The Colombo Declaration on the South Asia Co-operative Environment Programme (SACEP) (25 February 1981) <http://www.sacep.org/pdf/Declarations/07.The-Colombo-Declaration-on-SACEP-25-January-1981.pdf> last accessed 29 November 2024.

407 See website of SACEP <http://www.sacep.org/about-us> last accessed 29 November 2024.

408 SACEP "Marine and Coastal Biodiversity Strategy for the South Asian Seas Region: Living in Harmony with our Oceans and Coasts" (SACEP 2019) <http://www.sacep.org/pdf/Reports-Technical/2019.11.06-Marine-and-Coastal-Biodiversity-Strategy-for-the-South-Asian-Seas-Region.pdf> last accessed 19 November 2024.

409 ibid p 30.

410 ibid p 32.

411 ibid p 35.

412 ibid.

413 ibid.

414 ibid p 36.

415 ibid pp 36–37.

416 Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West and Central African Region (Abidjan Convention) (adopted 23 March 1981, entered into force on 5 August 1984) <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC118163/> last accessed 25 November 2024.

417 Protocol on integrated coastal zone management, Protocol on sustainable mangrove management, Protocol on environmental norms and standards for offshore oil and gas exploration and exploitation activities, Protocol concerning the Cooperation in the Protection and Development of the Marine and Coastal Environment from Land-Based Sources and the Activities (LBSA) in the Western, Central and Southern Africa Region, and Protocol Concerning Co-operation in Combating Pollution in Cases of Emergency in the Western and Central African Region.

418 Protocol on integrated coastal zone management (Pointe-Noire Protocol) (adopted in July 2019, not yet in force).

419 For the text of the BCC, see <https://www.benguelacc.org/download/bcc-brochure-in-english/> last accessed 8 December 2024.

The objective of the BCC is to promote a coordinated regional approach to the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the Benguela Current Large Marine Ecosystem (BCLME), to provide economic, environmental and social benefits (article 2). The precautionary principle, the prevention, avoidance and mitigation of pollution and the polluter pays principle are among the principles by which the Parties are to be guided (article 4(1)). In giving effect to the objective of the Convention and to the principles, the Parties must, inter alia: (a) take all possible steps to prevent, abate and minimize pollution and take the necessary measures to protect the marine ecosystem against any adverse impacts; (b) undertake an EIA for proposed activities that are likely to cause adverse impacts on the marine and coastal environments; (c) apply management measures based on the best scientific evidence available; and (d) protect vulnerable species and biological diversity (article 4(2)). The BCC includes the introduction of energy in its definition of "pollution" (article 1). Parties to the BCC would therefore be required to, inter alia, take all possible steps to prevent, abate and minimize anthropogenic underwater noise pollution, including from ships, and take the necessary measures to protect the marine ecosystem against any adverse impacts.

Other articles of the BCC include those relating to institutional arrangements (articles 5–13), including a compliance committee (article 12) (see section 3.4.9), obligations (article 17), and settlement of disputes (article 19). The introduction of ecosystem-based marine spatial planning (MSP) in the BCLME is supported by the Benguela Current Marine Spatial Management and Governance Project (MARISMA) 2014–2023). The project "Improving Ocean Governance in the Benguela Current Large Marine Ecosystem" (BCLMIII) focuses on supporting the BCLME countries to strengthen and integrate policy, institutional, and management structures and protocols in order to realise transboundary benefits, mainstream transboundary priorities into national policy frameworks while linking them to national development plans and strategies, and catalyse private sector finance into BCC Convention implementation and stress reduction activities in the region. In addition, the project aims to demonstrate sustainable stress-reduction activities on a national scale, with a particular focus on intersectoral collaboration and partnerships.[420]

Other regional instruments also apply to the Central, West and Southern African region. The AEWA and the Bern Convention (see section 3.2.1) apply to Parties to those treaties.

3.3.2.4 Atlantic Ocean (North-East) including North Sea

The OSPAR Convention[421] replaced the Oslo and Paris Conventions and was adopted in 1992, together with a Final Declaration and the Action Plan. It has 16 Parties as of 14 October 2024. The OSPAR Convention applies to the internal waters and the territorial seas of the Parties, the sea beyond and adjacent to the territorial sea under the jurisdiction of the coastal State to the extent recognized by international law, and the high seas, including the bed of all those waters and its sub-soil, situated within the limits defined by coordinates in the Convention (article 1(a)). The definition of "pollution" in the OSPAR Convention includes, like UNCLOS, the introduction of "energy" (article 1(d)) and consequently also underwater noise.

420 See the website of the BCC <https://www.benguelacc.org/bclme-iii-project-2/> last accessed 8 December 2024.

421 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) (adopted 22 September 1992, entered into force on 25 March 1998) 2354 UNTS 67.

The OSPAR Convention requires Parties to "take all possible steps to prevent and eliminate pollution" which would include anthropogenic underwater noise pollution, including from ships. Parties must also "take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected" (article 2(1)(a)). To this end, the Parties are mandated to adopt programmes and measures, individually or jointly, and to harmonise their policies and strategies (article 2(1)(b)).

Where there are reasonable grounds for concern "that substances or energy introduced, directly or indirectly, into the marine environment may bring about hazards to human health, harm living resources and marine ecosystems, damage amenities or interfere with other legitimate uses of the sea" the Parties must take preventive measures and apply the precautionary principle "even when there is no conclusive evidence of a causal relationship between the inputs and the effects" (article 2(2)(a)). The OSPAR Convention establishes, inter alia, obligations for Parties to take, individually and jointly, all possible steps to prevent and eliminate pollution from offshore sources in accordance with the Convention (article 5 and annex III). Annex III includes among the offshore sources of pollution "the use on, or the discharge or emission from, offshore sources of substances which may reach and affect the maritime area" (article 4(1)).

The Parties are also required to cooperate with a view to prescribing measures, procedures and standards to protect the maritime area against pollution from other sources to the extent that such pollution is not already the subject of effective measures agreed by other international organisations or prescribed by other international conventions (article 7). The Parties are obligated to conduct joint assessments of the quality status of the marine environment, which must provide information on the efficiency of the measures taken and planned to protect the marine environment (article 6 and annex IV).

They must take the necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practicable, marine areas which have been adversely affected; and cooperate in adopting programmes and measures for those purposes for the control of the human activities (annex V, article 2). Furthermore, Parties must apply the polluter-pays principle (article 2(2)(b)).

When pollution originating from a Party is likely to prejudice the interests of one or more of the other Parties, the Parties concerned must enter into consultation, at the request of any one of them, with a view to negotiating a cooperation agreement (article 21(1)). At the request of any Party concerned, the OSPAR Commission must consider the question and may make recommendations with a view to reaching a satisfactory solution (article 21(2)).

For the Convention's implementation the Parties must "adopt programmes and measures which contain, where appropriate, time-limits for their completion and which take full account of the use of the latest technological developments and practices designed to prevent and eliminate pollution fully" (article 2(3)(a)). The specific criteria for BAT and BEP are listed in appendix I to the Convention (article 2(3)(b)).

Other articles of the OSPAR Convention include those relating to scientific and technical research (article 8) (see section 3.4.1), access to information (article 9), institutional arrangements (article 10–12), decisions and recommendations (article 13), reporting (article 22), compliance (article 23) (see section 3.4.9), regionalization (article 24) and settlement of disputes (article 32).

The North-East Atlantic Environment Strategy (NEAES) 2030,[422] adopted by OSPAR in 2021, establishes 12 strategic objectives. Strategic objective 8 aims to "Reduce anthropogenic underwater noise to levels that do not adversely affect the marine environment". To this end, two specific operational objectives were agreed: 1) by 2025, to agree on a regional action plan setting out a series of national and collective actions and, as appropriate, OSPAR measures to reduce noise pollution; and 2) by 2022, to develop and implement a coordinated monitoring and modelling programme for continuous sound to support an assessment of anthropogenic underwater noise in the OSPAR maritime area. An implementation plan for the Strategy was developed, and a progress report on the implementation of the NEAES 2030 was published in 2023.[423]

A Regional Action Plan on Underwater Noise, intended to be adopted in mid-2025, will include all significant sources of both impulsive and continuous underwater noise.[424] It is planned to include an action dedicated to commercial shipping with a regional contribution to the EBP of the *Revised URN Guidelines*. For the elaboration of the Regional Action Plan OSPAR is in close contact with HELCOM to exchange knowledge and experience on underwater noise from shipping. In addition, OSPAR undertakes stakeholder consultations, including with IMO.

Within the framework of the NEAES 2030, the OSPAR Quality Status Report 2023 was issued including a thematic assessment on underwater noise. The 2022 Pilot Assessment of Ambient Noise[425] covers the impacts on the marine environment, the measures taken to date to reduce this source of pollution and their effectiveness. This Assessment draws on data and outcomes from the OSPAR Monitoring Strategy for Ambient Underwater Noise,[426] the Joint Monitoring Programme for Ambient Noise in the North Sea (JOMOPANS) and the Joint Framework for Ocean Noise in the Atlantic Seas (JONAS) using a descriptive pressure indicator to evaluate continuous noise (see also section 3.4.1.2).

The Pilot Assessment identified a lack of knowledge "concerning the ecological situation in an undisturbed North Sea or even about a realistic feasible minimum of ecological quality in relation to the human activities in the North Sea" and "concerning the cumulative impact on the ecosystem of human activities in the North Sea, like fisheries, shipping and windfarm development". Furthermore, there is a lack of risk-of-impact indicator noise maps.

The Pilot Assessment concludes with the following key message:

> Shipping noise is dominant in the underwater soundscape of the North Sea. In the southern part and along the major shipping routes the noise exceeds the natural sound by more than 20 dB for more than 50% of the time. Marine protected areas (MPAs) don't seem to give additional protection against continuous noise.[427]

The main shipping routes in the OSPAR Region have been identified to go through the OSPAR Region II (Greater North Sea) and Region IV (Bay of Biscay and Iberian Coast), including those from the Strait of Gibraltar to Rotterdam and Hamburg[428] (see also section 3.4.1.2).

ICES operates under the Convention for the International Council for the Exploration of the Sea[429] adopted in 1968. It has 20 Member Countries. Its main geographical scope extends over the Atlantic Ocean and

its adjacent seas and is primarily concerned with the North Atlantic (article 2). The main objective of the Convention is to promote and encourage research and investigations for the study of the sea particularly those related to the living resources thereof; to draw up programmes required for this purpose and to organize in agreement with the Parties such research and investigation as may appear necessary; and to publish or otherwise disseminate the results of research and investigations carried out under its auspices or to encourage the publication thereof (article 1).

ICES works closely with the EU, HELCOM and OSPAR on the topic of underwater noise by establishing joint data portals to monitor impulsive sound. Additionally, ICES hosts the data portal on continuous noise with the Baltic Sea Information on the Acoustic Soundscape (BIAS) data and the reports on continuous underwater noise of HELCOM Member States. The portal's main use is to present monitoring data and soundscape maps in line with the Marine Strategy Framework Directive and Helsinki Convention reporting obligations.

Other regional instruments also apply to the North-East Atlantic Ocean and North Sea. ASCOBANS applies to the conservation of cetaceans of the North-East Atlantic, and Irish and North Seas (see section 3.2.1). EU legislation (see section 3.3.1.1) applies to those States which are members of the EU. The AEWA and the Bern Convention (see section 3.2.1) apply to Parties to those treaties.

3.3.2.5 Atlantic Ocean (North-West)

(a) Canada

Canada has taken a multifaceted approach to address underwater noise from ships. In 2017, Canada took an international leadership role to promote global long-term action to reduce underwater vessel noise. In June 2021, the IMO's MEPC accepted a proposal from Australia, Canada and the United States to review the 2014 Guidelines and identify the next steps to further prevent and reduce underwater vessel noise. Work began at the Sub-Committee on Ship Design and Construction under Canada's guidance culminating in the approval of the *Revised URN Guidelines* and the Action Plan.

In Canada, Transport Canada regulates Canadian and foreign vessels, including the construction and operation of vessels, cargo handling and shipping, and navigation within Canadian waters. The Canada Shipping Act (CSA, 2001) is the principal legislation governing the safety of marine transportation and recreational boating, as well as the protection of the marine environment. In 2018, new amendments under the CSA were developed to enable the Governor-in-Council to make regulations to protect the marine environment and issue interim orders when immediate actions are needed to address urgent risks to the marine environment from the impacts of shipping and navigation. Since 2019, Transport Canada has implemented vessel measures using the interim order power under the CSA to address the threat of underwater noise from vessels to protect Canada's endangered and iconic Southern Resident killer whale. Interim orders are temporary mechanisms intended to address threats in the short time while a long-term regulatory approach is developed.

Current mandatory measures for smaller vessels include a 400m approach distance and a prohibition of impeding the path of all killer whales off the coast of Southern British Columbia; two Interim Sanctuary Zones off the coast of North Pender Island and the eastern tip of Saturna Island; a voluntary slowdown at Tumbo Channel (adjacent to the Saturna Island Interim Sanctuary Zone); and in collaboration with Pacheedaht First Nation, Transport Canada has put in place speed restricted zones in the waters of Swiftsure Bank.

Since 2015, Canada has also been a key partner to the Vancouver Port's Enhancing Cetacean Habitat and Observation (ECHO), providing funding to reduce disturbance from large commercial ships through voluntary actions. This work was captured in a Conservation Agreement with the Port of Vancouver, the Pacific Pilotage Authority, and five other marine transportation associations. This Agreement was recently renewed for another five-year term on 3 May 2024.[430] The revised work plan includes an ambitious number of initiatives with priorities around engagement and education, incentive programmes for cleaner and quieter vessels, continued voluntary slowdowns in Haro Strait-Boundary Pass and Swiftsure Bank, the lateral displacement of tug traffic in the Strait of Juan de Fuca as well as potential new on-water initiatives among others. To support high participation rates in slowdowns, Canada reimburses the increase in costs related to additional pilotage fees during slowdown transits.

A foundational project supported by Transport Canada, in partnership with the ECHO Program, is the state-of-the-art underwater listening station (ULS) at Boundary Pass. Deployed in May 2020 and operated by JASCO Applied Sciences (JASCO), the ULS is a marine acoustic observation station located 190 meters (620 feet) below the shipping lanes leading to and from the Port of Vancouver. All systems are functional 24/7 and capture high quality underwater noise data in real time from vessels, as well as ambient noise and marine mammal calls. The observation station measures and records underwater noise emissions from 4,000 to 5,000 commercial vessel transits per year, contributing to the world's largest known, non-military ship noise database. Access to the world's largest scientific-quality ship noise database supports ground-breaking underwater noise research.

In 2019, Transport Canada also launched its Quiet Vessel Initiative (QVI) which invested heavily in research – $2 million to support approximately 50 projects to evaluate the most promising, safe, and efficient quiet-vessel designs, retrofits, and operational practices, as well as to advance measurement and prediction of underwater noise from vessels. Despite the known impacts of underwater vessel noise on marine ecosystems, significant knowledge gaps existed at the outset of QVI about the specific sources of vessel noise (i.e. engines, propellers, hull design, etc.), their overall contribution to noise production, and the most effective noise mitigation technologies or designs for different vessel classes including tankers, tugs, and fishing boats. Research results from the QVI program will be disseminated to the public in a series of themed articles in 2025.

In 2020, the US Department of Transportation's Marine Environmental Technical Assistance Program (META) was directed to begin to look at technical solutions to address underwater noise from shipping and its associated impacts.[431] META supports the research, demonstration and development of emerging technologies, practices and processes that improve maritime environmental sustainability in an effort to support a safe, efficient and competitive US Maritime Transportation System. Initial authorization language provided the opportunity for META to identify, study, evaluate, test, demonstrate or improve emerging marine technologies and practices to reduce propeller cavitation. In 2023, this authority was expanded to focus beyond propeller cavitation to encompass all incidental vessel generated underwater noise. Through this authority, META has been facilitating the exploration not only of technologies and operations that can reduce URN, but also research and demonstrate opportunities that can further elaborate on the linkages between reducing underwater noise and the implementation of decarbonization strategies such as alternative fuels, new vessel designs, and emerging energy and propulsion technologies.

With the goal of undertaking a more coordinated and proactive approach to address the complex issue of underwater ocean noise, the Government of Canada developed the first draft of Canada's Ocean

Noise Strategy.[432] This strategy defines the government's vision and will guide future efforts. The structure closely aligns with the Ocean Noise Strategy Roadmap[433] of the United States' National Oceanic and Atmospheric Administration and the noise mitigation component of the European Marine Strategy Framework Directive (see section ....) and includes three main themes: 1. Science, knowledge gathering and innovation; 2. Assessment and management; and 3. Communication, coordination and engagement.

The draft strategy was released to the public on 23 August 2024, for a 60-day consultation period ending 22 October 2024. Feedback received during this consultation process will be captured in a "What We Heard" report and guide the development of the final strategy and a draft Federal action plan on ocean noise. These documents are anticipated to be released in 2025 with additional consultation and engagement on the action plan and its implementation. These processes will involve seeking input from partners and stakeholders to ensure comprehensive and well-informed decision making.

Understanding how ships make noise and how much noise they make are essential components for a quieter ocean. In Europe, mandatory limits on underwater noise came into effect in March 2024. These limits for both impulsive and continuous underwater noise sources define an acceptable maximum threshold for a designated marine habitat.

In Canada, Transport Canada is working with science and industry partners in developing meaningful and practical Underwater Vessel Noise Reduction Targets (UVNRTs). These targets are defined as Radiated Noise Level limits by vessel category based on current noise emission. These targets are viewed as a critical step towards the development of more effective Underwater Noise Management Plans as recommended by the *Revised URN Guidelines of IMO*. Initial work will continue working in partnership with shipowners to facilitate the development and real-world implementation of underwater noise management planning, including trialling UVNRTs to reduce URN emissions from ships. Lessons learned will inform national and international policy development, including the IMO EBP.

(b) United States of America

In the United States of America (US), the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) is the federal agency that is most responsible for protecting aquatic animals and their habitats, through a variety of legal mandates. NOAA addresses anthropogenic underwater noise impacts through these existing regulatory mechanisms, which provide important environmental protections for species and areas in its trust. These mechanisms are most effective and applicable in addressing discrete actions that could harm protected animals or areas. In order to effectively address the significant cumulative and chronic effects of anthropogenic underwater noise from sources like vessels in US waters, NOAA recognizes the need to partner with other US federal agencies as well as additional stakeholders.

The US hosted two early focusing events on underwater noise from shipping, bringing together the shipping industry and the regulatory and scientific communities: a 2004 symposium titled "Shipping Noise and Marine Mammals: A Forum for Science, Management, and Technology" and a more focused follow-on symposium in 2007 titled "Potential Application of Quieting Technology on Large Commercial Vessels". Through these meetings, a "menu" was developed of various technological design and retrofit options, as well as operational measures, and the relative costs and benefits associated with these proposed quieting options. Shortly thereafter, the US delegation to IMO submitted a document to MEPC 57 titled "Shipping noise and marine mammals" (MEPC 57/INF.4). NOAA then supported and chaired a 2008 international workshop convened in Hamburg, Germany, by Okeanos – Stiftung für das Meer (Foundation for the Sea),

a private environmental foundation, discussing specific design and retrofit options, and calling for specific action on vessel-quieting measures by IMO. Despite the broad interests represented, all participants agreed on an ambitious objective, calling for "...initial global action that will reduce the contributions of shipping to ambient noise energy in the 10–300 Hz band by 3 decibels in 10 years and by 10 decibels in 30 years relative to current levels. This goal [will] be accomplished by reducing noise contributions from individual ships". The formal consideration of this issue within IMO began at the 58th Session of the MEPC in June 2008, with a US petition to establish a correspondence group to review potential quieting technologies for large commercial vessels (MEPC 58/19). This proposal was accepted, and the US (NOAA and the US Coast Guard) chaired a correspondence group with broad IMO participation and eventual adoption of initial IMO Guidelines for quieting commercial vessels in April 2014.

For NOAA this international engagement is one component of a broader domestic initiative. Beginning in 2010, NOAA committed to improving the tools used by the agency to manage underwater noise impacts more comprehensively, including to better address cumulative impacts to whales, dolphins, and porpoises, leading to the development of an agency-wide Ocean Noise Strategy. The Ocean Noise Strategy Roadmap[434] was published in 2016 as a decadal vision for implementation of the Strategy, and serves as an organizing tool to rally the multiple NOAA offices that address ocean noise impacts around a more integrated and comprehensive approach. The Roadmap recommended the development of new noise management capacities[435] within NOAA and in partnership with other US agencies to address larger scale and longer term noise impacts, including but not limited to: continued work at IMO, promotion of noise reduction co-benefits associated with mandatory and voluntary speed reduction programmes, incentive programmes to reduce noise emitted during the development and operation of offshore wind, inclusion of acoustics as a characteristic of critical habitats for endangered species, reduction of underwater noise through restoration activities following spill incidents and development of tools to guide national application of permitting requirements and analyze permitted activities cumulatively.

Similarly, the Strategy promoted new monitoring and science interpretation tools to support more holistic decision making. NOAA, and collaborators in the US National Parks Service, (US Department of Interior) and the US Navy deployed multiple national scale monitoring arrays[436] between 2014 and 2016 that continue to present. The Noise Reference Station Network and the Sanctuary Sound Monitoring Program (previously SanctSound) both provide continuous, publicly available and standardized underwater sound recordings with a focus on data collection in marine protected areas, including US National Marine Sanctuaries and US National Parks. These data support evaluation of the status and trends in vessel noise on marine habitats of importance[437] and the influence of vessel management approaches, such as speed reduction, among many other applications. Collaboration and coordination with Canadian colleagues to develop best practices has been important throughout this work, due both to the value of consistency to marine operators working across US and Canadian waters and shared jurisdiction for transboundary and often fragile marine animal populations. Regional instruments that apply to the North-West Atlantic Ocean include the Inter-American Agreement for the Protection and Conservation of Sea Turtles (see section 3.2.1).

3.3.2.6 Baltic Sea

The Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention),[438] originally adopted in 1974 and replaced in 1992, has 10 Contracting Parties, including the EU and the Russian Federation. The Convention applies to the Baltic Sea and the entrance to the Baltic Sea, including the internal waters of the surrounding Parties (article 1).

THE REGIONAL ACTION PLAN ON UNDERWATER NOISE (RAP NOISE), ADOPTED BY HELCOM IN 2021, BECAME THE FIRST ACTION PLAN ON NOISE APPLICABLE TO A REGIONAL SEA

The Helsinki Convention obligates Parties to "individually or jointly take all appropriate legislative, administrative or other relevant measures to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance" (article 3(1)). The Convention defines "pollution" slightly different from UNCLOS, as the "introduction by man, directly or indirectly, of substances or energy into the sea, including estuaries, which are liable to create hazards to human health, to harm living resources and marine ecosystems, to cause hindrance to legitimate uses of the sea including fishing, to impair the quality for use of sea water, and to lead to a reduction of amenities" (article 2(1)). Nonetheless, the definition of pollution includes the introduction of "energy" and consequently also underwater noise.

The Helsinki Convention establishes a positive obligation to apply the precautionary principle (article 3(2)) and the polluter-pays principle (article 3(4)). Parties must promote the use of BEP and BAT (article 3(3)). Criteria for such use are set out in annex II to the Convention. If, however, the application of these practices "does not lead to environmentally acceptable results, additional measures shall be applied" (article 3(3)).

The Convention also establishes obligations for emission measurements (article 3(5)). In order to ensure that the Helsinki Convention's Parties' measurements can assess the state of the Baltic Sea's marine environment, a certain measurement standardization must be ensured. The Convention requires Parties to "ensure that measurements and calculations of emissions from point sources to water and air and of inputs from diffuse sources to water and air are carried out in a scientifically appropriate manner in order to assess the state of the marine environment of the Baltic Sea Area and ascertain the implementation of this Convention" (article 3(5)). Underwater noise from ships can be considered an emission from a point source. Cumulative noise from diffuse sources would also require consideration.

Annex IV to the Helsinki Conventions set out a series of mandatory measures for the mitigation of ship-source pollution. The Parties are required, in matters concerning the protection of the Baltic Sea Area from pollution by ships, to co-operate within IMO, in particular in promoting the development of international rules, based, inter alia, on the fundamental principles and obligations of the Helsinki Convention which also includes the promotion of the use of BAT and BEP as defined in annex II; and in the effective and harmonized implementation of rules adopted by IMO (annex IV, regulation 1). Parties are required to apply the provisions of annexes I to V of MARPOL 73/78 (annex IV, regulation 4). The definition of "discharge", in the Convention is the same as the definition of "discharge" in MARPOL (annex IV, regulation 1).

The Helsinki Convention also mandates, in addition to the provisions of the Convention which can be applied to pleasure craft, the implementation of additional "special measures to abate harmful effects on the marine environment of the Baltic Sea Area". The measures must, inter alia, deal with noise (article 9).

Other articles in the Helsinki Convention include those relating to fundamental principles and obligations (article 3), EIA (article 7) (see section 3.4.4.2(c)), nature conservation and biodiversity (article 15) (see

section 3.4.3.1(b)(ii)), reporting and exchange of information (article 16), information to the public (article 17), institutional arrangements (articles 19–23), scientific and technological cooperation (article 24), responsibility for damage (article 25) and settlement of disputes (article 26).

In 2013, it was agreed in the HELCOM Copenhagen Ministerial Declaration that the level of ambient and distribution of impulsive sounds in the Baltic Sea should not have a negative impact on marine life and that human activities that are assessed to result in negative impacts on marine life should be carried out only if relevant mitigation measures are in place.[439] To that end, the Ministerial Meeting agreed to establish "a set of indicators including technical standards which may be used for monitoring ambient underwater noise in the Baltic Sea", "encourage research on the cause and effects of underwater noise on biota", "map the levels of ambient underwater noise across the Baltic Sea", and "consider regular monitoring on ambient underwater noise as well as possible options for mitigation measures related to noise concerning the IMO's and CBD's work in that context".[440] The Ministerial Declaration further recognized the "international nature of shipping and the need to agree on global rules for shipping" in IMO. It recalled "the role of HELCOM, according to the Helsinki Convention, in the effective and harmonised implementation of rules adopted by the IMO".[441]

BSAP 2021, adopted at a HELCOM Ministerial Meeting in 2021,[442] addresses 11 main pressures, including "the input of anthropogenic noise" and a list of activities. Under its ecological objectives, the BSAP includes "No or minimal harm to marine life from man-made noise" and, as a management objective, "Minimise noise to levels that do not adversely affect marine life".

Progress in the achievement of commitments in the BSAP is monitored through regular reporting by the Parties and HELCOM Working Groups, with updates tracked via the HELCOM Explorer[443] – an online tool launched in 2016 to follow the implementation of actions.[444]

The Regional Action Plan on Underwater Noise (RAP Noise), adopted by HELCOM in 2021,[445] became the first action plan on noise applicable to a regional sea. It lists 35 regional actions, and 17 national actions focused on the reduction of pressures and impacts from underwater noise sources of different types (see also section 3.4.1.4). A number of the actions recommended by RAP Noise under its "Regional actions addressing continuous low-frequency noise" are intended to improve the collection and sharing of monitoring data. The implementation of the RAP Noise and additional actions on noise contained in the BSAP will enable the achievement of the ecological and managerial objectives on underwater noise contained in the BSAP.

The assessment of baselines and target levels is also being addressed through mapping of sensitive sea areas. Developing a low-frequency continuous noise indicator to assess pressures and, in the future, the impact on marine life, has also been one of HELCOM's main efforts to tackle continuous underwater noise from ships in the Baltic Sea (see also section 3.4.1.4).

In 2016, the EU Life+ BIAS project produced seasonal soundscape maps for the demersal, pelagic and surface zones, which identified underwater noise generated by commercial vessels as the primary source of human-induced underwater noise in the Baltic Sea. Other regional instruments also apply to the Baltic Sea. ASCOBAMS applies to the conservation of cetaceans of the Baltic Sea (see section 3.2.1). EU legislation (see section 3.3.1.1) applies to those States which are members of the EU. The AEWA and the Bern Convention (see section 3.2.1) apply to Parties to those treaties.

422 OSPAR "Agreement 2021-01: North-East Atlantic Environment Strategy 2030" Doc OSPAR 21/13/1 Annex 22 (2021) <https://www.ospar.org/documents?v=46337> last accessed 25 November 2024.

423 OSPAR "OSPAR's North-East Atlantic Environment Strategy 2030 – Progress Report" (OSPAR, 2023) <https://www.ospar.org/documents?v=51700> last accessed 25 November 2024.

424 See <https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/thematic-assessments/underwater-noise/> last accessed 25 November 2025.

425 N. Kinneging "Pilot Assessment of Ambient Noise" in OSPAR, 2023: The 2023 Quality Status Report for the Northeast Atlantic (OSPAR Commission, 2022) <https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/ambient-noise-pilot> last accessed 14 October 2024.

426 OSPAR "Agreement 2015-05: OSPAR Monitoring Strategy for Ambient Underwater Noise" <https://www.ospar.org/documents?d=34156> last accessed 30 November 2024.

427 Kinneging (n 425) p 3.

428 ibid.

429 Convention for The International Council for the Exploration of the Sea (adopted on 12 September 1964, entered into force on 22 July 1968) 652 UNTS 237.

430 Canada "A Species at Risk Act (SARA) Section 11 Conservation Agreement to support the recovery of the Southern Resident Killer Whale" (3 May 2024) <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/conservation-agreements/southern-resident-killer-whale-agreement-2024.html> last accessed 14 December 2024.

431 See <https://www.maritime.dot.gov/innovation/meta/vessel-generated-underwater-noise> last accessed 14 December 2024.

432 See <https://www.dfo-mpo.gc.ca/oceans/publications/noise-bruit/strategy-strategie/index-eng.html#3-0> last accessed 14 December 2024.

433 See <https://oceannoise.noaa.gov/roadmap-implementation> last accessed 14 December 2024.

434 ibid.

435 See <https://oceannoise.noaa.gov/Management> last accessed 14 December 2024.

436 See <https://oceannoise.noaa.gov/Science> last accessed 14 December 2024.

437 McKenna et al. (n 236).

438 Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) (signed 22 March 1974, entered into force on 3 May 1980, replaced by the 1992 Convention (adopted 9 April 1992, entered into force on 17 January 2000) <https://helcom.fi/about-us/convention> last accessed 25 November 2024.

439 Baltic Marine Environment Protection Commission, "HELCOM Copenhagen Ministerial Declaration – Taking Further Action to Implement the Baltic Sea Action Plan-Reaching Good Environmental Status for a Healthy Baltic Sea" (2013), para 25(b).

440 ibid.

441 ibid para 1(M).

442 Baltic Marine Environment Protection Commission, "Action Plan Baltic Sea" (October 2021).

443 HELCOM, HELCOM Explorer (maps.helcom.fi) <https://maps.helcom.fi/website/HELCOMexplorer/> last accessed 14 October 2024.

444 Baltic Marine Environment Protection Commission, "Implementation of the 2007 Baltic Sea Action Plan. HELCOM" (2021), p 4 <https://helcom.fi/post_type_publ/implementation-of-the-2007-baltic-sea-action-plan/> last accessed 7 February 2025.

445 Baltic Marine Environment Protection Commission, "HELCOM Recommendation 42-43/1, Regional Action Plan on Underwater Noise (RAP Noise)" (4 June 2021) <https://helcom.fi/wp-content/uploads/2021/10/Att.-HELCOM-Recommendation-42-43-1.pdf> last accessed 7 February 2025.

3.3.2.7 Black Sea

The **Convention for the Protection of the Black Sea Against Pollution (Bucharest Convention)**[446] adopted in 1992, has six Parties as of 14 October 2024. It applies to the Black Sea, including the territorial sea and EEZ of each Party (article I). The definition of pollution of the marine environment in the Bucharest Convention is based on the UNCLOS definition (article II(1)) and includes the introduction of energy into the marine environment and consequently also underwater noise.

Parties are required to take, individually or jointly, as appropriate, all necessary measures consistent with international law and in accordance with the Bucharest Convention to prevent, reduce and control pollution thereof in order to protect and preserve the marine environment (article V(1)). The Parties, when taking measures in accordance with the Convention for the prevention, reduction and control of the pollution of the marine environment of the Black Sea, must pay particular attention to avoiding harm to marine life and living resources, in particular by changing their habitats and creating hindrance to fishing and other legitimate uses of the Black Sea, and in this respect shall give due regard to the recommendations of competent international organizations (article XIII).

The Convention also establishes specific obligations for vessel source pollution. Parties must take individually or, when necessary, jointly, all appropriate measures to prevent, reduce and control pollution of the Black Sea from vessels in accordance with generally accepted international rules and standards (article VIII). Nothing in the Convention must affect in any way, inter alia, the exercise by ships and aircraft of navigational rights and freedoms, as provided for in international law, and as reflected in relevant international instruments (article XXIV). As anthropogenic underwater noise can be a pollutant under the definition of pollution, the aforementioned obligations also apply in relation to URN from shipping. However, currently there are no "generally accepted international rules and standards" available through IMO.

Other articles in the Bucharest Convention include those relating to scientific and technical cooperation and monitoring (article XV) (see section 3.4.1), responsibility and liability (article XVI), institutional arrangements (article XVII–XIX) and settlement of disputes (article XXV).

Four Protocols complement the Bucharest Convention,[447] including the Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea Against Pollution[448] (see section 3.4.3.1(b)(iii)).

Other regional instruments also apply to the Black Sea. ACCOBAMS applies to the conservation of cetaceans of the Black Sea (see section 3.2.1). EU legislation (see section 3.3.1.1) applies to those States which are members of the EU. Three Black Sea States are also members of GFCM (see section 3.2.2). The AEWA and the Bern Convention (see section 3.2.1) apply to Parties to those treaties.

3.3.2.8 Caribbean Sea, Gulf of Mexico and adjacent Atlantic area

The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention),[449] adopted in 1983, has 26 Parties as of 14 October 2024. It applies to the marine environment of the Gulf of Mexico, the Caribbean Sea and the areas of the Atlantic Ocean adjacent thereto south of 30^0 north latitude and within 200 nautical miles of the Atlantic coasts of the States referred to in the Agreement (articles 1(1) and 2(1)). Internal waters are excluded unless otherwise provided for in any protocol to the Cartagena Convention (article 1(2)).

Parties are obligated, individually or jointly, to take all appropriate measures in conformity with international law and in accordance with the Cartagena Convention and those of its Protocols in force to which they are parties to prevent, reduce and control pollution of the Convention area and to ensure sound environmental management, using for this purpose the best practicable means at their disposal and in accordance with their capabilities (article 4). The term "pollution" is not defined in the Cartagena Convention. Since the Convention provides that it and any its protocols "shall be construed in accordance with international law relating to their subject matter" (article 3(2)), the UNCLOS definition of pollution could be considered applicable. This would imply that the introduction of energy and consequently also underwater noise into the marine environment could be a form of pollution.

Parties are required by the Cartagena Convention to take all appropriate measures to prevent, reduce and control pollution "caused by discharges from ships and, for this purpose, to ensure the effective implementation of the applicable international rules and standards established by the competent international organization" (article 5). This obligation would apply to URN from shipping only if its introduction into the marine environment is considered a "discharge". Furthermore, international rules and standards would have to be established by IMO for this form of discharge.

Other articles of the Cartagena Convention include those relating to specially protected areas (article 10) (see section 3.4.3.1(b)(iv)), EIA (article 12) (see section 3.4.4.2(e)), scientific and technical cooperation (article 13) (see sections 3.4.1 and 4.4.7), liability and compensation (article 14), institutional arrangements (articles 15, 16, 20 and 21), transmission of information (article 22) and settlement of disputes (article 23 and annex).

Three Protocols complement the Cartagena Convention,[450] including the Protocol Concerning Specially Protected Areas and Wildlife (SPAW) in the Wider Caribbean Region (see section 3.4.3.1(b)(iv)). Furthermore, there are four Regional Activity Centers (RAC) which support the implementation of the different Protocols, including the SPAW-RAC under the SPAW Protocol.

Other regional instruments also apply to the Caribbean Sea, the Gulf of Mexico and the adjacent Atlantic area. The Inter-American Agreement for the Protection and Conservation of Sea Turtles (see section 3.2.1) applies to turtles in the Caribbean Sea.

3.3.2.9 Caspian Sea

The **Convention for the Protection of the Marine Environment of the Caspian Sea (Tehran Convention)**,[452] adopted in 2003, has five Parties as of 14 October 2024. It applies to the marine environment of the Caspian Sea (article 3). The definition of 'pollution' in the Tehran Convention is based on the UNCLOS definition (article 1) and thus includes the introduction of energy into the marine environment and consequently also underwater noise. The Tehran Convention establishes obligations for Parties to individually or jointly take all appropriate measures to prevent, reduce and control pollution of the Caspian Sea and to protect, preserve and restore the environment of the Caspian Sea (article 4(a) and (b)). To this end, the Parties must cooperate with each other and competent international organizations (article 4(c)). Parties must be guided by, inter alia, the precautionary principle, the polluter pays principle and the principle of accessibility of information on pollution of the marine environment of the Caspian Sea (aarticle 5). Parties are required, inter alia, to protect, preserve and restore endemic, rare and endangered marine species; and to conserve biodiversity, habitats of rare and endangered species, as well as vulnerable ecosystems (article14(1)(e) and (f)).

The Tehran Convention obligates Parties to take all appropriate measures to prevent, reduce and control pollution of the Caspian Sea from vessels and they must cooperate to develop "protocols and agreements to the Convention prescribing agreed measures, procedures and standards to that effect, taking into account relevant international standards" (article 9). As anthropogenic underwater noise can be a pollutant under the definition of pollution, the aforementioned obligation also applies in relation to underwater noise from shipping. However, currently no relevant "international standards" are available.

Other articles in the Tehran Convention include those relating to coastal zone management (article 15), EIA (article 17) (see section 3.4.4.2(f)), cooperation between the Contracting Parties (article 18), monitoring (article 19) (see section 3.4.1), research and development (article 20), exchange of and access to information (article 21), institutional arrangements (articles 22–23), implementation (article 26), reports (article 27), implementation and compliance (article 28) (see section 3.4.9), liability and compensation for damage (article 29) and settlement of disputes (article 30).

Four Protocols complement the Tehran Convention,[453] including the Protocol for the Conservation of Biological Diversity (Ashgabat Protocol)[454] (see section 3.4.3.1(b)(v)) and the Protocol on Environmental Impact Assessment in a Transboundary Context[455] (see section 3.4.4.2(f)). There is an additional protocol being negotiated on Monitoring, Assessment and Information Exchange.

3.3.2.10 Indian Ocean (West)

The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean (Nairobi Convention),[456] adopted in 1985 and amended in 2010, has 10 Parties as of 14 October 2024. The amended Convention applies to the Western Indian Ocean, covering the Eastern and South African Regions (article 1). It comprises the riparian, marine and coastal environment including the watershed of the Parties to the Convention (article 2(b)).

The 1985 Nairobi Convention establishes the obligation for Parties to "individually or jointly, take all appropriate measures under international law" and the Convention to prevent, reduce and combat pollution of the Convention area (article 4 (1)). The definition of "pollution" (article 2(c)) is similar to the UNCLOS definition and includes energy and consequently also underwater noise.

Parties under the Nairobi Convention are required to "take all appropriate measures to prevent, reduce and combat pollution of the Convention area caused by discharge from ships and, for this purpose, to ensure the effective implementation of the applicable international rules and standards established by, or within the framework of, the competent international organization" (article 5). Therefore, this obligation applies to underwater noise from shipping only if its introduction into the marine environment is considered a "discharge". Furthermore, international rules and standards would have to be available through IMO for this form of discharge.

The Convention provides that nothing in the Convention or any of its protocols, nor any act adopted on the basis of the Convention or its Protocols shall prejudice freedom of navigation on the high seas, the right and the modalities of passage through straits used for international navigation and the right of innocent passage in territorial seas, as well as the nature and extent of jurisdiction of the coastal State, island or archipelagic States, the flag States and the port States (article 28).

The amended Nairobi Convention introduced a new article on biological diversity (article 11) (see section 3.4.3.1(b)(vi)). Other relevant articles include those relating to EIA (article 14) (see section 3.4.4.2(g)), scientific and technical cooperation (article 15) (see section 3.4.1), liability and compensation (article 16), institutional arrangements (articles 17, 18 and 22), transmission of information (article 24), settlement of disputes (article 25 and annex) and compliance and enforcement (article 27) (see section 3.4.9).

Four Protocols complement the Nairobi Convention,[458] including the Protocol concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region[459] (see section 3.4.3.1(b)(vi)) which is undergoing revision, and the Protocol on Integrated Coastal Zone Management.[460]

Other regional instruments also apply to the Western Indian Ocean. The AEWA (see section 3.2.1) applies to Parties to the Agreement.

3.3.2.11 Mediterranean Sea

The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention),[461] adopted in 1976 and amended in 1995 has 22 Parties, including the EU. It applies to the maritime waters of the Mediterranean Sea proper including its gulfs and seas bounded by to the West by the meridian passing through Cape Spartel lighthouse, at the entrance of the Straits of Gibraltar, and to the East by the southern limits of the Straits of the Dardanelles between Mehmetcik and Kumkale lighthouses (article 1(1). The application of the Convention may be extended to coastal areas as defined by each Party within its own territory (article 1(2)).

The definition of "pollution" in the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) is identical to the definition in UNCLOS (article 2(a)). It includes energy and consequently also underwater noise. Parties to the Barcelona Convention are required, individually or jointly, to take all appropriate measures in accordance with the provisions of the Convention and those Protocols in force to which they are Party to prevent, abate, combat and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area and to protect and enhance the marine environment in that Area so as to contribute towards its sustainable development (article 4(1)). To this end, Parties pledge themselves to "take appropriate measures to implement the Mediterranean Action Plan and, further, to pursue the protection of the marine environment and the natural resources of the Mediterranean Sea Area as an integral part of the development process, meeting the needs of present and future generations in an equitable manner" (article 4(2)). In doing so, Parties must apply the precautionary principle; the polluter pays principle; undertake an EIA, also taking into account transboundary effects and necessary cooperation efforts, and promote integrated management of the coastal zones (article 4(3)) (see also section 3.4.4.2(h)). In implementing the Convention, the Parties must, inter alia, adopt programmes and measures, utilize BAT and BEP, and promote the application of, access to and transfer of environmentally sound technology, including clean production technologies, taking into account the social, economic and technological conditions (article 4(4)) (see also section 3.4.7).

Specifically in the context of vessel source pollution, Contracting Parties must "take all measures in conformity with international law to prevent, abate, combat and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area caused by discharges from ships and to ensure the effective implementation in that Area of the rules which are generally recognized at the international level relating to the control of this type of pollution" (article 6). This obligation therefore applies to underwater noise from shipping only if its introduction into the marine environment is considered a "discharge" and if rules which are generally recognized at the international level to control this type of discharge are available.

446 Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention) (adopted 21 April 1992, entered into force on 15 January 1994) 32 ILM 1101 (1982).

447 Protocol on Protection of the Black Sea Marine Environment against Pollution from Land-based Sources, Protocol on the Protection of the Black Sea Marine Environment Against Pollution by Dumping, Protocol on Cooperation in Combating Pollution of the Black Sea Marine Environment by Oil and Other Harmful Substances in Emergency Situations, and the Black Sea Biodiversity and Landscape Conservation Protocol.

448 The Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea Against Pollution (adopted on 14 June 2002, entered into force on 20 June 2011) <http://www.blacksea-commission.org/_convention.asp> last accessed 20 November 2024.

449 Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) (adopted 24 March 1983, entered into force on 11 October 1986) 1508 UNTS 157.

450 Protocol Concerning Cooperation in Combating Oil Spills in the Wider Caribbean Region, Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, and Protocol Concerning Pollution from Land-Based Sources and Activities.

451 Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (SPAW Protocol) (adopted on 18 January 1990, entered into force on 18 June 2000) 1 *Y.B. Int'l Envt'l L.* 441 (1990).

452 Convention for the Protection of the Marine Environment of the Caspian Sea (Tehran Convention) (adopted 4 November 2003, entered into force on 12 August 2006) <https://tehranconvention.org/en/tc/text-convention> last accessed 25 November 2024.

453 Protocol Concerning Regional Preparedness, Response and Co-operation in Combating Oil Pollution Incidents, Protocol on the Protection of the Caspian Sea against Pollution from Land based Sources and Activities, Protocol for the Conservation of Biological Diversity, and Protocol on Environment Impact Assessment in a Transboundary Context.

454 Protocol for the Conservation of Biological Diversity (Ashgabat Protocol) (adopted on 30 May 2014, not yet in force) <https://tehranconvention.org/en/tc/protocols> last accessed 24 November 2024.

455 Protocol on Environmental Impact Assessment in a Transboundary Context (adopted on 20 July 2018, not yet in force) <https://tehranconvention.org/en/tc/protocols> last accessed 24 November 2024.

456 Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean (Nairobi Convention) (adopted on 21 June 1985, entered into force on 30 May 1996) <https://www.nairobiconvention.org/CHM%20Documents/Protocols/1985%20Conference%20of%20Plenipotentiaries.pdf> last accessed 26 November 2024.

457 Amended Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean (Nairobi Convention) (adopted on 31 March 2010, not yet in force).

458 Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities, Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region, Protocol Concerning Cooperation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region, and Protocol on Integrated Coastal Zone Management.

459 Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region (adopted on 21 June 1985, entered into force on 30 May 1996) <https://www.nairobiconvention.org/nairobi-convention/who-we-are/nairobi-convention-protocols/> last accessed 26 November 2024.

460 Protocol on Integrated Coastal Zone Management in the Western Indian Ocean region (adopted 12 September 2023, not in force) <https://www.nairobiconvention.org/clearinghouse/sites/default/files/Final%20Act%20ICZM%20Protocol.pdf> last accessed 26 November 2024.

461 Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (adopted on 10 June 1985, entered into force on 8 July 2004) <https://www.unep.org/unepmap/who-we-are/barcelona-convention-and-protocols> last accessed 9 December 2024.

Other relevant articles in the Barcelona Convention include those relating to the conservation of biological diversity (article 10) (see section 3.4.3.1(b)(vii)), monitoring (article 12), scientific and technological cooperation (article 13) (see sections 3.4.1 and 3.4.7), environmental legislation (article 14), public information and participation (article 15), liability and compensation (article 16), institutional arrangements (articles 17–20, 24, 25), reports (article 26), compliance and control (article 27) (see section 3.4.9), and settlement of disputes (article 28 and annex A).

Seven Protocols complement the Barcelona Convention,[462] including the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean[463] (see section 3.4.3.1(b)(vii)) and the Protocol on Integrated Coastal Zone Management in the Mediterranean.[464]

Efforts within the Barcelona Convention framework

In 2008, the Parties decided to progressively apply the ecosystem approach to the management of human activities that may affect the Mediterranean marine and coastal environment.[465] They adopted an Ecosystem Approach roadmap to achieve and maintain GES of the Mediterranean Sea and coasts.[466] It consists of 11 Ecological Objectives (EO), which have been further broken down into Operational Objectives and indicators,[467] as well as GES definitions and associated targets.[468] EO 11 is assigned to "Energy including underwater noise", specifically setting as the objective 'Noise from human activities cause no significant impact on marine and coastal ecosystems'. To this end, the aim of the Operational Objective is that "Energy inputs into the marine environment, especially noise from human activities, is minimized" (for information regarding indicators, see section 3.4.1.5).

The Mediterranean Quality Status Report was presented at the Barcelona Convention MOP in 2023. It reiterates that even though the assessment was partially made during the COVID Pandemic, the "computation of the extent of exposure [to continuous sounds] resulted in non-tolerable (i.e. in non GES) for the Western Mediterranean Sea and the Aegean Levantine Sea Sub-regions (i.e. % affected habitat > 20%), while the status is tolerable (i.e. GES) in the Adriatic Sea and Central Mediterranean Sea Subregions".[469] The Report highlights the need to "implement measures to prevent, reduce, and mitigate underwater noise emissions, taking into account well developed guidance (e.g. CMS, IMO, Oceans, ACCOBAMS, etc)". According to the Report these measures should include the following: promote the application of vessel speed reductions by supporting for example ship speed limits in the proposed North-Western Mediterranean PSSA; address the issue of anthropogenic noise in the marine environment, including cumulative effects; integrate the issue of anthropogenic noise in management plans for MPAs and avoid or minimize producing noise in MPAs, and in areas containing critical habitat of cetaceans likely to be affected by man-made noise. Additional measures which were recommended include the following: apply the precautionary approach and envisage the appropriate mitigation measures, including a provision of expert review by specialists and a provision of the action to be taken if unusual events, such as atypical mass strandings, occur; and support NETCCOBAMS, a crucial tool for monitoring compliance with the agreed measures, such as vessel speed, mapping temporal and geographical distribution and abundance of whales with comparable data on shipping routes and densities.[470] Further recommendations refer to BAT and BEP such as to minimize cavitation, e.g. better maintenance and optimizing the propeller design; slow steaming or reduce ship speed; and implement underwater noise management plans developed for individual vessels.[471]

REMPEC is one of the Regional Activity Centres of UNEP/MAP and is administered by IMO. In 2022, the First Coordination Meeting on the implementation of the Mediterranean Strategy for the Prevention of,

Preparedness, and Response to Marine Pollution from Ships (2022 to 2031) took place.[472] To support the implementation of this Mediterranean Strategy, including its Action Plan, adopted at the Barcelona Convention's COP in 2021,[473] the Contracting Parties agreed to establish an Intersessional Working Group (IWG) on underwater noise from ships within the framework of Common Strategic Objective 7 (CSO7). It establishes the objective to "[i]dentify and understand collectively emerging issues related to pollution from ships in the Mediterranean, and define required actions to address issues identified."[474] The IWG-Noise was launched in August 2024.

Other regional instruments also apply to the Mediterranean Sea. ACCOBAMS applies to the conservation of cetaceans of the Mediterranean Sea (see section 3.2.1). EU legislation (see section 3.3.1.1) applies to those States which are members of the EU. The AEWA and the Bern Convention (see section 3.2.1) apply to Parties to the Convention. The GFCM has undertaken work in relation to anthropogenic underwater noise (see section 3.2.2).

3.3.2.12 Pacific Ocean (North-East)

The Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua Convention),[475] adopted in 2002, is not yet in force. Its scope of application comprises the maritime areas of the Northeast Pacific, defined in conformity with UNCLOS (article 2). Its definition of pollution of the marine environment expands the definition of pollution in UNCLOS. The Antigua Convention defines pollution as "the introduction by man, directly or indirectly, of substances or of energy into the marine environment (including estuaries and wetlands) which cause or may give rise to harmful effects such as damage to living resources or marine life, risks to human health, obstacles to maritime activities including fisheries and other legitimate uses of the sea, deterioration of sea water quality for their use, and impairment of leisure and aquaculture areas" (article 3(1)(d)). This definition includes energy and consequently also underwater noise.

Parties are required to, unilaterally, bilaterally or multilaterally, adopt appropriate measures pursuant to the provisions of the Convention, to prevent, control and avoid pollution of the marine and coastal environment of the Northeast Pacific, as well as other forms of deterioration that may affect these, and ensure sustainable environmental management of the marine and coastal areas and an effective development of their natural resources (article 5(1)). "Other forms of environmental deterioration" are defined as "activities of man-made origin that may alter the quality of the marine environment and its resources and affect them in such a way as to reduce their natural recovery and regeneration capacity, such as erosion, the introduction of exotic species, protection capacity against natural phenomena, etc." (article 3(1)(e)). Parties are required to collaborate as necessary at a regional level, directly or in cooperation with competent international organizations, in the drafting, adoption and implementation of rules, norms, practices and procedures for the effective protection and development of the marine and coastal environment of the Northeast Pacific against all types and sources of pollution, and for the sound planning and development of that environment and those areas and their appropriate environmental management, taking into account the special characteristics of the region (article (5)(4)).

Parties must adopt measures to prevent, reduce, control and remedy pollution and other forms of deterioration of the marine and coastal environment, including pollution caused by ships and any other arrangement or installation that operates in the marine environment, in particular, measures to avoid discharges, accidental or not, addressing emergencies in accordance with generally accepted international standards (art.article 6(1)(b)). The term '"discharges' " is defined in the Convention as '"the

pollution of the marine and coastal environment deriving from spills, disposal or dumping of wastes and hazardous substances from ships, aircraft, atmosphere or land-based sources of pollution' " (art.article 3(1)(f)). Therefore, the aforementioned obligation in relation to the prevention, reduction, control and remediation of pollution from ships applies to the introduction of underwater noise into the marine environment from ships only if it is considered a discharge. Furthermore, generally accepted international standards would need to be available to prevent, reduce and control such discharge.

The Antigua Convention requires Parties to apply the precautionary principle and promote the application of the polluter-pays principle (article 5(6)(a) and (b)). Furthermore, Parties must endeavour to promote the use of the BAT, including cleaner technologies appropriate to the conditions of the region, taking socioeconomic factors into account (article 10(2)(f)).

Other articles in the Antigua Convention include those relating to EIA (article 5(6)(c) and article 10(3)) (see section 3.4.4.2(i)), protection of species and areas (article 6(2)(c) and (d) and article 10) (see section 3.4.3.1(b)(viii)), monitoring of pollution and other forms of environmental deterioration (article 9) (see also section 3.4.1), integrated management and sustainable development of the marine and coastal environment (article 10), information exchange (article 11), science and technological information (article 12) (see sections 3.4.1 and 4.4.7), liability and compensation (article 13), institutional arrangements (articles 14–15), reports (article 19) and settlement of disputes (article 25).

Other regional instruments also apply to the North-East Pacific Ocean. The Inter-American Agreement for the Protection and Conservation of Sea Turtles (see section 3.2.1) also applies to turtles in the North-East Pacific Ocean.

3.3.2.13 Pacific Ocean (North-West)

The Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (Northwest Pacific Action Plan – NOWPAP)[476] was adopted in 1994 and involves cooperation between China, Japan, the Republic of Korea and the Russian Federation.

The overall goal of the Northwest Pacific Action Plan is "the wise use, development and management of the coastal and marine environment so as to obtain the utmost long-term benefits for the human populations of the region while protecting human health, ecological integrity, and the region's sustainability for future generations".[477] Its five main objectives comprise: (1) monitoring and assessment of the environmental condition; (2) creation of an efficient and effective information base; (3) integrated coastal area planning; integrated coastal area management; and (4) establishment of a collaborative and cooperative framework.[478] Identified tasks in relation to the fourth objective include the following: "zone bodies of water for particular purposes according to mutually-agreed and pre-determined criteria, and control discharges and other inputs to ensure that water quality is maintained at levels such that can be used for whatever purpose it has been set aside for; to introduce compulsory environmental impact assessment according to national criteria" (paragraph 21(b)); and "in an effort to improve water quality throughout the region, cooperation is also necessary in the prevention, control and combatting of marine pollution from sea-based sources, inter alia, through the implementation of existing international conventions concerned" (paragraph 21(d)). [479]

Four Regional Activity Centers support the implementation of the NOWAP, these are the Special Monitoring & Coastal Environmental Assessment Regional Activity Centre, the Data and Information Network

Regional Activity Centre, the Marine Environmental Emergency Preparedness and Response Regional Activity Centre and the Pollution Monitoring Regional Activity Centre.

No efforts in relation to underwater noise reduction have thus far been identified in the NOWPAP framework.

3.3.2.14 Pacific Ocean (South)

The Convention for the Protection of Natural Resources and Environment of the South Pacific Region (Noumea Convention)[480] was adopted in 1986, together with two Protocols,[481] under the auspices of the Secretariat of the Pacific Regional Environment Programme (SPREP). The Convention has 12 Parties, as of 14 October 2024. The marine area in the South Pacific Region to which the Noumea Convention applies is defined in its article 2. A definition of "pollution of the marine environment" is also provided (article 2(f)). It is nearly identical to the definition in UNCLOS and includes "energy" (article 2(f)) and consequently also underwater noise.

The Noumea Convention recognizes "the threat to the marine and coastal environment, its ecological equilibrium, resources and legitimate uses posed by pollution". It requires Parties to endeavour, either individually or jointly, to take all appropriate measures in conformity with international law and in accordance with the Noumea Convention and those Protocols in force to which they are Party to prevent, reduce and control pollution of the Convention Area, from any source, and to ensure sound environmental management and development of natural resources, using for this purpose the best practicable means at their disposal, and in accordance with their capabilities. In doing so the Parties must endeavour to harmonise their policies at the regional level (article 5(1)).

With regard to vessel source pollution, the Noumea Convention mandates that the Parties "take all appropriate measures to prevent, reduce and control pollution in the Convention Area caused by discharges from vessels, and to ensure the effective application in the Convention Area of the generally accepted international rules and standards established through the competent international organisation or general diplomatic conference relating to the control of pollution from vessels" (article 6). However, this obligation would apply to underwater noise from ships only if the introduction of such noise into the marine environment is considered a "discharge". Furthermore, generally accepted international rules and standards would need to be available to prevent, reduce and control such discharge.

Parties are required to cooperate in the formulation and adoption of other protocols to the Convention prescribing agreed measures, procedures and standards to prevent, reduce and control pollution from all sources or in promoting environmental management in conformity with the objectives of the Convention (article 5(3)). The Parties must, taking into account existing internationally recognized rules, standards, practices and procedures, cooperate with competent global, regional and sub-regional organisations to establish and adopt recommended practices, procedures and measures to prevent, reduce and control pollution from all sources and to promote sustained resource management and to ensure the sound development of natural resources in conformity with the objectives of the Convention and its Protocols, and to assist each other in fulfilling their obligations under the Convention and its Protocols (article 5(4)). National laws and regulations which Parties are required to endeavour to establish for the effective discharge of their obligations prescribed in the Convention "shall be no less effective than international rules, standards and recommended practices and procedures" (article 5(5)). The *Revised URN Guidelines* do not represent "generally accepted international rules and standards".

462 Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea, Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea, Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities, Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean, Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil, Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal, and Protocol on Integrated Coastal Zone Management in the Mediterranean.

463 The Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol) (adopted on 10 June 1995, entered into force on 12 December 1999) replaced the Protocol Concerning Mediterranean Specially Protected Areas (adopted on 3 April 1982) in the relationship among the Parties to both instruments. The Annexes to the 1995 Protocol were adopted on 24 November 1996 and entered into force on 12 December 1999. Annex II was last amended on 20 December 2017 and amendments entered into force on 14 September 2018. Annex III was last amended on 6 December 2013 and amendments entered into force on 16 April 2015.

464 Protocol on Integrated Coastal Zone Management in the Mediterranean (adopted on 21 January 2008, entered into force on 24 March 2011) in United Nations Environment Programme, "Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and Its Protocols" (Nairobi, 2019).

465 Decision IG.17/6 "Implementation of the ecosystem approach to the management of human activities that may affect the Mediterranean marine and coastal environment" (18 January 2008) UNEP Doc UNEP(DEPI)/MED IG.17/10, annex V.

466 Decision IG.20/4 "Implementing MAP Ecosystem Approach Roadmap: Mediterranean Ecological and Operational Objectives, Indicators and Timetable for Implementing the Ecosystem Approach Roadmap" (10 February 2012) UNEP Doc UNEP(DEPI)/MED IG 20/8, annex II, p 39).

467 ibid, p 59.

468 Decision IG.21/3 "Decision on the Ecosystems Approach Including Adopting Definitions of Good Environmental Status (GES) and Targets" (6 December 2013), UNEP Doc UNEP(DEPI)/MED IG.21/9, Annex II, 33).

469 Decision IG.26/3 "The 2023 Mediterranean Quality Status Report and a Renewed Ecosystem Approach Policy in the Mediterranean" (8 December 2023) UNEP Doc UNEP/MED IG.26/22, annex VI, Decision IG.26/3, annex, para 171.

470 ibid para 175.

471 ibid para 176.

472 REMPEC, "Report of the First Coordination Meeting on the Mediterranean Strategy for the Prevention of, Preparedness, and Response to Marine Pollution from Ships (2022-2031)" (REMPEC/WG.52/8, Floriana, 29 November – 1 December 2022, Malta, 13 March 2023).

473 Decision IG.25/16 "Decision on the Mediterranean Strategy for the Prevention of, Preparedness, and Response to Marine Pollution from Ships (2022–2031)" (10 December 2021) UNEP Doc UNEP(DEPI)/MED IG.25/27.

474 REMPEC, "Report of the First Coordination Meeting on the Mediterranean Strategy for the Prevention of, Preparedness, and Response to Marine Pollution from Ships (2022-2031)" (REMPEC/WG.52/8, Floriana, 29 November – 1 December 2022) annex V, para 20.6.

475 The Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua Convention) (adopted on 18 February 2002, not in force) <https://resolutions.unep.org/uploads/2002-antigua_convention.pdf> last accessed 28 November 2024.

476 Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (Northwest Pacific Action Plan – NOWPAP) (adopted 14 September 1994) UNEP Doc UNEP(OCA)/NOWPAP/IG1/5, annex IV.

477 ibid p 2.

478 ibid p 3.

479 ibid pp 6–7.

480 Convention for the Protection of Natural Resources and Environment of the South Pacific Region (Noumea Convention) (adopted 24 November 1986, entered into force on 22 August 1990) <https://forumsec.org/publications/treaty-collection> last accessed on 28 November 2024.

481 The Protocol for the Prevention of Pollution of the South Pacific Region by Dumping and the Protocol Concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region.

Other relevant articles in the Noumea Convention include those relating to specially protected areas and protection of wild fauna and flora (article 14) (see section 3.4.3.1(b)(ix)), EIA (article 16) (see section 3.4.4.2(j)), scientific and technical cooperation (article 17) (see section 3.4.1), technical and other assistance (article 18) (see section 3.4.7), transmission of information (article 19), liability and compensation (article 20), institutional arrangements (articles 21–22), and settlement of disputes (article 26 and annex).

The Noumea Convention is complemented by two Protocols.[482]

The SPREP's Strategic Plan 2017–2026[483] establishes the four priorities: climate change resilience, ecosystem and biodiversity protection; waste management and pollution control; and environmental governance. Anthropogenic underwater noise has not been identified in the Plan as a threat or pollutant to be addressed. Even though the SPREP State of the Environment and Conservation in the "Pacific Islands Regional Report from 2020" identifies "sound pollution" as a factor of human development which can lead to the displacement of marine species,[484] it does not further specify the activities responsible for it nor indicate any efforts regarding this matter.

The Whales and Dolphins Action Plan, which is included in the Pacific Islands Regional Marine Species Programme 2022–2026 (Marine Species Programme) – a regional strategy for conserving and managing dugongs, marine turtles, whales and dolphins, sharks and rays, and seabirds – also identifies anthropogenic noise from vessels as one of the main threats to cetaceans in the Pacific Islands region.[485] However, it does not establish any specific mitigation measures and does not mention any collaborative efforts with IMO.

3.3.2.15 Pacific Ocean (South-East)

The Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific (Lima Convention)[486] was adopted in 1981 under the auspices of the CPPS. It has five Contracting Parties as of 14 October 2024. The Convention applies to "the maritime area and the coastal area of the South-East Pacific within the maritime zone of sovereignty and jurisdiction of the High Contracting Parties up to the 200-mile limit and, beyond that zone, the high seas up to a distance within which pollution of the high seas may affect that area" (article 1). According to its Preamble, the Convention aims "to protect and preserve the marine environment and coastal area of the South-East Pacific against all types and sources of pollution".

The Lima Convention defines "pollution of the marine environment" (article 2(a)) like UNCLOS, and therefore includes "energy" and consequently also underwater noise.

The Parties to the Lima Convention are required to endeavour, either individually or through bilateral or multilateral cooperation, to adopt appropriate measures in order to prevent, reduce and control pollution in the marine environment and coastal areas of the South-East Pacific (article 3(1)). They must also endeavour to ensure that any laws and regulations they adopt to prevent, reduce and control pollution of their respective marine environments and coastal areas from any source and to promote appropriate environmental management of said environments and areas are as effective as the existing international standards (article 3(3)). The Parties must "cooperate, on a regional basis, directly or in collaboration with the competent international organisations, in formulating, adopting and implementing effective rules, standards, practices and procedures for the protection and preservation of the marine environment and coastal area of the South-East Pacific against all types and sources of pollution, and in promoting appropriate environmental management of such environment and area, taking into account characteristic regional features" (article

3(4)). Parties must take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other Parties or their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not, as far as possible, spread beyond the areas where the Parties exercise sovereignty and jurisdiction (article 3(5)).

The measures adopted by the Parties to prevent and control pollution of the marine environment must include, inter alia, those designed to minimize to the fullest possible extent "pollution from vessels, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, preventing intentional discharges, and regulating the design, construction, equipment, operation and manning of vessels in accordance with generally accepted international standards and rules" (article 4(b)). While underwater radiated noise from shipping is not mentioned, the possibility to adopt measures to prevent and control this form of pollution of the marine environment is not excluded. However, to date, no efforts concerning underwater noise pollution within the framework of the Lima Convention have been identified.

Other articles included in the Lima Convention relate to EIAs (article 8) (see section 3.4.4.2(k)) monitoring of pollution (article 7), scientific and technological cooperation (article 10) (see sections 3.4.1 and 4.4.7), exchange of information (article 9), responsibility and liability and compensation (article 11), institutional arrangements (articles 12–13) and reports (article 14).

Three Protocols and one Agreement complement the Lima Convention,[487] including the Protocol for the Conservation and Management of Protected Marine and Coastal Areas of the South-East Pacific.[488] All Lima Convention Parties are also parties to the latter Protocol (see section 3.4.3.1(b)(x)).

Other regional instruments that also apply to the South-East Pacific Ocean, include the Inter-American Agreement for the Protection and Conservation of Sea Turtles (see section 3.2.1) which also applies to turtles in the Pacific Ocean.

The Strategic Plan of the CPPS for the period of 2022 to 2030 does not include any work on underwater noise.[489] Its strategic objective in terms of contamination is to "[f]acilitate the implementation of measures in the region to prevent and reduce marine pollution from land and sea sources".[490] It aims to update the state of knowledge on marine pollution from diverse sources in the Southeast Pacific within the framework of the Coordinated Programme of Research, Surveillance and Control of Marine Pollution in the Pacific Southeast (CONPASCE). Underwater noise has not yet been included in the work programme of CONPASCE.

The CPPS's Marine Mammals Action Plan, which dates back to 1991, also does not consider anthropogenic underwater noise in general.[491] That Action Plan aims to identify distribution patterns, the conservation status, and threats for marine mammals to further develop conservation measures, regional programmes, agreements, and national legislation for their protection in the area of the Lima Convention.[492]

3.3.2.16 Red Sea and Gulf of Aden

The Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention),[493] adopted in 1982, has seven Parties as of 14 October 2024. It applies to the entire sea area, taking into account integrated ecosystems of the Red Sea, Gulf of Aqaba, Gulf of Suez, Suez Canal to its end on the Mediterranean, and the Gulf of Aden as bounded by the rhumb lines specified in the Convention (article II).

Like UNCLOS, the Jeddah Convention includes "energy" in its definition of marine pollution (article I(3)) and consequently also underwater noise. However, unlike the UNCLOS definition, the Jeddah Convention's definition of marine pollution only includes a reference to living marine resources and not to "marine life" and "other legitimate uses of the sea". The Convention establishes the general obligation for the Parties to, individually or jointly, take all appropriate measures in accordance with the Jeddah Convention and protocols to which they are Party for the conservation of the Red Sea and Gulf of Aden environment, including the prevention, reduction and combating of marine pollution (article III(1)). To this end, the Parties must cooperate with the competent international, regional and subregional organizations to establish and adopt regional standards, recommended practices and procedures for the conservation of the Red Sea and Gulf of Aden environment, including the prevention, reduction and combating of pollution from all sources in conformity with the objectives of the Jeddah Convention, and to assist each other in fulfilling their obligations under the Convention (article III(4)).

With regard to pollution from ships, the Parties are required to take all appropriate measures in conformity with the Jeddah Convention and with generally recognized international rules to prevent, reduce and combat pollution in the Sea Area caused by intentional or accidental discharges from ships and must ensure effective compliance in the Sea Area with generally recognized international rules relating to the control of this type of pollution including load-on-top, segregated ballast and crude oil washing procedures for tankers (article IV). However, this obligation would apply to underwater radiated noise from ships only if the introduction of such noise into the marine environment is considered a "discharge". Furthermore, generally recognized international rules would need to be available to prevent, reduce and control such discharge.

Other articles included in the Jeddah Convention relate to assessment and management of the environment (article XI) (see section 3.4.4.2(l)), scientific and technological cooperation (article X) (see section 3.4.1), technical and other assistance (article XII) (see section 3.4.7), liability and compensation (article XIII), sovereign immunity (article XIV), institutional arrangements (articles XVI–XIX), reports (article XXII), compliance control (XXIII) (see section 3.4.9), and settlement of disputes (XXIV).

Four Protocols complement the Jeddah Convention,[494] including the Protocol Concerning the Conservation of Biological Diversity and the Establishment of Network of Protected Areas in the Red Sea and Gulf of Aden (2005)[495] (see section 3.4.3.1(b)(xi)).

3.3.2.17 ROPME Sea Area

The Regional Convention for Co-Operation on the Protection of the Marine Environment from Pollution (Kuwait Convention),[496] adopted in 1978, has eight Parties as of 14 October 2024. The geographical coverage of the Kuwait Convention is determined by geographical coordinates and does not include the internal waters of the Parties unless otherwise stated in the Convention or any of its protocols (article II).

Like UNCLOS, the Kuwait Convention includes "energy" in its definition of marine pollution (article I(a)) and consequently also underwater noise. However, unlike the UNCLOS definition, the Kuwait Convention's definition of marine pollution does not include a reference to "marine life" and "other legitimate uses of the sea". The Convention establishes the general obligation for the Parties to individually or jointly, take all appropriate measures in accordance with the Kuwait Convention and protocols to which they are Party to prevent, reduce and combat marine pollution (article III(a)). To this end, the Parties must cooperate with the competent international, regional and subregional organizations to establish and adopt regional standards, recommended practices and procedures to prevent, reduce and combat

pollution from all sources in conformity with the objectives of the Kuwait Convention, and to assist each other in fulfilling their obligations under the Convention (article III(d)).

With regard to pollution from ships, the Parties are required to take all appropriate measures in conformity with the Kuwait Convention and applicable rules of international law to prevent, reduce and combat pollution in the Sea Area caused by intentional or accidental discharges from ships, and must ensure effective compliance in the Sea Area with applicable international rules relating to the control of this type of pollution including load-on-top, segregated ballast and crude oil washing procedures for tankers (article IV). However, this obligation would apply to underwater radiated noise from ships only if the introduction of such noise into the marine environment is considered a "discharge". Furthermore, applicable international rules would need to be available to prevent, reduce and control such discharge.

Other articles of the Kuwait Convention include those relating to environmental assessment (article XI) (see section 3.4.4.2(m)), scientific and technological cooperation (article X) (see section 3.4.1) and technical and other assistance (article XII) (see section 3.4.7), liability and compensation (article XIII), sovereign immunity (article XIV), institutional arrangements (articles XVI–XVIII), reports (article XXIII), compliance control (XXIV) (see section 3.4.9), and settlement of disputes (XXV).

Four Protocols complement the Kuwait Convention.[497] A draft Protocol concerning the conservation of biological diversity and the establishment of protected areas is under development.[498]

3.3.2.18 Polar Areas

(a) Antarctic Region and Southern Ocean Region

The Antarctic Treaty System embodies a set of binding legal instruments and non-binding commitments which contain approaches to the reduction of underwater noise from shipping. Its main instrument, the Antarctic Treaty,[499] adopted in 1959, has 29 Parties as of 14 October 2024. The Treaty applies to the area south of 60° South Latitude, including all ice shelves, but "nothing in the present Treaty shall prejudice or in any way affect the rights, or the exercise of the rights, of any State under international law with regard to the high seas within that area" (article VI). The Antarctic Treaty mandates that the Antarctic is used for peaceful purposes only (article 1(1)). Parties are required to meet for the purpose of exchanging information, consulting together on matters of common interest pertaining to Antarctica, and formulating and considering, and recommending to their Governments measures including regarding the use of Antarctica for peaceful purposes only, the facilitation of scientific research in Antarctica, the facilitation of international scientific cooperation in Antarctica, and the preservation and conservation of living resources in Antarctica (article IX(1)). To this end, the Agreed Measures for the Conservation of Antarctic Fauna and Flora (1959) superseded later by the Protocol on Environmental Protection to the Antarctic Treaty (1991) (see section 3.4.3.1(b)(xii)), the Convention for the Conservation of Antarctic Seals (1972) (see section 3.2.1), the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) (1980), and the Convention on the Regulation of Antarctic Mineral Resource Activities (1988) were adopted. The framework character of the Antarctic Treaty enables the instrument to be applied to underwater radiated noise from shipping, as well as scientific research and reduction measures.

(b) Arctic Region

The Arctic Council was established in 1996 with the Ottawa Declaration.[500] Its membership consists of eight States, six Permanent Participants (representing the Indigenous Peoples of the Arctic) and various observers comprised of non-Arctic States, intergovernmental and interparliamentary organizations,

as well as non-governmental organizations. The Working Group on the Protection of the Arctic Marine Environment (PAME) is one of the six Arctic Council Working Groups.[501] PAME is subdivided into thematic working areas, including one on Arctic Shipping. PAME's objective is the conservation and sustainable use of the Arctic marine environment, specifically through the facilitation of technical and scientific information to support the development of policies for managing marine activities in the Arctic. In 2009, the Arctic Council published the Arctic Marine Shipping Assessment (AMSA), facilitated by PAME, where underwater noise was identified as a regional issue deserving further research and investigation.[502] Drawing from the conclusions of the AMSA Report, PAME recommended that its members engage with relevant international organisations to further assess the effects of ship noise on marine mammals, and consider developing and implementing mitigation strategies.[503]

In 2019 PAME published the "Underwater Noise in the Arctic, A State of Knowledge Report" [504] that provides a baseline understanding of underwater noise pressures and impacts, including ambient sound levels, in the Arctic. One of the report's main findings was the special characteristics and vulnerability of the Arctic to underwater noise due to its formerly low ambient noise levels. The report further concluded, inter alia, that "the most commonly cited sources of anthropogenic underwater noise in the Arctic are from vessel traffic and oil and gas exploration activity". [505] It additionally stated that "vessel activity has been increasing throughout the Arctic, and may lead to increased underwater noise, whereas oil and gas exploration activities vary greatly in space and time throughout the Arctic, and have not been increasing as a whole". It analysed the knowledge gaps, identifying, inter alia, geographic, taxonomic and methodological gaps.

These efforts were further complemented in 2021 when PAME released the "Underwater Noise Pollution from Shipping in the Arctic Report"[506] that provided new knowledge on underwater noise pollution from shipping in the Arctic. Drawing from multiple data sources, including PAME's Arctic Shipping Traffic Database (ASTD), source levels of underwater noise produced by ships operating in the Arctic between 2013–2019 were generated, and their contributions to overall underwater soundscapes were modelled and changes explored over space and time. In addition, underwater noise from ships was discussed in relation to its potential effects on noise-sensitive species, particularly marine mammals. Finer scale modelling was also conducted in three locations known to have a comparably high presence of shipping and marine mammals – the Barents Sea, the Bering Sea, and Baffin Bay/Davis Strait. The report presents the first long term, basin scale shipping noise model of the Arctic Ocean and its regional seas, concluding that over seven years, from 2013 to 2019, underwater noise from shipping increased substantially in multiple locations across the Arctic.

PAME is currently engaged in a "Phase II" of this effort, seeking to further characterize the Arctic Ocean soundscape and its contributions from shipping, investigate scenarios for noise level predictions out to 2030, and model operational technological scenarios to mitigate underwaters noise impacts in three sub-regions of interest. The results of this work are expected to be finalized and approved by PAME in early 2025.

The increasing shipping activity in the Arctic has also led IMO to consider and disseminate the Guidelines for underwater noise reduction in Inuit Nunaat and the Arctic[507] (see section 2.3.1.4).

EU Member States are required to implement EU legislation in the Arctic.

482 Protocol for the Prevention of Pollution of the South Pacific Region by Dumping, and Protocol concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region.

483 SPREP "Strategic Plan 2017–2026 – Apia, Samoa" (2017).

484 SPREP *State of the Environment and Conservation in the Pacific Islands 2020 Regional Report* (2021).

485 SPREP "Pacific Islands Regional Marine Species Programme 2022–2026".

486 Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific (adopted 12 November 1981, entered into force on 19 May 1986) 1648 UNTS.

487 Agreement on Regional Cooperation to Combat Pollution of the Southeast Pacific by Hydrocarbons and other Harmful Substances in Cases of Emergency, Complementary Protocol to the Agreement on Regional Cooperation to Combat Pollution of the Southeast Pacific by Hydrocarbons and other Harmful Substances, Protocol for the Protection of the Southeast Pacific against Radioactive Contamination, Protocol for the Protection of the Southeast Pacific against Pollution from Land Sources, and Protocol for the Conservation and Administration of the Marine and Coastal Protected Areas of the Southeast Pacific.

488 Protocol for the Conservation and Management of Protected Marine and Coastal Areas of the South-East Pacific (adopted 21 September 1989, entered into force on 24 January 1995).

489 Permanent Commission of the South Pacific "Sexta Parte Plan Estratégico de La Comisión Permanente Del Pacífico Sur (CPS) 2022-2030".

490 ibid p 165.

491 Comisión Permanente del Pacífico Sur "Plan de Acción Para La Conservación de Los Mamíferos Marinos En El Pacífico Sudeste" (1991).

492 ibid.

493 Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (adopted 14 February 1982, entered into force on 20 August 1985) <https://persga.org/jeddah-convention/> last accessed 29 November 2024.

494 Protocol Concerning the Conservation of Biological Diversity and the Establishment of Network of Protected Areas in the Red Sea and Gulf of Aden, the Protocol Concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden, Protocol Concerning Exchange of Experts, Equipment and Materials in Cases of Marine Emergency, and the Protocol Concerning Cooperation in Management of Fisheries and Mariculture in the Red Sea and Gulf of Aden.

495 Protocol Concerning the Conservation of Biological Diversity and the Establishment of Network of Protected Areas in the Red Sea and Gulf of Aden (adopted 12 December 2005, not in force) <https://persga.org/app/uploads/2024/02/1707584827_592_2856467_conservationbiodiversityprotocol.pdf> last accessed 29 November 2024.

496 Kuwait Regional Convention for Co-operation on the Protection of the Marine Environment from Pollution (adopted 24 April 1978, entered into force on 1 July 1979) 1140 UNTS 133.

497 Protocol concerning Regional Cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency, Protocol concerning Marine Pollution resulting from Exploration and Exploitation of the Continental Shelf, Protocol for the Protection of the Marine Environment against Pollution from Land-based Sources, and Protocol on the Control of Marine Transboundary Movement and Disposal of Hazardous Wastes and other Wastes.

498 ibid.

499 Antarctic Treaty (adopted 1 December 1959, entered into force on 23 June 1961) 402 UNTS 71.

500 Ottawa Declaration (19 September 1996) <https://oaarchive.arctic-council.org/items/fb29e6d2-d60c-43ca-8e46-fa7a505033e0> last accessed 9 February 2025.

501 See website of PAME <https://pame.is/about/> last accessed 29 November 2024.

502 Arctic Council *Arctic Marine Shipping Assessment 2009 Report* <https://oaarchive.arctic-council.org/bitstreams/cbb4cce2-3fbf-46f4-aede-2e3e01cd5e89/download> last accessed 29 November 2024.

503 PAME *Underwater Noise in the Arctic: A State of Knowledge Report* (Roveniemi, 2019) (PAME Secretariat, Akureyri, 2019).

504 ibid.

505 ibid.

506 PAME *Underwater Noise Pollution from Shipping in the Arctic* (PAME Working Group, May 2021) <https://oaarchive.arctic-council.org/server/api/core/bitstreams/c7d409c8-e567-471f-89af-b8dc14ec7ca0/content> last accessed 9 February 2025.

507 IMO Doc MEPC.1/Circ.907 (n 130).

3.4 SPECIFIC MEASURES IN TREATIES AND NON-BINDING LEGAL INSTRUMENTS, AS WELL AS OTHER APPROACHES ASSOCIATED WITH THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING

This section will focus on specific measures in legally binding and non-binding instruments, as well as other approaches which can support or are associated with the reduction of underwater radiated noise from shipping. Information on developments at the regional level is presented under the following subheadings: addressing gaps in knowledge and data, including monitoring; application of relevant principles and approaches; ABMTs, including MPAs; EIA; awareness raising; incentivization; capacity-building and transfer of technology and financial resources; cooperation and coordination; and implementation, compliance and enforcement.

3.4.1 Addressing gaps in knowledge and data, including monitoring

The regional treaties and other legally-binding instruments establish obligations to cooperate in the fields of science and technology, including scientific research, environmental monitoring and other scientific and technical information, and the exchange of data and any other specific information for the purposes of their Conventions, such as: the Abidjan Convention (article 14); Cartagena Convention (article 13); Tehran Convention (article 18); Nairobi Convention (article 14); Barcelona Convention (article 13); Antigua Convention (article 12); Noumea Convention (article 17); Lima Convention (article 10); Jeddah Convention (article X); and Kuwait Convention (article X). Several of the treaties also indicate that this entails the development and coordination of national research and monitoring programmes concerning all types of pollution, specifically referencing cooperation with competent global and regional organizations to create a regional network of national research centers and institutions to ensure compatible results (see, e.g: Abidjan Convention (article 14); Cartagena Convention (article 13); Nairobi Convention (article 14); Antigua Convention (article 9); Lima Convention (article 10); Jeddah Convention (article X); and Kuwait Convention (article X)). Some regional Conventions also require their Parties to establish, where appropriate, in cooperation with competent international organizations, complementary or joint research programmes (see, e.g. the OSPAR Convention (article 8)) and monitoring programmes (e.g. the Noumea Convention (article 17)) covering all sources of pollution and a pollution monitoring system (see, e.g. the Black Sea Convention (article XV)). Some treaties also specifically mandate the promotion or undertaking of programmes of scientific, educational, technical and other assistance (e.g. the Antigua Convention (article 12) and the Lima Convention (article 10) (see section 3.4.7).

Efforts in addressing gaps in knowledge and data in relation to underwater radiated noise from shipping have been mainly concentrated in the EU and in regional organisations supported by developed countries, as well as in North America.

To achieve GES under the EU Marine Strategy Framework Directive, the regional bodies which include EU Member States collaborate with the EU, and similar to Descriptor 11 on underwater noise of the Marine Strategy Framework Directive, they set ecological objectives, operational objectives and targets for achieving the ecological objectives. They all include underwater noise and, specifically, continuous noise in their ecological objectives to achieve GES in their respective application areas.

3.4.1.1 Developments at the EU level

The EU, as a Party to ACCOBAMS, ASCOBANS, the Barcelona Convention, the Helsinki Convention and OSPAR Convention, collaborates with the regional bodies of these treaties. Under the Marine Strategy Framework Directive, various research projects have been funded and developed together with regional seas bodies to better understand the pressures of underwater noise on the European seas. Continuous noise monitoring projects have focused on shipping noise.

As indicated in section 3.3.1.1, EU TG Noise has been working on the development of the impact indicator for continuous noise which culminated in the establishment of a threshold value by the EU Commission in 2023. To this end, a new concept was introduced, the so-called Level of Onset Biological Effect (LOBE), defined as "The noise level at which individual animals start to have adverse effects that could affect their fitness".[508] For continuous URN, the noise level can be expressed as either spatially averaged sound pressure level or excess level.

The EU TG Noise has also been working on the methodology for monitoring. Through monitoring programmes, information on the pressure is being collected. In the implementation of the Marine Strategy Framework Directive, various monitoring and modelling projects of the average noise level have been carried out. These include for the Atlantic Sea, the Jonas Project[509] (2019 to 2021); for the Baltic Sea, the Bias, EU Life+ Project[510] (2012 to 2017); for the North Sea, specifically on ambient noise, the Jomopans Project[511] (2018 to 2022) and its follow-up project DEMASK (2024 to 2027);[512] for the Mediterranean, the quietMED project (2019 to 2021) and quietMed2 (ongoing);[513] and for the North Adriatic Sea, the Soundscape Project[514] (2019 to 2021). The projects have been developed in collaboration with the corresponding regional bodies. But also, cross regional projects have been, or are being, further developed, including the NAVISON project (NAVISON 2022–2024)[515] sponsored by the European Maritime Safety Agency, which provides predictions of URN from vessels in European Seas, and the ongoing Saturn Project (2021 to 2025),[516] which investigates the impacts of underwater noise on the behaviour, health and energy balance of aquatic organisms from a transdisciplinary lens.

The EU is financing the "European Catalogue of Sound Signatures (EcoSS)" project, aimed at developing an open library (i.e. a digital catalogue) of the sound tracks of the underwater soundscape, predominantly in shallow seas.

508 Borsani et al. (n 384).
509 MaREI, "JONAS: Joint Framework for Ocean Noise in the Atlantic Seas" <https://www.marei.ie/project/jonas/> last accessed 14 October 2024.
510 BIAS "Baltic Sea Information on the Acoustic Soundscape" <https://biasproject.wordpress.com/> last accessed 14 October 2024.
511 Joint Monitoring Programme for Ambient Noise North Sea. See Interreg North Sea, 10 Years of North Sea Soundscape Monitoring, End Report from the Interreg NSR JOMOPANS project June 2021 (2024) <https://www.interregnorthsea.eu/sites/default/files/2024-07/Interreg_Jomopans_10%20years%20of%20North%20Sea%20soundscape%20monitoring_web.pdf> last accessed 14 October 2024.
512 Interreg North Sea, Development and evaluation of noise management strategies to keep the North Sea healthy, <https://www.interregnorthsea.eu/demask/about-us> last accessed 14 October 2024.
513 QUIETMED2 <https://quietmed2.eu/> last accessed 14 October 2024.
514 Interreg Italy – Croatia SOUNDSCAPE: Soundscapes in the North Adriatic Sea and their impact on Marine Biological Resources Project <https://www.blue-world.org/soundscape-soundscapes-in-the-north-adriatic-sea-and-their-impact-on-marine-biological-resources/> last accessed 24 November 2024.
515 European Maritime Safety Agency, *NAVISON Final Report: Calculation and Analysis of Shipping Sound Maps for All European Seas from 2016 to 2050* (EMSA 2024) <https://emsa.europa.eu/navison> last accessed 14 October 2024.
516 SATURN Project, 'SATURN H2020 Project' (2024) <https://www.saturnh2020.eu/> last accessed 14 October 2024.

The NAVISON project has developed methods and tools for producing large-scale shipping sound maps in European waters that can be used to analyse past trends of underwater sound from shipping and investigate the forecast (2030, 2040, 2050) of different technologies and operational URN mitigation measures.[517] The four future scenarios are business as usual; GHG roadmap; underwater radiated noise management (URN); and URN management in addition to GHG roadmap. These future scenarios have been computed for a single frequency band (63 Hz). The sound maps further include tools for vessel traffic data processing, source level computations, acoustic environmental model automation, source density processing, ship sound propagation, and sound map post-processing. The report outlines that by employing a consistent approach to source measurement, propagation, and sound mapping across all European marine regions, it enables easier comparisons between different regions, years, traffic scenarios, and technical or operational measures.[518] The latter measures include speed reduction, more efficient propellers, quieter propellers, air injection systems, optimised hull forms, and hull and propeller cleaning.[519]

The NAVISON project features "a novel, state-of-the-art, semi-empirical, source-level model (PIANO) for machinery and cavitation".[520] Building on previous research, the NAVISON model offers enhanced accuracy in predicting source levels for all commercial vessels, including cargo vessels and bulk carriers, container ships, cruise and passenger vessels, ro-ro cargo and passenger vessels, and tankers and gas carriers. Additionally, the project introduces a new method for integrating component sound map layers to generate forecast scenarios for various combinations of reduction measures. EMSA has recommended replicating or expanding the NAVISON project in other regions through the regional intergovernmental bodies based on the lessons learned.

The areas identified as having the highest Sound Pressure Level (SPL) values in Europe are the English Channel, Strait of Gibraltar, Adriatic Sea, Dardanelles (Strait of Çanakkale), and some regions in the Baltic Sea (Kattegat, Arkona Basin, Gulf of Finland). In these regions the SPL is above 120 dB for most of the years from 2016 to 2023. The ship type making the largest contribution to the total sound energy density differs between 63 Hz and 125 Hz, and this can also be expected to be true for other frequency bands. The NAVISON project emphasizes the importance of AIS coverage in "obtaining accurate results based on the sound energy density analysis".[521]

At the EU level, it has been recommended to establish a common repository for data and research on underwater radiated noise from shipping which could ideally be expanded to a global scale or replicated in different regions. Such a repository would facilitate standardization, enable efficient data sharing and reuse, and provide a comprehensive overview of available information and data gaps. A federation of existing and new platforms could be developed, potentially with centrally located metadata for easier reference.[522]

At the EU level, it has also been recommended to establish an open-access independent scientific network dedicated to data sharing and monitoring continuous underwater noise to facilitate knowledge exchange and information sharing.[523]

517 European Maritime Safety Agency (n 515) p 14.
518 ibid p 113, sect 6.1.
519 ibid.
520 ibid.
521 ibid.
522 Cruz et al. (n 389).
523 ibid.

3.4.1.2 Atlantic (North-East)

At the level of OSPAR, the pressure indicator of the 2022 Pilot Assessment of Ambient Noise (see section 3.3.2.4) has been further developed in close coordination with the EU's Marine Strategy Framework Directive Common Implementation Strategy (CIS) process. To this end, OSPAR's Intersessional Correspondence Group on the Marine Strategy Framework Directive is working on the coordinated implementation and achievement of GES according to the Marine Strategy Framework Directive in the OSPAR region. As a next step in the assessment of continuous noise, the OSPAR Intersessional Correspondence Group on Noise has planned to develop a risk-of-impact indicator for continuous noise.

The Pilot Assessment includes information: on human activities that generate low-frequency continuous sound (based on AIS and VMS data); acoustical properties of the sources based on models elaborated in collaboration with the ECHO project (Vancouver area); and physical properties of the environment. It also includes a calculation of maps of the sound scape, the excess levels and dominance; measurements of long-term acoustical parameters at a number of stations; and an evaluation of excess level maps and production of confidence maps.[524] Maps of the 125 Hz 1/3-octave were presented, as this band was claimed to contain the major noise levels caused by shipping noise.[525]

3.4.1.3 Atlantic (North-West)

As indicated in section 3.3.2.5(a), Transport Canada is working with science and industry partners in developing Radiated Noise Level limits by vessel category based on current noise emission. These targets are viewed as a critical step towards the development of more effective Underwater Noise Management Plans as recommended by the *Revised URN Guidelines*.

A state-of-the-art underwater listening station (ULS) at Boundary Pass captures high quality underwater noise data in real time from vessels, as well as ambient noise and marine mammal calls. The observation station measures and records underwater noise emissions from 4,000 to 5,000 commercial vessel transits per year, contributing to the world's largest known, non-military ship noise database.

The QVI is evaluating the most promising, safe, and efficient quiet-vessel designs, retrofits, and operational practices, as well as to advance measurement and prediction of underwater noise from vessels.

As indicated in section 3.3.2.5(b), the US Ocean Noise Strategy Roadmap promoted new monitoring and science interpretation tools to support more holistic decision making. Multiple national scale monitoring arrays have been deployed. The Noise Reference Station Network and the Sanctuary Sound Monitoring Program (previously SanctSound) provide continuous, publicly available and standardized underwater sound recordings with a focus on data collection in MPAs. These data support evaluation of the status and trends in vessel noise on marine habitats of importance and the influence of vessel management approaches such as speed reduction, among many other applications. Collaboration and coordination with Canada has been important.

3.4.1.4 Baltic Sea

A thematic evaluation of underwater noise was included in the holistic health assessment of the Baltic Sea for the period 2016 to 2021 (HOLAS 3).[526] The assessment of continuous noise evaluated the sound pressure levels in the Baltic Sea in 2018, which was a year considered to be representative for the conditions in the six-year assessment period (2016 to 2021), being the year when more monitoring data was available.

Continuous noise was evaluated on the basis of numerical modelling of the whole Baltic Sea. Modelled sound maps were validated with measurements from seven monitoring stations.[527] Thus, good status is achieved when the indicator is below the spatial threshold, which expresses a proportion of area, for all months in 2018, for fish (125 Hz decidecade band) and marine mammals (500 Hz decidecade band). The recommendation from EU TG Noise was to use a spatial threshold of 20% or lower in the assessment. As there had not been an opportunity to discuss and agree on a regionally specific threshold value when producing the HOLAS 3 assessment for continuous noise (i.e. a pre-core evaluation is carried out in this first iteration) for the Baltic Sea, the choice was made to use 20%, which was interpreted as the default value. Two variants of the indicator were evaluated. One variant used the median total sound pressure level as metric to assess the risk of behavioural disturbance. The indicator was below the 20% spatial threshold for all assessment units for both fish (125 Hz decidecade band) and marine mammals (500 Hz decidecade level). The other variant used the median excess (elevation of ambient noise by anthropogenic sources) as a metric to assess risk of masking. The indicator was below the 20% spatial threshold for all assessment units for marine mammals but exceeded the 20% spatial threshold for 9 out of 17 assessment units for masking of fish communication, although not for fish behavioural disturbance where it was below the threshold value. This pre-core indicator is still to be developed in a range of aspects. While spatial and temporal threshold values were adopted at EU level, formal discussions and agreements remain about their implementation, including the possibility of adopting stricter thresholds and decisions left to be made at the regional level. Most important, this relates to decisions on habitat designation and establishing species (group)-specific values for level of onset of biologically adverse negative effects (LOBE). The indicator will therefore be further discussed and developed towards HOLAS 4.

The assessment of continuous noise under HOLAS 3 represents the first regional application of the Deliverables 3 (2021)[528] and 4 (2022)[529] of TG Noise framework and the EU thresholds.

Impulsive noise was evaluated on the basis of the occurrences of impulsive noise-producing maritime activities reported by the Parties to the regional HELCOM/OSPAR noise registry for impulsive noise events, hosted by ICES.[530] The recommendation from EU TG Noise was to evaluate the temporal and spatial proportion of habitats that are impacted and affected by underwater sound towards the establishment of a quantitative threshold value. In alignment with this approach, an interim assessment threshold value of a fraction over one year of exposed area of 10% of the Baltic Sea was used in this assessment. The distribution of sound was partially compared to the distribution of harbour porpoises in the Baltic Sea to get a first idea of overlap of sound and the occurrence of harbour porpoises. Across the assessment period the area/habitat exposed and disturbed with respect to displacement clearly remained below a fraction of 10% of the HELCOM area habitat per day, indicating that there should be enough habitat for harbour porpoises in the Baltic Sea to avoid regions impacted by low- and mid-frequency impulsive sounds. This pre-core indicator is still to be developed in a range of aspects. While spatial and temporal threshold values were adopted at EU level, formal discussions and agreements still remain about the use of these as well as, for example subbasin and habitat size in the assessment, and LOBE. The indicator will therefore be further discussed and developed towards HOLAS 4.

The Parties to the Helsinki Convention have committed to increase the accuracy of soundscape modelling tools by establishing national databases of source information about ships, to serve as input for spatio-temporal modelling of continuous noise.[531] This will enable the use of such national data for HELCOM noise mapping.[532] Maps on distribution of relevant species in the Baltic Sea is publicly available on the HELCOM website.[533]

In order to assess baseline and target levels of URN from shipping, HELCOM's RAP Noise aspires to improve the assessment of the impact of continuous noise by identifying important habitats and biologically sensitive areas and periods in the Baltic Sea region, vulnerable to elevated levels of continuous noise.[534] This work is being done in close collaboration with other working and expert groups, such as the Expert Group on Marine Mammals.

RAP Noise foresees the establishment of a common methodology for the assessment of the impact of activities generating continuous noise, such as shipping.[535] The HELCOM pre-core indicator for continuous underwater noise has been evaluated for the purposes of the HOLAS 3 "State of the Baltic Sea" report. Based on this pressure indicator, and with the inclusion of information about distribution of sensitive species and habitats, the Parties have committed to develop and implement one or more HELCOM impact indicators for continuous low-frequency noise. [536] The report on "Noise sensitivity of animals in the Baltic Sea" provides the information collected over two years within the framework of HELCOM to improve the knowledge and understanding of sources of underwater noise and their impacts on Baltic Sea species. It provides a prioritized list of noise-sensitive species in the Baltic Sea as well as their distribution and identified biologically sensitive areas.[537] In the development of the impact indicators on continuous noise, the spatial and temporal calendar of species will be overlapped with the spatial and temporal mapping of the continuous noise indicator which then will provide information on the likelihood of noise effects for the different species.[538] In addition, more sound types and frequencies are being investigated, to ensure further division of the HELCOM noise indicators into smaller entities.[539]

According to the RAP Noise, the environmental targets for underwater noise should take into account the target values set by TG Noise at the EU level.[540] To ensure consistency in the development of indicators and methods for establishing thresholds and targets, RAP Noise works with EU TG Noise on issues of mutual interest.[541]

One of the regional actions that RAP Noise foresees is to "increase the knowledge and encourage data sharing on the impact of noise by supporting research on sources and effects of continuous noise on marine biota." [542] A joint research project between Denmark, Estonia and Sweden on re-routing in Kattegat (TANGO)[543] investigated the effects, in terms of surrounding noise levels and harbour porpoise activity, when splitting a big shipping route into two smaller routes.

In September 2024, HELCOM launched its shipping data platform, which includes data on continuous underwater noise, composed by long collected various shipping and maritime-related data within the HELCOM Maritime Working Group, Expert Groups and projects.[544] In addition, HELCOM issued the annual publication of "Underwater noise emissions from Baltic Sea shipping" which is part of the HELCOM Baltic Sea Environment Fact Sheets publications.[545]

The Helsinki Convention's Parties have committed to increase regional coordination and management of continuous noise sources by establishing a common framework for modelling past, present and future noise levels in the Baltic Sea. Even though the soundscape planning tools developed under the BIAS project, are using AIS data and other relevant information about sources (e.g. source levels and frequency spectra), methods are to be developed to include noise from leisure boats without AIS transmitter as well as natural ambient noise.[546] HELCOM also intends to increase the knowledge and encourage data sharing on impact of noise by supporting research on sources and effects of continuous noise on marine biota.[547] This includes encouraging the exchange of statistical information about continuous low frequency sources, including frequencies' spectrum characteristics.[548]

ICES supports HELCOM's underwater continuous noise indicator for the BSAP and RAP Noise.[549] Common guidelines for reporting continuous noise levels to the database in the Baltic Sea have been developed.[550]

In 2020, the HELCOM continuous underwater noise database was established and hosted by ICES. The establishment of the HELCOM database, together with the "HELCOM Guidelines for monitoring continuous noise",[551] aim to provide a "standardized procedure to ensure that the output data from the monitoring are compatible with the HELCOM pre-core indicator 'Continuous low-frequency anthropogenic sound'".[552] It consists of measurements and soundscape modelling. With the aim of providing "spatio-temporal information that can be used for assessment of short-term status and long-term trends in sound pressure levels locally and regionally", the processed data is stored "together with modelled maps and a data-sharing platform and a soundscape planning tool that will be open access".[553] The HELCOM Guidelines set out monitoring methods and specifically the sampling methods and procedures. Information on data analysis is also provided.

At the national level, RAP Noise includes an action to improve the monitoring of underwater noise from leisure boats by developing a proposal for national regulations requiring AIS transmitters on leisure boats registered under the State's flag, considering both technical and socioeconomic factors.[554] The requirement could be based on criteria such as engine power, hull parameters, or similar factors.[555]

Coordination efforts with other regional and global bodies, such as ICES, IMO and OSPAR are foreseen in the BSAP and RAP Noise and have already proven relevant for addressing underwater noise in joint programmes. The EU-funded BIAS project was a key initiative supporting HELCOM's efforts, producing modeled maps of shipping noise. This project contributed valuable data for developing continuous underwater noise thresholds under the Marine Strategy Framework Directive, recommending the inclusion of the 2kHz frequency band in addition to the 63 Hz and 125 Hz bands.[556] The processed monitoring data and shipping noise maps from the BIAS project are held in the HELCOM public database hosted by ICES, as well as more recent maps developed in 2018 in the framework of the HELCOM BLUES project. In addition, HELCOM Parties upload their monitoring data to the database on a regular basis. The soundscape maps produced under the BIAS project in 2016 (see section 3.3.2.6) have served as a baseline for developing a monitoring programme of continuous noise in the Baltic Sea.

Other collaborations by HELCOM with other regional bodies, such as with the Baltic Sea Fisheries Forum (BALTFISH), have not yet been linked to the work regarding underwater noise.

3.4.1.5 Mediterranean Sea

As indicated in section 3.3.2.11, in 2008, the Parties to the Barcelona Convention adopted an Ecosystem Approach Roadmap with Ecological Objective (EO) 11 that "Energy inputs into the marine environment, especially noise from human activities is minimized". For the establishment of indicators, EO 11 further differentiates between impulsive and continuous noise. It sets for the latter "Trends in continuous low frequency sounds with the use of models as appropriate".

In that regard, one of the gaps that was identified in 2012 by the Barcelona Convention MOP was "the ability to uniformly assess pressures and states" for various indicators including underwater noise because for those pressures data for some countries is limited.[557] In 2013, the Barcelona Convention MOP also noted the limited knowledge in regard to noise which "should trigger specific monitoring efforts, starting from investigative monitoring that will be built on the state of the art scientific developments".[558]

In 2016, the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP)[559] was adopted.[560] A candidate common indicator was developed. Candidate common indicators (CCIs) are "indicators which still have many outstanding issues regarding their monitoring and assessment and therefore are recommended to be monitored in the initial phase of IMAP on a pilot and voluntary basis".[561]

The CCI 27 on continuous noise reads "Levels of continuous low frequency sounds with the use of models as appropriate".[562] In the framework of the UNEP/MAP Programme of Work adopted at the Barcelona Convention MOP in 2016, CCI 27 was subject to an IMAP Guidance Factsheet.[563] It provides information, inter alia, on possible methodology for indicator calculation, indicator units, data confidence and uncertainties. Nevertheless, the Barcelona Convention's MOP in 2023 confirmed that "EO 11, and its two candidate indicators, is still at an initial phase of development (countries invited to test the two CCIs by developing pilot monitoring of these CCIs)".[564] It therefore recommended, inter alia, to finalize soon as possible the development of indicators, target levels and factsheets for CCIs of EO 11.[565]

The ACCOBAMS project "Overview of the Noise Hotspots in the ACCOBAMS area" was launched in 2015 with the aim of producing the first overview at the Mediterranean scale of the extent of noise-producing human activities. Results of this project will support decision making on conservation measures for cetaceans. Further, as noise is a form of pollution, results of this project are highly relevant for the objectives of the Barcelona Convention, and particularly in the framework of the environmental compliance assessment programme (Ecosystems Approach) initiative. The project, inter alia, specifically overlays continuous noise mapping, including the main shipping lanes and areas close to ports, and cetacean density mapping, to identify priority areas for mitigation, including consideration of the concept of "quiet zones".[566]

3.4.2 Application of relevant principles and approaches

Most regional treaties include specific requirements for Parties to apply principles and approaches, such as the precautionary principle/approach, an ecosystem-based approach, and the use of the best available science/scientific information. Several agreements also incorporate the polluter-pays principle. Some treaties also mention the principle of sustainability, intergenerational equity, integrated management, adaptive management, the use of BAT and BEP, the principle of access to information and the cooperation principle.

524 Kinneging (n 425) pp 5–6.
525 ibid p 6.
526 HELCOM *Thematic assessment of hazardous substances, marine litter, underwater noise and non-indigenous species 2016-2021. Baltic Sea Environment Proceedings n°190* (HELCOM, 2023) <HELCOM-Thematic-assessment-of-hazardous-substances-marine-litter-underwater-noise-and-non-indigenous-species-2016-2021.pdf> last accessed 14 October 2024.
527 ibid.
528 Borsani et al. (n 384).
529 ibid.
530 See <https://www.ices.dk/data/data-portals/Pages/impulsive-noise.aspx> last accessed 8 December 2024.
531 RAP Noise (n 445) p 13, action 10.
532 ibid.
533 See <https://helcom.fi/baltic-sea-trends/data-maps/> last accessed 14 October 2024.
534 RAP Noise (n 445) p 9, action 14.
535 Ibid, action 15.
536 Ibid, action 18.
537 HELCOM *Noise Sensitivity of Animals in the Baltic Sea. Baltic Sea Environment Proceedings N° 167* (HELCOM, 2019) < https://helcom.fi/post_type_publ/bsep167/> last accessed 7 February 2025.
538 ibid p 37.
539 ibid.
540 RAP Noise (n 445) p 10, action 20.
541 ibid p 12, action 33.
542 ibid p 9, action 17.
543 Jakob Tougaard et al, *Effects of Rerouting Shipping Lanes in Kattegat on the Underwater Soundscape: Report to the Danish Environmental Protection Agency on EMFF Project TANGO* (Aarhus University, DCE – Danish Centre for Environment and Energy 2023) <http://dce2.au.dk/pub/SR535.pdf> last accessed 21 November 2024.
544 HELCOM, Shipping data platform (shipping-data-helcom.hub) <https://shipping-data-helcom.hub.arcgis.com/> last accessed 14 October 2024.
545 See <Maritime activities – HELCOM> and <https://helcom.fi/wp-content/uploads/2023/12/BSEFS-Underwater-noise-emissions-from-Baltic-Sea-shipping-in-2006-2022-2023.pdf> last accessed 8 December 2024.
546 RAP Noise (n 445) p 9, action 13.
547 ibid action 17.
548 ibid.
549 ICES "Continuous Noise Database" (underwaternoise.ices) <https://underwaternoise.ices.dk/continuous> last accessed 14 October 2024.
550 Instructions provided for that purpose are available at <https://www.ices.dk/data/data-portals/Pages/Continuous-Noise.aspx> last accessed 12 December 2024.
551 HELCOM *Guidelines for Monitoring Continuous Noise* (updated as noted by State & Conservation 14-2021) <https://helcom.fi/media/documents/Guidelines-for-monitoring-continuous-noise.pdf> last accessed 21 November 2024.
552 HELCOM "Continuous Noise Indicator" <https://indicators.helcom.fi/indicator/continuous-noise/> last accessed 21 November 2024.
553 ibid.
554 RAP Noise (n 445) p 13, action 7.
555 ibid.
556 Merchant et al. (n 382).
557 Decision IG.20/4 (n 466) p 48.
558 Decision IG.21/3 (n 468) Annex II.
559 Decision IG.22/7 "Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria" (12 February 2016) UNEP Doc UNEP(DEPI)/MED IG.22/28, p 419.
560 ibid p 424, para 25.
561 ibid p 425, para 30.
562 ibid p 426 para 30.
563 UNEP/MAP "IMAP Guidance Factsheets: Update for Common Indicators 13, 14, 17, 18, 20 and 21; New Proposal for Candidate Indicators 26 and 27" UNEP Doc UNEP/MED WG.467/5 (8 August 2019).
564 UNEP/MAP, "Report of the 23rd Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and Its Protocols"(Portorož, Slovenia, 5–8 December 2023) UNEP Doc UNEP/MED IG.26/22, p 258, para 44.
565 ibid.
566 See website of ACCOBAMS <https://accobams.org/conservations-action/anthropogenic-noise/> last accessed 10 December 2024.

3.4.3 Species-specific conservation plans and area-based management tools, including marine protected areas

Apart from the obligations that Parties have under global treaties (section 2), there are also many regional treaties and other legally binding instruments that contain obligations for the protection and conservation of certain species and for the establishment of ABMTs, including MPAs. These are presented in section 3.4.3.1 below.

As indicated in section 3.2.1, regional treaties which are focused on the conservation of specific fauna are ACCOBAMS, ASCOBANS, AEWA, the Bern Convention, the Inter-American Convention for the Protection and Conservation of Sea Turtles and the Convention for the Conservation of the Antarctic Seals. These regional treaties contain, for example conservation obligations to avoid any disturbance of certain species, especially during the period of breeding and rearing.

Regional fisheries bodies, such as the GFCM, are mandated by their members to establish fisheries-restricted areas or to protect vulnerable marine ecosystems. The impact of continuous noise, such as noise from vessel traffic, on fish stocks in these areas while fishing is not permitted led to the elaboration of a case study in the Adriatic Sea (see section 3.2.2).

3.4.3.1 Area-based management tools, including marine protected areas

In line with the obligations in global treaties as well as the commitments in major policy outcomes (see section 2.4.2), most regional seas have treaties in place with require their Parties to, individually or jointly as the case may be, take all appropriate measures "to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other marine life". This may also include the establishment of protected areas and management of those areas through prohibition or control of any activity likely to have adverse effects on the species, ecosystems or biological processes in such areas.

There are a number of different ABMTs available, including MPAs, and tools such as marine spatial planning and integrated coastal zone/area management which can assist in coordinating different activities taking place in the same marine area.

Most regional treaties and other legally binding instruments provide for the possibility to establish specially protected areas. A number of regional treaties also include specific annexes or Protocols dedicated to the conservation of biodiversity through the establishment of MPAs. All of them require the management of activities within these areas and the regulation of any act likely to harm or disturb the fauna. In that regard, some treaties list the regulation of the passage of ships among the measures that must be taken to mitigate any adverse effect against the site's conservation objective (e.g. the Black Sea Convention, the Cartagena Convention, the Tehran Convention, the Barcelona Convention). Some treaties indicate that the establishment of protected areas must not affect the rights of other Parties or third States under international law (e.g. the Noumea Convention).

An overview of the relevant provisions of regional seas treaties and/or their Protocols, as well as any specific actions taken within the framework of regional bodies in relation to underwater noise from shipping are presented below:

(a) Regional instruments applicable to more than one ocean/sea area

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive)[567] aims "to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States" (article 2(1)). The Habitats Directive defines conservation as "a series of measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status" (article 1(a)). Moreover, the Habitats Directive seeks to ensure the maintenance or reestablishment of a favourable conservation state of natural habitats listed in annex I and wild species of the fauna and flora of community interest outlined in annexes II, IV and V, taking into account economic, social, cultural and regional characteristics (articles 2(2) and 2(3)).

With this objective, the Habitats Directive creates the European ecological network of Natura 2000 protected areas, including MPAs, specifically for the protection of annex I habitats and annex II species to maintain or, where appropriate, restore at a favourable conservation status the habitats in the species natural range (article 3(1)). To this end, Member States are obligated to establish such areas in proportion to the representation of the referred habitat types within their territories (article 3(2)). Annex III provides criteria based on which Member States must propose such habitats to be protected under the Natura 2000 Network (article 4(1)). For aquatic species with a wide migratory range, Member States are required to propose only sites "where there is a clearly identifiable area representing the physical and biological factors essential to their life and reproduction" (article 4(1)).

The list of proposed areas must follow the procedure outlined in the Habitats Directive, and Member States must set priorities for each site based on the importance of the maintenance or restoration of the habitats or species subject to the proposal and in light of their threats within these sites before being approved by the EU Commission and included in the Natura 2000 Network (article 3). They must further establish the necessary conservation measures which may be established through "management plans specifically designed for the sites or integrated into other development plans, and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in annex I and the species in annex II present on the sites" (article 6(1)). To this end, measures must ensure to avoid the deterioration of the habitats and disturbance of the species for which the areas have been designated. The EU Directive further establishes specific obligations regarding EIA (article 6) and surveillance measures concerning the species' conservation status (article 11).

Article 12 of the Habitats Directive obliges Member States to take the necessary measures to establish a system of strict protection in the natural range for the animal species listed in letter (a) of annex IV (Animal and Plant Species of Community Interest in Need of Strict Protection), which include all cetacean species. The strict protection regime must constitute a legal framework based on coherent and coordinated preventive measures that are effectively implemented to prohibit, among other things (letter (b)) "deliberate disturbance of these species, particularly during the period of breeding, rearing, hibernation and migration" and (letter (d)) "deterioration or destruction of breeding sites or resting places" (article 12(1)). The Court of Justice of the European Union has interpreted the scope of the term "deliberate" in (b) and held that "a Member State fails to fulfil its obligations under Article 12(1)(b) and (d) of the Directive where it does not take all the requisite specific measures to prevent the deliberate disturbance of the animal species concerned during its breeding period or the deterioration or destruction of its breeding sites".[568]

In relation to these critical obligations in article 12 of the EU Habitats Directive, the EU Commission adopted in 2021 a Guidance Document. It further guides the interpretation of the "natural range", specifically highlighting that it encompasses a "dynamic concept" (paragraphs 1–9 and 1–11). Furthermore, it details the measures to establish and effectively implement a system of strict protection and specifically mentions "noise" as a form of disturbance, which, even if it does not necessarily always directly affect the physical integrity of a species, could also have an indirect negative effect on them (paragraph 2–39). The Guidance Document uses continuous noise from shipping as an example of a form of disturbance of cetacean species.

Also, it emphasises that the caused effects combined with additional effects of stress, confusion and panic "can be devastating for individual animals and for whole populations". It therefore proposes: "[a]s regards shipping, Member States can consider a wide range of preventive measures, including reducing the speed of vessels or rerouting the traffic". The strict protection regime must be applied to new and ongoing activities (paragraph 2–22). Voluntary measures are considered viable complementary approaches and tools but should not replace formal legal protection (paragraphs 2–23 and 2–28). To establish the appropriate measures, the guidance document references methodological guidelines adopted internationally, such as the ACCOBAMS Methodological Guide (see section 3.2.1 above), focusing on cetaceans, and the CMS Family Guidelines (see section 2.4.2.4 above). Even though the EU Habitats Directive does not define the term "deterioration of habitat", the Guidance Document outlines that the functionality of the habitat as a breeding site or resting place for species under annex IV must be maintained; this must also address activities which lead to a gradual loss of functionality of the site (section 2.3.4.c). In specific cases, exceptions to this strict protection are accepted according to the exhaustive list in article 16 of the Habitats Directive, including the overriding public interest, which must be reported to the EU Commission.

The EU Natura 2000 network, encompassing a science-based procedure, is also being developed in light of the Member States' commitments in the EU Biodiversity Strategy for 2030, which sets out a commitment to legally protect a minimum of 30% of the sea in the Union, of which at least one third should be under strict protection. Also, Regulation (EU) 2024/1991 of the European Parliament and the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869 (Nature Restoration Law) now adds to this protection regime, even though it is not limited to Natura 2000 sites, and it should specifically focus on habitats in need of restoration.

The Nature Restoration Law[572] is directly applicable to EU Member States and aims to restore degraded ecosystems, to achieve the EU's climate and biodiversity objectives and enhance food security. It establishes a framework within which Member States are required to implement effective and area-based restoration measures. These aim to jointly cover, as a target at Union level, throughout the areas and ecosystems of, at least 20% of land areas and at least 20% of sea areas by 2030, and all ecosystems in need of restoration by 2050 (article 1(2)). Specifically for the restoration of marine ecosystems, the Nature Restoration Law sets out increasing targets until 2050 depending on habitat types (article 5) to achieve their "good condition", which is defined "as regards an area of a habitat type, a state where the key characteristics of the habitat type, in particular its structure, functions and typical species or typical species composition reflect the high level of ecological integrity, stability and resilience necessary to ensure its long-term maintenance and ... in marine ecosystems, contribute to achieving or maintaining good environmental status" referring to the GES of the Marine Strategy Framework Directive (article 3(4)). Member States must therefore prepare National Restoration Plans (article 14) including the necessary restoration measures based on the examples of annex VII, which lists "Reduce various forms of marine pollution, such as nutrient loading, noise pollution and plastic waste" (point 30).

(b) Regional instruments applicable to one ocean/sea area

(i) Atlantic Ocean

Under the Abidjan Convention (see section 3.3.2.3), Parties are required to, individually or jointly as the case may be, take all appropriate measures to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other marine life. To this end, the Contracting Parties must endeavour to establish protected areas, such as parks and reserves, and to prohibit or control any activity likely to have adverse effects on the species, ecosystems or biological processes in such areas (article 11).

The OSPAR Convention (see section 3.3.2.4), annex V, requires the Parties to "take the necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practicable, marine areas which have been adversely affected" and to this end "cooperate in adopting programmes and measures for those purposes for the control of the human activities" (annex V, article 2). Specifically, in relation to actions under annex V concerning maritime transport, the OSPAR Commission commits to draw that question to the attention of IMO (annex V, article 4(2)). The Parties which are IMO members are encouraged to cooperate within IMO to achieve an appropriate response.

(ii) Baltic Sea

The Helsinki Convention (see section 3.3.2.6) requires its Parties to, individually and jointly, take all appropriate measures with respect to the Baltic Sea Area and its coastal ecosystems to conserve natural habitats and biological diversity and to protect ecological processes. Such measures shall also be taken in order to ensure the sustainable use of natural resources within the Baltic Sea Area. To this end, the Parties must aim at adopting subsequent instruments containing appropriate guidelines and criteria (art. 15). In this regard, the Report on Noise sensitivity of animals in the Baltic Sea is crucial for developing the continuous noise impact indicator.[573] The "input of sound" is reported as a pressure in the HELCOM MPAs database.[574]

HELCOM's BSAP's actions to reach GES regarding biodiversity include establishing spatial conservation measures. The target is to "establish a resilient, regionally coherent, effectively and equitably managed, ecologically representative and well-connected system of HELCOM MPAs, supported by those other spatial conservation measures, under alternative regimes for marine protection, which can contribute to the coherence of the network".[575] Furthermore, the network of MPAs must also include no-use zones and expand conservation efforts to actively include areas of particular importance for biodiversity and ecosystem resilience, including important ecosystem elements.[576]

Specifically for leisure boats, HELCOM's RAP Noise foresees that the Parties regulate the use of leisure boats at the national level in order to reduce the impact of underwater noise on noise-sensitive and biologically important areas and species.[577] This could include operational measures, such as speed limits for engine-driven leisure boats in MPAs designated for noise-sensitive species.[578]

(iii) Black Sea

The obligations in the Bucharest Convention (see section 3.3.2.7) are complemented by the Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea Against Pollution[579] adopted in 2002. The Protocol has 4 Parties, as of 14 October 2024. Its objective is to "maintain the Black Sea ecosystem in the good ecological state and its landscape in the favourable conditions" and to "preserve and to sustainably manage the biological and landscape diversity of the Black Sea in order to enrich the biological resources" (article 1(1)). The Protocol is also to serve as "a legal instrument

for developing, harmonizing and enforcing necessary environmental policies, strategies and measures in preserving, protecting and sustainably managing nature, historical, cultural and aesthetic resources and heritage of the Black Sea states for present and future generations" (article 1(2)). The Protocol applies not only to the Black Sea but also the Sea of Azov (article 3).

Each Party is required to take all necessary measures to, inter alia, protect, preserve, improve and manage in a sustainable and environmentally sound way areas of particular biological or landscape value, notably by the establishment of protected areas according to the procedure in annex 1; ensure that species occurring in the Protocol area are maintained at favourable conservation status and habitats close to undisturbed; restore and rehabilitate damaged areas of previously high biodiversity and landscape value; restore and maintain in good conditions the landscape of high nature, historical, cultural and aesthetic value (article 4(1)(a), (b), (d), (e)). The regulation of the passage of ships, any stopping or anchoring, is listed among the measures that Parties are required to take, in accordance with their legal system, to ensure the integrity, sustainability and development of protected areas (annex 1, article 3(1)(c)).

The Parties are required to list species of Black Sea importance that may be threatened, or important by reason of their role in ecosystem functioning or other significance for the region in annex 2, which will be subject to the special measures as described in annex 3. Such measures include prohibiting activities having adverse effects on such species or their habitats and carrying out management, planning and other measures to ensure favourable conservation status for such species (annex 3, article 1(3)). With respect to protected species of fauna, the Parties must control and where appropriate prohibit, inter alia, the disturbance of wild fauna, particularly during breeding, hibernation or migration, as well as other periods of biological stress (annex 3, article 1(4)(b)). The Black Sea Protocol allows for the possibility of exemptions from protection and conservation measures for traditional subsistence and cultural activities meeting certain criteria (article 8).

Parties are required to cooperate in conducting scientific research, and undertake, where appropriate, joint scientific programmes and projects and exchange relevant scientific data and information (article 10).

The Protocol also requires the Parties to adopt a legal instrument on integrated coastal zone management (article 7). Other articles in the Protocol include those relating to EIA (see section ....), publicity, participation of stakeholders, information and public awareness (article 9), responsibility and liability (article 11) and financial support and incentives (article 12). A list of species whose exploitation should be regulated by the Black Sea Biodiversity and Landscape Conservation Protocol is provided in annex IV, together with criteria for the selection of species for the purposes of the annex.

(iv) Caribbean Sea, Gulf of Mexico and adjacent Atlantic area

The obligations in the Cartagena Convention (see section 3.3.2.8) are complemented by its Protocol Concerning Specially Protected Areas and Wildlife (SPAW),[580] adopted in 1990. The Protocol has 18 Parties as of 14 October 2024. It requires each Party, in accordance with its laws and regulations and the terms of the Protocol, to take the necessary measures to protect, preserve and manage in a sustainable way areas that require protection to safeguard their special value, as well as threatened or endangered species of flora and fauna (article 3(1)). To this end, each Party is required to regulate and, where necessary, prohibit activities having adverse effects on these areas and species (article 3(2)). This includes managing species to prevent them from becoming endangered or threatened (article 3(3)). This obligation can be carried out through the establishment of protected areas "encouraging ecologically sound and appropriate use,

understanding and enjoyment of these areas, in accordance with the objectives and characteristics of each of them" (article 4). Protection measures must be established by each Party in conformity with its national laws and regulations and with international law and taking into account the conservation objective of the protected area. Such measures should include, as appropriate: the regulation of the passage of ships, of any stopping or anchoring, and of other ship activities, that would have significant adverse environmental effects on the protected area, without prejudice to the rights of innocent passage, transit passage, archipelagic sea lanes passage and freedom of navigation, in accordance with international law (article 5(2)(c)).

To this end, each Party must "adopt and implement planning, management and enforcement measures for protected areas" following the guidance criteria of the Scientific and Technical Advisory Committee (article 6). In addition, each Party may, as necessary, strengthen the protection of a protected area by establishing, within areas in which it exercises sovereignty, or sovereign rights or jurisdiction, one or more buffer zones in which activities are less restricted than in the protected area while remaining compatible with achieving the purposes of the protected area (article 8). In terms of protection of wild flora and fauna, each Party is obligated to "regulate and prohibit according to its laws and regulations, where appropriate, activities having adverse effects on such species or their habitats and ecosystems, and carry out species recovery, management, planning and other measures to effect the survival of such species" (article 10(1)). Each Party is also required to specifically prohibit or regulate all forms of disturbance of protected fauna "particularly during the period of breeding, incubation, estivation or migration, as well as other periods of biological stress" (article 10(3)(b)). Parties are required to adopt cooperative measures to ensure the protection and recovery of endangered and threatened species of flora and fauna listed in annexes I, II and III to the Protocol (article 11). The SPAW Protocol allows for the possibility of exemptions from management and conservation measures to meet traditional subsistence and cultural needs (article 14).

Other articles in the Protocol include those relating to EIA (article 13) (see section 3.4.4.2(e)), cooperation programme for, and listing of protected areas (article 7), protected areas and buffer zones contiguous to international boundaries (article 9), changes in the status of protected areas or protected species (article 15), publicity, information, public awareness and education (article 16), scientific, technical and management research (article 17) and mutual assistance (article 18), notification and reports to the Organization (article 19), institutional arrangements (articles 20, 22 and 23), establishment of common guidelines and criteria (article 21), and relationship to other Conventions dealing with special protection of wildlife (article 25).

(v) Caspian Sea

The obligations in the Tehran Convention (see section 3.3.2.9) are complemented by its Protocol for the Conservation of Biological Diversity (Ashgabat Protocol).[581] The Protocol was adopted in 2014 and is not yet in force. The general provisions and objectives of the Protocol are set out in its Part I. The objectives of the Protocol are to "protect, preserve, and restore the health and integrity of the biological diversity and the ecosystem of the Caspian Sea as well as to ensure the sustainable use of biological resources and in that context: (a) to safeguard threatened species, and vulnerable ecosystems, to ensure their long-term viability and diversity; (b) to prevent decline, degradation and damage to species, habitats and ecological systems, directed by the precautionary principle; and (c) to protect and conserve those areas that best represent the high range of species, special habitats, ecological systems and natural and related cultural heritage" (article 2). To this end, the Protocol establishes a comprehensive set of obligations set out in Parts II and III, which include the following: protect, preserve and restore biological diversity with particular emphasis on threatened species; protect, preserve and restore areas that are unique, highly

sensitive or regionally representative in an environmentally sound and sustainable manner, notably by the establishment of protected areas; and control sources of pollution and any activity that cause or may cause a significant negative impact on habitats and species (article 5(c), (d) and (j)). For the protection and conservation of species, Parties are required to, inter alia, regulate activities having adverse effects on protected species and their habitats, and other measures to ensure a favourable state of conservation of such species; and control and, where appropriate, prohibit the disturbance of fauna, particularly during the period of breeding, incubation, hibernation or migration, as well as other periods of biological stress (article 6(b) and (d)). Parties must undertake long-term monitoring of the status of threatened species included under annex I (categories for the identification of threatened species) to the Protocol, as well as the nature and magnitude of impacts threatening their survival according to agreed common population dynamics criteria; and exchange information on measures being taken to conserve populations of threatened species included under annex I and conduct an assessment of the effectiveness of such measures based on agreed common criteria (article 6(e), (g), (h)). They are also required to elaborate and implement national and, as appropriate, regional action plans for the species listed under annex I for their in-situ and ex-situ conservation and recovery; and cooperate to ensure the protection, conservation and, if necessary, restoration of threatened species listed under annex I (article 6(i) and (j)). Other obligations, inter alia, address the management of protected areas (article 10). For example, in conformity with applicable international treaties and national legislation, the Parties must take the protection measures required for, in particular the regulation of the passage of vessels and any stopping or anchoring, among other measures (article 10(1)(b)).

Other articles in the Protocol include those relating to the procedures for the establishment and listing of protected areas (article 11), conservation of biological diversity in the framework of coastal zone management, EIA (article 13), access to and transfer of technology (article 15), scientific and technical cooperation and assistance (article 16), exchange of information (article 17) environmental education and public awareness (article 18), reports of Contracting Parties (article 19) and settlement of disputes (article 22). Part V of the Protocol contains institutional and financial provisions.

(vi) Indian Ocean

The obligations in the Nairobi Convention (see section 3.3.2.10) are complemented by its Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region,[582] adopted in 1985. It is currently undergoing revision. The 1985 Protocol requires Parties to take all appropriate measures to maintain essential ecological processes and life support systems, to preserve genetic diversity, and to ensure the sustainable utilization of harvested natural resources under their jurisdiction. In particular, the Parties must endeavour to protect and preserve rare or fragile ecosystems as well as rare, depleted, threatened or endangered species of wild fauna and flora and their habitats in the Eastern African Region (article 2(1)). To this end, the Parties must develop national conservation strategies and coordinate, if appropriate, such strategies within the framework of regional conservation activities (article 2(2)). Parties are required to take all appropriate measures to ensure the strictest protection of the endangered wild fauna species listed in annex II to the Protocol. To this end, each Party is required to strictly regulate and, where required, prohibit activities having adverse effects on the habitats of such species. In particular, activities, such as damage to, or destruction of, critical habitats, and disturbance of wild fauna, particularly during the period of breeding, rearing and hibernation, must be prohibited, where required (article 4). The parties must also take all appropriate measures to ensure the protection of the depleted or threatened wild fauna species listed in annex III (article 5). Parties must coordinate their efforts for the protection of migratory species listed in annex IV whose range extends into their territories (article 6).

The Parties are required to establish protected areas in order to the safeguard the ecological and biological processes essential to the functioning of the East African region; and to safeguard populations of the greatest possible number of species of fauna and flora depending on these ecosystems (article 8(2)(a) and (c)). In establishing protected areas, Parties must take into account, inter alia, their importance: as natural habitats and in particular as critical habitats for species of fauna and flora especially those which are rare, threatened or endemic; and as migration routes or as wintering, staging, feeding or molting sites for migratory species (article 8(3)(a) and (b)). The Parties are required to formulate and adopt guidelines, standards, or criteria concerning the identification, selection, establishment and management of protected areas (article 9). Protection measures which Parties must take, in conformity with international law, may include the regulation of pleasure craft activities; the regulation of any act likely to harm or disturb the fauna or flora; any other measure aimed at safeguarding ecological and biological processes in protected areas (article 10(c), (f) and (k)). Parties may strengthen the protection of a protected area by establishing, within areas under their jurisdiction, one or more buffer areas in which activities are less severely restricted while remaining compatible with the purpose of the protected area (article 11). In promulgating protective measures, Parties must take into account the traditional activities of their local populations in the areas to be protected, and may grant exemptions under certain circumstances (article 12).

Other articles in the Protocol include those relating to the establishment of protected areas contiguous to the frontier or to the limits of the zone of national jurisdiction of another Party (art.article 13), publicity and notification (art.article 14), public information and education (art.article 15) regional cooperation with a view to creating a regional network of protected areas (art.article 16), scientific and technical research (art.article 17), exchange of information (art.article 18), technical cooperation (art.article 19), alteration of the boundaries of or withdrawal of protection from protected areas (art.article 20), as well as institutional arrangements (art.article 21).

(vii) Mediterranean Sea

The obligations in the Barcelona Convention (see section 3.3.2.11) are complemented by its Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol), which was adopted in 1995, while the annexes to the Protocol were adopted in 1996.[583] The Protocol has 17 Parties, including the EU, as of 14 October 2024.

The Protocol requires Parties to take the necessary measures to protect, preserve and manage in a sustainable and environmentally sound way areas of particular natural value, notably by the establishment of specially protected areas, as well as to protect, preserve and manage threatened or endangered species of flora and fauna (article 3.1).

Parties are obligated to, inter alia, cooperate, directly or through competent international organizations, in the conservation and sustainable use of biological diversity, and to adopt strategies, plans and programmes for the conservation of biological diversity and the sustainable use of marine and coastal biological resources and must integrate them into their relevant sectoral and intersectoral policies (article 3(2) and (4)). Furthermore, they must, inter alia, "identify processes and categories of activities which have or are likely to have a significant adverse impact on the conservation and sustainable use of biological diversity, and monitor their effects" (article 3.5). The establishment of specially protected areas under the SPA/BD Protocol aims, inter alia, to ensure the long-term viability of those areas and to maintain their biological diversity; and also to safeguard habitats critical to the survival, reproduction and recovery of endangered, threatened or endemic species of flora or fauna (article 4(a) and (c)). For the protection

of such areas the required conservation measures must be applied in conformity with international law, such as "the regulation of the passage of ships and any stopping or anchoring"; and the regulation and if necessary the prohibition of any other activity or act likely to harm or disturb the species or that might endanger the state of conservation of the ecosystems or species or might impair the natural or cultural characteristics of the specially protected area (article 6(c) and (h)). Nothing in the Protocol nor any act adopted on the basis of the Protocol shall prejudice, inter alia, the rights, freedom of navigation on the high seas, the right and the modalities of passage through straits used for international navigation and the right of innocent passage in territorial seas, as well as the nature and extent of the jurisdiction of the coastal State, the flag State and the port State (article 2(2)).

Planning and management measures for the specially protected areas must be adopted by the Parties. Such measures should include a management plan; and continuous monitoring of ecological processes, habitats, population dynamics, and landscapes, as well as the impact of human activities (article 7(2)(a) and (b)). Parties must also adopt measures for the active involvement of local communities and populations, as well as for the regulation of activities compatible with the objectives for which the specially protected area was established and the terms of the related permits (article 7(2)(c) and (e)). The Protocol sets out the obligation and procedure for the establishment and listing of specially protected areas, as well as any changes in their status (articles 8, 9 and 10).

Apart from a spatial protection regime, the SPA/BD Protocol establishes species-related conservation obligations with the aim of maintaining the favourable status of flora and fauna (article 11(1)). Parties must regulate and, where appropriate, prohibit activities having adverse effects on endangered or threatened species or their habitats, and carry out management, planning and other measures (article 11(2)). With respect to protected species of fauna, Parties are obligated to "control and, where appropriate, prohibit to the extent possible, the disturbance of wild fauna, particularly during the period of breeding, incubation, hibernation or migration, as well as other periods of biological stress" (article 11(3)(b)). The Parties must also coordinate their efforts, through bilateral or multilateral action, including, if necessary, agreements for the protection and recovery of migratory species whose range extends into the area to which the Protocol applies (article 11(4)). Cooperative measures are required specifically for endangered and threatened species included in the SPA/BD Protocol's List in annex II to the Protocol (article 12). The Parties must prohibit the destruction of and damage to the habitat of species listed in the annex and must formulate and implement action plans for their conservation or recovery (article 12(3)).

The Protocol also includes articles relating to EIA (article 17) (see section 3.4.4.2(h)), inventories (article 15), guidelines and common criteria (article 16), the integration of traditional activities (article 18), publicity, information, public awareness and education (article 19), scientific, technical and management research (article 20), mutual cooperation (article 21), mutual assistance (article 22) and reports of the Parties (article 23). Institutional provisions are contained in Part V of the Protocol.

(viii) Pacific Ocean (North-East)

Under the Antigua Convention (see section 3.3.2.12), which is not yet in force, Parties are required to adopt measures aimed at, inter alia, the identification of areas to be protected and the rehabilitation of degraded habitats and ecosystems; and the identification and protection of endangered species of flora and fauna, and those that may possibly require protection measures (article 6(2)(c) and (d)). As part of their policies for integrated management and sustainable development, Parties must endeavour to establish protected coastal areas with the objective of maintaining biological integrity and diversity; and identify the habitats

of living marine resources that contribute to the food security of coastal people and are of major socioeconomic and ecological importance (article 10(2)(h) and (i)). The Parties are required to adopt appropriate measures to protect and preserve rare or vulnerable ecosystems in the area within the scope of the Convention, as well as the habitats of species with low populations or that are threatened or endangered. To this end, the Parties must endeavour to establish protected areas. The establishment of such areas must not affect the rights of the other Parties or of third-Party States. In addition, the Parties are required to exchange information regarding the administration and management of such areas (article 10(5)).

(ix) Pacific Ocean (South)

Under the Noumea Convention (see section 3.3.2.14), Parties are required, individually or jointly, to take all appropriate measures to protect and preserve rare or fragile ecosystems and depleted, threatened or endangered flora and fauna as well as their habitat in the Convention Area. To this end, the Parties must, as appropriate, establish protected areas, such as parks and reserves, and prohibit or regulate any activity likely to have adverse effects on the species, ecosystems or biological processes that such areas are designed to protect. The establishment of such areas must not affect the rights of other Parties or third States under international law. In addition, the Parties are required to exchange information concerning the administration and management of such areas (article 14).

(x) Pacific Ocean (South-East)

The obligations in the Lima Convention (see section 3.3.2.15) are complemented by its Protocol for the Conservation and Management of Marine and Coastal Protected Areas of the Southeast Pacific,[584] adopted in 2009. The Protocol has five Parties as of 14 October 2024. It requires its Parties to undertake, individually or through bilateral or multilateral cooperation, to adopt appropriate measures in accordance with the Protocol to protect and preserve fragile, vulnerable ecosystems or those of unique natural or cultural value, with particular emphasis on flora and fauna threatened with depletion and extinction, by carrying out studies aimed at reconstructing the environment or restocking fauna and flora in necessary cases. To this end, Parties must establish, under their protection, parks, reserves, sanctuaries for fauna and flora or other categories of protected areas. In these areas, integrated management must be established, based on studies and inventories of their resources, with a view to their sustainable development, prohibiting any activity that may cause adverse effects on the ecosystem, fauna and flora as well as their habitat (article II).

The Parties undertake to provide information regarding the designation of protected areas, indicating the factors that have been taken into account for this determination. The information provided by the Parties must refer to the effects that they may have on the environment, coastal resources or their value (article III). The Parties must adopt common criteria for the establishment of areas under their protection. For this purpose, if they consider it appropriate, they shall jointly or individually request the advice and cooperation of the competent international organizations (article IV). In protected areas, each Party must establish integrated environmental management within guidelines which include the following: establish management of fauna and flora in accordance with the characteristics of protected areas; regulate all scientific, archaeological or tourist activities in said area; in general, prohibit any activity that may cause adverse effects on the species, ecosystems or biological processes that protect such areas, as well as on their character as national heritage: scientific, ecological, economic, historical, cultural, archaeological or tourist (article V).

The Parties are required to establish buffer zones around the protected areas, when they do not exist, in which uses may be regulated in order to ensure compliance with the purposes of the Protocol (article VI).

The Parties must take measures, individually or jointly, to prevent or reduce and control pollution of the environment, including pollution in protected areas, from any source of activity, and must strive to harmonize their policies in this regard. Such measures must include, inter alia, those designed to prevent, reduce and control, to the greatest extent possible pollution caused by ships, including measures to prevent accidents and deal with emergencies and prevent dumping, whether intentional or not; and other activities likely to cause environmental damage (article VII (1)(b) and (d)).

Parties are required to endeavour to cooperate in the management and conservation of protected areas, by exchanging information to this effect on the programmes and research developed by them, and the experiences gathered by each of them, in particular, in the scientific, legal and administrative fields (art. X). The Parties, directly or through the Executive Secretariat, must promote scientific, technical, legal, educational and other assistance programmes for protected areas (article XI). Each Party undertakes to ensure compliance with the provisions of the Protocol and to adopt the legal and administrative measures to prevent or sanction any activity that violates these provisions (article XIII).

Other articles in the Protocol include those related to EIAs (article VIII) (see section 3.4.4.2(k)), scientific and technical research, environmental education and community participation (article IX), environmental education (article X), compliance and sanctions (article XIII), and institutional arrangements (article XIV).

(xi) Red Sea and Gulf of Aden

The obligations in the Jeddah Convention (see section 3.3.2.16) are complemented by its Protocol Concerning the Conservation of Biological Diversity and the Establishment of Network of Protected Areas in the Red Sea and Gulf of Aden. The Protocol was adopted in 2005 but is not in force. The objective of the Protocol is to provide for the conservation, protection and restoration of the health and integrity of the ecosystems and biological diversity in the PERGSA [the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden] region, and to safeguard the threatened species, the critical habitats, sites of particular importance, as well as representative types of coastal and marine ecosystems, their biodiversity and their sustainable use and management, to ensure long-term viability and diversity (article 1). Parties are required to take all appropriate measures to: protect, conserve and manage their natural biological diversity with particular emphasis on threatened species, and protect, preserve and manage in an environmentally sound and sustainable manner areas that are unique, highly sensitive or regionally representative, notably by the establishment of protected areas (article 4 (1) and (2)). They are also required to adopt strategies, plans and programmes for the conservation of biodiversity and the sustainable use and management of marine and coastal biological resources, and adopt appropriate planning, management and supervision including legislation and monitoring measures for the protected areas, including contingency plans for environmental emergencies (article 4(2) and (3)). Furthermore, they are required to control, inter alia, sea-based sources of pollution that pose a significant impact on habitats and species (article 4(6)).

Parties must also ensure that systems of coastal and/or land-use and tenure provide for intergenerational equity and are consistent with the principles for conservation and sustainable resource use and management (article 4(7)).

The Protocol requires Parties to provide inventories of threatened species, if applicable, adopting the IUCN criteria to define these species. These inventories will be included in annex 1 to the Protocol (article 5(1)). Parties must consider developing and applying common, preferably quantitative criteria to deter-

mine species which are threatened at the regional level, as appropriate (article 5(2)). Parties are required to periodically provide an account of measures being undertaken to conserve populations of threatened species, if applicable. The effectiveness of such measures will be assessed using common criteria, and plans for additional action may be established as necessary (article 5(3)). The Protocol provides that the status of internationally recognized threatened species, as well as the nature and magnitude of impacts threatening their survival, should be monitored periodically by Parties according to common criteria, such as population size, extent of occurrence, number of mature individuals and estimated immediacy of extinction (article 5(4)).

Parties are required to make every effort to safeguard the habitats of threatened species and species of economic/cultural importance, and to limit negative impacts on these habitats and associated species caused directly or indirectly by human activities (article 7(2)). They must pursue conservation actions for these species at regional level, as appropriate, because a number of them are migratory (article 7(3)). Parties are required to regulate recreational activities and provide conservation measures for threatened species and species of economic/cultural importance (article 7(3)).

In order to promote cooperation in the management and conservation of natural areas, as well as in the protection of threatened species and their habitats, the Parties are required to draw up a "List of Protected Areas of Importance to the PERSGA region" (PERSGA PA List) (article 9(1)). Such List must include sites which are, inter alia, of importance for conserving the components of biological diversity in the PERSGA region; contain ecosystems specific to the PERSGA region or the habitats of threatened species; are nursery grounds for shrimp and migratory fish; include zones that help in the promotion of sustainable fisheries, the conservation of biodiversity and/or the maintenance of ecosystem functioning; and contribute to the regional network or system of protected areas (article 9(2)). The Protocol sets out criteria in its annex 3 with which the Parties must comply (article 9(3)), as well as the procedure for inclusion of proposed protected areas in the PERSGA PA List (article 10).

Parties are required to "make every reasonable and practical effort to safeguard protected areas from the negative impacts which threaten their persistence" (article 11(1)). All measures and requirements for the Protocol are applicable to the management of protected areas, with special consideration to the following: maintenance of threatened species, or species of economic/cultural importance; maintenance and conservation of special habitats; restoration of ecosystems and populations of species whenever possible; and involvement of local communities (article 11(1)). Parties are required to develop and implement management plans for marine and coastal protected areas according to the criteria specified in article 17 of the Protocol (article 11(2)). Parties are "encouraged to provide inventories for areas of special importance, such as areas containing sensitive ecosystems, reservoirs of biological diversity and important habitats for threatened species as well as fishery and other species of socioeconomic importance and cultural heritage endangered" (article 12). Identification of such areas might facilitate the selection of sites for possible inclusion in the PERSGA PA List (article 12). Parties must adopt and comply with conservation measures for special habitats (particularly wetlands/marshes, mangrove trees/forests, sea-grass beds and coral reefs) in order conserve them and to minimize possible adverse ecological effects from human activities (article 13).

Other articles included in the Protocol relate to EIA (article 15) (see section 3.4.4.2(l)), integrated coastal areas management (article14), restoration of ecosystems and populations of species (article 16), guidelines and common criteria (article 17), scientific and technical cooperation (article 20), information

exchange (article 21), environmental awareness (article 22), and reports to Parties (article 23). Institutional provisions are contained in Part 6 of the Protocol.

(xii) Polar areas

The Antarctic Treaty (see section 3.3.2.18(a)) is complemented by its adopted Protocol on the Environmental Protection to the Antarctic Treaty (Madrid Protocol),[585] in 1991. The Protocol has the same 29 Parties as the Antarctic Treaty, as of 14 October 2024. It designates "Antarctica as a natural reserve, devoted to peace and science" (article 2). Activities in the Antarctic Treaty area must be planned and conducted so as to avoid, inter alia, detrimental changes in the distribution, abundance or productivity of species of populations of species of fauna and flora; further jeopardy to endangered or threatened species or populations of such species; or degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance (article 3(2)(b)(iv), (v) and (vi)). Activities in the Antarctic Treaty area must be planned and conducted on the basis of information sufficient to allow prior assessments of, and informed judgments about, their possible impacts on the Antarctic environment and dependent and associated ecosystems and on the value of Antarctica for the conduct of scientific research. Such judgments must take account of, inter alia, the scope of the activity, including its area, duration and intensity; and the cumulative impacts of the activity, both by itself and in combination with other activities in the Antarctic Treaty area (article 3(2)(c)(i) and (ii)). Parties are required to cooperate in the planning and conduct of activities in the Antarctic Treaty area, and inter alia, promote cooperative programmes of scientific, technical and educational value, concerning the protection of the Antarctic environment and dependent and associated ecosystems (article 6(1)(a)).

Annex II on "Fauna and Flora" prohibits "taking or harmful interference", except in accordance with a permit (article 3(1)). "Harmful interference" is defined to mean, inter alia, "using vehicles or vessels, including hovercraft and small boats, in a manner that disturbs concentrations of native birds or seals", as well as "any activity that results in the significant adverse modification of habitats of any species or population of native mammal, bird, plant or invertebrate" (article 1(h)(ii) and (vi)). Underwater noise from shipping could thus be considered "harmful interference".

Any species of native mammals, birds and plants listed in appendix A to annex II are designated "Specially Protected Species" and must be accorded special protection by the Parties (article 3(4)). The limited circumstances in which a permit can be issued are set out in annex II (article 3(3)–(6)).

The Protocol's annex IV on Marine Pollution addresses discharges from vessels, mostly giving effect to MARPOL and its Annexes. However, its definition of "discharge", namely "any release howsoever caused from a ship and includes any escape, disposal, spilling, leaking, pumping, emitting or emptying" is broader than the definition of "discharge" in MARPOL. Therefore, consideration could be given to whether underwater noise pollution from ships could be considered a form of "discharge" under annex IV to the Protocol and how it could be specially regulated.

The Protocol's annex V on Area Protection and Management provides for the designation of Antarctic Specially Protected Areas (ASPA) and Antarctic Specially Managed Areas (ASMA). The establishment of an ASPA aims to "protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research" (article 3(1)). Parties are required to identify, within a systematic environmental-geographical framework, and to include in the series of ASPAs, inter alia, areas with important or unusual assemblages of species, including major colonies of

breeding native birds or mammals; and the type locality or only known habitat of any species (article 3(2)(c) and (d)). Entry into an ASPA is prohibited, except in accordance with a permit (article 3(4)).

Any marine area, where activities are being conducted or may in the future be conducted may be designated as an ASMA (article 4(1)). Designation of an ASMA is intended, inter alia, for "areas where activities pose risks of mutual interference or cumulative environmental impacts"; and entry into such areas does not require a permit (article 4(2) and (3)). One or more ASPAs can be included in an ASMA, therefore prohibiting entry in those specific areas unless there is a permit (article 4(4)). Activities in both areas must be prohibited, restricted or managed in accordance with management plans (article 2). Such plans must include, as appropriate, inter alia, the management of activities which are to be undertaken to protect the values for which special protection or management is required (article 5(3)(c)).

Other articles in the Protocol include those relating to EIA (article 8(2) and annex I), institutional arrangements (articles 10–12), compliance with the Protocol (article 13), inspection (article 14), liability (article 16), annual report by Parties (article 17), settlement of disputes (articles 18–20 and Schedule), as well as articles in annex V including those relating to designation procedures (article 6), permits (article 7), information and publicity (article 9) and exchange of information (article 10).

Goal 2, titled Healthy and Resilient Arctic Ecosystems, of the Arctic Council Strategic Plan 2021–2030 aims to promote pollution prevention, monitoring, assessment, conservation and protection of Arctic biodiversity, ecosystems, and species habitats, based on best available science, and respecting the importance of sustainable development for all current and future generations of Arctic inhabitants. Actions include promoting protection of the vulnerable Arctic ecosystems based on best available science and traditional knowledge and local knowledge; providing for conservation of biodiversity in the region, and supporting responsible use of its natural resources; and promoting action on issues that are critical to maintaining the health of Arctic ecosystems, as well as Arctic inhabitants. Other activities include encouraging cooperation among Arctic States; an ecosystem approach to management in the Arctic to advance conservation and sustainable use based on best available science; supporting work on protection and restoration of wetlands and habitats that are vital for Arctic species; and supporting international efforts on conserving nature and biodiversity and providing Arctic, including Indigenous perspectives on such efforts.

As of 2021, 5.24% of the Arctic's marine areas are protected. The protected area coverage of marine areas fell short of the Aichi Target for 10% of coastal and marine areas to be protected.[587]

3.4.3.2 Marine spatial planning and integrated coastal zone/area management

In addition to the aforementioned area-based management tools, some of the regional conventions also include obligations which require Parties to consider adopting and applying principles of integrated coastal area management (as in the case of the Jeddah Convention (article 14), or to promote integrated management (as in the case of the Barcelona Convention (article 4(3))) or strive to implement integrated management (as in the case of the Antigua Convention (article 10)). Integrated coastal area planning and integrated coastal area management are two of the main objectives of the Northwest Pacific Action Plan (see section 3.3.2.13). The introduction of ecosystem-based marine spatial planning in the BCLME is supported by the Benguela Current Marine Spatial Management and Governance Project (see section 3.3.2.3).

Legally binding instruments, specifically focused on integrated coastal zone management have been adopted under some regional seas conventions, as follows: the Pointe-Noire Protocol; the Protocol on Integrated Coastal Zone Management (ICZM) to the Nairobi Convention; and the Protocol on Integrated Coastal Zone Management in the Mediterranean. However, none of these Protocols have entered into force.

The only legally binding instrument specifically devoted to marine spatial planning, that is in force is Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning (Maritime Spatial Planning Directive).[588] This Directive provides a framework for the Member States to develop their maritime spatial plans (MSP) (article 1). Such MSPs must take into account "economic, social and environmental aspects to support sustainable development and growth in the maritime sector, applying an ecosystem-based approach, and to promote the coexistence of relevant activities and uses" (article 5(1)). It has been emphasized that it is essential that MSPs adequately address cumulative underwater noise pollution from both planned and existing human activities at sea.[589]

567 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (adopted on 21 May 1992, entered into force on 10 June 1992) OJL 206, 22/07/1992 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:31992L0043> last accessed 4 December 2024.

568 Case C-221/04 *Commission of the European Communities v Kingdom of Spain* [2006] ECR I-4515 para 70 with reference to Case C-103/00 Commission v Greece [2002] ECR I-1147, paras 36 and 39, and the Opinion of Advocate General Léger in that case, at point 57.

569 EU Commission Notice, *Guidance Document on the Strict Protection of Animal Species of Community Interest under the Habitats Directive* (Brussels, 12 October 2021) C(2021) 7301 final.

570 ibid table 14.

571 ibid.

572 Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869 (adopted 24 June 2024, entry into force on 18 August 2024) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1991> last accessed 4 December 2024.

573 HELCOM (n 537).

574 See <https://mpas.helcom.fi/apex/f?p=103:81:::NO:RP:P81_ID,P81_NAME:7,Input%20of%20sound> last accessed 12 December 2024.

575 Workplan of HELCOM Expert Group on Marine Protected Areas (EG MPA), 2023-2024 <https://helcom.fi/wp-content/uploads/2024/09/Workplan-of-HELCOM-Expert-Group-on-Marine-Protected-Areas-2023-2024.pdf> last accessed 7 February 2025.

576 ibid.

577 RAP Noise (n 445) p 13, action 8.

578 ibid.

579 See note 448.

580 See note 451.

581 See note 454.

582 See note 459.

583 See note 463.

584 See note 488.

585 Protocol on Environmental Protection to the Antarctic Treaty (adopted 4 October 1991, entered into force on 14 January 1998).

586 MARPOL (n 121) article 2(3)(a) contains the following definition: "Discharge' in relation to harmful substances or effluents containing such substances, means any release however caused from a ship and includes any escape, disposal, spilling, leaking, pumping, emitting or emptying". MARPOL also defines what 'discharge' does not include.

587 CAFF/PAME *Status and Trends for Arctic Conservation Measures. Conservation of Arctic Flora and Fauna and Protection of the Arctic Marine Environment* (Akureyri, Iceland, 2022).

588 Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning OJ L 257, 28.8.2014, pp 135–145

589 Merchant et al. (n 382).

3.4.4 Environmental Impact assessment and strategic environmental assessment

In addition to the obligations in global treaties regarding EIAs (see section 2.4.2.4), and the non-binding instruments which have been developed, such as the CMS Family Guidelines, many regional instruments also include provisions regarding EIA. Protocols setting out procedures for the conduct of EIA, among other provisions, have been adopted under the Antarctic Treaty and the Tehran Convention. Moreover, several States have also adopted two cross-regional treaties specifically on EIA and on SEA.

Regions which have not yet established procedures for the conduct of EIA may wish to consider using the procedures that have been developed thus far, an option that is also specifically provided for in the BBNJ Agreement (see section 2.4.2.4).

Furthermore, the ACCOBAMS MOP has recommended enhanced training of regulators on the appropriate application of the CMS Family Guidelines and the ACCOBAMS Methodological Guide: Guidance on underwater noise mitigation measures. It has been observed that many EIAs do not adhere to best practices, and stakeholders and decision-makers involved in the EIA process are often unfamiliar with the essential concepts and terminology needed to interpret noise exposure predictions effectively.[590]

3.4.4.1 Cross-regional instruments

The Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)[591] was adopted in 1991 and amended in 2001 and 2004. It has 41 Parties as of 14 October 2024. The Russian Federation and the United States have signed, but not ratified it. The Convention aims to enhance international cooperation in assessing environmental impact, in particular in a transboundary context, in light of the need and importance to develop anticipatory policies and of preventing, mitigating and monitoring significant adverse environmental impact in general and more specifically in a transboundary context (Preamble). Parties must take all necessary legal, administrative or other measures to implement the provisions of the Convention, including, with respect to proposed activities listed in appendix I that are likely to cause significant adverse transboundary impact, the establishment of an EIA procedure that permits public participation and preparation of the EIA documentation described in appendix II (article 2(2)). Appendix I lists activities such as offshore hydrocarbon activities but does not include any activities relating to vessel operations. An EIA must be undertaken prior to a decision to authorize or undertake a proposed activity that is listed in appendix 1 that is likely to cause a significant adverse transboundary impact (article 2(3)). The Party of origin must, consistent with the provisions of the Convention, ensure that affected Parties are notified of a proposed activity listed in appendix I that is likely to cause a significant adverse transboundary impact (article 2(4)). Parties must, at the initiative of any such Party, enter into discussions on whether one or more proposed activities not listed in appendix I is or are likely to cause a significant adverse transboundary impact and thus should be treated as if it or they were so listed. Where those Parties so agree, the activity or activities shall be thus treated.

General guidance for identifying criteria to determine significant adverse impact is set forth in appendix III (article 2(5)). The criteria listed in appendix III are size, location and effects. With respect to location, the appendix states that Parties may consider "proposed activities which are located in or close to an area of special environmental sensitivity or importance (such as wetlands designated under the Ramsar Convention, national parks, nature reserves, sites of special scientific interest, or sites of archaeological, cultural or historical importance) also, proposed activities in locations where the characteristics of proposed development would be likely to have significant effects on the population". With respect to effects, Parties may consider "proposed activities with particularly complex and potentially adverse effects, including

those giving rise to serious effects on humans or on valued species or organisms, those which threaten the existing or potential use of an affected area and those causing additional loading which cannot be sustained by the carrying capacity of the environment".

The EIA documentation which is to be submitted to the competent authority of the Party of origin must contain, as a minimum, the information described in appendix II to the Convention. It must include, inter alia, a description of the potential environmental impacts of the proposed project and the mitigation measures to keep adverse environmental impact to a minimum (appendix II). In addition, the documentation must encompass an explicit indication of predictive methods and underlying assumptions as well as the relevant environmental data used, and an identification of gaps in knowledge and uncertainties encountered in compiling the required information, as well as, where appropriate, an outline for monitoring and management programmes and any plans for post-project analysis (appendix II).

Other obligations include those relating to post project analysis (article 7 and appendix V), research programmes (article 9), institutional arrangements (articles 11 and 13), settlement of disputes (article 15 and appendix VII) and an Inquiry Commission (appendix IV). A database of transboundary EIAs[592] was established by the Parties, as well as a Compliance Committee following the amendment of the Convention.[593]

The Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (SEA Protocol)[594] was adopted in 2003. It has 35 Parties as of 14 October 2024. The Protocol requires its Parties to ensure that a SEA is carried out for plans and programmes which are likely to have significant environmental, including health, effects, and which have been prepared for, inter alia, fisheries or transport, and which set the framework for future development consent for projects listed in annex I and any other project listed in annex II that requires an EIA under national legislation (article 4(1)(2)). The Protocol sets the requirements for screening (article 5), scoping (article 6), an environmental report (article 7), public participation (article 8), consultation with environmental and health authorities (article 9), transboundary consultations (article 10), decision (article 11) and monitoring (article 12). It also addresses, inter alia, policies and legislation (article 13), institutional arrangements (articles 14 and 17) and settlement of disputes (article 20).

EU legislation

Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (Environmental Impact Assessment Directive)[595] as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014,[596] must be applied to private and public projects which are likely to have significant effects on the environment. "Projects" under the Directive are considered "the execution of construction works or of other installations or schemes" or "other interventions in the natural surroundings and landscape including those involving the extraction of mineral resources" (article 1(2)(a)). Projects serving national defence purposes can be excluded on a case-by-case basis, as well as projects for which the details are "adopted by a specific act of national legislation, since the objectives of this Directive, including that of supplying information, are achieved through the legislative process" (article 1(3) and 1(4)). The Directive differentiates between projects of a particular type, which will generally be subject to a systematic assessment due to their possible significant impacts and other projects for which the Member States might decide on a case-by-case basis or based on threshold values whether they must be subject to an assessment.

The Directive prescribes that the EIA must "identify, describe and assess appropriately, in the light of each case and following the procedures outlined in the Directive, the direct and indirect effects of a project

on, among other things, fauna and flora as well as on water and the interaction between those factors" (article 3). These should further cover "any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project" (annex IV, paragraph 5). The Directive further specifies that the description "should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project".

The Directive includes noise under its non-exhaustive list of the likely significant effects of the project on the environment resulting from it (annex IV, paragraph 5(c)). An estimate of noise is also listed under the required information to be provided in the framework of the EIA (annex IV, paragraph 1(d)). Underwater noise from vessels would, therefore, need to be assessed for any project subject to an assessment under the Directive and for which vessel traffic will be instrumental or shipping transport will be increased, independent of whether they are emitted on a permanent or temporary level. Therefore, underwater noise's cumulative and transboundary aspects must be assessed, and information on the short-term, medium-term, and long-term effects must be provided. In this context, the developer must, therefore, also provide: a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases (annex IV, paragraph 7).

The Habitats Directive (see section 3.4.3.1(a)) establishes that any plan or project not directly connected with or necessary to the management of the site in the special areas of conservation, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, must be subject to appropriate assessment of its implications (article 6(1)). Such projects shall only be authorized by Member States "after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public" (article 6(3)). A project may be authorized despite a negative assessment only "for imperative reasons of overriding public interest, including those of a social or economic nature" (article 6(4)). In such cases "the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected" and must inform the EU Commission of the compensatory measures adopted (article 6(4)). Where the site concerned "hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission to other imperative reasons of overriding public interest" (article 6(4)).

3.4.4.2 EIA in regional instruments applicable to one ocean/sea area

(a) Atlantic Ocean (Central, West and South African region)

The Abidjan Convention (see section 3.3.2.3) includes an article on EIA, but does not include an express obligation to conduct an EIA. The Convention requires Parties, as part of their environmental management policies, to develop technical and other guidelines to assist the planning of their development projects in such a way as to minimize their harmful impact on the Convention area. Each Party "shall endeavour to include an assessment of the potential environmental effects in any planning activity entailing projects within its territory, particularly in the coastal areas that may cause substantial pollution of, or significant and harmful changes to, the Convention area". To this end, Parties are required, in consultation with the Organization, to develop procedures for the dissemination of information concerning the assessment of those activities (article 13).

(b) Atlantic Ocean (North-East), including the North Sea

As indicated in section 3.3.2.4, the OSPAR Convention requires that its Parties prevent and eliminate pollution and take the necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and restore, where practicable, marine areas that have been adversely affected. The OSPAR Convention itself does not regulate EIA processes. Nevertheless, the North-East Atlantic Environment Strategy 2030 foresees that, by 2024, OSPAR will establish a mechanism to provide that, where Parties are authorizing human activities under their jurisdiction or control that may conflict with the conservation objectives of OSPAR MPAs in ABNJ, these activities are subjected to an EIA or SEA.[597] Moreover, several decisions have been adopted by the Parties to the OSPAR Convention that contain many suggestions that directly or indirectly support EIAs.[598]

(c) Baltic Sea

The Helsinki Convention (see section 3.3.2.6) requires that whenever an EIA of a proposed activity that is likely to cause a significant adverse impact on the marine environment of the Baltic Sea Area is required by international law or supranational regulations applicable to the Party of origin, that Party is required to notify the Commission and any Party which may be affected by a transboundary impact on the Baltic Sea Area (article 7(1)). The field of application of this EIA obligation is not predefined through a list of projects, but it is left to the discretion of each Party to consider which activities can cause a significant adverse impact on the marine environment in the light of their respective obligations under international law or supranational regulations.[599]

Other EIA requirements in the Helsinki Convention are included in annex VI (Prevention of pollution from offshore activities).

The RAP Noise proposes that Parties introduce mandatory impact assessment requirements before permitting noisy activities not regulated by other legislation, such as power boat races.[600]

(d) Black Sea

The Bucharest Convention (see section 3.3.2.7) includes a provision on EIA and an obligation to conduct an EIA. The field of application of the EIA obligation is not predefined through a list of activities, but it is left to the discretion of each Party to consider which activity may cause substantial pollution or significant and harmful changes to the marine environment.[601] Parties, when they "have reasonable grounds for believing that activities under their jurisdiction or control may cause substantial pollution or significant and harmful changes to the marine environment of the Black Sea, ... shall, before commencing such activities, assess their potential effects on the basis of all relevant information and monitoring data and shall communicate the results of such assessments to the Commission" (article XV(5)).

The Black Sea Biodiversity and Landscape Conservation Protocol (see section 3.4.3.1(b)(iii)) requires that, in the planning process leading to decisions on projects and activities that could significantly affect species and their habitats, protected areas, PSSAs, and landscapes, the Parties evaluate and take into consideration the possible direct or indirect, immediate or long term impact, including the cumulative impact of the projects and activities being contemplated according to criteria and objectives to be regionally developed and agreed pursuant to the Black Sea Convention and international experience in this matter, e.g. the Espoo Convention (article 6). The exact field of application of the assessment obligation is not defined through a list of projects and activities.

(e) Caribbean Sea, Gulf of Mexico and adjacent Atlantic area

The Cartagena Convention (see section 3.3.2.8) includes an article on EIA and an obligation to conduct an EIA for major development projects. In spite of the focus on major development projects, underwater noise from ships might still need to be assessed if vessel traffic is instrumental for a major development project that is subject to an assessment, or it will lead to an increase in shipping transport.

The Convention requires Parties, as part of their environmental management policies, to undertake to develop technical and other guidelines to assist the planning of their major development projects in such a way as to prevent or minimise harmful impacts on the Convention area (article 12(1)). Each Party is required to assess within its capabilities, or ensure the assessment of, the potential effects of such projects on the marine environment, particularly in coastal areas, so that appropriate measures may be taken to prevent any substantial pollution of, or significant and harmful changes to, the Convention area (article 12(2)). To this end, each Party must, with the assistance of the Organisation when requested, develop procedures for the dissemination of information and may, where appropriate, invite other Contracting Parties which may be affected to consult with it and to submit comments (article 12(3)).

The Protocol concerning Specially Protected Areas and Wildlife (see section 3.4.3.1(b)(iv)) also includes an obligation to conduct an EIA, but does not restrict the required assessment to major development projects as in the case of the Convention. The Protocol requires each Party, in the planning process leading to decisions about industrial and other projects and activities that would have a negative environmental impact and significantly affect areas or species that have been afforded special protection under the Protocol, to evaluate and take into consideration the possible direct and indirect impacts, including cumulative impacts, of the projects and activities being contemplated (article 13).

(f) Caspian Sea

The Tehran Convention (see section 3.3.2.9) includes an article on EIA and an obligation to conduct an EIA. The field of application of the assessment obligation is not predefined through a list of activities, but it is left to the discretion of each Party to consider which activity is likely to cause significant adverse effect on the marine environment of the Caspian Sea (article 17).

The Convention requires each Party to take all appropriate measures to introduce and apply procedures of EIA to any planned activity that is likely to cause significant adverse effects on the marine environment of the Caspian Sea (article 17(1)). Each Party "will take all appropriate measures to disseminate results of environmental impact assessment carried out in accordance with paragraph 1", to other Parties (article 17(2)). The Parties must cooperate in the development of protocols that determine procedures of EIA of the marine environment of the Caspian Sea in a transboundary context (article 17(3)).

The Tehran Convention's Protocol on Environmental Impact Assessment in a Transboundary Context,[602] adopted in 2018, is not yet in force. It provides a comprehensive framework for the implementation of effective and transparent EIA procedures in a transboundary context to any proposed activity which is likely to cause significant transboundary impact on the marine environment in order to prevent, reduce and control pollution of the marine environment, promote conservation of its biodiversity, and rational use of its natural resources (article 2). To this end, it establishes obligations for the conduct of such EIA and the subsequent monitoring. The Ashgabat Protocol to the Tehran Convention (see section 3.4.3.1(b)(v)) requires that the Parties apply the procedures of EIA as a tool for preventing and minimizing adverse impacts on biological diversity in the marine environment (article 13).

(g) Indian Ocean (West)

The 1985 Nairobi Convention (see section 3.3.2.10) includes an article on EIA (article 13) and an obligation for Parties to conduct an EIA. The same article is also included in the amended Nairobi Convention (article 14). Both articles restrict the EIA to major development projects where there are reasonable grounds to expect that they may cause substantial pollution of, or significant and harmful changes to, the Convention area. In spite of the focus on major development projects, underwater noise from ships might still need to be assessed if vessel traffic is instrumental for a major development project that is subject to an assessment, or it will lead to an increase in shipping transport.

The Convention requires Parties, as part of their environmental management policies, in cooperation with regional and international organizations, if necessary, to develop technical and other guidelines to assist the planning of their major development projects in such a way as to prevent or minimise harmful impacts on the Convention area (article 13(1)). Each Party is required to assess within its capabilities, the potential environmental effects of major projects on the marine environment which it has reasonable grounds to expect may cause substantial pollution of, or significant and harmful changes to, the Convention area (article 13(2)). To this end, the Parties must, if appropriate, in consultation with the Organisation, develop procedures for the dissemination of information and, if necessary, for consultations among the Parties concerned (article 13(3)).

(h) Mediterranean Sea

The Barcelona Convention (see section 3.3.2.11) includes a provision on EIA and an obligation to conduct an EIA. Parties are required to "undertake environmental impact assessments for proposed activities that are likely to cause significant adverse impact on the marine environment and are subject to an authorization by competent national authorities" (article 4(3)(c)). The field of application of the assessment obligation is not predefined through a list of activities, but it is left to the discretion of each Party to consider which activity is likely to cause significant adverse impact on the marine environment of the Mediterranean Sea.[603]

The SPA/BD Protocol (see section 3.4.3.1(b)(vii)) also includes an obligation to conduct an EIA and specifies that the required assessment is for industrial and other projects and activities. The Protocol requires Parties, in the planning process leading to decisions on industrial and other projects and activities that could significantly affect protected areas and species and their habitats, to evaluate and take into consideration the possible direct or indirect, immediate or long-term, impact, including the cumulative impact of the projects and activities being contemplated' (article 17).

(i) Pacific Ocean (North-East)

The Antigua Convention (see section 3.3.2.12) is not in force. It includes provisions on EIA, but not an express obligation to conduct an EIA. Furthermore, it is left to the discretion of each Party to consider which activities may cause pollution or cause significant or harmful environmental alterations.

The Antigua Convention requires Parties to encourage cooperation between States with respect to environmental impact procedures related to activities under their jurisdiction or control that may have adverse effects on the marine environment of other States or in areas outside the boundaries of their national jurisdiction, by means of notifications, exchange of information and consultations (article 5(6)(c)). As part of their policies for integrated management and sustainable development, Parties must endeavour to include an assessment of possible environmental effects when planning any activity that involves the implementation of projects inside their territory that may, especially in coastal areas, cause pollution in the area within the scope of the Convention or cause significant or harmful environmental alterations to it (article 10(3)).

(j) Pacific Ocean (South)

The Noumea Convention (see section 3.3.2.14) includes an article on EIA and an obligation to conduct an EIA for major projects. In spite of the focus on major projects, underwater noise from ships might still need to be assessed if vessel traffic is instrumental for a major project that is subject to an assessment, and/or if it will lead to an increase in shipping transport.

The Noumea Convention requires Parties to agree to develop and maintain, with the assistance of competent global, regional and subregional organisations as requested, technical guidelines and legislation giving adequate emphasis to environmental and social factors to facilitate balanced development of their natural resources and planning of their major projects which might affect the marine environment in such a way as to prevent or minimise harmful impacts on the Convention Area (article 16(1)). Each Party is required, within its capabilities, to assess the potential effects of such projects on the marine environment, so that appropriate measures can be taken to prevent any substantial pollution of, or significant and harmful changes within, the Convention Area (article 16(2)). To this end, each Party must, where appropriate, invite: (a) public comment according to its national procedures; and (b) other Parties that may be affected to consult with it and submit comments. The results of these assessments must be communicated to the Organisation, which is required to make them available to interested Parties (article 16(3)).

(k) Pacific Ocean (South-East)

The Lima Convention (see section 3.3.2.15) includes an article on EIA but does not include an express obligation to conduct an EIA. In spite of the focus on development projects, underwater noise from ships might still need to be assessed if vessel traffic is instrumental for a major project that is subject to an assessment and/or if it will lead to an increase in shipping transport.

The Lima Convention requires the Parties to develop technical and other guidelines to facilitate the planning of their development projects to minimise their harmful impact (article 8(1)). Furthermore, in any planning activity involving execution of projects within its territory, particularly in the coastal areas, a Party must endeavour to include an assessment of the potential environmental effects of such projects that may cause substantial pollution of, or significant and harmful changes to the Convention's area of application (article 8(2)).

The Protocol for the Conservation and Management of Marine and Coastal Protected Areas of the South-east Pacific (see section 3.4.3.1(b)(x)) also includes an obligation to conduct an EIA, but does not restrict the required assessment to development projects as in the case of the Convention. The Protocol requires Parties to carry out an EIA of any action that may generate adverse effects on protected areas. They must exchange information on proposed alternative activities or measures to avoid such effects (article VIII).

(l) Red Sea and Gulf of Aden

The Jeddah Convention (see section 3.3.2.16) includes an article on EIA, but does not include an express obligation to conduct an EIA. Furthermore, the field of application of the EIA is not predefined through a list of projects, but it is left to the discretion of each Party to consider which projects could be planned and executed in such a way as to minimize their harmful impact on the marine environment.

The Convention requires each Party to give due consideration to marine environmental effects when planning or executing projects, including an assessment of potential environmental effects, particularly in the coastal areas (article XI(1)). The Parties may, in consultation with the General Secretariat, develop

procedures for dissemination of information on the assessment of the activities referred to in paragraph 1 of article XI (article XI(2)). The Parties undertake to develop, individually or jointly environmental standards, both technical and other guidelines in accordance with standard scientific practice to assist the planning and execution of their projects in such a way as to minimize their harmful impact on the marine environment. In this regard, international standards may be used where appropriate (article XI(3)).

The Protocol Concerning the Conservation of Biological Diversity and the Establishment of Network of Protected Areas in the Red Sea and Gulf of Aden (see section 3.4.3.1(b)(xi)) also includes an article on EIA but does not restrict the EIA to projects. The Protocol requires the Parties to endeavour to broaden the scope and strengthen the role of EIA as a mechanism for minimizing biodiversity and habitat loss, so that an EIA is a requirement for any new project or activity likely to have significant impact on coastal and marine biodiversity and habitat in the area, or wider area defined by the Protocol; and an EIA extends to all major components of biodiversity and their bioeconomic value, integrated with social, cultural and economic value, and assessments made over the long term as well as the short term (article 15(1)). Parties are encouraged to exchange information and undertake consultation with other concerned Parties where proposed national projects/activities are likely to have transboundary impacts on biological diversity in areas under the sovereignty of other Parties (article 15(2)).

(m) ROPME Area

The Kuwait Convention (see section 3.3.2.17) includes an article on EIA, but does not include an express obligation to conduct an EIA. Furthermore, the field of application of the EIA is not predefined through a list of projects, but it is left to the discretion of each Party to consider which projects could be planned and executed in such a way as to minimize their harmful impact on the marine environment.

The Convention requires each Party to endeavour to include an assessment of potential environmental effects in any planning activity entailing projects within its territory particularly in coastal areas, which may cause significant risks of pollution in the Sea Area (article XI(a)). The Parties may, in consultation with the secretariat, develop procedures for dissemination of information on the assessment of the activities referred to in paragraph (a) (article XI(b)). The Parties undertake to develop, individually or jointly, technical and other guidelines in accordance with standard scientific practice to assist the planning of their development projects in such a way as to minimize their harmful impact on the marine environment. In this regard, international standards may be used where appropriate (article XI(c)).

(n) Polar Areas

The Madrid Protocol (see section 3.4.3.1(b)(xii)) includes an article on EIA and obligations to conduct an EIA. Moreover, annex I to the Protocol sets out EIA procedures.

The Madrid Protocol provides that proposed activities "shall be subject to the procedures set out in annex I for prior assessment of the impacts of those activities on the Antarctic environment or on dependent or associated ecosystems according to whether those activities are having (a) less than a minor or transitory impact; (b) a minor or transitory impact; or (c) more than a minor or transitory impact (article 8(1)). Each Party must ensure that the assessment procedures set out in annex I are applied in the planning processes leading to decisions about any activities undertaken in the Antarctic Treaty area pursuant to scientific research programmes, tourism and all other governmental and non-governmental activities in the Antarctic Treaty area for which advance notice is required under article 7 (5) of the Antarctic Treaty, including associated logistic support activities (article 8(2)).
Annex 1 to the Protocol sets out the EIA process and consists of three levels of EIA: Preliminary Environ-

mental Evaluation, the Initial Environmental Evaluation and the Comprehensive Environmental Evaluation. For projects that have more than a minor or transitory effect, the initial environmental assessment must include "consideration of alternatives to the proposed activity and any impacts that the activity may have, including consideration of cumulative impacts in the light of existing and known planned activities" (article 2(b)). In a further step, a Comprehensive Environmental Evaluation must be conducted considering "possible indirect or second-order impacts of the proposed activity" as well as "of cumulative impacts of the proposed activity in the light of existing activities and other known planned activities" (article 3(2)).

The Arctic Council has not developed any legally binding requirements to conduct an EIA. Guidelines for Environmental Impact Assessment in the Arctic were approved in 1997 under the Arctic Environmental Protection Strategy. In addition, the Arctic Council Sustainable Development Working Group issued a compendium titled "Good Practices for Environmental Impact Assessment and Meaningful Engagement in the Arctic – Including Good Practice Recommendations" in May 2019.[605] The compendium formulates good practice recommendations that encourage Arctic States, their authorities and private or public proponents to promote true dialogue and meaningfully engage with relevant stakeholders; utilize Indigenous knowledge and local knowledge to complement scientific knowledge; build internal capacity to work in the Arctic context and provide resources to communities to meaningfully engage in EIA; and strengthen circumpolar cooperation on transboundary EIA. The compendium recommends, inter alia, to apply the principles of the Espoo Convention.[606]

590 Adrian Farcas, Paul M Thompson, and Nathan D Merchant "Underwater Noise Modelling for Environmental Impact Assessment" (2016) 57 *Environmental Impact Assessment Review* 114-122.

591 Convention on Environmental Impact Assessment in a Transboundary Context (adopted 25 February 1991, entered into force on 10 September 1997) 1989 UNTS 309.

592 ECE MP Decision I/5 "Establishment of the Database on Environment Impact Assessment" (20 May 1998) ECE Doc ECE/MP.EIA/2 annex V.

593 ECE MP Decision II/4 "Review of Compliance" (27 February 2001) ECE Doc ECE/MP.EIA/4.

594 Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (adopted 21 May 2003, entered into force on 11 July 2010) 2685 UNTS 140.

595 Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) *OJ* L 26, 28.1.2012, pp 1–21.

596 Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance *OJ* L 124, 25.4.2014, pp 1–18.

597 North-East Atlantic Environment Strategy 2030 (n 422) Strategic objective 5.03 (S5.03).

598 ECE "Draft report on synergies and possible cooperation activities in marine regions. Note by the Bureau" ECE Doc ECE/MP.EIA/WG.2/2023/9 (2023) paras 82-83 and Box 5.

599 ibid para 66.

600 RAP Noise (n 445) p 13, action 12.

601 ECE"Draft report on synergies ..." (n 598) paras 53 and 54.

602 See note 455.

603 ECE "Draft report on synergies ..." (n 598) paras 25 and 26.

604 Finnish Ministry of the Environment, Arctic Environment Protection Strategy 1997: Guidelines for Environmental Impact Assessment (EIA) in the Arctic (Kirjapaino Auranen, Forssa, 1997).

605 Päivi A. Karvinen and Seija Rantakallio, eds. (Arctic Council, 2019).

606 ECE "Draft report on synergies ..." (n 598) paras 114-115 and Box 7.

3.4.5 Awareness-raising

It is critical to raise awareness among relevant stakeholders of the importance of reducing URN from shipping. As indicated in section 3.3.2.5(b), the US took the initiative and hosted two early focusing events on underwater noise from shipping, bringing together the shipping industry and the regulatory and scientific communities in 2004 and 2007. It also supported and chaired a workshop in 2008.

HELCOM's RAP Noise includes specific recommendations on awareness-raising. It proposes that Parties enable national actions to reduce underwater noise by improving awareness among ship and onshore infrastructure owners and the public of the actual noise level radiated by ships, for example employing real-time in-situ measurements close to ports.[607] Recommended measures include providing real-time feedback to ship's crew, and to raise awareness and to aid in optimising vessel and engine operations for reduced URN.[608] RAP Noise also recommends establishing platforms to share best practices on policy options within Member States and between authorities, the private sector, and NGOs. It recommends, for example issuing a bulletin highlighting best practices and policy options within the region and globally.[609] Also, on a national level, RAP Noise proposes that Parties participate and actively contribute to common platforms for sharing best practices on policy options within HELCOM countries (gaps in national legislation, etc.).[610]

3.4.6 Incentivization

Most of the regional treaties do not include a specific provision on incentivization, apart from the Black Sea Biodiversity and Landscape Conservation Protocol (see section 3.4.3.1(b)(iii)) which requires each Party to provide, in accordance with its capabilities, financial support and incentives of those national/regional activities which are intended to achieve the objectives of the Protocol, in accordance with their national plans, priorities and programmes (article 12).

Incentives are generally encouraged or provided for in policy outcomes. For example, the ACCOBAMS MOP recommended that its Member States "invite port authorities to develop incentive programmes that encourage the monitoring and reduction of underwater noise emissions, and to report regularly on all noise-generating activities to improve the mapping of Noise Hotspots Report (MOP8/2022/Inf43)".[611]

At the EU level, it has also been recommended to assess the effectiveness of incentives, voluntary certifications, and noise labeling in order to explore their potential application at a regional level. It has been suggested to promote ships adopting Quiet Class notations calling at European harbours. Even though this could potentially be replicated in other regions it will depend upon available resources and infrastructure, which is why capacity building, transfer of technology and financial resources would be necessary in this context.

607 RAP Noise (n 445) p 13, action 11.
608 ibid p 10, action 21.
609 ibid p 12, action 31.
610 Ibid p 13, action 9. See also the "Informal consultation workshop on underwater noise by shipping IC WS Noise", hosted by the Federal Maritime and Hydrographic Agency, Germany, in cooperation with the Coalition Clean Baltic on 8 and 9 September 2022 <https://www.ccb.se/event/2022-workshop-underwater-noise-shipping> last accessed 14 October 2024.
611 ACCOBAMS Res 8.17 (n 344).

HELCOM's RAP Noise aims to strengthen cooperation among Baltic Sea port authorities by introducing new initiatives, such as harbour fee systems, to incentivize voluntary quiet vessel operations following the example of the Vancouver Port and the related ECHO Programme.[612] The HELCOM BSAP also foresees activities regarding incentivization.[613]

As indicated in section 3.3.2.5(a), Canada has been a key partner to the Vancouver Port's ECHO, providing funding to reduce disturbance from large commercial ships through voluntary actions. A revised five-year work plan, adopted in 2024, includes incentive programmes for cleaner and quieter vessels and continued voluntary slowdowns. To support high participation rates in slow-downs, Canada reimburses the increased pilotage fees as a result of slowdown transits.

3.4.7 Capacity-building and transfer of technology

The need for capacity-building and transfer of technology has been emphasized in several regions. The SACEP Marine and Coastal Biodiversity Strategy for the South Asian Seas Region specifically refers capacity constraints as a factor which impacts the ability of States to implement policies aimed at conservation of biodiversity. Developing countries in other regions also require assistance and technology in order, for example to strengthen the knowledge base (see section 3.3.2.2).

As mentioned in section 3.4.1, many regional seas conventions establish obligations to cooperate in the fields of science and technology, including scientific research, environmental monitoring and other scientific and technical information, and the exchange data and any other specific information for the purposes of their Conventions.

ACCOBAMS (see section 3.3.1) requires its Parties, within the limits of their national jurisdiction and in accordance with their international obligations, to apply the conservation, research and management measures included in annex 2 which include capacity building (article II(3)).

Some regional conventions, such as the Jeddah Convention (article XII) (see section 3.3.2.16) and the Kuwait Convention (article XII) (see section 3.3.2.17) require the Parties to cooperate, directly or through competent regional or international organizations, in the development of programmes of technical and other assistance, in fields relating to the marine environment and its conservation in coordination with their Organisations.

Under the Barcelona Convention (see section 3.3.2.11), Parties commit to cooperate in "access to and transfer of environmentally sound technology" (article 4(4)) and "in the provision of technical and other possible assistance in fields relating to marine pollution, with priority to be given to the special needs of developing countries in the Mediterranean region" (article 13).

612 RAP Noise (n 445) p 10, action 22.
613 Baltic Sea Action Plan (n 442).

Both the Cartagena Convention (see section 3.3.2.8) (article 13(3)) and the Noumea Convention (see section 3.3.2.14) (article 18) require their Parties to undertake to cooperate, directly and when appropriate through the competent global, regional and subregional organisations, in the provision to other Parties of technical and other assistance in fields relating to pollution and sound environmental management of the Convention Area, taking into account the special needs of the island developing countries and territories.

The Antigua Convention (see section 3.3.2.12) (article 12) and the Lima Convention (see section 3.3.2.15) (article 10) require their Parties to cooperate directly, or through the Executive Secretariat or another competent international organisation, as appropriate, in the fields of science and technology, and to exchange data and any other specific information for the purposes of their Convention. To this end, Parties are required, directly or through the Executive Secretariat or another competent international organisation to: (a) encourage (Antigua Convention) or promote (Lima Convention) scientific, educational, technological assistance programmes and those of any other kind for the protection and preservation of the marine environment and the coastal area, and for the prevention, reduction and control of marine pollution. Such assistance must include, inter alia: (i) training of scientific and technical personnel; (ii) participation in relevant international programmes; (iii) supplying necessary equipment and facilities (Lima Convention); (iv) enhancing the capacity of the Parties to manufacture such equipment (Lima Convention); and (v) providing facilities for, and advice on, research, monitoring, educational and other programmes. It also includes providing appropriate assistance to minimize the effects of major incidents or accidents which may cause serious pollution of the marine environment; providing appropriate assistance in the preparation of environmental assessments; and cooperating in developing programmes for appropriate assistance in the environmental management of the marine environment and the coastal area.

3.4.8 Cooperation and coordination (with and among different stakeholders, including the industry)

The treaties and other legally-binding instruments, as well as the action plans and other non-binding instruments that have been developed and adopted at the regional and subregional levels to protect and preserve the marine environment demonstrate the commitment of States to cooperation. Regional treaties also mandate further cooperation between and among States on a range of issues including the prevention, reduction and control of pollution of the marine environment, scientific research, in the exchange of data and other scientific information, in the monitoring and assessment of pollution (see section 3.4.1), as well as in the provision of technical and other assistance (see section 3.4.7). Cooperation among States is critical in view of the transboundary nature of underwater noise pollution.

The Helsinki Convention (see section 3.3.2.6) requires the Parties, in matters concerning the protection of the Baltic Sea Area from pollution by ships, to cooperate within IMO, in particular in promoting the development of international rules, based, inter alia, on the fundamental principles and obligations of the Helsinki Convention which also includes the promotion of the use of BAT and BEP as defined in annex II (annex IV, regulation 1(a)). Parties are also required to cooperate in the effective and harmonized implementation of rules adopted by IMO (annex IV, regulation 1(b)).

HELCOM's RAP Noise aims to "strengthen coordination with IMO on the development of actions, as appropriate, to reduce underwater noise from commercial shipping and cooperate with other relevant actors as needed in the development of technical and operational solutions to reduce such noise in line with the aforementioned IMO actions". This also involves addressing current and future quiet ship designs and exploring the feasibility of systems that provide real-time feedback to the bridge on the ship's noise emissions.[614]

COOPERATION AND COORDINATION BETWEEN REGIONAL BODIES IS ALSO CRITICAL

As part of RAP Noise's implementation plan it is foreseen that Parties submit lessons learned/best practices in the implementation of the *Revised URN Guidelines* to MEPC 83-85.

For leisure boats, RAP Noise foresees establishing discussions with engine producers to develop industry standards for underwater noise emissions for boat engines.[615]

The EU Maritime Spatial Planning Directive (see section 3.4.3.2) and obligations in regional seas conventions and Protocols that mandate integrated coastal zone management provide frameworks for public participation and stakeholder consultation at an early stage.

Cooperation and coordination between regional bodies is also critical. For example, cooperation between the EU, the regional seas bodies, ACCOBAMS, and ASCOBANS has been crucial for developing knowledge and methodology in addressing underwater noise from shipping. As indicated in section 3.2.1, within the Mediterranean the Joint ACCOBAMS/ASCOBANS/CMS Working Group on Noise supports the work under the Barcelona Convention and UNEP/MAP.[616]

In the development of underwater noise indicators for continuous noise, HELCOM and OSPAR have also been working closely with the EU TG Noise. But also, cooperation between HELCOM and OSPAR and ICES has proven to be crucial for addressing underwater noise from shipping and can result in coordinated efforts on the development of common and/or compatible indicators, databases and assessment methodologies.[617] HELCOM also collaborates closely with BALTFISH but not yet on work regarding underwater noise. The BSAP encourages this collaboration with relevant HELCOM working groups to be further developed to facilitate a wide range of actions to achieve GES. The aim is to establish measures to prevent or control the adverse impacts of fishing.

As indicated in section 3.2.2, one of the main conclusions of the GFCM/OceanCare Workshop was for GFCM to foster coordination with CBD, CMS, IMO, and other relevant international organisations to ensure coherence in the implementation at the regional level of existing policies addressing, inter alia, the impacts of anthropogenic underwater noise on marine biodiversity. The GFCM/FAO is currently the only regional fisheries body that is studying the assessment of the impacts of anthropogenic underwater noise pollution on fisheries, underlining the need for other regional fishery bodies to also carry out research and collaborate with regional environmental organisations.

Establishing Regional Activity Centers can also further strengthen efforts in the prevention reduction and control of pollution by focusing on specific activities or impacts. This is the case for REMPEC (see section 3.3.2.11), a coordination body between UNEP/MAP and IMO, which is responsible for supporting the implementation of the Mediterranean Strategy for the Prevention, Preparedness, and Response to Marine Pollution from Ships. The strength of such Activity Centers is that they can also foster internal cross-sectoral cooperation within the Parties. The national environmental ministries usually appoint delegates to

the Regional Seas Conventions. Still, the work within REMPEC addresses topics traditionally addressed by the national IMO delegations, which tend to be allocated to administrative departments specifically working on maritime traffic. Policy options other than MSP and integrated coastal zone/area management, which can also foster cooperation and coordination among different ministries/agencies at the national level, include the development of an ocean noise strategy. As indicated in section 3.3.2.5(b), the US Ocean Noise Strategy Roadmap serves an organizing tool to bring together the multiple NOAA offices that address ocean noise impacts around a more integrated and comprehensive approach and decision-making. Canada has also developed a draft Ocean Noise Strategy (see section 3.3.2.5(a)).

3.4.9 Implementation, compliance and enforcement

The aforementioned sections indicate that practically all of the regional treaties and other legally-binding instruments, include energy in their definition of pollution, and therefore noise. Accordingly, the impact of anthropogenic underwater noise pollution can be reduced through the effective implementation of, compliance with, and enforcement of the obligations to prevent, reduce and control pollution of the marine environment in those treaties and other legally-binding instruments. Also crucial is the effective implementation of, compliance with, and the enforcement of the obligations in treaties and other legally-binding instruments that are focused on the conservation of specific fauna. The application of non-legally binding instruments at the national level is also critical. However, some regional bodies, such as SACEP have highlighted capacity constraints in relation to implementation and enforcement (see section 3.3.2.2).

Several regional treaties and other legally binding instruments include articles which are aimed at fostering compliance with their provisions, such as: the Inter-American Agreement for the Protection and Conservation of Sea Turtles (article X); the Abidjan Convention (article 23); the Benguela Current Convention (article 12); the OSPAR Convention (article 23); the Tehran Convention (article 28); the Nairobi Convention (article 27); the Barcelona Convention (article 27); the Jeddah Convention (article XXIII); and the Kuwait Convention (article XXIV).

With regard to enforcement, some treaties and other legally binding instruments also include specific obligations regarding enforcement of their provisions, such as: ACCOBAMS (article II(3); AEWA (section 4.3.9); and the Nairobi Convention (article 27). The EU Habitats Directive (see section 3.4.3.1(a)) states that the Member States must "undertake surveillance of the conservation status of the natural habitats and species" to which the Treaty applies "with particular regard to priority natural habitat types and priority species" (article 11).

"THE GFCM/FAO IS CURRENTLY THE ONLY REGIONAL FISHERIES BODY THAT IS STUDYING THE ASSESSMENT OF THE IMPACTS OF ANTHROPOGENIC UNDERWATER NOISE POLLUTION ON FISHERIES"

Moreover, some regional treaties also include provisions mandating cooperation in investigations regarding violations, such as the Helsinki Convention (see section 3.3.2.6) which requires States to assist each other, as appropriate, in investigations regarding the violation of pollution prevention and mitigation measures "which have occurred or are suspected to have occurred within the Baltic Sea Area" (annex IV, regulation 2).

Particularly noteworthy are two directives of the European Parliament and of the Council which concern criminal offences and penalties.

Directive (EU) 2024/1203 of the European Parliament and of the Council of 11 April 2024 on the protection of the environment through criminal law and replacing Directives 2008/99/EC and 2009/123/EC (Environmental Crime Directive)[618] "establishes minimum rules concerning the definition of criminal offences and penalties to protect the environment more effectively, as well as with regard to measures to prevent and combat environmental crime and to enforce Union environmental law effectively" (article 1). Its recitals point out that the introduction of underwater noise, as a form of energy, "into the environment can cause substantial damage to the quality of air, water or soil or substantial damage to an ecosystem, animals or plants" and that therefore "various instruments of Union environmental law regulate the introduction of energy into the environment". It concludes that "[i]n light of those instruments, the unlawful introduction of energy into the environment should constitute a criminal offence under this Directive if it causes or is likely to cause substantial damage to the environment or human health" (recital 15).

Thus Member States must ensure that, inter alia, "the discharge, emission or introduction of a quantity of materials or substances, energy or ionising radiation, into air, soil or water which causes or is likely to cause the death of, or serious injury to, any person or substantial damage to the quality of air, soil or water, or substantial damage to an ecosystem, animals or plants" constitutes a criminal offence where it is unlawful and intentional or seriously negligent (articles 3(2)(a) and 3(4)). Such conduct is considered unlawful when it either breaches: (a) "Union law which contributes to pursuit of one of the objectives of the Union's policy on the environment as set out in Article 191(1) TFEU" [Treaty on the Functioning of the European Union]; or (b) "a law, regulation or administrative provision of a Member State, or a decision taken by a competent authority of a Member State, which gives effect to the Union law referred to in point (a)" (article 3(1)).

The introduction of underwater noise from ships would be considered a criminal offence if it causes: (a) "the destruction of, or widespread and substantial damage which is either irreversible or long-lasting to, an ecosystem of considerable size or environmental value or a habitat within a protected site"; or (b) "widespread and substantial damage which is either irreversible or long-lasting to the quality of air, soil or water" (article 3(3)). To assess the damage, Member States need to take into account the baseline condition of the affected environment, whether the damage is long-lasting, medium-term or short-term, the extent of the damage and the reversibility of the damage (article 3(6)). Moreover, to assess if the conduct is "likely to cause damage to the quality of air or soil, or the quality or status of water, or to an ecosystem, animals or plants" they must take into account one or more of the elements, where relevant. Such elements include, inter alia, the following: "the conduct relates to an activity which is considered to be risky or dangerous for the environment or human health, and requires an authorization which was not obtained or complied with"; or "the extent to which a regulatory threshold, value or another mandatory parameter set out in article 191(1) TFEU or national law of a Member State which gives effect to Union law or in an authorisation issued for the relevant activity is exceeded (article 3(7)). The Environmental Crime Directive further regulates inciting, aiding and abetting, and attempting criminal offences (article 4).

Directive 2005/35/EC of the European Parliament and of the Council of 7 September 2005 on ship-source pollution and on the introduction of penalties for infringements (Ship-source Pollution Directive)[619] aims to protect the marine environment from ship-source pollution and to improve marine safety, by incorporating IMO standards, in particular MARPOL Annexes I and II, into EU law. Based on the Amendment of Directive 2009/123/EC, Member States are required to pass legislation on criminal penalties for ship-source pollution, thus ensuring that persons responsible for illegal discharges at sea are subject to adequate penalties, independent of their flag. The substances covered include polluting substances in MARPOL Annexes III-VI and do not mention the introduction of energy or underwater noise. However, the sectoral shipping legislation is undergoing a critical revision to modernise and reinforce maritime safety and pollution prevention rules, including the Ship-source Pollution Directive. The legislative proposal (COM(2023)273) on ship-source pollution lists several pollutants, including underwater noise in its Preamble referring to the ongoing discussions 'at the IMO regarding new environmental issues in relation to international shipping, resulting in both water and air pollution', which 'may result in new regulations under MARPOL 73/78' (rec. 21). In light of the obligations under the EU Strategy Framework Directive to achieve GES, it highlights among other things the qualitative Descriptor 11 referring to underwater noise (see section 3.3.1.1). Moreover, the proposed text foresees an evaluation of the Directive based on the experience gained from its implementation and the information reported by the Member States and the Union-wide overview (proposed new art. 12a.1).

614 RAP Noise (n 445) p 12, action 30.
615 ibid action 34.
616 EU TG Noise (n 347) p 6.
617 RAP Noise (n 445) p 12, action 32.
618 Directive (EU) 2024/1203 of the European Parliament and of the Council of 11 April 2024 on the protection of the environment through criminal law and replacing Directives 2008/99/EC and 2009/123/EC, *OJ L, 2024/1203, 30.4.2024.*
619 Directive 2005/35/EC of the European Parliament and of the Council of 7 September 2005 on ship-source pollution and on the introduction of penalties for infringements OJ L 255, 30.9.2005, pp 11–21.

SECTION

4

ANALYSIS OF EXISTING NATIONAL LEGAL INSTRUMENTS (LPCS)

4.1 INTRODUCTION

Building technical capacity and raising awareness are crucial to addressing the global challenge of underwater radiated noise from shipping. This issue is particularly pressing in developing countries, where limited technical resources and knowledge often hinder effective mitigation. Active participation from these countries is essential, given their significant role in international shipping.

The selected Lead Pilot Countries (LPCs) and their corresponding large marine ecosystems (LMEs) are detailed in Table 2.

Table 2: Selected LPCs and its corresponding LME

LPC	LME
Argentina	Patagonian Shelf
Chile	Humboldt Current
Costa Rica	Pacific Central American Coastal Caribbean Sea
India	Arabian Sea Bay of Bengal
South Africa	Benguela Current Agulhas Current
Trinidad and Tobago	Caribbean Sea

Argentina

Argentina has an extensive maritime coastline and a critical inland waterway network formed by the De la Plata, Paraná, and Paraguay rivers, which hosts numerous port facilities, including 70 with active commercial operations. In Argentina's foreign trade, agricultural product exports are especially prominent due to their high volume and economic value. Major maritime activities include offshore resource exploration and extraction, dredging operations and commercial shipping by merchant vessels.

Chile

Due to its location and geographical situation, embracing the Pacific Ocean, Chile has a natural projection into the sea of vast jurisdictional waters, making it one of the countries with the largest Exclusive Economic Zones (EEZ) in the world. As a result, Chile's coastal waters are teeming with diverse marine life, including seabirds, penguins, fish and mammals, creating an LME. Chile has also a total annual export volume of 63.5 million metric tons (based on 2021 data) from Chilean ports. Maritime operations in Chile associated with underwater radiated noise issues include offshore industrial activities, such as, blasting, dredging, drilling, hydrocarbon extraction, seismic exploration, sonar surveys, submarine cable laying and construction activities of port infrastructure.

Costa Rica

Costa Rica has a variety of maritime activities that generate underwater radiated noise in the marine environment, such as maritime transport activities (in the different national ports along the Pacific coast and the Caribbean coast); commercial and sport fishing; leisure tourism, such as whale watching, diving and snorkelling. Other shipping-related activities linked to underwater radiated noise problems include seismic surveys, marine construction and submarine cable installation.

India

India operates 12 major ports and 205 notified non-major ports along its coastline and islands. Most shipping traffic between the North Atlantic and Asia-Pacific regions passes through the Indian Ocean Region, with substantial growth in shipping volume and vessel sizes on this route over recent decades. India also has offshore oil fields where activities such as drilling, production, pile driving and seismic surveying generate underwater radiated noise. Additionally, military sonar exercises contribute to underwater radiated noise pollution in these waters.

South Africa

South Africa is positioned along one of the world's major maritime routes, linking the Americas, Europe, and the East. The country has eight commercial ports along its coastline bordering the Indian and Atlantic Oceans. Key maritime activities include coastal (passenger ferries, coastal infrastructure development) and maritime transport (cargo vessels), as well as ship building. Other shipping-related activities resulting in the issue of underwater radiated noise include recreational activities (e.g. sport fishing and whale-watching), dredging, seismic surveying, seabed mining, subsea cable laying, drilling and other offshore oil and gas exploration.

Trinidad and Tobago

Trinidad and Tobago is positioned in the Southernmost part of the Lesser Antilles of the Caribbean archipelago, with an EEZ that significantly exceeds its land area. The nation has eight major port areas with 30 facilities that handle trade in petroleum, chemicals, dry and liquid bulk, containers, general cargo and break bulk. Additional maritime activities associated with underwater radiated noise include pipeline laying, dredging, offshore oil and gas exploration and seismic surveying.

Objective and Methodology

This study represents the third section of a comprehensive analysis, presenting the results of a gap analysis across three tiers: global, regional and national. The objective of this study is to analyse existing policies, strategies and standards at the national level within LPCs related to mitigating URN from shipping. Findings from this national-level gap analysis will contribute to identifying broader gaps and informing global policy options to be developed from the collective analysis.

The methodology for this study followed a structured three-step process. The first step involved identifying primary contacts within each LPC who could provide relevant information on URN from shipping. In the second step, survey methods were used by distributing a questionnaire to the focal points (FPs) and contact points (CPs) within each LPC, followed by an evaluation of their responses. This step also included a qualitative gap assessment of existing public documents, such as IMO reports, GloNoise presentations at country workshops or conferences, expert articles, and industry, research and government publications. The third and final step consisted of an in-depth search and supplementary data collection, including focus meetings with FPs and/or CPs of each LPC and additional literature review.

This study employs a qualitative gap assessment, focusing on several key areas:

- identification of obligations under global and regional frameworks related to the marine environment and shipping activities;
- identification of national legal instruments in each LPC related to the marine environment;
- identification of national legal instruments in each LPC related to shipping activities;
- identification of national measures and tools in each LPC related to mitigation of underwater radiated noise;
- identification of national strategies and approaches addressing underwater radiated noise;
- identification of different approaches to implementing the *Revised URN Guidelines*; and
- identification of major gaps and challenges in implementing the *Revised URN Guidelines* effectively.

Relevant and technical recommendations are provided to address gaps at the national level.

4.2 OBLIGATIONS UNDER GLOBAL AND REGIONAL INSTRUMENTS

LPCs are parties to several global and regional treaties and are also members of international and regional cooperation organizations that address the issues related to the marine environment and shipping activities. A detailed summary of these instruments follows:

- Table 3 presents a summary of participation of the LPCs in global treaties containing obligations pertaining to the protection and preservation of the marine environment.
- Table 4 provides a summary of the participation of LPCs in global treaties pertaining to shipping.
- Table 5 outlines participation of the LPCs in regional treaties containing obligations pertaining to the protection and preservation of the marine environment.

These tables collectively highlight LPCs' commitments under various international frameworks for marine protection. Sections 2 and 3 of this study provide an analysis of global and regional legal instruments associated with the reduction of underwater radiated noise from shipping.

Argentina

Argentina is a Member State of IMO (Law No. 13910) and is a Party to UNCLOS. This regulatory framework also includes several specific norms and international conventions related to the environment that the Argentine Republic has ratified, namely: the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes; the Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention); the CBD; the United Nations Framework Convention on Climate Change (UNFCCC); the International Convention for the Regulation of Whaling; the Convention on the Conservation of Antarctic Seals; CITES; and the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), among others.

Argentina has also duly adhered to other relevant international obligations such as SOLAS approved by Law No. 22,079; MARPOL approved by Law No. 24,089; the International Convention on Oil Pollution Preparedness, Response and Cooperation approved by Law No. 24,292; COLREG, Law No. 21546; the London Convention, Law No. 21947; and the STCW 78, as amended, Law No. 22608.

Currently, Argentina coordinates the Anthropogenic Underwater radiated Noise Working Group and reviews the recommendations made by the IWC on noise, as well as the work carried out on URN in other international organizations. Argentina participated in the consultation rounds carried out by IMO in the revision of the 2014 URN Guidelines. Since 2009, Argentina has also participated in the IWC's "SORP" (Southern Ocean Partnership) programme, and research tasks have been carried out on cetacean acoustics throughout the Argentine Sea and Antarctica.

Chile

Chile is a Party to UNCLOS and the main international environmental conventions, such as the CBD, the UNFCCC, the Basel Convention and the Stockholm Convention. In addition, Chile is a Party to international maritime treaties that protect the marine environment, including: MARPOL; the Lima Convention, and its Protocol for the Conservation and Management of Protected Marine and Coastal Areas of the Southeast Pacific; and the AFS Convention. Chile was the second country in the world to ratify the BBNJ Agreement. Chile also implements the Polar Code. In addition, Chile is working on the implementation of guidelines elaborated by IMO in relation to ballast water, biofouling, marine litter and URN. In Chile, vessels must comply with all Chilean and international rules and regulations, including COLREG, SOLAS and IMO resolutions and standards, especially those related to the protection of marine environment.

Costa Rica

Costa Rica is a Party to international conventions, such as UNCLOS and SOLAS. As an IMO and UN Member State, it participates in international forums, like the Ocean Conference in Lisbon where Costa Rica presented the country's successful experience in the GloLitter project, which aims to prevent and reduce marine pollution caused by marine plastic from shipping and fishing activities. Costa Rica is also a member of COCATRAM and the Regional Marine Pollution Emergency, Information and Training Centre (RAC-REMPEITC) – Caribe. Additionally, it joined the Government of Canada in 2020 in supporting a proposal to reduce the decibels produced by vessels that affect the normal behaviour of cetaceans, especially orca whales. With regard to MARPOL, Costa Rica is in the process of calling for approval through the Consultation Bill No. 13141.[620]

India

India is a Party to UNCLOS and SOLAS. In addition, the Government of India has implemented all MARPOL related regulations. India is also a member of regional agreements pertaining to the protection and preservation of the marine environment and/or marine fauna such as the Madrid Protocol, and the CCAMLR. In terms of regional cooperation structures addressing issues related to the marine environment, India is member of SACEP.

620 Legislative Assembly of the Republic of Costa Rica, last accessed 27 November 2024.

South Africa

As a Member State of IMO, South Africa is committed to working together with other Member States to fulfil and progress the mission and vision of the organisation. South Africa has international obligations as a Party to MARPOL, SOLAS and UNCLOS. In particular, as a Party to UNCLOS, South Africa has a duty to protect and preserve the marine environment, which includes addressing the introduction of energy, such as underwater radiated noise, that may harm the marine environment. In addition, as a Party to the CBD, South Africa is obligated to take measures to minimize the impacts of underwater radiated noise on marine and coastal biodiversity, as outlined in the CBD's voluntary guidelines for the consideration of biodiversity in environmental impact assessments and strategic environmental assessments. South Africa has demonstrated this on many occasions by hosting regional capacity building events and playing a role in regional multilateral agreements, such as the BCC and the Nairobi Convention (to which South Africa is a member), and in forums, such as the Indian Ocean Rim Association and the Maritime Technology Cooperation Centre pertaining to shipping. Eventually, South Africa's commitments under the African Union's Agenda 2063, which includes goal 6 "Blue/ocean economy for accelerated economic growth" aims at mirroring UN SDG 14 and so target a sustainable management of the continent's marine and coastal resources, also require addressing the impacts of underwater radiated noise.

Trinidad and Tobago

Trinidad and Tobago is an IMO and UN Member State, and is Party to international conventions, such as MARPOL, SOLAS and UNCLOS. Trinidad and Tobago also has international obligations as a Party to the World Heritage Convention. It is also a Party to regional treaties, such as the Cartagena Convention and the SPAW Protocol. Trinidad and Tobago also cooperates with international bodies such as IMO and regional bodies such as the RAC-REMPEITC – Caribe to address issues related capacity-building and preservation of the marine environment.

Table 3: Obligations under global treaties pertaining to marine environment

LEAD PILOT COUNTRIES	BBNJ (not yet in force)	CBD	CITES	CMS	International Whaling Convention	RAMSAR	UN Fish Stock	UNCLOS	World Heritage	UNFCCC
Argentina										
Chile										
Costa Rica										
India										
South Africa										
Trinidad & Tobago										

Table 4: Obligations under global treaties pertaining to shipping

LEAD PILOT COUNTRIES	AFS	COLREG	IMO	London Convention	London Protocol	MARPOL	OPRC	Polar Code	SOLAS	STCW	STCW-F	UNCLOS
Argentina		■	■	■		■	■		■	■		■
Chile	■	■	■	■	■	■	■	■	■	■		■
Costa Rica			■	■					■	■		■
India	■	■	■			■	■		■	■		■
South Africa	■	■	■	■	■	■	■		■	■	■	■
Trinidad & Tobago	■	■	■		■	■	■		■	■		■

Table 5: Obligations under regional treaties pertaining to marine environment

LEAD PILOT COUNTRIES	Abidjan Convention	Benguela Convention	Cartagena Convention	Lima Convention	Madrid Protocol	Nairobi Convention	AEWA	CCAMLR	CCAS	IAC	SACEP	SPAW Protocol
Argentina					■			■	■	■	■	
Chile				■	■			■	■	■		
Costa Rica			■							■		
India							■				■	
South Africa	■	■			■	■	■	■	■			
Trinidad & Tobago			■									■

4.3 NATIONAL LEGAL INSTRUMENTS

4.3.1 National Legal Instruments related to Marine Environment and Marine Fauna

Currently, none of the LPCs specifically mention "underwater radiated noise" as a form of marine pollution, nor do many explicitly include the term "URN from shipping" in their national or sectoral legislation. While the term "marine pollution" is not always clearly defined in the legislation of some of the LPCs, most have incorporated the precautionary principle or an ecosystem-based approach in their national legislation. All LPCs have legal instruments aimed at protecting their ecosystems. A detailed description of the legal instruments in each LPC is provided below, with a summary of the most relevant legal instruments presented in Table 6.

Argentina

The Argentinian National Regulation[621] regarding underwater radiated noise is limited to the procedures for monitoring marine fauna that must be applied as part of the mitigation measures for the impacts of seismic activity on the marine environment, with resolution No. 201/2021 by the former Ministry of Environment and Sustainable Development. In this area, the current Undersecretariat of Environment is the implementing authority. The term "marine pollution" refers to UNCLOS and is incorporated into the Argentine national legal system by Law No. 24543. Likewise, some partial and complementary definitions can be found in various regulatory norms. The precautionary principle is provided for primarily in the Minimum Budget Law (recognized constitutionally) No. 25675 or "General Environmental Law", by virtue of which it is not only stated, but also the interpretation and creation of all national environmental regulations under said precept is ordered. Therefore, all legislation related to the subject must be developed considering said principle as a guiding principle or interpreted in the sense established by it.

Additionally, at the national level, the protection of the environment, as well as the management and sustainable use of natural resources, finds reception and genesis in the National Constitution itself through its sections 41 and 43, which are instrumented and implemented through several laws that refer to this mission, such as: Law No. 25612 of Integral Management of Industrial Waste and Service Activities (complemented by Law No. 24051 of Hazardous Waste); the already mentioned Laws No. 25675 "General Environmental Law"; and No. 25688 of Minimum Environmental Budgets for the Preservation, Development and Rational Use of Water, as well as:

- Navigation Law No. 20094;
- the General Law of the Argentine Naval Prefecture (Law No. 18398, article 5);
- Law No. 22190 which establishes a regime of prevention and control of the contamination of waters or other elements of the environment by polluting agents from ships and naval artifacts;
- the creation of the National System of Marine Protected Areas (Law No. 27037) and its complementary laws and decrees;
- the Minimum Environmental Budgets for the Preservation of Waters, their Exploitation and Rational Use (Law No. 25688);
- the Regime of Maritime, River and Lake Navigation, regulatory of Law No. 22190 (Conformed Decree No. 770/2019); and
- the Regulatory and Complementary Provisions of the Environmental Protection Directorate of the Argentine Naval Prefecture (PNA Ordinances of Volume 6[622]).

621 Argentinian National Laws, last accessed 27 November 2024.
622 PNA Ordinances, Volume 6 (Environmental Protection Directorate), last accessed 27 November 2024.

Chile

The National Ocean Policy (2018) contains general guidelines for the protection of the marine environment in Chile. However, although Chilean law does not specifically include a definition of "marine pollution", it does define the concept of "pollution" as the presence in the environment of substances, elements, energy or combinations of them, in concentrations or concentrations and permanence higher or lower, as appropriate, than those established in current legislation. In addition, Law No. 19300 defines the concepts of "Environment" and "Pollution-Free Environment". Regarding the precautionary principle, Chile created Law No. 21600 on the biodiversity and protected areas service and the national system of protected areas and Law No. 21455 that sets up the framework law on climate change. The Ministry of the Environment (MMA) of Chile is responsible for designing and implementing environmental policies under article 70 of the General Bases Law of the Environment (Law No. 19.300/2014).

Regarding the management carried out by the MMA, since 2018 the line of work related to underwater radiated noise and its impacts began to be developed, with the formation of the "Underwater radiated noise Coordination Group and its Effects on Fauna" which later led to the creation of the "Operating Committee for the Strengthening of the Management of Underwater radiated noise Control and Prevention of its Impacts on Biodiversity", in 2020 (Ministry of the Environment Exempt Resolution No. 0504, 15 June 2020). The Committee aims to support and strengthen the structures and processes necessary for the institutions involved to carry out effective actions to manage underwater radiated noise and conserve biodiversity. The Committee is led by the Ministry of the Environment and is made up of other public organizations dedicated to environmental protection, academics, NGOs and the General Directorate of Maritime Territory and Merchant Marine (DIRECTEMAR).

Among the Chilean State agencies with environmental competences are the Ministry of the Environment; the Directorate General of the Maritime Territory and Merchant Marine; the Environmental Evaluation Service (SEA); the National Fisheries and Aquaculture Service (SERNAPESCA); the Undersecretariat for Fisheries and Aquaculture (SUBPESCA); and the Superintendency for the Environment (SMA).

Approved guidelines already exist for the prediction and assessment of the impacts of underwater radiated noise[623] and marine ecosystems[624].

Costa Rica

The term "Marine pollution" is not specifically defined per se in the Costa Rican legislation, however, according to Executive Decree No. 41774 (2019) Article 6, the dumping of solid and liquid waste on reefs and coral communities is prohibited, as well as in those areas of the marine/land zone or coastal zone, where marine currents can carry such waste to coral areas and rocky reefs. The Costa Rican Political Constitution[625] also refers to the protection, sustainability, conservation and use of water in its article 50.

623 Evaluation Criteria in the SEIA: Prediction and Evaluation of Impacts by Underwater Noise, last accessed 27 November 2024.
624 Guide for the Prediction and Evaluation of Impacts on Marine Ecosystems (2024), last accessed 27 November 2024.
625 Costa Rican Political Constitution, last accessed 27 November 2024.

Costa Rica also created the National Marine Commission under Executive Decree No. 38014, which articulates, integrates and reconciles the policies and planning instruments issued in marine matters, promoting their implementation through the governing institutions. The Decree also develops and proposes the National Marine Policy for integrated and effective management of marine spaces. In general, the legislation and regulations of Costa Rica are particularly rich and developed, especially in the context of the protection of biodiversity. Costa Rica's Biodiversity Law of 1998 law advocates respect for all forms of life, includes traditional knowledge in its conceptualization of biodiversity and introduces a participatory governance system for sustainable use of natural resources.

India

Like most LPCs, India does not have specific legislation for URN, but it is being considered. India defines the term "Marine Pollution" in the Merchant Shipping Act 1958, and "Environment Pollution" in the Environmental Protection Act of 1986. The latter covers pollution controls, with opportunities to expand and regular marine noise. India's Coastal Regulation Zone (CRZ) notification, which is primarily aimed at managing India's coastal areas, could be adapted to include noise pollution. India has various laws for protection of marine biodiversity, including the Wildlife Protection Act of 1972 and the CRZ. These provide indirect protection against noise pollution by safeguarding habitats of marine species.

South Africa

Currently, South Africa does not have policies, regulations, standards, guidelines or strategies pertaining to underwater radiated noise. However, the term "noise" is included in the National Environment Management Act (No. 107 of 1998), in the definition of pollution. South Africa also has a Marine Pollution (Prevention of Pollution from Ships) Act that was passed in 1986 with the aim to prevent pollution from ships. Regarding the precautionary principle, South Africa passed the Marine Living Resources Act in 1998, which aims to conserve the marine ecosystem through the sustainable use of marine resources.

Other national legal instruments that South Africa has enacted pertaining to the marine environment are: the Protected Areas Act 2003 (used to manage MPAs); the Biodiversity Act 2004 (to conserve biodiversity, protect species and ecosystems, and sustainably use indigenous biological resources); the Marine Spatial Planning Act 2018 (to plan marine spaces); and the Integrated Coastal Management Act 2008 (legal authority for integrated coastal management in South Africa). Furthermore, section 24 of the Constitution of the Republic of South Africa (1996) guarantees everyone the right "...to an environment that is not harmful to their health or wellbeing; and to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that: a) prevent pollution and economic degradation; b) promote conservation".

Trinidad and Tobago

Although Trinidad and Tobago does not have a national legal instrument directly related to underwater radiated noise, it has several national legal instruments that specifically define marine pollution such as the Environmental Management Act, Water Pollution Rules, Marine Areas (Preservation and Enhancement) Act, Marine Governance and Policy, and the Integrated Coastal Zone Management Policy Framework.

Other relevant legislation includes Trinidad and Tobago's Marine Areas (Preservation and Enhancement) Act of 1970. The Buccoo Reef (Northwest Tobago) was designated an MPA in 1973 under that Act. Furthermore, the Environmental Management Act Chapter 35:05 has the goal of ensuring protection, conservation, enhancement and wise use of the environment of Trinidad and Tobago.

Table 6: Summary of most relevant national legal instruments per each LPC

LPC	NATIONAL LEGAL INSTRUMENTS	PERTAINING TO
Argentina	National legislation by Law 24543 Water Pollution Prevention System Act, Law No. 22190 and its Regulatory Decree 770/2019. PNA Ordinances, Volume 6 (Environmental Protection Directorate). Resolution N° 201/2021 of the former Ministry of Environment and Sustainable Development.	Marine Pollution
Chile	Environmental Act. 1994 (General Bases of the Environment, Law 19300)	
Costa Rica	Executive Decree No. 41774, 2019	
India	Merchant Shipping Act 1958 Environmental Protection Act, 1986	
South Africa	Marine Pollution (Prevention of Pollution from Ships) Act, 1986 National Environmental Management Act, 1998	
Trinidad and Tobago	Environmental Management Act, 2000 Integrated Coastal Zone Management Policy Framework	
Argentina	General Environmental Law No. 25675 Protected Maritime Areas Act, Law No. 27037 (National System of Maritime Protected Areas).	Precautionary Principle, Ecosystem Approach and Environmental Protection of Marine Areas
Chile	National System of Protected Areas, Law No. 21600 Framework for Climate Change, Law No. 21455 National Ocean Policy, 2018	
Costa Rica	Executive decree No. 38014 (National Maritime Policy) Biodiversity Law No. 7788, 1998, article 22	
India	India's Wildlife Protection Act, 1972 Environmental Protection Act, 1986 Coastal Regulation Zone	
South Africa	Marine Living Resources Act 1998 Protected Areas Act 2003	
Trinidad and Tobago	Environmental Management Act, 2000 Marine Areas (Preservation and Enhancement) Act 1970 Environmental Sensitive Areas Rules 2001	

4.3.2 National Legal Instruments related to Shipping Activities

Each of the LPCs has a national authority that regulates shipping activities and has developed legal instruments that govern the conditions for the registration of ships in each corresponding country. The way jurisdiction is exercised over ports differs in each country. A full description of the primary authority and legal instruments related to shipping of each LPC is set out below and a summary of them is listed in Table 7.

Argentina

Argentina relies on the Argentine Naval Prefecture (PNA), as the maritime authority responsible for implementing and applying the respective guidelines issued by IMO.

In said scenario, both the controls and the requirements related to pollution prevention and marine environment protection are inherent to PNA, in its role as maritime authority, and are regulated by international standards and conventions, to which Argentina has duly adhered and of which PNA is the authority for their application and for all related national regulations.

Currently, the PNA is seeking to address the issue of URN through the development of a new chapter of the Maritime, River and Lake Navigation Regime (REGINAVE)[626] which provides the main pillar for adopting regulations inherent to the safety of navigation as well as the protection of the marine environment, derived mainly from international standards.

In Argentina, although there is a National Port Authority, as well as provincial authorities, the PNA is the maritime authority responsible for the port security and has its own complementary powers in said jurisdiction. It is also an auxiliary customs, immigration and health authority.

Chile

Chile relies on its Ministry of National Defence and its high-level body, DIRECTEMAR as the authority to regulate shipping activities through a legal instrument; the Executive Decree 2222 (replaces navigation law).

Chile, in accordance with international law, must exercise its rights and obligations as a coastal State, flag State and port State. As a port State, and in accordance with international agreements, it inspects foreign vessels that visit Chilean ports in order to verify compliance with said norms and agreements. Navigators who transit through Chilean canals, straits and fjords must comply with the provisions of DIRECTEMAR, the National Maritime Authority of Chile, and the information provided by the Hydrographic and Oceanographic Service of the Chilean Navy (SHOA).

Costa Rica

In Costa Rica, it is the Ministry of Public Works and Transport which has the authority to regulate shipping activities. Its main instrument to govern the conditions of ships is a bylaw used for the registration of ships. Costa Rica does so through its port captaincies, the Maritime Port Division (DVMP), the Ministry of Public Works and Transport (MOPT) and in accordance with the article 1 of the Executive Decree.[627] The latter

626 Regulatory Decree 770/2019, Title No. 8 and Chapter 12 – Title 4 of the "Regime of Maritime, River and Lake Navigation" – REGINAVE; Ordinances, provisions and other related regulations issued by the PNA.

627 Executive Decree No. 41003 MOPT-SP-MINAE – Establishes avoidance zones to increase maritime safety and reduce the likelihood of collisions between merchant vessels and cetaceans.

Decree establishes zones to avoid in order to increase maritime safety and reduce the probability of collisions between merchant vessels and cetaceans off the Pacific coast of Costa Rica.

India

The Ministry of Ports, Shipping and Waterways has the authority to regulate shipping activities. Such activities are implemented through India's Merchant Shipping Act, 1958 and Inland vessels Act, 2021. In India, it is the Port Authority of India that oversees the jurisdiction of ports.

South Africa

The National Department of Transport is the authority that regulates shipping activities in South Africa. The legal instruments that govern the conditions for vessel registration are the Ship Registration Act 58 of 1998 and the Ship Registration Regulations 2002. South African Safety Maritime Authority (SAMSA) which is an entity of the National Department of Transport is a custodian of these legal instruments. The National Ports Authority is responsible for the regulation of ports through the implementation of the National Port Act (NPA) 12 of 2005.

The NPA establishes a strong legislative framework for promoting environmental stewardship in and around South Africa's commercial ports, which experience significant vessel traffic annually, with numerous ships anchored daily in outer anchorages. Environmental protection is a central theme in the NPA, addressed across various sections. Chapter 7, titled *Development, Environment, and Closure of Ports,* highlights the importance of integrating environmental considerations into port development. Section 69 mandates that the Authority balance environmental protection with port development and ensure sustainable, transparent planning that involves stakeholder consultation and considers biophysical and economic factors. Section 74 empowers the Authority to address environmental threats posed by unseaworthy vessels within port limits, including their removal if they pose a risk to the environment or public safety. Section 80 provides for regulations aimed at protecting the environment within ports, including preventing pollution, cleaning port waters, and regulating the discharge of ballast water. Additionally, section 11 emphasizes the Authority's responsibility to regulate and control pollution and safeguard the environment within port limits, which extend to outer anchorages.

While the NPA does not specifically reference URN, its comprehensive provisions establish a sound legal foundation to address this issue and implement measures to mitigate its impact effectively.

Trinidad and Tobago

The Ministry of Works and Transport (Maritime Services Division) has authority to regulate shipping activities through the Shipping Act of 1987. Trinidad and Tobago has enacted other legal instruments pertaining to shipping activities such as the Harbour Act; the Oil Pollution in Territorial Waters Act; the Pilotage Act; the Carriage of Goods by Sea Act; the Motor Launches Act; the Droghers Act; the Territorial Sea Act; and the National Maritime Policy and Strategy (under consideration by Cabinet and yet to be approved).

In Trinidad and Tobago, shipping activities are primarily exercised by the Maritime Services Division of the Ministry of Works and Transport and other stakeholders including, but not limited to: the Port Authority of Trinidad and Tobago; the Trinidad and Tobago Coast Guard; the Ministry of Energy and Energy Industries; the Environmental Management Authority; the Institute of Marine Affairs; the Pilotage Authority; the Telecommunications Authority of Trinidad and Tobago; the Ministry of Trade and Industry; the Customs and Excise Division; the Immigration Division; and the Ministry of Health.

Table 7: National legal instruments and primary authority related to shipping activities

LPC	LEGAL INSTRUMENTS	PRIMARY AUTHORITY
Argentina	Navigation Act, Law No. 20,094. Law No. 22,190 Regime of Pollution Prevention, Decree 770/2019 REGINAVE	Argentine Naval Prefecture (PNA)
Chile	Executive Decree No. 2222 Executive Decree No. 23187	Ministry of National Defence (DIRECTEMAR and SHOA)
Costa Rica	Executive Decree No. 41003 Bylaw for the registration of vessels	Ministry of Public Works and Transport (MOPT)
India	Merchant Shipping Act, 1958 Inland vessels Act 2021	Ministry of Ports, Shipping and Waterways
South Africa	Ship Registration Act 58, 1998 Ship Registration Regulations, 2002 National Port Act 12 2005	The Office of the Department of Transport (Maritime Affairs)
Trinidad and Tobago	Shipping Act 1987 Oil Pollution in Territorial Waters Act 1952 Harbour Act 1880 Pilotage Act 1939 Carriage of Goods by Sea Act 1926 Motor Launches Act 1926 Droghers Act 1914 Territorial Sea Act 1969	Ministry of Works and Transport (Maritime Services Division)

4.3.3 National Measures and Tools related to Mitigation of URN

LPCs have implemented effective measures and tools related to the mitigation of URN. A full description of each measure and tool is set out below.

Exclusive Economic Zones

An EEZ, as defined by the UNCLOS, is an area of the sea beyond and adjacent to the territorial sea. The EEZ can extend to a maximum breadth of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured. In the EEZ, a coastal State has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters suprajacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds. A coastal State also has jurisdiction with regard to the establishment and use of artificial islands, installations and structures; marine scientific research; and the protection and preservation of the marine environment. Other States enjoy, subject to the relevant provisions of UNCLOS, the freedoms of navigation and overflight and of the laying of submarine cables and pipelines, and other internationally lawful uses of the sea related to these freedoms, such as those associated with the operation of ships, aircraft and submarine cables and pipelines, and compatible with the other provisions of UNCLOS. In exercising their rights and performing their duties under UNCLOS in the EEZ, States shall have due regard to the rights and duties of the coastal State and shall comply with the laws and regulations adopted by the coastal State in accordance with UNCLOS and other rules of international law.

All LPCs have declared their EEZ through legal instruments as summarized below in Table 8.

Argentina enacted the Maritime Spaces Law (Law No. 23,968) in 1991, which was later amended in 2020. Chile enacted Law No. 18,565 (which modifies the Civil Code with regard to maritime spaces and issues a regulation) in 1986. Costa Rica amended its Political Constitution, article No. 6 by enacting Decree No. 5699 in 1975. India enacted the Territorial Waters, Continental Shelf, Exclusive Economic Zone, and Other Maritime Zones Act 1976. South Africa enacted the Maritime Zones Act in 1994. Trinidad and Tobago declared its EEZ through its Archipelagic Waters and Exclusive Economic Zone Act 1986.[628]

Table 8: National legal instruments used to declare an EEZ

LPC	LEGAL INSTRUMENTS USED TO DECLARE AN EEZ
Argentina	Maritime Spaces Law No. 23,968, 1991, and its last amendment in force.
Chile	Maritime Spaces Law No. 18,565, 1986
Costa Rica	Political Constitution of Costa Rica. Article No.6, 1975
India	Territorial Waters, Continental Shelf, Exclusive Economic Zone, and Other Maritime Zones Act 1976
South Africa	Maritime Zones Act 1994
Trinidad and Tobago	Archipelagic Waters and Exclusive Economic Zone Act 1986

628 The texts of the respective national laws of the LPCs is available on the website of the Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, United Nations (accessed 27 November 2024)

Marine Protected Areas

All LPC have adopted shipping regulations for application in already established MPAs, and it is a requirement to have a management plan when establishing an MPA. However, URN is not recognized as a threat to conservation targets in MPAs. Information on the national authority/ministry in each LPC responsible for designating and managing an MPA is presented below and in Table 9.

In Argentina, MPAs must have a management plan drawn up and approved, which may include guidelines related to the subject. The National Parks Administration under the Undersecretary of Environment is the authority responsible for applying these guidelines.

Chile has four types of MPAs: marine parks and marine reserves, which are essentially aquatic; and nature sanctuaries and multiple-use marine and coastal protected areas, which may include portions of land. All are decreed by the Ministry of the Environment, but in the case of the first two, the Undersecretariat of Fisheries and Aquaculture is responsible for providing the necessary background for their designation, with oversight remaining in the hands of the National Fisheries and Aquaculture Service. In turn, MPA administration falls to various state institutions, depending on the type of protected area and its conservation objectives. With the implementation of Law No. 21,600 (Law for Nature), which creates the Biodiversity and Protected Areas Service (SBAP) and the National System of Protected Areas (SNAP), the administration and management of protected areas falls under the responsibility of the SBAP.

Costa Rica enacted Executive Decree No. 43368[629] to expand the boundaries of the Isla del Coco National Park and the creation of a marine area for the management of underwater mountains. Costa Rica has also enacted Executive Decree No. 38014, which articulates, integrates and reconciles the policies and planning instruments associated with marine matters for effective management of marine ecosystems. Costa Rica also has the National System of Conservation Areas (SINAC) which is part of the Ministry of Environment, Energy and Telecommunications (MINAET) set up by article 22 of 1998 Biodiversity Law No. 7788. It has instrumental legal authority and exercises its functions as a decentralized and participatory institutional management and coordination body, integrating competencies in protected areas and the protection and conservation of the use of river basins and water systems to dictate policy.

In India, the Ministry of Environment Forest and Climate oversees environmental protection laws, including designation and management of MPAs, as well as the CRZ notification, which indirectly touches upon marine protection and is primarily aimed at managing India's coastal areas.

In South Africa, the Department of Forestry, Fisheries and Environment is the ministry responsible for designating and managing MPAs. It is also responsible for establishing any MPA (with navigation regulations), and it is a requirement to have a management plan when establishing an MPA. South Africa has 42 MPAs along the coastline which include several sensitive ecosystems. The National Biodiversity Assessment 2018 further highlights the importance of protecting marine ecosystems, which face significant pressures such as pollution, habitat degradation, and reduced freshwater inflows into estuaries. Estuaries and wetlands, critical for water security, fisheries, and mitigating climate risks, are among the most threatened and least protected ecosystems. Although MPAs have been established, these efforts need expansion and integration to address biodiversity threats effectively. Recommendations include improving freshwater flow management into estuaries, restoring degraded ecosystems, and broadening the MPA network to safeguard underrep-

629 Executive Decree No. 43368 (accessed 27 November 2024)

resented and high-value ecosystems. These measures align with existing legal frameworks and highlight the need to address emerging challenges, such as underwater radiated noise, which remains an unregulated aspect of marine environmental management in South Africa.

Trinidad and Tobago through the Ministry of Agriculture, Land and Fisheries has designated the Buccoo Reef Marine Park as an MPA where activities such as commercial and recreational fishing are prohibited. Other prohibited activities that generate URN include construction, dredging, drilling and industrial or mineral exploration. The Buccoo Reef MPA is important for several reasons, including coastal protection, food, tourism and as a habitat for vulnerable species. However, the reef has been damaged by anthropogenic activities. Regarding Environmentally Sensitive Areas (ESA), Trinidad and Tobago has set out the standards and guidelines for the designation of an Environmentally Sensitive Area under section 41 of the Environmental Management Act. An ESA will be designated for habitat protection purposes or if required by Trinidad and Tobago's international obligations. However, to date no marine areas have been designated as ESAs.

Table 9: National Ministry to designate and manage MPAs

LPC	MINISTRY TO DESIGNATE AND MANAGE MPAS
Argentina	Undersecretary of Environment, Chief of the Cabinet of Ministers
Chile	Ministry of Environment
Costa Rica	Ministry of Environment and Energy
India	Ministry of Environment Forest and Climate Change
South Africa	Department of Forestry, Fisheries and Environment
Trinidad and Tobago	Department of Marine Resources and Fisheries

Marine Spatial Planning

Marine Spatial Planning (MSP) is a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that have been specified through a political process.[630]

This tool has also been used in Argentina and India to manage shipping activities, and in the case of South Africa it is at an early stage. Trinidad and Tobago is in the early stages of an MSP design through the Integrated Coastal Zone Management (ICZM) committee for the Gulf of Paria, west coast of Trinidad and Tobago, and will encompass all major marine activities, including shipping.

In Argentina, Pampa Azul is an inter-ministerial strategic initiative that articulates actions of scientific research, technological development and innovation to provide scientific bases for national ocean policies, including to deepen scientific knowledge as a basis for conservation policies and management of natural resources. In this framework, it has created a coordination committee that brings together different ministries with responsibility for the sea. This initiative presents a unique opportunity for the realization of an integrated and coordinated approach to the planning and management of marine areas.

630 UNESCO-IOC/European Commission *MSPglobal International Guide on Marine/Maritime Spatial Planning* (IOC Manuals and Guides no 89) (UNESCO Paris 2021).

Chile envisions a future where marine life in coastal and ocean ecosystems is rebounding, diverse and resilient, and where ecosystems provide increasing benefits to human well-being and healthy communities. Chile's goal is to protect and restore ocean life, on which all life depends, by improving marine resource management with the greatest impact on marine biodiversity and to accelerate progress using the levers of science, seafood markets, and addressing illegal, unreported and unregulated fishing globally.

The Costa Rican National Strategy for Integrated Management of Coastal and Marine Resources addresses the need to integrate and strengthen a system of MSP that allows the rational use of marine resources. Within the framework of the CBD, Costa Rica has initiated dialogue processes in seven sites using the MSP approach. Based on these ongoing processes, some lessons have already been identified that can be considered for future maritime activities such as shipping.

In India under the India-Norway MSP, two areas namely Pondicherry and Lakshadweep were taken up to balance growth alongside sustainable management of ocean resources and the preservation of the coastal environment. The work was implemented by the Ministry of Earth Sciences through the National Centre for Coastal Research, the Institute of Marine Research and the Norwegian Environment Agency, along with the Department of Science and Technology of the Union Territory of Puducherry and Lakshadweep.

South Africa is currently working with its neighbouring countries, within the framework of the Benguela Current Convention and cooperating with other international partners to develop the necessary capacities to implement MSP so that it is introduced and established as standard operating procedure by the government. The South African MSP process will consider and integrate multiple existing spatial interests and claims, currently including shipping activities and ports.

Trinidad and Tobago has recently created an MSP model for the Buccoo Reef Marine Park. Utilising methods such as researcher observation, questionnaires and interviews, socio-economic activities were studied and mapped. Spatial-temporal changes were mapped using GIS techniques and included assessments of land use changes, coastline changes and changes to marine features or habitats. Ecological health in the study area was assessed through fish, coral and benthic surveys.

Routeing measures

A TSS is a routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes. The purpose of a TSS is to reduce traffic density, and generally lessen the incidence of encounters between ships on reciprocal courses, which are the most dangerous. Other routeing measures include areas to be avoided. The latter also helps to mitigate the URN footprint from shipping traffic.

Argentina has established some areas to be avoided, within areas under its national jurisdiction, such as MPAs. For years Chile had also used ship routeing measures, but in recent decades it has implemented TSS in Punta Arenas, the Strait of Magellan, Hornos Island, among others.

In Costa Rica, the Directorate of Navigation and Safety of the Ministry of Public Works and Transport led the legislation[631] to establish two new ships' routeing systems, creating an area to be avoided and a TSS

631 Decree No. 41003-MOPT-SP-MINAE, 2018, complements an area to be avoided previously adopted by IMO in 2017 and implemented in January 2018.

to increase maritime security at the entrance of Golfo Dulce and the Gulf of Nicoya, respectively. The passage of this important Decree protects the marine environment, especially the migratory species of cetaceans that could be affected by accidental collisions with an increasing number of large vessels. The design and development of the administrative stages to implement a Maritime Traffic Control System in the Costa Rican Caribbean is in compliance with the obligations established in chapter V of SOLAS, to allow control of the movements of vessels on the coast and generate a database.

The Directorate General of Shipping proposed the establishment of a TSS off the south-west coast of India to prevent collision incidents between merchant vessels and fishing vessels off the coast of Kerala. India also replaced its existing Deep-Water route by a TSS and existing safety fairway on approaches to the Gulf of Kutch. This approach not only ensures improvement in safety of navigation, avoidance of collision, ease in flow of traffic and the avoidance of areas of heavy traffic, but also improves safety of life, property and the environment. In South Africa, a TSS has been implemented off the south coast to ensure safe navigation for loaded tankers north and south of Alphard Banks (South of Cape Infanta); and the FA Platform (South of Cape St. Blaize) for eastbound and westbound traffic. Additional approaches have been implemented in Port Elizabeth, Saldanha Bay and Table Bay.

Although there is no TSS in Trinidad and Tobago, maritime safety standards and regulations are adhered to.

4.4 NATIONAL APPROACHES ADDRESSING URN

Each LPC has a different level of preparedness to react to the URN issue and its impacts on the marine environment and marine fauna. This section provides an overview of each LPC's different approaches to address URN, including institutions and stakeholders conducting noise survey studies, creating regional initiatives, and participating in workshops and conferences to raise major awareness about URN. A summary of LPC institutions, frameworks and initiatives is detailed in Table 10.

Argentina

Argentina has set up three main URN targets as ongoing activities: (1) demarcation of sensitive areas for marine fauna; (2) regulation of hull cleaning activities; and (3) installation of new engines and propellers. To achieve these targets, Argentina has relied on institutions such as the Cethus Foundation, the National Institute for Fisheries Research and Development (INIDEP), the National Patagonian Centre (CENPAT), and the Centre for Marine Systems Studies (CESIMAR) to conduct studies on hydro-acoustics and surveys of MPAs, and to acquire hydroacoustic equipment to continue and increase research in the designated areas. Argentina has also participated (and hopes to continue doing so) in workshops with port authorities to raise awareness about reducing underwater radiated noise and develop joint proposals to comply with current regulations of IMO and other international organizations. In 2021 Argentina started to implement a noise monitoring campaign with the support of researchers and technicians from the National Parks Administration, PNA, the Southern Centre for Scientific Research of the National Scientific and Technical Research Council (CADIC-CONICET) and the Cethus Foundation. The objective of this research campaign is to generate information to build acoustic propagation models in MPAs and set up an URN baseline to generate more information and define conservation strategies to be carried out.

EACH LPC HAS A DIFFERENT LEVEL OF PREPAREDNESS TO REACT TO THE URN ISSUE AND ITS IMPACTS ON THE MARINE ENVIRONMENT AND MARINE FAUNA

Chile

In Chile, technical committees have been created involving the academic sector and state agencies with environmental responsibilities. For instance, Chile created the Operating Committee for strengthening management of underwater radiated noise control and prevention of its impacts on biodiversity to support and strengthen the coordination, systematization, management and development of actions, programmes, plans and projects of the different institutions that comprise it, in relation to the control of underwater radiated noise and the prevention of its impacts on biodiversity. Communication Instances have been created between state agencies and the academic sector (universities and NGOs) to establish technical-scientific criteria for the evaluation of the impacts of underwater radiated noise in ecologically sensitive areas, such as MPAs.

More recently, the subject of underwater radiated noise has been incorporated into the National Oceanographic Plan under the concept of underwater noise pollution, aiming at developing baselines of the underwater acoustic landscape and acoustic characterization of noise-generating activities in the marine environment, to evaluate the potential impacts of these on the physiology and behaviour of marine mammals, fish and invertebrates and to establish mitigation measures. Within the framework of the SEIA, projects that contemplate underwater acoustic emissions, in a preventive manner, must recognize and control the effects and impacts of underwater noise that they may generate during their implementation. For the above, the evaluation must be carried out in accordance with the Exempt Resolution No. 202299101681 and recommendations and guidelines addressed in the technical document: "Evaluation Criteria in the SEIA: Prediction and Evaluation of Impacts from Underwater radiated noise" [632].

Chile also had projects and sponsorships such as "The Blue Boat Initiative" (Buoy Oceanographic Alert Technology) which was a project sponsored by the Chilean Ministry of the Environment and carried out in conjunction with the Melimoyu Ecosystem Research Institute (MERI) Foundation during 2022–2023. The project aims to preserve and protect whales, while monitoring the oceans, and studying and valuing marine ecosystem services. The Blue BOAT Initiative included a network of smart buoys, and a passive acoustic and oceanographic monitoring system. Another project is the "Underwater acoustic monitoring in Patagonia" promoted by the Centre for Dynamic Research on High Latitude Marine Ecosystems (IDEAL) of the Universidad Austral de Chile and the Alfred Wegener Institute of Germany and with the sponsorship of the Ministry of the Environment. One of the goals of the project is to monitor the anthropogenic impact from cruise ships on marine mammals. In Chile stakeholders such as Acustica Marina, have the technology to be able to monitor and process natural anthropogenic acoustic information and generation of real-time alerts of events of interest.

632 Exempt Resolution No. 202299101681, last accessed 27 November 2024.

Costa Rica

In Costa Rica URN is not a priority issue, nevertheless, the ONDAS initiative together with other local scientific entities such as Centre for Research in Marine Sciences and Limnology of the University of Costa Rica (CIMAR-UCR); the Maritime Engineering unit for Rivers and Estuaries of the University of Costa Rica (IMARES-UCR); and the Faculty of Marine Biology of the National University (UNA) have developed workshops and talks at the level of the National Academy of Sciences (ANC) to raise awareness of URN by shipping traffic and its impact on marine life, especially in areas where there is high shipping traffic density.

The ONDAS initiative has been installing acoustic recorders on the coast of Costa Rica and Panama since 2016 to understand and evaluate the soundscape in the study areas, the presence of cetacean species and noise sources, as well as their spatial and temporal changes. The ONDAS initiative has a database of more than two million minutes of recordings from the evaluation and monitoring of marine sensitive areas such as in the Gulf of Papagayo, the Isla del Cano Biological Reserve, and the Gandoca-Manzanillo Wildlife Refuge. In Costa Rica, there is also a process of developing a wave forecasting instrument in Puerto Caldera (Puntarenas), whereby the authorities have the decision to order (on certain days of the year) operational shutdowns of all port activity (operational shutdowns of ships), causing ships to dock and undock, which could have a positive/negative impact on the generation of noise pollution. The project aims to provide a technical mechanism for decision-making regarding "operational shutdowns" of the port.

India

India considers URN a priority issue in the country from environmental and strategic aspects. India has proposed an Underwater Domain Awareness framework to raise awareness on policy and technology intervention along with acoustic capacity and capability building. India has also organized national conferences, symposia and workshops, such as the National Symposium on Acoustics for Ocean Environment, organized by the Acoustical Society of India under the National Institute of Oceanography. A national workshop on passive acoustic sensors was conducted at the National Institute of Ocean Technology (NIOT) under the aegis of International Quiet Ocean Experiment (IQOE). The Ocean Society of India also conducts biennial conferences – OSICON – (Ocean Society of India Conference), focusing on sustainable usage and development of oceans. Underwater acoustics and its impact are topics which are seriously pursued in studies presented in these conferences at various research institutes and premier educational institutions. India is also exploring ways to enhance ship traffic management systems to minimize noise pollution in critical zones.

India is also working with global partners to install real-time underwater radiated noise monitoring systems, especially near sensitive marine environments like coral reefs and marine parks. India is in the process of building a network of URN monitoring stations along major shipping lanes, using hydrophones to track noise levels and establish baseline data. The NIOT has developed expertise in the area of Ocean Acoustics and development of acoustic systems for ocean applications, ambient noise measurements in Indian deep and coastal waters and Polar regions, and underwater acoustic systems for source localization and strategic applications. NIOT has also developed an autonomous ambient noise measurements system and has operated it successfully in many coastal regions in India.

South Africa

South Africa has established several URN targets for the near future. These include increasing the number of comprehensive studies related to URN from shipping and integrating data from multiple ports and coastal regions. South Africa has also started vessel risk mitigation programmes, such as the Green Ports initiative which focuses on reducing the environmental footprint of ships including URN. South Africa has also a high-tech Maritime Rescue Coordination Centre (MRCC) to monitor the activities on its coastline and beyond.

Currently, the AFNAP project, led by the University of Paris-Saclay and in collaboration with BLSA and NMU, was initiated in 2021 to understand the behavioural responses of African penguins to marine noise and how this may impact their communication network at sea. To date, miniature hydrophones and accelerometers have been deployed on African penguins in Algoa Bay to facilitate this. In addition to this monitoring, BLSA and the Southern African Foundation for the Conservation of Coastal Birds installed an APMS on Bird Island in Algoa Bay in October 2022. Data from the APMS will be used to assess the birds' response to a number of potential threats, including marine noise (using in-situ hydrophone data). NMU researchers have been monitoring noise levels in the vicinity of bunkering and transiting vessels since 2023 to improve our understanding of noise levels associated with bunkering activities.

Trinidad and Tobago

Trinidad and Tobago has completed the National Maritime Policy and Strategy (2022) which is currently before Cabinet awaiting approval. It will, when approved, provide the framework for the development of appropriate programmes and activities in the areas of sustainable maritime transport, port operations, marine resource management and protection, trade logistics, compliance, monitoring and enforcement. It will also provide for the passage of pertinent maritime legislation for decent conditions of work and the promotion of international gender equality efforts from a Small Island Developing State perspective. Trinidad and Tobago agrees that the impacts of anthropogenic noise on the seas needs to be monitored through proper data acquisition.

Currently two scientific researchers have started to implement a programme to record the soundscape of marine sensitive areas, such as the Buccoo Reef MPA. This will provide a baseline for URN from shipping traffic.

Furthermore, key research institutions within Trinidad and Tobago that would be and could be instrumental for underwater radiated noise research are the University of Trinidad and Tobago; the University of the West Indies; the Institute of Marine Affairs; and the Environmental Research Institute Charlottesville. Other institutions that may offer support are the Trinidad and Tobago Coast Guard (TTCG); the Department of Marine Resources and Environment, within the Tobago House of Assembly; and the Maritime Services Division, under the Ministry of Works and Transport.

Table 10: Summary of institutions, frameworks and initiatives addressing URN in each LPC

LPC	INSTITUTIONS, FRAMEWORKS AND INITIATIVES ADDRESSING URN
Argentina	PNA Cethus Foundation INIDEP CENPAT CESIMAR CADIC-CONICET
Chile	Operating Committee for the Control of Underwater noise CONA – National Oceanographic Plan SEIA Framework The Blue Boat Initiative IDEAL Centre COPAS Coastal CEAZA – Center for Advanced Studies in Arid Zones Acustica Marina
Costa Rica	CIMAR-UCR IMARES-UCR UNA ANC ONDAS initiative
India	UDA Framework NIOT IQOE OSICON
South Africa	Green Ports initiative MRCC
Trinidad and Tobago	National Maritime Policy and Strategy (2022) – to be approved Underwater Radiated Noise Baseline of the Buccoo Reef MPA

4.5 DIFFERENT APPROACHES ADDRESSING THE REVISED URN GUIDELINES

Some LPCs have taken supportive steps to develop through national institutes and stakeholders, efficient designs for the construction of quiet ships, as well as the implementation of maintenance approaches for URN reduction. A brief description of actions taken by the LPCs is presented below. A summary per LPC is shown in Table 11.

Designers & Stakeholders

In Argentina, the INIDEP designed a new silent vessel measuring 8.5 meters wide and with a capacity for 18 people. The new modifications include a new structure and motorization with completely diesel-electric propulsion. The new ship has a hull with a straight bow, a bulb on the bottom of the stern, a specially designed 5-blade propeller. Furthermore, mechanisms were invested in to reduce the URN from the machinery, reduce bubbles, and reduce cavitation and vibration.

Shipbuilders

In India, Garden Reach Shipbuilders and Engineers plans to build the first battery-powered tugboat as part of its plans to become a hub for green shipbuilding by 2030. This follows a memorandum of understanding signed with designer SeaTech Solutions International, the American Bureau of Shipping and battery system provider Shift Clean Energy. This collaboration intends to produce an electric-powered tug to SeaTech's E-Volt 50 design to pave the way for low-emissions harbour operations in India.

Other Indian shipbuilders, like Goa-based shipbuilder Chowgule and Company Pvt Ltd, has launched four of twelve advanced electric hybrid propelled ships. The electric hybrid ships are being constructed at Chowgule and the Company's Loutulim shipyard, which is emerging as a centre for innovation and sustainability. The electric hybrid ships boast a sophisticated design that combines traditional propulsion systems with electric power, offering improved fuel efficiency and lower emissions. The move aligns with global efforts to transition towards sustainable practices in shipping, contributing to the reduction of the industry's environmental impact. In addition, this series of ships will be equipped with engines in accordance with IMO Tier III regulations.

South Africa hosts three primary shipbuilding firms, specializing in the construction of small to medium-sized vessels such as port craft, naval patrol ships, tugs, dredgers and other specialized patrol vessels. These shipbuilders primarily serve markets within Sub-Saharan Africa, addressing regional maritime needs with tailored solutions. In addition to new ship construction, a significant portion of their revenue is derived from ship repair and maintenance, a sector in which they excel due to their strategic location along major shipping routes. While South African shipbuilders do not directly compete with large-scale shipbuilding firms for the production of large cargo vessels, they possess the technical expertise and capacity to undertake such projects. This highlights their ability to adapt to more complex shipbuilding demands when necessary. Their expertise in building robust and versatile vessels for specialized operations positions them as key players in the African maritime industry, contributing to both the economic and strategic capabilities of the region.

For the past few decades, Costa Rica and Trinidad and Tobago have been focused on the construction of small ships (30 feet or less) primarily for fishing purposes. Ship repair yards have been established in the Chaguaramas Peninsula and Port of Spain areas to service small ships and provide lifting, storage

and maintenance services. Trinidad and Tobago has also been providing dry docking services for large vessels on the Chaguaramas Peninsula for the past few decades through a floating dock facility at Caribbean Dockyard. However, the floating dock facility experienced difficulties a few years ago and is no longer operational. The Government of Trinidad and Tobago is currently conducting an environmental feasibility study to establish a large dry dock and ship repair yard in southern Trinidad (La Brea).

Ship operators

In Chile, the ship operator Saam Towage stands out for its most recent agreement to add the first electric tugboat in Latin America and to its Chilean fleet in 2025. The electric tug was designed by Vancouver-based naval architect firm Robert Allan Ltd and is powered by Corvus Energy Orca lithium-ion battery banks. The electric tugboat will help to reduce URN from shipping coming from machinery. These ships are certified with a UWN class notation which certifies that a vessel meets certain standard requirements for underwater radiated noise reduction. Electric tugs allow significant UWN reductions for transit operations. Certification tests are performed in calm and deep waters. Execution is done with certified hydrophones and equipment.

Maritime authorities

In its role as national maritime authority, PNA has established a synergic working group with the Faculty of Engineering (University of Buenos Aires), the National Technological University (UTN), the University Institute of Maritime Security (IUSM) and hydroacoustic cabinets of the intervening team to address URN reduction approaches. In India, the Directorate General of Shipping (DGS) has issued standard operating procedures (SOPs) for the implementation of shore power supply at Indian ports. Meanwhile, all Indian ports have committed to supplying shore power to ships wherever possible, reducing the need for ships to run their engines while docked.

Classification societies

With regard to classification societies, Costa Rica refers to Executive Decree No. 18275-MOPT[633] as the basis for the regulation of inspections by classification societies of ships recognized by the General Directorate of Maritime Transport. The Indian Register of Shipping (IRS) is India's national classification society and is a member of the International Association of Classification Societies (IACS). IRS actively participates in various activities of IACS and IMO related to URN. South Africa has received support from international classification societies. Bureau Veritas Marine & Offshore has recently confirmed joining the South African URN task force.

Design and technical noise reduction approaches

Argentina has started to address the operational optimization of existing hulls and propellers, the efficient design of new ships, and the prediction of the hydrodynamic behaviour of ships and marine installations. The latter has been the result of coordination and collaboration between government, shipbuilders, and research institutes.

633 Executive Decree No. 18275-MOPT, last accessed 27 November 2024.

The Indian Register of Shipping, Mumbai, is working with Indian shipyards on silencing ultra-low noise naval corvettes for the Indian Navy. Some of these niche technologies can be adopted or adapted to commercial shipping. The country plans to bring these experts on a common platform to find the right solutions most suited for the region. As far as passenger ships are concerned, several organisations such as the DGS – the authority for the implementation of shipping policy; the Shipping Corporation of India – the operator; and Cochin Shipyard – the builder; all under the Ministry of Shipping, have been involved from conceptual design to delivery of quieter technologies. As an example, four passenger vessels with diesel electric propulsion for Andaman & Nicobar Administration were built. These vessels included noise reduction features as per IMO *2014 URN Guidelines.* Many URN reduction features were understood to add improvement to crew and passenger comfort, and the vessels are expected to showcase the benefits to the owners, operators and users so that the technology is more widely appreciated and adopted.

Maintenance and operational approaches

With regard to maintenance approaches, South Africa has created awareness through SAMSA to increase awareness on the need to reduce underwater radiated noise from shipping (e.g. activities associated with underwater hull cleaning). The studies on underwater radiated noise are also supporting a better understanding of the subject and an examination of how the mitigation and prevention of this pollution can be conceptualized. The South African Hull Cleaning Committee has been established to monitor underwater hull cleaning activities. Argentina has also begun to regulate hull cleaning activities to mitigate URN through a series of recommendations on propeller polishing and dimensional control to maintain original measurements and raising awareness through training workshops and seminars on the GloNoise project for shipowners, maritime agencies, shipbuilders and stakeholders.

In terms of operational approaches (see also section 4.3.4 Routeing Measures), India has launched programmes like "Just in time Arrivals" at some major ports, including Mumbai and Cochin, reducing ship idling times and thus lowering noise generation.

Evaluation and monitoring

Argentina has research institutions that have the technological capacity to carry out assessments and monitoring of URN from shipping. In particular, the Hydrodynamic Testing Centre at the National Technological University (CEHID) and the Naval and Oceanic Hydrodynamics Laboratory (LabHiNO) which experiments with physical and numerical models, a cavitation tunnel recovery and sea trials. Chilean ship operator, Saam Towage, started a noise measurement project which includes an UWN Class Notation certifying that a ship meets certain URN reduction standards. It conducts its assessments with certified hydrophones and equipment in calm and deep waters.

"ALL INDIAN PORTS HAVE COMMITTED TO SUPPLYING SHORE POWER TO SHIPS WHEREVER POSSIBLE, REDUCING THE NEED FOR SHIPS TO RUN THEIR ENGINES WHILE DOCKED"

Table 11: Stakeholders in LPC capable of supporting URN reduction approaches

LPC	SHIP-OWNERS	DESIGNERS	SHIP-BUILDERS	SHIP OPERA-TORS	MARITIME AUTHOR-ITIES	CLASS-IFICATION SOCIETIES
Argentina	X	X	X	X	X	
Chile	X			X	X	
Costa Rica	X			X	X	X (international)
India	X		X	X	X	X (national)
South Africa	X	X	X	X	X	X (international)
Trinidad and Tobago	X			X	X	

4.6 MAJOR GAPS AND CHALLENGES IN IMPLEMENTING THE REVISED URN GUIDELINES

Each LPC has a different level of readiness to implement the *Revised URN Guidelines,* so not all gaps and other challenges are equally applicable. The most significant gaps and challenges that each LPC needs to address in order to implement the *Revised URN Guidelines* are presented in the following subsections.

4.6.1 National Gaps

Gaps in relation to management approaches associated with mitigation of URN from shipping relate to the following relevant areas: obligations under global instruments; knowledge and raising awareness; capacity-building, technology innovation and training; cooperation coordination and data sharing; URN management planning; URN reduction approaches; protected and sensitive areas; financial resources; and regulatory framework.

Obligations under global and regional instruments

All LPCs agree that it is necessary to first enact national laws and regulations to implement the international agreements to which their countries are a Party. All LPCs are already parties to UNCLOS, and global legal instruments related to the marine environment, such as the CBD and CMS. In addition, most LPCs are also parties to IMO instruments related to shipping, such as SOLAS and MARPOL (except Costa Rica).

Knowledge and awareness-raising

Over the past decade, Argentina, Chile and India have been engaged in knowledge sharing on URN. They have all participated in various workshops and periodic meetings related to URN, not only to promote knowledge but also to raise awareness. Regional alliances and research and development projects related to URN have emerged from their participation. However, there are still many in the shipping industry who are unaware of the ecological impacts of URN as is the case in Trinidad and Tobago and other small island developing states of the Caribbean Region.

Capacity-building, technology innovation and training

Capacity-building, technology innovation and training are mostly needed to effectively mitigate URN. Costa Rica, South Africa and Trinidad and Tobago require assistance in building expertise in monitoring techniques and noise reduction technologies. In order to adapt to these new technologies, all LPCs need to strengthen their capabilities, which includes training to develop skills, abilities, processes and resources. International partnerships play an important role in enhancing local knowledge and skills to manage and support LPCs' efforts to mitigate URN from shipping effectively.

Cooperation, coordination and data sharing

A major gap common to most LPCs is the lack of national coordination between maritime authorities, ship operators, shipowners and classification societies to bring together the necessary elements to adopt supporting measures that allow them to move forward in mitigating URN from shipping. In countries where quiet ships are already being built, such as Argentina, coordination between designers, shipbuilders, suppliers and manufacturers, based on the *Revised URN Guidelines,* is key.

Costa Rica, South Africa and Trinidad and Tobago have recognized the importance of addressing this gap through data sharing mechanisms. However, only Argentina and Chile have benefited from the use of

data sharing platforms. Examples of these tools may include user-friendly platforms for ship operators to report and share noise-related data with maritime authorities. Another type of data sharing may include the exchange of experiences between LPCs in implementing quieter ship designs and operational practices to minimize noise emissions in similar regions.

URN management planning

A common deficiency in all LPCs is the lack of knowledge and therefore of planning in the *Revised URN Guidelines* by many stakeholders. In order to support effective management planning, awareness among shipowners, designers, builders and operators of vessels is needed, followed by the establishment of specific URN objectives in the short and long term based on national needs and resources.

While most maritime authorities and port captaincies (in the case of Costa Rica) in each LPC have the capacity to collect navigation data through the AIS, a major gap with maritime authorities lies in taking support actions that enable and promote URN management planning, for example by supporting the implementation of tools to measure ship noise levels, supporting innovation and adopting noise reduction technologies.

URN reduction approaches

When it comes to implementing and enforcing URN mitigation measures, such as new hull and propeller designs or replacing old machinery and propellers, there are major deficiencies in most LPCs. In terms of shipbuilding, only Argentina, India and South Africa have shipbuilding facilities. Currently, Costa Rica and Trinidad and Tobago do not have any major shipbuilding facilities for large ships. Over the past decades, Costa Rica and Trinidad and Tobago have focused on building small ships used primarily for fishing. Furthermore, shipbuilding is currently not required to follow any of the measures in the *Revised URN Guidelines* for URN mitigation.

Regarding operational approachhes, India has minimized this gap by developing its own "Just in time Arrivals" programme in some major ports, reducing ship downtime and thus mitigating URN from shipping. However, a significant gap remains the absence of other incentives in place to support compliance with the *Revised URN Guidelines.* Most LPCs maintain that incentivisation would be the least feasible measure applicable to their legislation.

Protected and sensitive sea areas

At the national level, all LPCs have so far designated MPAs/PSSAs in areas within national jurisdiction. Some LPCs have not yet recognized URN as a threat to MPAs/PSSAs and therefore do not include measures to address URN from shipping, making these sensitive areas and the marine life within them vulnerable to potential impacts caused by international shipping activities.

Baselines, monitoring and evaluation

Underwater noise baselines in less developed countries also include improving data collection and monitoring studies. Acoustic monitoring systems are mostly needed to effectively monitor URN, collect data and generate a baseline.

Financial resources

Regarding financial resources, India, Costa Rica and Trinidad and Tobago have jointly referred to the need for increased funding to support monitoring studies assessing the impact of URN on marine biodiversity.

Regulatory Framework

A major gap in all LPCs is that most of them have not yet defined "underwater radiated noise" as a type of marine pollution in their legislation. Regarding shipping activities, the term "URN from shipping" is not yet explicitly used. Strong marine governance in establishing an effective URN mitigation strategy is crucial for LPCs.

4.6.2 National Challenges

A summary of the main challenges faced by each LPC in implementing the *Revised URN Guidelines* is presented below.

Argentina

Argentina summarised its main challenges as: raising awareness and operational capacity; defining baselines; adhering to and promoting international policies; strengthening research and production; promoting an analysis agenda on the subject; encouraging the training of the actors involved; and ensuring the knowledge transfer.

Chile

Although the initial challenges were the acquisition of specific knowledge in the assessment of the impact of noise on marine fauna and the professional relationship with institutions that carry out various lines of work in this field, Chile will continue actively participating in the process, adopting any IMO guidelines defined in its national regulations after the corresponding process, in accordance with its national reality and maritime interests.

Costa Rica

Costa Rica acknowledges that there are several major challenges in the assessment of URN and implementing mitigation measures to reduce URN from shipping. One being the limited monitoring infrastructure, there is a lack of adequate monitoring systems to assess noise levels effectively. The other challenge is the regulatory framework, current regulations may not be robust enough to address the specific sources and impacts of underwater radiated noise pollution. Finally, there is also a shortage of seafarers trained to meet the mitigation of URN associated with shipping activities.

India

Main challenges in India are data limitations, costs and lack of awareness. There is limited real-time data on URN impacts, most research is in the early stages, and implementing noise-reduction technologies in older ships is expensive. In India, many ship operators and shipowners are still unaware of the ecological impacts of URN.

India is planning to initiate more comprehensive research studies on URN impacts, especially around MPAs to fine-tune mitigation strategies. Collaboration with international entities like IMO and the World Maritime University can also support India's technologies on mitigation of URN from shipping. The government is also in talks with the IMO's GreenVoyage2050 project to explore more fuel-efficient and noise-reducing technologies for India's expanding fleet.

India also recognises that a major challenge in meeting the URN approaches from the *Revised URN Guidelines* is the lack of legislation regarding URN. However, this is being evaluated.

South Africa

Key challenges for South Africa include limited technical infrastructure, limited funding, shortage of technical skills, and the impact of climate change. While hydrophones have been installed in certain areas, South Africa lacks comprehensive coverage for URN monitoring. A major barrier to expanding monitoring programmes is the lack of dedicated financial resources. Also, currently there is limited availability of trained personnel in the field of URN assessment and mitigation technology of URN from shipping. Changing sea conditions, driven by climate change, further complicate efforts to measure URN impacts on marine ecosystems.

Trinidad and Tobago

Trinidad and Tobago summarized the main challenges in five areas: baseline data; technical training; capacity-building; financing; and legislative process. Education and awareness workshops have been initiated, along with initial training on data collection. Trinidad and Tobago has identified areas of interest for hydrophone and Hydromoth deployment.

4.7 RECOMMENDATIONS TO ADDRESS GAPS AT THE NATIONAL LEVEL

Sections 0 and 4.6.2 identified possible gaps and other challenges in implementing the *Revised URN Guidelines* in relation to ship-based reduction measures. This section provides general and specific recommendations as to how to address such gaps and challenges at the national level, especially within the framework of IMO. These recommendations can serve as guidance to each LPC in formulating short- and long-term national policy options. A summary of the identified gaps, challenges and recommendations for each LPC's consideration in relation to the *Revised URN Guidelines* is presented in Table 1.

4.7.1 General recommendations

General recommendations may include obligations under global instruments; knowledge and raising awareness; capacity-building, technology innovation, and training; cooperation, coordination and data sharing; URN management planning; URN reduction approaches; protected and sensitive areas; baselines, monitoring and evaluation; financial resources; and regulatory framework as presented below.

Obligations under global and regional instruments

In general, it is important for States to become parties to relevant global and regional treaties and to effectively and fully implement, comply with and enforce those treaties.

For example, since Argentina, Costa Rica and India have already signed the BBNJ Agreement, they could consider proceeding to ratify it as Chile did. South Africa and Trinidad and Tobago could also consider signature and ratification of or accession to the Agreement. Costa Rica could begin to close gaps in terms of marine pollution (operational or accidental) generated by shipping, by ratifying maritime conventions such as MARPOL and COLREG.

All LPCs may consider the provisions of relevant treaties and the measures that have been recommended by other intergovernmental bodies to mitigate URN from shipping and identify areas for enhanced cooperation and coordination.

Knowledge and raising awareness

Raising public awareness about URN pollution can encourage governments and industries to follow the *Revised URN Guidelines.* The message can be spread through national campaigns and the involvement of NGOs. Other ways may include organizing seminars, workshops and periodic meetings that promote URN topics and raise awareness on the problem of anthropogenic URN and its effects on marine fauna.

Capacity-building, technology innovation, and training

Research institutes can serve as capacity-building centres by research, innovation, and data collection and analysis. Offering technical training programmes through workshops can improve understanding and implementation of the guidelines by national authorities and local stakeholders.

Government, stakeholders, research institutes and NGOs could facilitate these training initiatives involving specialized professionals with previous experience in developing and implementing URN management planning and URN reduction approaches.

Cooperation, coordination and data sharing

Collaborative work, coordination, and data sharing are the pathways forward. The primary focus may be on the creation of national coordination working groups, chaired by the government representatives from relevant Secretariats/agencies and with the participation from the public and private sectors.

LPCs may consider regional alliances, research and project development through periodic meetings related to URN among developing countries. These meetings may include the sharing of scientific information and data as well as the participation of members of the government (maritime authorities, ministry of environment, ministry of transportation, national defence), the shipping sector (shipowners, ship operators, shipbuilders including suppliers and manufacturers, engineering consulting firms and ship classification societies), analysts (research institutes, academics and environmental consulting firms) and the biodiversity conservation community (institutions specializing in marine mammals and NGOs).

URN management planning

URN management planning should be considered as a flexible tool that allows for a tailored approach and may include establishing a baseline of a ship's URN, setting clear and specific targets. To do so, it is advisable to have the support of several parties, such as shipowners, designers, shipbuilders, ship operators, maritime authorities, classification societies, suppliers and manufacturers.

URN reduction approaches

Not all LPCs are equally prepared to begin implementing the approaches to reducing URN outlined in the *Revised URN Guidelines.* However, a good start may be to consider removing old machinery and replacing it with new engines and propellers, especially on older ships.

Port actions could support a reduction in URN from shipping through operational measures associated with reduced speed, change of route or simply by the implementation of shore power supply at ports. Ports could also propose other actions such as discounted port fees and reduced ship waiting times at ports, both based on underwater radiated noise performance. Cooperation and integration actions between ports could help scale their measurements through environmental indices and classification society annotations.

Ship Speed Reduction

Limiting ship speed, either by setting a maximum speed allowed for all ships or by setting percentage limits on speeds for individual ships, is not only an operational tool to be implemented, but is also a potential management tool and its effectiveness should be assessed. The most feasible approach would be to set general speed limits for all ships for the following reasons:

- it has been successfully tested through modelling (JOMOPANS-ECHO MODEL[634]) and in monitoring programmes (ECHO Program[635] – Port of Vancouver, Canada).
- reduced speeds lead to reduced power consumption, which in turn makes noise reduction reasonable and expected, except for ships that are equipped with a controllable pitch propeller, and
- UNCLOS can support the imposition of speed limits by a coastal State on ships navigating its territorial sea, provided that the measures are in conformity with the Convention (e.g. are non-discriminatory and do not impede innocent passage).

Ships' routeing

While changing shipping routes to protect certain areas can be a slow and cumbersome process, new shipping routes using natural environmental features such as trenches or islands can dilute traffic and therefore it may mitigate the impacts of URN by changing or blocking the propagation of the sound waves. These may include precautionary areas and/or areas to avoided due to especially sensitive ecological and environmental factors such as URN.

Shore power supply

Shore power not only reduces ship emissions and noise in berthing but also has shown practical implications for maritime competitiveness. However, the existing literature and industry reports reveal that a limited number of ships have access to shore power at ports.

Protected and sensitive areas

Since it is necessary to have a management plan in place when establishing an MPA, it may be convenient to include URN as part of the conservation targets. Consideration of the application of "underwater radiated noise" as a criterion for the demarcation and designation of MPAs and PSSAs is of great importance. Other considerations include the allocation of a wide buffer zone within the boundaries of the MPA and PSSA, as well as the provision of ship routeing, ship reporting measures and speed reductions on a seasonal basis on potential demarcation of protected areas without first requiring prior designation of that area as an MPA and PSSA.

Baselines, monitoring and evaluation

It is also imperative to make consistent and transparent efforts to reduce URN from shipping by acquiring specialized equipment for standardized short and long-term URN monitoring programmes at strategic

634 Management Measures to Reduce Continuous Underwater radiated noise from Shipping (2023), last accessed 27 November 2024.
635 2023 Annual report Enhancing Cetacean Habitat and Observation (ECHO) Program, last accessed 27 November 2024.

locations along shipping traffic routes and MPAs. The latter will help establish baseline data and generate a greater number of comprehensive URN research studies, all within the framework of an integrative management strategy. Each URN monitoring programme should follow the same international best practices (e.g. noise measurement,[636] baseline of ambient noise[637] sound analysis and reporting[638]); as well as existing international standards for underwater acoustics terminology;[639] quantities and procedures for URN measurement form ships.[640] Some technologies can be adapted to local conditions such as, for example sharing noise levels of stationary monitoring stations deployed at different locations in MPAs and along important shipping traffic routes, to be assessed.

Financial resources

Financial assistance for developing countries can help build the infrastructure and technical knowledge needed to implement monitoring programmes and URN reduction approaches effectively.

Regulatory framework

The first step in each LPC's legislation is regulate URN as a pollutant of the marine environment. LPCs can then proceed to oversee the implementation of the *Revised URN Guidelines,* which in turn can help ensure compliance and facilitate the adoption of corrective measures.

4.7.2 Specific recommendations

Each LPC is invited to consider the relevant and specific recommendations presented in this section. They do not intend to be exhaustive or anticipate any other additional recommendations in this regard.

Argentina

Argentina with the support of PNA has been able to set up the bases to address the issue of URN through the development of a new chapter of REGINAVE. Argentina is invited to consider the following recommendations. Starting with the continuation of knowledge and awareness raising, consider providing new knowledge to government entities, the shipping industry, analysts and the conservation community to encourage and facilitate the implementation of the *Revised URN Guidelines.*

Regarding the implementation, and compliance of URN reduction approaches, consider promoting the installation of new engines and propellers on older ships; as well as to consider establishing periodic and mandatory hull cleaning activities for ships to support the reduction approaches set out in the *Revised URN Guidelines.*

About the demarcation of protected and sensitive areas for marine fauna, consider having a large buffer zone within the MPA/PSSA boundaries, as the URN is not localized and may have a broad transboundary impact. As per baselines, monitoring and evaluation, consider the adoption of existing international standards of acoustic terminology and best practices for measurement procedures to assess the exposure of marine life to underwater radiated noise.

636 Robinson et al. (n 329).
637 Eickmeier, J., Tollit, D., Trounce, K., Warner, G., Wood, J., MacGillivray, A. and Li, Z., 2021. Salish Sea Ambient Noise Study: Best Practices, last accessed 27 November 2024.
638 Van Geel et al. (n 331).
639 ISO 18405:2017, last accessed 27 November 2024.
640 ISO 17208-1:2016 (n 330).

Chile

Chile has given the initial steps by creating technical committees for the management of underwater noise and raising awareness of the effects and impacts of underwater noise on marine fauna. Chile is invited to consider the following recommendations.

About cooperation, coordination and data sharing, consider collaborating with the Secretariats of other LPCs in exchanging ideas to overcome the challenges posed by the implementation of the *Revised URN Guidelines;* as well as to consider regional alliances, research and project development through periodic meetings related to URN among developing countries including LPCs members.

With regard to URN management planning, consider including the support of shipbuilders to meet URN specifications; as well as the help of classification societies to support effective management planning.

Costa Rica

In Costa Rica, the ONDAS initiative together with other local scientific entities has been able to install acoustic recorders along the coast of Costa Rica to understand and evaluate the soundscape in the study areas. Costa Rica is invited to consider the following recommendations.

Starting with knowledge and awareness-raising, consider adding your participation in future URN workshops at IMO to raise awareness the reduction of URN from shipping through the *Revised URN Guidelines.* As per capacity-building, technical innovation, and training, consider developing training provisions relating to URN reduction in the marine environment awareness training of seafarers and of fishing vessel personnel.

With regard to baselines, monitoring and evaluation, consider developing best practices for the reduction of URN from shipping and other guidance materials within the framework of the IMO GloNoise project. Regarding regulatory framework, consider developing mandatory "national rules and standards" to prevent, reduce and control URN pollution of the marine environment from ships.

India

India has been very active in recent years in sharing knowledge through the organization of national conferences, symposiums and workshops as well as in ambient noise measurement in deep and coastal waters. India is invited to consider the following recommendations.
Regarding cooperation, coordination and data sharing, consider co-organizing conferences, workshops and other events with other LPC members to foster data sharing and cooperation. As per URN management planning, consider including the assistance of ship designers to meet URN requirements.

In terms of implementation, and compliance of URN reduction approaches, consider the establishment of mandatory thresholds for ships that do not meet the design and technical reduction approaches set out in the *Revised URN Guidelines.*

With regard to financial resources, consider engaging the private sector, international financial institutions and NGOs for bankable underwater radiated noise reduction projects. About the regulatory framework, consider including the term "underwater radiated noise" in your environmental legislation.

South Africa

South Arica have been monitoring noise levels in the vicinity of bunkering and transiting ships since 2023 to assess the noise levels associated with bunkering activities. South Africa is invited to consider the following recommendations.

As per capacity-building, technical innovation, and training, consider development of capacity-building projects addressing the already identified national needs and challenges. Regarding the implementation, and compliance of URN reduction approaches, consider implementing the use of onshore power supply in port and application of the *Interim guidelines on safe operation of onshore power supply (OPS) service in port for ships engaged on international voyages.*

In terms of demarcation of protected areas for marine fauna, consider providing the possibility to adopt ship routeing and ship reporting measures, as well as speed reductions for application in an area on a seasonal basis on potential demarcation of protected areas without first requiring the prior designation of that area as an MPA/PSSA. Regarding to financial resources, consider conducting a local needs assessment and/or regulatory impact assessments to draw attention to the financial aspects of URN reduction.

Trinidad and Tobago

Trinidad and Tobago has already started to implement a programme to record the soundscape of marine sensitive areas, such as the Buccoo Reef. Trinidad and Tobago is invited to consider the following recommendations. As per, capacity-building, technical innovation, and training, consider continuation and expanding the scope of capacity-building projects for the uptake of the IMO *Revised Guidelines.*

With regard to the implementation, and compliance of URN reduction approaches, consider the establishment of ships' routeing systems or TSS which move maritime traffic away from key feeding, breeding and nursery habitats or areas of high density of marine species or migratory pathways. In terms of baselines, monitoring and evaluation, consider the acquisition of underwater acoustic monitoring equipment to assess underwater noise levels effectively.

About financial resources, consider apply for increased funding to support monitoring studies assessing the impact of URN on marine biodiversity. Regarding the demarcation of protected and sensitive areas (MPA/PSSA), Consider applying "underwater radiated noise" as a criterion in the demarcation and designation of MPAs/PSSAs. The latter could lead the state to initiate the regulation of the framework.

Table 12: Recommendations to be implemented by each LPC to address gaps/challenges in relation to the revised URN Guidelines

GAP / CHALLENGE	RECOMMENDATION	TO BE IMPLEMENTED BY
1. Obligations under global instruments	Consider the provisions of relevant treaties and the measures that have been recommended by other intergovernmental bodies to mitigate URN from shipping and identify areas for enhanced cooperation and coordination	Argentina Chile Costa Rica India South Africa Trinidad and Tobago
	Consider beginning closing gaps in terms of marine pollution (operational or accidental) generated by shipping, by ratifying maritime conventions such as MARPOL and COLREG	Costa Rica
	Consider proceeding to sign and subsequently ratify the BBN Agreement or to accede to it	Argentina Costa Rica India South Africa Trinidad and Tobago
2. Knowledge and raising awareness	Consider adding your participation in future URN workshops at IMO to raise awareness the reduction of URN from shipping through the *Revised URN Guidelines*	Costa Rica India Trinidad and Tobago
	Consider providing new knowledge to government entities, the shipping industry, analysts and the conservation community to encourage and facilitate the implementation of the *Revised URN Guidelines*	Argentina Costa Rica Trinidad and Tobago
3. Capacity-building, technical innovation, and training	Consider continuation and expanding the scope of capacity-building projects for the uptake of the IMO *Revised Guidelines*	Argentina Costa Rica South Africa Trinidad and Tobago
	Consider development of capacity-building projects addressing the identified national needs and challenges	Argentina Costa Rica South Africa Trinidad and Tobago
	Consider developing training provisions relating to URN reduction in the marine environment awareness training of seafarers and of fishing vessel personnel	Argentina Costa Rica South Africa Trinidad and Tobago
4. Cooperation, coordination and data sharing	Consider collaborating with the Secretariats of other LPCs to share their experiences in implementing the *Revised URN Guidelines* to IMO through submissions to MEPC and SDC, as appropriate	Argentina Chile Costa Rica India South Africa Trinidad and Tobago

GAP / CHALLENGE	RECOMMENDATION	TO BE IMPLEMENTED BY
4. Cooperation, coordination and data sharing (continued)	Consider regional alliances, research and project development through periodic meetings related to URN among developing countries including LPCs members	Chile Costa Rica India
	Consider co-organizing conferences, workshops and other events with other LPC members to foster data sharing and cooperation	Chile Costa Rica India
5. URN management planning	Consider including the assistance of ship designers to meet URN requirements	Chile Costa Rica India Trinidad and Tobago
	Consider including the support of shipbuilders to meet URN specifications	Chile Costa Rica Trinidad and Tobago
	Consider including the help of classification societies to support effective management planning	Argentina Chile Trinidad and Tobago
6. URN reduction approaches	Consider promoting the installation of new engines and propellers on older vessels	Argentina Chile India South Africa
	Consider establishing periodic and mandatory hull cleaning activities for ships to support the reduction approaches set out in the *Revised URN Guidelines*	Argentina Chile India South Africa
	Consider the establishment of mandatory thresholds for ships that do not meet the design and technical reduction approaches set out in the *Revised URN Guidelines*	Argentina Chile India South Africa
	Consider the establishment of ships' routeing systems or TSS which move maritime traffic away from key feeding, breeding and nursery habitats or areas of high density of marine species or migratory pathways	Trinidad and Tobago
	Consider implementing the use of onshore power supply in port and application of the *Interim guidelines on safe operation of onshore power supply (OPS) service in port for ships engaged on international voyages*	Argentina Chile India South Africa
7. Protected and sensitive areas	Consider applying "underwater radiated noise" as a criterion in the demarcation and designation of MPAs/ PSSAs	Argentina Costa Rica South Africa Trinidad and Tobago

GAP / CHALLENGE	RECOMMENDATION	TO BE IMPLEMENTED BY
7. Protected and sensitive areas (continued)	Consider providing for the possibility of having a large buffer zone within the boundaries of the MPA/PSSA since URN is not localized and can have a wide transboundary impact	Argentina South Africa Trinidad and Tobago
	Consider providing the possibility to adopt ship routeing and ship reporting measures, as well as speed reductions for application in an area on a seasonal basis on potential demarcation of protected areas without first requiring the prior designation of that area as an MPA/PSSA	Argentina South Africa Trinidad and Tobago
8.Baselines, monitoring and evaluation	Consider the acquisition of underwater acoustic monitoring equipment to assess underwater noise levels effectively	Trinidad and Tobago
	Consider the adoption of existing international standards of acoustic terminology and best practices for measurement procedures to assess the exposure of marine life to underwater radiated noise	Argentina Chile Costa Rica India South Africa Trinidad and Tobago
	Consider developing best practices for the reduction of URN from shipping and other guidance materials within the framework of the IMO GloNoise project	Argentina Costa Rica South Africa Trinidad and Tobago
9 .Financial resources	Consider conducting a local needs assessment and/or regulatory impact assessments to draw attention to the financial aspects of URN reduction	Costa Rica India South Africa Trinidad and Tobago
	Consider applying for increased funding to support monitoring studies assessing the impact of URN on marine biodiversity	Costa Rica Trinidad and Tobago
	Consider the involvement of the private sector, international financial institutions, NGOs for bankable projects on reduction of URN	Costa Rica South Africa India Trinidad and Tobago
10. Regulatory framework	Consider including the term "Underwater radiated noise" in your ambient legislation	Argentina Chile Costa Rica India South Africa Trinidad and Tobago
	Consider developing mandatory "national rules and standards" to prevent, reduce and control URN pollution of the marine environment from ships	Argentina Chile Costa Rica India Trinidad and Tobago

SECTION

POLICY OPTIONS FOR THE IMO REGULATORY FRAMEWORK

Section 2.3.2, and sections 3 and 4, identify possible gaps and other challenges in the *Revised URN Guidelines* and in other relevant IMO instruments in relation to ship-based reduction measures, and also provides potential recommendations as to how to address such gaps and challenges within the framework of IMO. A summary of these gaps, challenges and recommendations is presented in a table format in section 5.1 below. In view of the recommendation to consider the development of mandatory "international rules and standards" to prevent, reduce and control URN pollution of the marine environment from vessels, potential policy options that could be considered for the development of legally binding international rules and standards are presented in section 5.2.

Member States and international organizations of IMO are invited to consider the possible gaps, challenges, potential recommendations and policy options presented in this section. They are not intended to be exhaustive and to pre-empt any other additional gaps, challenges and recommendations thereon.

5.1 SUMMARY OF IDENTIFIED GAPS AND OTHER CHALLENGES AND RECOMMENDATIONS IN RELATION TO SHIP-BASED REDUCTION MEASURES FOR CONSIDERATION WITHIN IMO

A summary of possible gaps and other challenges in the *Revised URN Guidelines* and in other relevant IMO instruments and of potential recommendations is presented below.

> "MEMBER STATES AND INTERNATIONAL ORGANIZATIONS OF IMO ARE INVITED TO CONSIDER THE POSSIBLE GAPS, CHALLENGES, POTENTIAL RECOMMENDATIONS AND POLICY OPTIONS PRESENTED IN THIS SECTION"

Table 13: Summary of possible gaps and other challenges and recommendations in relation to ship-based reduction measures for consideration within IMO

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
1	Legal status (Section 2.3.2.1 (a))	URN has not been formally recognized as a form of pollution in IMO mandatory instruments. No regulation currently exists among IMO instruments that would require Member States to implement, comply with, and enforce obligations relating to the prevention, reduction and control of underwater noise pollution from ships, as required by UNCLOS	Consider developing mandatory "international rules and standards" to prevent, reduce and control URN pollution of the marine environment from vessels.	Member States and international organizations
2	Limited guidance on the relevance of other instruments (Section 2.3.2.1 (b))	Insufficient and incomplete guidance as to the relevance of other instruments for the application of the *Revised URN Guidelines*	Consider the introduction in the *Revised URN Guidelines* of references to other IMO instruments and international instruments potentially contributing to URN reduction from shipping, together with guidance on the relevance and applicability of those instruments	Member States and international organizations
3	Limited awareness of the *Revised URN Guidelines* (Section 2.3.2.1 (c)	Information which can assist in the application of the *Revised URN Guidelines* is required. For example, shipowners, ship builders and designers, and other stakeholders regularly ask where to find available resources and information to assist the industry in the application of the *Revised URN Guidelines*	· Consider providing additional information to encourage and facilitate the application of the *Revised URN Guidelines* · Consider sharing information through the Noise Assessment Toolkit · Consider developing best practices for the reduction of URN from shipping and other guidance materials	Member States and international organizations IMO Secretariat IMO Secretariat

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
4	Limited awareness of the *Revised URN Guidelines* (Section 2.3.2.1 (c)	Limited specific references to other relevant IMO instruments in the *Revised URN Guidelines* may result in insufficient awareness of the Guidelines in the work of other IMO bodies	Consider drawing the attention of other IMO bodies to the relevance of the *Revised URN Guidelines* for their work, e.g. the Sub-Committee on Human Element, Training and Watchkeeping (HTW)	Member States and international organizations
5	Limited awareness of the *Revised URN Guidelines* (Section 2.3.2.1 (c)	There is a need to increase awareness of the *Revised URN Guidelines* among seafarers and fishing vessel personnel There is a need to increase awareness of the *Revised URN Guidelines* among developing countries	· Depending on the outcomes of the EBP and potential follow-up proposals and/ or documents providing comments by Member States and international organizations, consider the development of training provisions in relation to the reduction of URN in the marine environment awareness training of seafarers and of fishing vessel personnel, as well as potential amendments to the STCW Convention and the STCW-F Convention · Consider continuation and expanding the scope of capacity-building projects for the uptake of the IMO *Revised Guidelines*	Member States and international organizations IMO Secretariat

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
6	Capacity, technological and financial constraints (Section 2.3.2.1 (d))	Institutional, policy and legal arrangements to address URN from shipping are often insufficient in developing countries. There is also a lack of mechanisms for fostering multi-stakeholder partnerships There is insufficient data and knowledge on the impacts of URN from shipping on most marine species in some regions. There are technological needs Funding opportunities are disproportionately available to developed countries	· Consider organizing or co-organizing conferences, workshops and other events to foster information sharing and cooperation · Consider conducting needs assessment in the LPCs and/or regulatory impact assessments to draw attention to specific capacity, technological and financial constraints for the reduction of URN · Consider involvement of private sector, International Financial Institutions for bankable projects on reduction of URN · Consider development of capacity-building projects addressing the identified needs and challenges	Member States and international organizations, and IMO Secretariat IMO Secretariat IMO Secretariat IMO Secretariat

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
7	Insufficient cooperation and coordination (Section 2.3.2.1 (e))	There is a need to strengthen cooperation and coordination with and among intergovernmental bodies that provide measures associated with the reduction of URN from shipping or that have work programmes relating thereto or in relation to other sources of underwater noise	· Consider the provisions of relevant treaties and the measures that have been recommended by other intergovernmental bodies to mitigate URN from shipping and identify areas for enhanced cooperation and coordination	Member States and international organizations IMO Secretariat
			· Consider inviting relevant intergovernmental bodies that are addressing the reduction of URN from shipping to join the GloNoise Partnership	IMO Secretariat
			· Consider collaborating with the Secretariats of relevant intergovernmental bodies in raising awareness of the *Revised URN Guidelines* and relevant IMO instruments, and of the global and regional legal and management approaches which can support the reduction of URN from shipping	IMO Secretariat
			· Consider collaborating with the regional marine pollution emergency response centres and other regional partners to foster cross-sectoral coordination at regional and national levels	IMO Secretariat
8	Baselines and targets (Section 2.3.2.2 (a))	There is a need for a clear target on lowering URN from ships in order to facilitate regulation, as well as the establishment of indicators	Depending on the outcome of the EBP and potential follow-up proposals and/or documents providing comments by Member States and international organizations, consider the establishment of mandatory threshold values for ships that do not meet the design and technical reduction approaches set out in the *Revised URN Guidelines*	Member States and international organizations

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
9	Baselines and targets (Section 2.3.2.2 (a))	There is a need for international standardization of underwater acoustic terminology and common measurement standards. There is also a need for measurement procedures to assess the exposure of marine life to the underwater sound of dredgers in shallow waters	Consider and address these gaps and other challenges, including within the framework of the London Convention and Protocol	Member States and international organizations
10	Limited blending of requirements on GHG reduction and URN (Section 2.3.2.2 (c))	The potential contribution of energy efficiency measures to the reduction of URN has only been mentioned in the *Revised URN Guidelines*.	Consider conducting further studies on how IMO's adopted measures for the reduction of GHG emissions from ships have contributed thus far or will contribute to the reduction of URN	Member States and international organizations
11	Maintenance approaches (Section 2.3.2.2 (d))	The use of ultrasonic AFS, which the *Revised URN Guidelines* have cautioned to avoid where possible in national and international designated protected areas, is not prohibited by the AFS Convention	Consider regulating ultrasonic AFS internationally, ideally within the framework of the AFS Convention	Member States and international organizations
12	Maintenance approaches (Section 2.3.2.2 (d))	The 2023 *Biofouling Guidelines* are not mandatory. It will be important to not repeat the experience with the 2011 *Biofouling Guidelines* which were revised due to their limited uptake and effectiveness	Consider emphasizing the link between the effective application of the 2023 *Biofouling Guidelines* and URN reduction, and also monitor and evaluate the effectiveness of the 2023 *Biofouling Guidelines* in that regard	Member States and international organizations

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
13	Operational approaches (Section 2.3.2.2 (e))	Few countries have availed of the available IMO measures in order to move traffic away from key feeding, breeding and nursery habitats, migratory routes or areas of high density of cetaceans and/ or other marine life	Consider encouraging the establishment of ships' routeing systems which move maritime traffic away from key feeding, breeding and nursery habitats or areas of high density of marine species or migratory pathways	Member States and international organizations
14	Operational approaches (Section 2.3.2.2 (e))	Speed limit restrictions have thus far been adopted in very limited circumstances	· Consider encouraging ship speed reductions in key feeding, breeding and nursery habitats or areas of high density of marine species or migratory pathways · Consider what measures would be appropriate for those ships where speed reduction does not result in a reduction of URN	Member States and international organizations
15	Operational approaches (Section 2.3.2.2 (e))	Ship strikes and URN from shipping are currently considered separately even though many issues are common to both threats	Consider including in the *Revised URN Guidelines* a reference to the Guidance document for minimizing the risk of ship strikes with cetaceans	Member States and international organization

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
16	Operational approaches (Section 2.3.2.2 (e))	The current requirement that proposals for ships' routeing and ship reporting systems for the protection of the marine environment can only be considered for an area which has been identified as a PSSA could slow down the process for the consideration of such proposals. Since climate change is impacting the migration patterns of marine species, a more flexible approach with respect to proposals for ships' routeing, ship reporting systems and also speed reductions might be warranted	Consider providing for the possibility to adopt ship routeing and ship reporting measures, as well as speed reductions for application in an area on a seasonal basis without first requiring the prior designation of that area as a PSSA	Member States and international organizations

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
17	Operational approaches (Section 2.3.2.2 (e))	Many of the ship routeing measures and in particular the ship speed reduction measures that have been adopted by IMO are voluntary.	· Consider inviting States to provide information on whether ship routeing and/or ship speed reduction measures adopted thus far, in particular voluntary measures, have been effective in moving traffic away from key feeding, breeding and nursery habitats, migratory routes or areas of high density of cetaceans and/or other marine life · If the responses received indicate that voluntary measures have generally not been effective, consider the adoption of mandatory routeing systems and/or speed reductions provided that such mandatory measures and actions taken to enforce compliance with such measures are not inconsistent with international law, including the relevant provisions of UNCLOS	Member States and international organizations
18	Operational approaches (Section 2.3.2.2 (e))	The *PSSA Guidelines* categorize "noise" as a substance and not as a form of energy as in the Code on Noise Levels on Board Ships. In addition, the criteria for the identification and designation of PSSAs do not take underwater noise pollution into account and have not been designed for transboundary pollution, such as underwater noise	Consider amending the *PSSA Guidelines* to indicate that '"noise" is a form of energy which can result in pollution of the marine environment rather than a "substance". Also consider applying noise as a criterion in the identification and designation of PSSAs and consider specifying what APMs apply to the reduction of URN from shipping. Furthermore, consider providing for the possibility of having a large buffer zone within the boundaries of the PSSA since URN is not localized and can have a wide transboundary impact	Member States and international organizations

NO.	GAP / CHALLENGE	NATURE OF THE GAP / CHALLENGE	RECOMMENDATION	IMPLEMENTED BY
19	Operational approaches (Section 2.3.2.2 (e))	There may not be a common understanding as to what areas are included under the 'international designated protected areas' mentioned in the *Revised URN Guidelines*. Furthermore, the *Revised URN Guidelines* only list some types of protected areas and do not include, for example the possibility of ABMTs, including MPAs, being adopted under the BBNJ Agreement.	· Consider clarifying what areas are considered 'international designated protected areas' and where to find information about such areas · Consider including a reference to the types of protected areas that are not mentioned in the *Revised URN Guidelines* and also a reference to the BBNJ Agreement	Member States and international organizations
20	Operational approaches (Section 2.3.2.2 (e))	The Polar Code does not address URN and does not include a reference to the *Revised URN Guidelines*. Also, the mandatory pollution prevention measures set out in Part II-A of the Code are not applicable to URN from shipping.	· Consider including special measures with respect to the reduction of URN in the Polar Code · Consider including a reference to the *Guidelines for underwater radiated noise reduction in Inuit Nunaat and the Arctic* in the Polar Code and consider the measures proposed therein.	Member States and international organizations
21	Operational approaches (Section 2.3.2.2 (e))	The *Revised URN Guidelines* do not recommend the use of onshore power supply in port	Consider recommending the use of onshore power supply in port and application of the *Interim guidelines on safe operation of onshore power supply (OPS) service in port for ships engaged on international voyages*	Member States and international organizations

5.2 POTENTIAL POLICY OPTIONS LEADING TO "GENERALLY ACCEPTED INTERNATIONAL RULES AND STANDARDS" ON UNDERWATER NOISE POLLUTION FROM SHIPS

No mandatory regulation currently exists among IMO instruments that would require Member States to implement, comply with, and enforce obligations relating to the prevention, reduction and control of URN pollution from ships. This also implies that there are no "generally accepted international rules and standards" in place as required by UNCLOS. Although, as indicated in section 2.3.1, there are regulations in IMO instruments that can contribute to the reduction of underwater noise pollution and some are deemed to be "generally accepted", in particular MARPOL, SOLAS and COLREG.

The development of "international rules and standards" to address URN pollution from ships which are legally binding, namely mandatory instruments, can provide legal certainty regarding the status of such rules and standards. This section will consider the options that could be explored for the development of legally binding international rules and standards for the prevention, reduction and control of URN pollution from ships. Factors that require consideration in that regard and which will have a bearing on the options to be considered include the following:

- The need to ensure conformity with UNCLOS, especially since it provides the legal basis for the development of "international rules and standards" to prevent, reduce and control URN pollution of the marine environment from vessels, and obligations to implement those "international rules and standards" that are "generally accepted" and enforce "applicable international rules and standards". UNCLOS also sets out the rights and duties of States with respect to the protection and preservation of the marine environment and the conservation and management of living marine resources.
- The importance of developing international rules and standards which can be expected to be "generally accepted" since these are the rules and standards which must be implemented by flag States in accordance with UNCLOS.
- The need for international rules and standards to be developed and implemented as soon as possible in order to enable their consideration together with the design changes that need to be made for ships to comply with Annex VI to MARPOL.
- The need for an efficient amendment process in order to incorporate required changes as a result of new developments (e.g. technological, scientific) or as a result of experience with implementation.

It is important to also consider other global and regional instruments and the potential impact of international rules and standards developed by IMO on the implementation or application of those instruments. As indicated in section 2.1.1, once international rules and standards developed by IMO are "generally accepted" they are also applicable to the States that are parties to UNCLOS that may not have participated in their development. Furthermore, section 3 indicates that the States that are parties to a number of regional conventions would also be obligated to implement the "generally accepted international rules and standards".

Many regional conventions include energy as part of the definition of pollution of the marine environment and some contain general obligations to prevent, reduce and control pollution of the marine environment from vessels in accordance with "generally accepted international rules and standards". Several other regional conventions limit the scope of the obligation to prevent, reduce and control pollution of the marine environment from vessels to "intentional or accidental discharges from ships", which implies that they are only required to implement, comply with and enforce regulations governing discharges in MARPOL.

In light of the abovementioned factors and other considerations, the following options for developing legally binding measures for URN pollution from ships will be explored in sections 5.2.1 to 5.2.2 below:

1. a new Protocol to MARPOL in order to add a new annex to the Convention; and/or
2. a new code tied mainly to MARPOL.

Potential amendments to SOLAS might also be required. In the case of option 2, a new code could be tied to both MARPOL and SOLAS. Either option might also entail amendments to other IMO instruments depending on the form and content of a future instrument.

5.2.1 New Protocol to MARPOL

MARPOL, which includes mandatory Annexes I and II, as well as Annexes III, IV and V, and the 1997 Protocol which added Annex VI, have a significant number of Contracting Parties representing close to 99% of the world's merchant fleet.[641] MARPOL is generally regarded as the main IMO instrument containing "generally accepted" and "applicable" international rules and standards to prevent, reduce and control pollution of the marine environment from vessels referred to in UNCLOS. [642] Legally binding international rules and standards relating to the prevention, reduction and control of URN pollution from vessels would therefore be well placed within MARPOL, with the exception of potential rules and standards relating to safety of ships and navigation which are regulated by SOLAS.

MARPOL has a broad definition of a "ship".[643] However, the release of harmful substances directly arising from the exploration, exploitation and associated offshore processing of sea-bed mineral resources is excluded. Also excluded from the scope of application of MARPOL is any warship, naval auxiliary or other ship owned or operated by a State and used, for the time being, only on government non-commercial service. However, each Party to MARPOL must ensure by the adoption of appropriate measures not impairing the operations or operational capabilities of such ships owned or operated by it, that such ships act in a manner consistent, so far as is reasonable and practicable, with MARPOL.[644]

MARPOL includes a definition of "harmful substance"[645] which is not considered incompatible with the definition of "pollution of the marine environment" included in article 1(1), subparagraph 4, of UNCLOS.[646]

641 See <https://www.imo.org/en/About/Conventions/Pages/StatusofConventions.aspx> last accessed 24 November 2024.
642 IMO study (n 71) p 58.
643 MARPOL (n 121) art. 2(4).
644 ibid article 3.
645 ibid article 2(2) defines 'Harmful substance' to mean "any substance which, if introduced into the sea, is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea, and includes any substance subject to control by the present Convention".
646 IMO study (n 71) p 58.

Both definitions cover actual or potential harm to living resources and marine life, hazards to human health, hindrance to legitimate uses of the sea, and reduction of amenities. However, while the definition in UNCLOS applies to all sources of marine pollution, including the introduction of energy into the marine environment, MARPOL addresses in its article 1(1) only "discharges" of harmful substances or effluents containing such substances in contravention of MARPOL,[647] as defined in article 2(3) of MARPOL[648].[649] Underwater noise as a form of energy differs from the substances which MARPOL regulates in several annexes. It is thus not possible to apply the provisions of MARPOL to URN in its current form.

Therefore, if URN or underwater noise pollution were to be included within the scope of application of MARPOL it would be necessary to amend MARPOL in order to include a reference to "URN".

It has been suggested that since the *PSSA Guidelines* already list noise as a pollutant among the substances that could be released by a ship directly into the marine environment,[650] an extended definition of the term "substance" to include noise could be considered.[651] While this option would not necessitate any other amendment since the definition of "discharge" in MARPOL is broad enough to include URN, it would not be in conformity with UNCLOS which draws a distinction between "substances" and "energy" in its definition of pollution of the marine environment.

Another option that has been suggested is to amend article 1(1) of MARPOL by adding "emission" in respect of energy or noise (with an appropriate definition of "emission") after the reference to "discharge of harmful substances ...".[652] Such amendment would reflect the distinction between substances and energy in UNCLOS. However, it may not be necessary to add "emission" since "radiated" already conveys that idea. If its inclusion is considered necessary, then a definition of "emission" in a new annex would also be needed in order to avoid creating confusion with the definition of "emissions" which has been included under Annex VI to MARPOL for the purposes of that Annex.[653]

An amendment to article 1(1) of MARPOL would require a consequential amendment to the definition of '"discharge' " in article 2(3) in order to include a reference to '"noise' " or '"energy"'. In fact, it would be imperative to ensure that '"discharge' " is understood to encompasses '"energy' " in order to ensure that the MARPOL enforcement measures can apply and that the prescriptive and enforcement jurisdiction of States under UNCLOS also encompasses URN. As indicated in section 3.2.1.3 above, under UNCLOS,

647 MARPOL (n 121) article 1(1), provides as follows: "The Parties to the Convention undertake to give effect to the provisions of the present Convention and those Annexes thereto by which they are bound, in order to prevent the pollution of the marine environment by the discharge of harmful substances or effluents containing such substances in contravention of the Convention".

648 ibid, article 2(3) contains the following definitions: "(a). 'Discharge', in relation to harmful substances or effluents containing such substances, means any release howsoever caused from a ship and includes any escape, disposal, spilling, leaking, pumping, emitting or emptying; (b). 'Discharge' does not include: (i). dumping within the meaning of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, done at London on 13 November 1972; or (ii). release of harmful substances directly arising from the exploration, exploitation and associated offshore processing of sea-bed mineral resources; or (iii). release of harmful substances for purposes of legitimate scientific research into pollution abatement or control".

649 IMO study (n 71) p 58. Dotinga (n 63; Scott (n 186) and Daniel Owen "The Application of Marine Pollution Law to Ocean Noise" in Mark Simmonds, Sarah Dolman and Lindy Weilgart (eds) *Oceans of Noise* (2003) A WDCS Science Report annex 1.

650 IMO Assembly Res A.982(24) (n 136) para 2.2.

651 Owen (n 649).

652 ibid.

653 IMO Res. MEPC.328(76) (June 2021) in IMO Doc MEPC 76/15/Add.1 annex 1.

port State and coastal State enforcement provisions in relation to vessel-source pollution mainly address measures that can be taken if there is a '"discharge' " in violation of applicable international rules and standards for the prevention, reduction and control of pollution from vessels. There are thus significant advantages to extending the application of MARPOL to URN pollution in order to also benefit from the prescriptive and enforcement jurisdiction in MARPOL and in UNCLOS.

The inclusion of provisions on URN in MARPOL would require an amendment to MARPOL articles 1(1) and 2(3) and the adoption of a new Protocol to add a new annex since measures to prevent, reduce and control URN pollution would be very different from the current regulations in the MARPOL Annexes and it would not be possible to amend the existing Annexes.

Amendments to articles of MARPOL must be adopted by a two-thirds majority of only the Parties to the Convention present and voting and are deemed to have been accepted on the date on which they are accepted by two thirds of the Parties, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet.[654] An amendment to an article of MARPOL enters into force six months after the date of its acceptance with respect to the Parties which have declared that they have accepted it.[655]

The inclusion of a new annex to MARPOL could be effected through the adoption of a Protocol which also enables lower entry into force conditions to be included.[656] For example, the 1997 Protocol provided that it would enter into force 12 months after not less than 15 States, the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant shipping have become parties to it.[657] Once an annex has been adopted, the tacit amendment procedure could be applied when amendments are introduced.[658]

5.2.2 New code tied to an IMO convention

Generally, a code contains technical regulations and provides the required standards for the elements mentioned in a particular provision(s) of a convention. If a code is to be legally binding then it would need to be made mandatory under the provisions of a convention that it becomes part of. A code can be made mandatory under one or two conventions (e.g. the Polar Code (see section 2.3.1.4 (c))), and it can contain only a mandatory part or also a voluntary part (e.g. Code on Noise Levels on Board Ships (see section 2.3.1.2 (b)) and Polar Code).

654 MARPOL (n 121) article 16(2).
655 ibid.
656 Ibid article 15.
657 1997 Protocol (n 122) article 6.
658 ibid.
659 See for example, Guidelines for the Authorization of Organizations Acting on Behalf of the Administration in IMO Assembly Res A.739(18) (4 November 1993), amended by IMO Res MSC.208(81) (18 May 2006). The Guidelines became mandatory under SOLAS chapter XI.

A code is not the only legal instrument that can be made mandatory under an IMO convention or conventions. Occasionally, previously non-mandatory Guidelines have also been made mandatory by IMO through an amendment of the IMO convention concerned.[659] However, in most cases codes have mandatory application.[660]

A code could be formulated in such a way that it could be made mandatory directly under a convention (e.g. as in the case of the STCW Code) or it could be made mandatory at a later stage (e.g. the Code on Noise Levels on Board Ships was initially voluntary but then following its revision it was made mandatory under SOLAS). Member States at IMO have, on several occasions after the review of voluntary guidelines or guidance documents (e.g. Code on Noise Levels on Board Ships), progressed to the development of codes, with some mandatory as a next step e.g. Polar Code.

A code can be brought into force and implemented as a stand-alone document under an existing convention or conventions through the efficiency of the tacit acceptance procedures.[661] If a code addressing URN pollution is to have mandatory application, then it would probably have to be adopted under MARPOL and possibly also SOLAS with respect to ship design and equipment aspects. However, as has been noted in section 5.2.11 above, MARPOL does not currently address underwater noise pollution and would need to be amended before it can be used as a legal basis for mandatory application of a code.

Mandatory codes can be amended in accordance with the procedure of the convention or conventions under which they have been made mandatory. The tacit amendment procedures of MARPOL and SOLAS are similar. Prescriptive and enforcement jurisdiction with respect to a code would be determined by the convention or conventions under which it has been made mandatory. The first step to prepare amendments to MARPOL and/or SOLAS is to make a new output proposal to the respective Committees of IMO (MEPC and/or MSC) in accordance with the Organization and Method of Work.[662]

660 See for example, the Code on Noise Levels on Board Ships and the HSC Codes (section 2.3.1.2(b) above), as well as the Polar Code (section 2.3.1.4). Those Codes and other mandatory codes that have been adopted by IMO are listed in the "2023 Non-exhaustive list of obligations under instruments relevant to the IMO Instruments Implementation Code (III Code)" adopted by IMO Assembly Res A.1187(33) (6 December 2023).

661 IMO Secretariat "Outcome of DE 55 – Legal opinion on making the Polar Code mandatory". IMO Doc MEPC 62/11/4/Add.1 (2011).

662 IMO "Organization and Method of Work of the Maritime Safety Committee and the Marine Environment Protection Committee and their Subsidiary Bodies" IMO Doc MSC-MEPC.1/Circ.5/Rev.5 (2023).

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