

Regulating Ocean Noise: A Non-traditional Threat to Maritime Security

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Ocean noise, sometimes referred to as noise pollution, is the intentional or incidental introduction of human-generated (anthropogenic) sound energy into the marine environment. Examples of activities causing anthropogenic ocean noise include commercial shipping, recreational activities, natural resource exploration, underwater construction, scientific research and military sonar use. Whenever man interacts with the world's oceans, he puts sound energy into the water column. While considerable scientific uncertainty exists on the potential affects of anthropogenic ocean noise on the marine environment, some parties allege myriad adverse significant impact on living marine resources. The alleged impact runs the spectrum from reduced commercial fish catch rates to biologically significant behavioural impact, to marine mammal mass strandings, injury and mortality.

In recent years, a number of scientists, environmental non-governmental organisations (NGOs), and international bodies have shown a growing interest in anthropogenic ocean noise and its potential adverse impact on the marine environment, especially living marine resources, such as marine mammals. This interest is the result of advances in acoustic and marine mammal behavioural sciences, aggressive strategic communication campaigns by environmental NGOs, and a series of highly publicised marine mammal mass stranding deaths allegedly linked to scientific research and military exercises. This movement has, in turn, led several international bodies, regional organisations, and international groups to address the issue, convene scientific inquiries,

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take policy actions and even call for domestic and international regulation of anthropogenic sound-producing activities. Assuming these groups successfully implement international or regional restrictions/prohibitions, what, if any, impact will be there to domestic and international maritime security? Are the relevant parties considering the impact as they propose, formulate and implement ocean noise environmental protection treaties, agreements and policies? Can environmental protection ever be a threat to maritime security?

This article premises that regional or international regulation of ocean noise-producing activities, such as commercial shipping, natural resources exploitation and defence sonar use, constitute a non-traditional threat to domestic and international maritime security. It is a non-traditional threat precisely because most people think of activities purporting to advance environmental stewardship and protection of the world's marine resources as only beneficial endeavours. The anthropogenic ocean noise issue illustrates how some environmental protection actions can present unrecognised and often unaddressed, risks. Part One introduces the topic of anthropogenic ocean noise. Part Two summarises efforts by international and regional bodies to regulate anthropogenic ocean sound-producing activities through existing, modified and new international treaties, conventions and regional agreements. Finally, Part Three concludes that international regulations restricting or prohibiting vital domestic ocean sound-producing activities can result, if not safeguarded, in a significant threat to maritime security, national defence and the global economy.

Part One: Ocean Noise

Introduction

One of the consequences of the industrial revolution and its associated exponential population growth, expanded global trade and insatiable demand for natural resources is the considerable increase in human ocean-based activities. Many of these activities, including oil and mineral exploration and extraction, commercial shipping, commercial fishing and defence activities have led to significantly increased amounts of ambient undersea sound, or 'noise pollution', in the world's oceans.¹ This increase, in turn, has led to concerns over the potential impact of anthropogenic (human-generated) noise producing activities on marine life, especially marine mammals relying on highly developed auditory systems for vital life functions.²

Similar to the issue of global warming, domestic and international governmental policy-makers turning to science find a paucity of research and significant uncertainty on the issue of whether anthropogenic noise producing activities (hereinafter ocean sound) are harmful to marine environment. A series of recent high-profile international events suggesting a temporal/physical relationship between some human sound-generating activities (industrial geophysical seismic surveys and military sonar use) and mass stranding injuries and mortalities to marine mammals has raised concerns, generated organised opposition and increased international interest in the issue.³ This has led a growing number of international bodies seeking to address the issue of anthropogenic undersea sound impact to marine resources, urge scientific scrutiny, take policy actions and even call for international regulation restricting/prohibiting sound-producing activities.

This article introduces the issue of anthropogenic undersea noise, summarises current efforts addressing the issue and presents the thesis that international regulations limiting or prohibiting vital sound-producing activities, such as commercial shipping, natural resource exploration and exploitation, and defence activities, represent potentially significant non-traditional, non-technical asymmetric threats to the global economy, national defence and international security.

Sound in the Ocean

Scientists define sound as mechanical energy vibrations transmitted as a wave through elastic solid, liquid or gas medium.⁴ A sound wave is, therefore, a flow of energy 'from one region of space to another'.⁵ The propagation of sound in water is highly complex and case-specific, with characteristics depending on the type of sound waves (longitudinal vs. transverse), transmission medium physical properties and generic properties of waves (frequency, wavelength, period, amplitude, intensity, speed, and direction).⁶ Sound in an undersea ocean environment varies with weather, water depth, ocean floor characteristics, time of day or year and other environmental conditions.⁷

The world's oceans are noisy environments, with noise produced by both natural and anthropogenic sources. Natural physical and biological sources of ambient⁸ underwater noise include wind, rain, waves hitting the shoreline, earthquake seismic events, volcanic activity, lightening strikes, thermal noise, movement or breaking of sea ice and sounds produced by fish, invertebrates and marine mammal activity.⁹

Intentional and incidental anthropogenic undersea sound-producing activities include commercial ship traffic, oil and gas seismic exploration, industrial resource drilling and

extraction, military active sonar systems and ship strength test explosions, torpedoes and mine detonations, marine scientific research, oceanographic experiments, geophysical research, fishery acoustic deterrent and harassment devices, dredging, underwater construction (e.g. pile driving), wind turbine operation and ice breaking.¹⁰ Anthropogenic undersea sound becomes undersea noise, or undersea noise pollution, when its introduction disrupts the activity or balance of animal life in the maritime environment.¹¹ In other words, it must have a significant deleterious effect on marine life or ecosystems.

Marine Mammals, Sound and Anthropogenic Undersea Noise

Ranging from aquatic cetaceans (whales, dolphins and porpoises) to semi-aquatic pinnipeds (walruses, seals and sea lions) and polar bears, marine mammals comprise a diverse group of approximately 120 known species.¹² Adapting and evolving for millions of years in an underwater environment, marine mammals have evolved specialised sensory capabilities to take advantage of the physics of underwater sound.¹³ Marine mammals use sound to navigate, find food, avoid predators, and for communication to announce location and territory, attract mates, establish dominance and maintain group cohesion and social interaction.¹⁴ The biological advantages of hearing and sound-generating evolutionary responses are due to the properties of underwater sound “being relatively fast (typically at least 4.5 times greater in salt water than in air), highly directional, and independent of light levels and water clarity”.¹⁵ This exceptional ability to transmit sound over potentially long distances has significant implications for ocean use policies.

Some scientists, policy makers, international bodies, and environmental NGOs allege anthropogenic undersea noise may have a potential serious detrimental effect on marine species and ecosystems.¹⁶ They argue exposure to anthropogenic undersea noise interferes with the ability of some marine species’ ability to use sounds to communicate, reproduce, navigate, find prey and avoid predators, because of temporary or permanent hearing loss or other ‘masking’ of the animal’s aural environment.¹⁷ Some advocates have alleged a range of adverse impact to living marine resources, including reduced catch rates of commercial fish, marine mammal mass strandings and marine mammal behavioural effects, injury and mortality.

Anthropogenic Sound-Producing Activities

Commercial Shipping

The industrial revolution's transition from wooden ships driven by wind power to increasingly larger steel-hulled ships driven by propeller engines significantly increased the amount of low-frequency undersea noise in the world's oceans.¹⁸ The reason for this is two-fold: the increase in number of commercial vessels operating on the world's oceans and the inherent sound-producing nature of machine-driven metal vessels. Today, commercial shipping traffic is a major contributor to anthropogenic undersea noise.¹⁹

The second half of the 20th century witnessed a dramatic increase in the volume of sea-borne commercial shipping. From approximately 30,000 active vessels of significant size in the 1930s, the world's merchant fleet had risen to more than 85,000 vessels by 1999.²⁰ In the 14-year period, from 1985 to 1999, world seaborne gross tonnage trade doubled to 5 billion tonnes annually representing more than 90 per cent of total world trade.²¹

Modern commercial vessels are inherently noisy machines. While exact characteristics vary with vessel type, size, speed, load and mode of operation, these vessels produce loud and predominately low frequency (10 Hz to 1 kHz) undersea noise.²² Specific sources of ship-generated sound include propeller cavitation (responsible for 83 per cent of the acoustic field surrounding a vessel),²³ hull mounted machinery, hull flexing, and hydrodynamic flow over the hull.²⁴ Commercial vessel sound production source levels range from 180 to 190 dB (re $\mu\text{Pa}^2/\text{Hz} @ 1 \text{ m}$) for supertankers, large tankers, container ships, and other large merchants²⁵ and 150 to 170 dB (re $\mu\text{Pa}^2/\text{Hz} @ 1 \text{ m}$) for mid-size ships such as tugs and ferries.²⁶ Drillship and dredging operations generate broadband source levels of up to 185 dB (re $\mu\text{Pa}^2/\text{Hz} @ 1 \text{ m}$).²⁷

The increase in commercial shipping has led to a significant increase in ship-generated undersea noise in the world's oceans. According to scientific studies, the increase in ship traffic resulted in a doubling of ship-generated noise in the Pacific every decade for the past 40 years²⁸ and a 10 dB (re $\mu\text{Pa}^2/\text{Hz} @ 1 \text{ m}$) increase in ambient noise during the period 1950 to 1975.²⁹

Natural Resource Exploration and Exploitation

Activities associated with the oil, gas, and mineral exploration and extraction industry are a major source of anthropogenic undersea noise.³⁰ These activities include geophysical

seismic surveys used to study the geology of the ocean floor.³¹ In these surveys, arrays of 12-48 air guns fire bursts of pressurised air into the water towards the ocean floor repeatedly every several seconds.³² These surveys produce undersea noise at tens of Hz, with source levels ranging from 216 to 259 dB (re $\mu\text{Pa}^2/\text{Hz} @ 1 \text{ m}$).³³ Other sources of industrial anthropogenic undersea noise include underwater construction, offshore oil and gas platform construction and demolition, and resource drilling, pumping and extraction operations.³⁴

Defence Activities

A recent and highly controversial source of anthropogenic undersea noise is defence activities, especially the testing and training of military active sonar systems. Sonar is an acronym for SOund Navigation And Ranging.³⁵ It is a method or device for 'seeing' underwater to detect and locate objects by either intercepting the acoustic waves of an object's natural-borne sound (passive sonar) or by emitting pulses of sound and receiving the reflecting acoustic waves that bounce off an object as echoes (active sonar).³⁶ Knowing the speed of sound in water and the time for the sound wave to travel to the object and back, active sonar systems can quickly calculate distance (range) between the ship and underwater object.³⁷ There are several types of active sonar: high frequency (> 10 kHz), mid-frequency (1-10 kHz), and low frequency (< 1 kHz). The acoustic frequency of sound determines how rapidly the sound dissipates in the ocean environment, with high frequency sound used over relatively short ranges (< 5 nautical miles (nm)), mid-frequency at the 5-10 nm range, and low frequency for very long distances.

Modern navies use various types of active sonar systems mounted on the hulls of ships, towed behind ships in an array, dipped into the water from helicopters, or attached to free-floating buoys (sonobuoys).³⁸ They use high-frequency active sonar's short-range and high-resolution capabilities for determining water depth, hunting mines and guiding torpedoes.³⁹ These systems typically operate with source levels in the range of 180 to 230 dB (re $\mu\text{Pa}^2/\text{Hz} @ 1 \text{ m}$).⁴⁰ Due to its moderate attenuation and typical range of 1-10 nautical miles, navies use mid-frequency active sonar systems, such as the AN SQS/56 and AN/SQS-53, as their primary tool for conducting anti-submarine warfare.⁴¹ The US Navy reports AN SQS/56 and AN/SQS-53 mid-frequency operating levels at 223 and 235 dB (re $\mu\text{Pa}^2/\text{Hz} @ 1 \text{ m}$), respectively.⁴² Low-frequency system ranges of up to 100 nm make them ideal for long-range search and surveillance of

submarines.⁴³ The US Navy's low frequency surveillance-towed array sensor system-low frequency active (SURTASS-LFA) system operates at a peak source level of 215 dB (re $\mu\text{Pa}^2/\text{Hz}$ @ 1 m).⁴⁴

Civilian Sonars

Civilian commercial active sonar uses include echo sounding, bottom imaging, bottom and surface scattering studies, fish finding, navigation, communication and acoustic harassment devices, and operating remote and unmanned underwater vehicles.⁴⁵ Scientific active sonar uses include biomass estimations, wave measurements, water velocity measurements, bottom type assessments and sub-bottom profiling.⁴⁶

Future Trends

Given the anticipated increases in the world population, global economic networks, and competition for available limited natural resources, our interactions with the marine environment will reasonably grow in both volume and complexity in the next century or so. Future trends in the shipping industry indicate improved vessel propulsion systems leading to faster ships operating in higher sea states, an increase in commercial shipping densities along existing coastal routes, expansion of new routes, especially in the Arctic, and the expected doubling by 2030 in the number of large commercial shipping vessels.⁴⁷ Similarly, national governments will increasingly turn to their coastal and continental shelf waters to exploit available fisheries, subterranean energy deposits of oil and natural gas, and other natural resources. Increased nation-state reliance on maritime natural resource exploitation and a global economy that necessitates freedom of navigation and open sea lines of communication will lead to a rise in maritime defence-related navies. By necessity, these navies will rely on active sonar systems as effective counter-measures to the worldwide proliferation of ultra-quiet, electric diesel submarines threatening coastal shipping lanes and key strategic choke points such as the Straits of Hormuz and Straits of Malacca.

Summary

Human activities in, on and under the water have significantly increased in the last 100 years and will continue to grow in the near future. These increases in human activity have resulted in a proportionate increase in anthropogenic ocean noise. Concern about

the potential adverse impacts of increasing ocean noise levels on marine resources, especially some species of marine mammals, has led some international bodies and other groups to consider the issue of ocean noise. The next section reviews the actions of some of these groups and their proposals seeking to regulate, limit, or restrict anthropogenic ocean noise-producing activities worldwide.

Part Two: International Efforts to Regulate Ocean Noise

Despite the international trans-boundary nature of anthropogenic ocean noise, the migratory practices of marine mammals and other species, and the growing proliferation of international environmental treaties, there are currently no international rules, standards, or regulatory structures addressing sound-generating ocean activities in a global context.⁴⁸ This leaves individual nations or regional organisations to develop and implement management mechanisms to regulate anthropogenic ocean noise. Under current international law, these efforts are restricted to addressing ocean noise in the waters of an exclusive economic zone (EEZ) (up to 200 nm) of an individual country or group of countries. In response, some international institutions have begun addressing the issue of regulating anthropogenic ocean noise in waters outside their national jurisdiction, such as on the high seas. This section summarises recent actions by some international institutions and domestic organisations to expand existing or implement new international conventions, treaties and regional agreements to regulate anthropogenic noise-producing activities.

United Nations Convention on the Law of the Sea (UNCLOS)

An international agreement resulting from the third United Nations Conference on the Law of the Sea (1973-82), the United Nations Convention on the Law of the Sea (UNCLOS) established a comprehensive international legal regime for matters relating to all uses of oceans and their resources.⁴⁹ To date, 157 states and the European Community have joined UNCLOS.⁵⁰ Generally codifying customary international law, UNCLOS, among other things, defines the rights and responsibilities of member states in their use of the world's oceans natural resources, assigns member states an affirmative obligation and responsibility to protect and preserve the marine environment, and requires member states to assess and communicate the potential impact of their activities on the marine environment.⁵¹

UNCLOS does not specifically address anthropogenic ocean noise. Advocates for UNCLOS regulation of anthropogenic ocean noise sound-producing activities argue that this is a sub-category of UNCLOS regulated 'marine pollution'. UNCLOS defines 'pollution of the marine environment' as:

"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".
 [Emphasis added]⁵²

Originally intended to encompass thermal pollution, some parties have suggested "... the inclusion of 'energy' implies noise can be a form of marine pollution under the terms of the (Law of the Sea) convention".⁵³

Merely including anthropogenic undersea noise within the definition of 'energy' is not enough to meet UNCLOS marine pollution definitional requirements. To meet UNCLOS definitional requirements, the introduction of acoustic energy must result in, or be reasonably likely to result in, 'deleterious effects' to the marine environment.⁵⁴ These types of determinations are difficult given the current level of scientific uncertainty surrounding the impact of anthropogenic undersea noise on the marine environment and the lack of agreed upon standards for interpreting the terms 'harm', 'hazards', 'hindrance', 'impairment', and 'reduction'.⁵⁵ Some marine mammal protection advocates cite a growing body of scientific evidence suggesting actual or potential harm to marine mammals from anthropogenic ocean sound-producing activities, in particular military active sonar use, as sufficiently satisfying UNCLOS 'deleterious effect' requirement.⁵⁶

Despite the UNCLOS 'marine pollution' definition not encompassing anthropogenic ocean noise, the United Nations (UN), working mostly through the UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS)⁵⁷, has recently taken an interest in the effects of anthropogenic ocean noise on the marine environment. Significant actions worth highlighting include:

- The June 2005 UNICPOLOS proposal that the UN General Assembly request further studies and consideration of the effects of ocean noise on marine living resources⁵⁸;

- The UN Secretary General's July 2005 report to the General Assembly listing anthropogenic underwater noise as one of five "current major threats to some populations of whales and other cetaceans";⁵⁹
- The UN General Assembly Resolutions 60/30 (November 2005)⁶⁰ and 61/222 (November 2006) encouraging "further studies and consideration of the impacts of ocean noise on marine living resources".⁶¹

Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR)

An international environmental instrument that has adopted the UNCLOS 'marine pollution' definition is the 1992 Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR).⁶² The OSPAR convention serves as the current legislative instrument regulating international cooperation to protect the marine environment of the Northeast Atlantic.⁶³ Its mission is "to conserve marine ecosystems and safeguard human health in the Northeast Atlantic by preventing and eliminating pollution; by protecting the marine environment from the adverse effects of human activities; and by contributing to the sustainable use of the seas".⁶⁴

The Convention is administered by the OSPAR Commission, a governing body comprising of representatives of the 15 contracting parties.⁶⁵ Recent efforts by the OSPAR Commission include recommendations for assessments of 'pollution' from undersea noise 'raised by offshore activities',⁶⁶ and official recognition of undersea 'noise disturbance' as a human activity with potentially harmful effects for several whale species.⁶⁷

International Convention on the Prevention of Pollution from Ships (MARPOL 73/78)

Signed in 1973 and modified by the Protocol of 1978, the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)⁶⁸ came into force in 1983. Its stated objective is to preserve the marine environment by eliminating pollution and minimising accidental discharge from ships.⁶⁹ It contains 6 annexes, addressing the following specific types of ship marine pollution: Oil (Annex I); Noxious Liquid Substances Carried in Bulk (Annex II); Harmful Substances Carried in Packaged Form (Annex III); Sewage (Annex IV); Garbage (Annex V); and Air Pollution (Annex VI).⁷⁰

While warships⁷¹ are expressly exempt from its requirements, commercial shipping vessels flagged under countries that are its signatories are subject to its requirements, regardless of where they sail and member nations are responsible for vessels registered under their respective nationalities.⁷²

The International Maritime Organisation (IMO) administers MARPOL 73/78, a permanent international body established to promote maritime safety acts to promote cooperation among governments and the shipping industry, coordinate international maritime safety and related practices, environmental concerns, legal matters, technical cooperation, and maritime security.⁷³

Like the UNCLOS, MARPOL 73/78 does not specifically address anthropogenic ocean noise. Unlike UNCLOS and OSPAR, MARPOL 73/78's definition of 'pollution' is limited solely to ship discharges of 'harmful substances'.⁷⁴ It is, therefore, expressly outside the scope of current MARPOL 73/78 authority to regulate ship discharges of undersea sound energy.⁷⁵

Despite MARPOL 73/78's lack of authority to adopt measures restricting or prohibiting sound emissions from ships, the IMO has been actively engaged in the ship noise issue. Specific IMO actions include recognising anthropogenic undersea noise as a hazard to the marine environment, listed shipping noise as an appropriate target of designated 'particularly sensitive sea areas',⁷⁶ and assigning the topic to its Marine Environment Protection Committee (MEPC) for review and study.

At the 58th Session of the Committee (MEPC 58) of the IMO held in London during June 6-10, 2008 the MEPC agreed to a high priority programme to minimise the introduction of incidental noise from commercial shipping operations into the maritime environment to reduce potential impacts to marine life.⁷⁷ Specifically, the MEPC proposed the development of "non-mandatory technical guidelines for commercial ship quieting technologies" and "potential navigational and operational practices to minimise the introduction of incidental noise from commercial shipping operations into the marine environment".⁷⁸ The 59th Session of the Committee (MEPC 59), held during July 13-17, 2009 considered a report on "noise from commercial shipping and its adverse impacts on marine life" and agreed to continue its work "on the future development of voluntary technical guidelines for ship quieting technologies".⁷⁹

Convention on Migratory Species

Concluded under the aegis of the UN Environment Programme (UNEP), the

Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) is an inter-governmental treaty concerned with the conservation of terrestrial, marine, and avian migratory wildlife and habitats on a global scale.⁸⁰ As of November 11, 2008 there were 110 parties to the CMS.⁸¹

Resolution 9.19

Meeting in Rome during December 1-5, 2008 the CMS Conference of Parties adopted a resolution entitled “Adverse Anthropogenic Marine/Ocean Noise Impacts on Cetaceans and Other Biota” (Resolution 9.19).⁸² Resolution 9.19 recognises anthropogenic ocean noise as a form of energy ‘pollution’ and reaffirms that the difficulty of proving negative impacts of acoustic disturbance on cetaceans necessitates a precautionary approach in cases where such impact is likely.⁸³ It urges parties and invites non-parties that exercise jurisdiction over any part of the range of CMS listed marine species, or over flag vessels within or beyond national jurisdictional limits, “to control the impact of emission of man-made noise pollution in habitat of vulnerable species and in areas where marine mammals or other endangered species may be concentrated”.⁸⁴ It also calls on parties and invites non-parties “to adopt mitigation measures on the use of high intensity active naval sonars” and “aim to prevent impacts from the use of such sonars... where risks to marine mammals cannot be excluded”.⁸⁵

International Convention of the Regulation Whaling (ICRW)

The International Convention of the Regulation Whaling (ICRW) is an international agreement signed in 1946 to ensure the protection and conservation of worldwide whale stocks by establishing a system of international regulation of the 85 member parties’ commercial, scientific, and aboriginal whaling practices.⁸⁶ The International Whaling Commission (IWC) governs the ICRW.⁸⁷ IWC responsibilities include designating specified areas as whale sanctuaries; setting annual whaling limits on numbers and size; prescribing open and closed seasons and areas for whaling; providing for the complete protection of certain whale species; compiling catch reports and other statistical and biological records; and encouraging, coordinating, and funding whale research, including assessments of environmental impacts on cetaceans.⁸⁸

In 2004, the Standing Working Group (SWG) hosted a mini-symposium to consider the effects of anthropogenic undersea noise on cetacean populations.⁸⁹ In its

report to the full IWC at its 56th Meeting in July 2004, the IWC Scientific Committee agreed there is “compelling evidence implicating that military sonar has a direct impact on beaked whales in particular” and “evidence of increased sounds from other sources, including ships and seismic activities”, gives cause for serious concern.⁹⁰

Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)

The Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) is a regional cooperative agreement “to reduce threats to cetaceans, improve knowledge, and conserve marine diversity in the Mediterranean and Black Seas”.⁹¹

Resolution 3.10

In October 2007, the ACCOBAMS contracting parties held their third meeting in Dubrovnik, Croatia.⁹² Continuing the discussion of anthropogenic underwater noise from the second meeting held in 2004, the parties passed Resolution 3.10 entitled “Guidelines to Address the Impact of Anthropogenic Noise on Marine Mammals in the ACCOBAMS Area”.⁹³ Repeating prior resolutions classifying ocean noise as a ‘marine pollutant’, the resolution reminded the parties of the requirement to regulate discharge at sea of pollutants believed to have adverse effects on cetaceans and to apply the precautionary principle to all conservation, research, and management measures.⁹⁴ It also urged the parties to consider underwater noise levels a ‘quality parameter’ in habitat, zoning, and management assessments in specially protected areas and other marine protected areas of the Mediterranean and asked the parties to consider ‘high-power noise sources’ in the management plans of their marine protected areas.⁹⁵ The Resolution invited the parties to implement underwater noise-producing activity mitigation and monitoring measures, including “avoiding key marine mammals habitats, areas of high marine mammal density and marine protected areas, and defining appropriate buffer zones around them”.⁹⁶

Significantly, the parties agreed in 2007 to form a Working Group consisting of government representatives and scientists to address the management of anthropogenic noise in the agreement area.⁹⁷ The Working Group will address anthropogenic noise deriving from activities such as “seismic survey and airgun uses, coastal and offshore

construction works, the construction, the operation, and the decommissioning of offshore platforms, playback and controlled exposure experiments, whale watching, blasting of residual war weapons, underwater acoustic devices, military sonar, civil high power sonar operations and shipping activities".⁹⁸

Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS)

Aimed at preserving and protecting the numerous small migratory cetacean species native to the Baltic and North Seas, including dolphins, whales and harbour porpoises, the ASCOBANS is a regional agreement to promote cooperation among its parties in addressing the human activity threats of habitat loss, marine pollution, acoustic disturbances, and fishery 'bycatch'.⁹⁹ The revised ASCOBANS agreement area covers a large portion of the Northeast Atlantic Ocean and the Baltic, Irish and North Seas.¹⁰⁰ The ASCOBANS parties address anthropogenic ocean noise through an annexed conservation and management plan, establishing mandatory conservation measures, including "the prevention of significant disturbance, especially of an acoustic nature".¹⁰¹

Resolution 4

At the fifth meeting of the parties to ASCOBANS in December 2006, the parties passed Resolution Number 4, "Adverse Effects of Sound, Vessels and Other Forms of Disturbance on Small Cetaceans".¹⁰² Among other things, the resolution requested the parties and range states to "develop, with militaries and other relevant authorities", effective mitigation measures to "reduce disturbance of, and potential physical damage to, small cetaceans".¹⁰³ The resolution also requested the parties and range states to reduce the impact of noise on cetaceans from seismic surveys, vessels (particularly high speed ferries), commercial fishery acoustic harassment devices, industrial activities (including wind farms), and other anthropogenic acoustic disturbances.¹⁰⁴ Of particular note was the ASCOBANS parties' 'reaffirmation' that the "the difficulty of proving detrimental effects of acoustic disturbance on cetaceans *necessitates* a precautionary approach".¹⁰⁵ (Emphasis added).

European Cetacean Society

Established in January 1987, the European Cetacean Society (ECS) promotes and

advances marine mammal scientific studies and conservation efforts, as well as disseminates information about cetaceans.¹⁰⁶ In March 2009, the ECS issued a resolution in conjunction with its 23rd Annual Conference on “Climate Change and Marine Mammals”, addressing the threat of military sonars to the beaked whale species.¹⁰⁷ Stating there is “sufficient evidence that active sonar exposure even at relatively low levels can have significant impacts” on the beaked whale species, the resolution calls for ‘competent authorities’ to urgently adopt and enforce international and national standardised military sonar use marine mammal mitigation protocols.¹⁰⁸

European Parliament

The European Parliament (EP) is the directly elected parliamentary body of the 27 member states of the European Union (EU).¹⁰⁹ The EP and the Council of the EU together form the bicameral legislative branch of the EU’s institutions.¹¹⁰

In October 2004, the EP overwhelmingly adopted a resolution calling on the EU and its member states to:

*“adopt a moratorium on the deployment of high-intensity active naval sonars until a global assessment of their cumulative environmental impact on marine mammals, fish and other marine life has been completed”.*¹¹¹

It also called on the member states to:

“Actively pursue, in the framework of NATO and other international organisations, the adoption of moratoriums and restrictions on the use of high intensity active sonars in naval operations and the development of alternative technologies”;

“Immediately restrict the use of high-intensity active naval sonars in waters falling under their jurisdiction”; and

*“Monitor and investigate in a transparent manner mass strandings and deaths of marine mammals in EU waters which are associated with the use of intense anthropogenic noise and to communicate the findings to the European Commission (EC)”.*¹¹²

The resolution also calls for the EC “to conduct a study of the potential impact on the marine environment of the deployment of high-intensity active naval sonars and to provide an assessment on the basis of information from the member states of the impact of current practices in European waters”.¹¹³ In addition, the resolution calls for the EC and the member states “to set up a multinational task force to develop international agreements regulating noise levels in the world’s oceans, with a view to regulating and limiting the adverse impact of anthropogenic sonars on marine mammals and fish”.¹¹⁴

World Conservation Union (IUCN)

Founded in 1948, the IUCN is a non-governmental, international organisation dedicated to worldwide natural resource conservation.¹¹⁵ Comprising of about 1,000 members from more than 150 countries, including 77 states, 114 government agencies, 800 NGOs, and about 11,000 volunteer scientists, the IUCN supports conservation scientific research, manages field projects and brings together governments, NGOs, UN agencies, companies and local communities to address environment and development challenges by developing and implementing policy, laws and best practice.¹¹⁶

Resolution 3.068

The IUCN at its meeting in Bangkok during November 17-25, 2004 adopted resolution 3.068 recognising anthropogenic ocean noise as a form of pollution (comprised of energy) that may have adverse effects on the marine ecosystem.¹¹⁷ It further requested the reduction of anthropogenic ocean noise around the world that governments work through the UN “to develop mechanisms for the control of undersea noise” and called for further research on the effects and mitigation of anthropogenic ocean noise on marine species at the highest standards of science and public credibility.¹¹⁸

Recognising anthropogenic ocean noise, depending on source and intensity, as a form of pollution, the resolution calls on member governments to apply the precautionary principle in assessing the impacts of noise generated by commercial, military and industrial activities. The resolution also entreated governments to avoid the use of powerful noise sources in habitats of vulnerable species and in areas where marine mammals or endangered species may be concentrated, and to work through the UN “to develop mechanisms for the control of undersea noise”.¹¹⁹

Summary

This section provided an overview of efforts by some groups seeking the prevention, reduction and elimination of anthropogenic ocean noise-producing activities through a two-pronged strategy. The first prong calls for the use or modification of existing international treaties, conventions and regional agreements to address anthropogenic ocean noise and regulate human generated noise-producing activities. The second prong, running concurrent with the first, calls for the implementation of new international treaties, conventions and regional agreements, specifically addressing, regulating and reducing anthropogenic ocean noise-producing activities. If successful, these efforts are likely to have a significant adverse impact on important maritime activities, such as commercial shipping, natural resource extraction and military readiness. The next section discusses the impact of ocean noise to maritime security.

Part Three: Ocean Noise Impact to Maritime Security

Man, a product of the African savannah, has increasingly ventured his way onto, into and above the planet's vast oceans and seas. A small population and activities limited to mostly sailing within sight of land, subsistence fishing from small craft and minor coastal construction efforts resulted in a negligible impact on the marine environment. When the industrial revolution unleashed the ability to power steel by steam, oil and atoms, Man's interactions with the marine environment increased considerably. These activities include, but are not limited to, enormous supertankers plying the world's ocean routes, arctic icebreaking, continental shelf oil and natural gas extraction, anti-submarine warfare sonar use exercises, pier construction, and installation of offshore wind farms. Many of these activities, such as commercial shipping and fishing, natural resource exploration and extraction, and maintaining effective naval forces, have significantly benefited humanity and are indispensable to maintaining a robust global economy, shielding domestic defence and ensuring international maritime security.

Man's increased maritime activities are, however, not without some risk. These increases have led to an increase in underwater noise in the world's oceans, notably in coastal waters and along major shipping lanes. What is not clear, however, is the impact this increase in underwater sound may be having on marine resources. This lack of scientific certainty and consensus prevents governmental policy-makers from effectively balancing the risks and weighing the harms to fashion acceptable environmental

protection policies. Quantification of actual risks will allow regulatory schemes that provide reasonable environmental and natural resource protection while allowing maximum beneficial noise-producing activities, such as commercial shipping, natural resources extraction and naval training and operations. Science is unable to provide this requisite level of clarity and certainty.

Into the breach of scientific uncertainty, step the environmental NGOs, international bodies, regional organisations and other groups. Ostensibly concerned about the potential adverse impact of increasing ocean noise levels on marine resources, they call for and seek binding restrictions or prohibitions on all or some human-generated sound-producing activities. At first blush, these efforts may appear to be benign, reasonable restrictions motivated by well-intentioned environmental stewardship responsibilities towards the world's marine resources. On closer inspection, the ocean noise debate's myopic focus on environmental protection reveals its fatal flaw, rendering it a significant threat to worldwide maritime security.

Proceeding without definitive scientific guidance, focused solely on avoiding future speculative harms and premised on a precautionary approach to environmental policy, the groups and forums seeking action on the ocean noise issue seldom solicit, address, consider, or balance the inherent risks to domestic and international maritime security that will result from the restriction or prohibition of critical anthropogenic ocean noise-producing activities. These risks include adverse impact to domestic and global economies, if international treaties restrict or prohibit commercial shipping during certain periods of the year, along certain marine mammal migration routes, or in large areas of the ocean designated as marine protected areas. They include risks to domestic economic security if natural resource extraction activities (e.g. oil, natural gas and fish) are restricted or prohibited in coastal waters, within recognised EEZs, and on the continental shelf. They also include unacceptable risks to national defence by limiting or prohibiting naval readiness activities, such as the testing, training and use of active sonars in direct contravention of the inherent right of self-defence under international law. Finally, the risks include the potential for disparate application of restrictions or sanctions by regional organisations or nation blocs as a form of economic protectionism, to deny other nations access to global resources, as a means of political retaliation, or to gain a military or political advantage.

As international bodies, regional organisations and, increasingly, self-proclaimed non-governmental environmental groups develop, advocate and implement policies

and management responses to marine environment anthropogenic sound-related issues, individual nations need to be mindful of the potential adverse costs to their national defence, economy and maritime security. To defend against the ocean noise maritime security threat, individual nations must first recognise the threat and then neutralise it.

It is difficult for a modern, enlightened and globally responsible nation to recognise a seemingly benign and well-intentioned effort to protect maritime resources as an insidious threat to its national security. Here, it is important for everyone to separate the ends from the means. No nation should quibble with the ocean noise movement's desired end state of protecting and preserving ocean environment and its resources. The threat to maritime security is not in the end state but rather in the means employed to reach that end state. The relevant parties interpreting, formulating, proposing, advocating and implementing ocean noise environmental protection treaties, laws, agreements and policies to regulate anthropogenic sound-producing activities are not considering, weighing and balancing the important risks to domestic national security, the global economy and international maritime security.

Once they acknowledge the ocean noise maritime security threat, individual nations should move to neutralise the threat by actively engaging in the relevant domestic, regional and international ocean noise forums to ensure participation by all stakeholders (including the sound-producers), and make certain all critical national interests are considered during the process. These interests include, but are not limited to, commercial shipping and fisheries, natural resource exploration and extraction, and national defence maritime capabilities. Typically, either individual nations generally assign oversight responsibility and negotiation authority for ocean noise to their environmental protection ministries or they delegate the authority to international or regional bodies pursuant to convention, treaty or agreement. Nations will do well to review this practice and to develop safeguards to ensure the review and high-level participation of other important ministries, other than environment (e.g. defence, fisheries, natural resources and commerce).

The failure to address the ongoing ocean noise movement as a non-traditional threat to maritime security may result in unintended, unacceptable, and untenable prohibitions on vital domestic commercial shipping, natural resource extraction and naval defence activities.

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