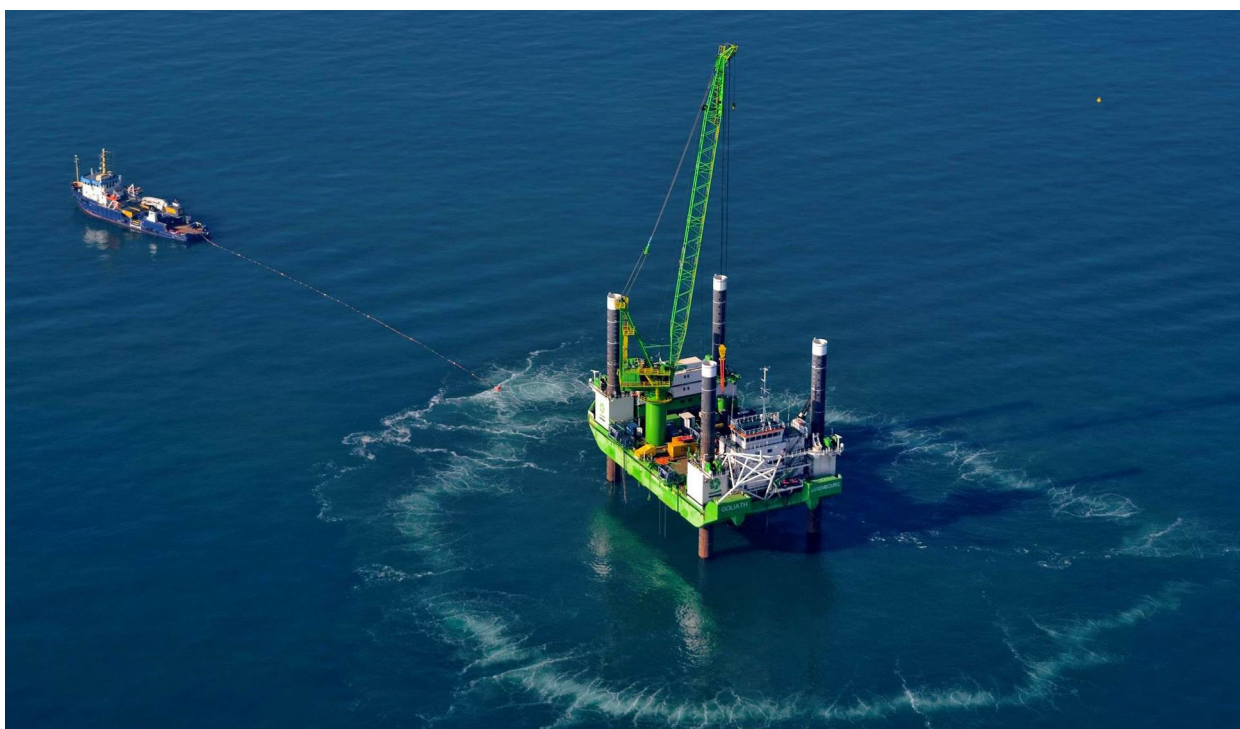




OSPAR

COMMISSION

OSPAR inventory of measures to mitigate the emission and environmental impact of underwater noise



OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.

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The 2025 update of the report was prepared by Niels Kinneging (Netherlands, ICG-Noise co-convenor) and the OSPAR Secretariat.

Annex I by prepared by Sven Koschinski and Karin Lüdemann, Germany

Annex 2 by Ross Compton (EnerGeoAlliance, OSPAR observer organisation)

Annex 3 by Consultants Dr. rer. nat. Andreas Müller, Dipl. Ing. Thierry Maquil and Contributors Dr. Nicole Heilbeck, Dr. Susanne Heitmüller, Dr. Carina Juretzek, Dr. Ing. Christian Krüger

Annex 4 by JNCC, United Kingdom and BFN, Germany. Prepared by Sarah Canning and Sonia Mendes (JNCC, UK), Sven Koschinski and Alexander Liebschner (BFN, Germany)

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1. Purpose of the OSPAR Inventory

One of the Strategic Objectives in OSPAR's North-East Atlantic Environment Strategy (NEAES 2030) is to reduce anthropogenic underwater noise to levels that do not adversely affect the marine environment.

The OSPAR inventory of measures to mitigate the emission and environmental impact of underwater noise was published in 2014 following a recommendation of the Quality Status Report (QSR) 2010 that OSPAR should increase efforts to develop, review and apply mitigation measures to reduce the impacts of underwater noise and develop Guidelines on best environmental practices (BEP) and best available techniques (BAT) for mitigating noise emissions and their environmental impacts (OSPAR 2010). Since then, annexes have been added or updated in 2016, 2020 and 2024. The purpose of this inventory is to provide OSPAR Contracting Parties with an overview of effectiveness and feasibility of mitigation options to avoid or reduce emissions and impacts of underwater noise, and to support OSPAR EU Member States in establishing programmes of measures in relation to underwater noise under the Marine Strategy Framework Directive (MSFD). The inventory is designed to help avoid and reduce the introduction of underwater noise and/or its impacts on the marine environment through a common understanding of best mitigation options and by aiding Contracting Parties in their choice of options in the management of underwater noise sources and ultimately by the application of best available techniques (BAT) and best environmental practice (BEP), as defined in Appendix 1 to the OSPAR Convention, for activities generating impulsive and/or continuous underwater noise.

Developing and employing adequate mitigation measures would help OSPAR Contracting Parties and any other interested party in their efforts to reduce potentially negative effects of anthropogenic underwater noise on the marine environment and to reach noise reduction targets in their national marine strategies and/or Good Environmental Status (GES) according to the MSFD.

2. Introduction

A condensed overview of current knowledge on trends in pressures and impacts of the North-East Atlantic and its regions was provided by OSPAR with the Quality Status Report 2023 (QSR 2023). Underwater noise is recognised as one of the main pressures in the marine environment and the noise levels are thought to be increasing. Underwater noise includes all sounds produced by anthropogenic activities. The QSR 2023 revealed that incidence and intensity of noise pollution, whether continuous noise largely from shipping or impulsive noise from geoscience surveys, pile driving and military activities, are expected to increase in the North-East Atlantic.

Underwater sound is of vital importance to marine life. Marine mammals, many fish species and even some invertebrates use sound to communicate, to find mates, to search for prey, to avoid predators and hazards and to navigate.

Many of the human activities like offshore construction, sand and gravel extraction, drilling, shipping, use of sonar, underwater explosions, seismic surveys, acoustic harassment or deterrent devices generate sound and contribute to the general background level of noise in the sea. Underwater sound from anthropogenic sources has the potential to mask biological communication and to cause behavioural reactions, physiological effects, injuries and mortality in marine animals. Possible impacts depend on the nature and level of the sound and the acoustic sensitivity of the animal.

The QSR 2023 included a Thematic Assessment on Underwater Noise, which listed the dominant source of continuous underwater noise as shipping, recreational boating, fishing, aggregates extraction, oil and gas activities, and offshore wind turbines. Impulsive noise is generated by

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geoscience surveys (e.g. using compressed air technology), pile driving, military sonar and explosions (for UXO removal by detonation). Shipping noise and impulsive noise are particularly intense in the Greater North Sea Region. Underwater noise was seen as a future priority for OSPAR as noise from different sources remains a significant pressure in the OSPAR maritime area. Two Indicator Assessments on Anthropogenic Impulsive Sound Distribution and Anthropogenic Impulsive Sound Risk of Impact, respectively, and a Pilot Assessment of Ambient Noise were published in the QSR 2023, strengthening the importance of this issue. Measures to mitigate impulsive noise have had some impact, but international guidelines on reducing continuous noise appear to have had little effect to date. Despite these overall trends in impulsive noise, the QSR 2023 reported some reduction in noise exposure for harbour porpoise – a species particularly vulnerable to impulsive noise, both because of its distribution in heavily used marine areas and due to its threatened population status. This decrease in noise exposure is a result of measures taken to reduce noise from piling activity.

This OSPAR inventory of underwater mitigation measures focus on certain human activities which are considered of prime concern. As mentioned above the inventory is designed to help Contracting Parties in avoiding and reducing the introduction of underwater noise generated by certain human activities and its environmental impacts by applying appropriate mitigation measures. The mitigation measures are presented separately in annexes each covering one of the following human activities (Those in grey are yet to be completed):

Annex 1: pile driving;

Annex 2: seismic surveys;

Annex 3: shipping (updated 2025);

Annex 4: explosions;

Annex 5: dredging;

Annex 6: sonar;

Annex 7: high frequency impulsive sources (e.g. echosounders)

3. General considerations for mitigation of underwater noise in OSPAR maritime area

There is a wide variety of human activities generating underwater noise in the marine environment. Emitted frequencies range from low frequency in the range of several Hz to very high frequency emissions of several hundred kHz. Source levels may also vary largely depending on the activity. Due to the variation in acoustic characteristics of the anthropogenic noise sources, the site-specific sound propagation and the differences in acoustic sensitivity of marine biota, there is no generic set of mitigation measures that can be recommended. Mitigation measures for underwater noise should therefore be adjusted to match specific area and project-related characteristics.

In general, the overriding objective of all mitigation approaches is to minimise or reduce to an acceptable level the negative impacts of underwater noise generated by human activities to marine life. Death, injury or other temporal and permanent physical damage/impairment as well as disturbance can be seen as examples of negative impacts. Such impacts can occur if the respective activity takes place in an area where noise sensitive species are present at the same time. In that sense, to achieve the aim of mitigation besides pure technological measures several additional options exist that are more or less independent from the activity itself.

Environmental effects of anthropogenic underwater noise may be reduced or avoided by reducing the source level and/or the propagation of noise or by restricting noise generating activities to areas and times not bearing sensitive species. The following list contains options that may be taken into account when considering noise mitigation measures independent of the sort of activity planned:

- if possible, refraining from applying activities generating harmful noise;
- spatio-temporal exclusion or limitation of noise generating activities (*e.g.*, BMU 2013 to protect harbour porpoises from disturbance at most sensitive time of their life cycle);
- overall restriction of anthropogenic underwater noise to a certain level (*e.g.*, limitation of impulsive noise during offshore wind farm construction to 160 dB SEL at 750 m in the German part of the North Sea to protect especially harbour porpoises from being injured);
- general exclusion of noise generating activities from certain areas (*e.g.*, by rerouting of shipping lanes);
- using alternative techniques with lower sound emissions;
- modification of operational state of noise source, *e.g.*, reducing ship speed.

It may be helpful to design a site and activity specific noise mitigation concept prior to the deployment of any measures. For that purpose it seems to be appropriate to:

- forecast possible underwater noise emissions of the planned activity;
- forecast the cumulative effects taking into account the noise introduction of other sources in the same area;
- evaluate the site-specific sound propagation by using appropriate models;
- analyse occurrence and seasonality of sensitive and/or protected marine species in that area in order to identify sound mitigation needs;
- conduct an EIA with respect to the activity planned.

If marine mammals are the species of concern additional measures are available to prevent any death, injury or other physical damage rather than disturbance of individual specimen due to the activity:

- displacing animals from the area of harmful underwater noise with the aid of Acoustic Deterrent Devices (ADDs) and/or Acoustic Harassment Devices (AHDs) such as pingers or seal scarers;
- employing so called soft-start or ramp-up procedures if appropriate to allow animals to escape the area effected detrimentally by the noise;
- ensuring the absence of marine mammals from the impact zone by visual or acoustic monitoring (preferably real time) with the aid of marine mammal observer (MMO) and passive acoustic monitoring (PAM) respectively during the construction phase (*e.g.*, JNCC 2009, 2010).

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OSPAR
COMMISSION

OSPAR Secretariat
The Aspect
12 Finsbury Square
London
EC2A 1AS
United Kingdom

t: +44 (0)20 7430 5200
e: secretariat@ospar.org
www.ospar.org

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