

# Addressing underwater noise in Europe: Current state of knowledge and future priorities

Frank Thomsen, Sonia Mendes, Paula Kellett, Sheila J. J. Heymans

The new European Marine Board Future Science Brief on underwater noise takes a holistic view of the topic and discusses how this topic can be further advanced in Europe. Written by a multidisciplinary group of European experts, it presents priority evidence gaps and barriers for the management of underwater noise. It recommends actions needed to address these gaps and barriers. These actions are relevant for both the marine policy and science communities, and require transdisciplinary communication and collaboration to ensure a holistic approach to addressing this important challenge.

## WHAT HAVE WE ALREADY ACHIEVED?



### Anthropogenic underwater sound

- Characterisation of impulsive & continuous noise sources (e.g. airguns, shipping, pile-driving, dredging)
- Establishment of regional noise registers
- Measurement & mapping of ambient noise levels in parts of Europe
- Establishment of joint regional underwater noise monitoring programmes
- Study of long-term trends in Ocean noise & in exceptional circumstances (e.g. COVID)

### Effect of noise on marine animals

- Development of knowledge on hearing abilities & sound usage, especially for marine mammals
- Recognition of the importance of sound & particle motion for fishes and invertebrates
- Large collaborative field studies run on behavioural responses to noise
- Greater understanding of the mechanisms causing marine mammal strandings
- Development and use of new technology to support research on the impacts of noise

### Managing underwater noise

- International agreements which acknowledge underwater noise as a pressure, especially EU MSFD
- A number of international standards for measuring and reporting underwater noise published
- Progress towards the reduction of noise generated by shipping
- Regulation, management & mitigation measures tailored to specific noise sources or species of concern (e.g. pile-driving & military sonar)

## WHAT ARE THE PRIORITY GAPS AND ACTIONS?

An overarching gap and a barrier to knowledge development, communication between stakeholder groups, and comparison and combination of studies on underwater noise are **standards**, both for measuring and reporting. We need develop internationally accepted standards which address all aspects of underwater noise.

Fundamental to the assessment of noise exposure, dose-response and the management of risk posed by noise, is comprehensive monitoring of marine species' habitat use, movements, behaviour and distribution. Significant process will only be made if studies are appropriately supported with adequate funding and new technologies.

### Anthropogenic underwater sound

- Foster comprehensive monitoring and data collection of current soundscapes / ambient noise, including via joint monitoring programmes in existing and new areas
- Shortlist high priority (and biologically relevant) sound sources and perform standardized source characterisation studies

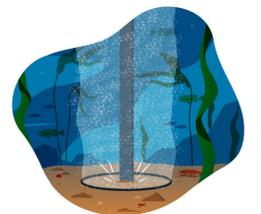


### Effect of noise on marine animals

- Conduct comprehensive monitoring combined with spatial ecological modelling of marine species' dynamic habitat use, movements, behaviour and distribution to establish baselines
- Undertake hearing studies on baleen whales and on selected fish and invertebrate species
- Conduct field and modelling studies on changes in acoustic habitats to identify communication masking risks in fishes and marine mammals
- Conduct further studies on behavioural response of marine mammals and fishes due to exposure to high intensity impulsive sounds to assess population consequences
- Conduct taxa-relevant studies on hearing impairment and physiological stress in invertebrates, fishes and marine mammals
- Conduct dedicated studies including multi-species investigations, predator-prey interactions, and interaction with other food web levels, addressing the question of how noise impacts combine with other stressors
- Develop frameworks and conduct studies to allow population-level assessment of effects from cumulative impact of noise and other pressures

### Managing underwater noise

- Conduct dedicated modelling and field studies to improve understanding of effectiveness, safety and cost-effectiveness of noise mitigation devices, mitigation measures and management options
- Develop regional action plans and guidelines for Environmental Impact Assessment and policies
- Initiate international collaborative transdisciplinary projects to develop stakeholder and societal capacity in understanding and addressing underwater noise, including technical guidance and workshops, sharing data and best practices, and supporting communication



Credit: Amy Dozier, JONAS and SATURN Projects

## FIND OUT MORE

The new EMB Future Science Brief 7 on **Addressing underwater noise in Europe: Current state of knowledge and future priorities** is available and free to download on the European Marine Board website: [www.marineboard.eu](http://www.marineboard.eu)

Hard copies can be requested from the European Marine Board Secretariat at: [info@marineboard.eu](mailto:info@marineboard.eu)

You can also follow the conversation on EMB's social media:



@EMarineBoard



European Marine Board IVZW



EMarineBoard



emarineboard

You can find out more about EMB activities on underwater noise here: [www.marineboard.eu/underwater-noise](http://www.marineboard.eu/underwater-noise)

Keep up to date with the latest news by subscribing to the EMB newsletter:

[www.marineboard.eu/emb-newsletter](http://www.marineboard.eu/emb-newsletter)