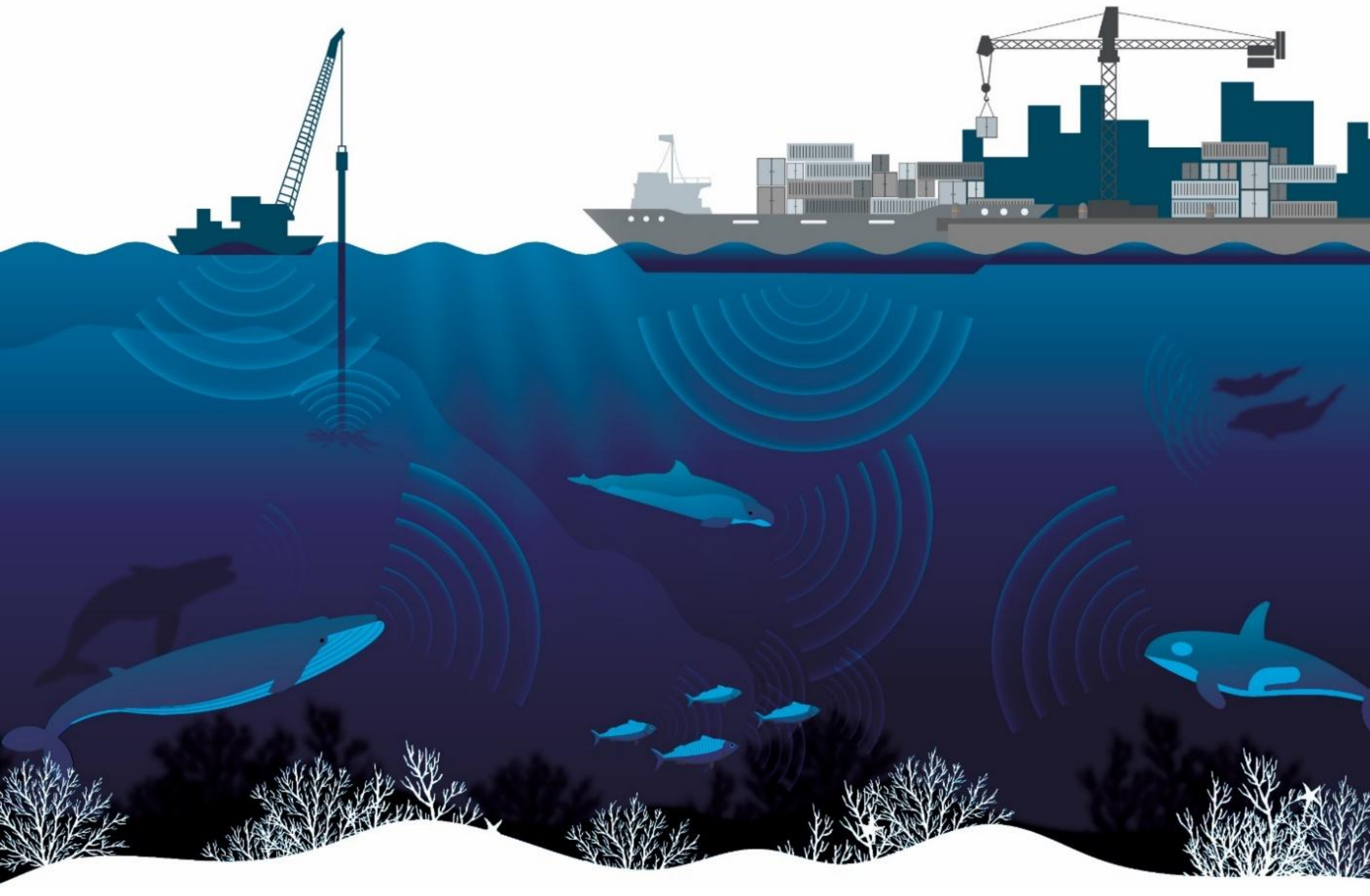
PIANC

The World Association for Waterborne Transport Infrastructure

A GUIDE FOR ASSESSING AND MANAGING EFFECTS OF UNDERWATER SOUNDS FROM NAVIGATION INFRASTRUCTURE ACTIVITIES



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ENVIRONMENTAL COMMISSION

A GUIDE FOR ASSESSING AND MANAGING EFFECTS OF UNDERWATER SOUNDS FROM NAVIGATION INFRASTRUCTURE ACTIVITIES

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PIANC has Technical Commissions concerned with inland waterways and ports (InCom),coastal and ocean waterways (including ports and harbours) (MarCom), environmental aspects (EnviCom) and sport and pleasure navigation (RecCom).

This report has been produced by an international Working Group convened by the Environmental Commission (EnviCom). Members of the Working Group represent severalcountries and are acknowledged experts in their profession.

The objective of this report is to provide information and recommendations on good practice. Conformity is not obligatory and engineering judgement should be used in its application, especially in special circumstances. This report should be seen as an expert guidance and state-of-the-art on this particular subject. PIANC disclaims all responsibility in the event that this report should be presented as an official standard.

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SUMMARY

Activities associated with the construction, operation, and maintenance of waterborne transport infrastructure (e.g. wharves, jetties, shipping channels and berths, piled structures) generate underwater sounds, and there is a growing international awareness that these sounds may impact ecological receptors (e.g. aquatic species) within the surrounding waters.

Underwater sound is not a problem in itself; problems arise when sounds turn into an exposure that has an impact (or poses a risk) (thus becoming underwater noise), which depends on the hearing sensitivity of the receptor species (predominantly aquatic fauna) and on the type of impact generated (e.g. masking, behavioural change, physical damage).

It is possible to broadly determine the risk of potential impacts to aquatic fauna from underwater sound based on the type(s) of activity being proposed. Activities such as underwater blasting and percussion piling can be considered potentially high-risk activities, while other activities, such as drilling and rock dumping, can be considered relatively low-risk activities.

A variety of freshwater, estuarine, and marine animals are known to be affected by anthropogenic underwater sound. Negative effects for more than 100 aquatic species (e.g. cetaceans, teleost fishes, sea turtles and invertebrates) have been reported in scientific studies. Marine mammals have been the most researched and are recognised as being potentially sensitive to anthropogenic underwater sound. More recently other groups including fish, diving birds and invertebrates are also being considered in impact assessments, particularly if important habitats or migration routes occur in proximity to proposed activities.

This report provides a review of the potential biological effects of underwater sound from waterborne transport infrastructure activities and a framework for the evaluation of the potential ecological risks. A risk-based approach is proposed for the assessment and management of the environmental effects of underwater sound associated with the development, operation and maintenance of navigation infrastructure. This methodology can inform management decisions for a comprehensive range of underwater sound sources and site-specific scenarios.

This report is structured to (1) provide an overview of underwater sound including key natural and anthropogenic sources relevant to waterborne infrastructure, (2) provide an overview of the potential environmental effects of anthropogenic underwater sound, (3) present a conceptual framework for the assessment of risk, and (4) recommend guidance on the development of management measures. Additionally, recent case studies are provided to demonstrate the application of risk-based approaches applied to underwater sound scenarios.

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