

ID: W3009237673

TITLE: Ecological Risk Assessment of Underwater Sounds from Dredging Operations

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ABSTRACT:

ABSTRACT There is an increasing international focus to understand and quantify the potential ecological risks of low-frequency underwater sounds produced from anthropogenic activities (e.g., commercial shipping, dredging, construction, and offshore energy production). For dredge operations, a risk-based approach has been proposed for identifying, assessing, and managing risks; however, specific details of the framework and demonstration of the approach are lacking. Thus, the goal of this study was to provide a practical, concise, and reliable framework for assessing the effects of dredging sounds on aquatic life. The specific objectives were to 1) further specify a risk assessment approach for assessing underwater sounds from dredging operations, 2) demonstrate the utility of the approach in practice using a case study, and 3) document the strengths and challenges of the approach. The risk framework was adapted for underwater sounds to include a project formulation step, an analysis step to analyze and assess exposure and biological responses, a risk characterization process in which the preceding steps are integrated and uncertainty is addressed, and a risk management step. A key beneficial component of this framework is the use of a phased approach, whereby a screening step offers a process that utilizes existing or readily available information to evaluate risk. In general, a limitation of evaluating risks due to dredge operations is the degree of uncertainty surrounding effect thresholds for many marine species; however, this approach emphasizes the importance of documenting and communicating uncertainty to regulators, stakeholders, and practitioners in the decision-making process. A case study example is included to illustrate how the framework can be applied in practice. The primary strength of this method is the intrinsic flexibility of the framework to adapt as the scientific understanding improves and new data become available in the rapidly evolving field of underwater acoustics. Integr Environ Assess Manag 2020;16:481-493. © 2020 SETAC

SOURCE: Integrated environmental assessment and management

PDF URL: None

CITED BY COUNT: 7

PUBLICATION YEAR: 2020

TYPE: article

CONCEPTS: ['Dredging', 'Process (computing)', 'Risk analysis (engineering)', 'Underwater', 'Risk assessment', 'Component (thermodynamics)', 'Risk management', 'Computer science', 'Engineering', 'Environmental resource management', 'Environmental science', 'Business', 'Ecology', 'Geography', 'Physics', 'Thermodynamics', 'Computer security', 'Archaeology', 'Finance', 'Biology', 'Operating system']