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TITLE: Sensitivity of the mussel Mytilus edulis to substrate?borne vibration in relation to anthropogenically generated noise

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ABSTRACT:

MEPS Marine Ecology Progress Series Contact the journal Facebook Twitter RSS Mailing List Subscribe to our mailing list via Mailchimp HomeLatest VolumeAbout the JournalEditorsTheme Sections MEPS 538:185-195 (2015) - DOI: https://doi.org/10.3354/meps11468 Sensitivity of the mussel Mytilus edulis to substrate?borne vibration in relation to anthropogenically generated noise Louise Roberts1,*, Samuel Cheesman2,4, Thomas Breithaupt3, Michael Elliott1 1Institute of Estuarine and Coastal Studies (IECS), University of Hull, Hull HU6 7RX, UK 2Subacoustech Ltd., Bishop?s Waltham SO32 1QD, UK 3School of Biological, Biomedical and Environmental Sciences, University of Hull, Hull HU6 7RX, UK 4Present address: Independent research professional, Salisbury SP2 7DS, UK *Corresponding author: louise.roberts@hull.ac.uk ABSTRACT: Many anthropogenic activities in the oceans involve direct contact with the seabed (for example pile driving), creating radiating particle motion waves. However, the consequences of these waveforms to marine organisms are largely unknown and there is little information on the ability of invertebrates to detect vibration, or indeed the acoustic component of the signal. We quantified sensitivity of the marine bivalve Mytilus edulis to substrate-borne vibration by exposure to vibration under controlled conditions. Sinusoidal excitation by tonal signals at frequencies within the range 5 to 410 Hz was applied during the tests, using the ?staircase? method of threshold determination. Thresholds were related to mussel size and to seabed vibration data produced by anthropogenic activities. Clear behavioural changes were observed in response to the vibration stimulus. Thresholds ranged from 0.06 to 0.55 m s-2 (acceleration, root mean squared), with valve closure used as the behavioural indicator of reception and response. Thresholds were shown to be within the range of vibrations measured in the vicinity of anthropogenic operations such as pile driving and blasting. The responses show that vibration is likely to impact the overall fitness of both individuals and mussel beds of M. edulis due to disruption of natural valve periodicity, which may have ecosystem and commercial implications. The observed data provide a valuable first step to understanding the impacts of such vibration upon a key coastal and estuarine invertebrate which lives near industrial and construction activity, and illustrate that the role of seabed vibration should not be underestimated when assessing the impacts of noise pollution. KEY WORDS: Substrate-borne vibration · Anthropogenic noise · Seismic energy · Mytilus edulis · Sensitivity threshold · Marine energy Full text in pdf format Supplementary material PreviousNextCite this article as: Roberts L, Cheesman S, Breithaupt T, Elliott M (2015) Sensitivity of the mussel Mytilus edulis to substrate?borne vibration in relation to anthropogenically generated noise. Mar Ecol Prog Ser 538:185-195. https://doi.org/10.3354/meps11468 Export citation RSS - Facebook - Tweet - linkedIn Cited by Published in MEPS Vol. 538. Online publication date: October 28, 2015 Print ISSN: 0171-8630; Online ISSN: 1616-1599 

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