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TITLE: Quantifying cumulative impacts of human pressures on the marine environment: a geospatial modelling framework

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ABSTRACT:

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<https://doi.org/10.3354/meps08345> Quantifying cumulative impacts of human pressures on the marine environment: a geospatial modelling framework V. Stelzenmüller*, J. Lee, A. South, S. I. Rogers Centre for Environment, Fisheries and Aquaculture Science (Cefas), Pakefield Road, Lowestoft NR33 OHT, UK *Email: vanessa.stelzenmuller@cefas.co.uk

ABSTRACT: Worldwide increasing pressure on the marine environment requires integrated and ecosystem-based management, and a sound understanding of cumulative impacts of human pressure. As yet, the quantification of risk of cumulative impact remains a difficult task in practice. We developed a geospatial modelling framework to group data on the spatial distribution and intensity of human activities by generic pressure. The impact of those pressures was mapped by accounting for the sensitivity of UK marine landscapes to those pressures. With the help of GIS-based multi-criteria analysis, we developed 4 different scenarios to quantify risk of cumulative impacts that accounted for different importance of ranked pressures (equal, linear and logistic decrease), including a simulated expert consultation. Finally, we assessed the sensitivity of the scenario outcomes to changes to input parameters and compared model outcomes. The risk assessment framework exposed both a wide range of possible modelled scenarios and uncertainties, but all scenarios revealed similar locations with an increased risk of cumulative impacts. Results showed that the logistic weighting scheme was very sensitive to changes in the importance and ranking of pressures in comparison to the linear weighting scheme. For marine planning the use of a weighting scheme with more constrained values should be used in conjunction with a sensitivity analysis to determine the order of input parameters. Once a more comprehensive geodatabase becomes available our standardised framework can be applied to support both the development of sustainable marine plans in practise and the prioritisation of different uses. KEY WORDS: GIS-MCA · GIS-based multi-criteria analysis · Fuzzy sets · Human pressures · Sensitivity · Impact · Marine landscapes · Marine planning Full text in pdf format PreviousNextCite this article as: Stelzenmüller V, Lee J, South A, Rogers SI (2010) Quantifying cumulative impacts of human pressures on the marine environment: a geospatial modelling framework. Mar Ecol Prog Ser 398:19-32. <https://doi.org/10.3354/meps08345> Export citation RSS - Facebook - Tweet - linkedIn Cited by Published in MEPS Vol. 398. Online publication date: January 05, 2010 Print ISSN: 0171-8630; Online ISSN: 1616-1599 Copyright © 2010 Inter-Research.

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