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‘Many a mickle makes a muckle’: considering cumulative stressors on marine mammals

Emily Hague¹, Rebecca Walker², Duncan Vaughan², Carol Sparling³, Ross Culloch⁴, Ceri Morris⁵, Alastair Lyndon¹, Teresa Fernandes¹, Lauren McWhinnie¹

¹Heriot Watt University, UK. ²Natural England, UK. ³Sea Mammal Research Unit, UK. ⁴Marine Scotland Science, UK. ⁵Natural Resources Wales, UK

Abstract

The effects of human activity can lead to multiple stressors having a cumulative impact on the environment. Cumulative Effects Assessments (CEA) formally evaluate these impacts, yet are a recognised area of significant weakness despite being an integral component of the Environmental Impact Assessment (EIA) process since its inception in 1985. This is in part because our knowledge of the consequences of anthropogenic impacts, and the associated thresholds, varies broadly, and our understanding of how stressors may interact is limited. As such, CEAs usually assess the impacts of each stressor separately, though it is evident that considering stressors individually or in isolation does not indeed constitute a true assessment of their cumulative effects.

We present the results of a review of >70 CEAs from ten maritime industries considering potential cumulative impacts on marine mammals. Using an objective framework to examine the quality of each assessment allowed for comparison over time and across industries. We found inconsistency in the language used to define and describe cumulative effects, a lack of routinely applied methodology, and an overall disparity in CEA quality across industries. There was no explicit description of the temporal or spatial scale of the assessment in 67% and 41% of cases, respectively, despite defining scale being a critical component of an effective CEA. Furthermore, for over three-quarters of the CEAs the decision provided on whether impacts were predicted to be significant (and so requiring appropriate mitigation measures to be taken) was based on the practitioner opinion rather than quantitative analysis. This raises uncertainty about the effectiveness of these assessments as a replicable tool to quantify and ultimately prevent significant cumulative impacts occurring. We assessed CEAs where marine mammals were receptors due to our collective expertise, however our findings are broadly applicable to CEAs conducted for marine environments.

Keywords

marine mammals, cumulative effects, impacts, practice