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TITLE: Integrating Multiple Pressures at Different Spatial and Temporal Scales: A Concept for Relative Ecological Risk Assessment in the European Marine Environment

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ABSTRACT:

ABSTRACT A Relative Ecological Risk Assessment model is presented with an emphasis on risk calculation and risk characterization. Several types of impacts are incorporated including mortality, competition, and disturbance effects at different spatial scales exemplifying fisheries effects on benthic communities, marine mammals, and birds. Fisheries sectors analyzed are beam trawlers, demersal otter trawlers, gillnet, and sandeel fisheries in the German Exclusive Economic Zone of the North Sea. The basic ecological unit to which the risk score applies is the population/stock level or the distribution range of a community. The risk function comprises an exposure term and the loss function. The loss function is driven by a relative term, that is, the ratio between negative potential, that is, decline or mortality, and positive potential, that is, recovery. Sensitivity analysis is carried out to indicate model precision and its capabilities to distinguish between high and low risk areas and impacts. Limit reference values important for characterization of relative ecological risk are analytically defined. Model parameterization is based on literature review, and calculated examples show that beam trawling appears as a strong risk component to benthic communities, likely to exceed the limit reference value. For marine mammals (i.e., Harbour porpoise) in the German EEZ, by-catch in gillnet fisheries is a relatively strong risk. Key Words: ecological risk assessment North Sea marine protected area Natura2000 ecosystem approach fisheries impact

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