

Benthic Response Index for Assessing Infaunal Communities on the Southern California Shelf

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ABSTRACT

Although benthic infaunal communities are commonly measured to assess the effectiveness of environmental management in protecting biological resources, the tools used to interpret the resulting data are often subjective or site specific. We present an objective, quantitative index for application throughout the southern California coastal shelf environment that measures the condition of a benthic assemblage, with defined thresholds for levels of environmental disturbance. The index was calculated using a two-step process in which ordination analysis was employed to quantify a pollution gradient within a 717-sample calibration data set. The pollution tolerance of each species was determined based upon its distribution of abundance along the gradient. The index is calculated as the abundance-weighted average pollution tolerance of species in a sample. Thresholds were established for reference condition as well as for four levels of biological response. Reference condition was established as the index value in samples taken distant from areas of anthropogenic activity and for which no contaminants exceeded the effects range low (ERL) screening levels. The four response levels were established as the index values at which key community attributes were lost. Independent data sets were used to validate the index in three ways. First, index sensitivity to a spatial gradient of exposure to a discharge from a point source was tested. Second, index response to a temporal gradient of exposure to a discharge from a point source was examined, testing index robustness to natural temporal variation. Third, the effect of changes in natural habitat (e.g., substrate, depth, and latitude) on index sensitivity was tested by evaluating the ability of the index to segregate samples taken in areas with high and low chemical exposure, across a gradient of physical habitats.

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