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Relative performance of the Southern California Benthic Response Index using species abundance and presence-only data: Relevance to DNA Barcoding

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ABSTRACT

Benthic indices used to assess sediment quality are based on having abundance data for all species in the community. Molecular genetic approaches, including DNA barcoding provide promise for improving the speed and accuracy of taxonomic identifications. Future application of DNA barcoding by analyzing bulk environmental samples through next-generation sequencing will enable rapid species identification, but this gain may be offset by the inability of these methods to quantify species abundances. To address this issue we evaluated the performance of the Southern California Benthic Response Index (BRI) when species abundance data were removed from its calculation. The presence BRI was created by eliminating abundance weighting while preserving species identity. The relationship between the presence and abundance BRI was highly significant, with an $r^2 = 0.98$. The presence BRI also validated almost equally to the abundance BRI when applied to the spatial and the temporal monitoring data used to validate the original BRI. Simulations were conducted to assess how large the barcode library must be for an effective index, with changes in the r^2 between the presence and abundance BRI determined as taxa were systematically removed from calculation of the presence BRI. The r^2 remained above 0.8 with fewer than 400 species in the library.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2011AnnualReport/ar11_297_303.pdf