

Effects of Beach Nourishment: Does Increased Microhabitat Diversity Drive Increased Species Richness?

Douglas Johnson¹ and Julian P.S. Smith III^{1,*}

¹ Department of Biology, Winthrop University, SC, USA

*smithj@winthrop.edu

Beach nourishment, or the emplacement of dredged sand to mitigate the effects of erosion, has become a standard method of repairing tourist beaches. One long-term effect of nourishment is a coarsening of the beach, as the finer sediments wash away quickly, leaving behind shell-hash. This is of concern, as sediment grain-size is arguably the major abiotic determinant of meiofaunal community structure. Using sieving granulometry to determine sediment parameters and DNA metabarcoding to characterize the meiofaunal community, we have examined two beaches in North Carolina, USA that differ in nourishment history. Our preliminary findings show that there is a significant difference between the two in sediment parameters, with the nourished beach having a significantly greater mean ($p=0.0013$) and median ($p=0.0002$) grain-sizes. Analysis of alpha diversity from the metabarcoding data shows that the nourished beach exhibits significantly higher diversity (as measured by OTU richness) in all three measures used (Faith's PD, Chao1, and number of OTU's). We hypothesize that the increased proportion of habitat heterogeneity in the nourished beach supports higher species richness.

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Keywords: Beach nourishment, metabarcoding, species discovery, species diversity

Individual and community level responses of benthic nematodes to the environmental estuarine gradient (Sado estuary, SW coast, Portugal)

Kasia Sroczyńska^{1,*}, Teresa Rosmaninho¹, Paula Chainho² and Helena Adão¹

¹MARE – University of Évora, School of Sciences and Technology, Apartado 94, 7002-554 Évora, Portugal

²MARE - University of Lisbon, Faculty of Sciences, Campo Grande, 1749-016 Lisboa, Portugal

*kasia@uevora.pt

Nematodes are among the best candidates for ecological quality assessment due to their ubiquity and sensitivity to abiotic stressors. A background knowledge of how the complex mix of environmental conditions along the Sado Estuary sections affect nematode structural and functional distribution patterns is a prerequisite to develop future bio-assessment tools. Nevertheless, there is less knowledge on how individual species respond to the environmental estuarine gradient when compared to community responses. This study represents the first

data of nematode assemblages and its functional traits (Maturity index-MI, Trophic diversity index - TDI⁻¹) and morphometric attributes (length, weight, L/W ratio and individual biomass) in the Sado Estuary, Portugal. A strong influence of oxygen, temperature, salinity, organic matter content and % of gravel on community structural organization was identified, whereas no significant differences among different estuary “sections” were found for diversity indices, abundance and functional MI, TDI⁻¹ indices. Morphometric attributes at the nematode assemblage level were driven by temperature, while at the individual genus level they were mainly associated to salinity, depth and gravel %. Length positively responded to salinity, whereas weight and biomass of most individual genera were positively related to % of gravel and inversely to depth. Significant differences in individual morphometric parameters were found among different estuary sections, although there were no significant differences for diversity metrics and species abundance. This finding suggests that morphometric attributes at the individual genus level better represent differences in abiotic conditions, when compared to community level indicators. These results provide important evidence to support the use of morphometric attributes at the individual genus level as indicators to assess environmental status.

Keywords: Nematode genera, nematode community, estuarine gradient, morphometric attributes, functional traits