

Southern California Bight 2013 Regional Monitoring Program: Volume VI. Benthic Infauna

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EXECUTIVE REPORT

One of the central tenets of benthic ecology is that changes in macrobenthic (i.e., those animals that live in and on the bottom of the ocean) community structure can be used to infer the overall health and condition of the location where the organisms are collected. Macrobenthic community structure is a good indicator of ecosystem condition and health because these animals are directly associated with the sediment where most toxics accumulate, they have limited mobility to escape stressors, and they display a wide range of physiological responses and tolerances to different types of stressors. In addition to their use as ecosystem condition indicators, macrobenthic community composition also provides direct measures of Estuarine Habitat, Marine Habitat, and Shellfish Harvesting beneficial uses, as well as indirect or partial measures of a variety of other beneficial uses.

This report presents the results and interpretation of the macrobenthic infaunal component of the 2013 Southern California Bight Regional Monitoring Program's Contaminant Impact Assessment element. The objectives of this study were to measure the extent and magnitude of macrobenthic community composition across the Southern California Bight and to characterize the trends in that condition over the last 15 years (1998-2013).

Samples of benthic macrofauna were successfully collected at 361 sites across the Southern California Bight, ranging from Point Conception in the north to the US-Mexico border in the south using a random tessellation stratified design. Samples were allocated across 12 different strata; 4 in enclosed embayments, 4 on the continental shelf, 2 on the continental slope, and 2 that span both the shelf and the slope. Approximately a third of those sites were revisits of sites that had previously been sampled in 2008 and 2003 or 1998. Samples were collected with a 0.1-m² Van Veen grab, sieved on a 1-mm screen, and then preserved for identification. Specimens from each sample were sorted from the detritus and identified to the lowest possible taxonomic level, typically species.

All data passed Quality Assurance/Quality Control Data Quality Objectives set for sorting accuracy (95%), taxonomic identification accuracy (90%), taxonomic discrimination (90%), and counting accuracy (90%). Sorting accuracy was 97.7% across all samples, with a minimum amount of corrective actions needed. The taxonomy labs averaged 97.7% accuracy of identification, 91.6% accuracy in taxonomic discrimination, and 95.3% accuracy in counting.

Macrobenthic community composition was assessed for the continental shelf portions of the Southern California Bight (6-200m deep) and embayments with salinity greater than 27 psu (practical salinity units). These areas represent approximately 37% of the total area of the Southern California Bight. The Benthic Response Index (BRI) (Smith et al. 2001) was used to assess samples from the continental shelf and the California Sediment Quality Objectives Benthic Line of Evidence (SQO BLOE) (Ranasinghe et al. 2009, Bay et al. 2014) framework was used for samples from embayments. Each of these indices had

four condition categories, but for simpler interpretation this gradient in condition was condensed into two categories: good condition (reference + low disturbance conditions) and poor condition (moderate disturbance + high disturbance conditions).

Benthic macrofaunal composition indicated that the vast majority of the Southern California Bight was doing well in 2013. More than 98% of the assessable portions of the region were in good condition (77.9% reference condition + 20.6% low disturbance condition) and less than 2% were in poor condition. However, macrobenthic community conditions were not uniform across the regions. The embayment strata were in relatively poorer condition compared to the rest of the region with over 16% of the embayment area in moderate (14%) or high disturbance (2.3%). In contrast, the continental shelf strata were in relatively better condition with 1.2% in moderate disturbance condition, and no portions of the strata were in the high disturbance condition.

While the vast majority of the Bight macrobenthic community composition was in good condition in 2013, the patterns in condition scores and composition suggested changes in the macrobenthos compared to previous surveys. Though still characterized as being in good condition overall, the multi-survey temporal trend illustrated a decrease in the amount of reference condition area paired with an increase in the amount of reference condition area paired with an increase in the amounts of low disturbance area. Analysis of the subset of sites that were revisited during multiple surveys showed a similar pattern, indicating that 63% of the region had a stable trend in condition scores from 1998 – 2013, but 32% of the area showed a declining trend over the same period and 5% showed an improving trend in condition score. Both the multi-survey and site-revisit approaches to characterizing temporal trends indicated that the most notable reductions were located in the Channel Islands stratum. In contrast, the estuaries stratum had the largest relative proportion of area improving in condition over time. Unfortunately we lack a robust casual framework to identify the potential local or regional causes driving these subtle changes in the macrobenthic communities of the region.

Full Text

http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/971_B13BenthicInfauna.pdf