Quantifying changes to deep-sea coral-associated infaunal communities in the Gulf of Mexico after the Deepwater Horizon oil spill

Jill R. Bourque[1] and Amanda W.J. Demopoulos[1]
[1]Wetland and Aquatic Research Center, U.S. Geological Survey, 7920 NW 71st St, Gainesville, FL 32653, jbourque@usgs.gov

Deep-sea corals create complex three-dimensional habitats that support distinct communities in adjacent sediments. While these systems may harbor significant levels of biodiversity and enhanced densities, details of their community structure and function are just starting to emerge. Several deep-sea coral habitats were impacted by the 2010 Deepwater Horizon (DWH) oil spill and recovery of associated sediment communities may take several years. While spill-associated organic enrichment may lead to increased abundances of tolerant taxa, toxic effects of the spill may lead to declines in sensitive groups that can persist over time. However, temporal variability in coral-associated sediment macrofauna is unknown and represents an important consideration for post-spill community assessments. We present information on an ongoing assessment of the long-term effects of the DWH oil spill on deep-coral ecosystems in the Gulf of Mexico. Study areas were located on the continental slope of the northern Gulf of Mexico, including impacted coral locations within BOEM Lease Blocks Mississippi Canyon (MC) 294, 297, and 344, and reference coral locations at MC036 and Atwater Valley 347. Between 2010 and 2016, we collected quantitative samples of macrobenthic (> 300 μm) communities and their environment using ROV deployed push cores to sample sediments. We examined infaunal communities to quantify post-spill temporal changes in community metrics, including density, diversity, and community composition, which were coupled with sediment characteristics (e.g., grain size and organic carbon). Macrofaunal densities at impacted sites varied over time, while diversity was lower than at reference sites. Polychaete communities differed among years within impacted sites but not within reference sites. Specifically, the relative proportion of sensitive and tolerant taxa varied among years as did key sediment parameters. These multi-year data provide an unprecedented 7-year post-spill baseline for tracking changes in coral-associated sediment communities in natural habitats. These results will help inform future monitoring and restoration activities and lead to the development of effective adaptive management and conservation strategies for these vulnerable ecosystems.