Biogeochemical responses to the installation of artificial reefs on the shallow Northeastern Gulf of Mexico Shelf: primary production, respiration and nutrient fluxes

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In response to the Deepwater Horizon Oil spill, which led to extended closures of offshore fisheries, significant early restoration funding has been devoted to the deployment of offshore artificial reefs in the northern Gulf of Mexico. We examine the effects of artificial reef habitat on ecosystem productivity and nutrient cycling using a before, after, control and impact design. Specifically, we address the question whether artificial reefs create biogeochemical hotspots and increase rates of primary productivity, which then enhances secondary productivity including fish production. We examined fish community composition, pelagic and benthic associated primary production, and nutrient exchange across the sediment-water interface for a year prior to reef deployment and then following colonization of the reef. Benthic chambers were deployed at nine study sites to examine sediment-water exchanges of dissolved oxygen content, ammonium, dissolved inorganic phosphate, nitrite, and nitrite plus nitrate. Light reaching the sandy sediment surface supports a productive benthic microalgal community, particularly during the summer. Reef associated primary production, respiration and nutrient fluxes have increased as colonization by biofouling benthic invertebrates has increased.