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Examining the Effects of Sea Level Rise on the Intertidal Oyster Crassostrea Virginica and Associated Biodiversity, in the Intertidal Waters of Apalachicola Bay, Florida

EXAMINING THE EFFECTS OF SEA LEVEL RISE ON THE INTERTIDAL OYSTER *CRASSOSTREA VIRGINICA* AND ASSOCIATED BIODIVERSITY, IN THE INTERTIDAL WATERS OF APALACHICOLA BAY, FLORIDA

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The Intergovernmental Panel on Climate Change (IPCC) predicts sea level rise in the next century between 25 and 56 cm. Changing sea level may result in variations within sedimentation patterns, predation and competition between organisms. The Eastern oyster *Crassostrea virginica,* is an ecologically and commercially important species in Apalachicola Bay, Florida. As part of a modeling project The Ecological Effects of Sea Level Rise in the Northern Gulf of Mexico (EESLR-NGOM), oyster "ladders" were developed that support five oyster recruiting mats and sediment traps at 30cm increments within the intertidal zone, from the benthos to just below the mean high tide water line, resulting in percent submersion times from 1% to 98%, submergence time is a proxy for sea level rise.

Five ladders were deployed at each of the two sites adjacent to live intertidal oyster reefs within Apalachicola Bay, one inside the Apalachicola National Estuarine Research Reserve, and the other within St. George Island State Park. Each ladder was constructed of PVC and wood, the ladders were anchored and leveled at equal depths to one another. Both locations were chosen in protected areas which made them unlikely to experience oyster harvesting. Ladders were monitored for six weeks during the summer 2011 oyster recruitment season, daily for abiotic factors: water temperature, air temperature, salinity and wind speed, and biweekly during high tide for sediment, sessile and motile organisms: species richness, species abundance, orientation and size of oyster spat.

Significant differences were found in spat recruitment with peaks at 70% submergence, and spat size peaking at the highest submersion times, oyster spat recruitment peaked on mats submerged sixty to eighty percent of the time (Figure 1). Oyster spat length significantly increased with submergence time (Figure 2). Growing angle of oyster spat from the benthos was non-significant during the six week trial time. Barnacle recruitment varied significantly with time submerged; there was also a block effect as 98% of barnacles recruited at the State Park site (Figure 3). As sea level rise occurs, submersion time on intertidal oyster reefs will increase. Sedimentation showed a significant pattern with more sediment accumulated closer to the benthos (Figure 4). Since optimum submersion time for oyster recruitment was sixty to eighty percent, future recruitment may decrease on existing reefs and may drive reefs shoreward. Additional effects are expected to be seen for spat angle measurements on longer trials. Longer trials are scheduled to run from May to December, 2012 at two sites in Apalachicola Bay, FL and two sites in Grand Bay, MS.

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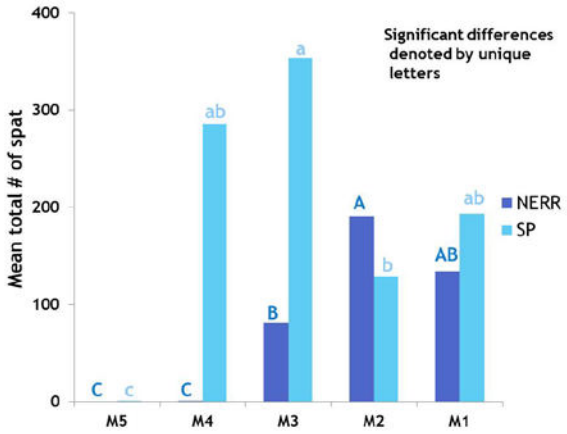

Figure 1 Mean number of live oyster spat.

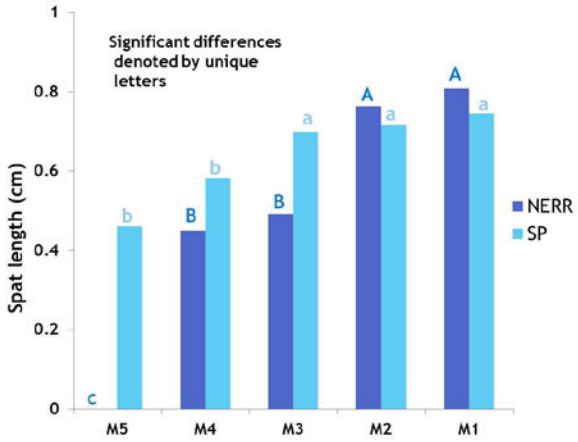

Figure 2 Mean oyster spat length.

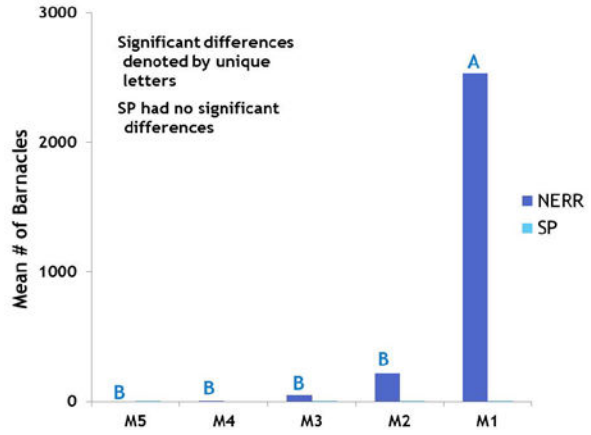

Figure 3 Mean number of barnacles.

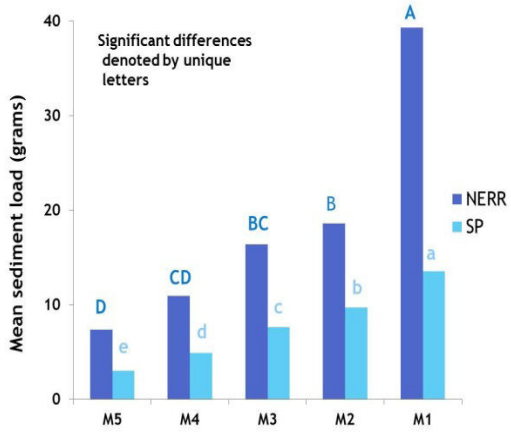

Figure 4 Mean total weight of sediment.