Abstract

Since the 1950s, the Galveston Bay (GB) system has lost over 47,000 acres of marsh. A recent Living Shorelines (LS) effort has been underway since 1995. Anecdotal evidence suggests Living Shorelines (LS) projects are an ecologically beneficial option for erosion control and property protection. However, much of the scientific data regarding ecologic function comes from large-scale habitat restoration projects rather than smaller sites reflective of the majority of LS sites in GB. Much of this anecdotal habitat occurs where LS sites have been placed in a very small portion of the total 47,000 acres of marsh. This study was compared to natural marsh reference sites and traditionally armored (bulkhead) sites near each project site to ascertain what ecological benefits may be measured. The data suggests that while the restored sites are similar to natural sites across a number of the ecologic community characteristics measured, time may be required before community development achieves ecologic parity with comparable natural sites.

Objectives:

• Compare ecosystem community metrics of natural reference sites to restored (LS) sites and bulkhead armored sites.
• Plant species diversity, coverage, and abundance
• Characteristics of Spartina alterniflora biomass
• Nekton community diversity, richness, and abundance

Introduction

Marshes provide many benefits including nutrient recycling, wave buffering, and nursery habitat for the juvenile stages of many species of marine invertebrates and fish. For example, shrimp and blue crab population have been correlated with the availability of wetland habitat (Minello, 2006). Previous research in GB and other locations has indicated that there are significant functional differences between a created/restored marsh and a natural reference marsh, particularly inFunctional and nekton densities (Minello and Webb, 1997; Rozas et al., 2005). This study was a scientific approach to measuring the differences between reference, restored LS, and bulkhead armored shoreline sites.

Methods

• Compared each LS site to a natural reference site and bulkhead site.
• Plot transect method: two-meter transect located parallel to the shoreline, one-square-meter plots at each and one center point on transect line
• Samples collected April 2012, June 2012, and June 2014
• Standard water quality parameters
• Plant species diversity, coverage, abundance, importance value, 1. Are they similar to other created/restored marshes?
2. How do living shoreline sites compare to natural marshes?

Preliminary Conclusions

• The data suggests that while the LS sites are similar to the natural sites across a number of the ecologic community characteristics measured, time may be required before community development achieves ecologic parity with comparable natural sites.
• The data partly supports our hypothesis

Future Work

• Sample additional sites
• Additional sample sites are ongoing

Acknowledgements

Thank you to the landowners for allowing access to the sites and to the Trull Foundation, the Coastal Society and RAE for funding support. Travel support for Abby Ficklin and Zachary Martin was provided by NSF S-STEM grant # 1259362 made to the University of Houston – Clear Lake. Also thanks to Monica Buenrostro, Lauren Eagle, Becky Freeman, Trey Gammon and Phylis Woodley for their assistance.

References

• Minello, T.J. 2004. A habitat-use model to determine essential fish habitat for juvenile brown shrimp (Farfantepenaeus aztecus) in Galveston Bay, Texas. Estuaries 27(2):387-397.
• Minello, T.J. and J. Webb. 1997. Use of natural and created Spartina alterniflora salt marshes by fishery species and other aquatic fauna in Galveston Bay, Texas, USA. Marine Ecology Progress Series 151:165-179.

Appendix

Table 1. Living Shoreline, Bulkhead, and Reference Sites. Bold indicates site was compared to natural marsh reference sites and traditionally armored (bulkhead) sites near each project site to ascertain what ecological benefits may be measured.

<table>
<thead>
<tr>
<th>Site</th>
<th>Date</th>
<th>Species Richness</th>
<th>Nekton Species Diversity</th>
<th>Plant Species Diversity</th>
<th>Total Plant Abundance</th>
<th>Benthic Macroinvertebrate Species Richness</th>
<th>Benthic Macroinvertebrate Species Diversity</th>
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Living Shorelines: Small Scale Restoration Efforts and Their Ecological Impacts on Local Communities

Zach Martin, Abby Ficklin, Robert Cummings, Thomas Provost, Lee Anne Wilde, Tia Hall, and Jim Dobberstein

Lee College and The Galveston Bay Estuary