



# The living shoreline approach as an alternative to shoreline hardening: Using science to inform coastal management policies

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Sea wall



Shoreline hardening

Groin/Jetty



Photo credit: CC News & Times

Breakwater



Photo credit: VIMS

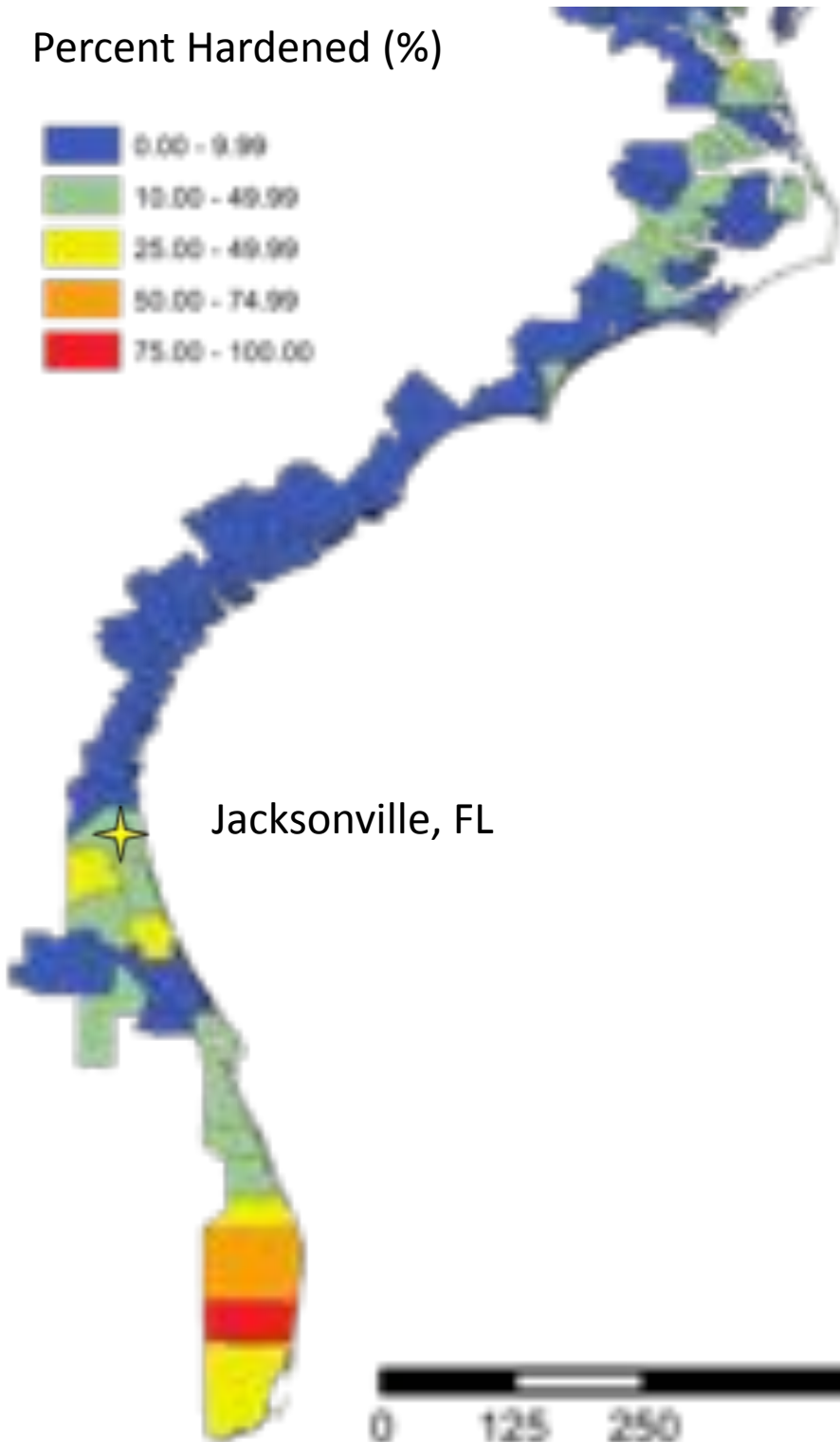
Bulkhead



Riprap Revetment



Percent Hardened (%)



Jacksonville, FL

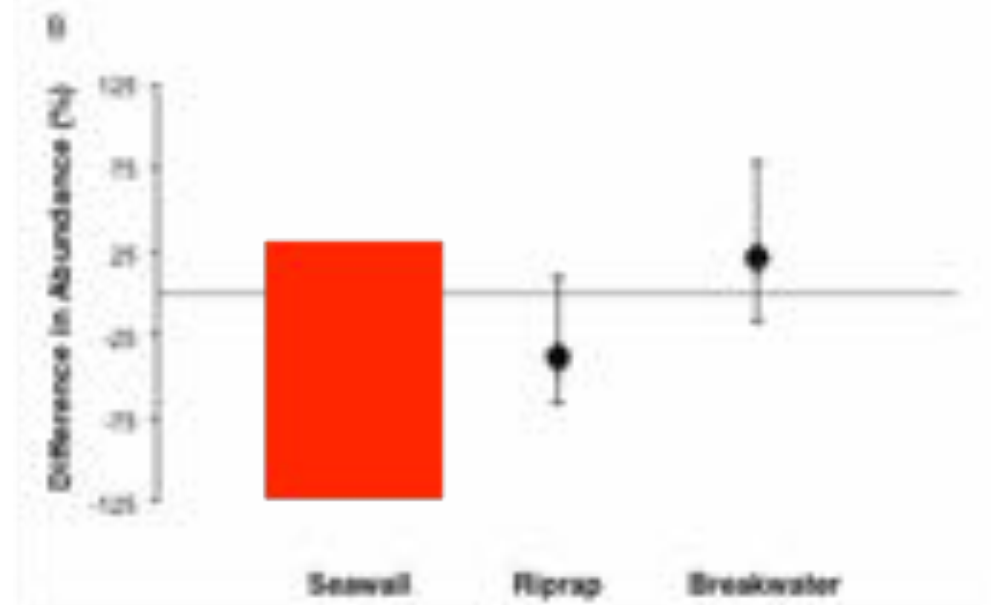
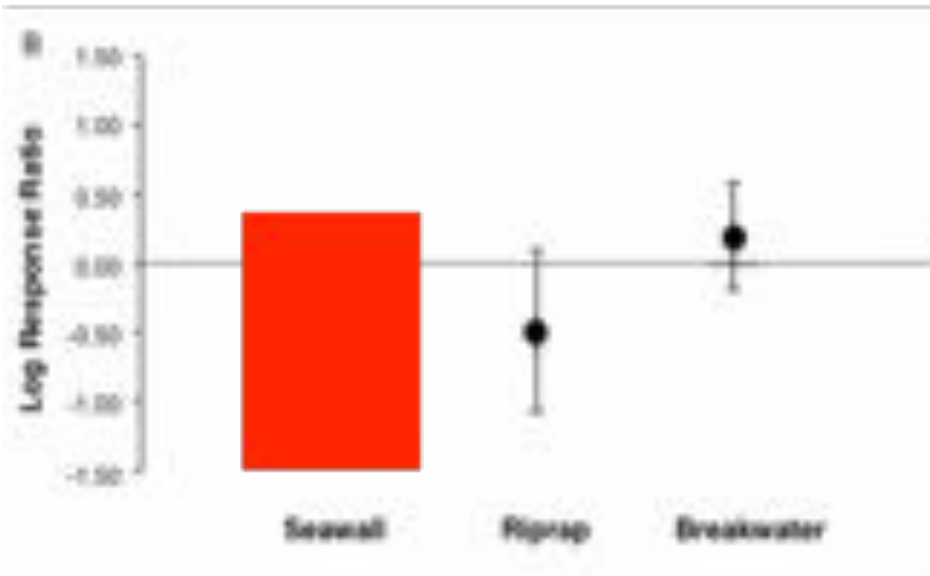
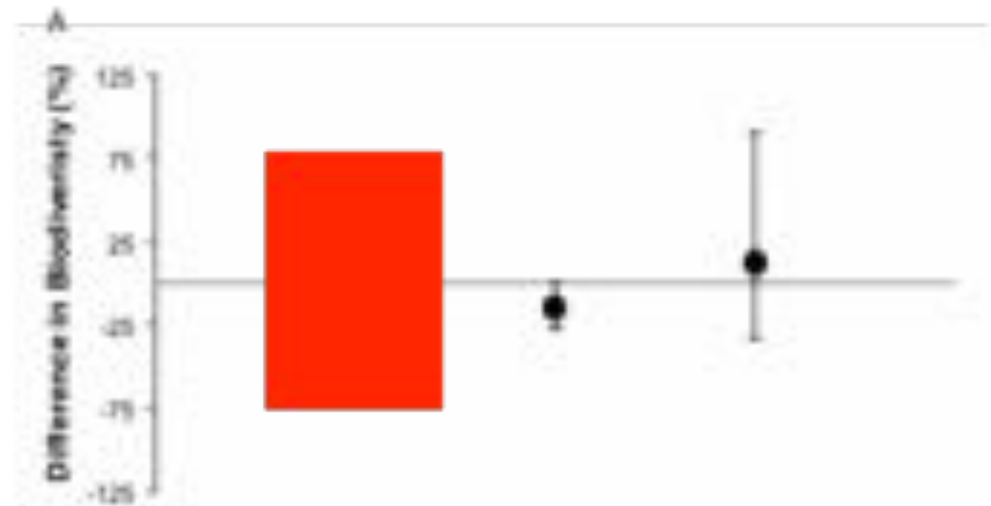
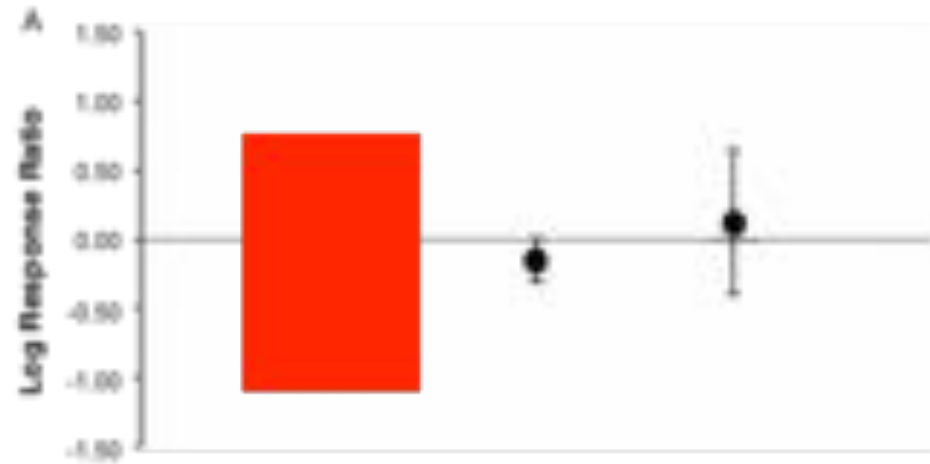
# Shoreline Hardening Southeast Sheltered Coast

~**14%** of the continental U.S.  
shoreline is hardened

~**10%** of the sheltered  
shoreline from NC to FL is  
hardened



# Shoreline hardening effects

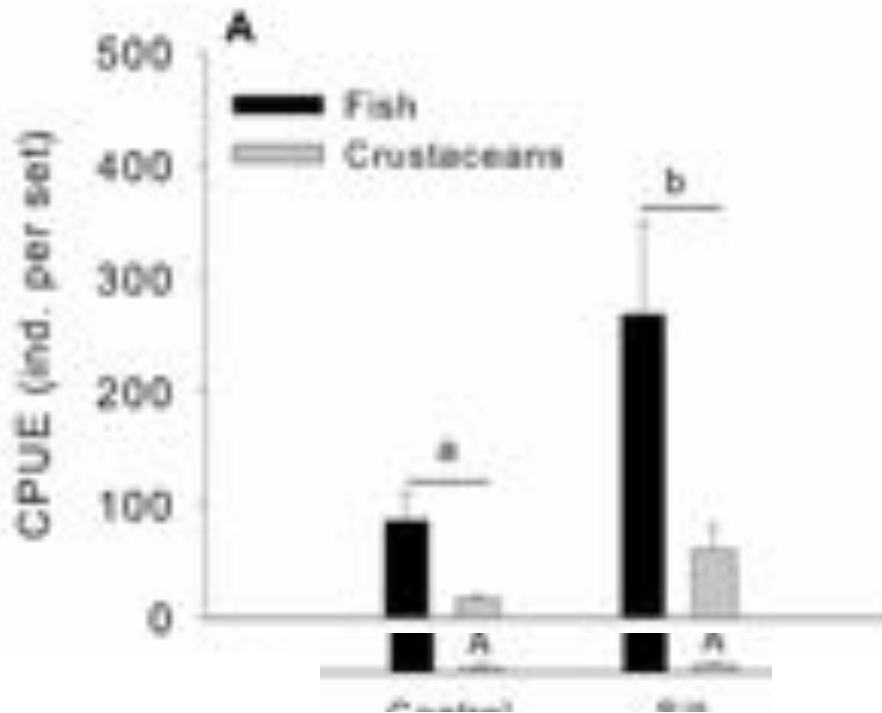
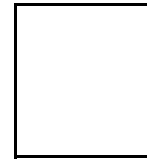
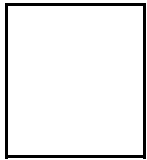


# What are the alternatives?

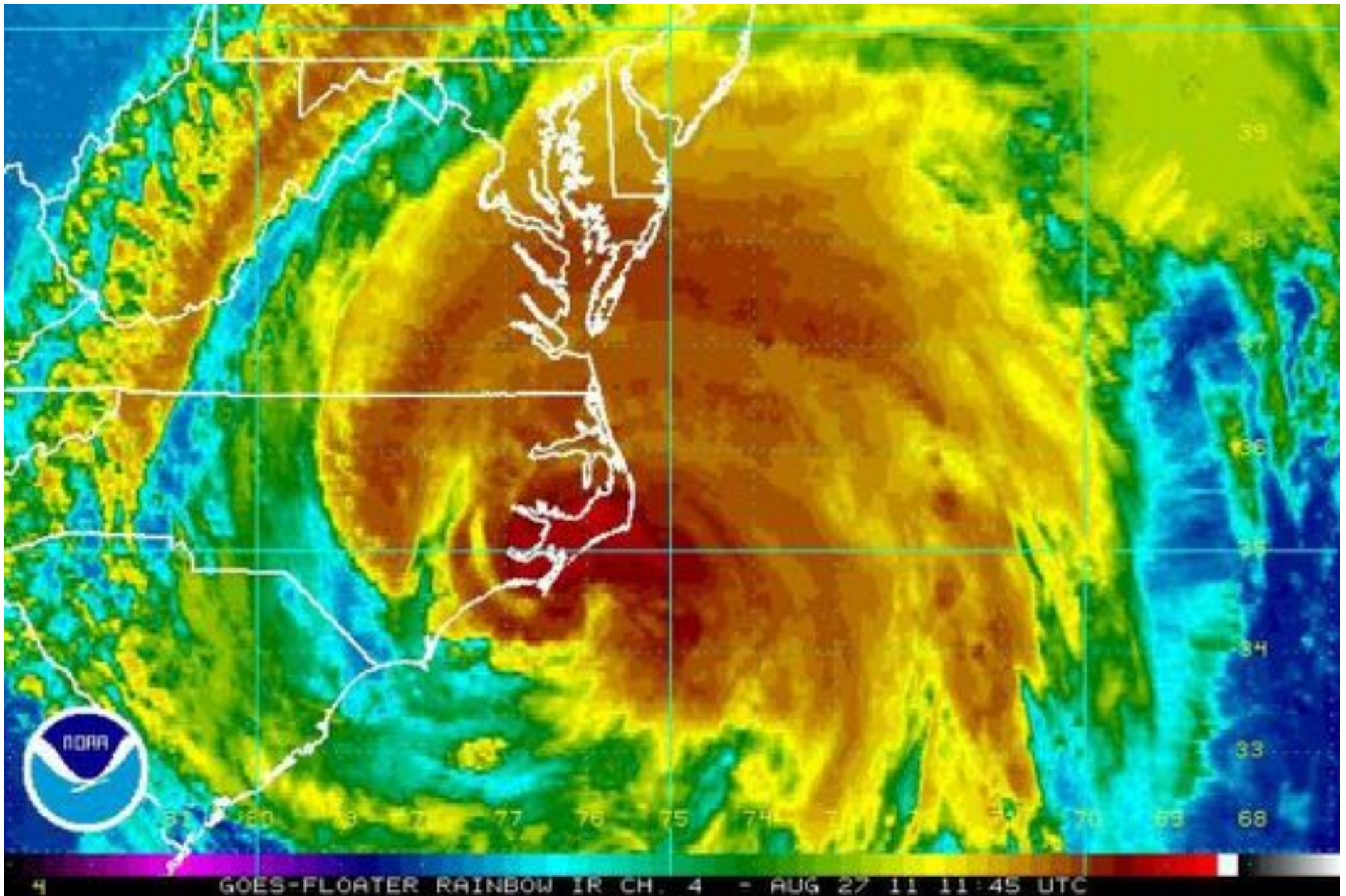
**Living shorelines** “A living shoreline incorporates vegetation or other ‘soft’ elements alone or in combination with some type of harder shoreline structure (e.g. oyster reefs or rock sills) for added stability. Living shorelines maintain continuity of the natural land - water continuum and reduce erosion while providing habitat value and enhancing coastal resiliency. (NOAA 2015).



# Comparison of marshes with and without sills



# Erosion Protection





# Erosion Protection



# Acknowledgements

## **Co-authors**

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