Habitat Tradeoffs Workshop:

Living Shorelines

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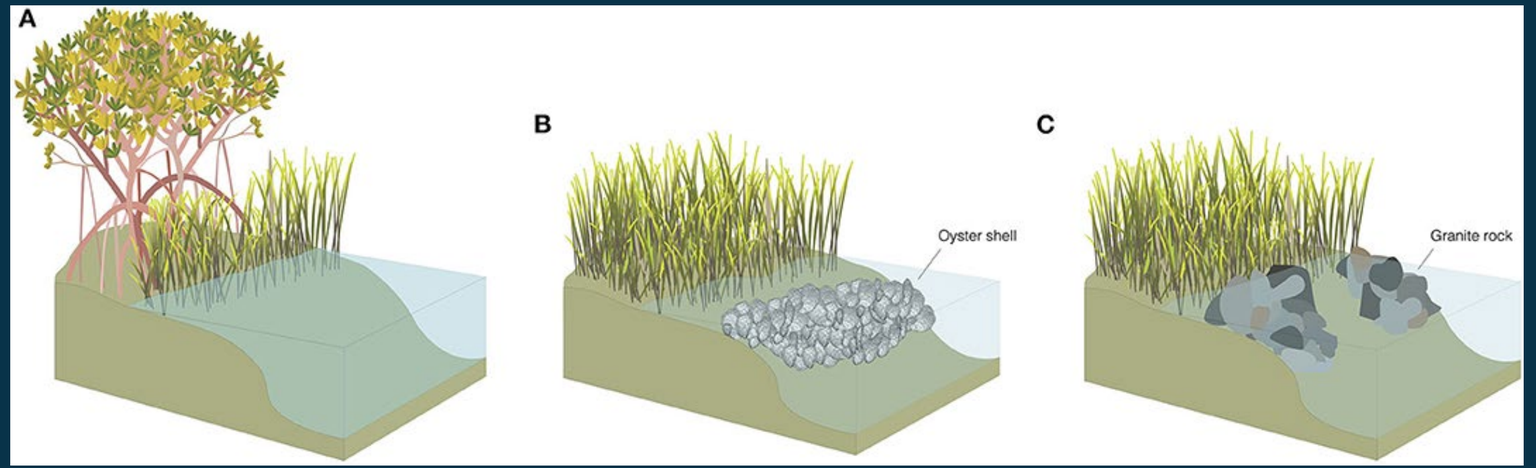
Photo Credits: R. Gittman

Living shorelines

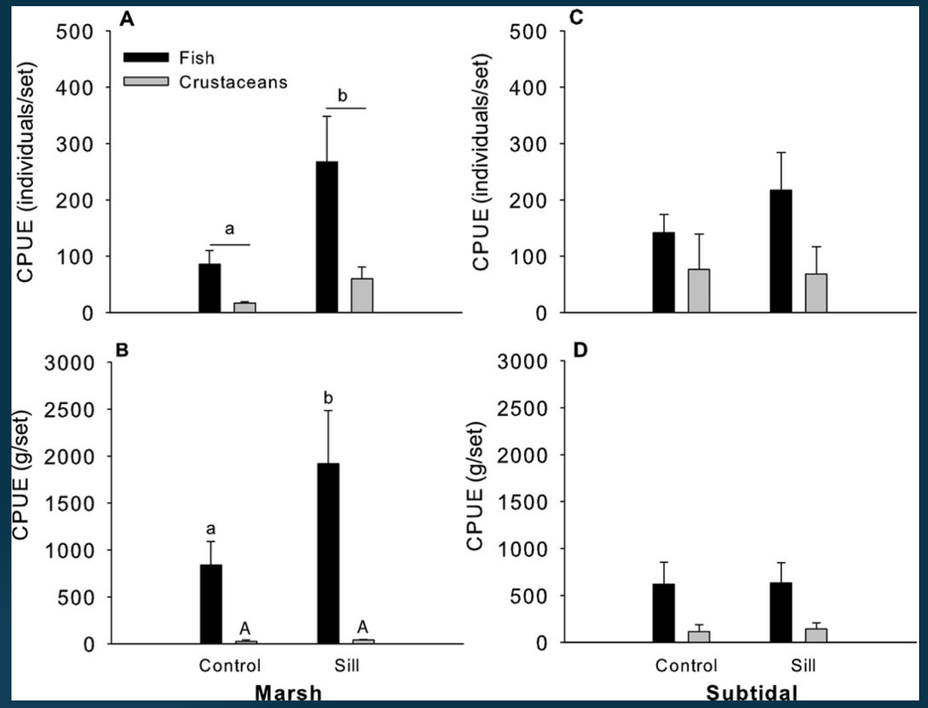
Shoreline protection approaches that incorporate habitat restoration alone or in combination with some type of built infrastructure to provide coastal protective services to humans.

(NOAA 2015, Smith et al. 2020)



Smith et al. 2020 Frontiers in Marine Science

Living Shorelines: Habitat



Gittman et al. 2016 *Ecological Applications*

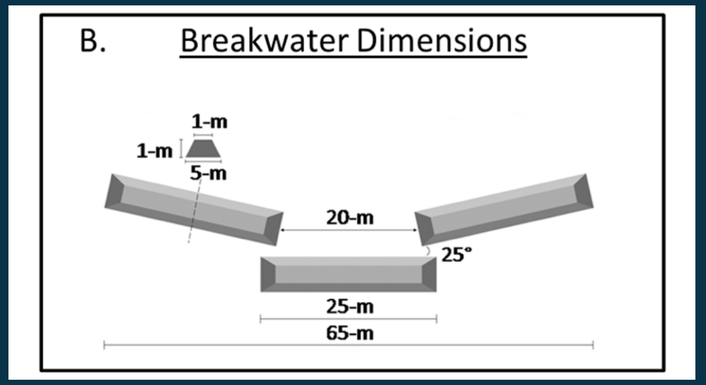
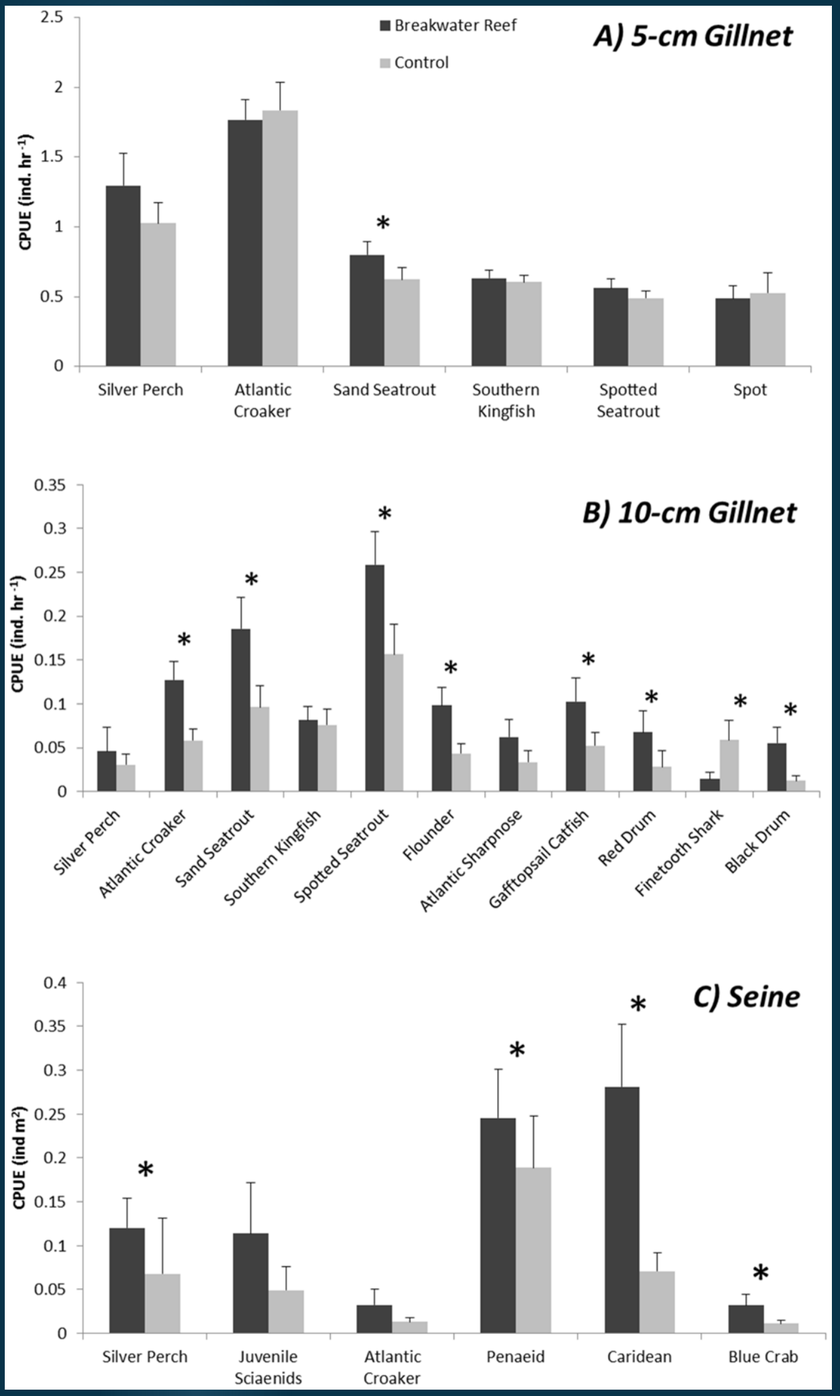


Table 6 Mean seasonal abundance of crabs, fish and shrimp for natural and restored marshes at DUML and NCMM for all years combined

	DUML				NCMM			
	Spring		Fall		Spring		Fall	
	Natural (9)	Restored (9)	Natural (6)	Restored (6)	Natural (6)	Restored (6)	Natural (12)	Restored (12)
Crabs	1.00 ± 0.78	0.56 ± 0.34	2.00 ± 0.86	**3.33 ± 1.52**	5.17 ± 1.56	2.50 ± 1.23	4.33 ± 0.99	3.75 ± 0.90
Fish	**773.11 ± 258.25**	**912 ± 185.53**	173.33 ± 79.90	166.17 ± 60.27	**1220.67 ± 588.87**	**986.33 ± 515.07**	47.83 ± 15.34	32.08 ± 9.25
Shrimp	**51.33 ± 28.53**	13.44 ± 9.35	2.00 ± 1.44	20.83 ± 14.11	18.00 ± 8.06	42.83 ± 15.95	15.00 ± 5.42	8.42 ± 4.73

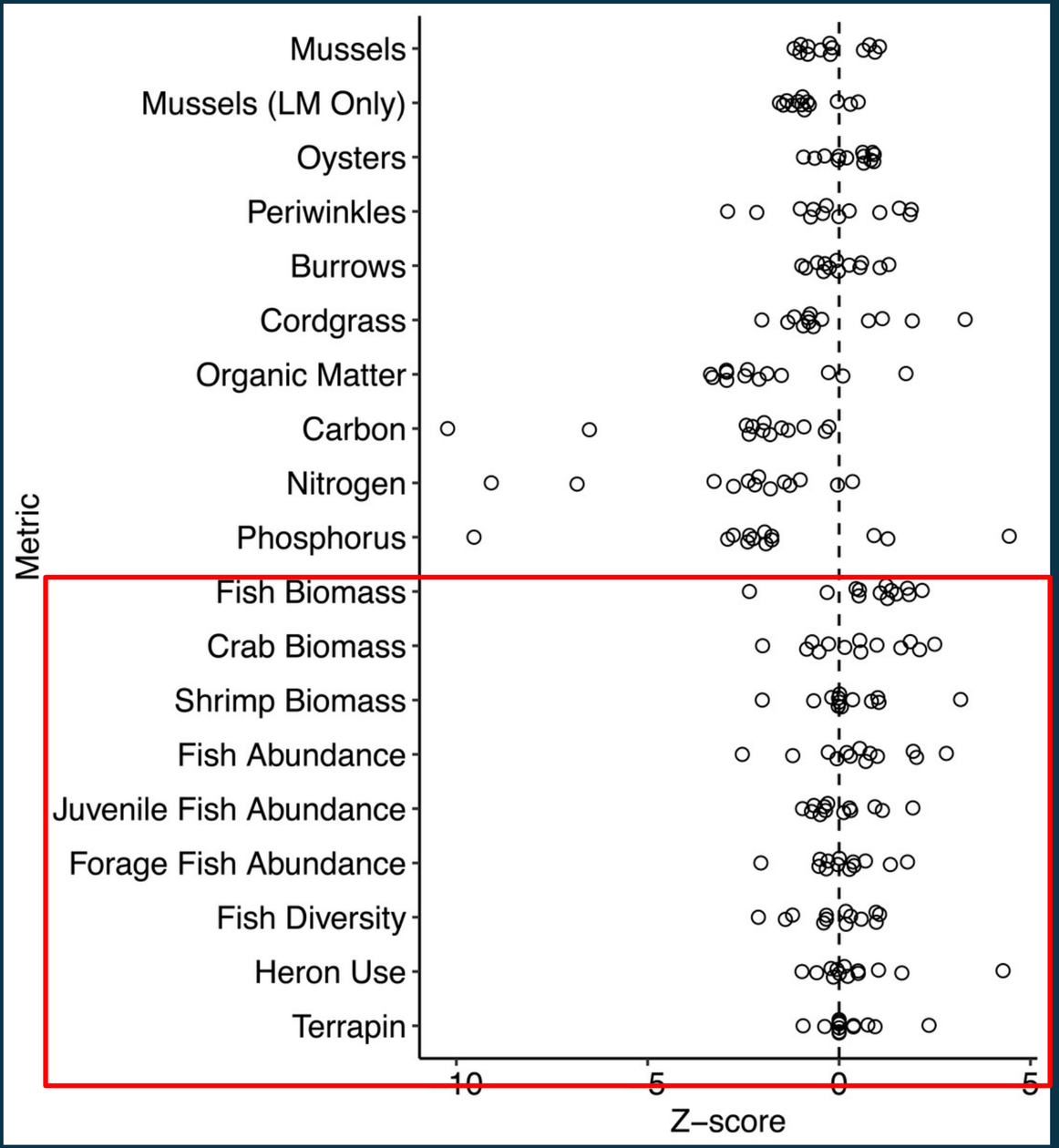
Standard error and number of samples (in parentheses) are also shown. Within each site, seasonal values were not significantly different between restored and natural marshes. Bold values indicate that seasonal abundance per site and marsh type was significantly greater in that season than in the other

Currin et al. 2008 *Wetlands Ecology Management*

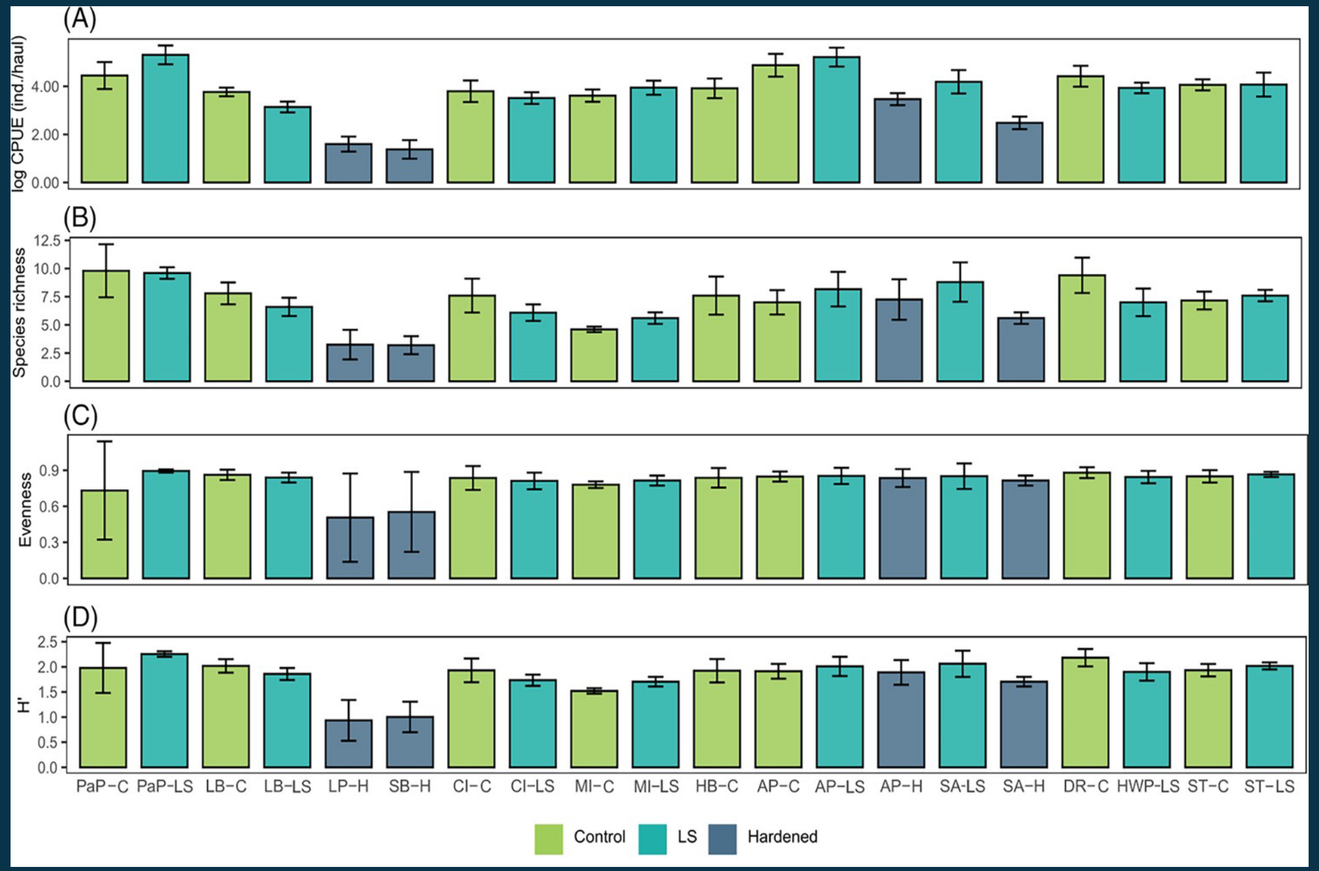


Scyphers et al. 2011 *PLOS One*

Living Shorelines: Habitat

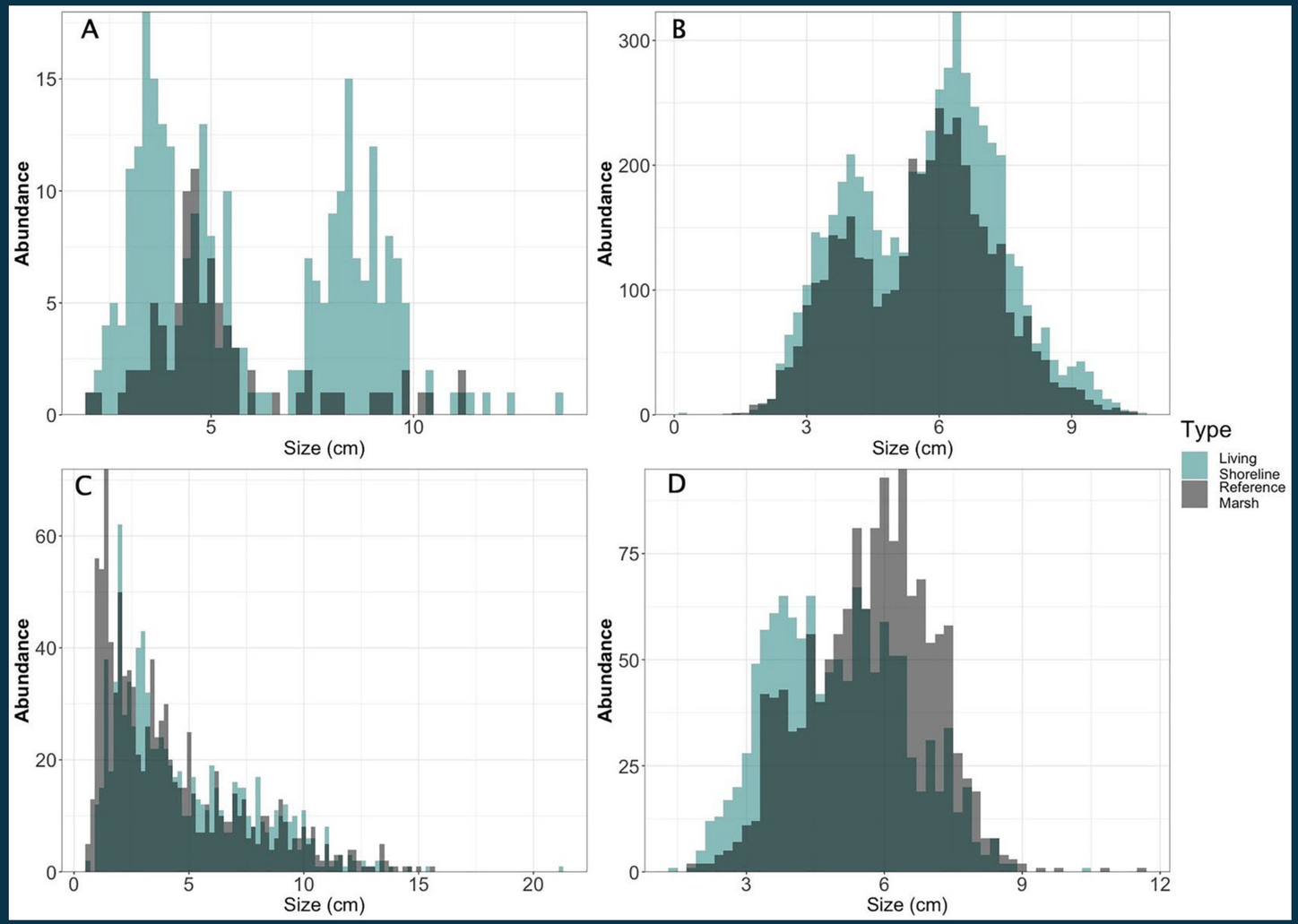


Isdell et al. 2021 *PeerJ*

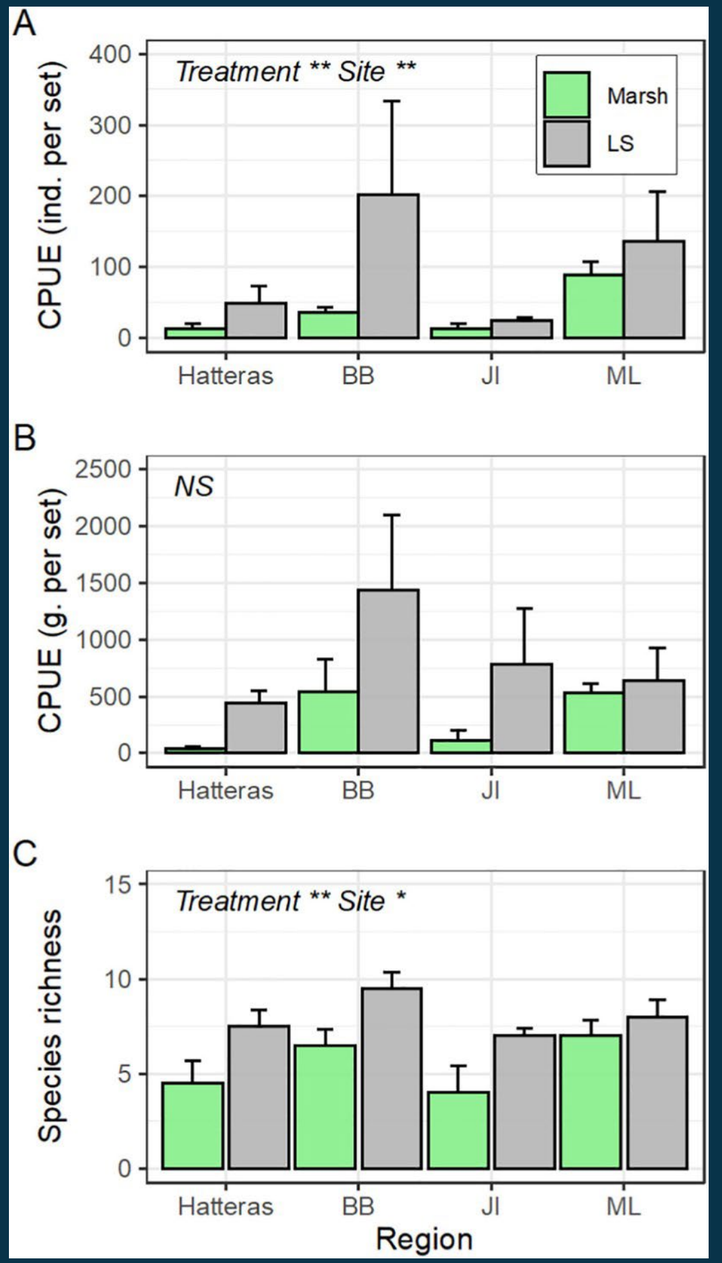


Barros et al. 2023 *Restoration Ecology*

Living Shorelines: Habitat

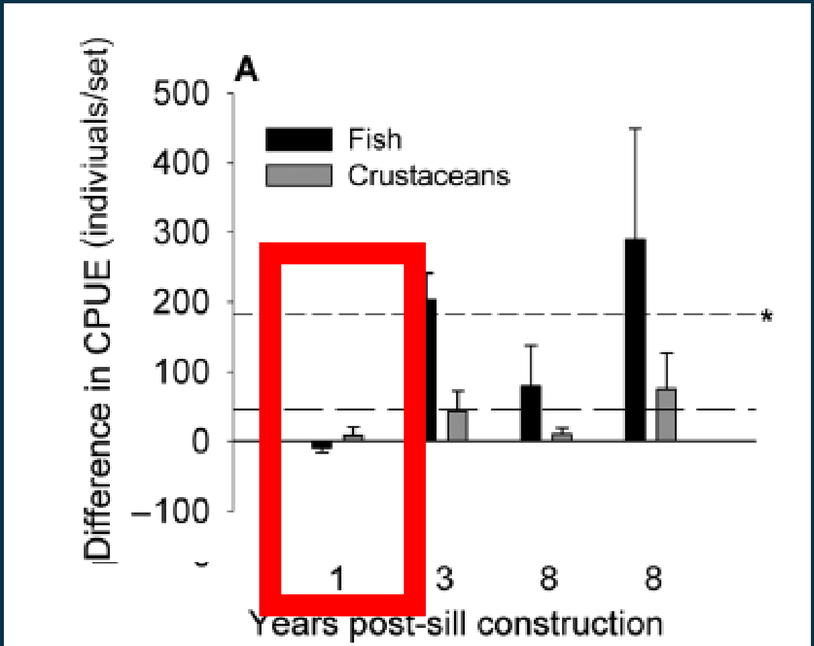


Striped killifish (A), mummichog (B), blue crab (C), and silverside (D): Guthrie et al. 2022 *Ecological Engineering*

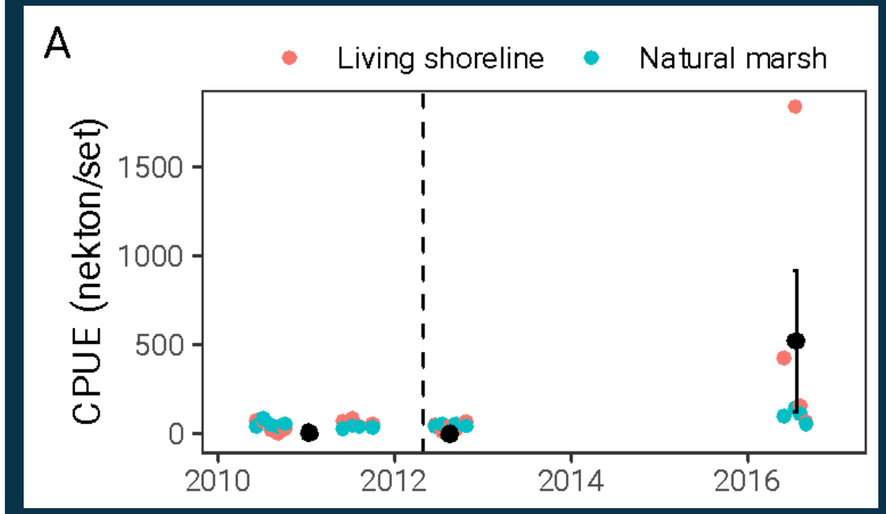


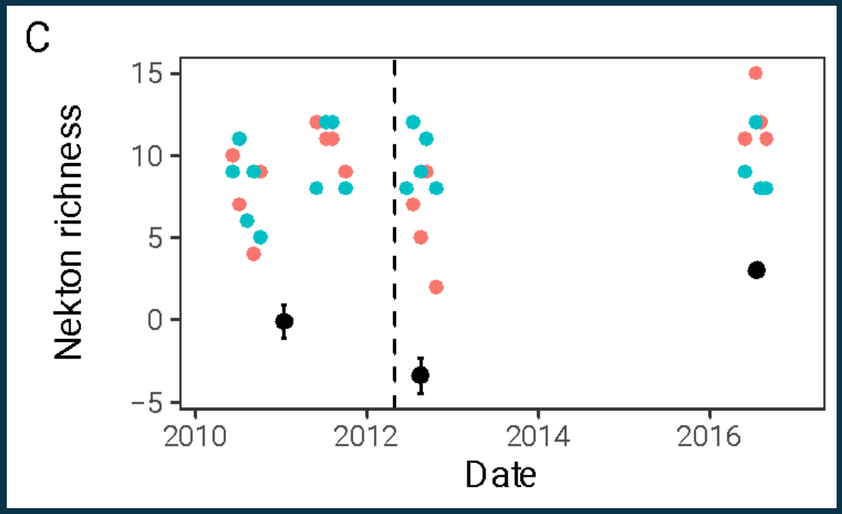
Smith et al. 2021 *Ecological Engineering*

Living Shorelines: Habitat Provision Over Time



Gittman et al. 2016 *Ecological Applications*





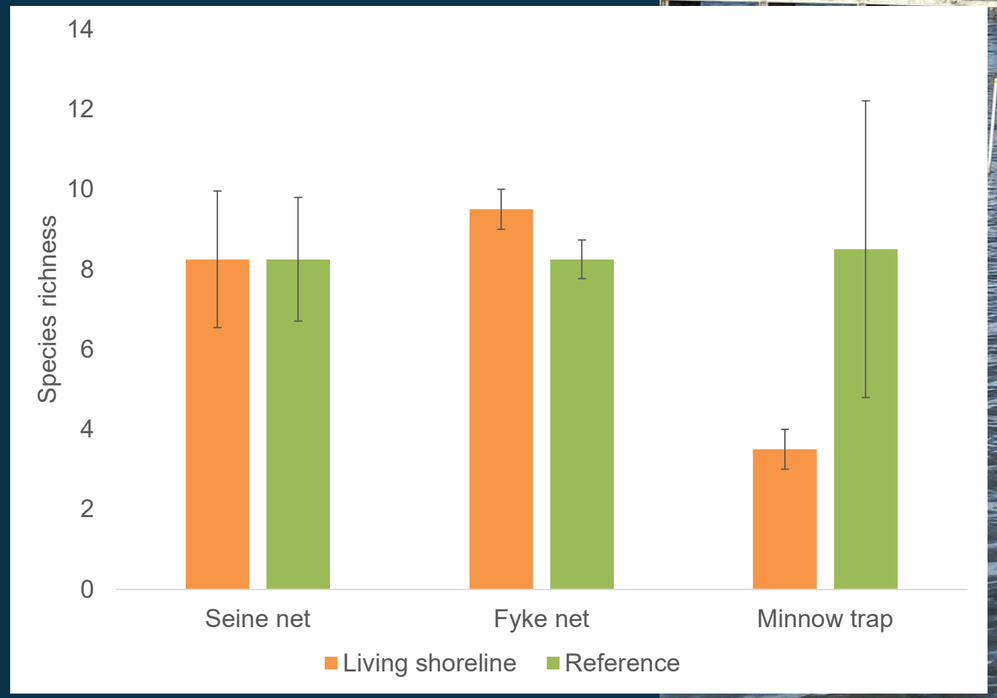
Smith et al. *In prep*

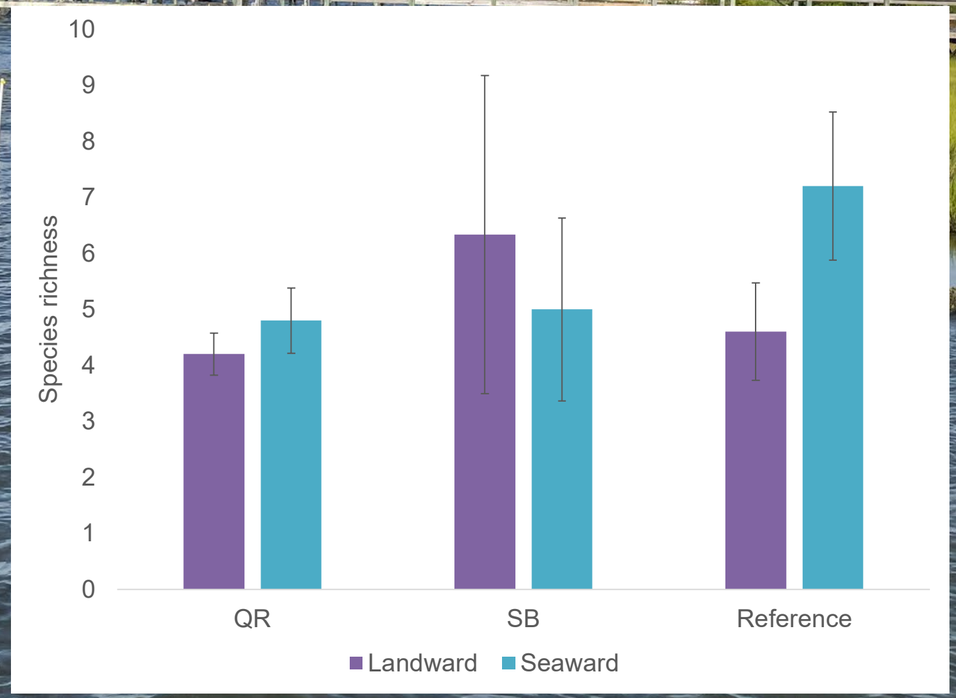
Evaluating new designs

Geesin et al. *in prep*

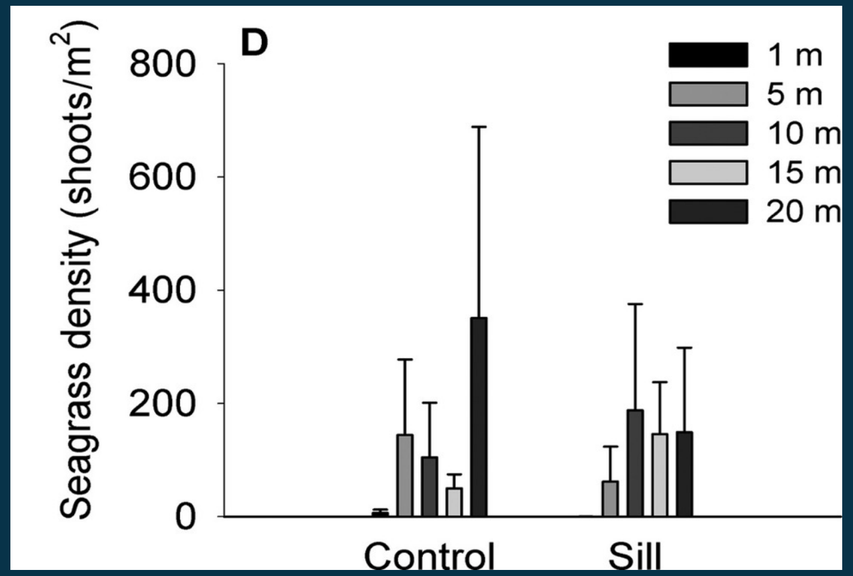
NATIVE SHORELINES
a DAVEY company

Sea Grant
North Carolina

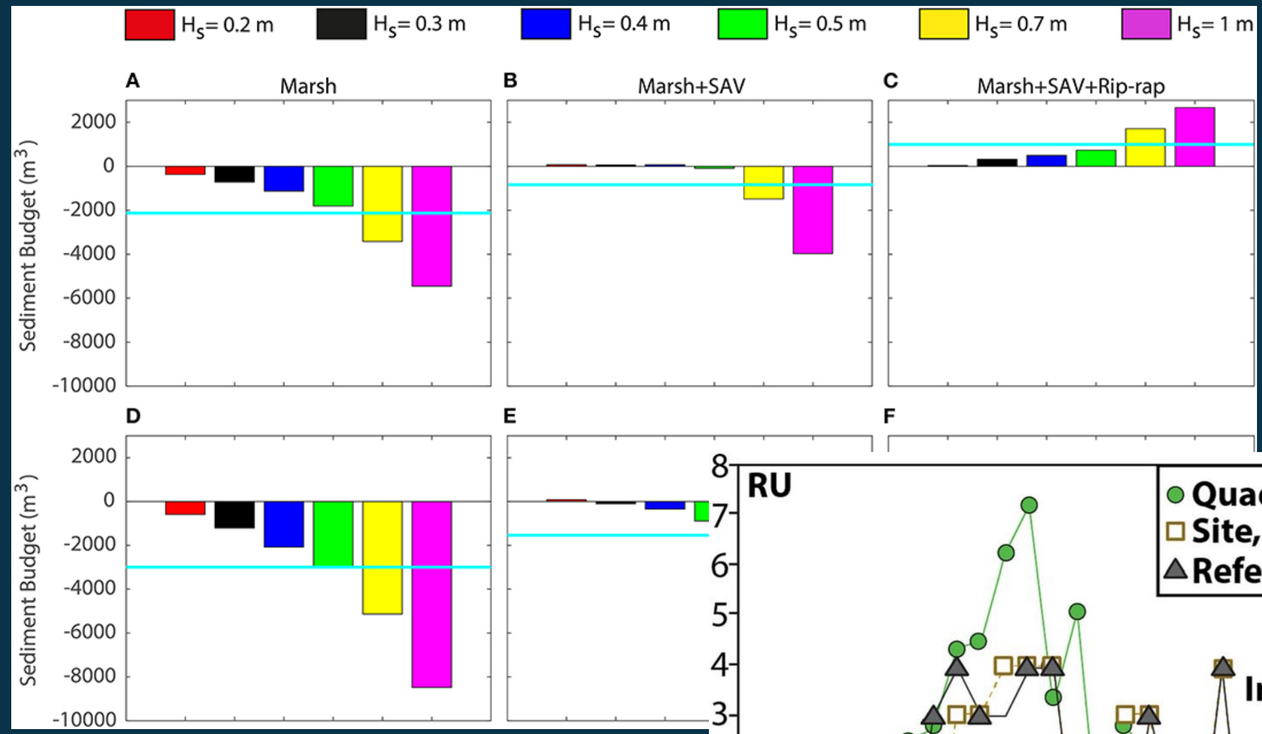




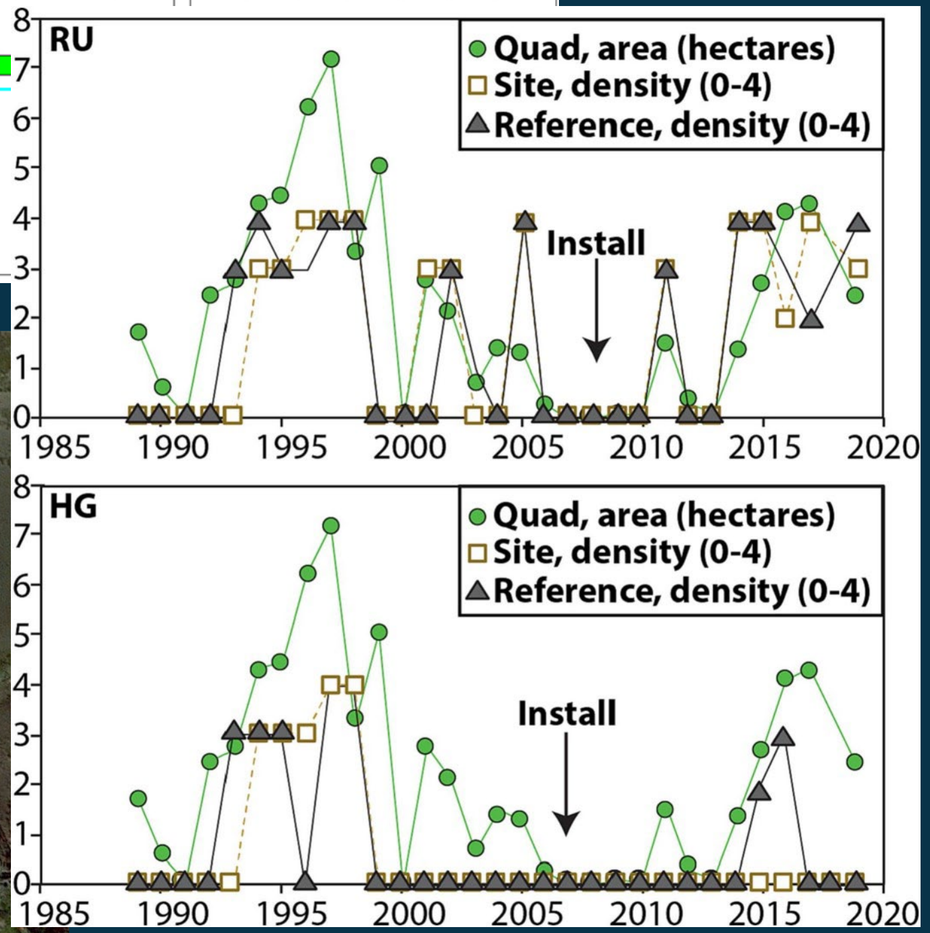
Living Shorelines: Seagrass



Gittman et al. 2016 *Ecological Applications*

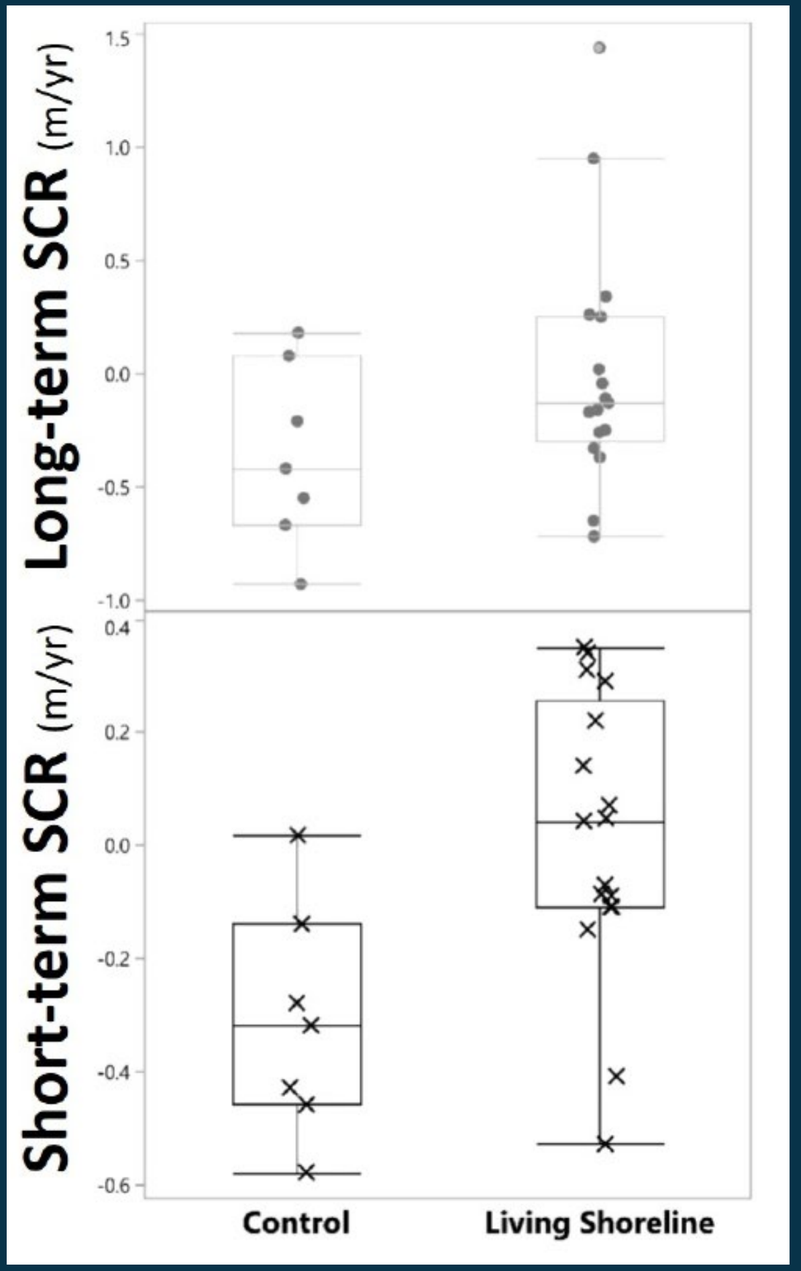


Vona et al. 2021 *Frontiers in Marine Science*



Palinkas et al. 2023 *Ecological Engineering*

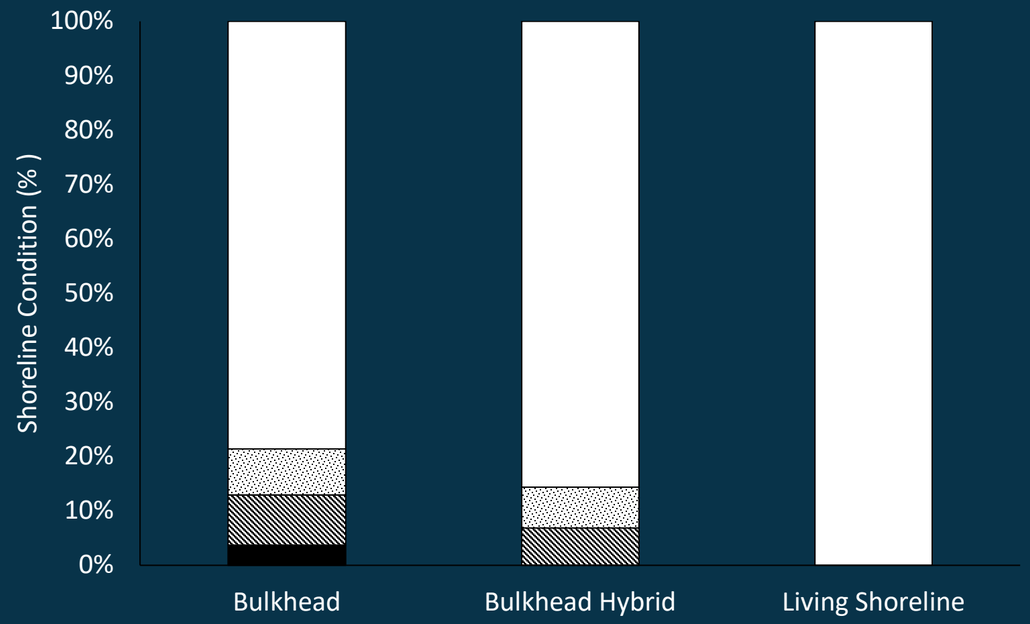
Storm Resilience



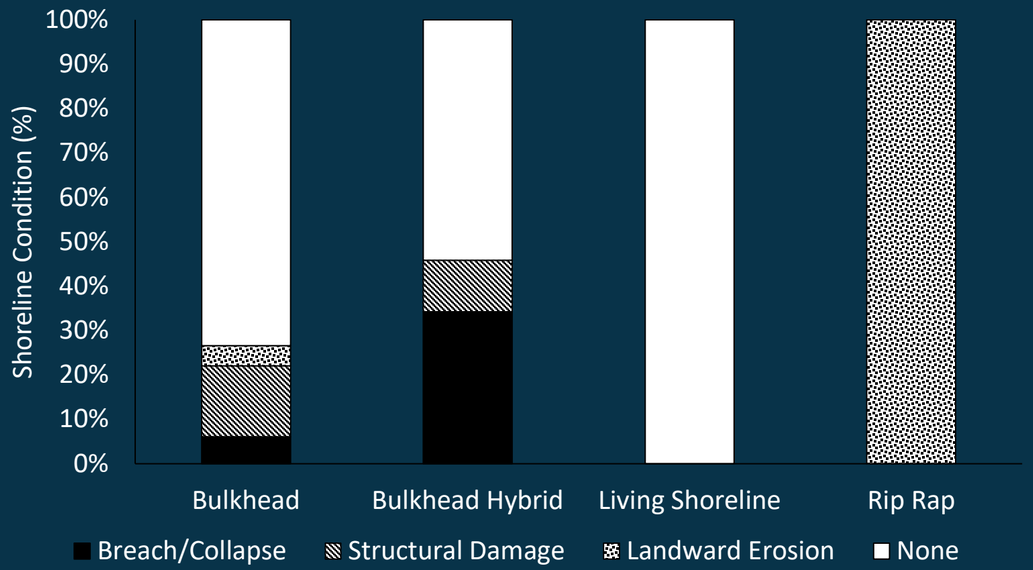
Gittman et al., 2014 *OCM* ; Smith et al. 2017, 2018 *Marine Policy and Ecological Applications*

Polk et al. 2021 *IEAM*, Gittman et al. 2021 *CSP*, Gittman et al. *in prep*

Hurricane Florence 2018



Hurricane Dorian 2019

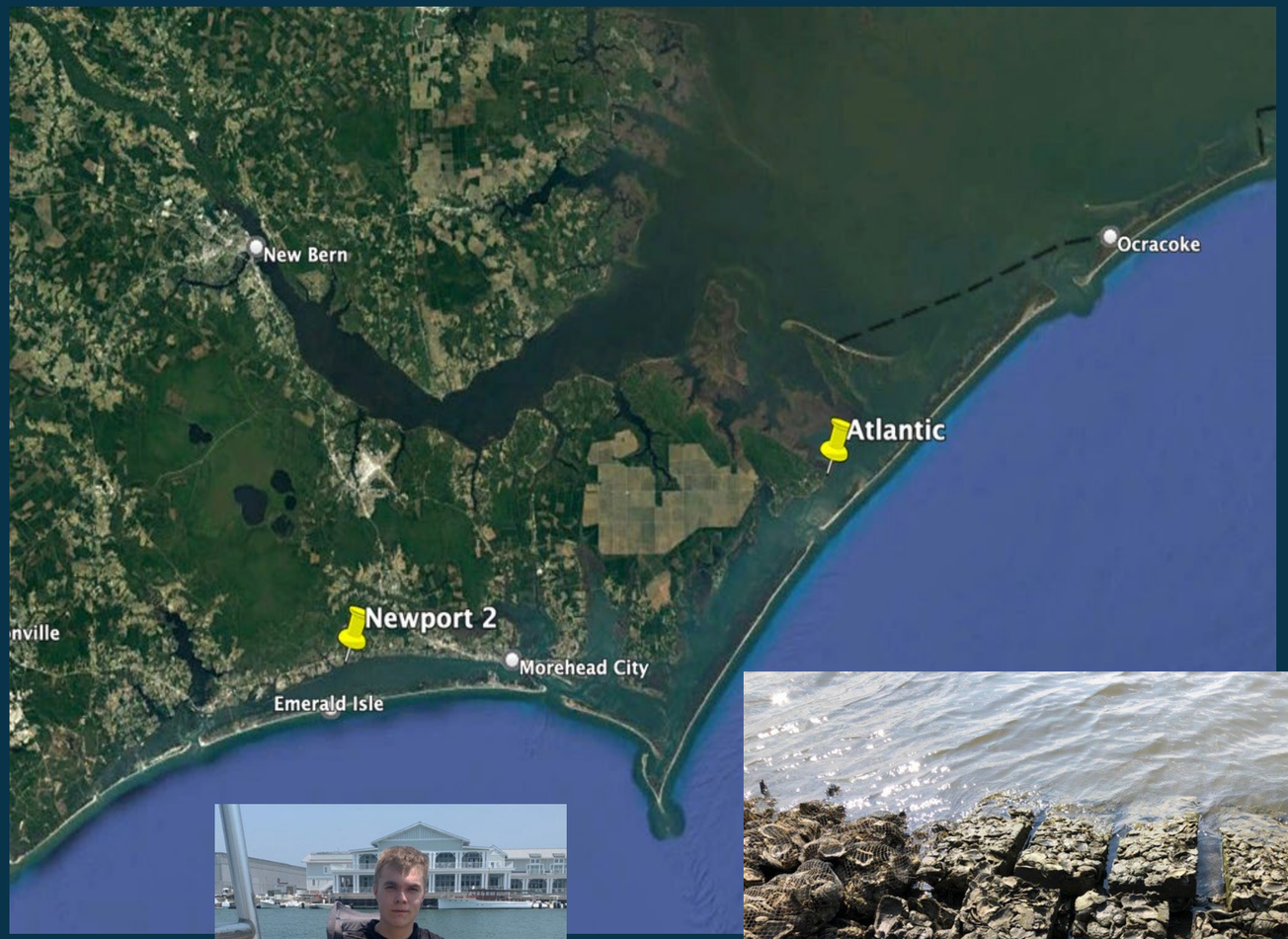


How did living shorelines perform relative to bulkheads?

Gittman et al. *in prep*

Photo Credit: R. Gittman

Wave Transmission During Normal vs. Storm Conditions - TS Ian



Atlantic, NC, Video: Georgette Tso

Quick Reefo

collaboratory
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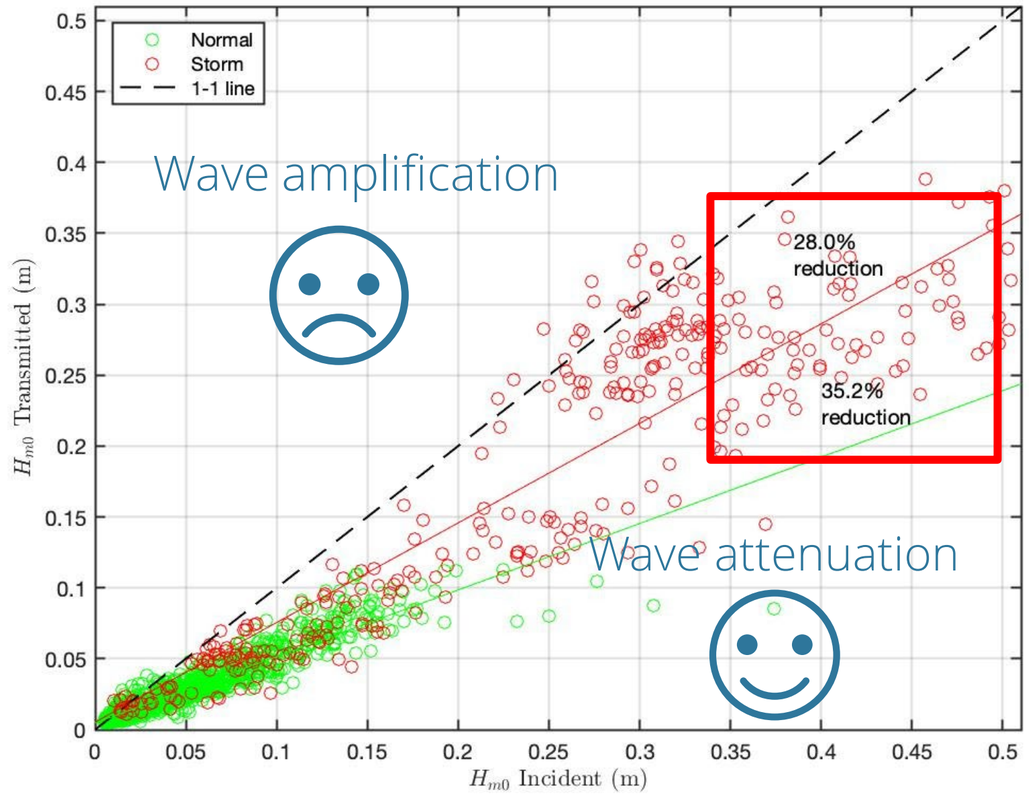
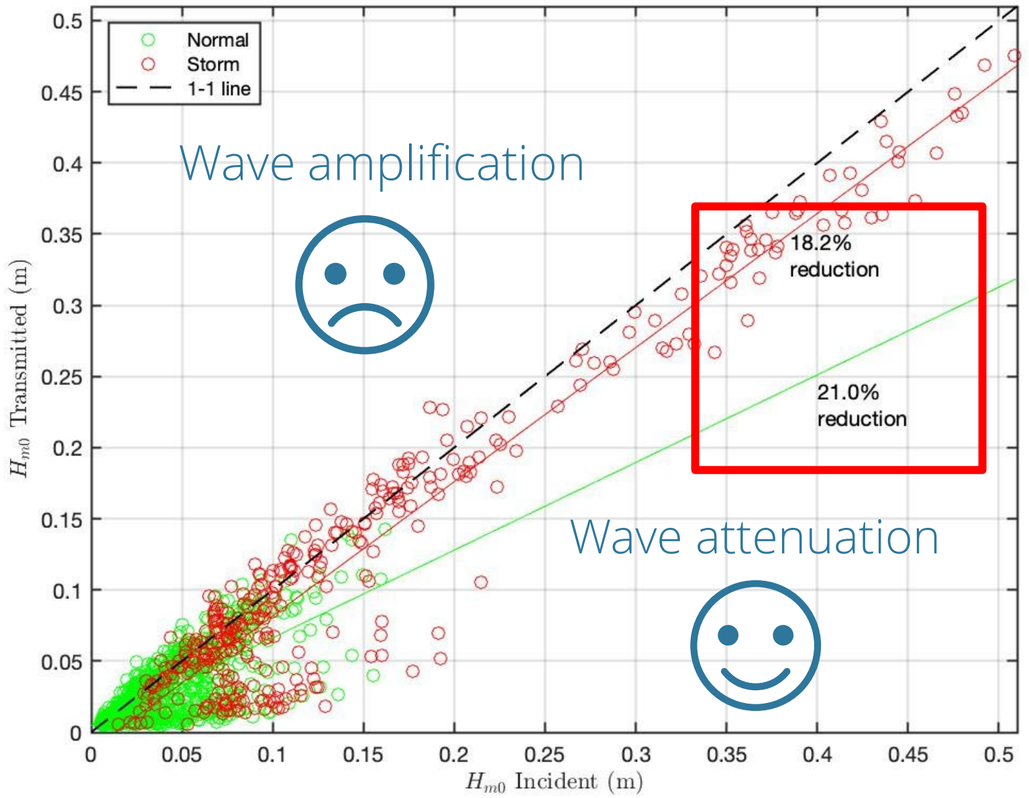
Wave Transmission During Normal vs. Storm Conditions - TS Ian

Atlantic, NC



Newport, NC



$$K_t = \frac{H_{m0,LANDWARD}}{H_{m0,SEAWARD}}$$

When Kt=1 (black line), there was no change in wave height as the wave crossed the breakwater

Tso et al. In prep