



Status and Trends of Living Shorelines in Texas

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July 28, 2023

Texas General Land Office • Commissioner Dawn Buckingham, M.D.

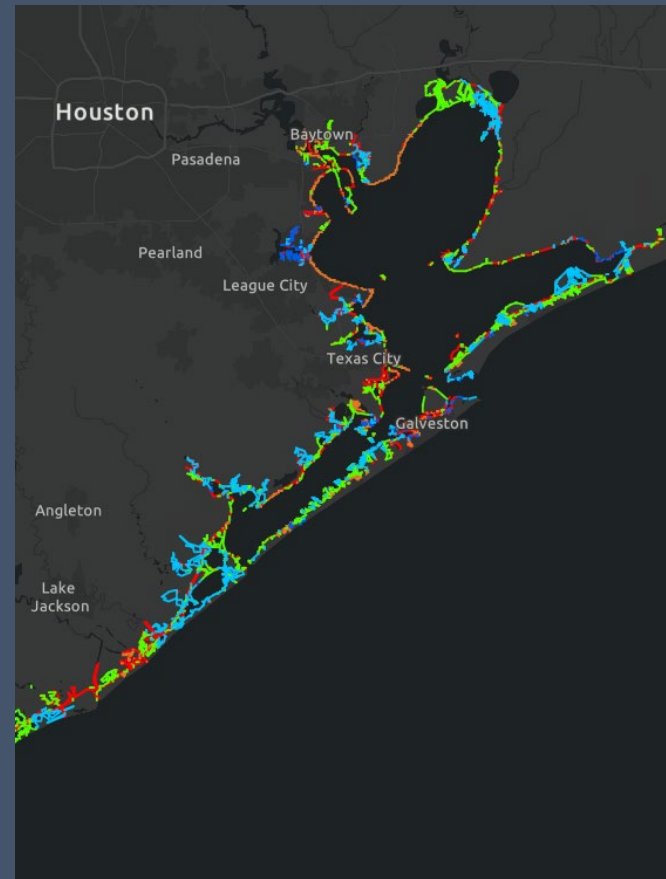
TEXAS GENERAL LAND OFFICE

The Republic of Texas created the General Land Office in 1836. The oldest state agency in Texas, the GLO was formed to determine who owned what and where after the Texians and Tejanos won independence. Today the General Land Office manages state lands, operates the Alamo, helps Texans recovering from natural disasters, helps fund Texas public education through the Permanent School Fund, provides benefits to Texas Veterans, and manages the vast Texas coast.



Commissioner Dawn Buckingham, M.D.

<https://www.glo.texas.gov/livingshorelines/>



A GUIDE TO LIVING SHORELINES IN TEXAS

Living Shorelines Defined

31 Tex. Admin. Code § 155.1 (2021)

“Alternatives to traditional armoring shoreline stabilization techniques such as bulkheads. Living shorelines incorporate substantial natural or nature-based features, potentially combined with hard structural components as approved by the Texas General Land Office, to provide shoreline protection and stabilization while maintaining shoreline ecosystem functions.”

Copano Bay, Rockport TX



Texas General Land Office
Commissioner Dawn Buckingham, M.D.



Total: 120 projects; year 1987 - current

SOFT STABILIZATION 34

Marsh Grass Plantings

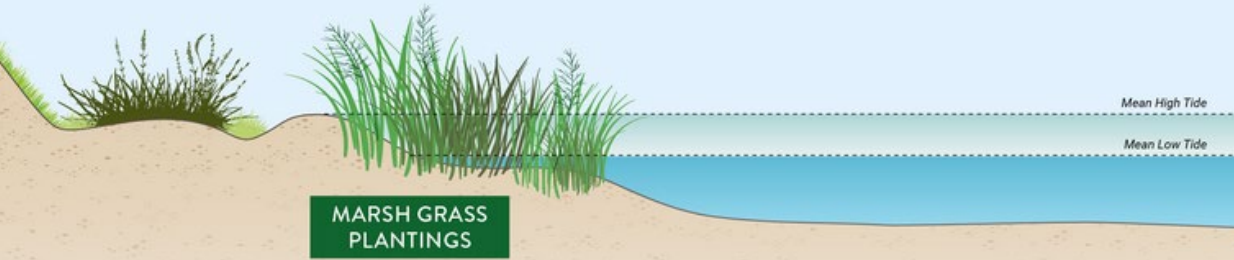


Diagram not to scale.

HYBRID STABILIZATION 64

Breakwaters with Marsh Grass Plantings

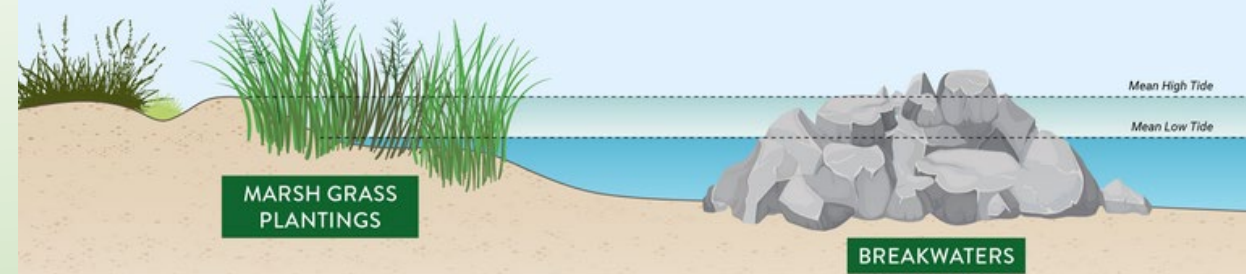


Diagram not to scale.

RETROFIT: SOFT STABILIZATION 1

Retaining Wall or Bulkhead with Marsh Grass Plantings

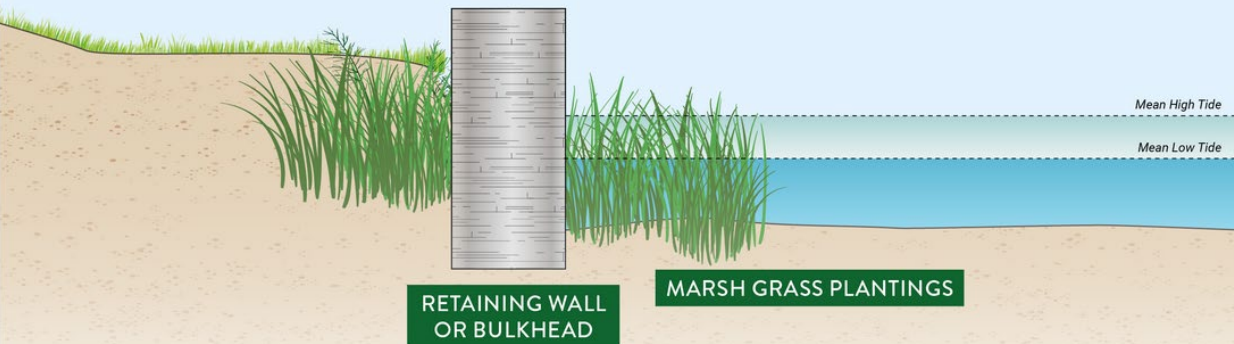
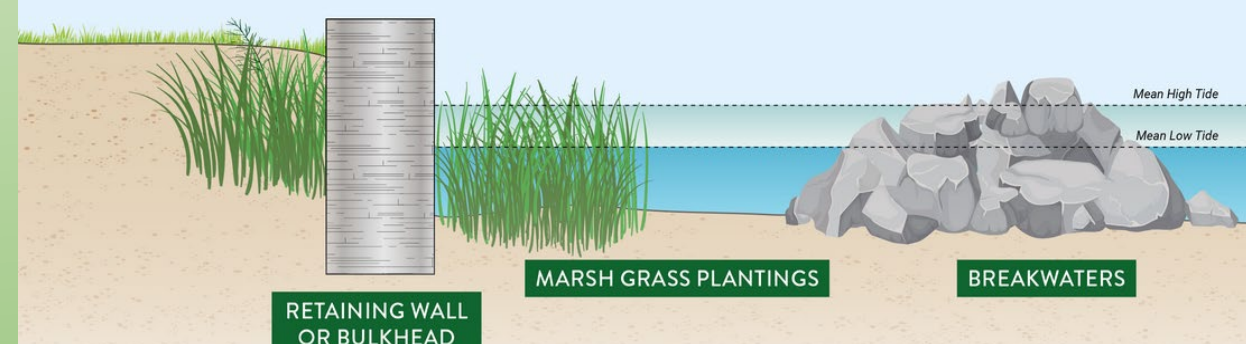
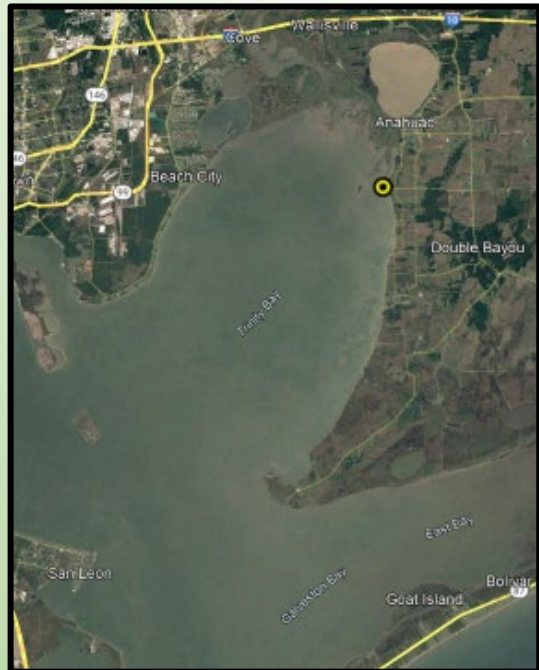
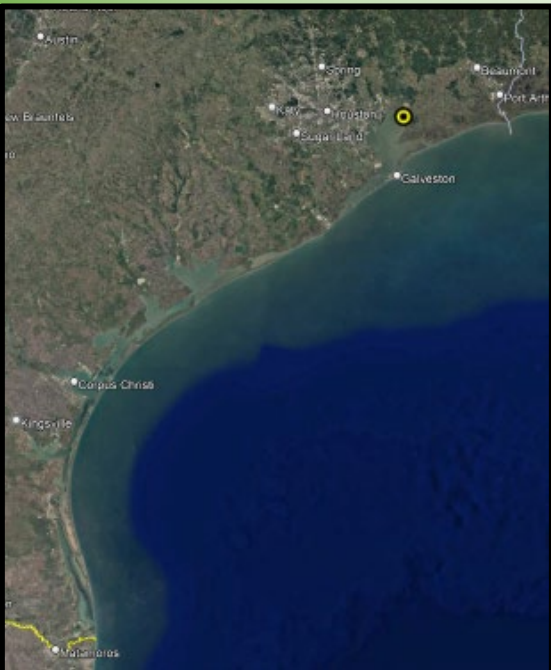


Diagram not to scale.

RETROFIT: HYBRID STABILIZATION 21

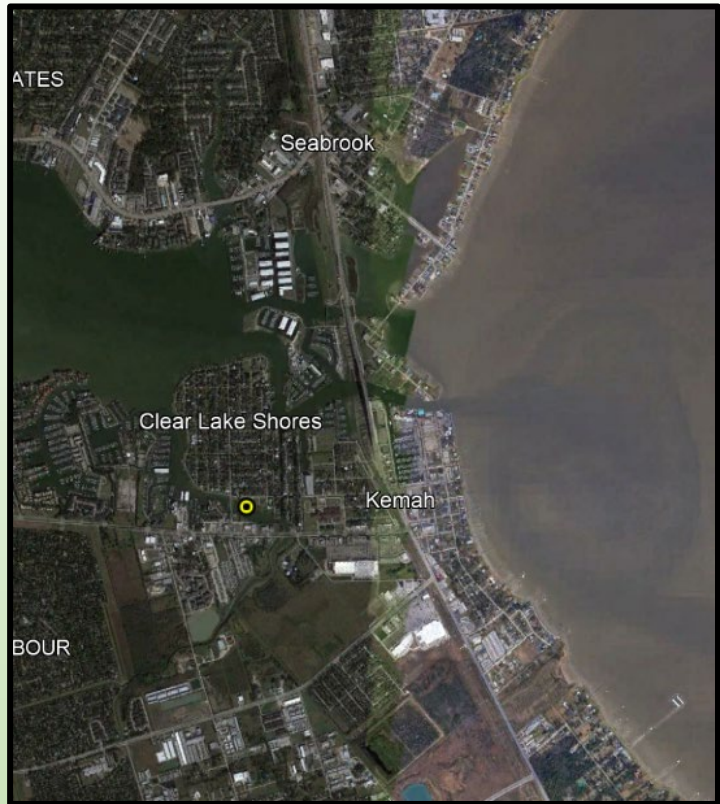
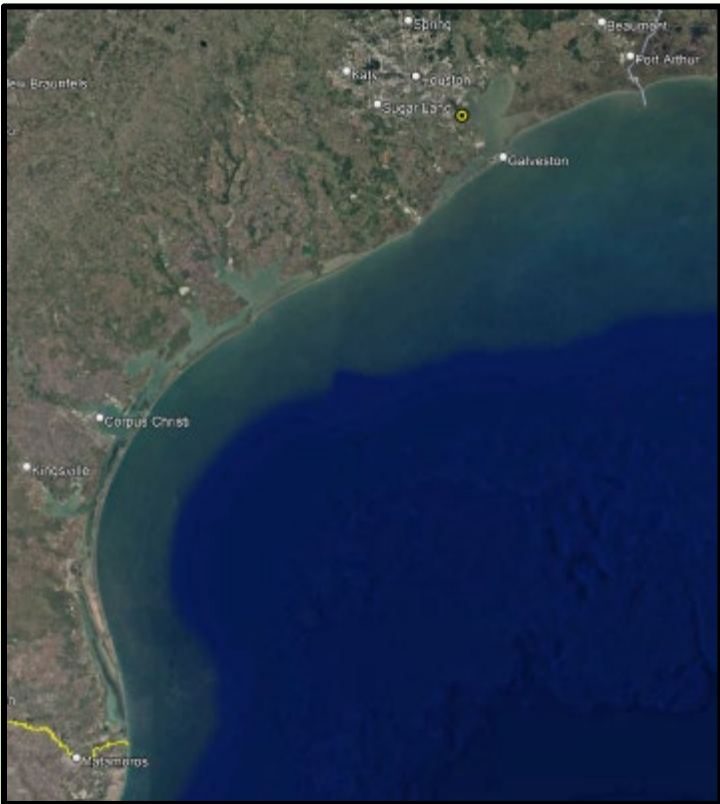
Retaining Wall or Bulkhead with Breakwaters and Marsh Grass Plantings





Hybrid: Levee Road living shoreline
 Constructed in 2015
 1,350 linear feet
 Spartina alterniflora planted with rock rubble breakwater for protection
 Chambers County in partnership with GBF





Soft: Jarboe Bayou Park living shoreline

Constructed in 2006

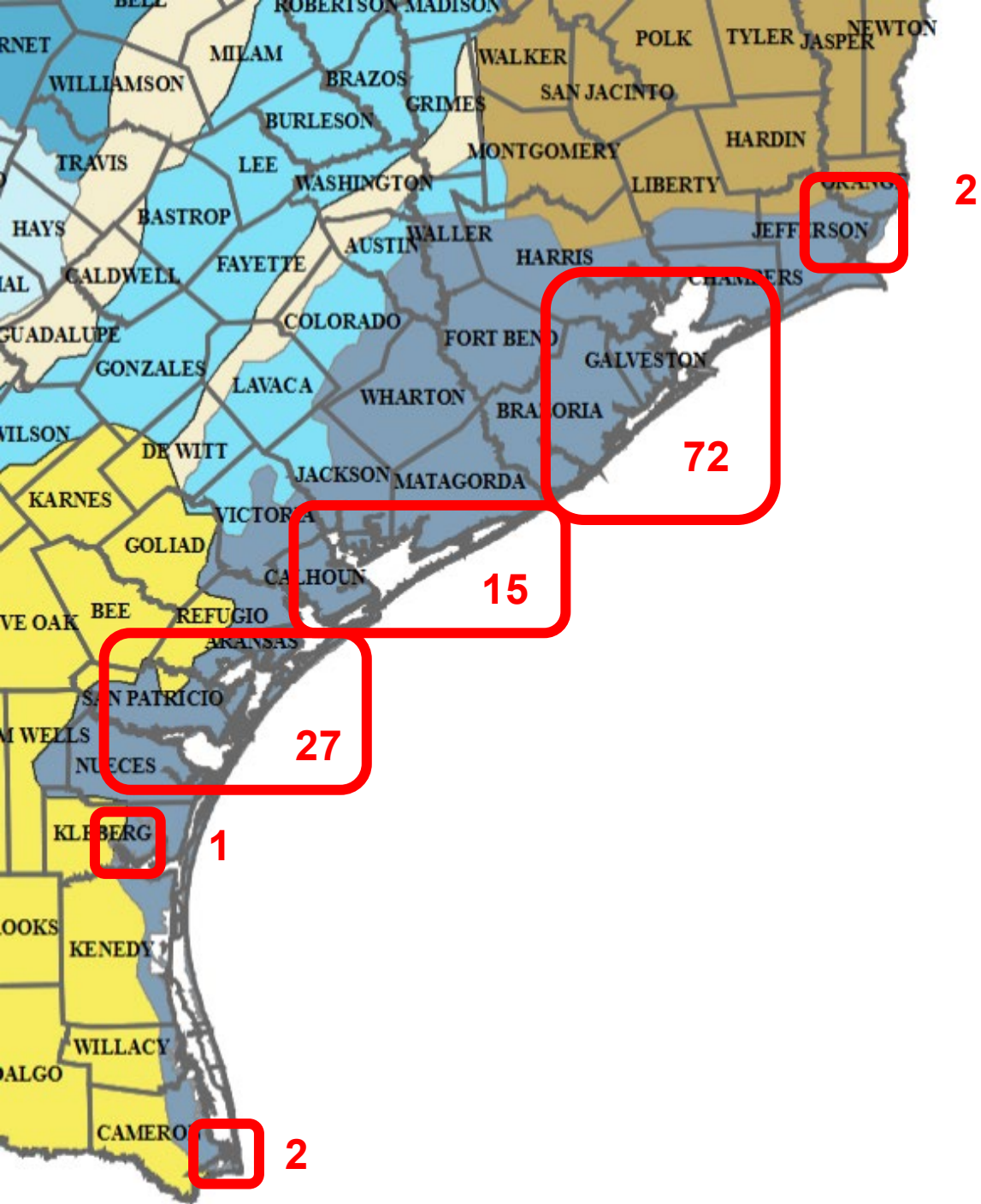
750 linear feet

Spartina alterniflora planted, shoreline graded

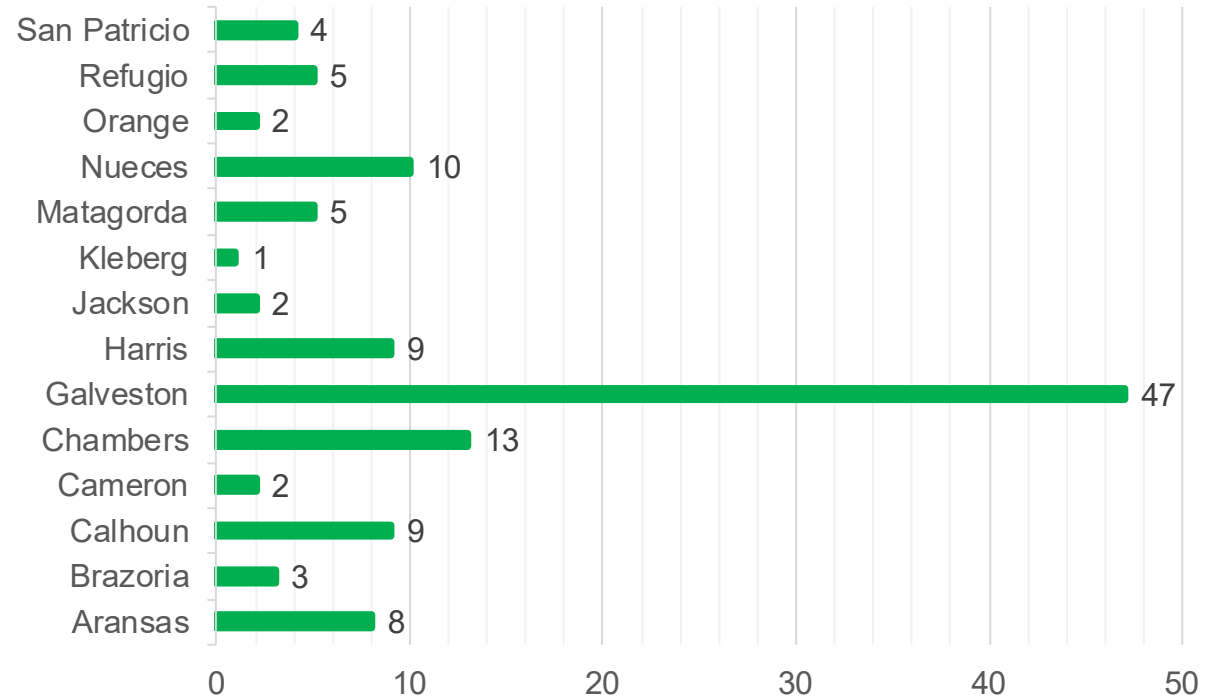
City of Clear Lake in partnership with GLO CMP, USFWS, NFWF, TPWD, GBF, Clear Creek Foundation, Shell Marine Habitat Program

LOCATIONS: 120 PROJECTS

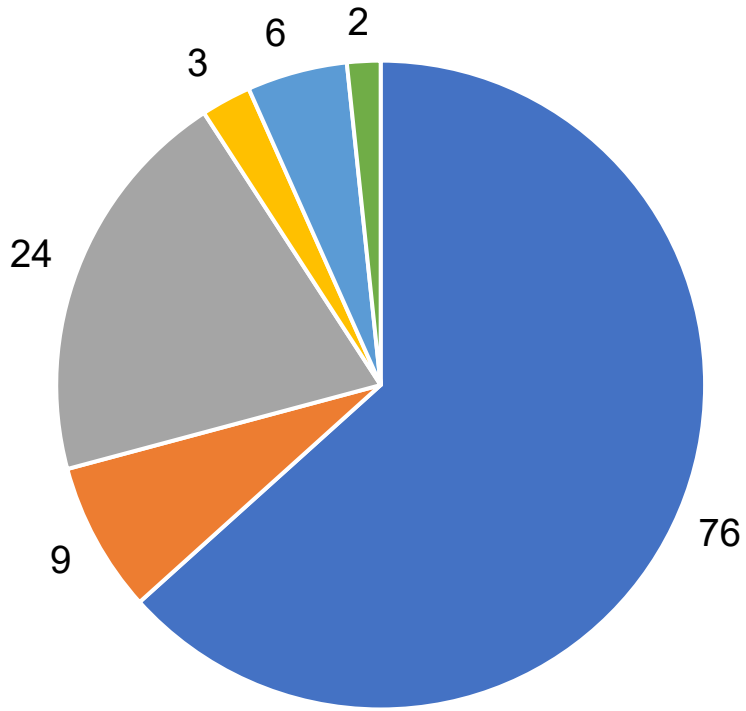
1987 - CURRENT



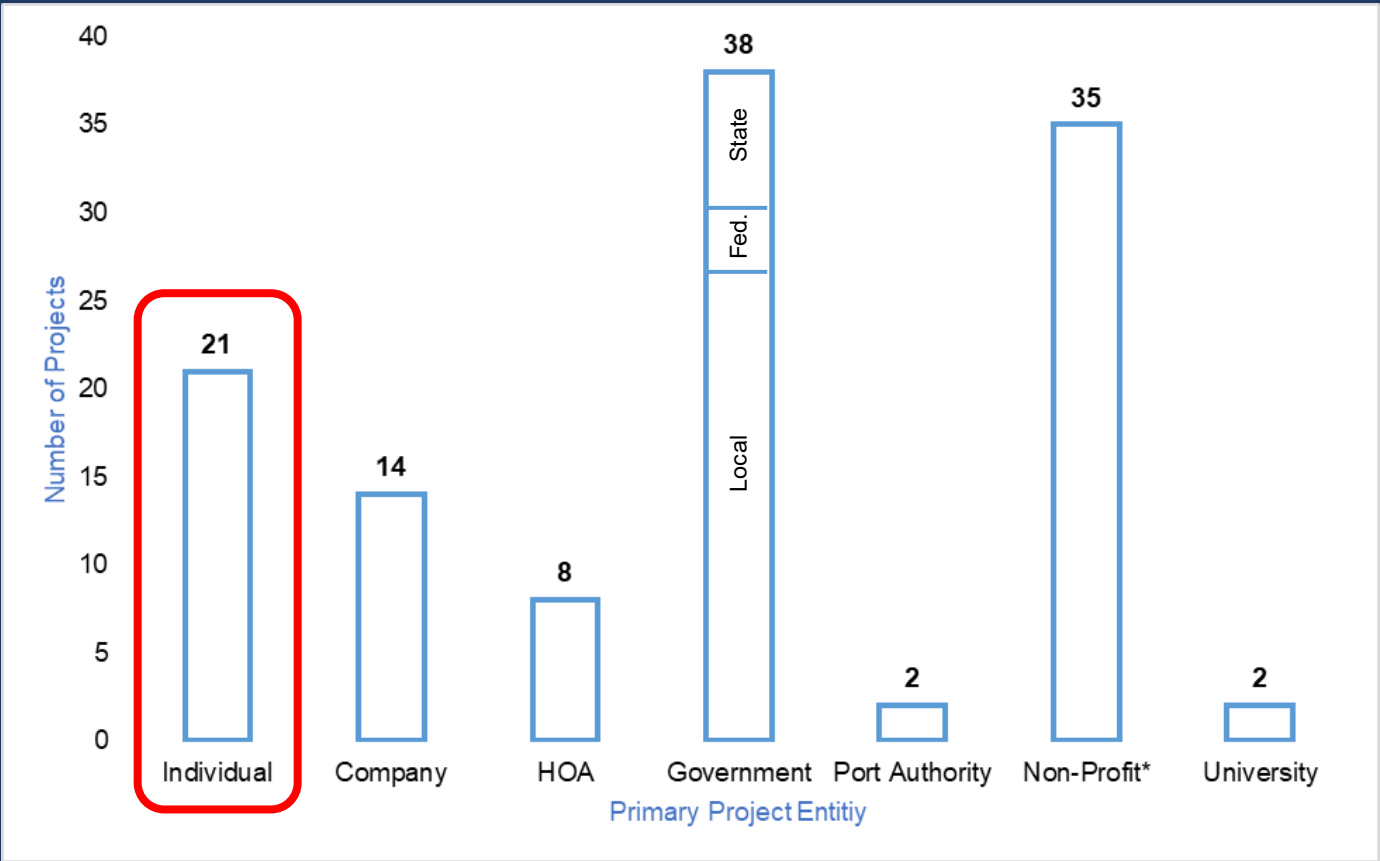
Number of Projects Per County



Project Primary Purpose



- Living Shoreline
- Mitigation
- Rookery Protection
- Habitat Restoration
- Oyster Restoration
- Research



Individual: 16 GBF projects, 2 mitigation, 1 BU, 2 non GBF projects

2001 – 2018, with most complete prior to 2010



PERMITTING: LIVING SHORELINE VS BULKHEAD

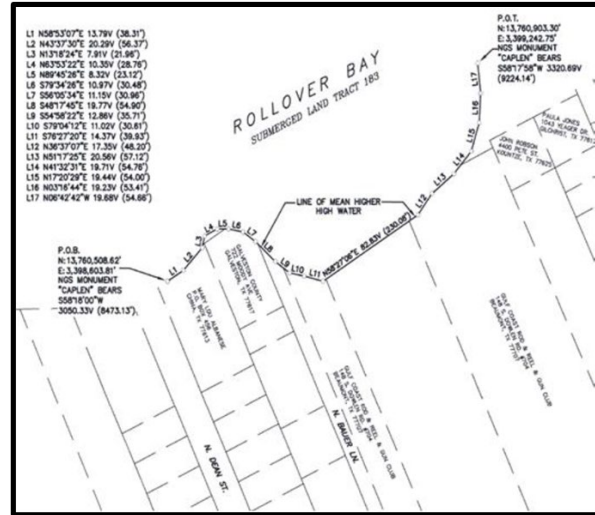
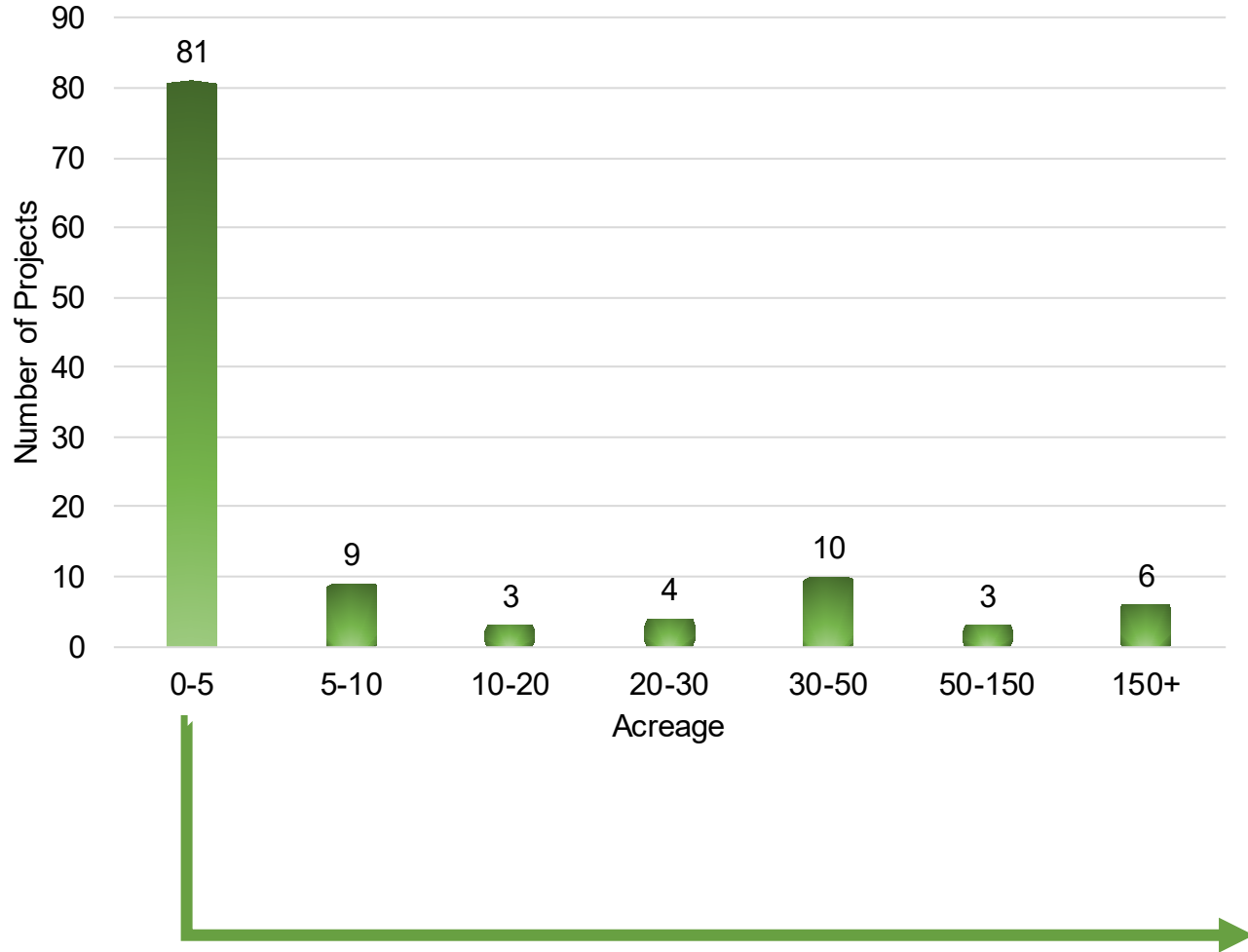
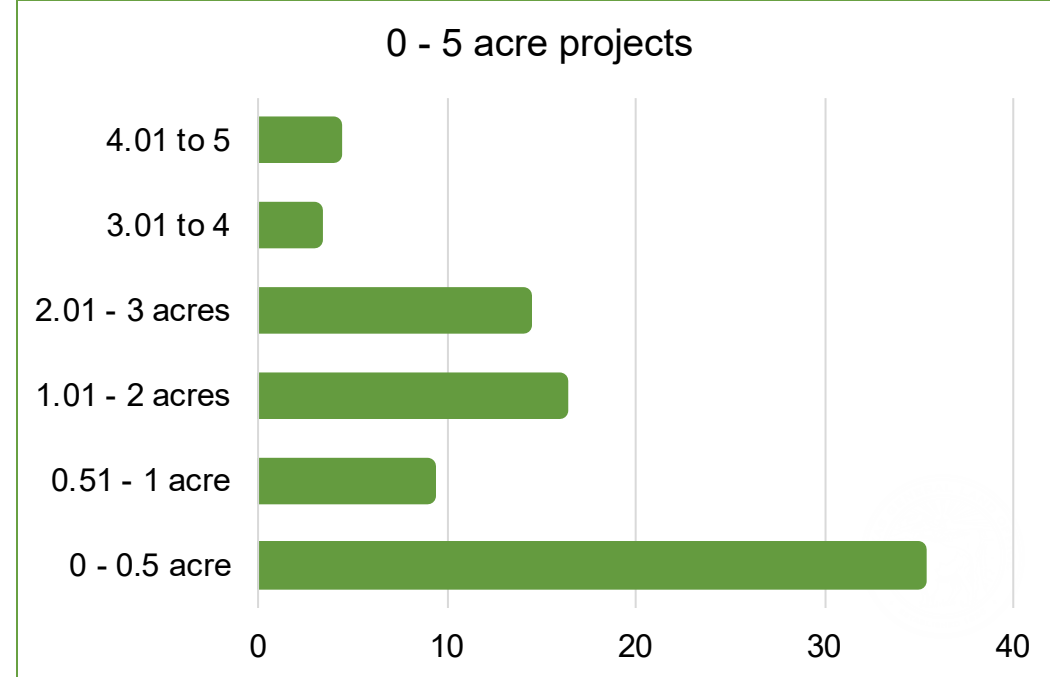


Photo courtesy GSI

Projects by Size



0 - 5 acre projects



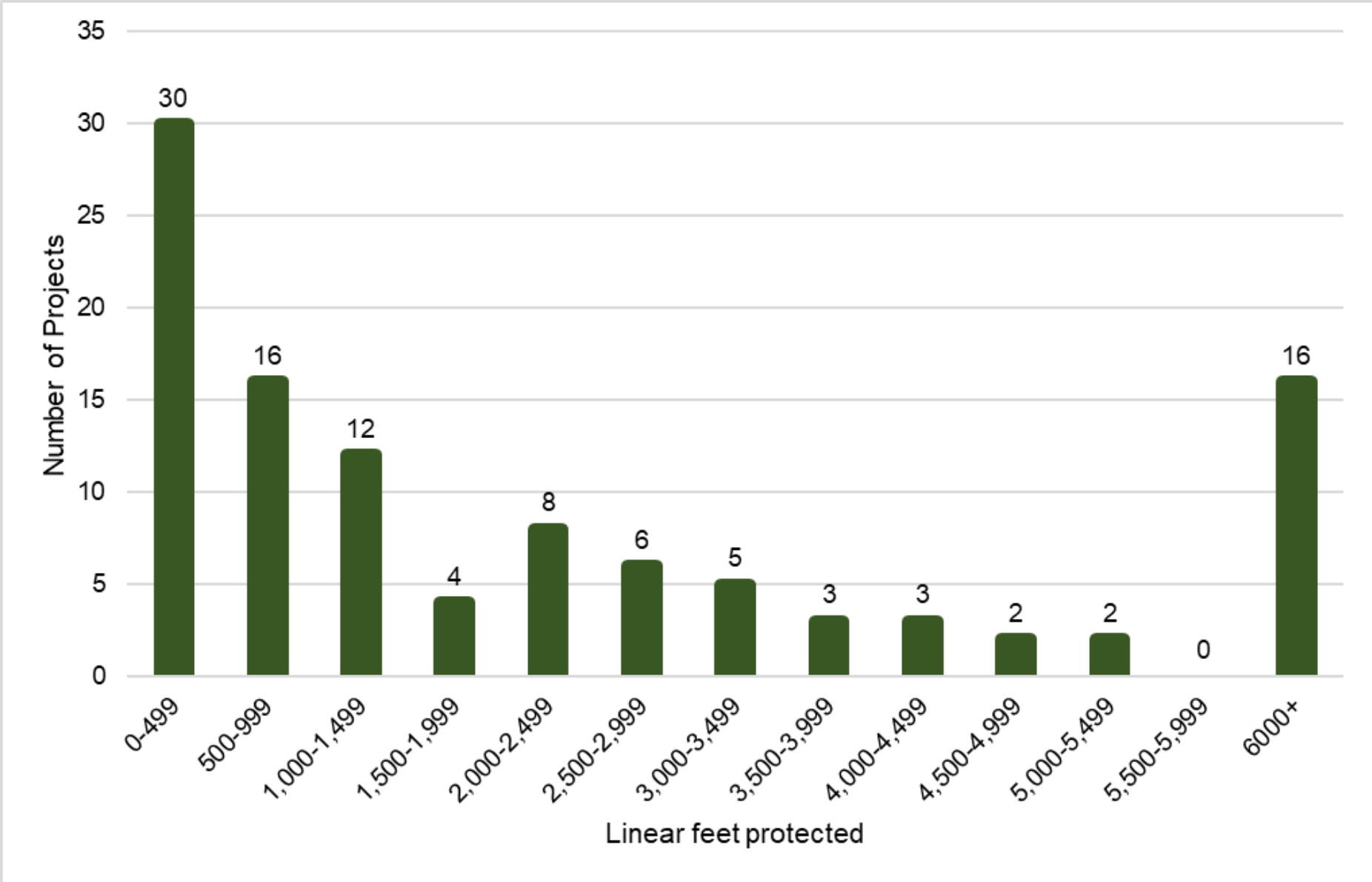




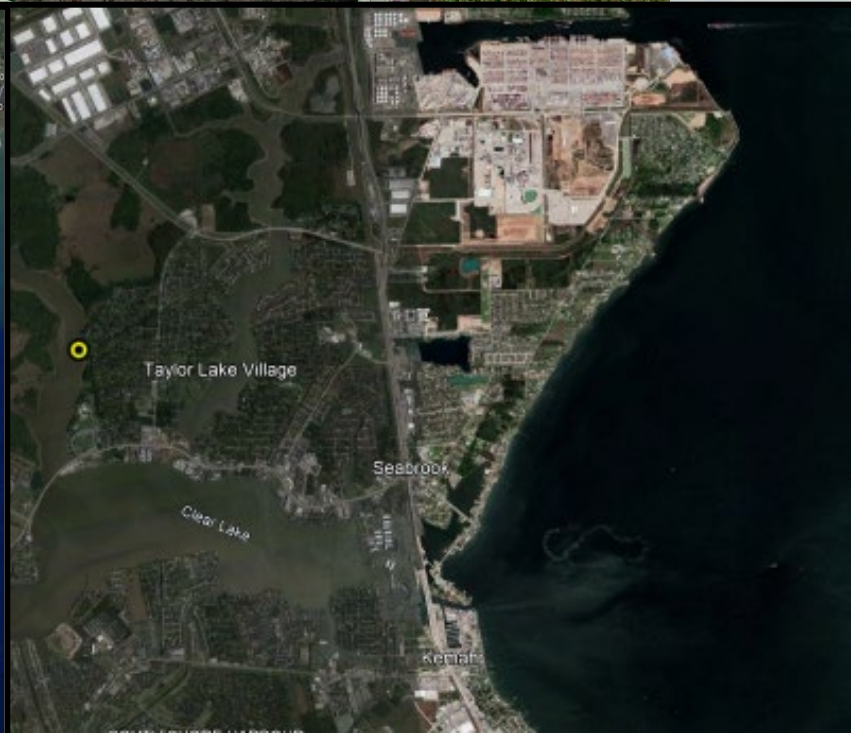
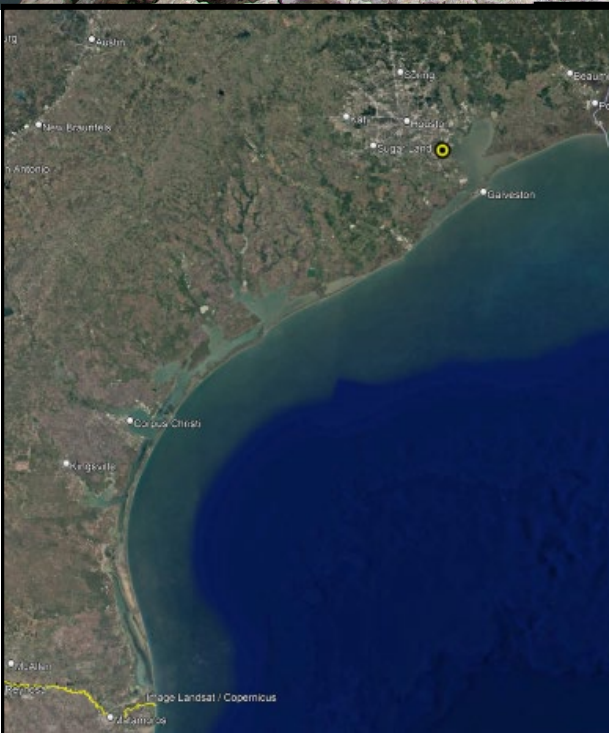
Photo 2012

Photo courtesy of Galveston Bay Foundation



Clear Lake Forest Park LS
Photo 2023
Retrofit

650 linear feet
1.45 acres
40 feet into the water



Project Planting

- *Spartina alterniflora*: 87
- Mixed high / low marsh: 12
 - *Batis maritima*: 1
 - *Spartina patens*: 1
 - *Distichlis* spp: 1
 - *Spartina spartinae*: 1
 - *Scirpus* spp: 2
 - *Sporobolus virginicus*: 1
- *Halodule* seagrass: 8
- *Avicennia germinans*: 3
- Pine trees: 1
- *Juncus roemerianus*: 1
- *Zizaniopsis miliacea*: 1
- *Sagittaria lancifolia*: 2
- *Ludwigia uruguayensis*: 1
- *Carex* spp: 1
- *Cyperus* spp: 1

120 total projects

Smooth cordgrass (*Spartina alterniflora*) planting



Saltmarsh hay (*Spartina patens*) planting
Photo courtesy of Triton Environmental



Bullrush (*Scirpus* spp.) and needlerush (*Juncus roemerianus*)



Seagrass (*Halodule*) plug
Photo courtesy of Mott MacDonald and PCCA

Project Components

120 total projects

Oyster structures: 22*

Riprap: 12

Articulated block: 4

Large earth moving – levees, berms, terracing, mounds: 18

Breakwaters = 86

- Rock rubble: 47
- Sakrete: 7
- Sheetpile: 6
- Geotextile: 8
- Concrete bar: 1
- Temporary: 5
- Oyster structure breakwater : 20

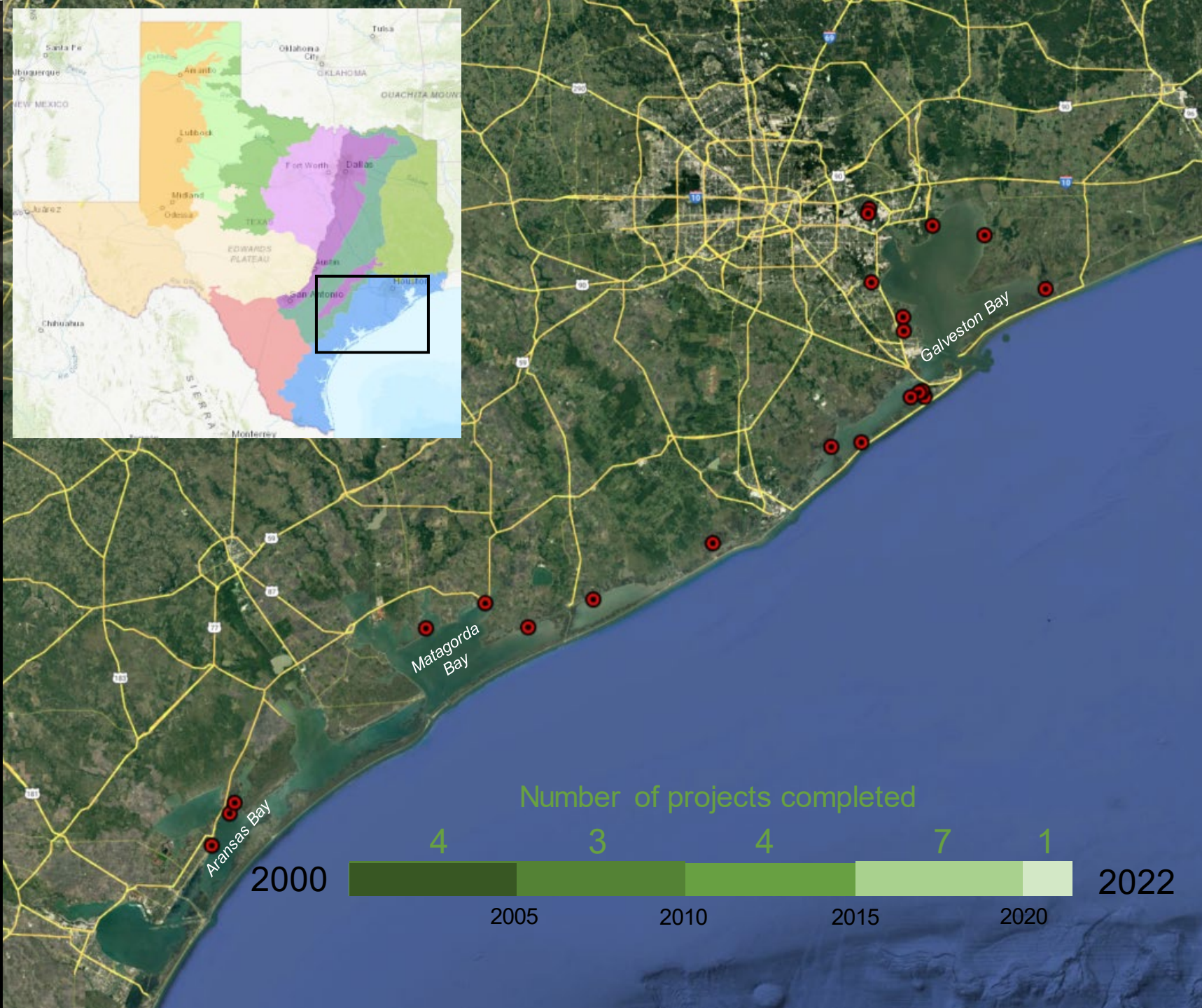


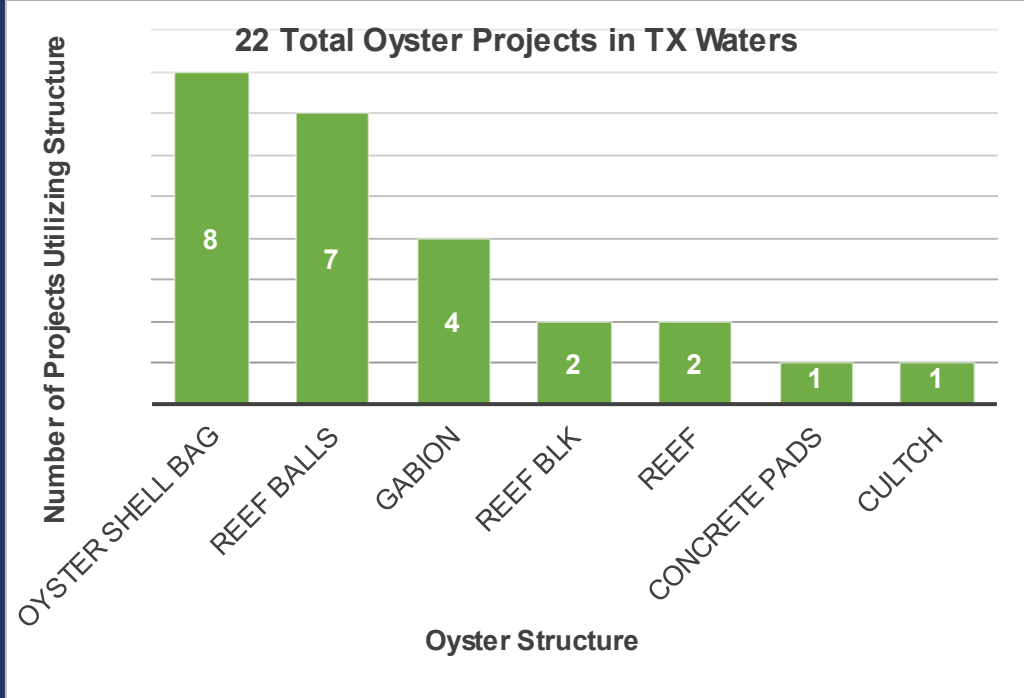
OYSTERS AND LIVING SHORELINES

- 22 oyster-specific projects total
- Year 2000 – 2022
- Innovations in oyster living shorelines



Oysters growing on rock rubble breakwater
Copano Bay, Rockport TX





Gabion submerged shell beds
 Little Bay, Rockport TX
 Photo courtesy of AECOMv



Oyster shell bag breakwater
 Sweetwater Lake, Galveston TX
 Photo courtesy of GBF



Reef balls
 Oyster Lake, Galveston West Bay
 Photo courtesy of GBF



Oyster ReefBLK gabion structures
 Mad Island Marsh Preserve, Matagorda Bay
 Photo courtesy of D. Buzan

Where do we go from here?

- Focus on local government entities and nonprofits, who qualify for funding – half of existing projects are either local government or nonprofit
- Monitoring and documenting successes and failures
- Oysters and oyster structures in living shorelines
- Mangrove expansion effects on living shorelines



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