

**Trinity Bay Case Studies  
GLO Living Shorelines  
Workshop  
August 8, 2019**



**Lee Anne Wilde**



**GALVESTON BAY  
FOUNDATION**



**GALVESTON BAY**  
FOUNDATION

- Mission:

- To protect, preserve, and enhance the natural resources of Galveston Bay and its tributaries for present users and for posterity.

- Four target areas:

- Conservation
- Education
- Research
- Advocacy

1100 Hercules Ave., Ste 200  
Houston, TX 77058  
[www.galvbay.org](http://www.galvbay.org)

# GBF & Habitat Restoration

- Actively restoring habitat since 1991
- Diverse habitat types: wetland, sea grass, & reef
- “Community based” habitat restoration
  - Volunteer-based: Marsh Mania planting events
  - Private Landowners: Living Shorelines Initiative



# GBF, Private Landowners, and Living Shorelines

Provide assistance with:

- Project design
- Materials selection
- Permitting
- Construction
- Plant selection & installation



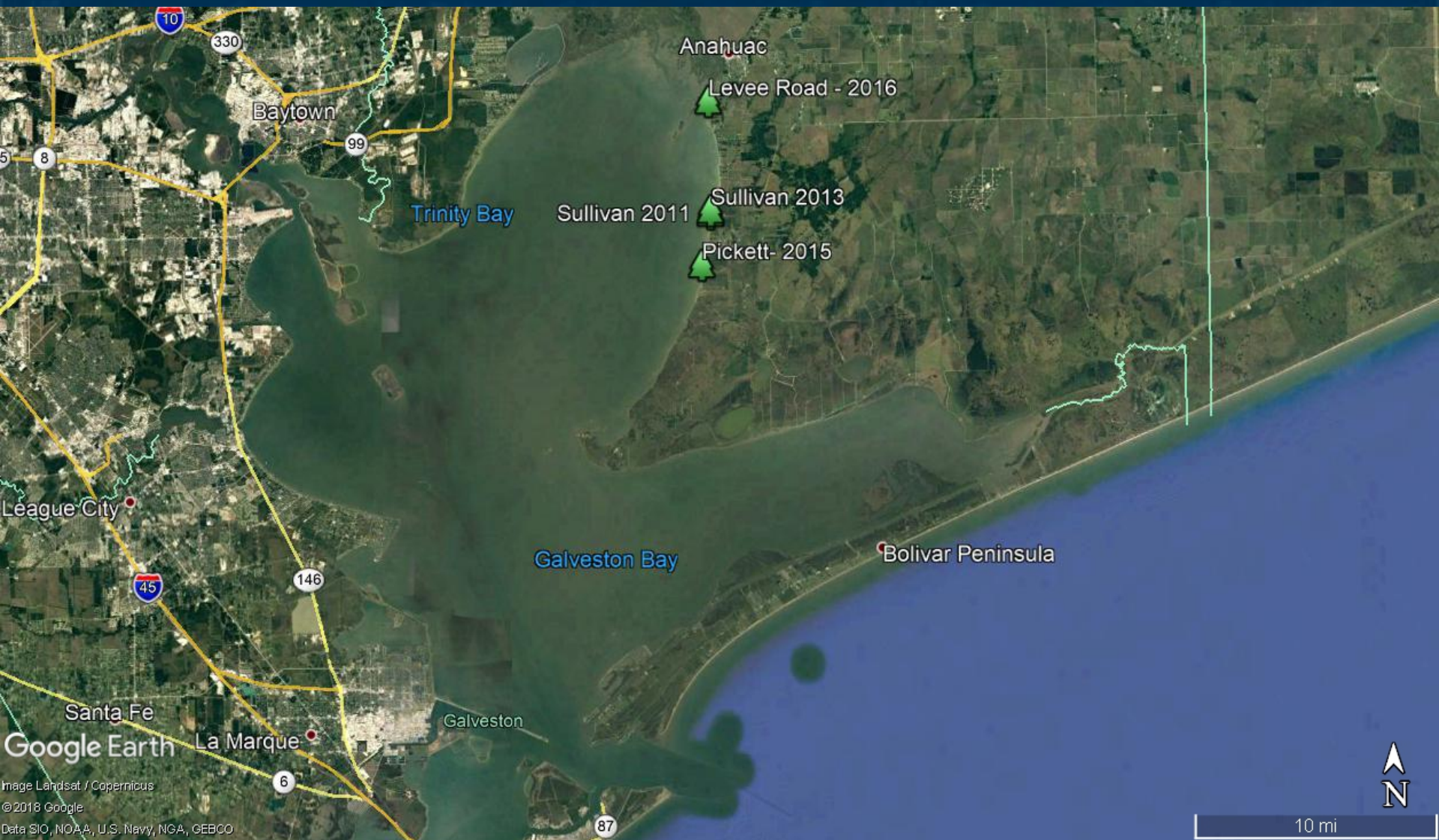












Google Earth

Image Landsat / Copernicus  
© 2018 Google  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO







Trinity Bay

Galveston Bay

East Bay

Houston Ship Channel

West Bay

Google earth

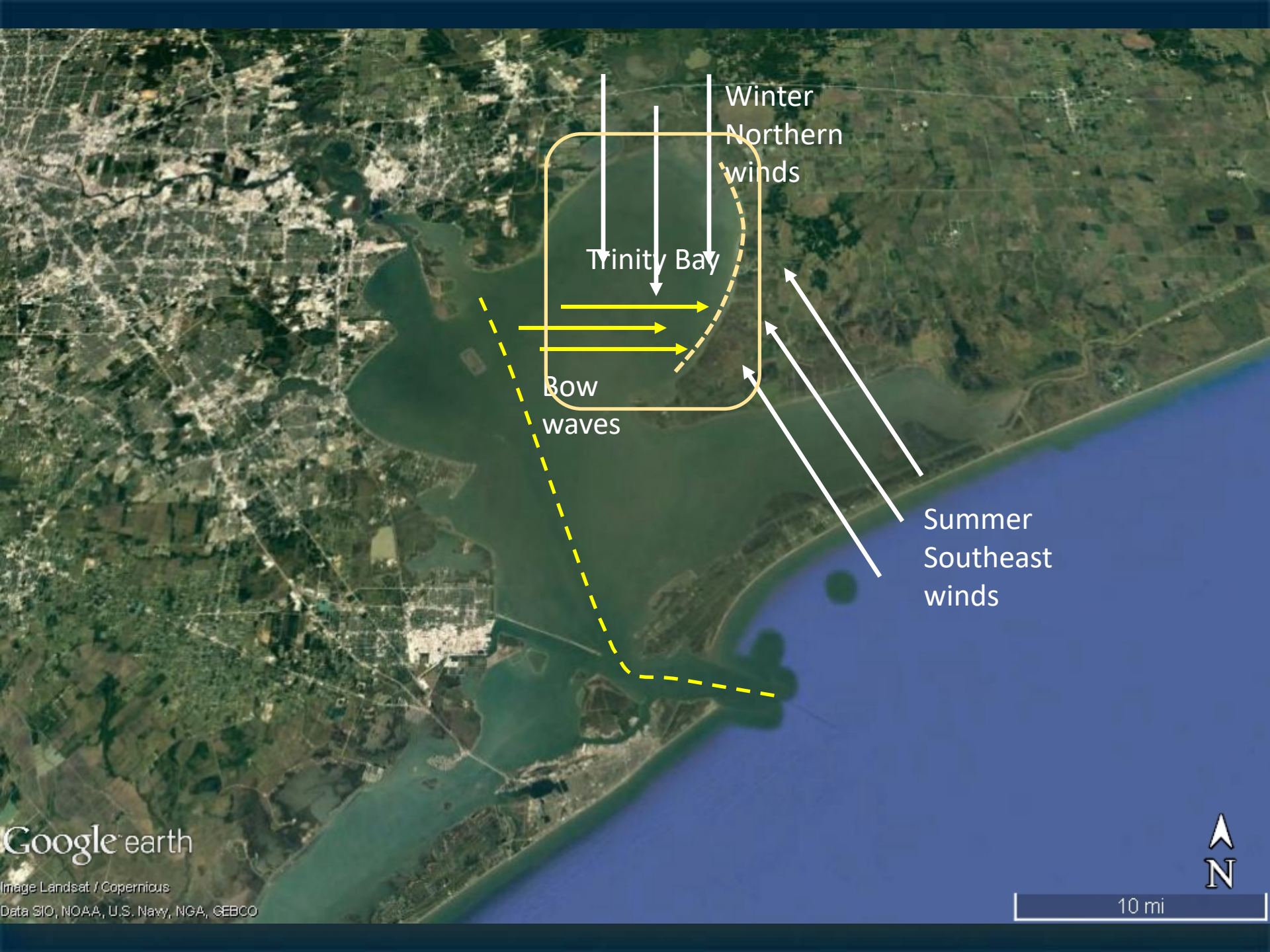
Image Landsat / Copernicus

Data SIO, NOAA, U.S. Navy, NGA, GEBCO



10 mi





Google earth

Image Landsat / Copernicus

Data SIO, NOAA, U.S. Navy, NGA, GEBCO



10 mi



## Sullivan Shoreline Project Phase I

**Breakwater:** 338LF (374LF rock)

**Marsh Created:** 0.36 acres

**Total Project Cost:** \$15032.75

**Max distance from shore:** 89LF

**Concrete used:** ~315 tons/225cyd

**Dimensions:** Base = 15', Crest=3',  
Height=3'



## Sullivan Shoreline Project Phase II

**Breakwater:** 537LF

**Marsh Created:** 1.43 acres

**Total Project Cost:** \$51,960.00

**Max distance from shore:** 165LF

**Concrete used:** ~735 tons/525 cyd

**Dimensions:** Base = 15', Crest=3',  
Height=3'



## Sullivan shoreline

Pre-shoreline work  
Image date: 11-2006

Google<sup>™</sup> earth

Image U.S. Geological Survey



700 ft

September 2008



Google Earth

©2013 Google







## Sullivan shoreline

Fence Installation  
Image date: 12-2008

**Orange snow  
fence between  
stout pilings**

Google earth

Image Texas General Land Office

500 ft

N















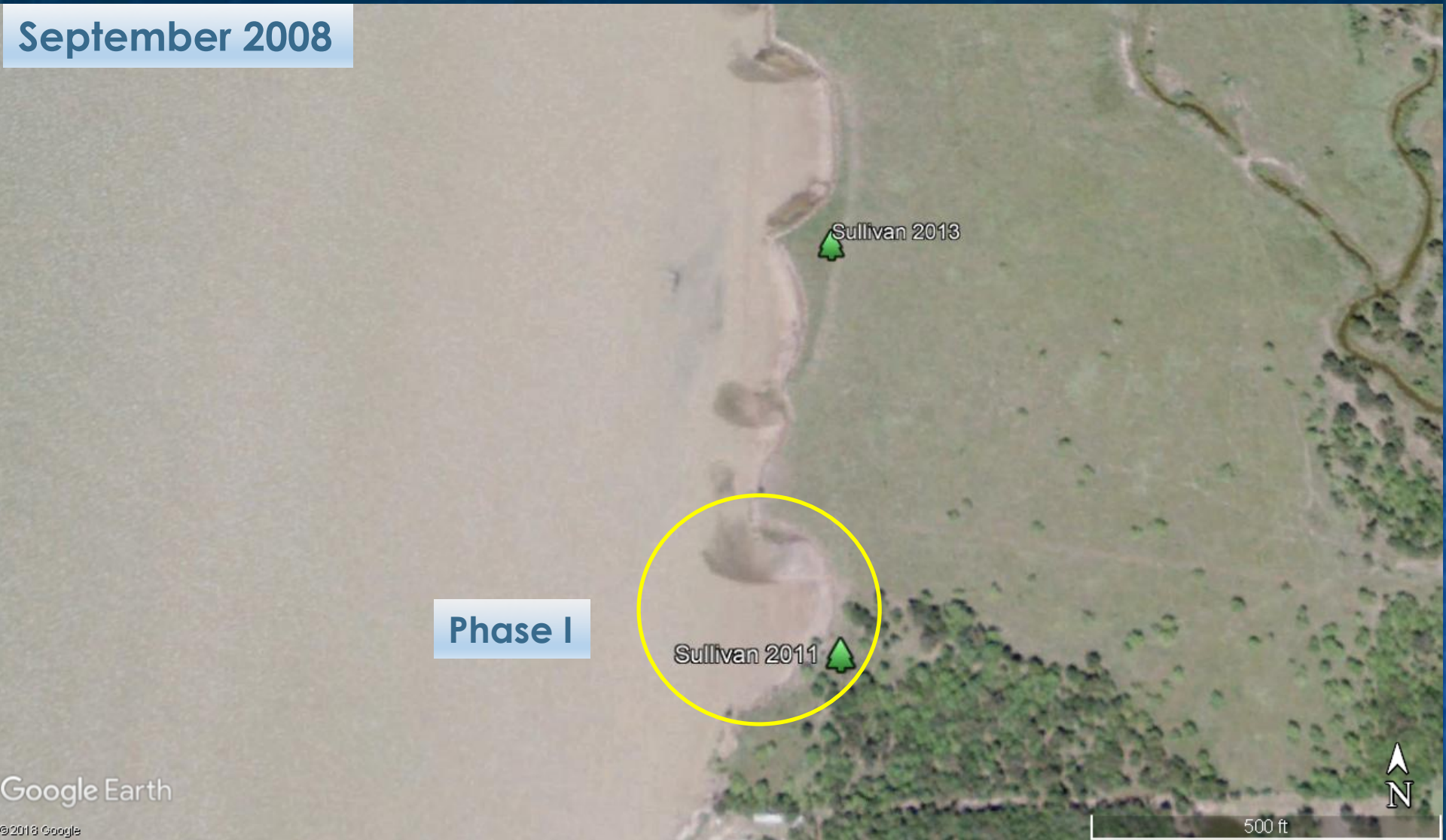








September 2008



Phase I



# Crushed Concrete



**April 2011**

18-24 inch, clean concrete

Can be placed by land or barge

Works in high energy areas





October 2012





**March 2013**



September 2008



Google Earth

© 2013 Google

500 ft





March 2013





July 2013





September 13, 2013





October 2013



September 2008



Sullivan 2013



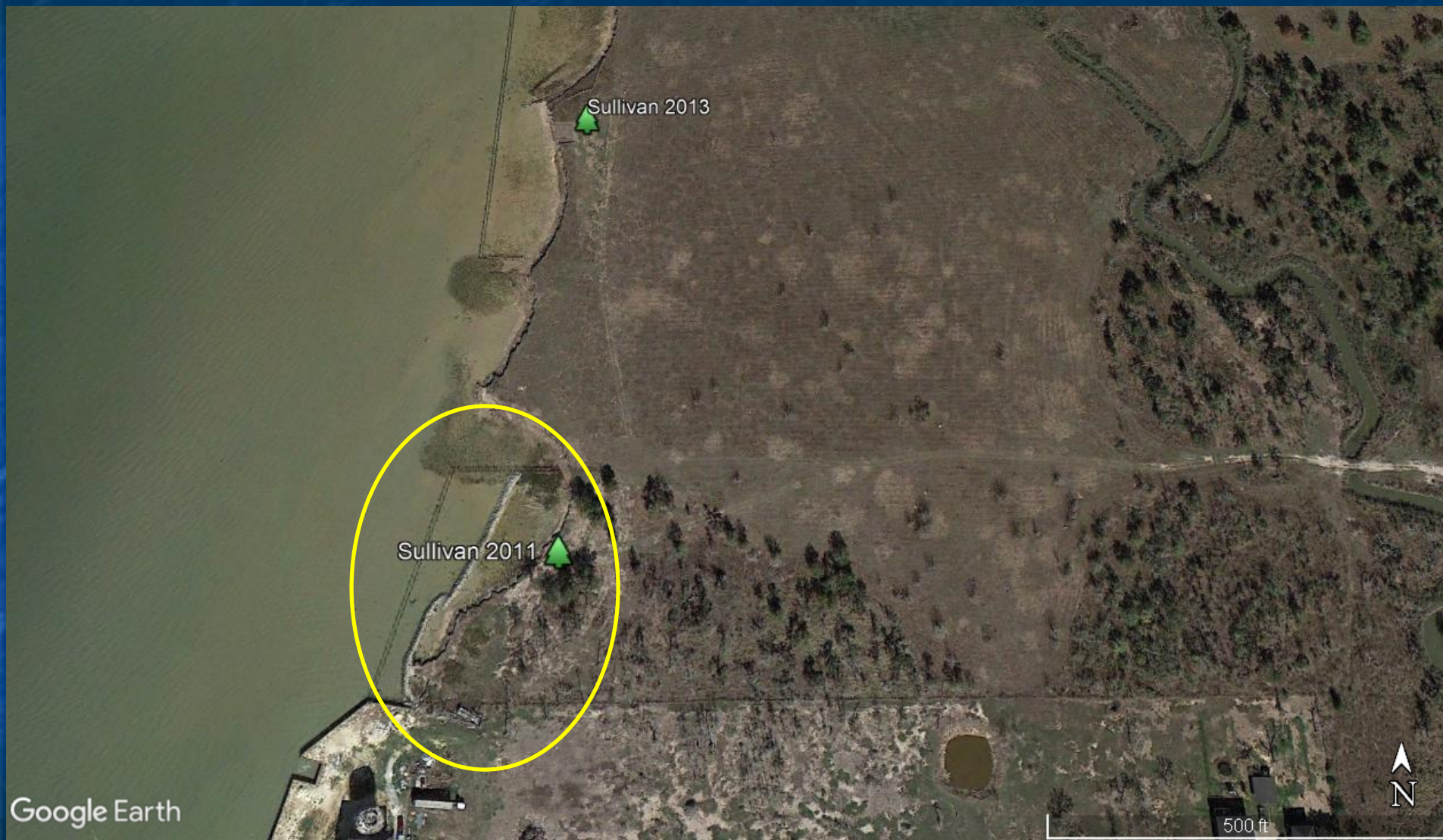
Sullivan 2011

Google Earth

©2013 Google







2011





Google Earth

500 ft



2014

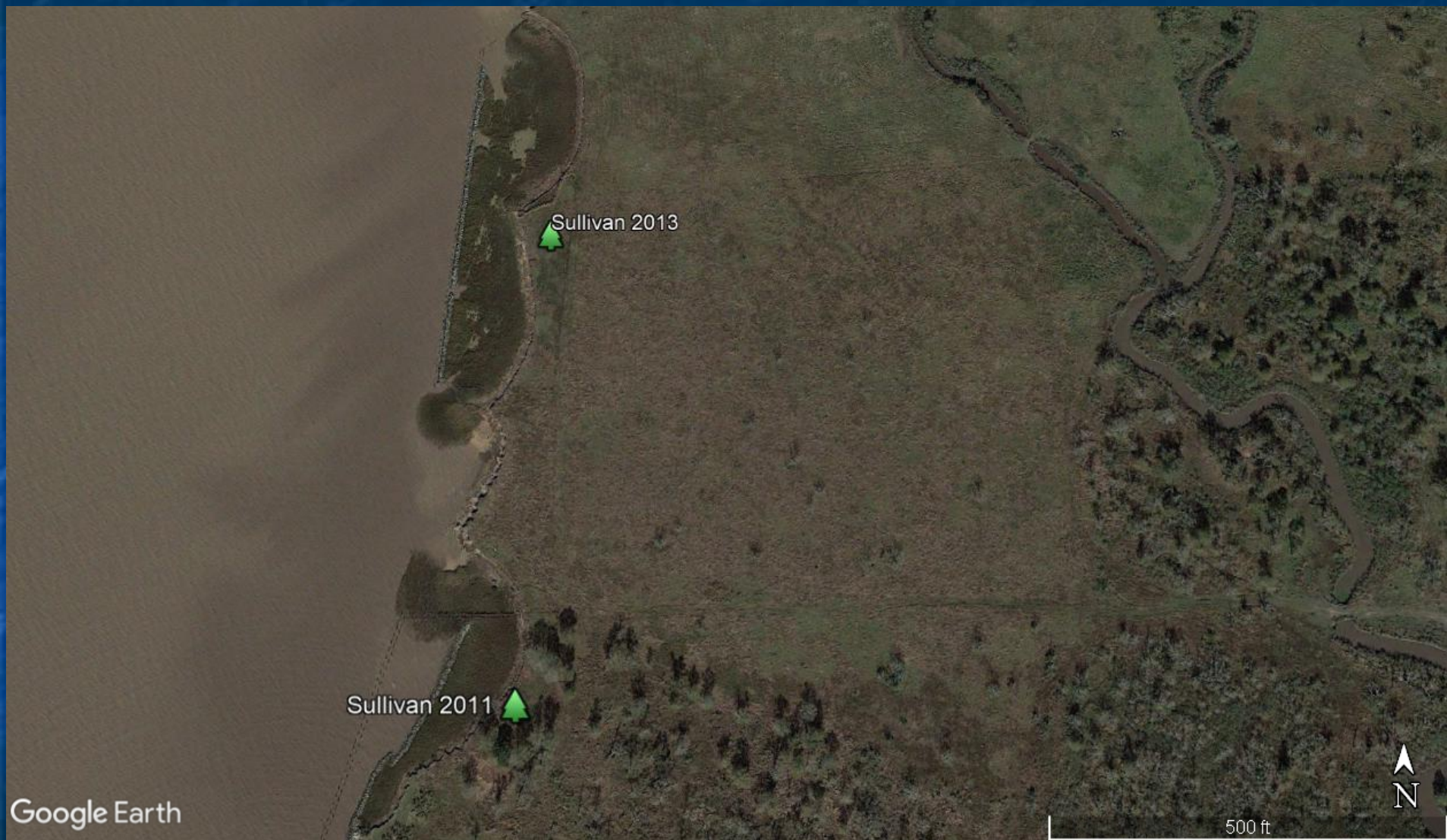




Google Earth

2014

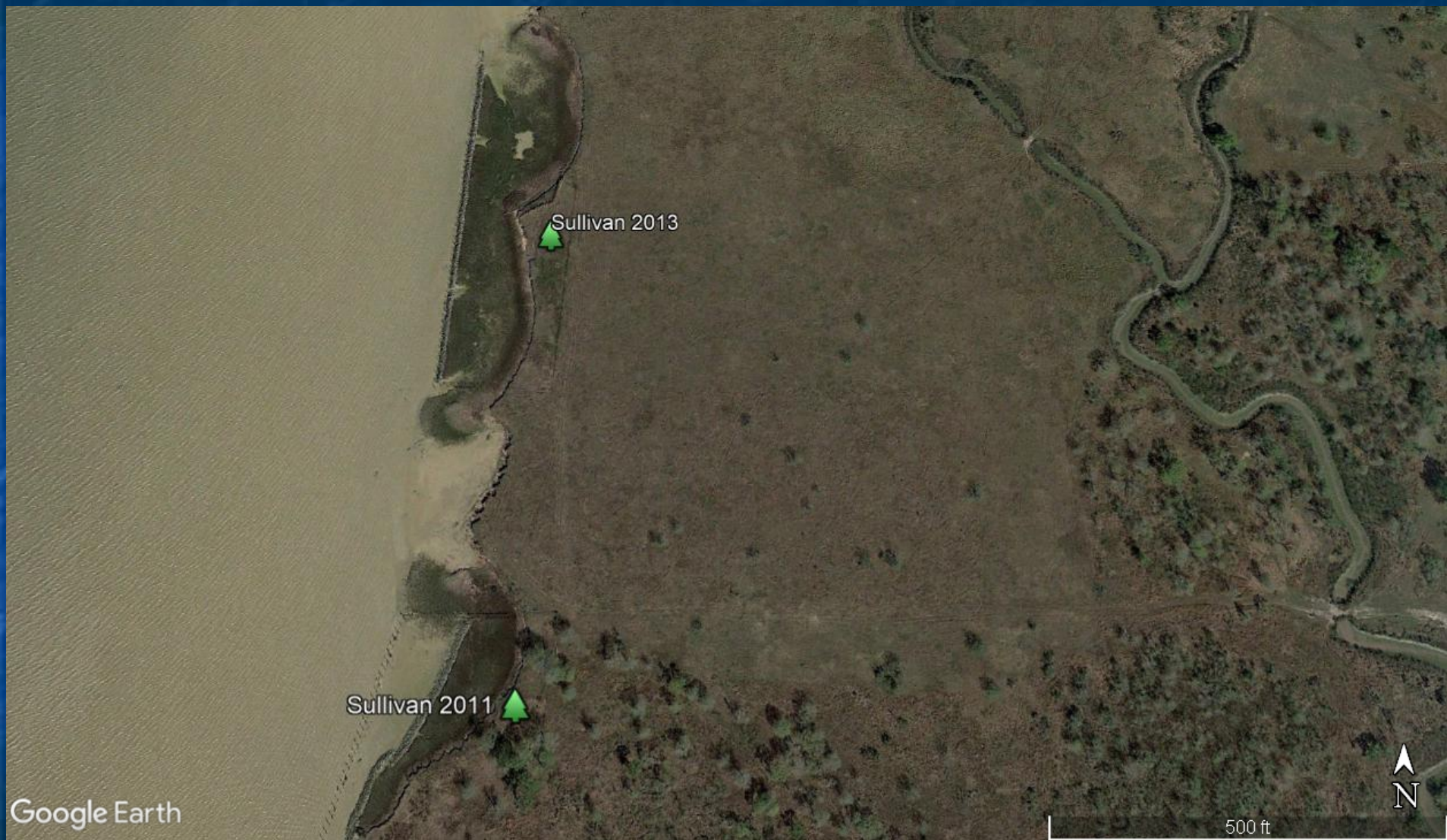




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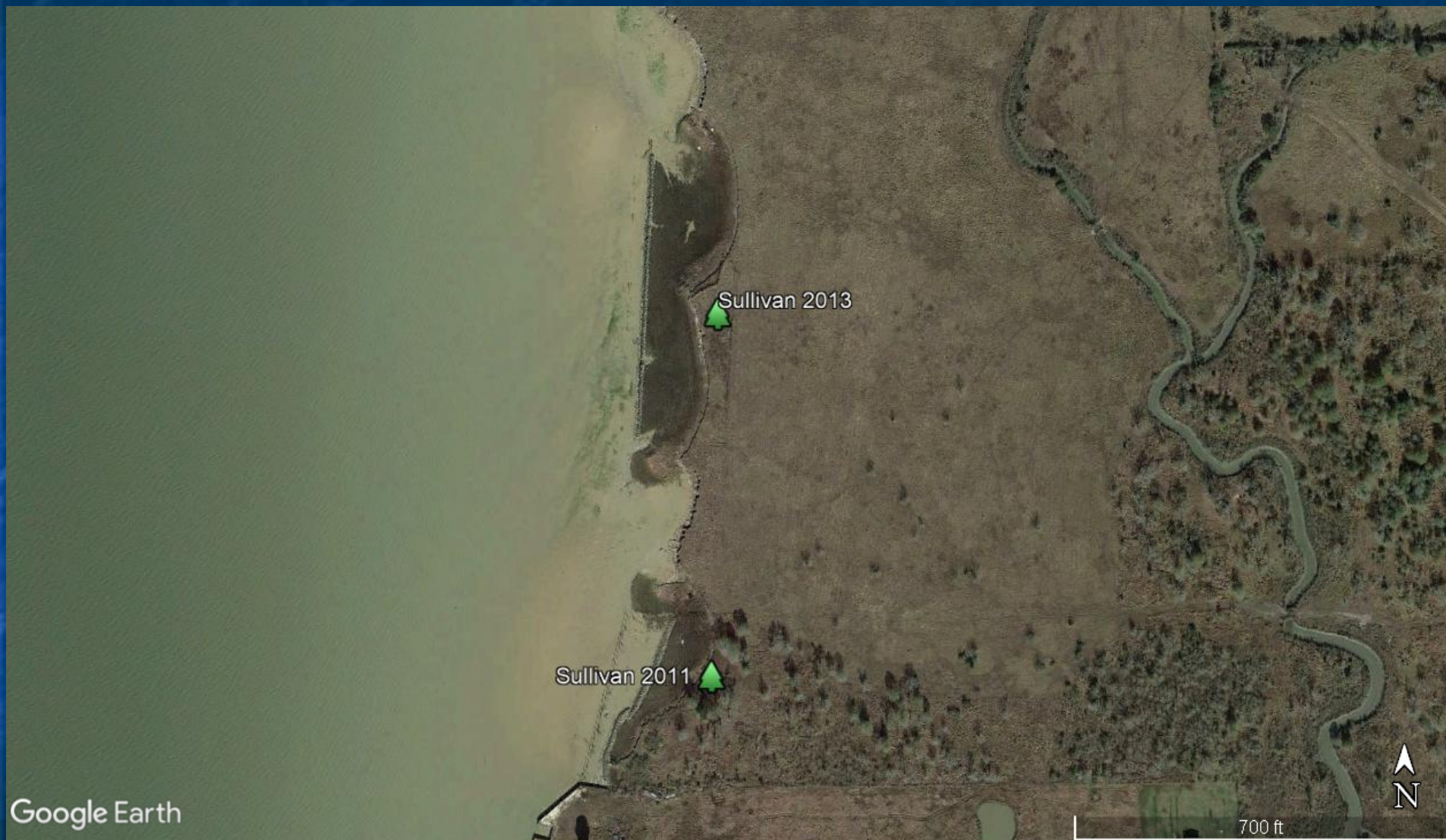
2015





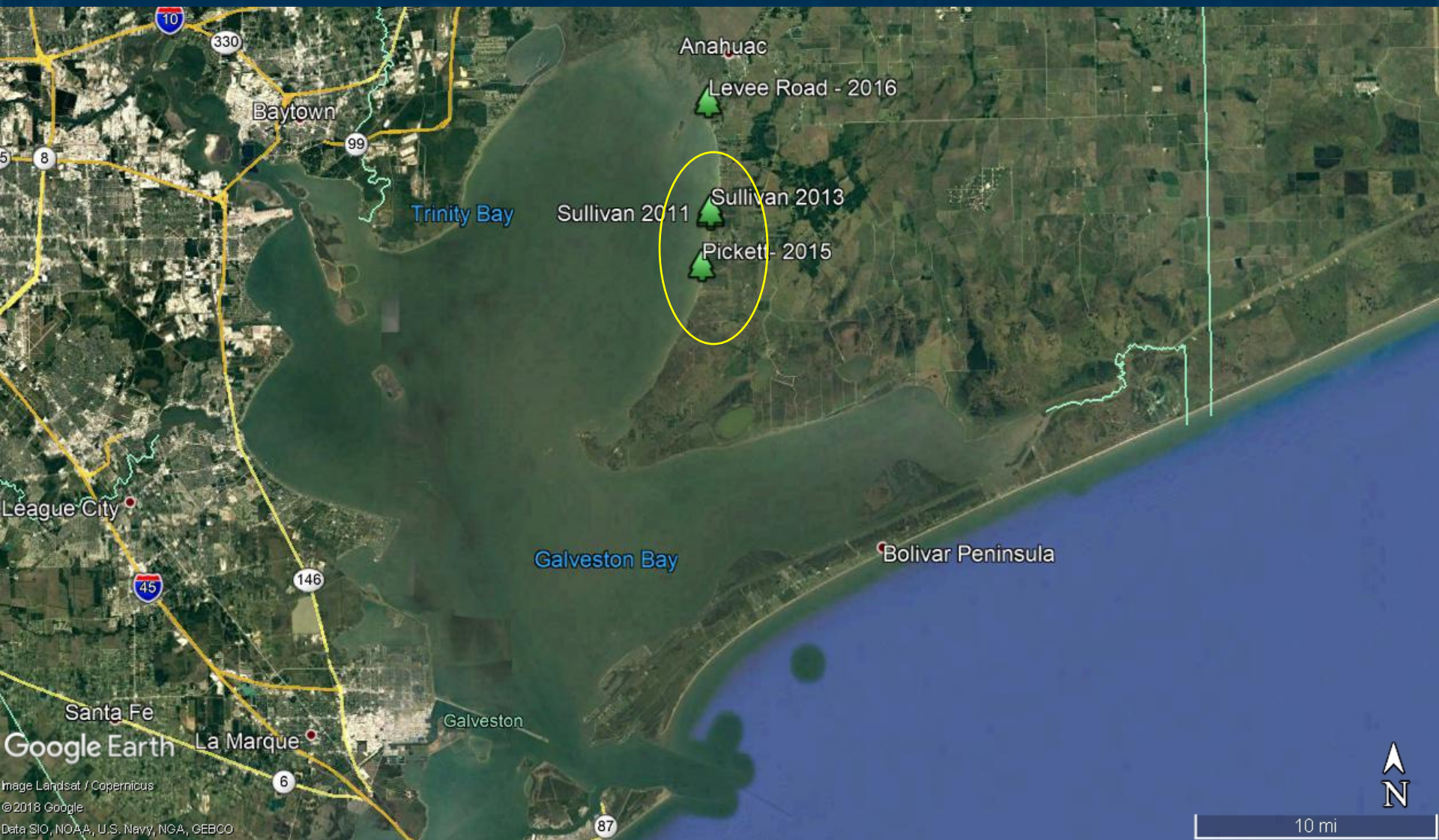
2017





January 2018







## Pickett Shoreline

### Living Shorelines Project

Trinity Bay, Chambers  
County, TX

**Breakwater:** 1300LF

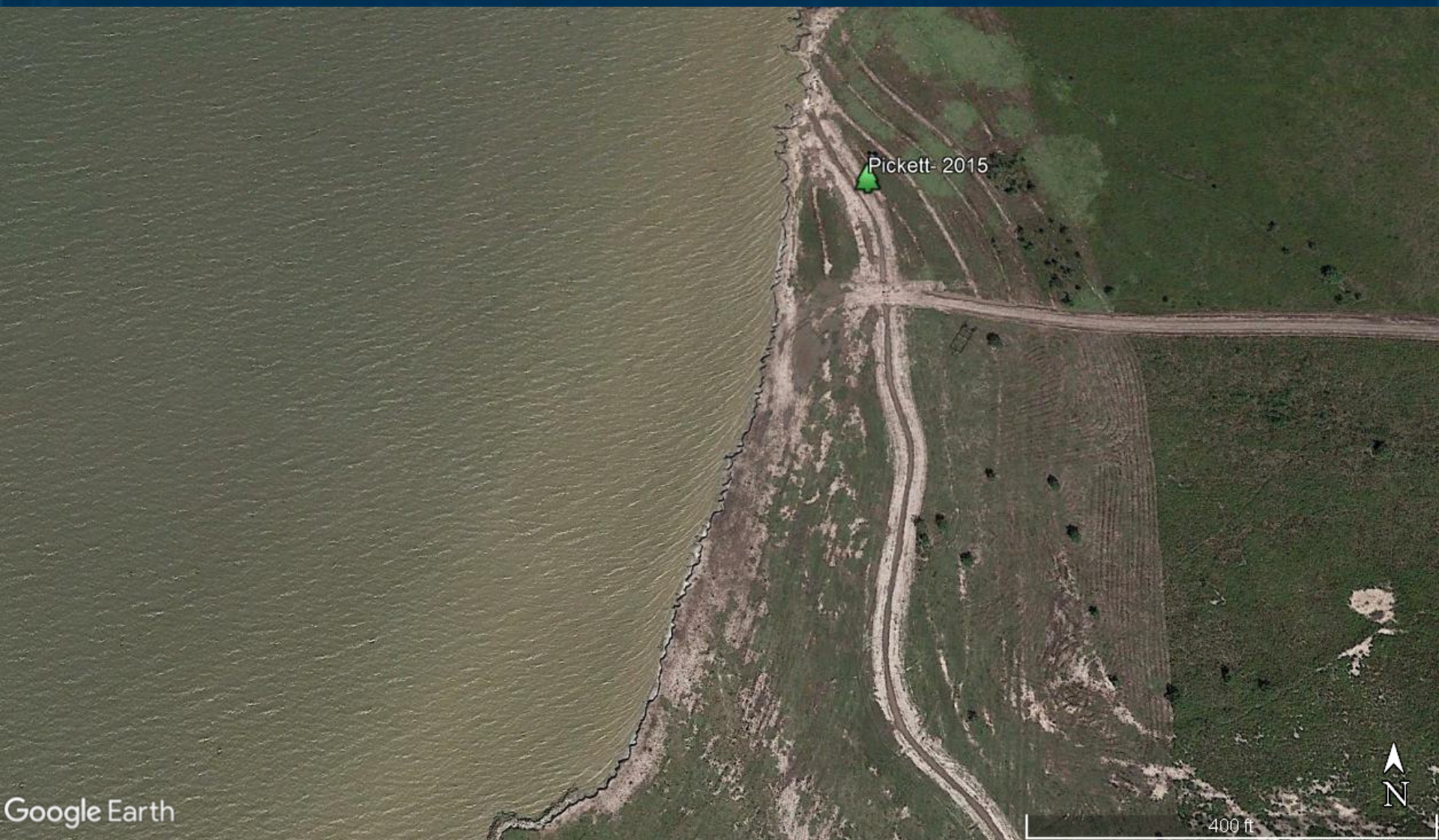
**Marsh Potential:** 2.43  
acres

**Total Project Cost:**  
\$138,530.50

**Summary:** Same  
method, different  
results than Sullivan







Google Earth

400 ft

N

September 2014



Breakwater  
installed spring  
2015

Pickett- 2015

Material  
placed  
by  
barge

Google Earth



500 ft

December 2015



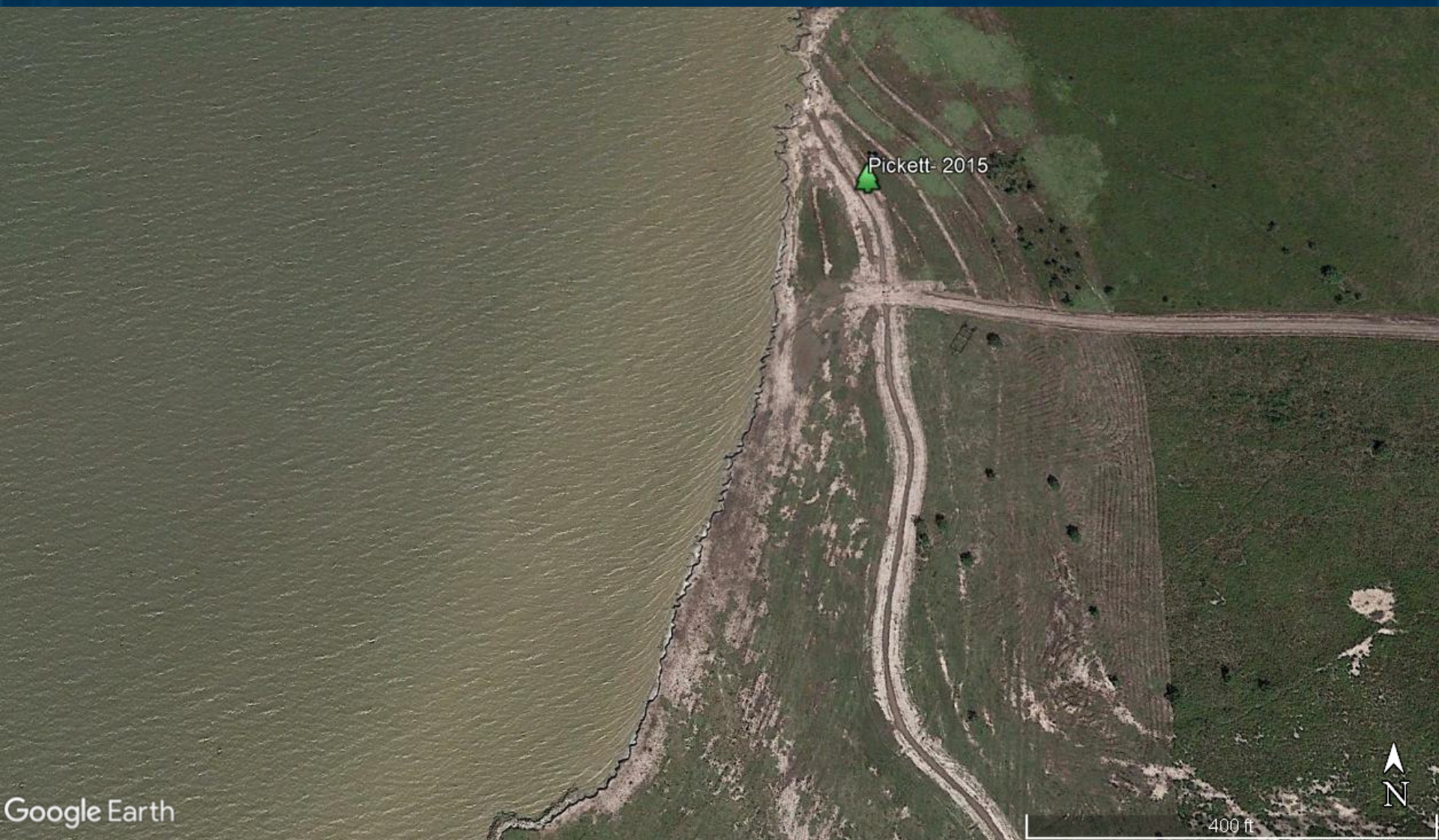


Boy Scouts and Marsh Mania volunteers have planted 8500 stems of *Spartina alterniflora* as well as seashore paspalum and marshhay cordgrass









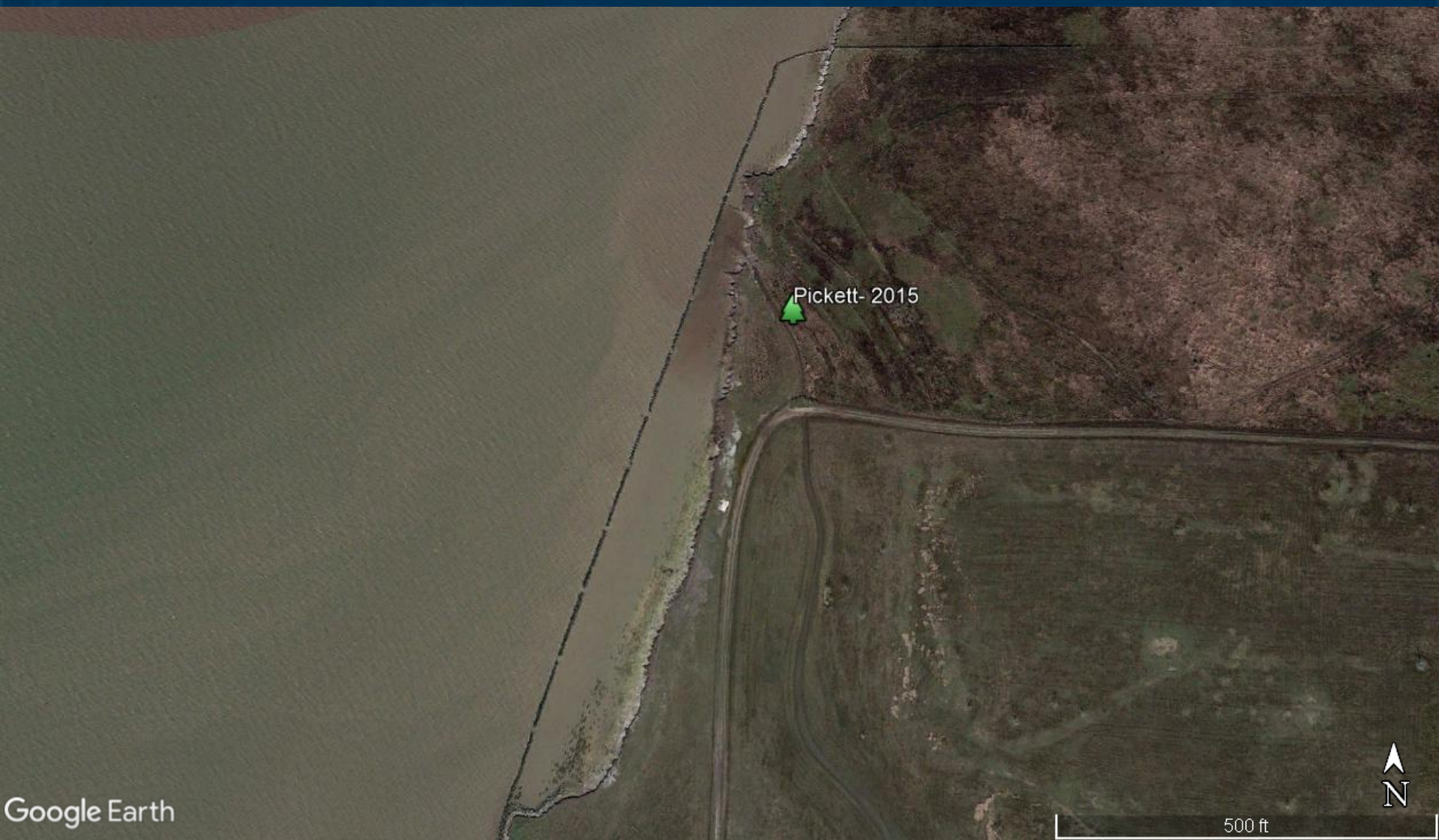
Google Earth

400 ft

N

October 2014

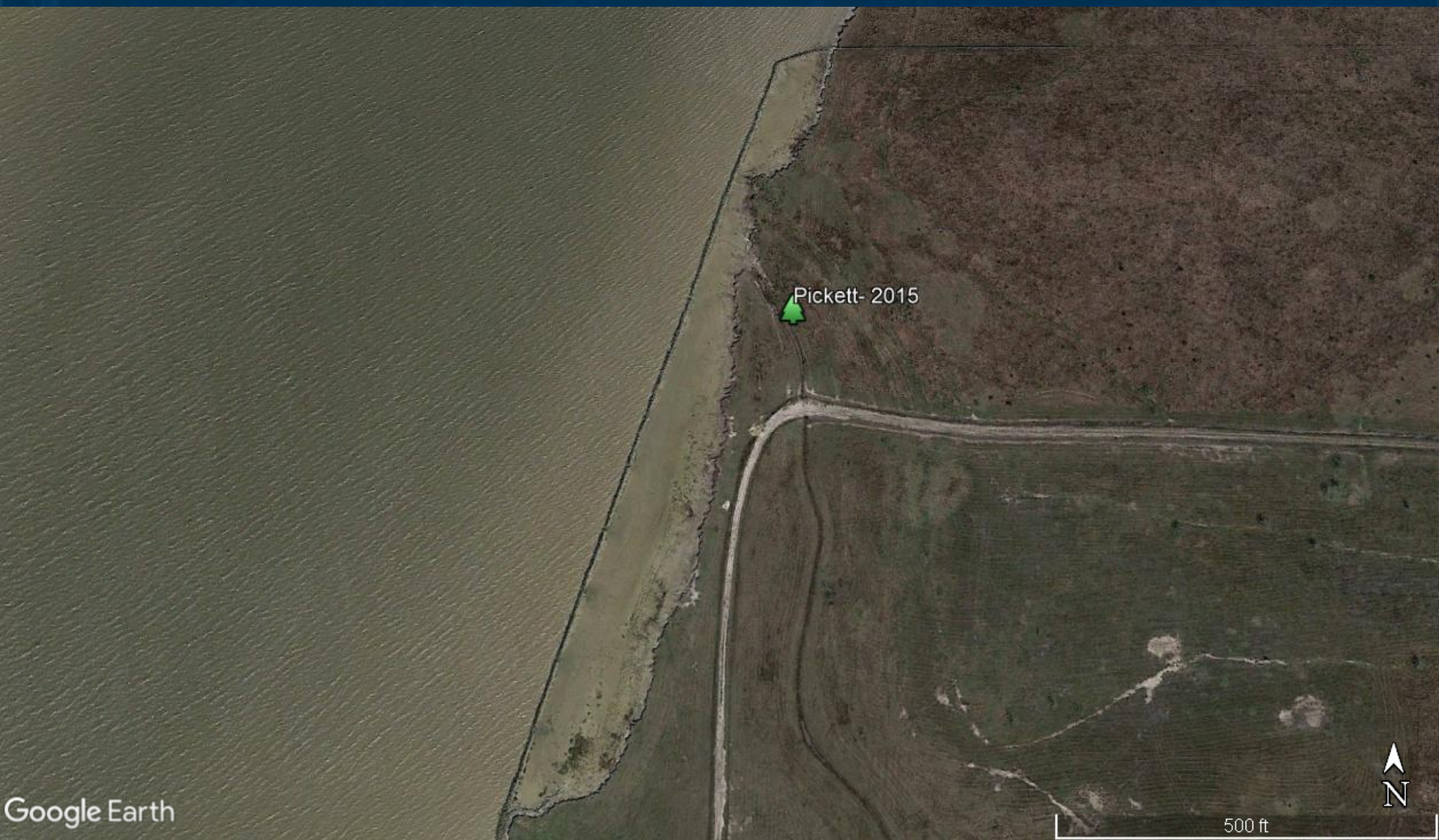




Google Earth

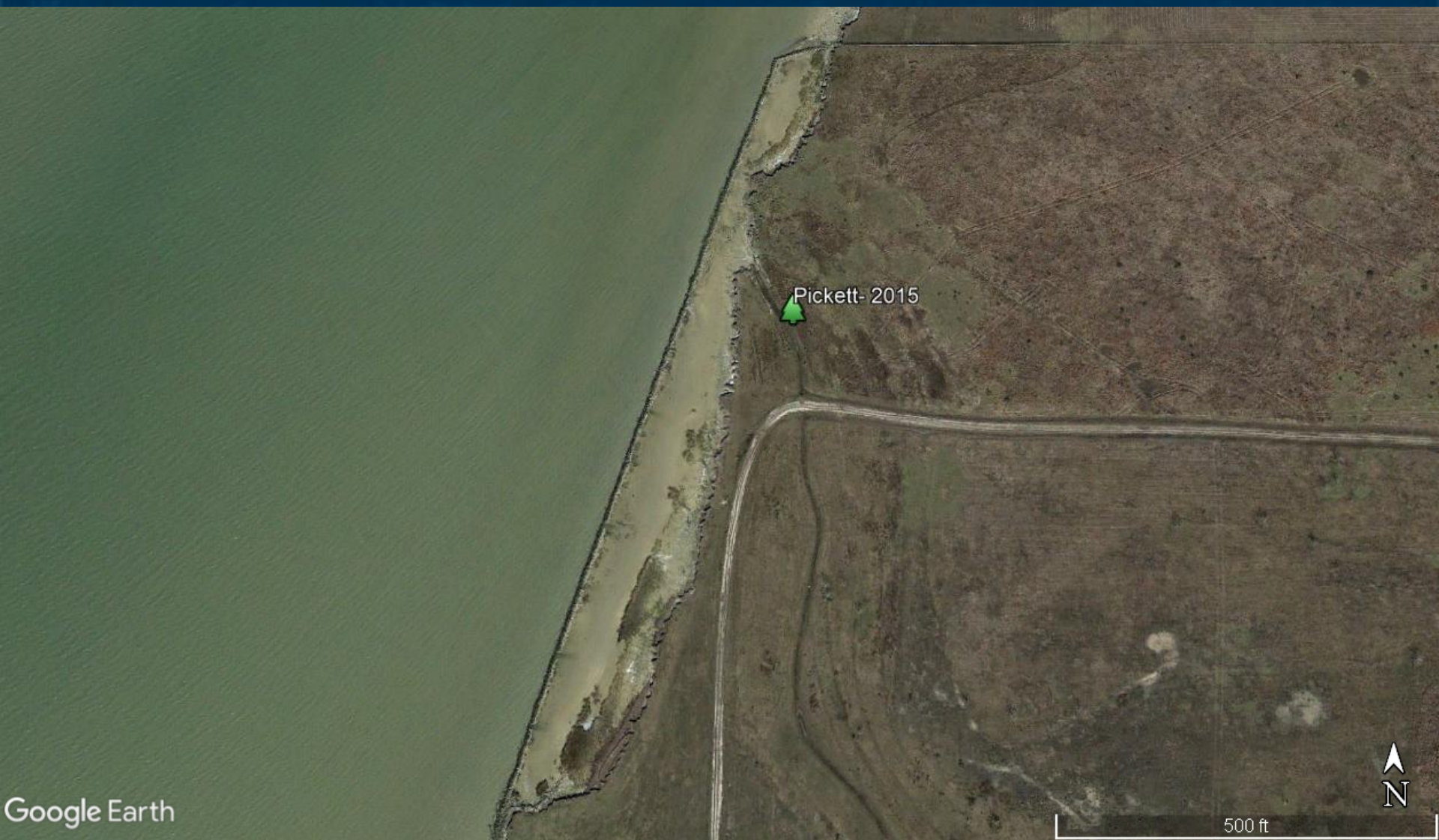
December 2015





September 2017





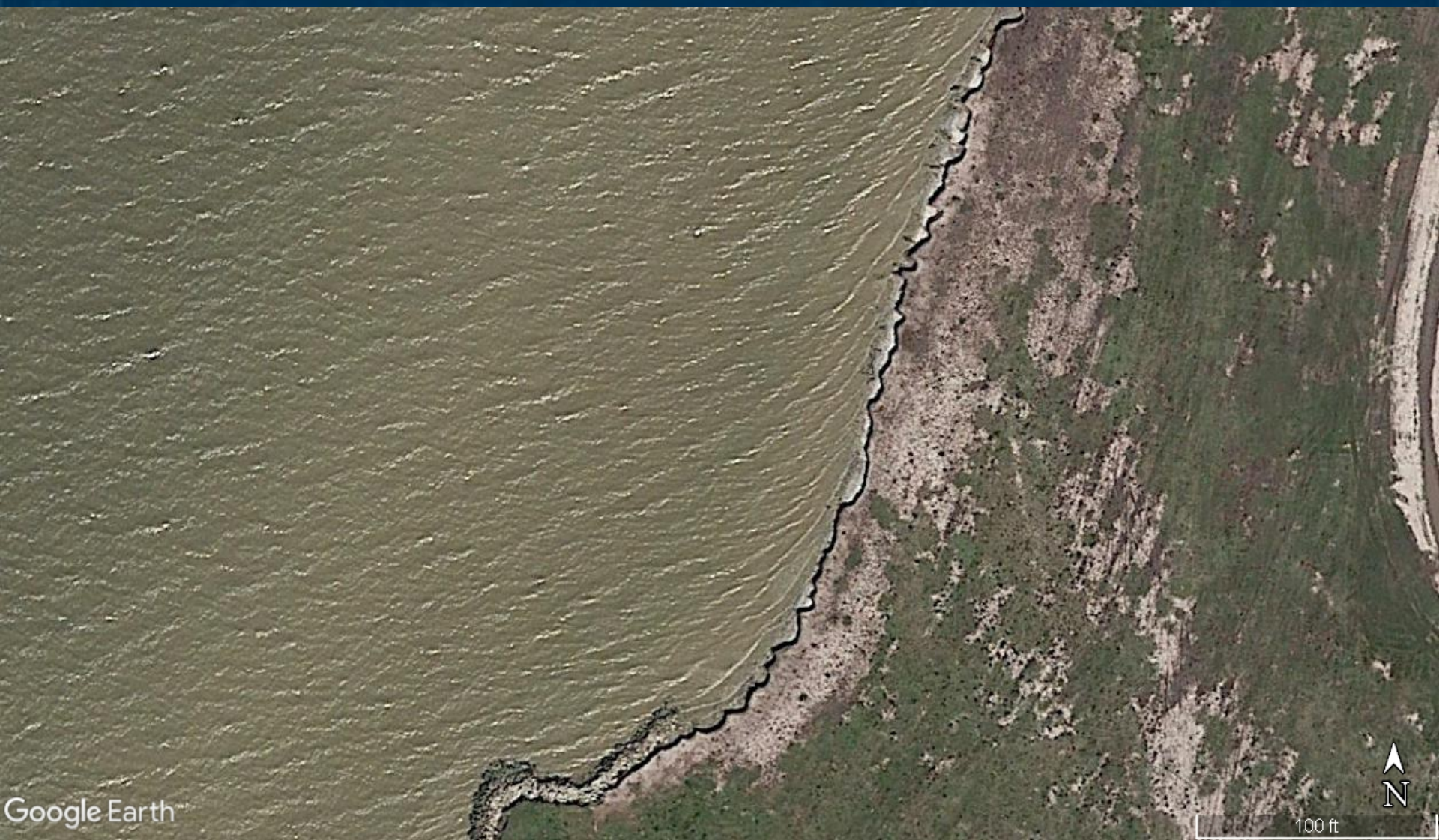
Google Earth



500 ft

January 2018





October 2014





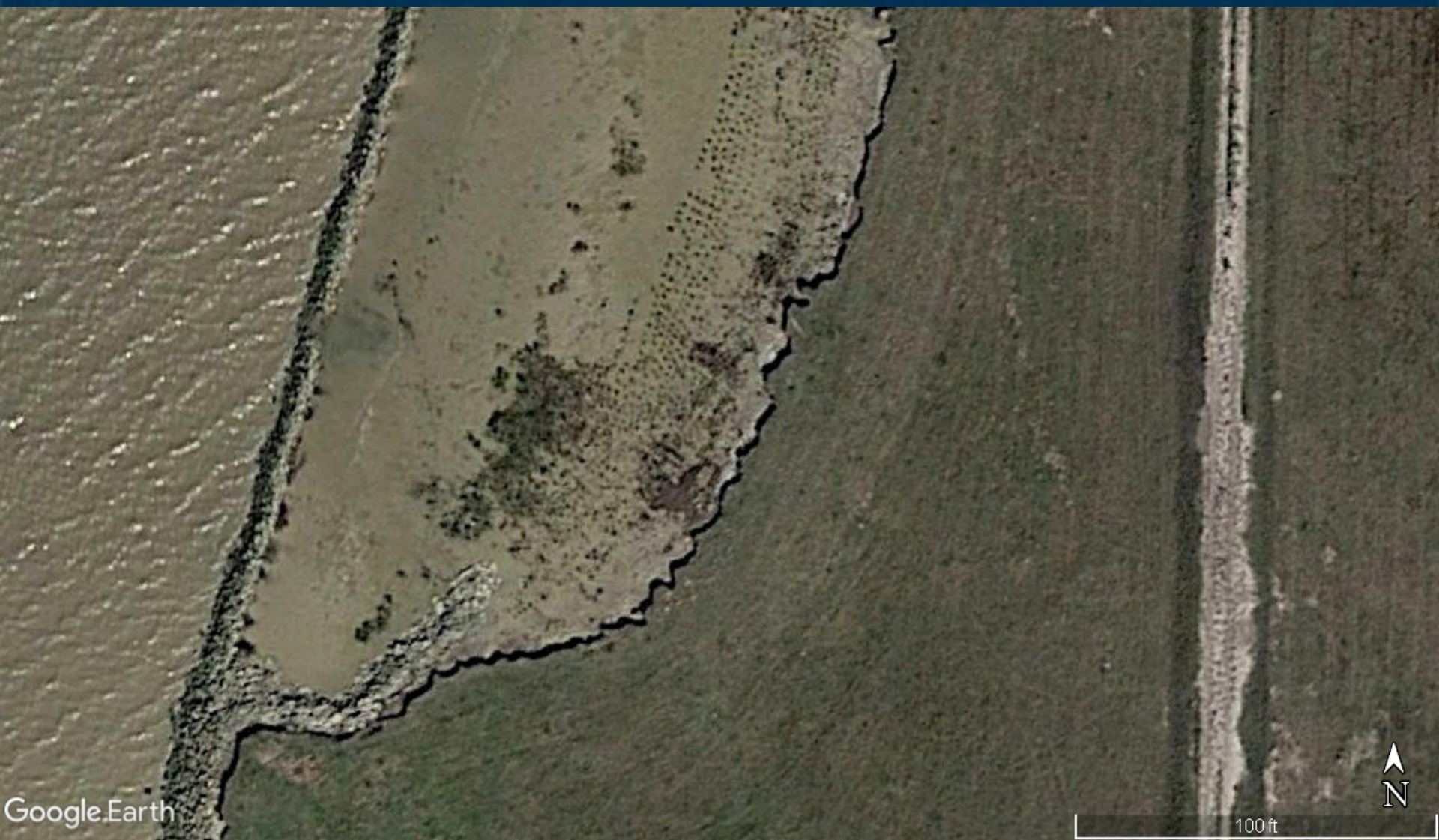
Google Earth



100 ft

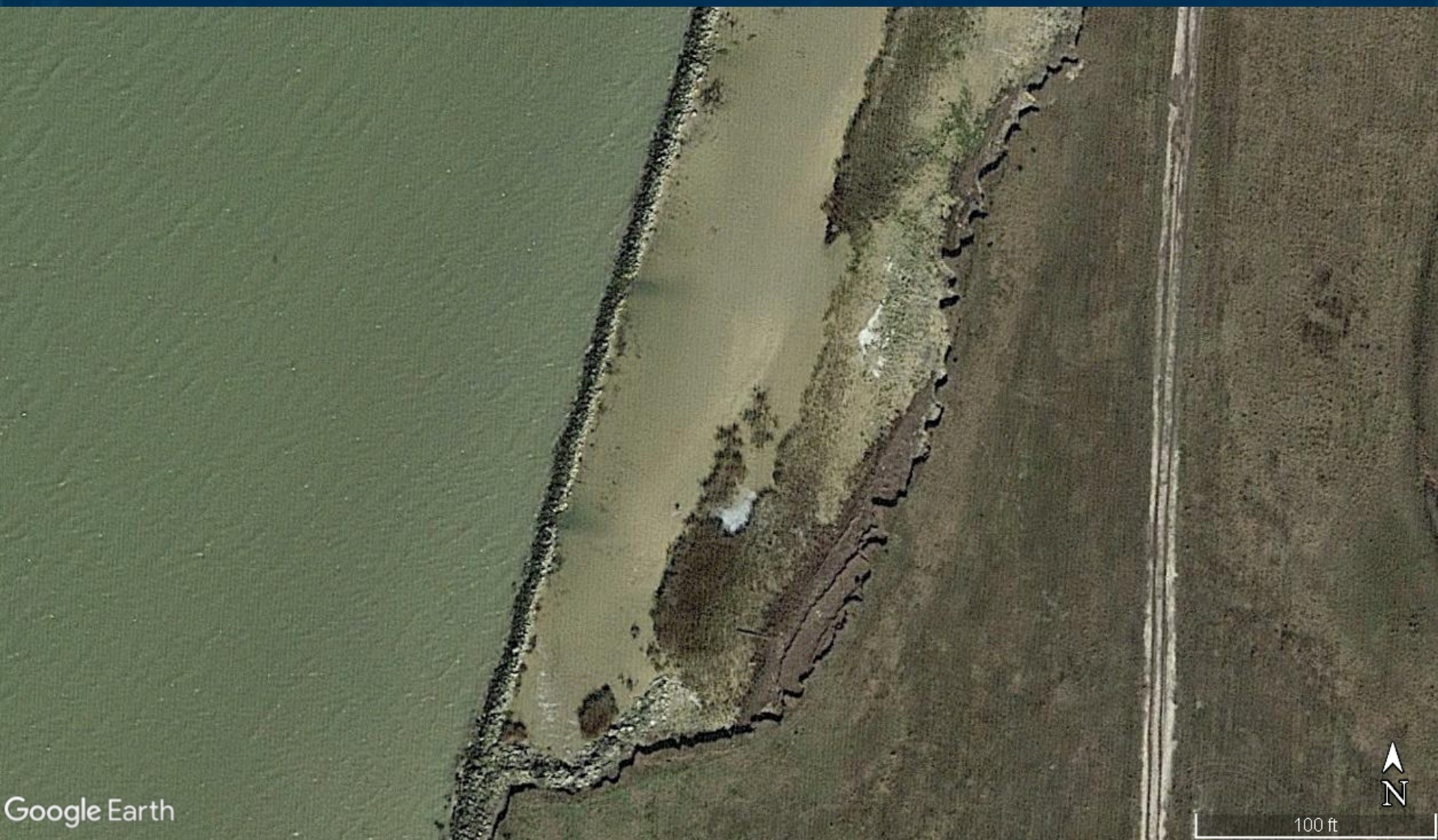
December 2015





January 2018





Google Earth

100 ft



January 2018











# Comparison Chart

	Sullivan	Pickett
Location	Trinity Bay, Chambers Co., Tx	Trinity Bay, Chambers Co., TX
Avg water depth based on tide charts	2.5 ft	2.5
Length of breakwater	875LF in 2 section	1300LF
Total area protected	2.31 acres	2.43 acres
Max distance from shore	165LF	130LF
Material used	315 tons phase 1 885 phase 2	1510tons/1008cyd



# Permitting USACE NW27

## USACE NW 27

### **Aquatic Habitat Restoration, Establishment, and Enhancement Activities.**

Activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas, the restoration and enhancement of non-tidal streams and other non-tidal open waters, and the rehabilitation or enhancement of tidal streams, tidal wetlands, and tidal open waters, provided those activities result in net increases in aquatic resource functions and services.



# Permitting COE NW54

## Living Shorelines.

Structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the construction and maintenance of living shorelines to stabilize banks and shores in coastal waters, which includes the Great Lakes, along shores with small fetch and gentle slopes that are subject to low- to mid-energy waves. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes. Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures.



# Permitting USACE

## Why NOT NW54?

(Wasn't enacted until 2017, but ...)

- (a) The structures and fill area, including sand fills, sills, breakwaters, or reefs, **cannot extend into the waterbody more than 30 feet** from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects;
- (b) The activity is **no more than 500 feet in length along the bank**, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects;



# Permitting TX GLO

**No State of Texas land lease required.**

**Lease from Chambers-Liberty Counties Navigation  
District**



# The Good News

Grass IS growing – new shoots, bunches are thickening.

Material IS settling behind the breakwater.

Long term, the project will be a success, but progress is SLOOOOOOWWWWW





## Lessons Learned

In high wave energy environments, the use of heavier materials off-shore to slow the waves is necessary.

However, correctly designed and placed, they can still yield healthy inter-tidal marsh and provide additional benefits such as increased oyster habitat.







## Lessons Learned, continued

Even sites in similar environments that are geographically close can behave differently. Slight differences in tide ranges, soils, wind direction and other factors can promote or inhibit grass growth.

Every site is different and must be approached as such.





# GBF Wishes to Thank





# Contact US!

## [www.galvbay.org](http://www.galvbay.org)

- For Living Shorelines Site Visits, Site Assessments and Implementations:

- Haille Leija
- Habitat Restoration Manager
- [hleija@galvbay.org](mailto:hleija@galvbay.org)
- Phone: 281-332-3381 x203

- For General Questions Regarding Living Shorelines, Available Resources, Methodologies, and Processes:

- Lee Anne Wilde
- Living Shorelines Program Manager
- [lwilde@galvbay.org](mailto:lwilde@galvbay.org)
- Phone: 832-724-3381