

# LIVING SHORELINES

Concerns and Realism with Living Shorelines, Seagrass Restoration, and Oyster Restoration in Northwest Florida:  
*Year-round Field Observations and Studies Since 2003*

*2018 Living Shorelines Symposium, Pensacola FL*

*Heather Reed Moore*

Ecological Consulting Services Inc



ECS

- ▶ Beauty of Living shorelines
- ▶ Place oyster shell to stop the wave action
- ▶ Plant grass to stabilize the shorelines
- ▶ Pretty simple? Easy
- ▶ NOT ALL LIVING SHORELINES SHOULD BE CREATED AS EQUAL Restoration vs. Creation
- ▶ SITE SPECIFIC



ECS





# Monitoring

SMART (Students Monitoring Areas Restoration Techniques)

- Successes and potential problems
- Improve on a project
- Projects develop over time
- Monitoring can be one week out of a year  
an entire summer or all year
- Can improve and update regulations



ECS

► Living Shorelines

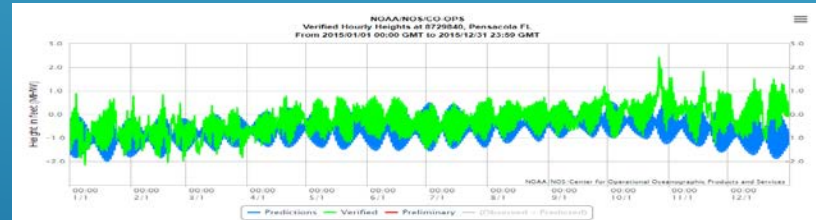
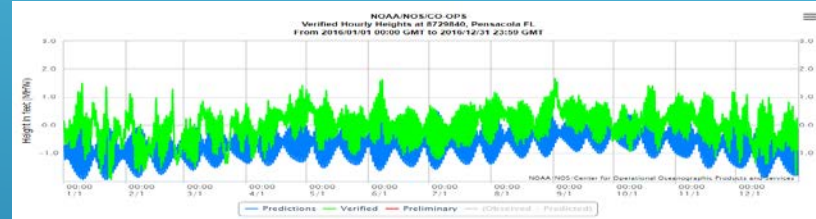


ECS



# Sea Level Rise

Long term salt water exposure



## CHANGES THE SUBTIDAL FLOOR AND COASTLINES

Oyster dies/ shells fall on the floor

Changes the sediment type

Changes existing habitat

Creates a new ecosystem

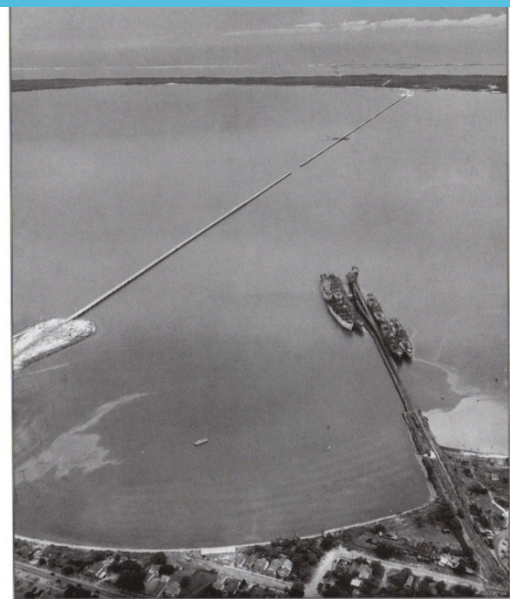
Changes sand to muck



ECS



## Sand to muck



*In April 1946 several "Freedom Ships" returned here from service in WW II and were moored near the old Bay Bridge. One night, a sudden severe storm pulled the ships from their moorings. By morning, two of the ships had broken through the bridge at one point and a third ship went through at a separate point, severing the crucial link between Pensacola and the Gulf Breeze Peninsula. The Floyd Smith Construction Company completed a bypass around the damaged area in August of that same year.*



*May 21, 1946 Pensacola Bay with Muscogee Wharf in the foreground.*

Photo courtesy of T. T. Wentworth, Jr. Collection, West Florida Historic Preservation, Inc., University of West Florida  
Caption from conversation with Mr. & Mrs. Ed Bonifay, Jr.

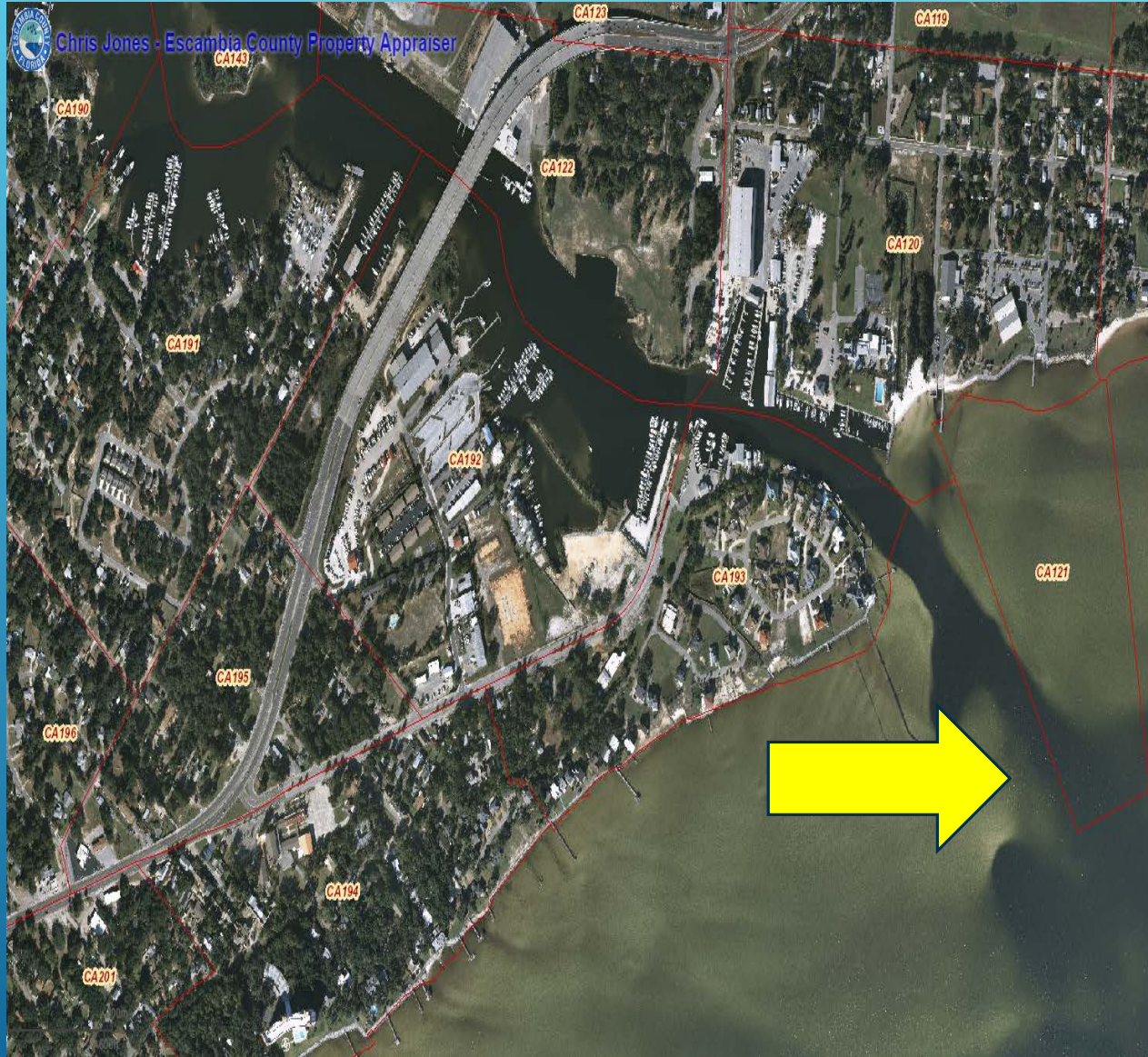


Need sand to keep the bays clear to allow PAR and more light for seagrass



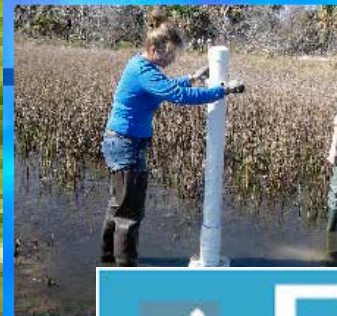
# ECS





ECS



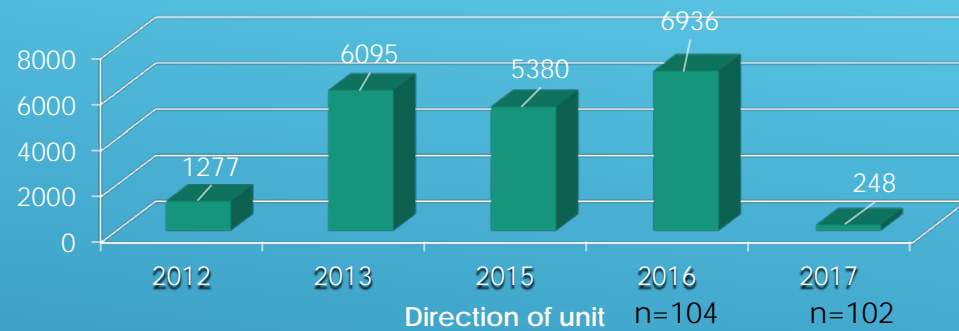


- ▶ Start with oyster reef
- ▶ Shell precious natural resource
- ▶ Provides filtration\*
- ▶ Bound together makes a nice reef
- ▶ Let's take a closer look
  - Filtration- Oysters do not filter 24 hours a day seven days a week
  - Closed System vs Open System
  - Male to female ratio
  - What affects the health of an oyster?

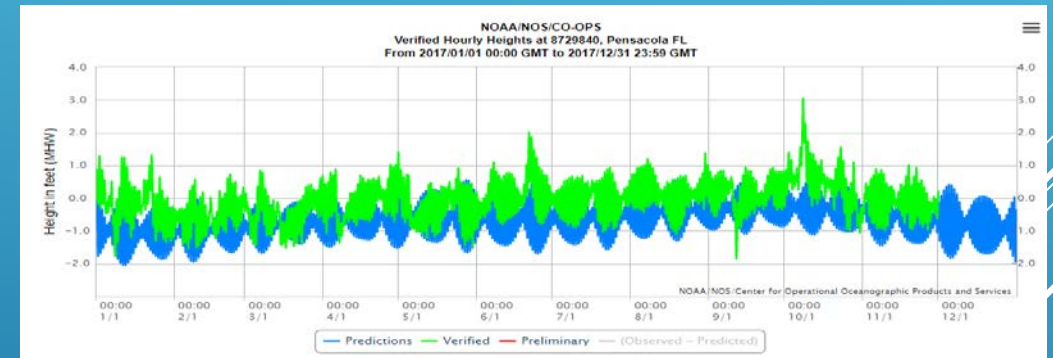
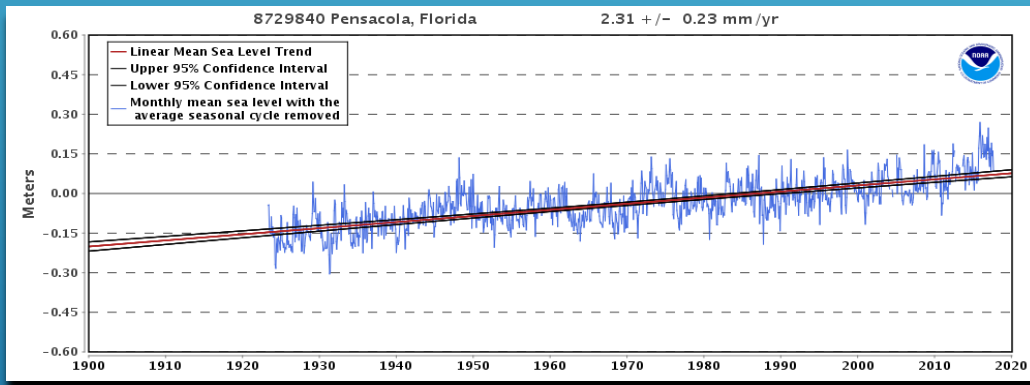
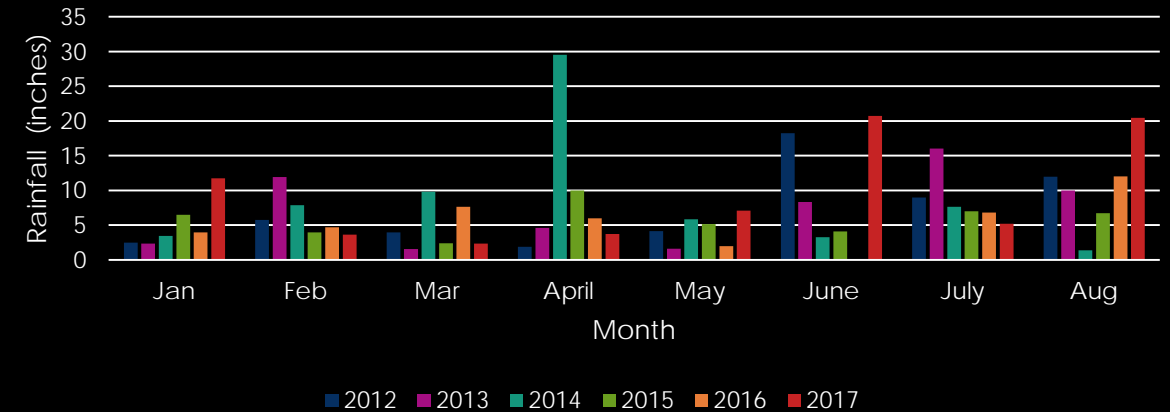




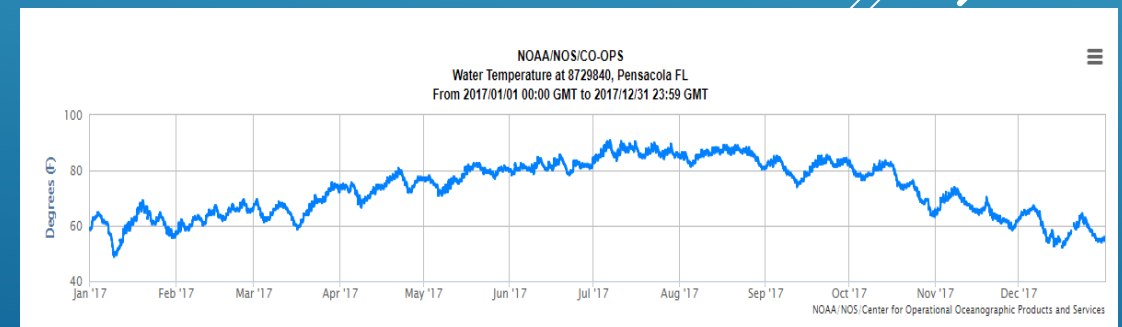
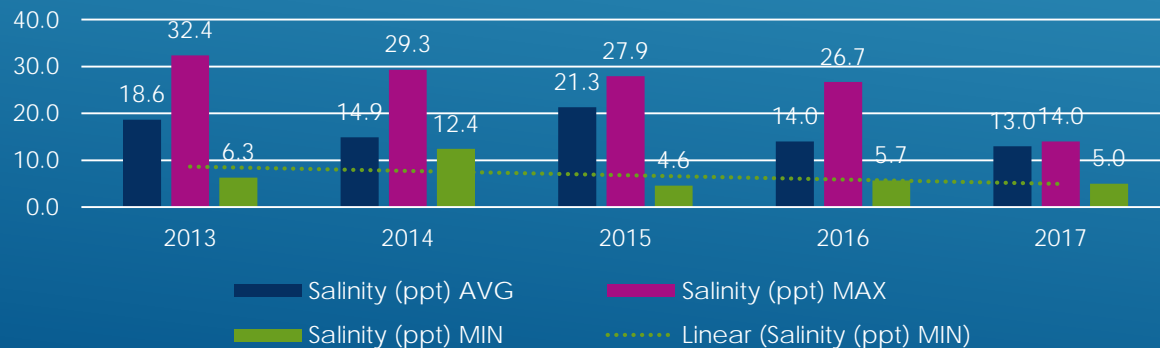
## Total # of oyster drills found on the reefs of Deadman's Island



## On site Precipitation 2012-2017



## Five Year Salinity Average in Pensacola Bay



# Depth

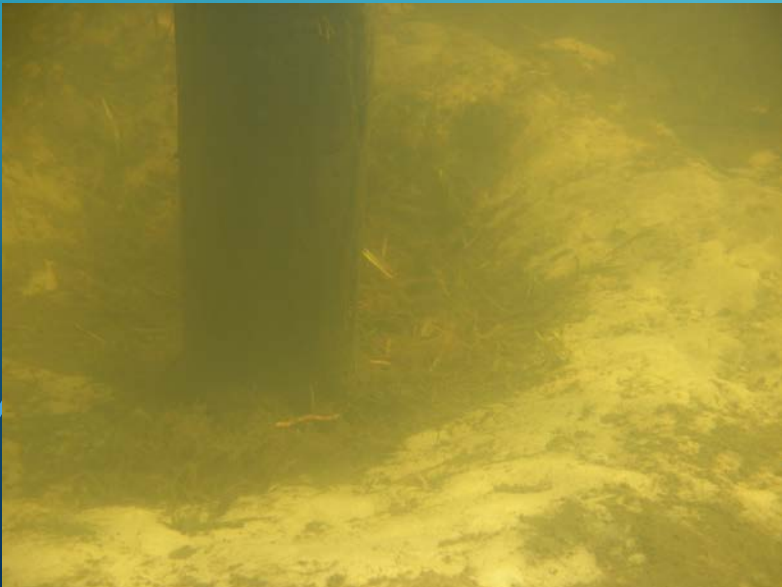
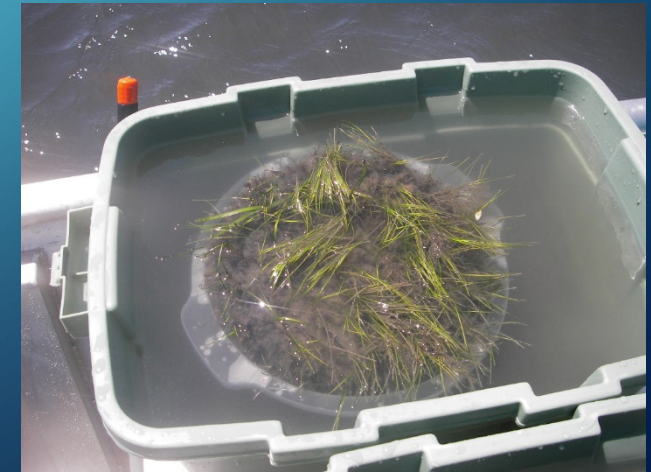
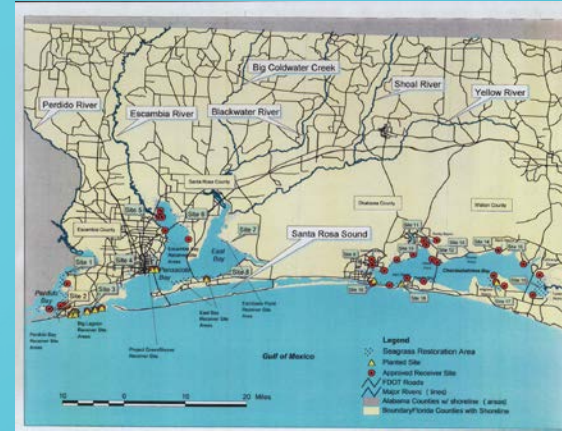
- ▶ Oysters do well in about minimum 3 feet of water
- ▶ In shallow water 3 feet to 0, they bake in the sun, get smothered or pelted by the sand being transported. Therefore die off and leave the skeleton of the shell- falls off and shell debris start creating a new ecosystem in the sand
- ▶ 10 foot mean high water rule- not effective in most areas in Pensacola Bay
- ▶ Off shore oyster reef- great to keep sandy shorelines
- ▶ Weight of the reefs





# Seagrass

- The beloved seagrass – we need seagrass for water clarity and nursery
- Seagrass restoration is possible but only under the right conditions
- shoot **senescence** and subsequent mortality be balanced by shoot recruitment.
- Seagrass expansion- term misused
- But what is the dark side?



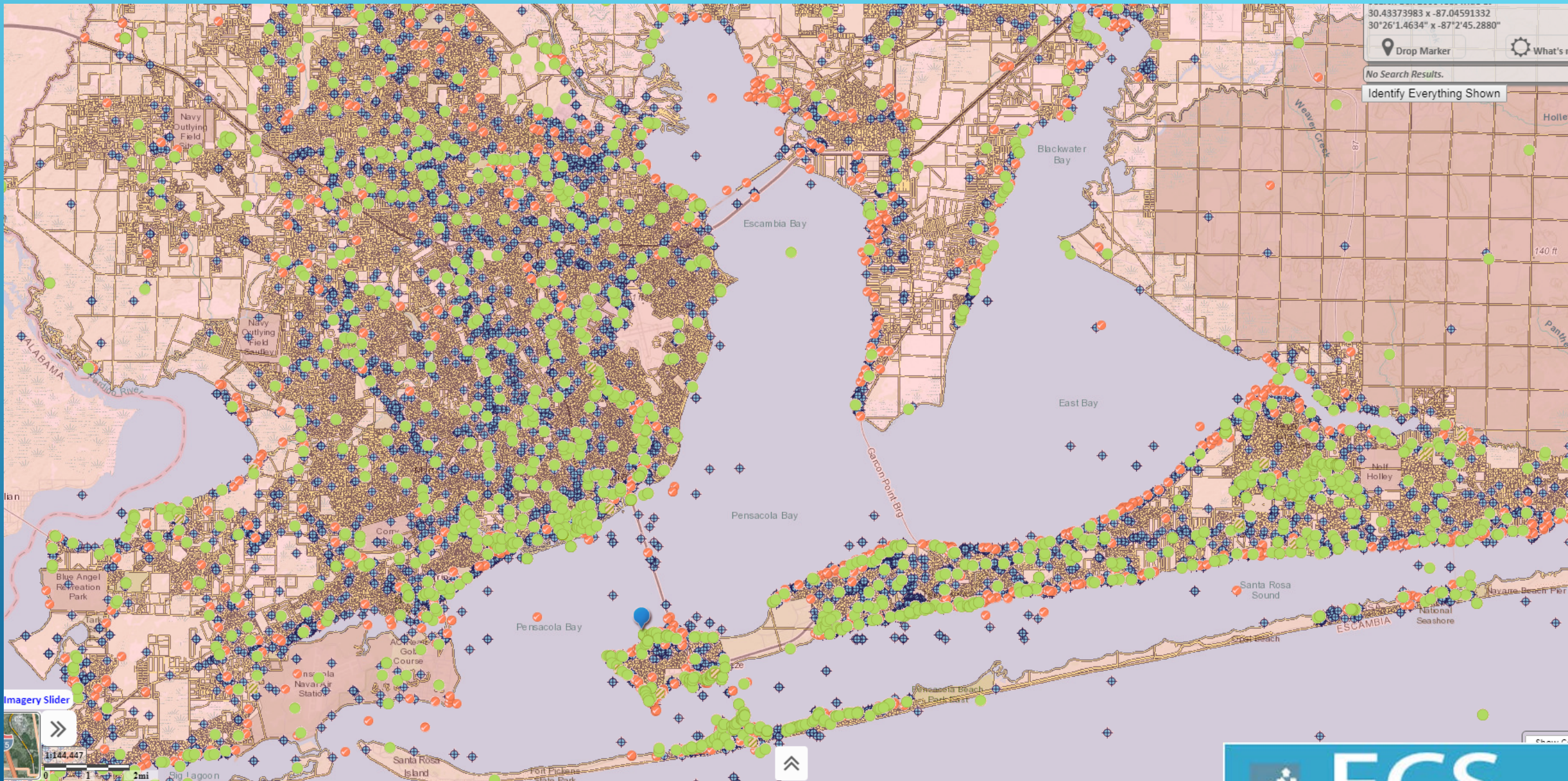
ECS

# Water Quality

- ▶ Why cant we just grow seagrass?
- ▶ nutrients,- runoff- detritus- sediment transport
- ▶ What is the real source of our water quality demise?
- ▶ Drum roll....









- ▶ We have to figure out a way to create an artificial wetlands
- ▶ Wetland bogs
- ▶ Water by-pass
- ▶ Filter water behind the wetlands and leave the sand





Our water quality is constantly threatened by many different sources and types of pollution. Under the Clean Water Act, every must adopt water quality standards to protect, maintain and improve the quality of the nation's surface waters. These standards represent a level of water quality that will support the goal of "swimmable/fishable" waters. Water quality standards are ambient standards as opposed to discharge-type standards. These ambient standards, through a process of back calculation procedure known as total maximum daily loads or wasteload allocations form the basis of water quality based permit limitations that regulate the discharge of pollutants into surface waters under the National Pollutant Discharge Elimination System (NPDES) permit

# CLEAN WATER ACT

State Criteria reevaluation every three years

(so far State results show there is no need to reevaluate)

Observation- State criteria for most water quality is too low –  
outdated instruments

the “best available technology” (

Clean Water Act needs to be changed to mandate new technology and the  
State needs to accept new technology in their methods.



ECS

## Abstract

Seagrass surveying and ground truthing hasn't been accurate in defining density of the entire seagrass bed. It is difficult to compare with aerial photos due to aerial dates, seasons and dormancy of the seagrass in Northwest Florida. Seagrass is prime density in the winter months, Drones surveys are being used as well as a developed program to quantify percent coverage. Costly, lydar data has been shown over time to not accurately reflect the correct loss/gain of the seagrass beds to due to clouds and shadows.

## Purpose

To reduce cost of ground truthing and accurately quantify loss/gain of seagrass.

Obtain more accurate measurement

Drone surveys and seagrass mapping used before dormancy occurs.



Seagrass surveys use various filters to help determine percent coverage digitally without the concern of pixilation, overcast, outdated aerals, lydar, expensive ground truthing,

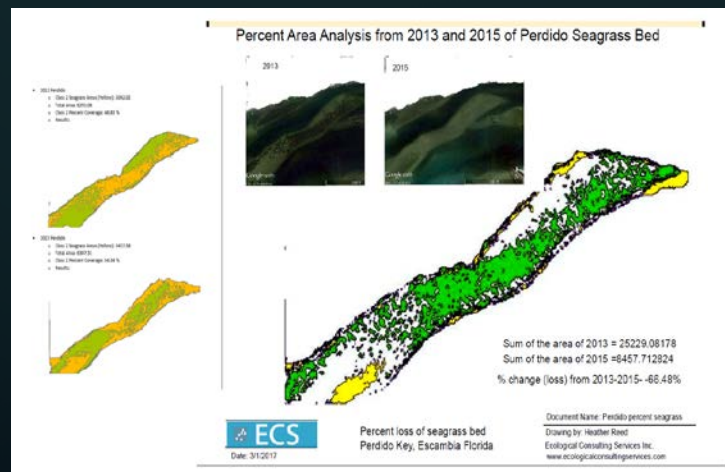
## Methods

Historical aerals were analyzed, including some lydar data.

Seagrass data was mapped out by hand using these aerals.

Seagrass data was digitally mapped also using the aerals. Ground truthing was performed to check accuracy of sites.

\*Permits/waivers are required by the FAA in most areas of north west florida due to aircraft space designation . Obtain realtime information with latest technology to compliment ground truthing



A comparison of percent density of seagrass in Perdido Beach between two years .

## Acknowledgements

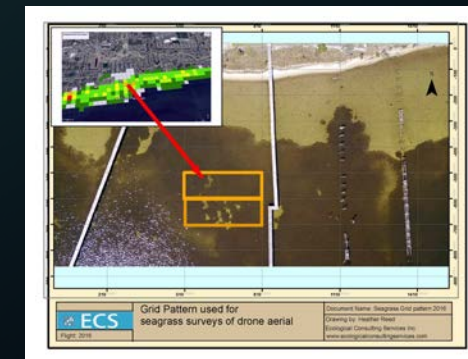
Research and GIS Mapping:  
Heather Reed, Nathaniel Holley, Faith Scafe

## Comparison analysis

The previous years aerals and lydar contained many questionable parameters. Seagrass outlined by hand is not efficient to determine the seagrass density after coalescence. Seagrass mapping through quadrants is great for a quick idea but digital mapping and drone mapping

## Outcomes

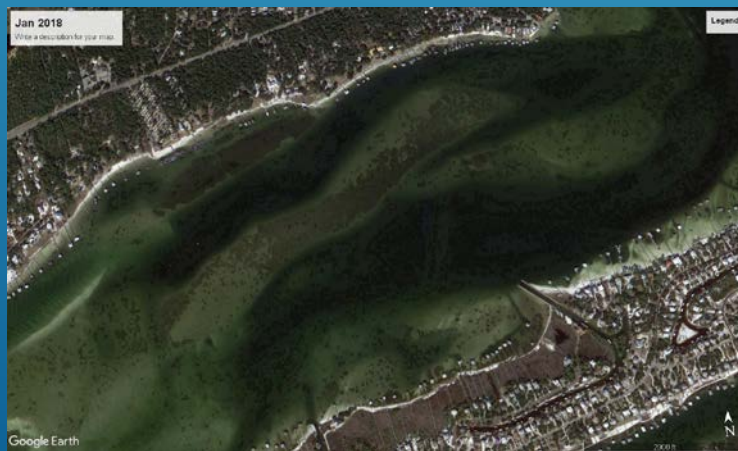
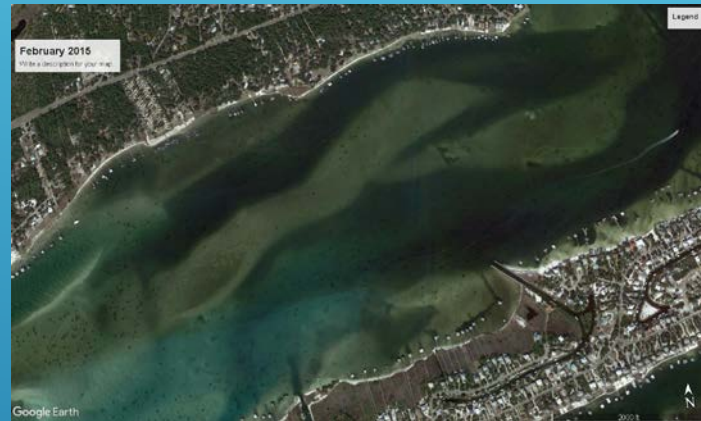
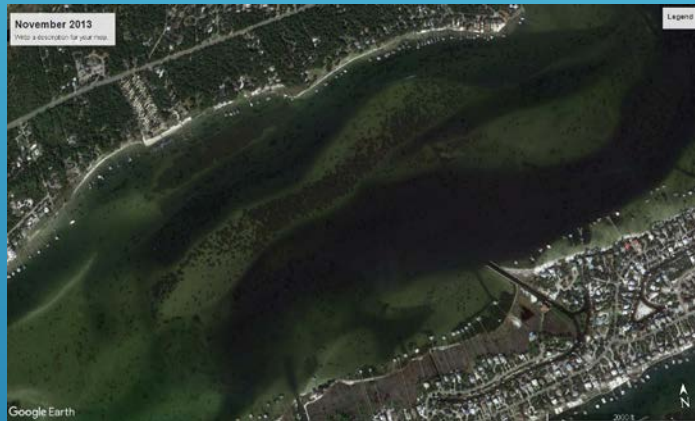
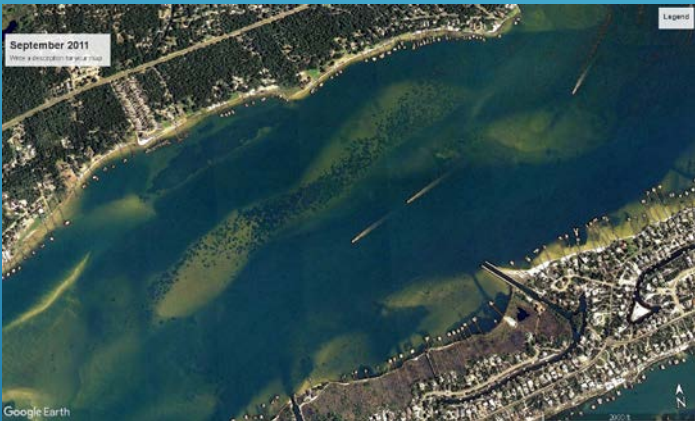
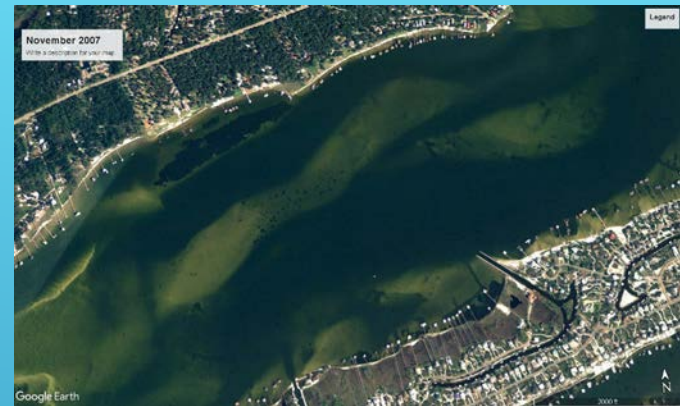
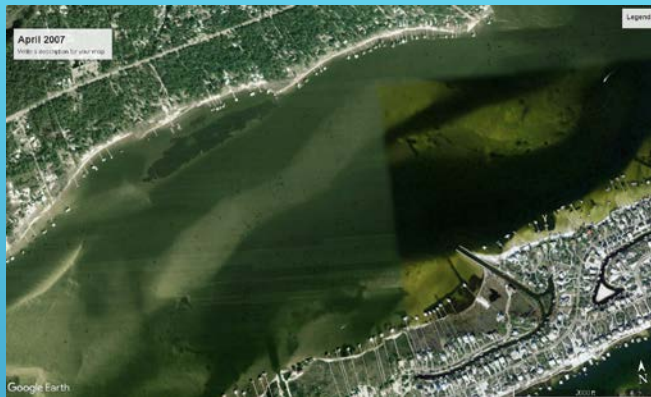
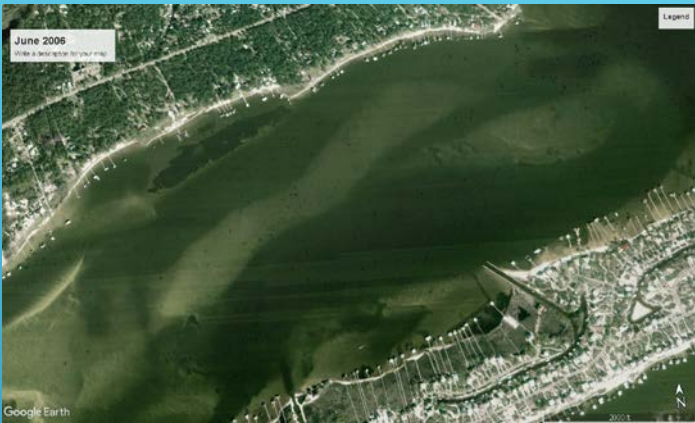
Several drones studies showed some flaws in filming but cab overcome with practice  
Best practical method for real time seagrass monitoring



## Conclusion

- Can be used with most video and photos
- Can be less expensive and less labor intensive than ground-truthing in the winter months
- Results will take less time



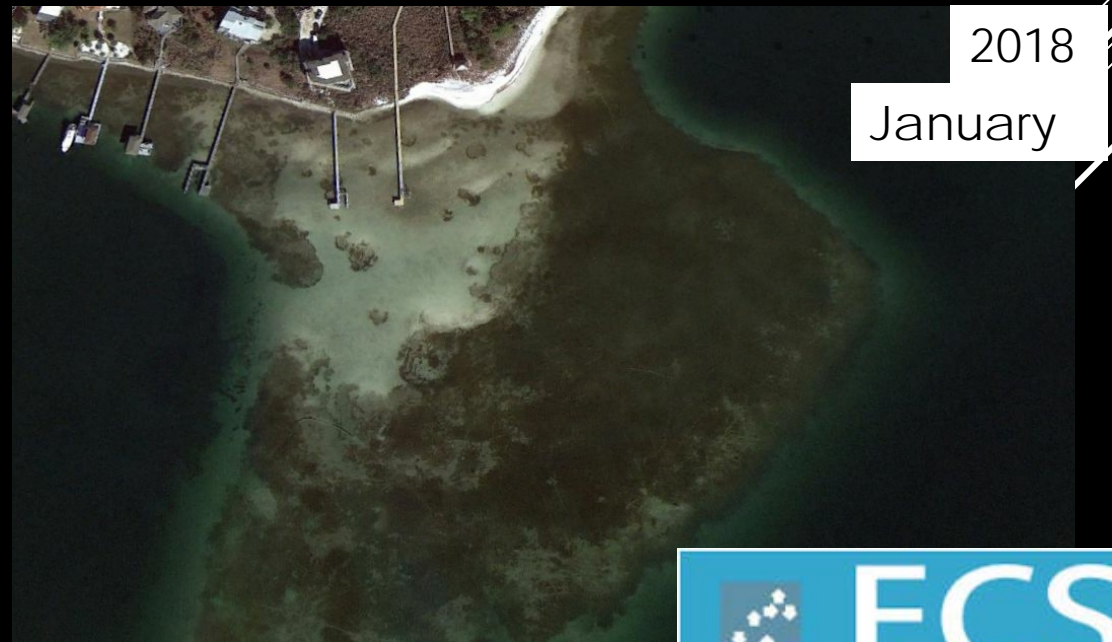
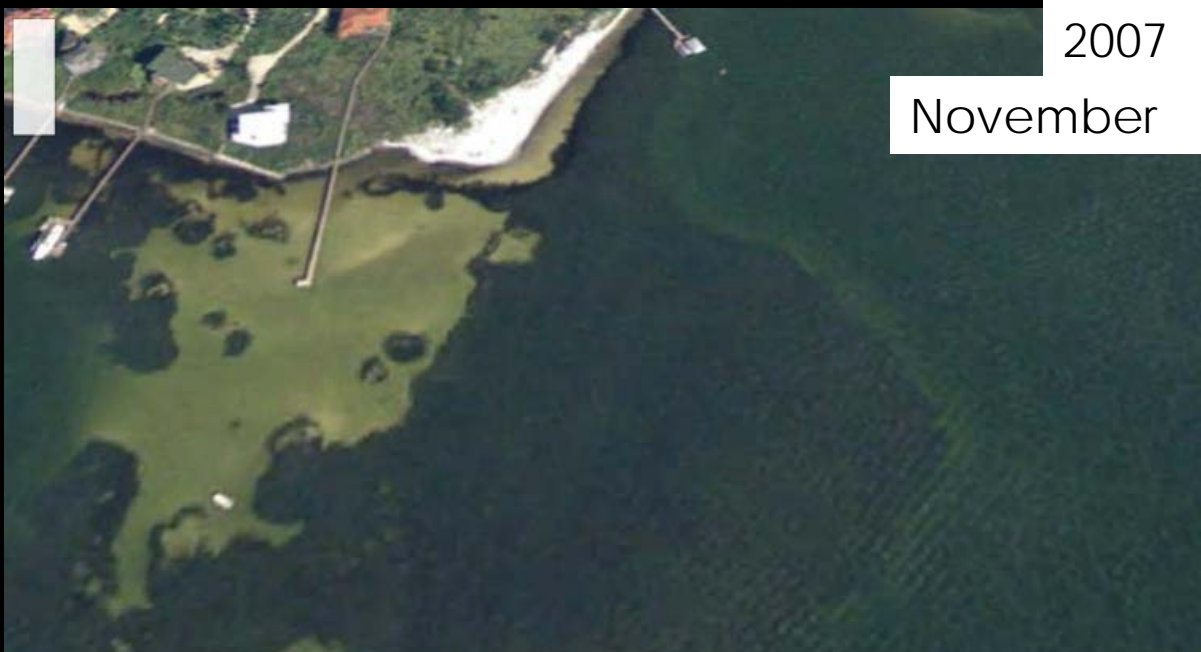


Seagrass  
Recovery?



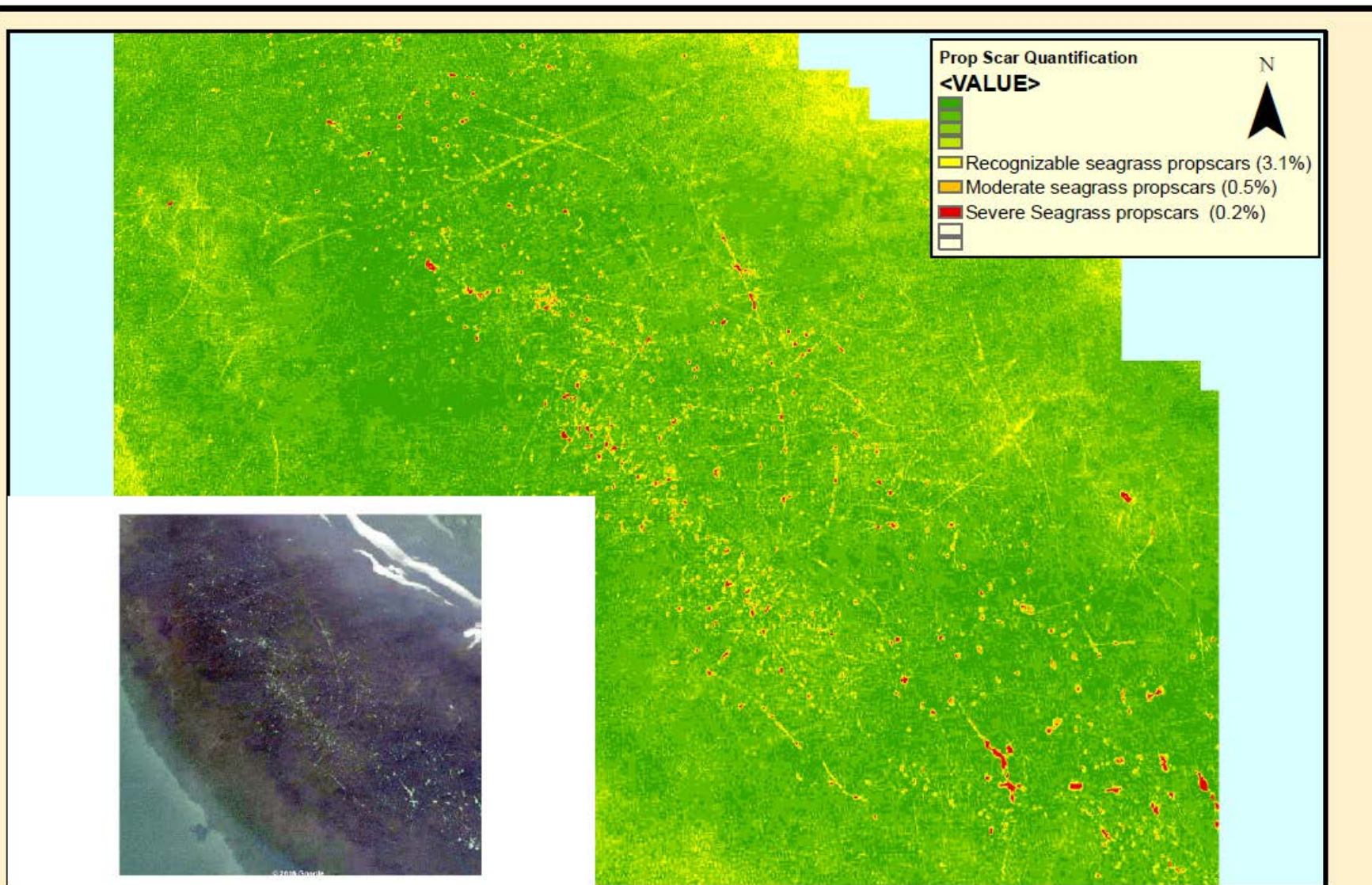
ECS





ECS



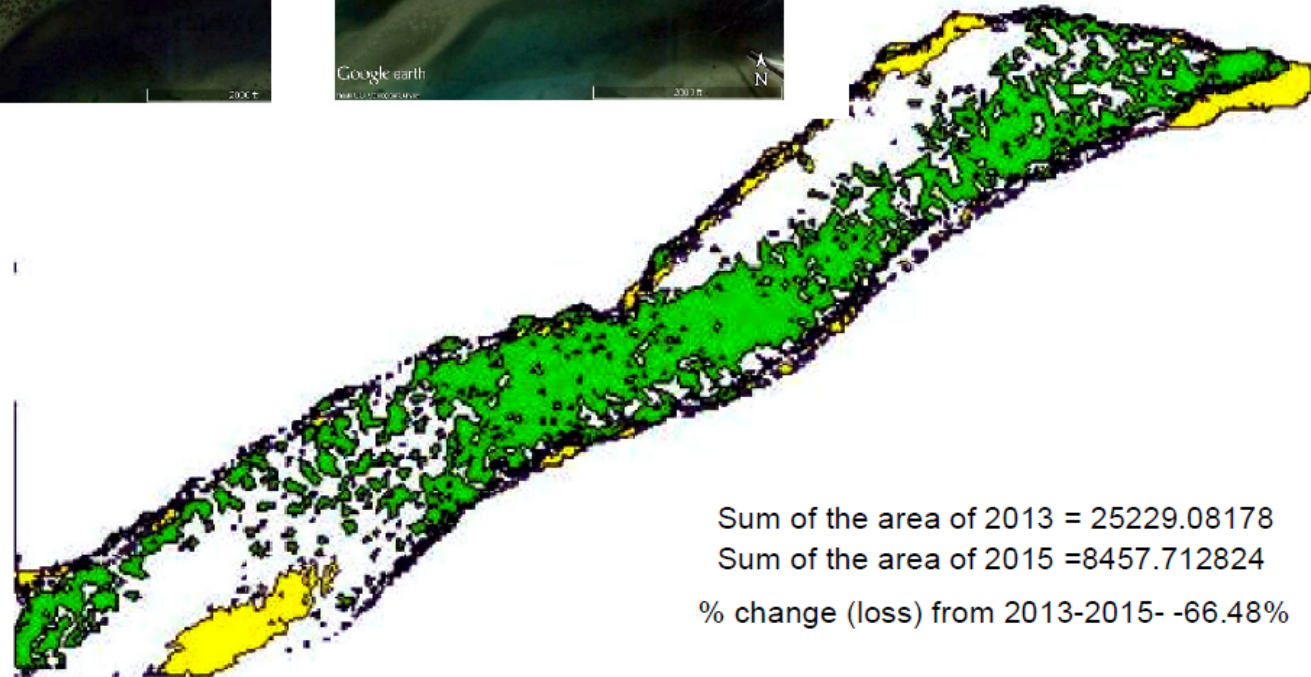
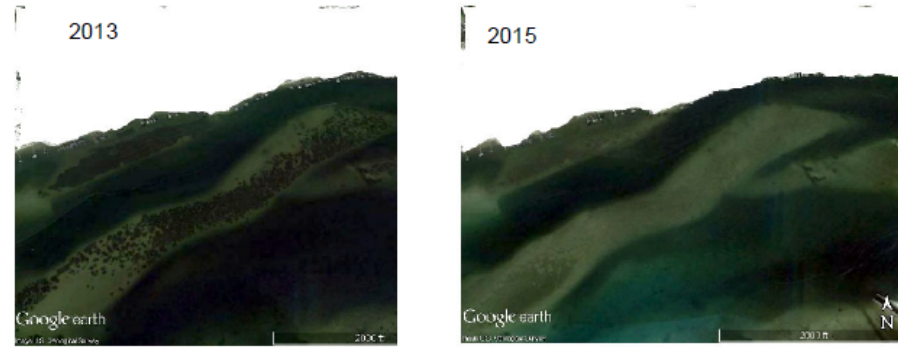


## Percent Area Analysis from 2013 and 2015 of Perdido Seagrass Bed

- 2013 Perdido
  - Class 2 Seagrass Areas (Yellow): 3062.02
  - Total Area: 6291.08
  - Class 2 Percent Coverage: 48.83 %
  - Results:



- 2015 Perdido
  - Class 2 Seagrass Areas (Yellow): 3427.58
  - Total Area: 6307.31
  - Class 2 Percent Coverage: 54.34 %
  - Results:



Sum of the area of 2013 = 25229.08178  
Sum of the area of 2015 = 8457.712824  
% change (loss) from 2013-2015 = -66.48%



Date: 3/1/2017

Percent loss of seagrass bed  
Perdido Key, Escambia Florida

Document Name: Perdido percent seagrass

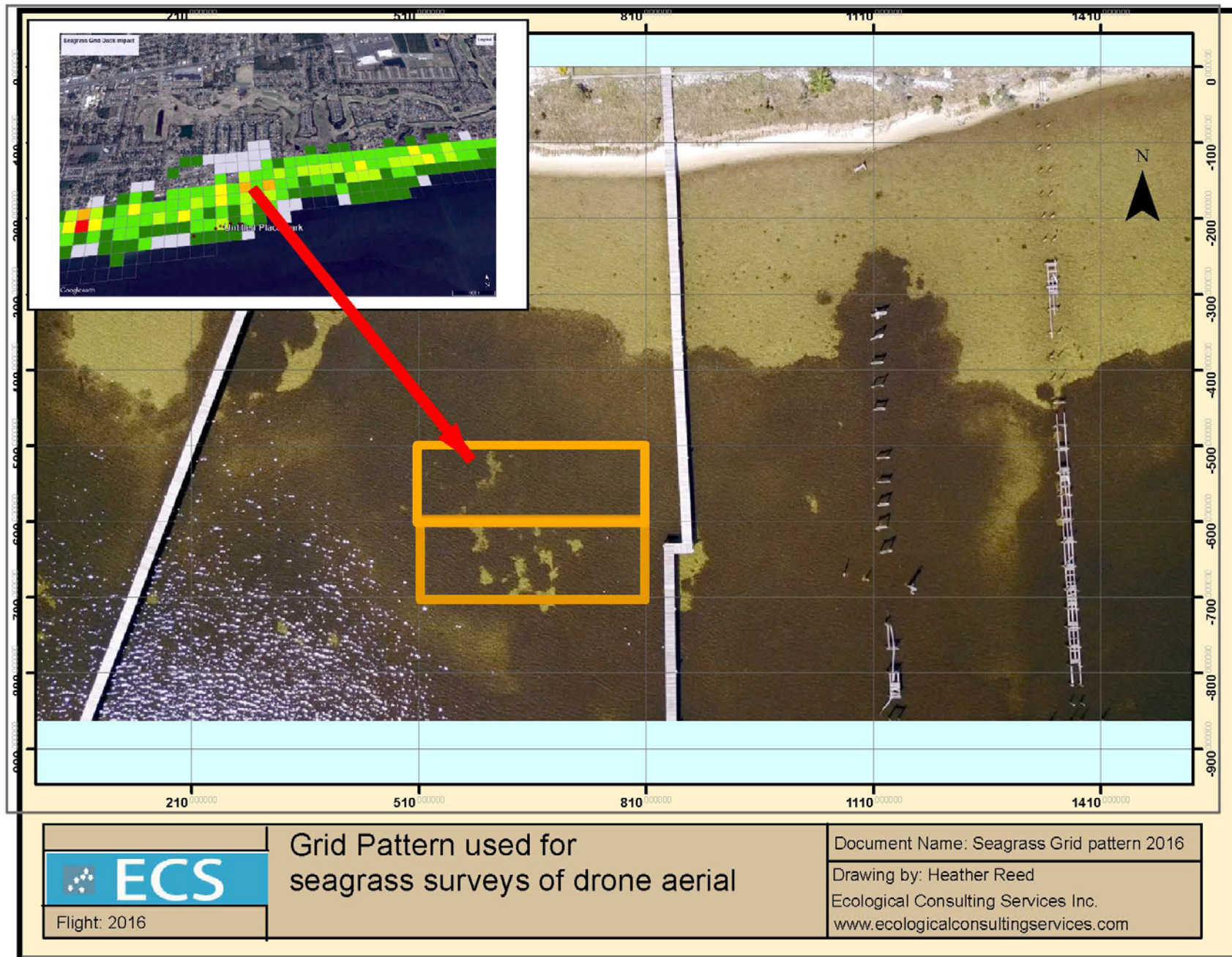
Drawing by: Heather Reed

Ecological Consulting Services Inc.

[www.ecologicalconsultingservices.com](http://www.ecologicalconsultingservices.com)







2015



2017



ECS



# QUESTIONS?

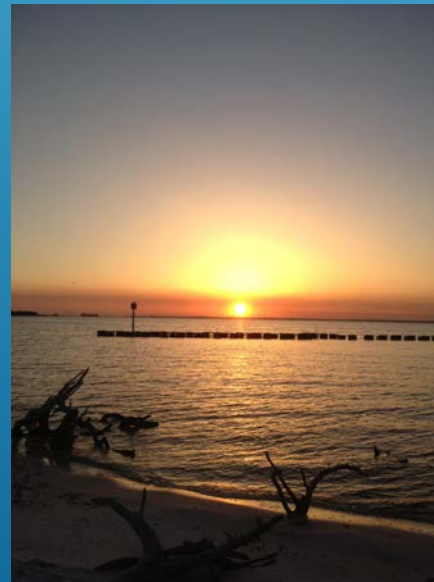
HEATHER REED MOORE

PM@ECOLOGICALCONSULTINGSERVICES.COM

VISIT  
WWW.ECOLOGICALCONSULTINGSERVICES.COM

WWW.SOCIALIZEWITHEducation.ORG

850-417-7008 850-346-2073 (cell)



Teen  
Socialize With  
Education   
[www.socializewitheducation.org](http://www.socializewitheducation.org)

<https://www.linkedin.com/in/heatherreedpensacola/>



ECS