

# Roadblocks to Seagrass Recovery: Seagrass Restoration Planning



Pensacola Beach, January 29, 2016

Welcome and thank you for attending this workshop

Workshop goals and agenda:

1. Introduce and explain this project. Elicit feedback.
2. Locate as much information as possible on historical seagrass cover in Perdido Bay, Big Lagoon, Pensacola Bay, and Santa Rosa Sound
3. Locate original imagery and ancillary imagery from disparate sources for site-by-site evaluation.
4. Locate published and unpublished data on water and sediment quality.
5. Elicit expert opinion and information on site-specific timelines of seagrass loss and obstacles to recovery and expansion.

## Basic Premises:

1. Seagrass recovery and enhancement can offset some habitat damage caused by Deepwater Horizon oil spill.
2. Seagrass transplanting is extremely expensive and the success is variable.
3. However, experience in Tampa Bay and Sarasota Bay has shown that, when favorable conditions are created, natural recovery and expansion of seagrass occurs.
4. In many cases, the roadblocks to seagrass recovery are not the same factors that caused seagrass loss in the first place.

# Project funded by NFWF Gulf Environmental Benefit Fund

http://nfwf.org/gulf/Pages/GEBF-Florida.aspx

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Green sea turtle | Credit: iStock

## Gulf Environmental Benefit Fund in Florida

### Current Projects

To date, NFWF has awarded over \$69.7 million from the Gulf Environmental Benefit Fund for 21 restoration projects in the state of Florida. These projects were selected for funding following extensive consultation with the Florida Fish and Wildlife Conservation Commission, the Florida Department of Environmental Protection, the U.S. Fish & Wildlife Service (FWS) and the National Oceanic and Atmospheric Administration (NOAA).

**FEATURE STORY**



Keeping Sea Turtles in the Dark: GEBF boosts efforts to cut light pollution along Florida's nesting beaches.

[Learn more](#)

**STAFF REPRESENTATIVE**

**Michael Sharp**   
Director, Gulf Environmental Benefit Fund (AL, FL, MS)

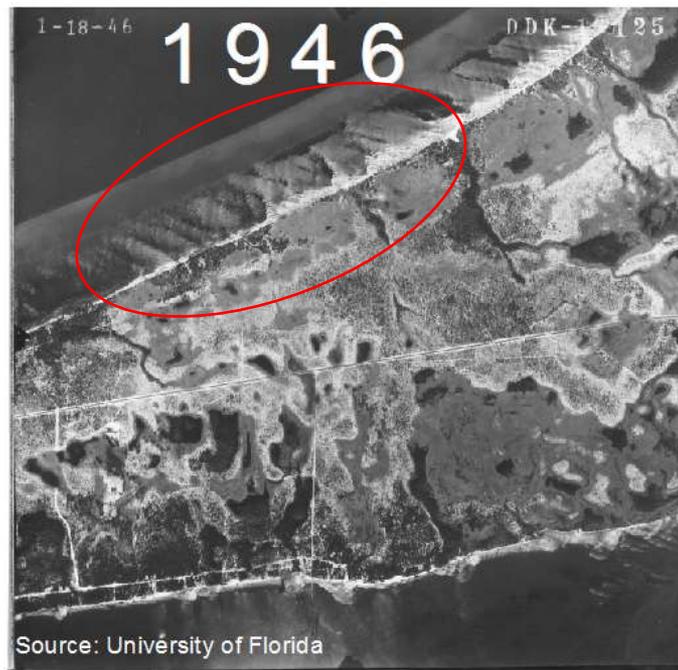
**GULF NEWS**

**11/10/2015**  
More than \$80 Million for New Restoration Projects on the Gulf Coast.

**10/8/2015**  
Keeping sea turtles in the dark

## Project Goals:

1. Identify obstacles to seagrass recovery and expansion in target estuaries
2. Develop a GIS Seagrass Recovery Potential (SRP) model of potential stressors and obstacles to recovery and spread in each estuary
3. Use SRP model to identify candidate areas and tools for successful seagrass recovery and enhancement.



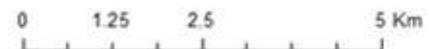
## Pensacola Bay Seagrass



# What are the barriers to seagrass recovery and/or expansion?



Potential Seagrass Habitat, Gulf Breeze, FL

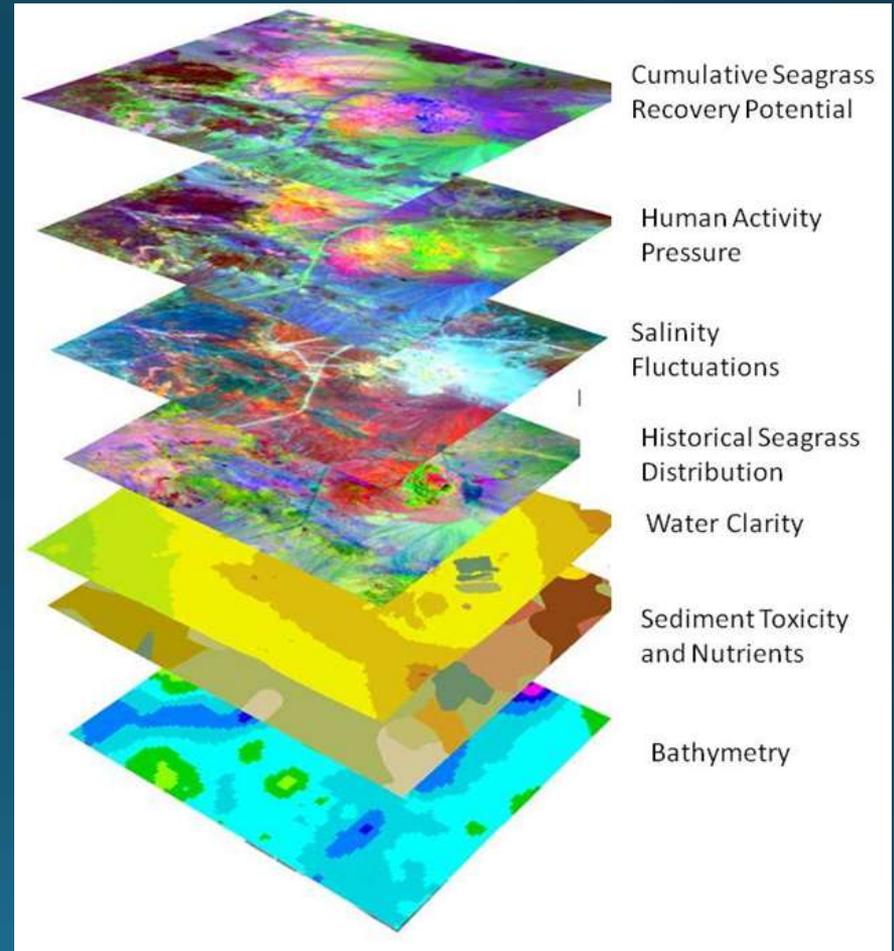


## Project Tasks and Deliverables

1. Assemble and create, where necessary, seagrass status and trends data for project estuaries.
2. Compare present seagrass distribution to historical target distributions
3. Determine estuary-specific and site-specific roadblocks to seagrass recovery and expansion in target estuaries.
4. Using available data supplemented by field sampling and Modis satellite imagery, construct a time series of optical water quality (OWQ) in target estuaries.
5. Build a user-friendly website for retrieval of OWQ data.

## Project Tasks and Deliverables (Continued)

6. Based on elements 1-6 above, build a spatial Seagrass Recovery Potential (SRP) GIS model to guide seagrass recovery and enhancement projects.



Essentially, all models are wrong, but some are useful.

(George E. P. Box)

Image Credit: Geological Society of America

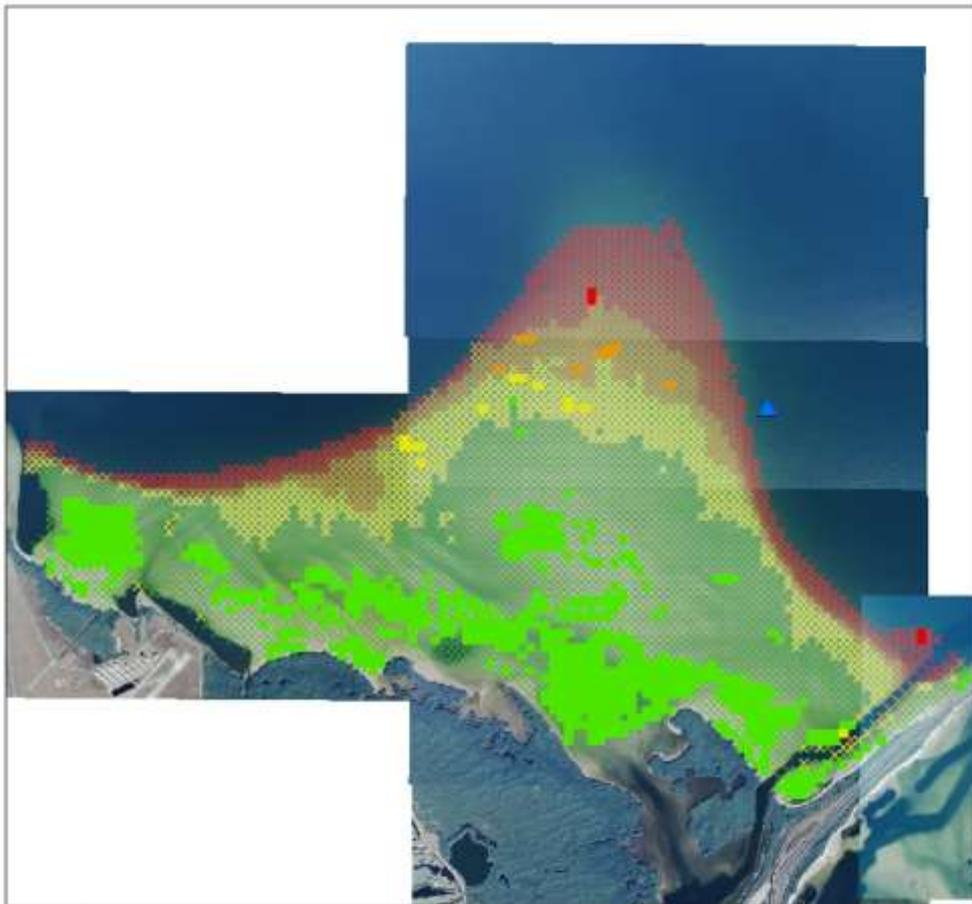
# Example of Grid-Based Modeling Approach- Feather Sound, Tampa Bay

## Inputs:

- HCEPC Water Quality Data
- Bathymetry Data
- Seagrass aerial photos

Process: Use OWQ data to calculate transparency and bathymetry to calculate light availability (%SI).

Result- Critical assessment of minimum light requirement for Shoalgrass- *Halodule wrightii*



2006



## Model Layers- Partial List

Current seagrass distribution  
Historical seagrass distribution

Bathymetry

In Situ Optical Water Quality  
MODIS Optical Water Quality

Sediment Toxicity

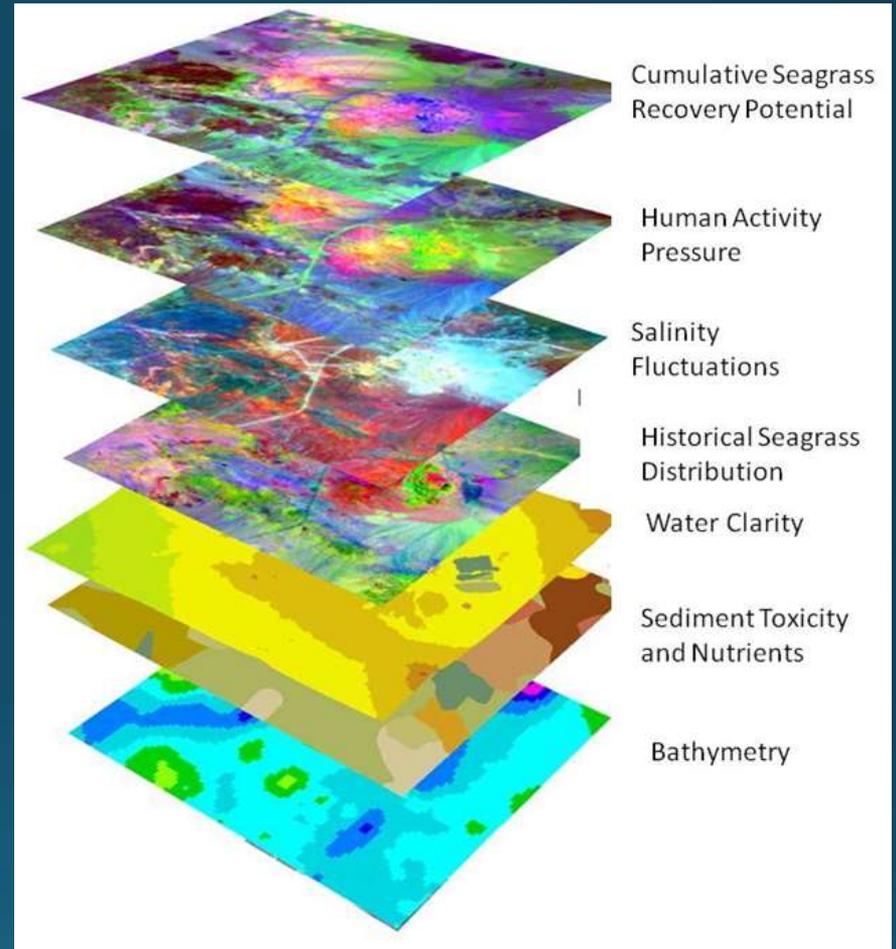
Physical Disturbance

Animal Disturbance

Salinity Fluctuations

Hypoxia and Anoxia

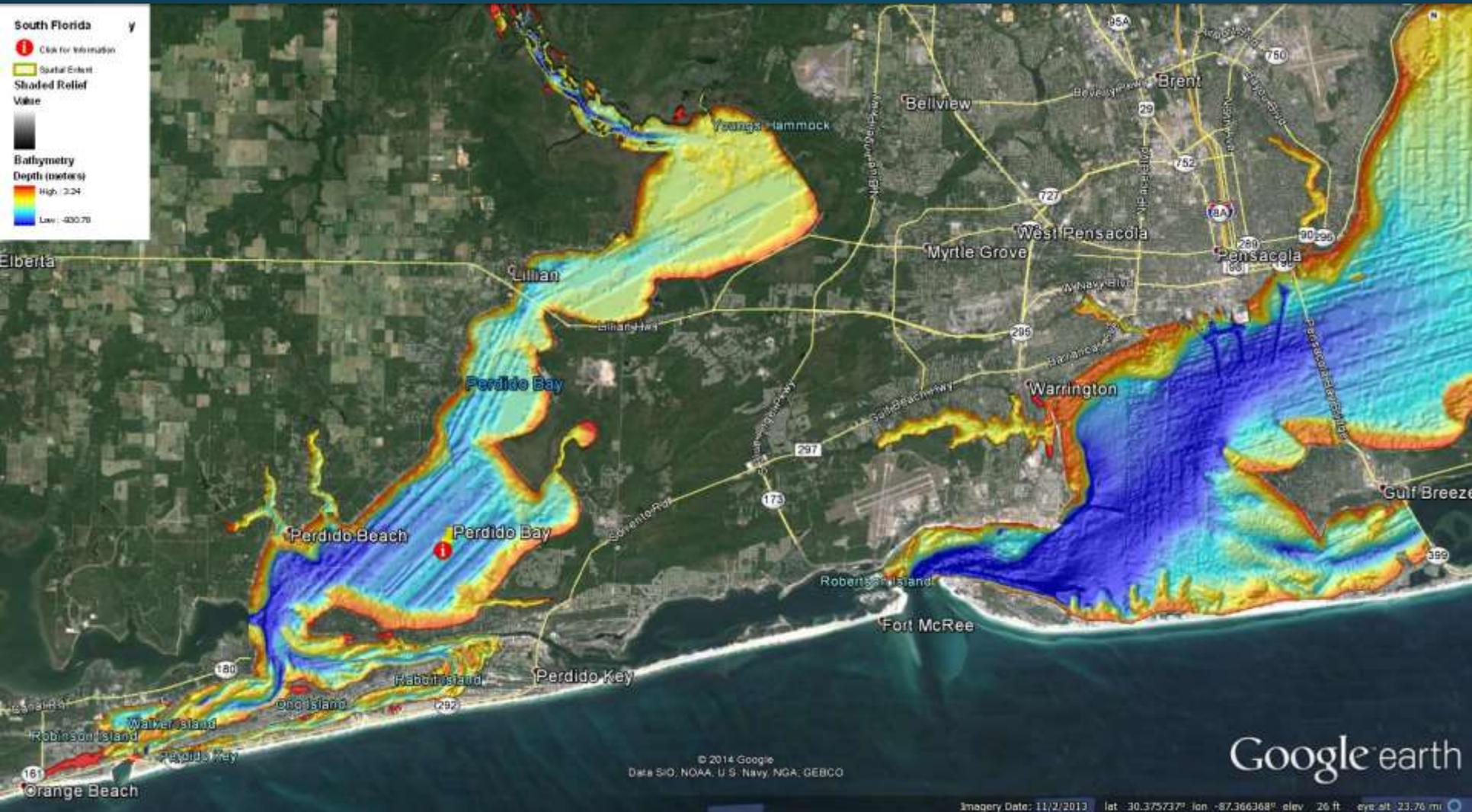
Human Activity Pressure



Platform- ArcGIS

Products- Shapefiles and KML

# First Input Data Layer- NOAA Bathymetry



Statistics of Perdido\_Model\_Bathy3m

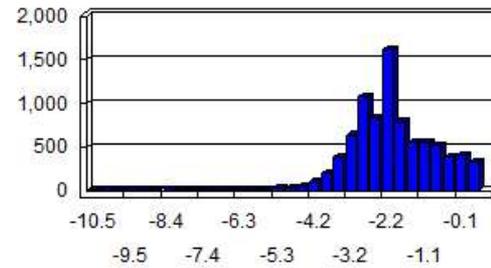
Field

MIN

Statistics:

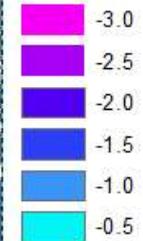
Count: 8477  
Minimum: -10.51  
Maximum: 0.3  
Sum: -15817.08996  
Mean: -1.865883  
Standard Deviation: 1.153655  
Nulls: 0

Frequency Distribution



Model\_Bathy

MIN



# One approach to assessing light limitation: MODIS time series optical water quality (OWQ) data- [optics.marine.usf.edu](http://optics.marine.usf.edu)



Florida Fish and Wildlife Conservation Commission

Optical Oceanography Laboratory  
College of Marine Science

Optical Water Quality and Seagrass Data for the Suwannee River Estuary — A Joint Project between FWC and USF, supported by FDEP & NASA

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### Welcome to Florida's Suwannee River Estuary Region

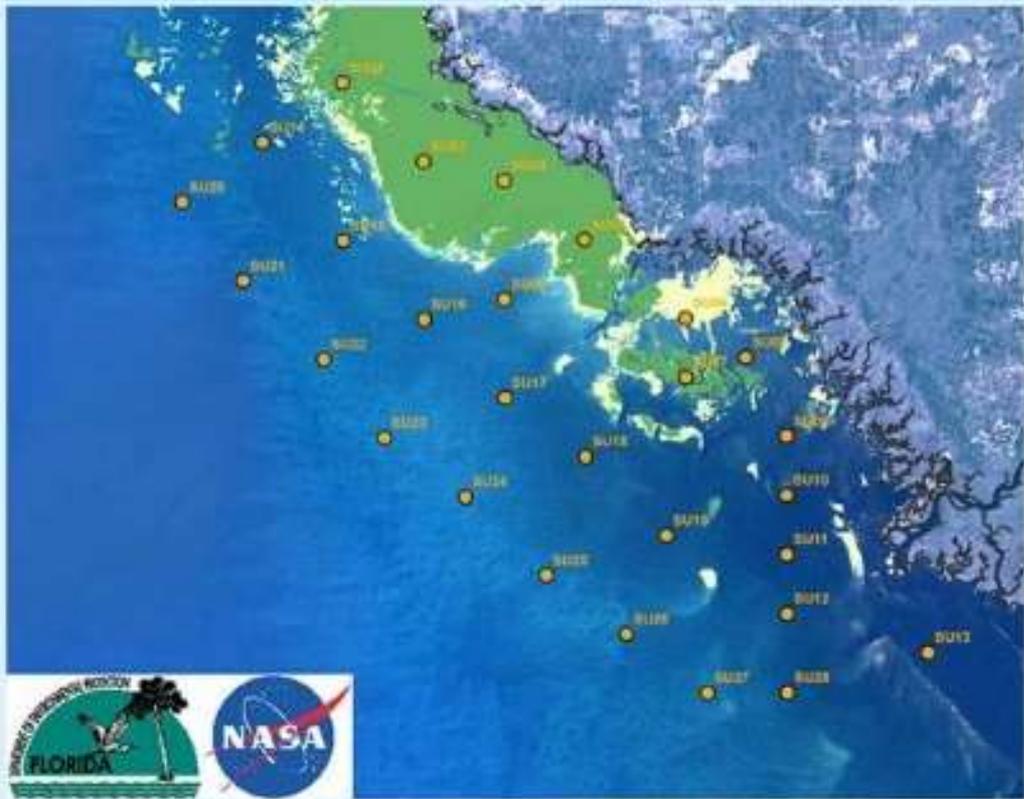
The Big Bend area of Florida's coast has over 600,000 acres of seagrass supporting many economically important species of fish and shellfish.

Healthy seagrass beds depend on water clarity, and this website provides access to historical and real-time water clarity and seagrass abundance data for the Suwannee River Estuary and nearby coastal waters.

### Quick Links

By clicking on any of the stations on the image to the right, you will be taken to the data for that station. These links can also be found in the menu to the left under the Projects section. If you are looking for the Steinhatchee Big Bend Region page you can click here:

Suwannee Station Clickable Map



Click on any of the stations above to see the data.





Optical Water Quality and Seagrass Data for the Suwannee River Estuary ← Temporal Cover Data SU 02

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Location: **Bottom** | Kd488 | Light Penetration | Chlorophyll-a | aCDOM443 | bbp(700) | SST

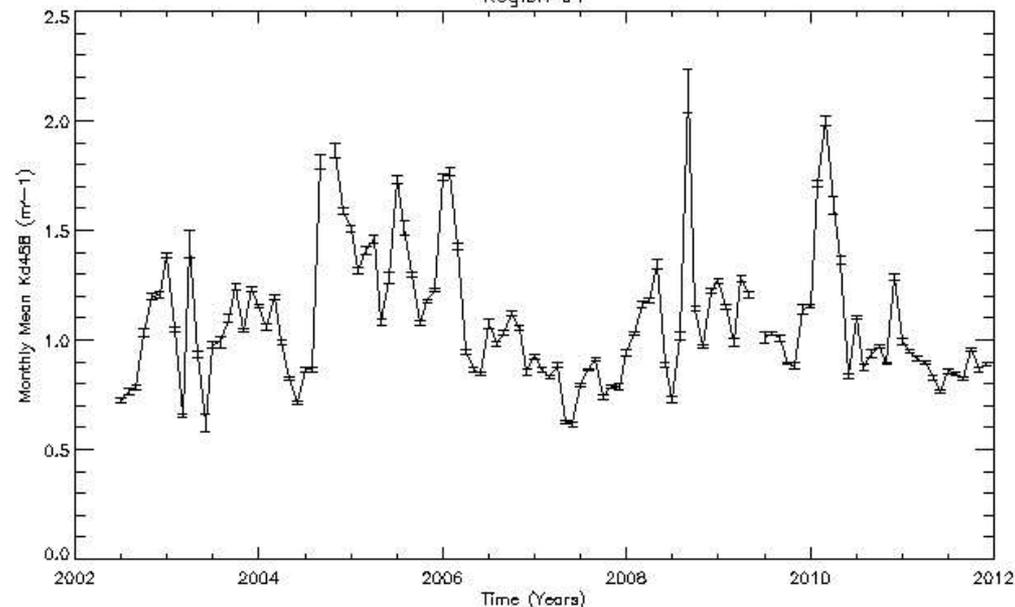
Station Name: **SU 02 - Suwannee River Estuary**

Measurement	Value Now	This week last year	This month last year	Long-term Average
Water Temperature	28.0	27.5	27.3	27.0
Chlorophyll	<b>4.2</b>	2.2	2.5	2.2
CDOM	<b>10.2</b>	5.5	5.0	5.3
Turbidity	2.4	3.2	2.8	2.5
Transparency (Kd488)	1.2	0.8	0.8	0.7
Light (% Surface)	<b>18%</b>	25%	25%	24%

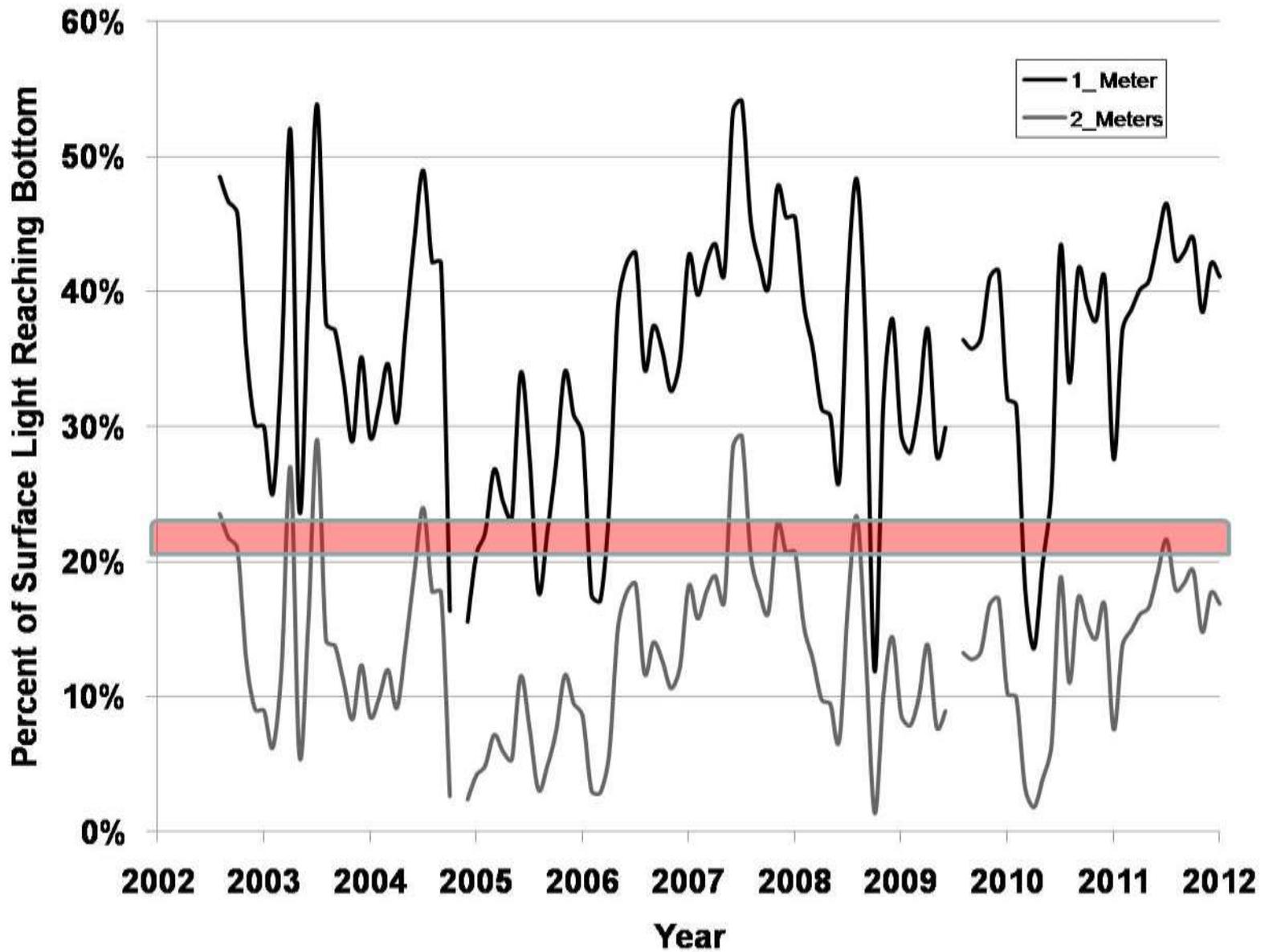


This is an image representation of the Bottoms of Station SU 02. It is described as "SEEDP" which is explained to the left in the "Bottom Type" Section. Click on this image to open a larger image.

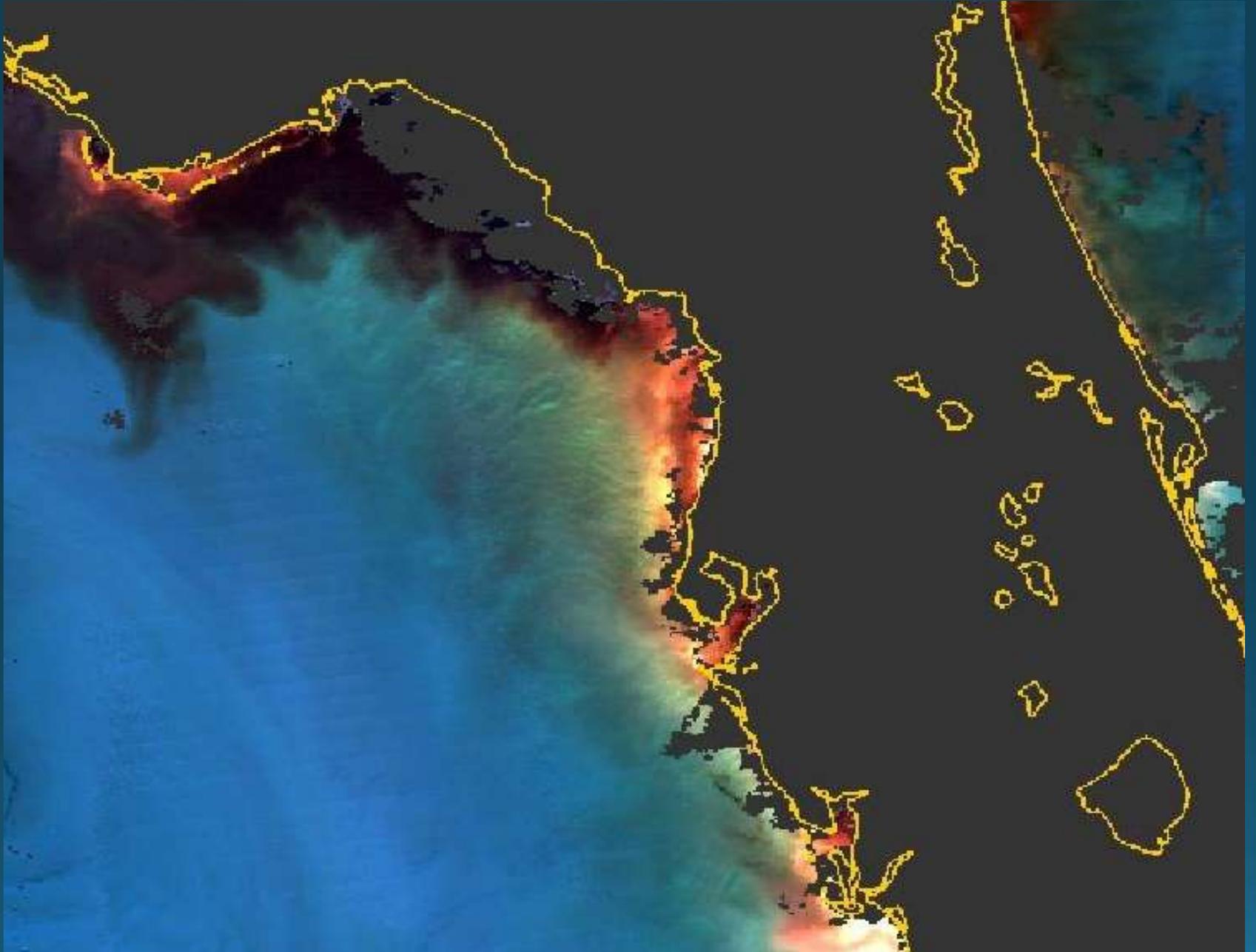
Region 01



# Light Penetration in Water Column



# MODIS Image- CDOM from Suwannee and Ochlockonee Rivers



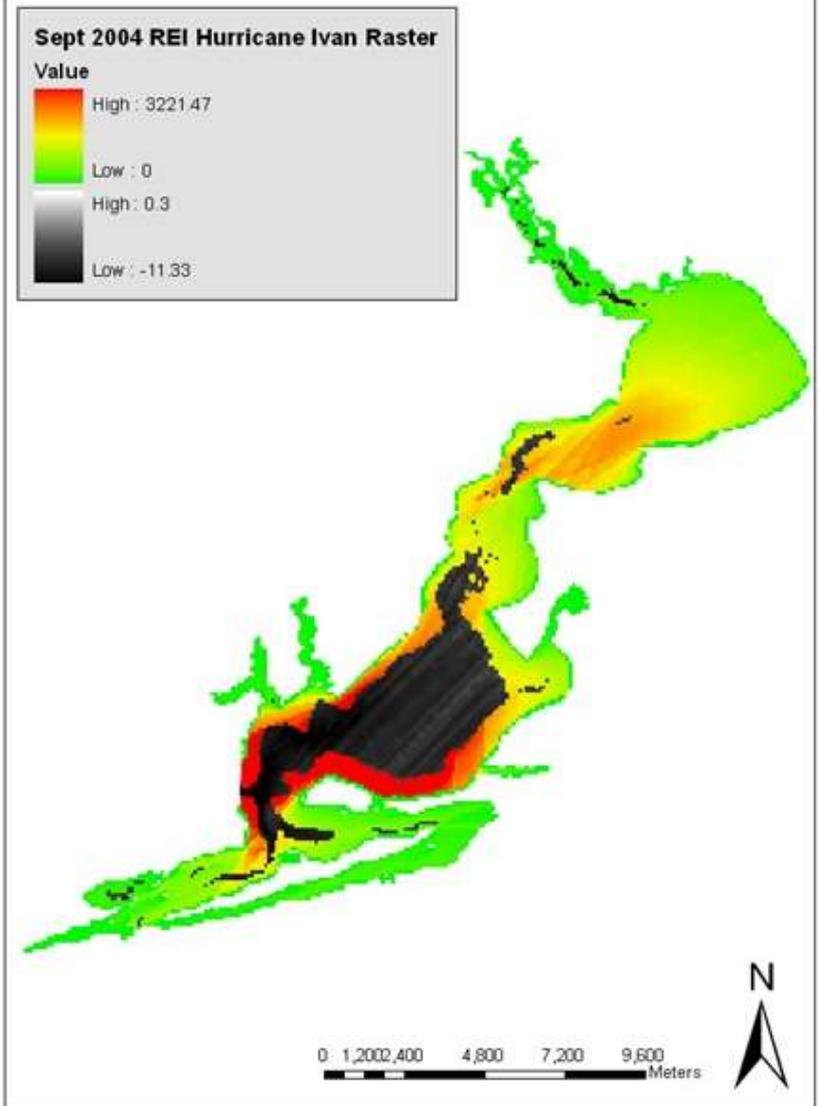
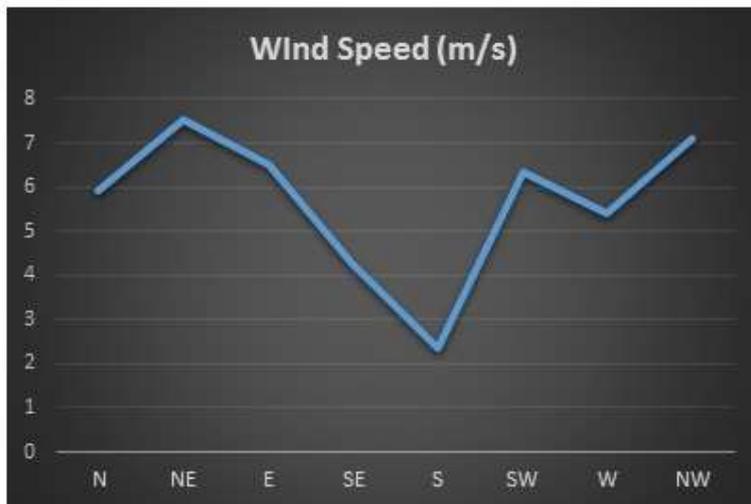
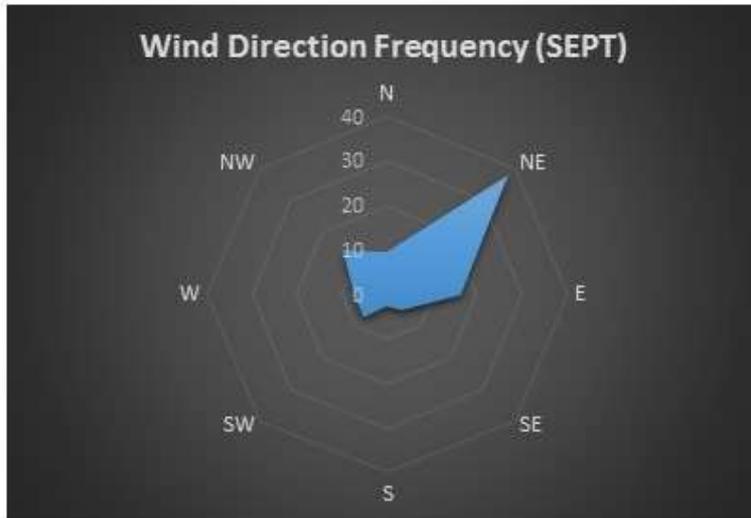


# Physical Disturbance Suggested by Sediment Bed Form



# NOAA Physical Disturbance Model (WEMo)- Perdido Bay, September 2004

## Hurricane Ivan



# Example of Wave Action and Erosion Along I-275 in Tampa, April 2010



# Effect of Rip Rap Barriers, January 2014



© 2014 Google

Google earth

1995

Imagery Date: 1/17/2014 lat 27.940679° lon -82.547439° elev 0 ft eye alt 1657 ft

# Animal Disturbance- Manatees, Stingrays, Cownose Rays, Sea Urchins Inhabit Seagrass Beds



# Periodic Irruptions of Sea Urchins Have Been Documented Stressors- Animal Disturbance and Water Quality can be Synergistic



Photo: Steve Geiger, FWRI

# Human Activity Impacts Include Prop Scarring



## St. Joseph Bay Propeller Scarring

Score	Description	# Cells	% of vegetated cells
9	Bare bottom visible	1056	
0	Vegetated, no scars	1998	57.3%
1	1-2 scars	646	18.5%
2	3-10 scars	466	13.4%
3	11-25 scars	265	7.6%
4	>25 scars	81	2.3%
5	Cell mostly scarred	29	0.8%
	Total scarred cells	1487	42.7%
	Total vegetated cells	3485	
	Sun Glare	248	
	Unreadable	15	
	Too Deep	2709	

**Table 2: Roadblocks to SAV Recovery**

<b>Stressor</b>	<b>Distribution</b>	<b>Severity</b>	<b>Effect(s)</b>	<b>Assessment Methods</b>	<b>Restoration Action(s)</b>
Light Stress	Widespread	Varies by cause	Inhibited growth, death	<i>In situ</i> and satellite measurements, nutrient data, TMDL models	Nutrient reduction, sediment reduction, point and non-point source treatment
Salinity Pulses	Widespread	Varies by freshwater source	Metabolic drain	<i>In situ</i> salinity measurements, freshwater discharge data, models	Stormwater retention, watershed best management practices (BMPs)
Salinity Stratification	Frequent	Varies with depth, bottom contours	Metabolic drain	<i>In situ</i> salinity measurements, rainfall, runoff data, models	Stormwater retention, floodplain restoration, sandbar enhancement
Wind, wave, and tidal action	Frequent	Varies with fetch, depth, tide range	Removal of shoots, sediment resuspension	<i>In situ</i> sediment grain size and bedform analysis, models	Physical protection, sandbar enhancement
Sediment toxicity	Common	Alone or synergistic stressor	Acute or chronic; species vary	Sediment sulfide & carbon measurements, FDEP, US EPA, NOAA contaminant data	Removal, <i>in situ</i> remediation, source reduction
Bioturbation, Animal disturbance	Common	Locally severe	Grazing or removal	Field surveys for stingrays, cownose rays, sea urchins. FWC seine, trawl data	Exclosures, harvest, removal
Propeller Scarring	Common	Locally severe	Physical damage or death	Targeted aerial mapping	Boater education, signage, exclusion zones, remediation

Thank you again for attending this workshop

We need your help to locate as much information as possible on

1. Historical seagrass cover in Perdido Bay, Big Lagoon, Pensacola Bay, and Santa Rosa Sound
2. Original imagery and ancillary imagery
3. Published and unpublished data on water and sediment quality.
4. Your expert opinions and information on site-specific obstacles to seagrass recovery and expansion.

We will use this information to guide seagrass recovery efforts and all project data will be distributed on the web to guide future projects.