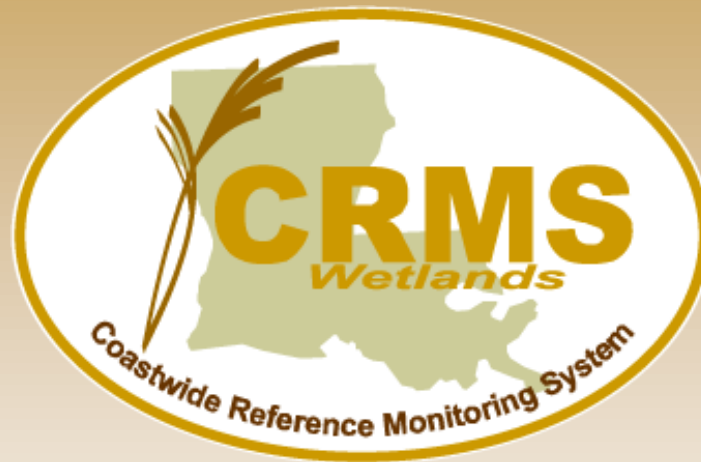




Coastal Protection and  
Restoration Authority of Louisiana



# CRMS Website Roadshow



**Summer 2016**

**NMFS-6/17/16, USFWS & NRCS-6/28/16,  
USACE-6/29/16, EPA-7/27/16**



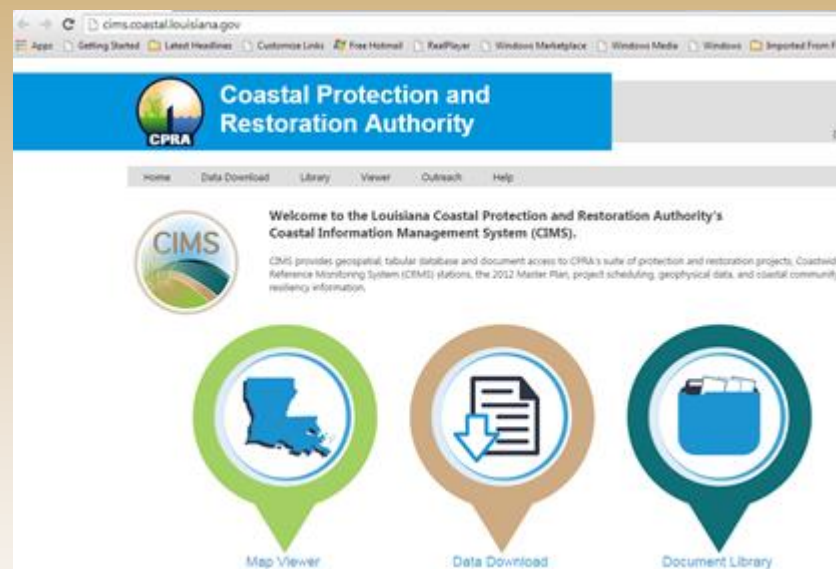
## CRMS



[lacoast.gov/crms](http://lacoast.gov/crms)



## CIMS

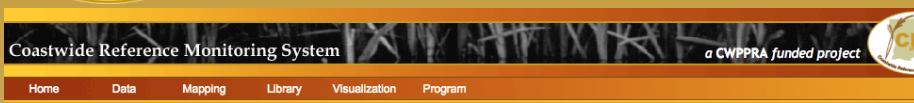


[cims.coastal.louisiana.gov](http://cims.coastal.louisiana.gov)



# Reminder

Interactive charting



Previous Charting Version

Charting Bulk Charting Data Download Reporting

Hydro

Water Level Range  
Hydro Completeness  
Salinity  
Water Level  
Temperature  
Continuous  
Site Hydro Index  
Soil Porewater  
Precipitation

Interactive Hydro

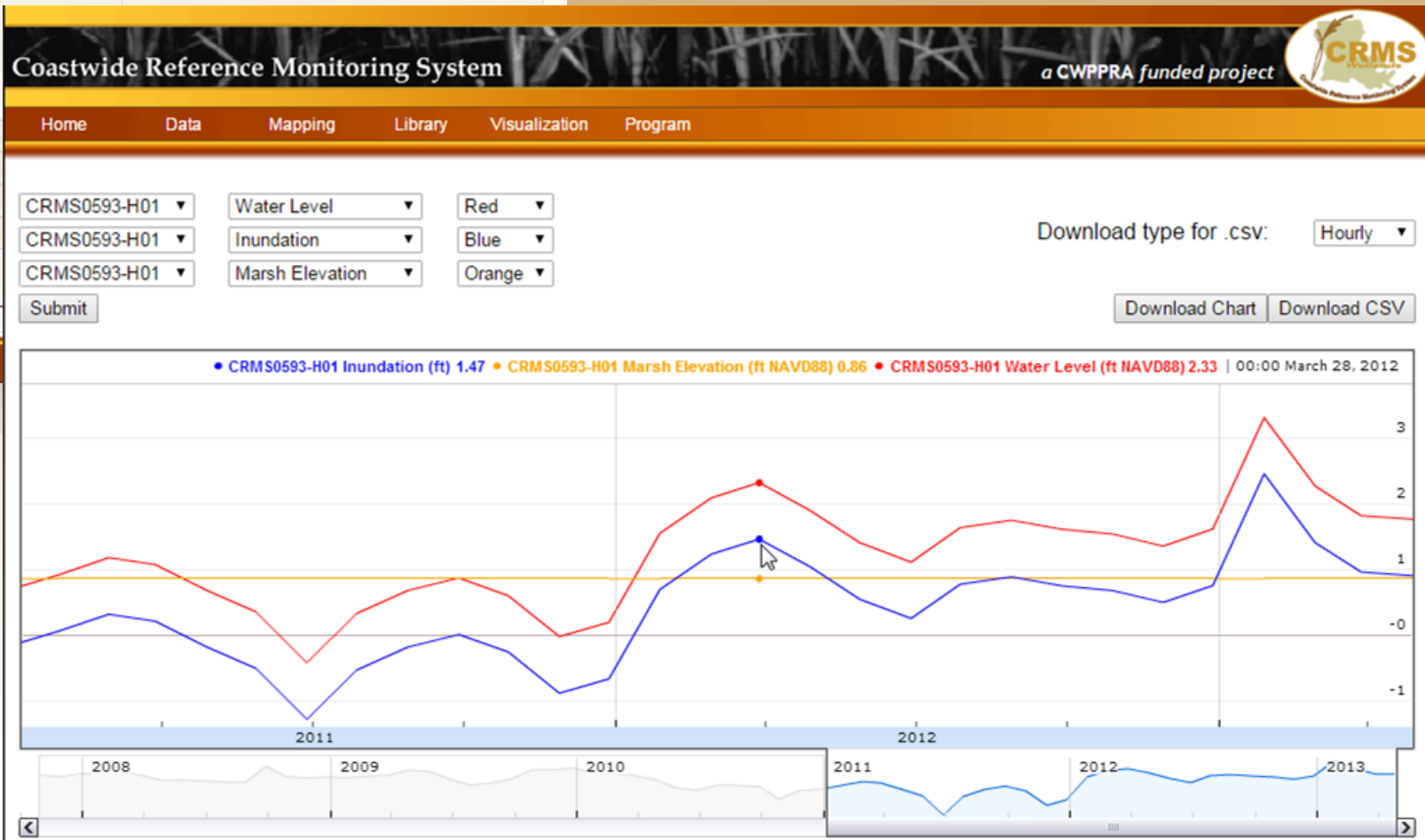
Vegetation

Soil

Spatial

Report Card Charts

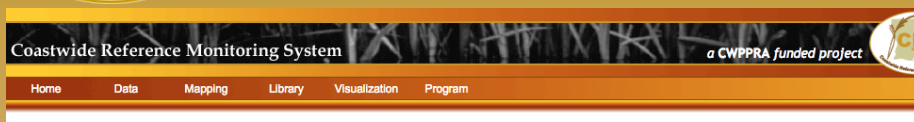
Clear Charts





# Reminder

Data download feature within interactive charting



Previous Charting Version

Charting Bulk Charting Data Download Reporting

## Hydro

Water Level Range  
Hydro Completeness  
Salinity  
Water Level  
Temperature  
Continuous  
Site Hydro Index  
Soil Porewater  
Precipitation

Interactive Hydro

Vegetation

Soil

Spatial

Report Card Charts

Clear Charts

## Coastwide Reference Monitoring System

a CWPPRA funded project



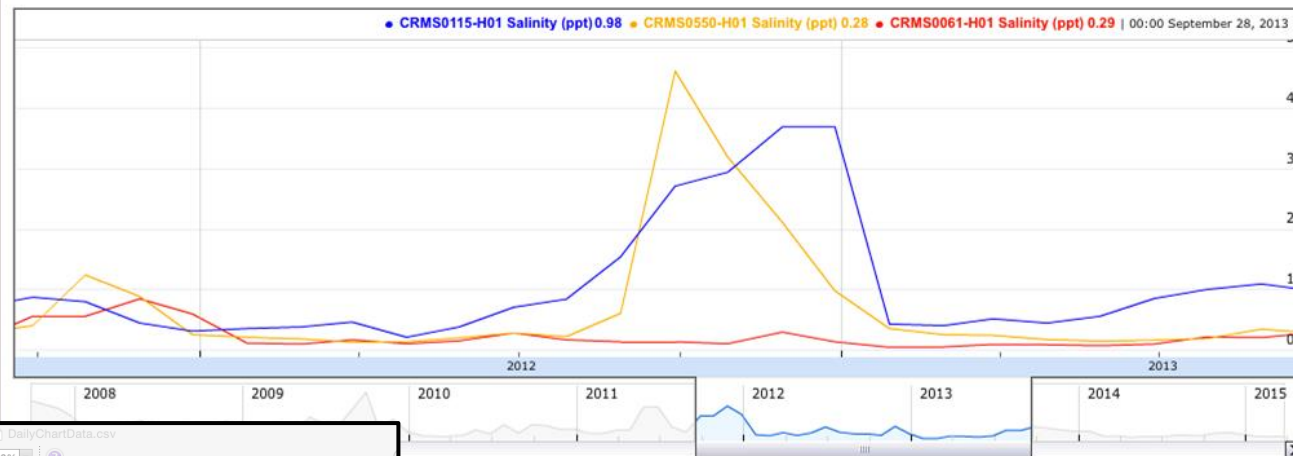
Home Data Mapping Library Visualization Program

CRMS0061-H01 Salinity Red  
CRMS0115-H01 Salinity Blue  
CRMS0550-H01 Salinity Orange  
Submit

Download type for .csv:

Hourly  
Daily  
Monthly

Download Chart Download CSV

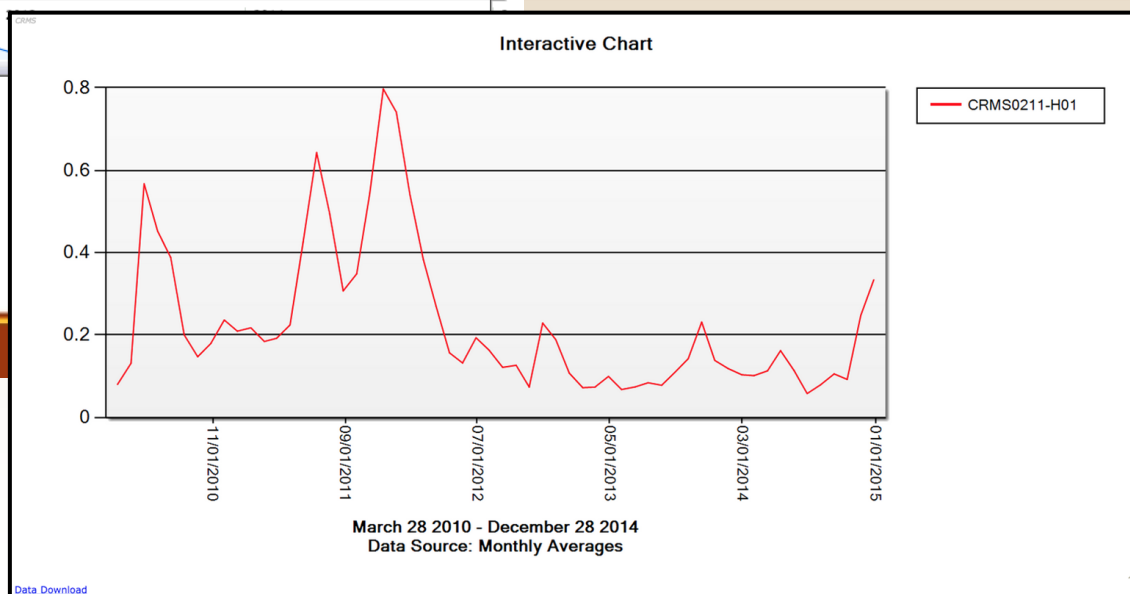
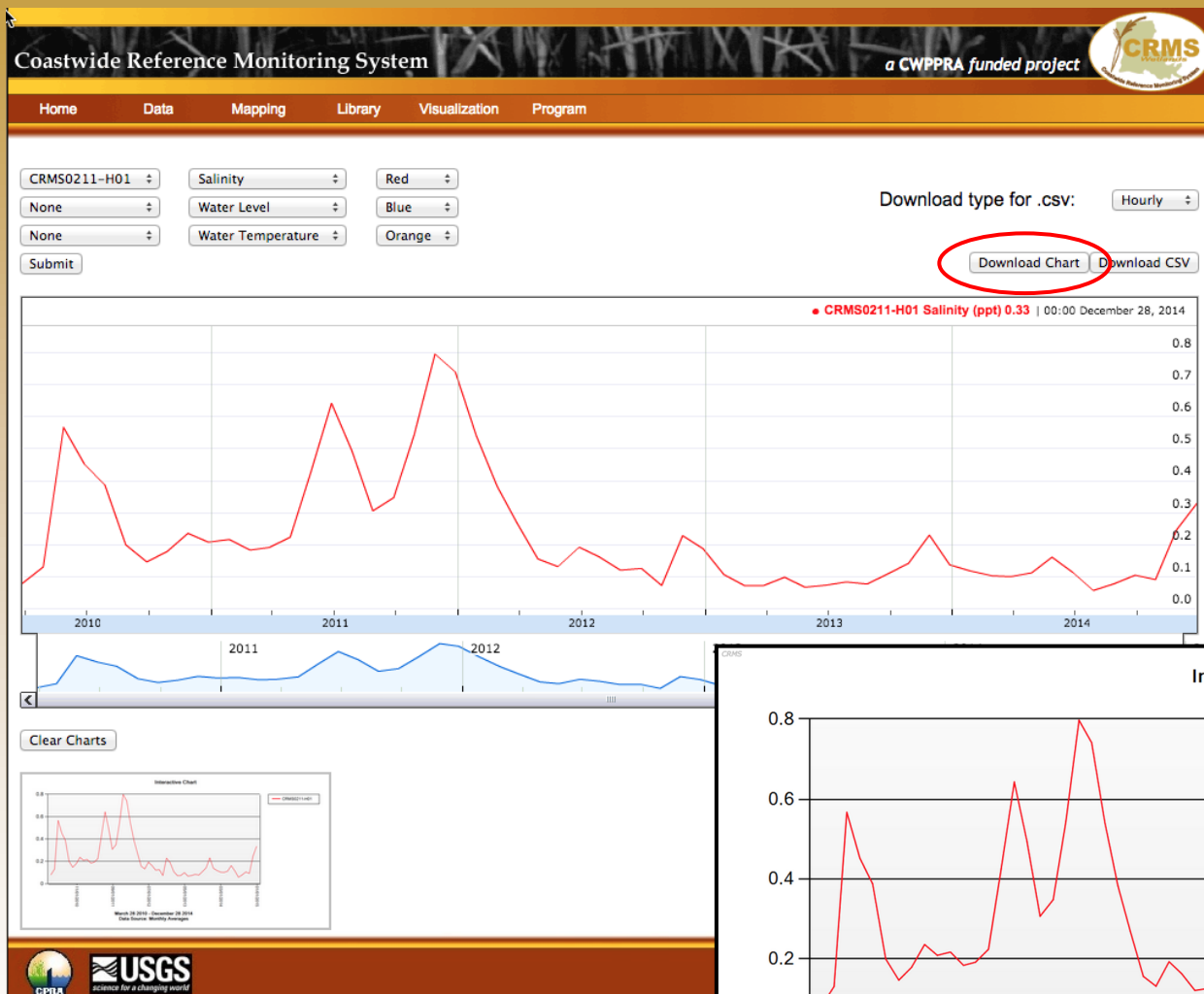


Date										
A1	B	C	D	E	F	G	H	I	J	K
Date	Station One	Station One Type	Station One Value	Station Two	Station Two Type	Station Two Value	Station Three	Station Three Type	Station Three Value	
8/16/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.819583	CRMS0550-H01	Salinity	0.26125	
8/17/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.6925	CRMS0550-H01	Salinity	0.27125	
8/18/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.722917	CRMS0550-H01	Salinity	0.270417	
8/19/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.724583	CRMS0550-H01	Salinity	0.287391	
8/20/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.623333	CRMS0550-H01	Salinity	0.31	
8/21/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.617917	CRMS0550-H01	Salinity	0.308333	
8/22/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.602917	CRMS0550-H01	Salinity	0.292083	
8/23/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.669167	CRMS0550-H01	Salinity	0.303913	
8/24/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.71125	CRMS0550-H01	Salinity	0.315	
8/25/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.674583	CRMS0550-H01	Salinity	0.345417	
8/26/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.5725	CRMS0550-H01	Salinity	0.31875	
8/27/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.7375	CRMS0550-H01	Salinity	0.27875	
8/28/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.799167	CRMS0550-H01	Salinity	0.274583	
8/29/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.750833	CRMS0550-H01	Salinity	0.297083	
8/30/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.685	CRMS0550-H01	Salinity	0.37	
8/31/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.637083	CRMS0550-H01	Salinity	0.485833	
9/1/11	CRMS0061-H01	Salinity	0.570833	CRMS0115-H01	Salinity	0.498333	CRMS0550-H01	Salinity	0.43375	
9/2/11	CRMS0061-H01	Salinity	1.09583	CRMS0115-H01	Salinity	0.713333	CRMS0550-H01	Salinity	0.977083	



# Reminder

Generate static hydro chart from within the interactive charting interface.





### Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

#### CRMS Publications

Administration

Support Docs

Contacts

Publications

Data Descriptions

Privacy

Accessibility

FOIA

Disclaimer

Data Citation

Atazadeh, I., M.B. Edlund, B. Van der Vijver, K. Mills, S.A. Spaulding, P.A. Gell, S.S. Lee, K.E.L. Smith, P. Newall, and M. Potapova. 2014. [Morphology, ecology, and biogeography of \*Stauroneis pachycephala\* P.T. Cleve \(Bacillariophyta\) and its transfer to the genus \*Envekeadea\*](#). *Diatom Research* 29:4: 455-464.

### Coastwide Reference Monitoring System

Library Visualization Program

Vijver, K. Mills, S.A. Spaulding, P.A. Gell, S. Crawford, A.F. Barton, M. Potapova. 2014. [Morphology, ecology, and biogeography of \*Stauroneis pachycephala\* P.T. Cleve \(Bacillariophyta\) and its transfer to the genus \*Envekeadea\*](#). *Diatom Research* 29:4: 455-464.

## 75+ pubs mention CRMS or use CRMS data

- no abstracts included
- not an exhaustive list
- submissions-email Sarai

Blanchette, T.A., Liu, K.B., Qiang, Y. and Lam, N.S.N., 2015. [Wetland Accretion Rates Along Coastal Louisiana: Spatial and Temporal Variability in Light of Hurricane Isaac's Impacts](#). *Water*, 8(1), p.1.

Brien, L.F., 2015. [Modeling eutrophication vulnerability in coastal Louisiana wetlands impacted by freshwater diversion: A remote sensing approach](#)(Doctoral dissertation, Kansas State University).

Burleson, D.W., Rifai, H.S., Proft, J.K., Dawson, C.N. and Bedient, P.B., 2015. [Vulnerability of an industrial corridor in Texas to storm surge](#). *Natural Hazards*, 77(2), pp.1183-1203.

Byrnes, M., & Berlinghoff, J. (2012). [Gulf Regional Sediment Management Master Plan: Case Study Compilation](#). *Journal of Coastal Research*, 72-124. Retrieved from <http://www.jstor.org/stable/41508594>

Cahoon, D.R., 2015. [Estimating relative sea-level rise and submergence potential at a coastal wetland](#). *Estuaries and Coasts*, 38(3), pp.1077-1084.

Carle, M., Sasser, C., & Roberts, H. (2015). [Accretion and Vegetation Community Change in the Wax Lake Delta Following the Historic 2011 Mississippi River Flood](#). *Journal of Coastal Research*, 31(3), 569-587. Retrieved from <http://www.jstor.org/stable/43385533>

Carle, M.V. and Sasser, C.E., 2016. [Productivity and Resilience: Long-Term Trends and Storm-Driven Fluctuations in the Plant Community of the Accreting Wax Lake Delta](#). *Estuaries and Coasts*, pp.1-17.

Carle, M.V., Wang, L. and Sasser, C.E., 2014. [Mapping freshwater marsh species distributions using WorldView-2 high-resolution multispectral satellite imagery](#). *International Journal of Remote Sensing*, 35(13), pp.4698-4716.

Couvillion, B.R. and H. Beck. 2013. [Marsh Collapse Thresholds for Coastal Louisiana Estimated Using Elevation and Vegetation Index Data](#). *Journal of Coastal Research* 63:58-67

Couvillion, B., M. Fischer, H. Beck, and W. Sleavin. 2016. [Spatial configuration trends in coastal Louisiana from 1985 to 2010](#). *Wetlands*. 10.1007/s13157-016-0744-9.

Couvillion, B.R., Steyer, G.D., Wang, H., Beck, H.J. and Rybczyk, J.M., 2013. [Forecasting the effects of coastal protection and restoration projects on wetland morphology in coastal Louisiana under multiple environmental uncertainty scenarios](#). *Journal of Coastal Research*, 67(sp1), pp.29-50.



Create charts for sites that are "CRMS like" but have different naming convention

[Previous Charting Version](#)

Charting

Bulk Charting

Data Download

Reporting

▼ Hydro

Water Level Range  
Hydro Completeness  
Salinity  
Water Level  
Temperature  
Continuous  
**Site Hydro Index**  
Soil Porewater  
Precipitation

Interactive Hydro

► Vegetation

► Soil

► Spatial

► Report Card Charts

Clear Charts

Water Year is October 1 - September 30

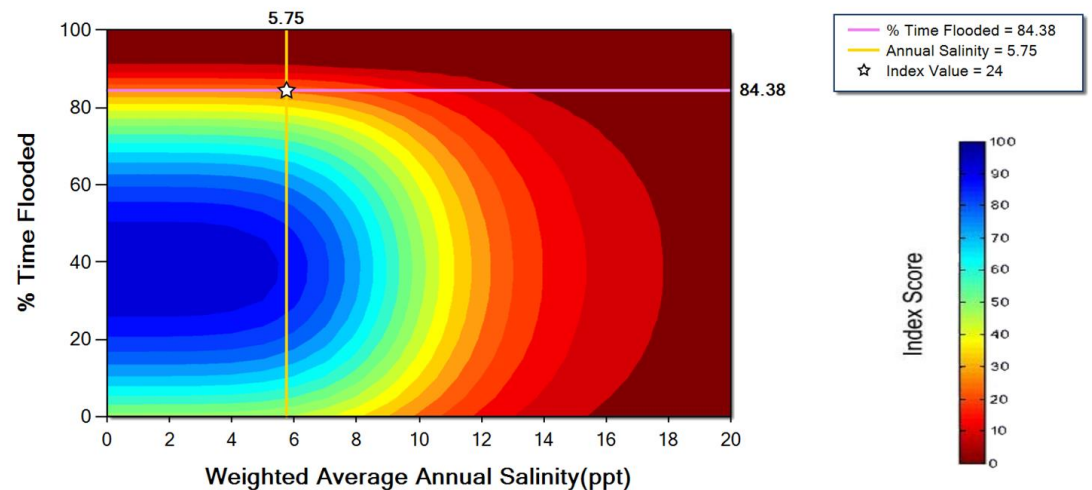
[More Info on Chart](#)

Scale:

Year:

BA39-01  
BA39-02  
BA39-03  
CRMS0002  
CRMS0003  
CRMS0006  
CRMS0030  
CRMS  
CRMS  
CRMS

Hydrologic Index for 2012 Brackish Marsh, BA39-01





Charting

Bulk Charting

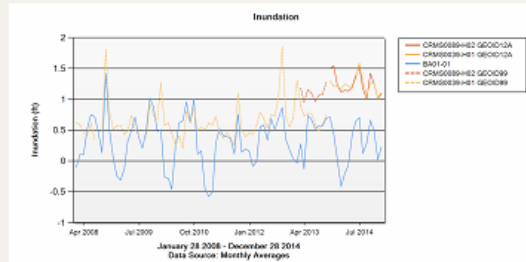
Data Download

Reporting

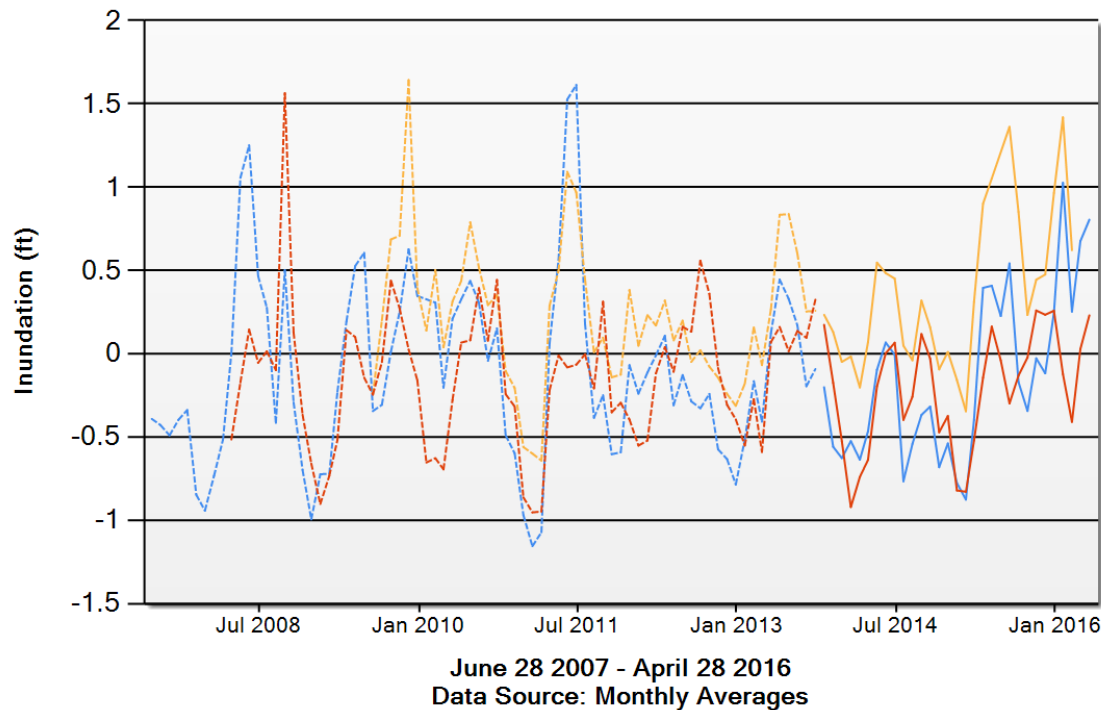
### Hydro

Water Level Range  
Hydro Completeness  
Salinity  
Water Level  
Temperature  
**Flooding**  
Continuous  
Site Hydro Index  
Soil Porewater  
Precipitation

Interactive Hydro



### Inundation





Home	Data	Mapping	Library	Visualization	Program	
<b>CRMS Support Documentation</b>					Administration	Support Docs
					Contacts	Publications
					Data Descriptions	Privacy
						Accessibility
						FOIA
						Disclaimer
						Data Citation

Bass, A. S., C. F. Robertson, W. K. Rhinehart. 2003. [Office of Coastal Restoration quality management plan: 2003](#). Louisiana Department of Natural Resources. Ba

Couvillion, B., M. Fischer, H. Beck, and W. Sleavin. 2016. [Spatial configuration trends in coastal Louisiana from 1985 to 2010](#). Wetlands. 10.1007/s13157-016-0744-9.



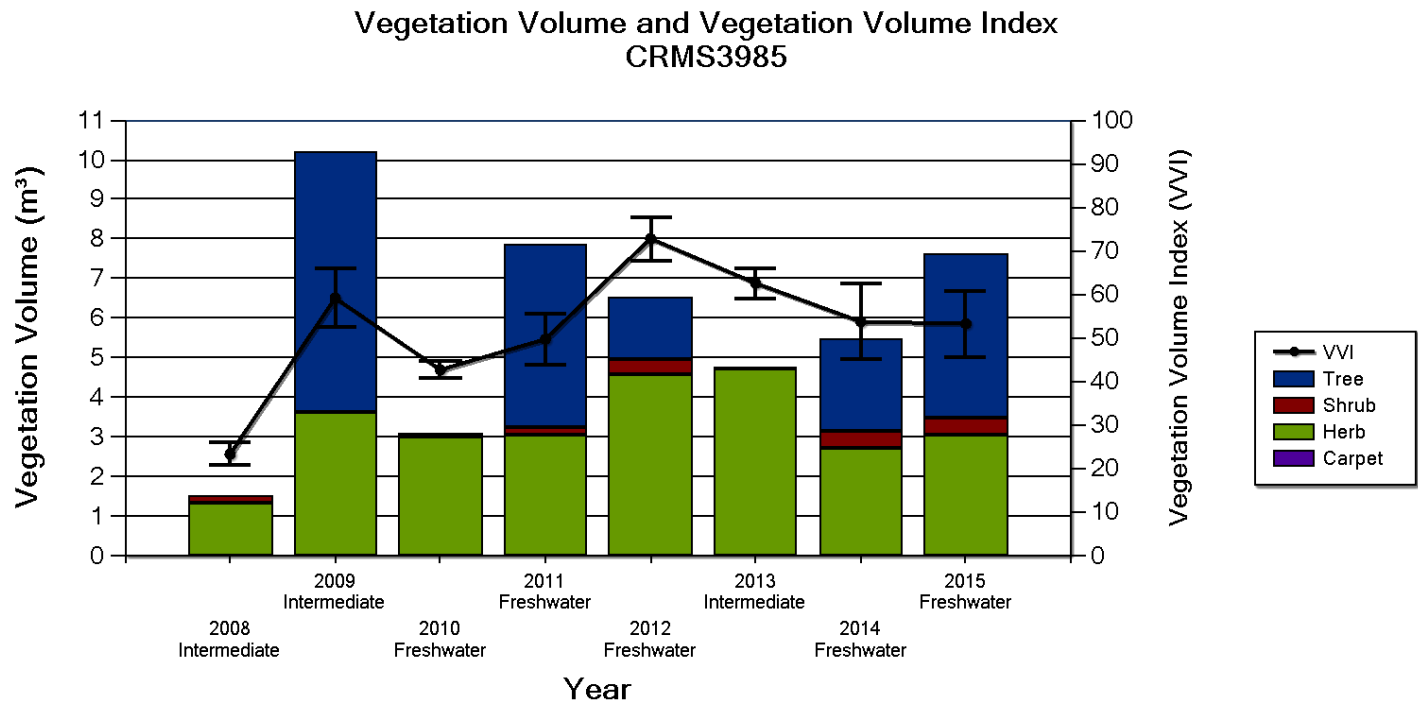
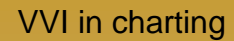
Prepared in cooperation with the Coastal Wetlands Planning, Protection and Restoration Act Task Force

## Coastwide Reference Monitoring System (CRMS) Vegetation Volume Index: An Assessment Tool for Marsh Habitat Focused on the Three-Dimensional Structure at CRMS Vegetation Monitoring Stations

Open-File Report 2015-1206

U.S. Department of the Interior  
U.S. Geological Survey

- Quantifies the volume of vegetation at a site ( $m^3$ ) by incorporating cover AND height for each vegetation layer.
- Proxy for vegetation production, quantifying 3d structure.
- The VV values are indexed into VVI scores by marsh type.
- Developed to be paired with the FQI.





Charting

Bulk Charting

Data Download

Reporting

**Generate Report Card**

Year: 2015

## ▼ Generate Report Card

Site Level Report

Project Level Report

Basin Level Report

Coastwide Level Report

## ► OM&amp;M

Clear Reports

Report Card CRMS3985 2015

CRMS3617  
CRMS3626  
CRMS3639  
CRMS3641  
CRMS3650  
CRMS3664  
CRMS3667  
CRMS3680  
CRMS3784  
CRMS3800  
CRMS3913  
CRMS3985

**The Vegetation Volume Index (VVI)**

The Vegetation Volume Index (VVI) is a measure of the amount of three-dimensional vegetative structure present irrespective of observed vegetation species. The VVI was developed using CRMS data from coastal Louisiana but could be employed in other marsh or shrub scrub ecosystems. It was developed using the area of total vegetation cover (m<sup>2</sup>) multiplied by vegetation layer height (m) of each of four vegetation layers; carpet, herbaceous, shrub, and tree. This methodology does not distinguish between early and late successional stage vegetation species. As a result, early stage annual species can score similarly or higher than late stage perennial species as vigor and robust growth forms outweigh vegetation community stability in some dynamic environments. CRMS sites are comprised of 10 sampling stations that are sampled annually. The VVI scores range from 0 to 100 and are calculated for each sampling station based on the vegetation volume of the combined layers and marsh type of each sampling station. Individual station level VVI scores are averaged to obtain an annual CRMS site VVI score. For more detailed information regarding the development of the VVI see: <https://pubs.er.usgs.gov/publication/ofr20151206> and Wood et al. 2015.

Vegetation Volume and Vegetation Volume Index  
CRMS3985

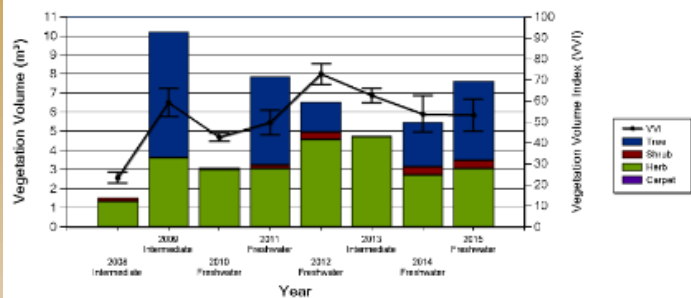
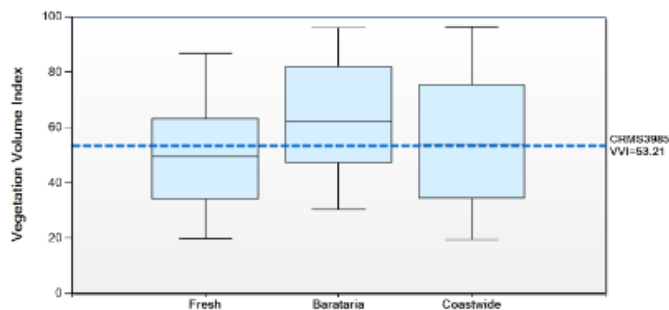


Figure 13. Vegetation Volume Index for CRMS3985.

Site Scale: CRMS3985 - 2015



Site Scale: CRMS3985 - 2008 through 2015

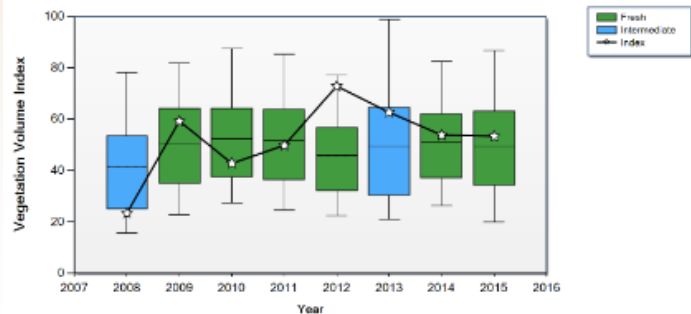


Figure 15. A time series of VVI scores for a CRMS site relative to the box plot of the scores for all the sites within the same marsh type each year.

### Coastwide Scale Assessment: Vegetation Volume Index (VVI)

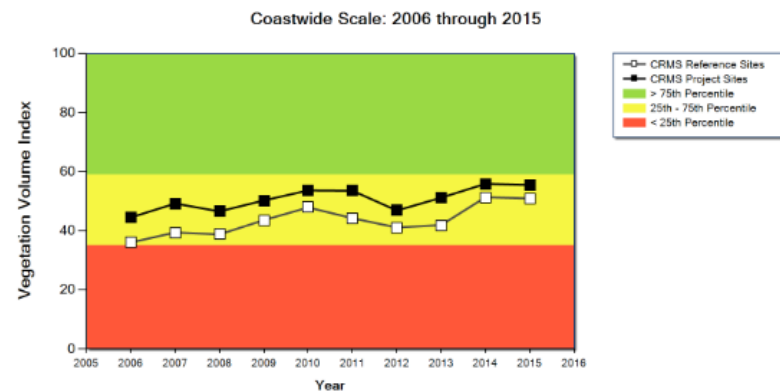


Figure 26. VVI scores across the coast are shown over time. The mean ( $\pm$  SE) VVI scores are calculated for all project and reference sites by year.  
CRMS Project Sites - 2006 N = 1329; 2007 N = 2131; 2008 N = 2281; 2009 N = 2324; 2010 N = 2209; 2011 N = 2330; 2012 N = 2335; 2013 N = 2329; 2014 N = 2330; 2015 N = 2330  
CRMS Reference Sites - 2006 N = 619; 2007 N = 955; 2008 N = 991; 2009 N = 1019; 2010 N = 991; 2011 N = 990; 2012 N = 988; 2013 N = 990; 2014 N = 990; 2015 N = 990



## Previous Charting Version

Charting

Bulk Charting

Data Download

Reporting

### ▼ Hydro

#### Water Level Range

Hydro Completeness

Salinity

Water Level

Temperature

Continuous

Site Hydro Index

Soil Porewater

Precipitation

Interactive Hydro

▶ Vegetation

▶ Soil

▶ Spatial

▶ Report Card Charts

Clear Charts

Water Year is October 1 - September 30

[More Info on Chart](#)

Scale: Multi Station ▼

Year: 2004 ▼

Basin: All Basins ▼

Project: All Projects ▼

Selection limited to 10 items

BA01-01	BA01-02
BA01-03	BA01-09
BA01-04	BA01-14
BA01-10	BA02-56
BA01-16	
BA02-57	
BA03C-16	
BA03C-60	
BA03C-61	

Previous Selection

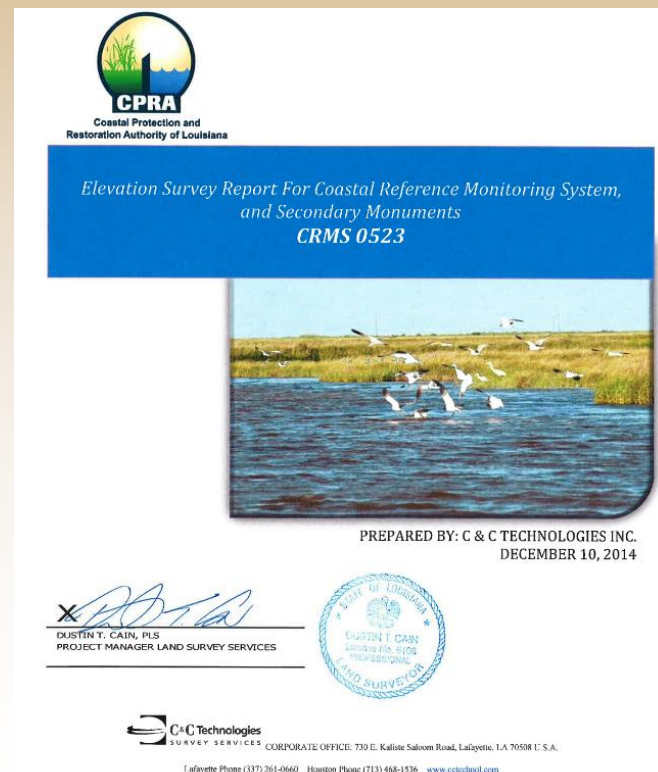
Show Map Selector

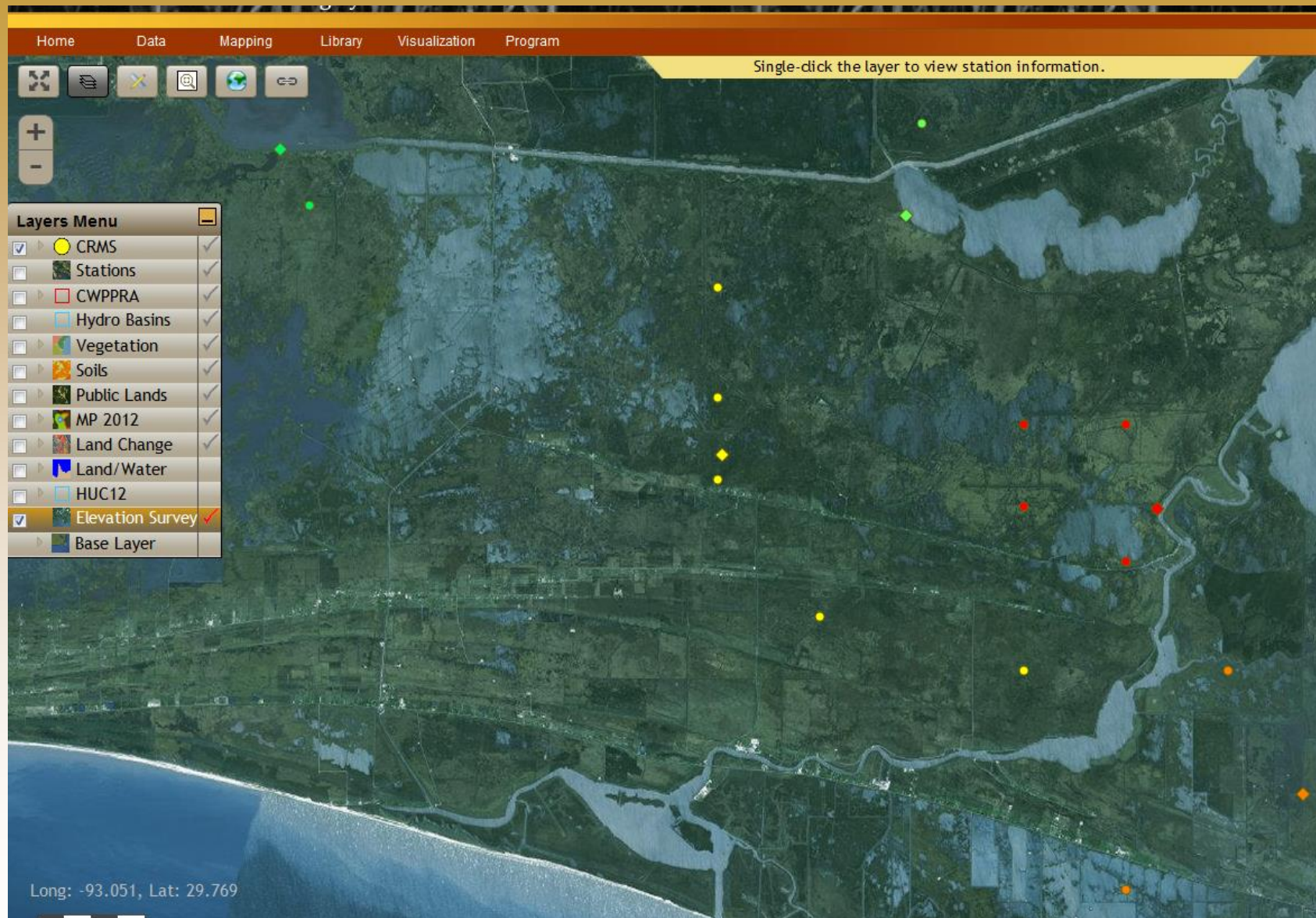
Submit Request



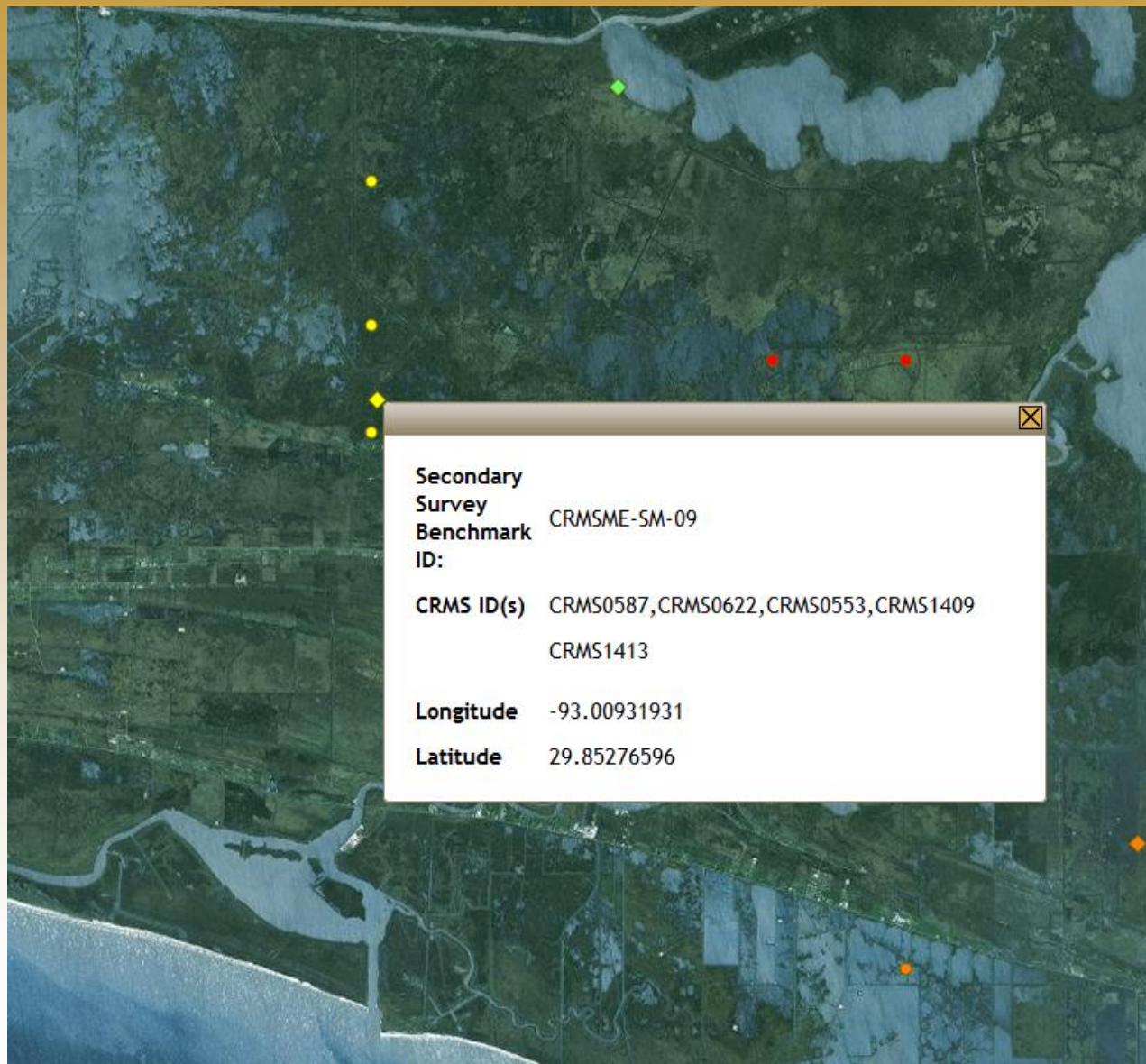
## Reminder: Coastwide Elevation Survey

- Sites were surveyed at the beginning of the program over several years and data were reported in ft NAVD88 GEOID99
- Spring/Summer 2014 all sites were surveyed in GEOID12a
- Elevations are stored in the CIMS database with their GEOID info
- Serving the GEOID12a elevations starting October 1, 2013
- New average marsh elevations were calculated for each CRMS site





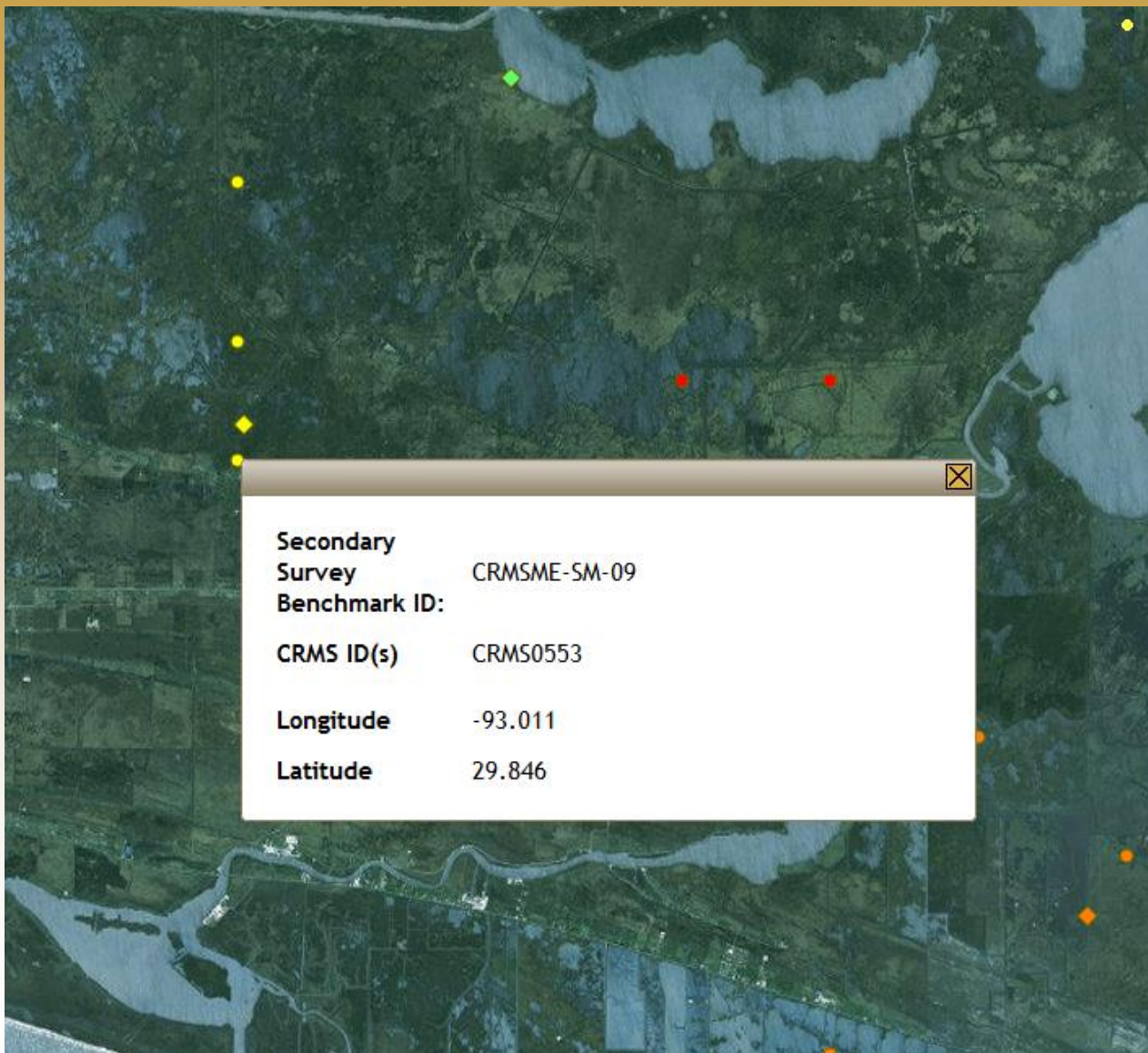
Note: You have to be zoomed in fairly close to activate layer.



**Benchmarks**



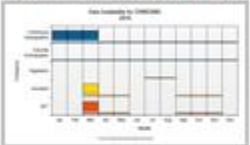
**CRMS Sites**






Info Water Vegetation Soil Spatial Report Card Tools


Site ID: CRMS3985  
Lat, Long: 29.7175, -90.149  
Marsh Elevation: 0.48ft NAVD88 GEOID12A  
Data Availability: 2016




Pre/Post Construction Pictures:





Post Construction



Preliminary Site Visit North

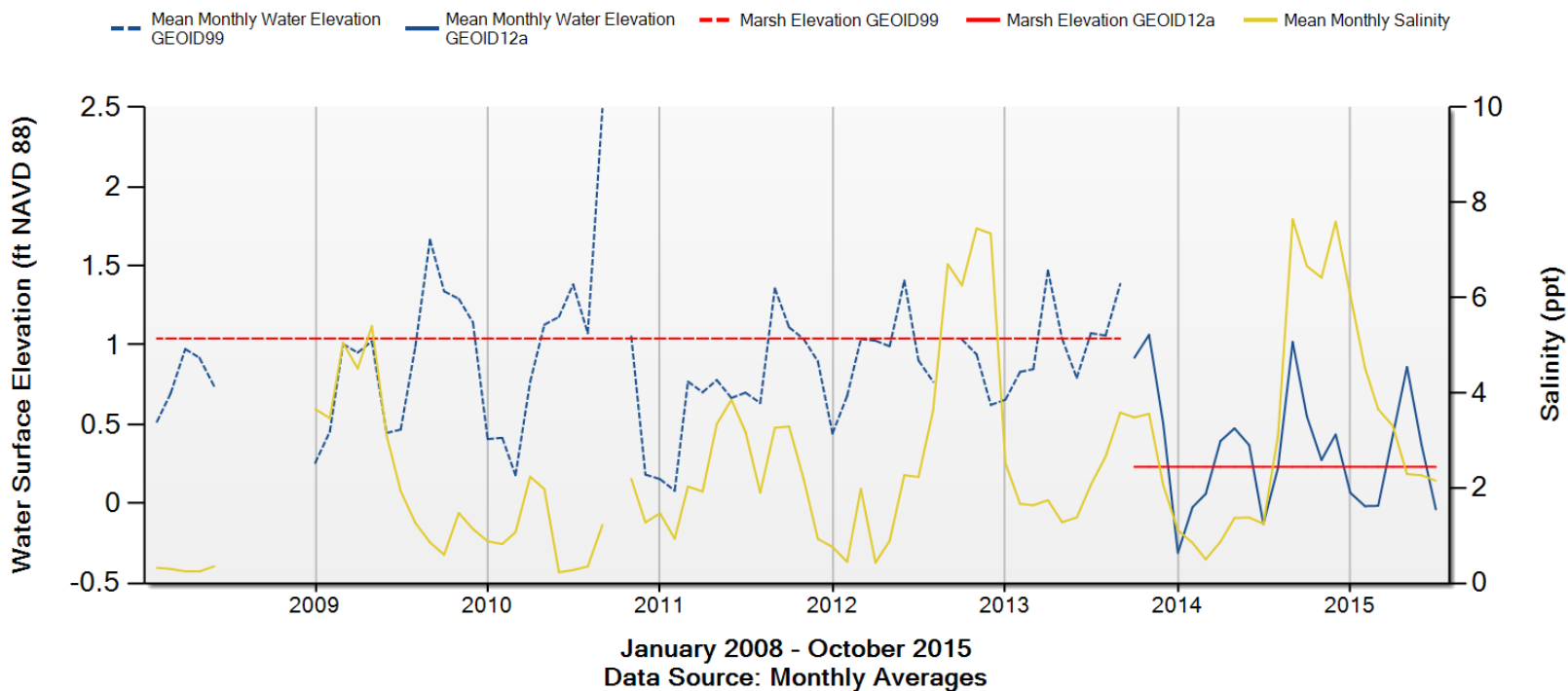


Pre Construction

 [CRMS3985 Survey Report Initial](#)  
 [CRMS3985 Survey Report Summer 2014](#)

- Initial survey report and 2014 report are available in the site level bubble
- Revised visualizations to reflect new elevations (water elevation, marsh elevation, flooding, etc.)
- Provided correction factors to be applied to “old” data

## Coastwide Reference Monitoring System CRMS0121 - Continuous Hydrographic Data

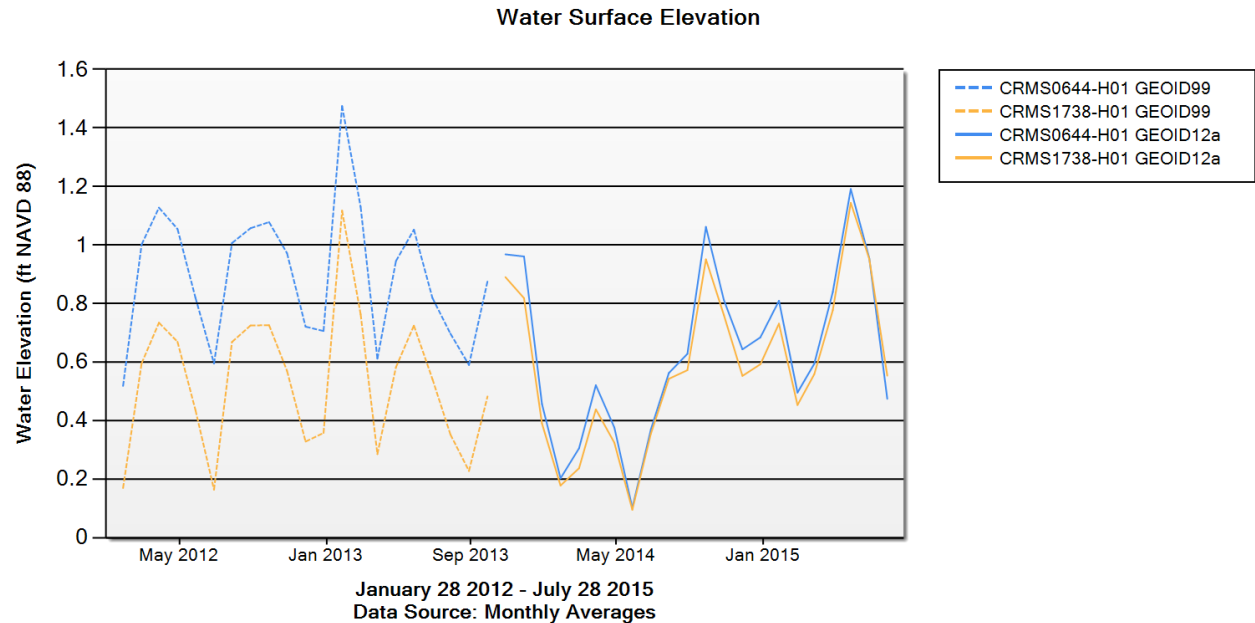


- Data shifts are visible due to resurveying in visualizations
- GEOID is identified for every elevation in charts and data downloads

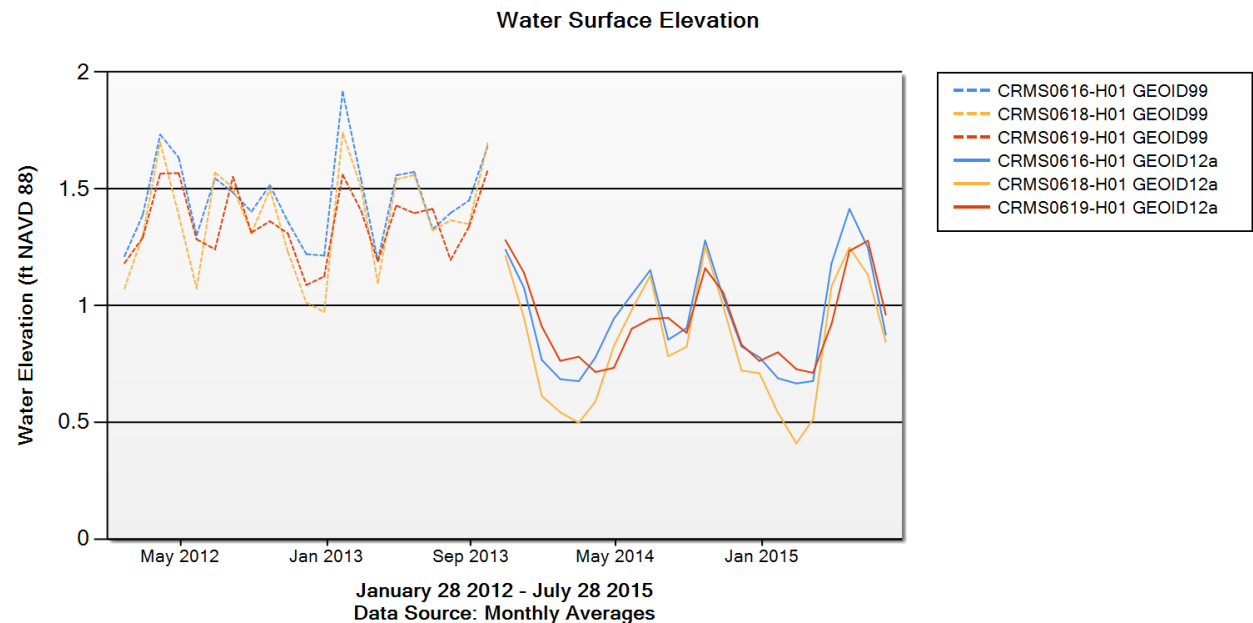


# Coastwide Elevation Survey

- The new survey tightens up differences between stations.



- Water elevations in GEOID12a are lower than they were in GEOID99 by around 0.5 to 1.0 feet.





Charting

Bulk Charting

Data Download

Reporting

## Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

### ▼ Hydro

Hydro Averages

Hydro Index

Percent Flooded

Water Level Range

Shifted Water Elevation Data

Scale: Select Value

Select Value

Correction factor (from GEOID99 to GEOID12A)

Shifted Water Elevation (GEOID12A)



CRMS

MOVE CLOSE

The Station specific value used to shift the water elevation data from GEOID99 to GEOID12A.

$GEOID12A = GEOID99 + \text{Correction Factor}$

**Correction Factor :** The value that is used to shift the elevation data from GEOID99 to GEOID12A.

**Shifted water elevation (12A):** Water elevation values collected in GEOID99 with the station specific correction factors applied to provide GEOID12A water elevation values. These shifted water elevations were used in the computation of the Submergence Vulnerability Index.



Charting

Bulk Charting

Data Download

Reporting

## Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

### Hydro

Hydro Averages

Hydro Index

Percent Flooded


Water Level Range

Shifted Water Elevation Data

### Vegetation

### Soil

### Spatial

Scale: Shifted Water Elevation (GEOD12A) 

Year:

Select All	Deselect All
2006	2012
2007	
2008	
2009	
2010	
2011	
2013	
2014	
2015	

Submit

Select All	Deselect All
CRMS0002	CRMS0147
CRMS0003	
CRMS0006	
CRMS0008	
CRMS0030	
CRMS0033	
CRMS0034	
CRMS0035	
CRMS0036	

[Show Map Selector](#)

Email Address:

Submit Request



Name	Date Modified	Type	Size
3193_ShiftedWaterElevationData.zip	6/14/2016 3:40 PM	WinZip File	42 KB

Name	Type	Compressed size	Password ...	Size	Ratio	Date modified
3193.csv	Microsoft Excel Comma S...	41 KB	No	501 KB	92%	6/14/2016 3:40 PM
3193_Coordinates.csv	Microsoft Excel Comma S...	1 KB	No	1 KB	18%	6/14/2016 3:40 PM
DISCLAIMER.txt	Text Document	1 KB	No	1 KB	37%	6/14/2016 3:40 PM

	A	B	C	D	
1	Station_ID	MonDateTime	Water_Elev_Datum (ft NAVD88)	GEOID	
2	CRMS0147-H01	11/6/2012 21:00	0.11	GEOID12A	
3	CRMS0147-H01	11/6/2012 22:00	0.35	GEOID12A	
4	CRMS0147-H01	11/6/2012 23:00	0.46	GEOID12A	
5	CRMS0147-H01	11/7/2012 0:00	0.49	GEOID12A	
6	CRMS0147-H01	11/7/2012 1:00	0.47	GEOID12A	
7	CRMS0147-H01	11/7/2012 2:00	0.48	GEOID12A	
8	CRMS0147-H01	11/7/2012 3:00	0.44	GEOID12A	
9	CRMS0147-H01	11/7/2012 4:00	0.37	GEOID12A	
10	CRMS0147-H01	11/7/2012 5:00	0.33	GEOID12A	
11	CRMS0147-H01	11/7/2012 6:00	0.18	GEOID12A	
12	CRMS0147-H01	11/7/2012 7:00	0.05	GEOID12A	
13	CRMS0147-H01	11/7/2012 8:00	-0.09	GEOID12A	
14	CRMS0147-H01				
15	CRMS0147-H01				
16	CRMS0147-H01				
17	CRMS0147-H01				
18	CRMS0147-H01				
19	CRMS0147-H01				

**Disclaimer:**

These water elevation data have been shifted from the GEOID in which they were observed (GEOID99) into the most recent GEOID (GEOID12A).


Stations were surveyed relative to GEOID12A in water year 2014. Uncertainty increases with time as values are shifted prior to water year 2014.

Corrections for subsidence have not been identified or applied.

[Charting](#)[Bulk Charting](#)[Data Download](#)[Reporting](#)

### Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

Scale:  

Select All	Deselect All
CRMS0131	CRMS0147
CRMS0132	
CRMS0135	
CRMS0136	
CRMS0139	
CRMS0146	
CRMS0148	
CRMS0153	
CRMS0154	

#### Hydro

[Hydro Averages](#)[Hydro Index](#)[Percent Flooded](#)[Water Level Range](#)[Shifted Water Elevation Data](#)




#### Vegetation

#### Soil

#### Spatial

[Show Map Selector](#)

Email Address:

 3194\_Coordinates.csv  
 DISCLAIMER.txt  
 GEOID99\_TO\_GEOID12A.csv



A	B	C	D
Station ID	Correction_Factor (ft NAVD88)		
CRMS0147-H01	-0.6		



Released on the Website

CRMS station layer added to the map with station coordinates

Single-click a station on the map to view Information.

**Layers Menu**

- ☒ CRMS
- [Download KML](#)
- Zoom To: CRMS0311
- ☐ 1 km<sup>2</sup> Buffer
- ☐ 200 m<sup>2</sup> Buffer
- ☐ RealTime Hydro Sites
- ☐ Floating Marsh
- [Classify](#)

**Stations**

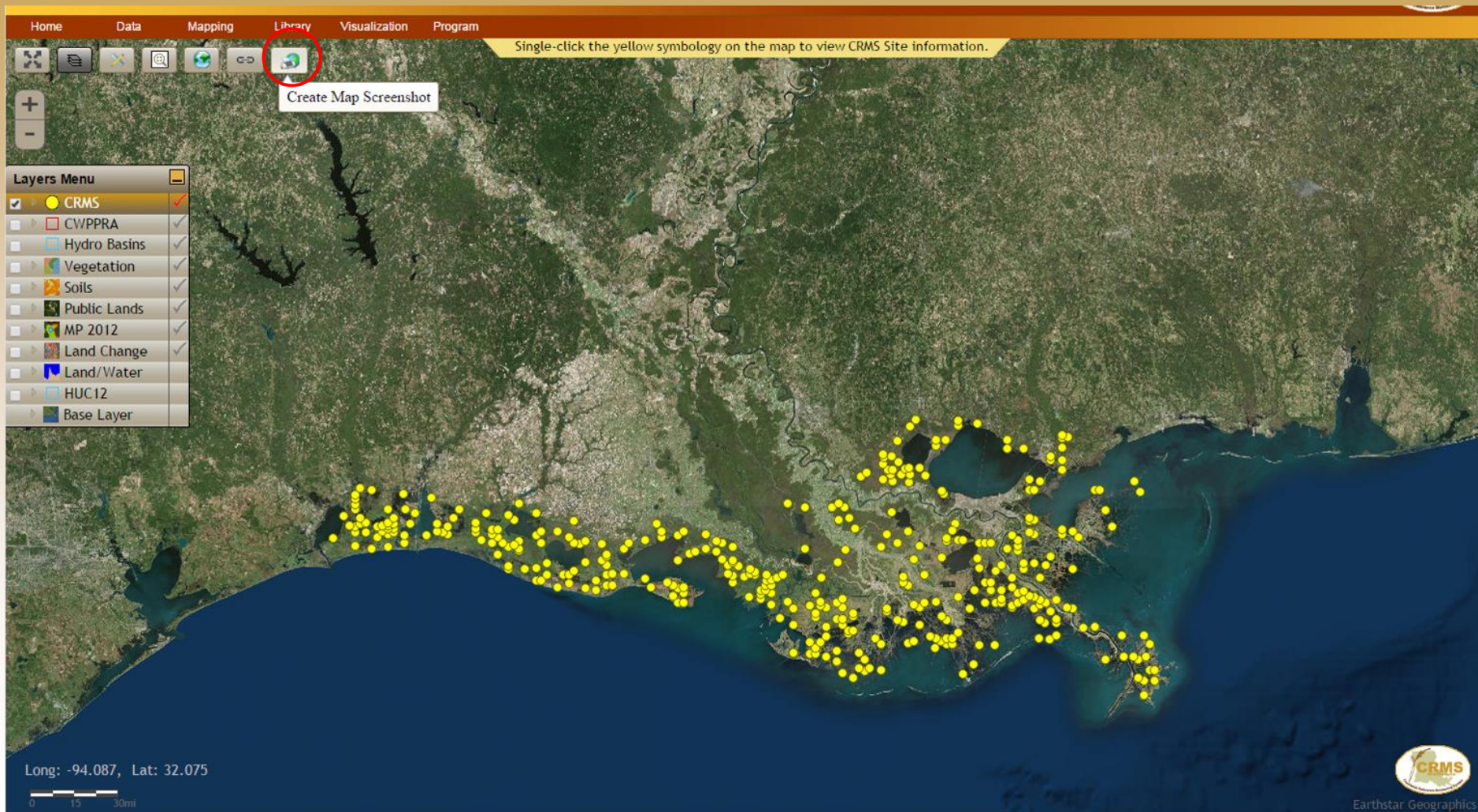
- ☒ Stations
- ☐ CWPPRA
- ☐ Hydro Basins
- ☐ Vegetation
- ☐ Soils
- ☐ Public Lands
- ☐ MP 2012
- ☐ Land Change
- ☐ Land/Water
- ☐ HUC12
- ☐ Elevation Survey
- ☐ Base Layer

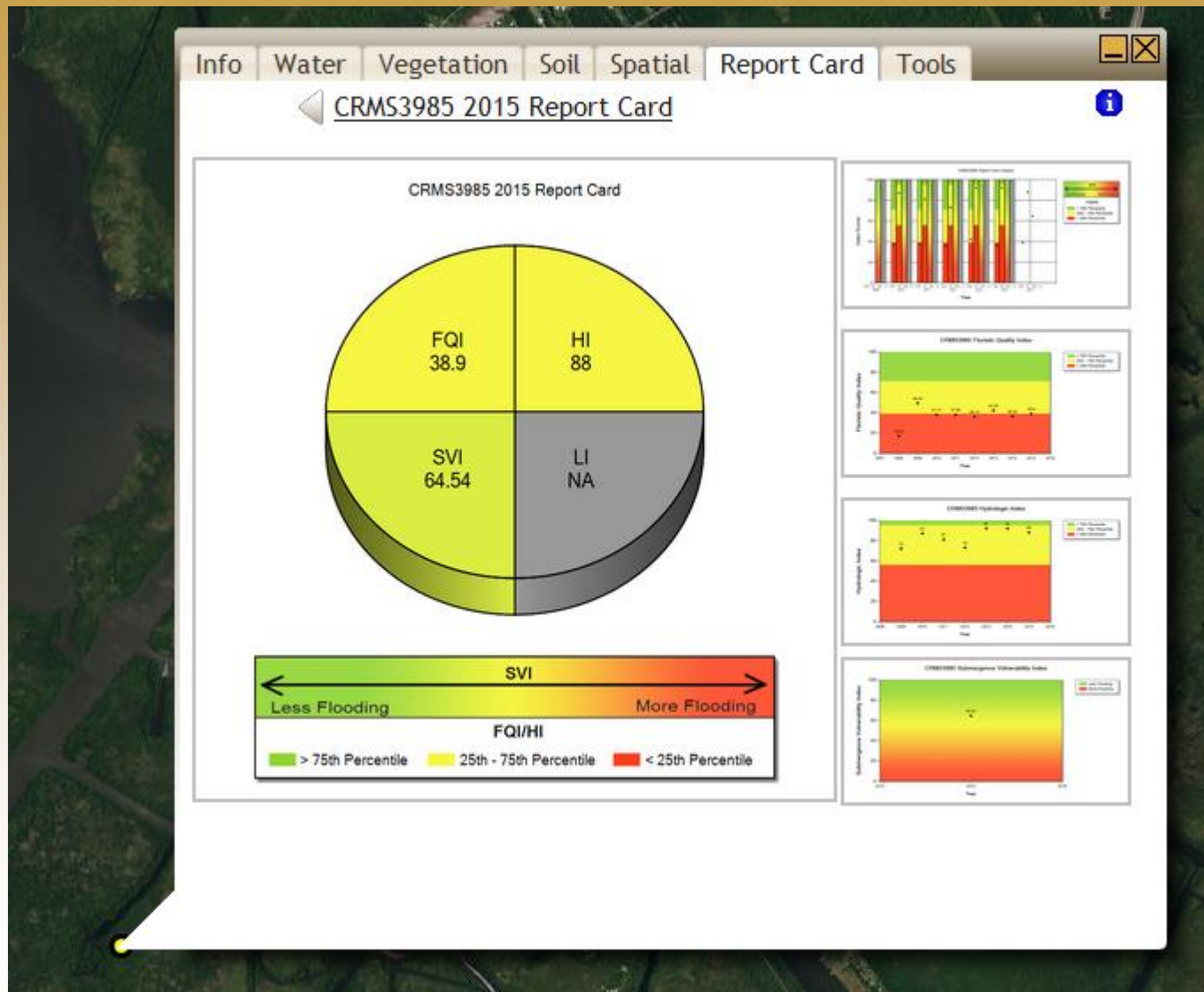
<b>Station ID</b>	CRMS0311-A01
<b>Longitude</b>	-90.791805
<b>Latitude</b>	29.214749
<b>Basin</b>	Terrebonne
<b>Measure</b>	Vertical Accretion
<b>Data Type</b>	Elevation Change
<b>Frequency</b>	Variable

**Layers Menu**

- ☒ CRMS
- ☒ Stations
- ☐ CWPPRA
- ☐ Hydro Basins
- ☐ Vegetation
- ☐ Soils
- ☐ Public Lands
- ☐ MP 2012
- ☐ Land Change
- ☐ Land/Water
- ☐ HUC12
- ☐ Base Layer



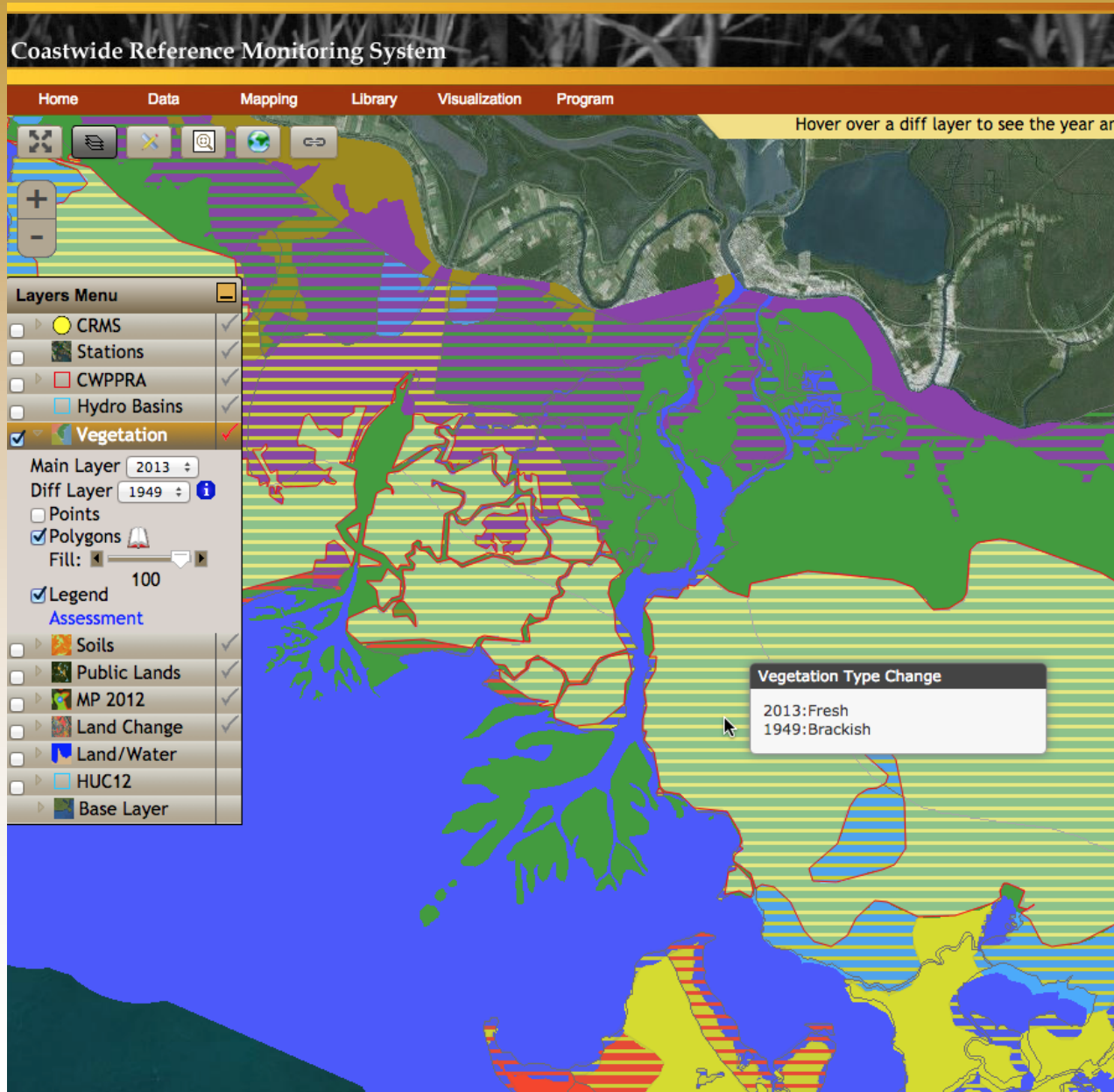


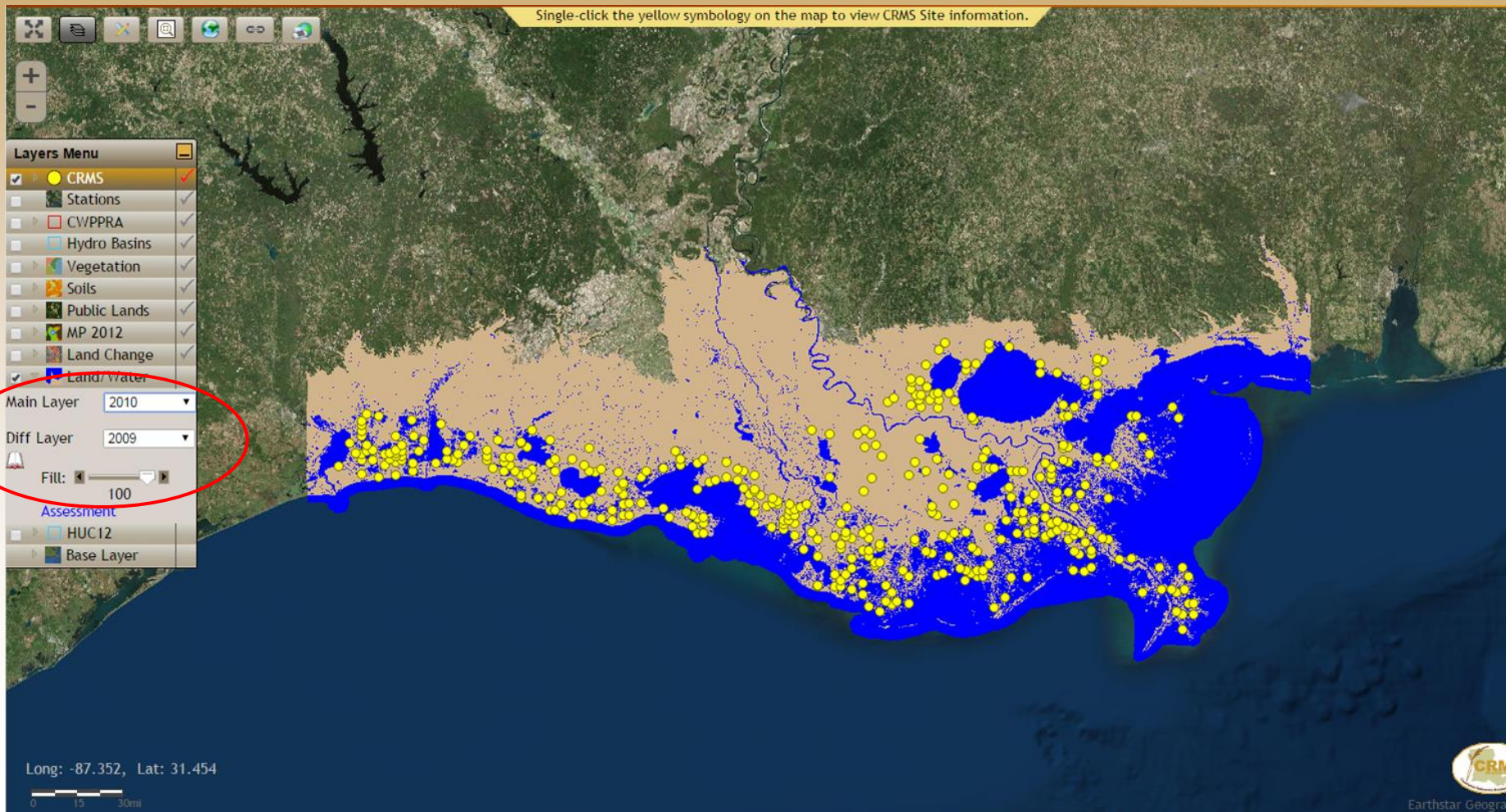




Coming Soon

Add a difference layer to the land/water layer

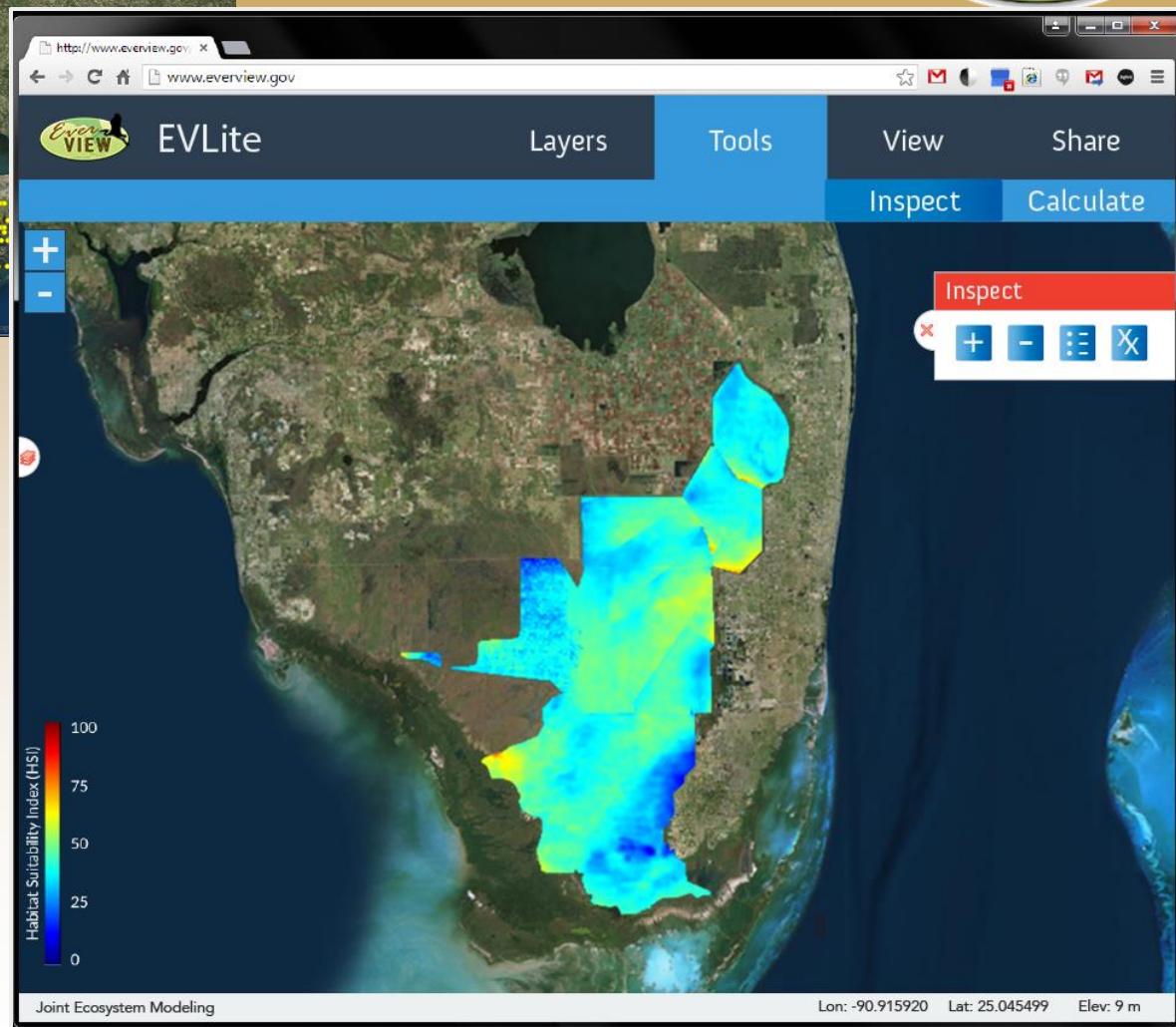
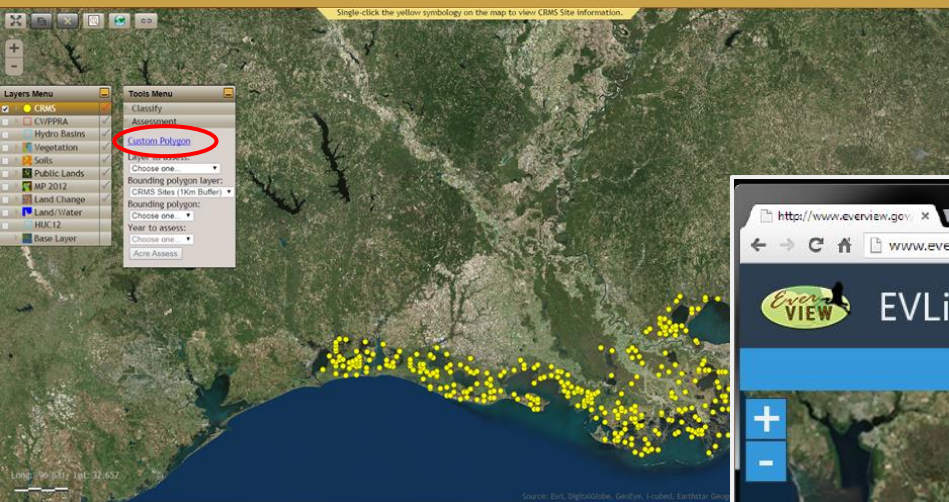






# In progress

Add "MY" shapefile to the CRMS map  
(Leveraging work on the EverVIEW project)

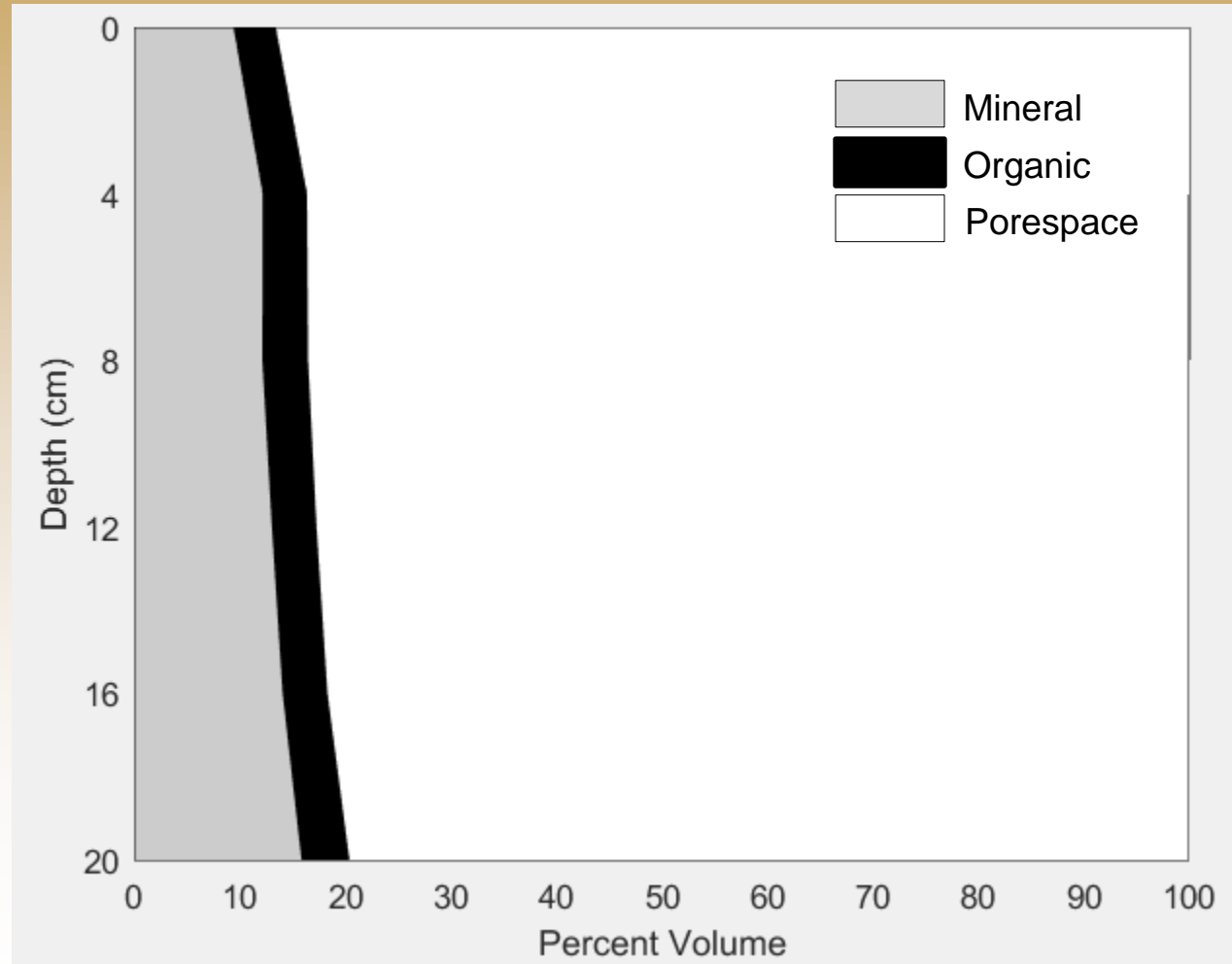




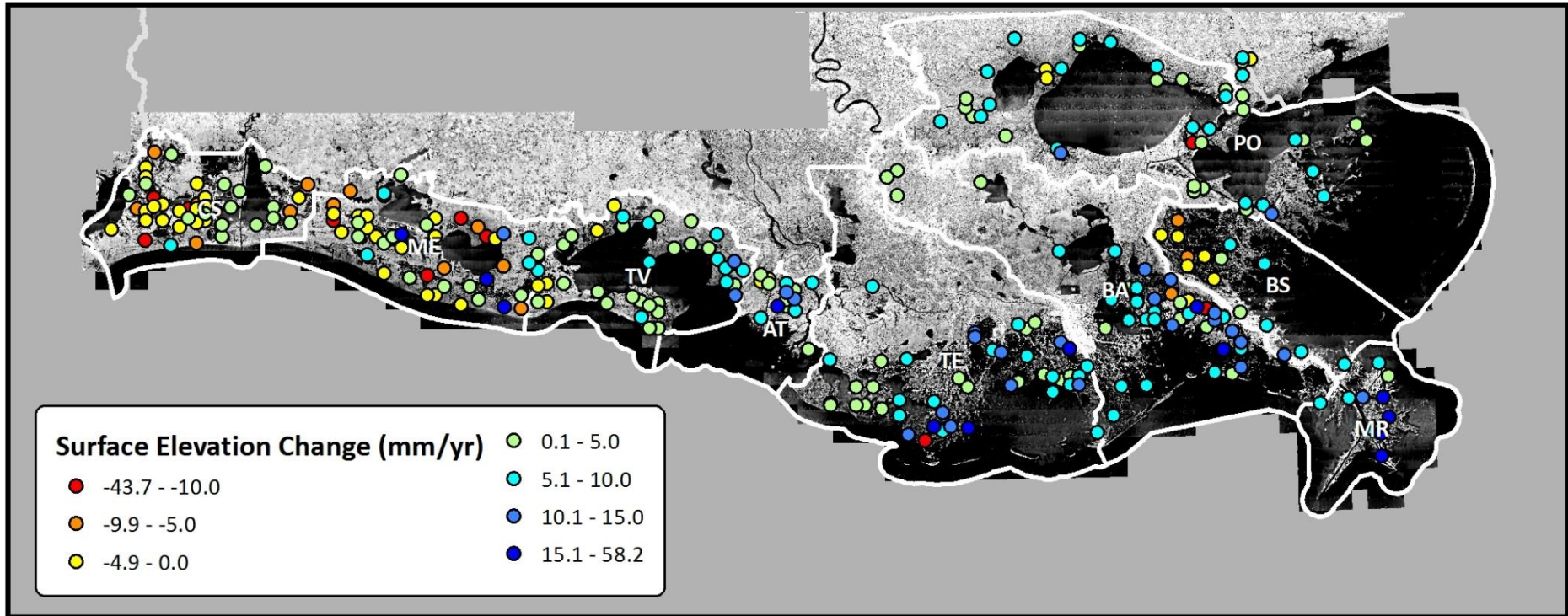
# **CRMS Analytical Team Updates**

### Site level

Instructive to show where soil volume is coming from and would enable visual comparisons over a decade once the new soil survey is conducted.



# Surface Elevation Change



**Series of coastwide graphics:**  
 Tidal amplitude  
 Inundation time  
 Land change

# Surface Elevation Change, Accretion, and Shallow Subsidence

## Elevation Change

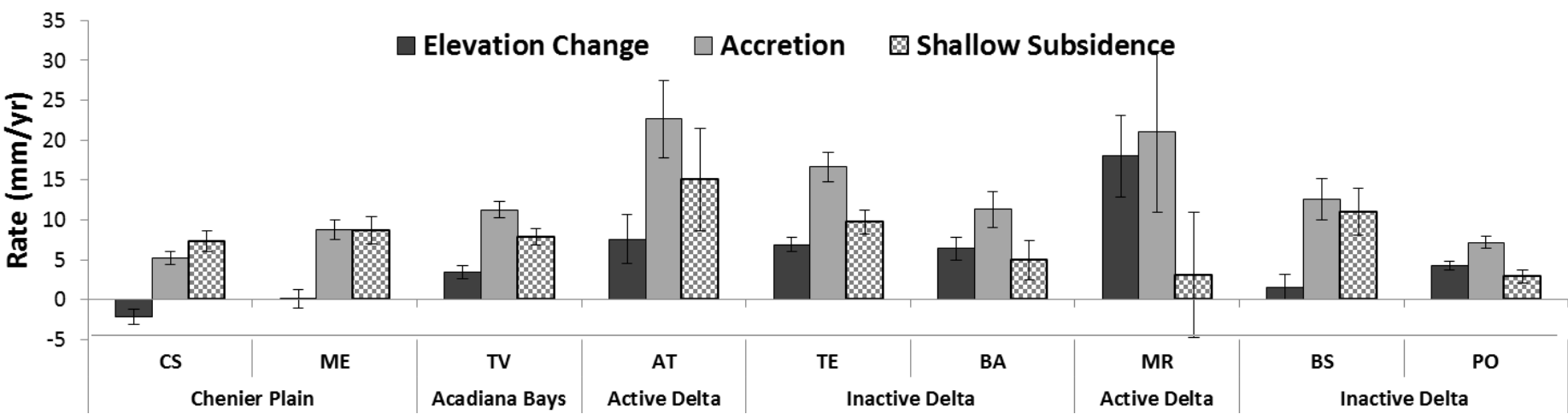
- Elevation Change is significantly higher in the MR than all other deltas.
- Elevation Change in CS, ME, and BS are significantly lower than the other basins.

## Accretion

- Although there are significant differences in accretion among basins, there are no patterns related to geophysical province (AT is significantly higher than PO and CS).
- The active deltas have the highest accretion rates

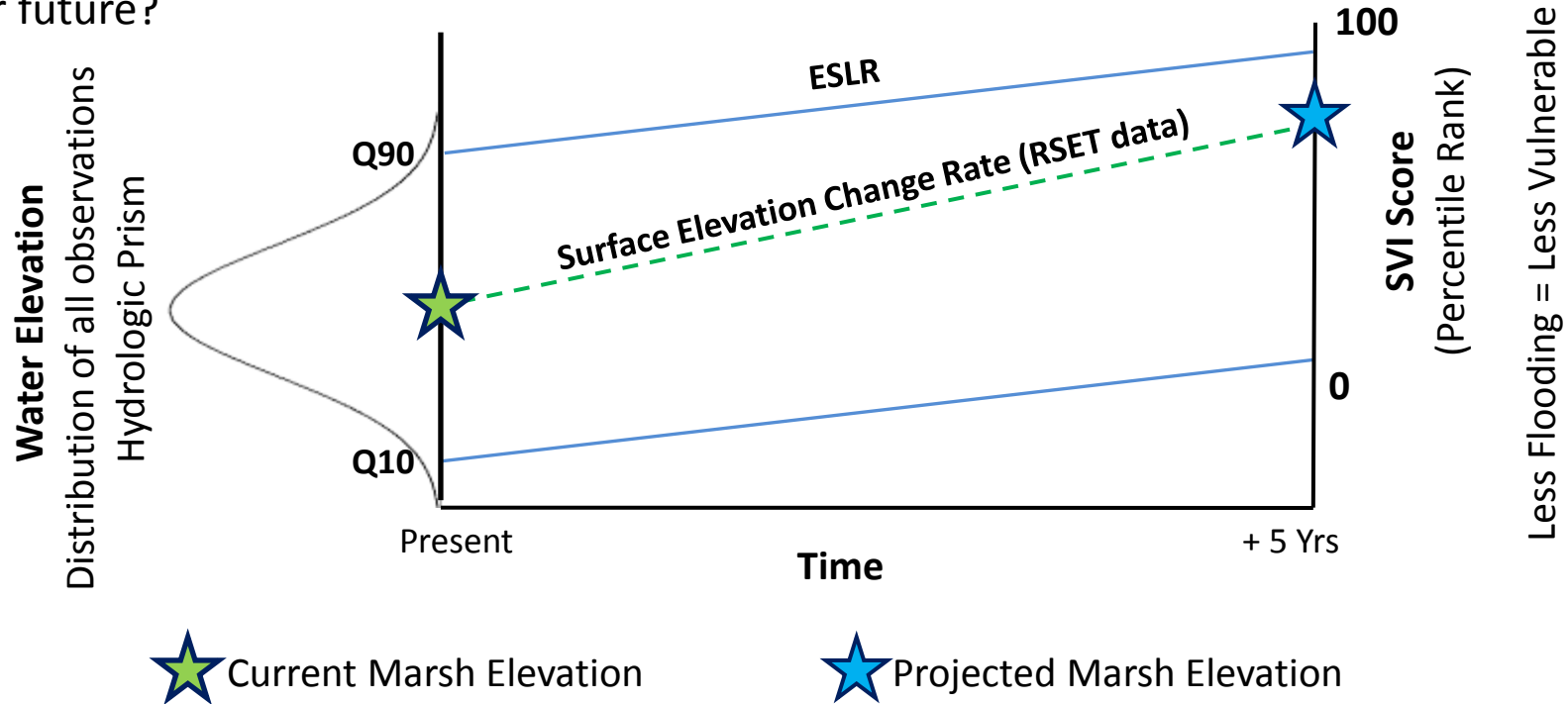
## Shallow Subsidence

- There are no meaningful differences in shallow subsidence (AT is significantly higher than PO).



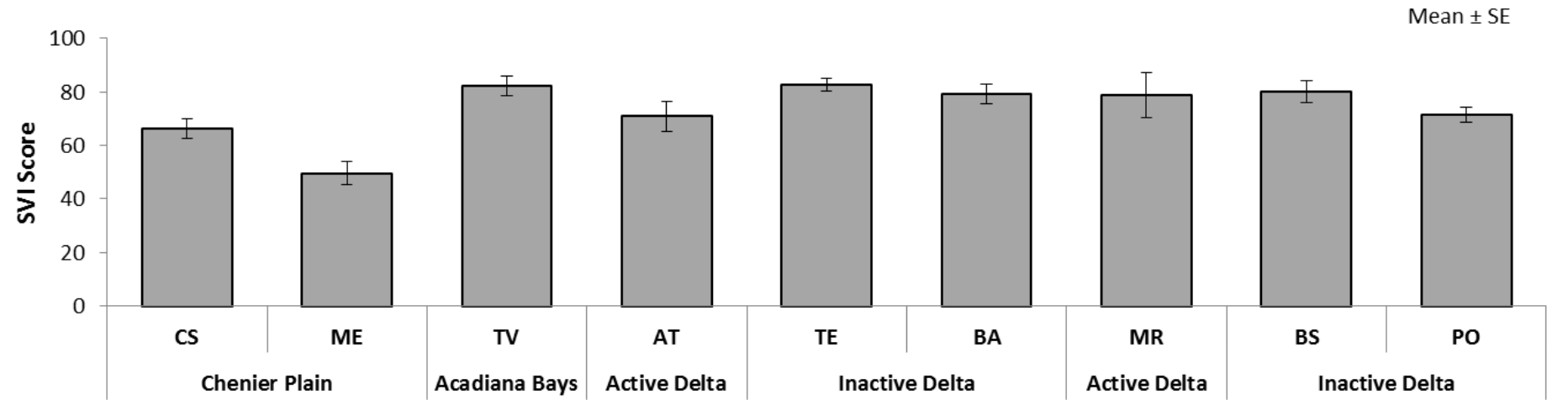
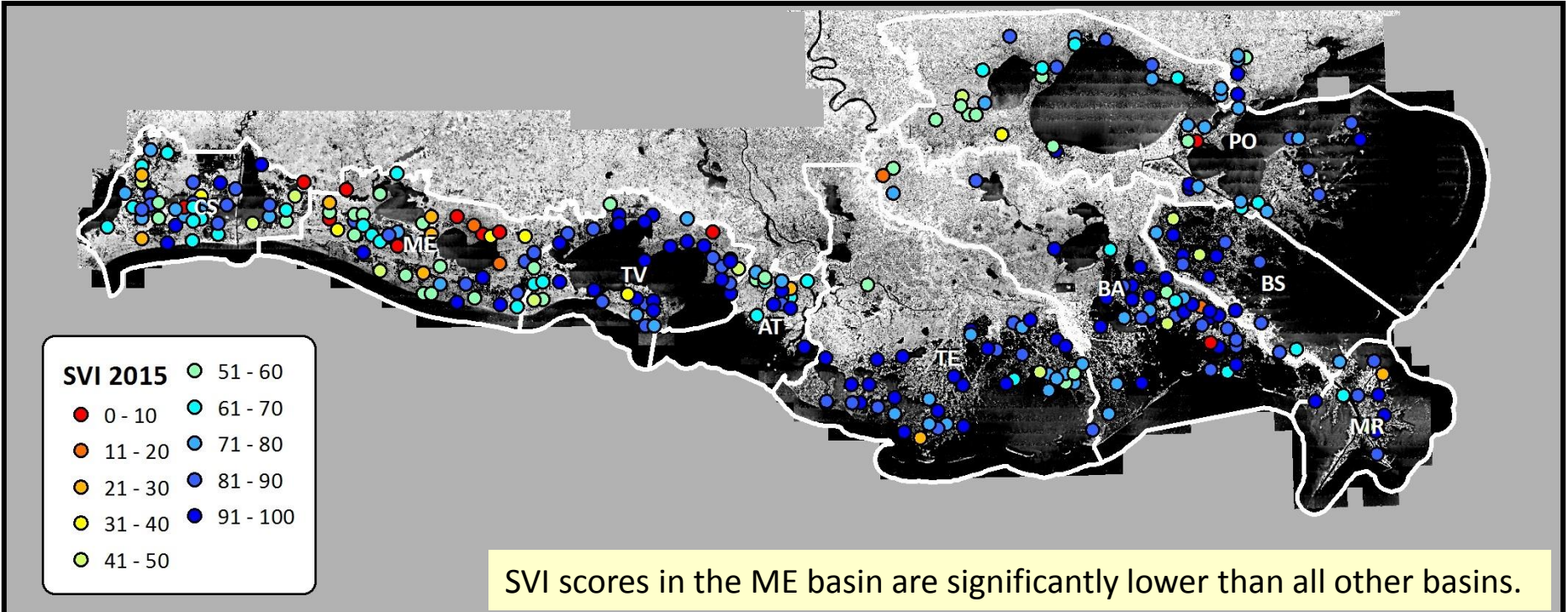
Where does the wetland surface sit within the site's tidal frame?

Given the distribution of all observed water elevations, surveyed marsh surface elevation and its measured rate of elevation change, and the reported (observed) rate of eustatic sea level rise, how often do we expect the site to be flooded in the near future?

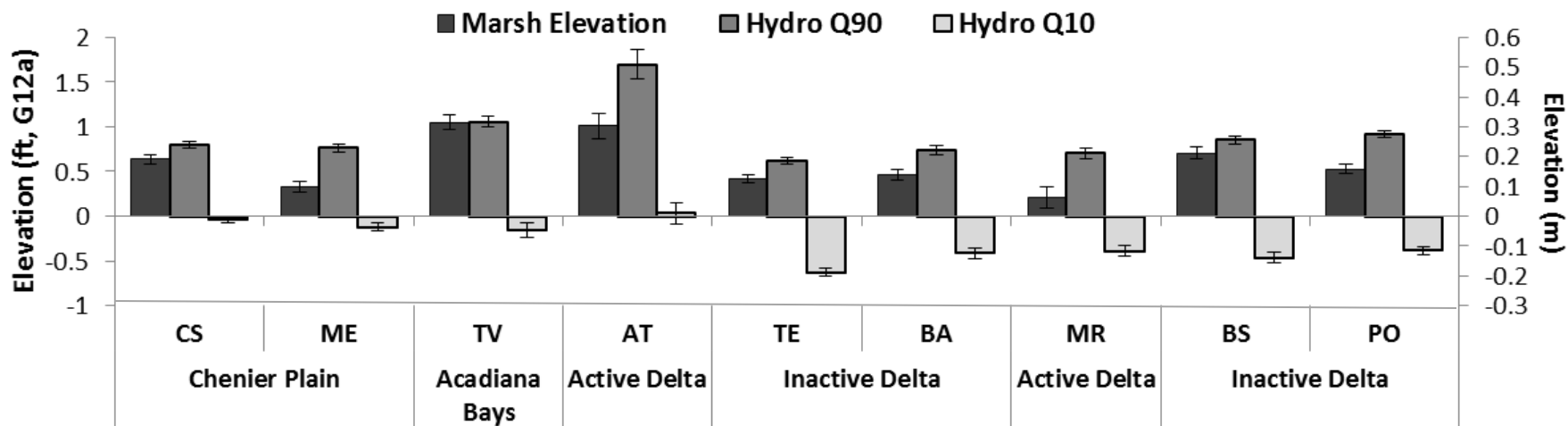
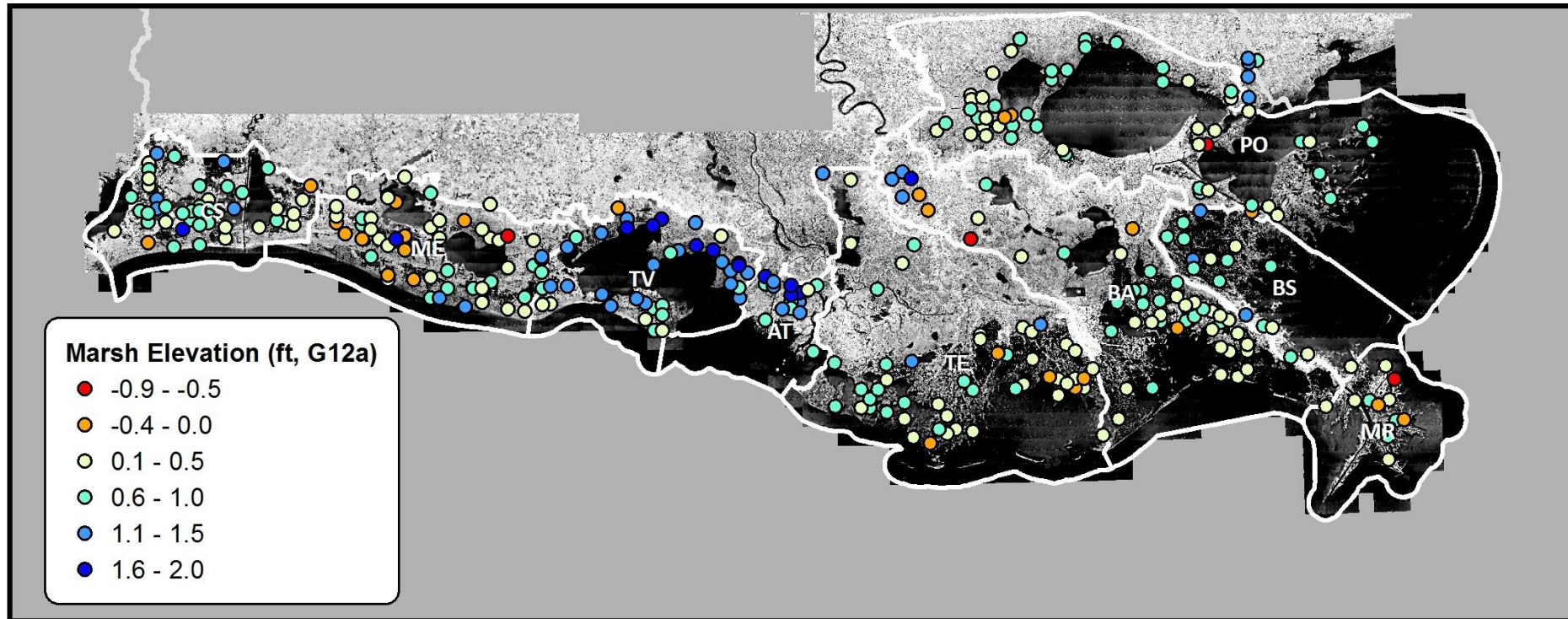


**SVI Score = 90;** Site predicted to be out of the water 90% of the time.

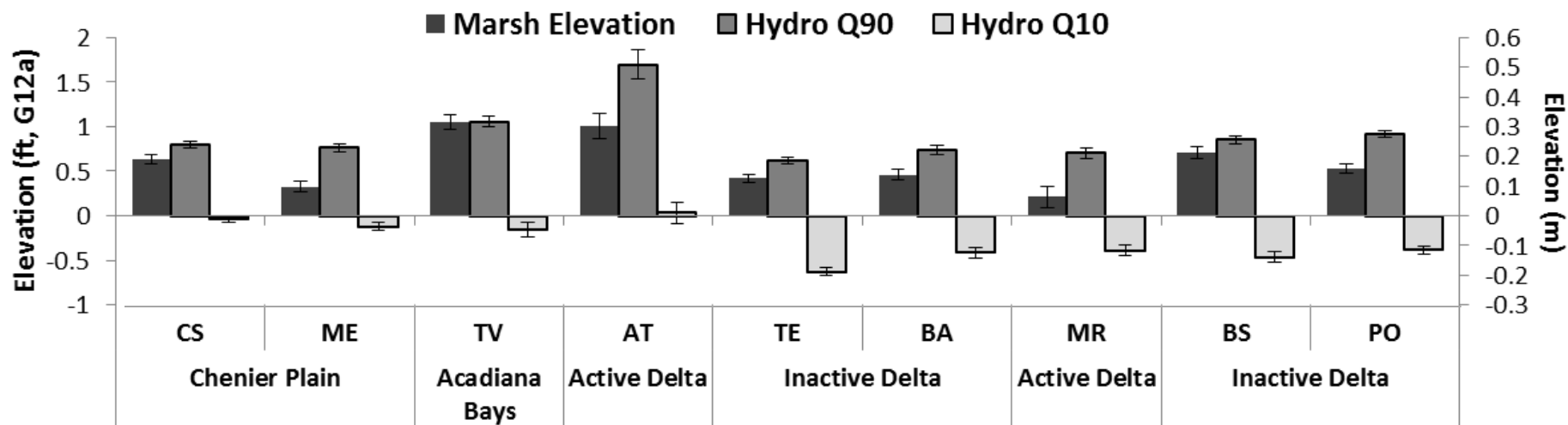
# 2015 Submergence Vulnerability Index Scores



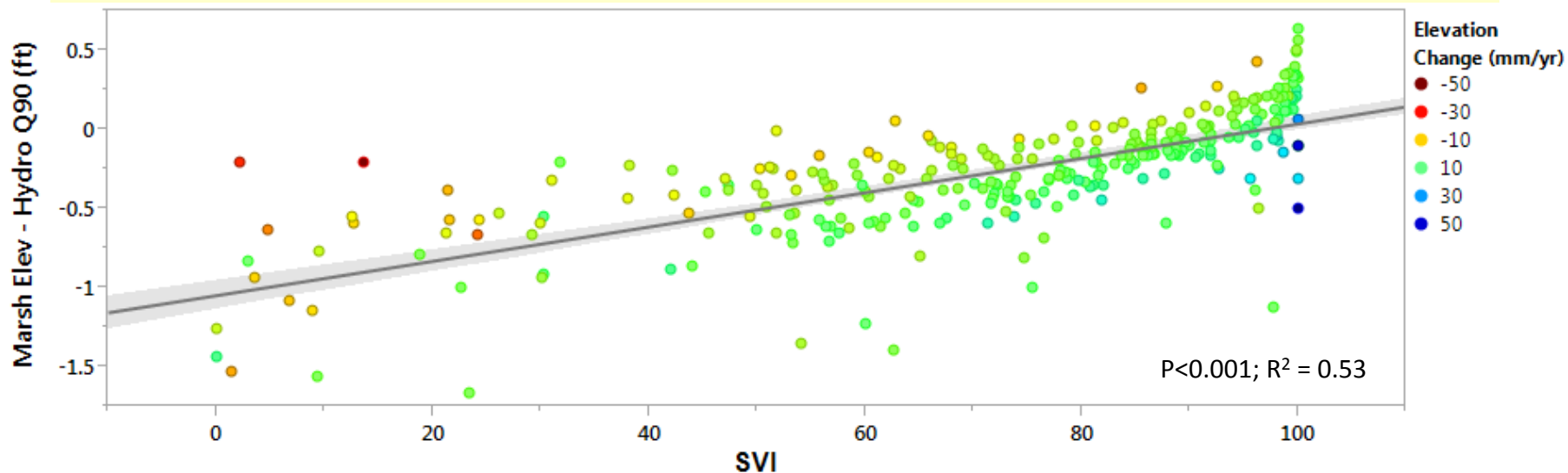
# 2014 Marsh and Water Elevations (ft, NAVD88, Geoid 12a)



# Factors Impacting SVI Scores – Preliminary results

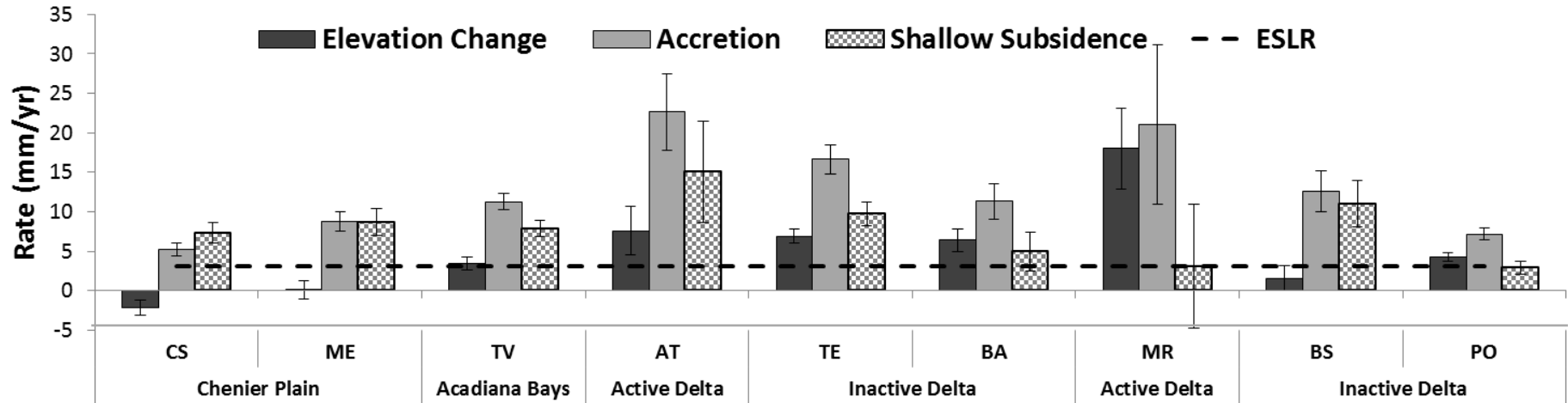


The difference between marsh elevation and the 90<sup>th</sup> Quantile of the hydrologic distribution accounts for most of the variability in SVI scores followed by elevation change rates.

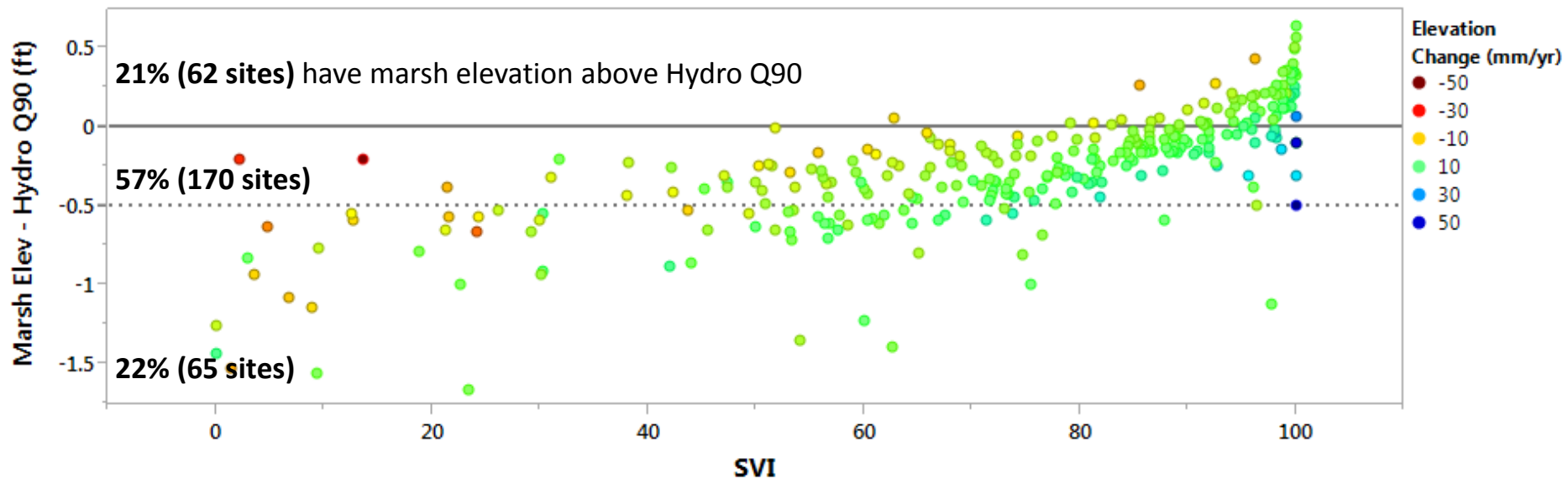


# Factors Impacting SVI Scores

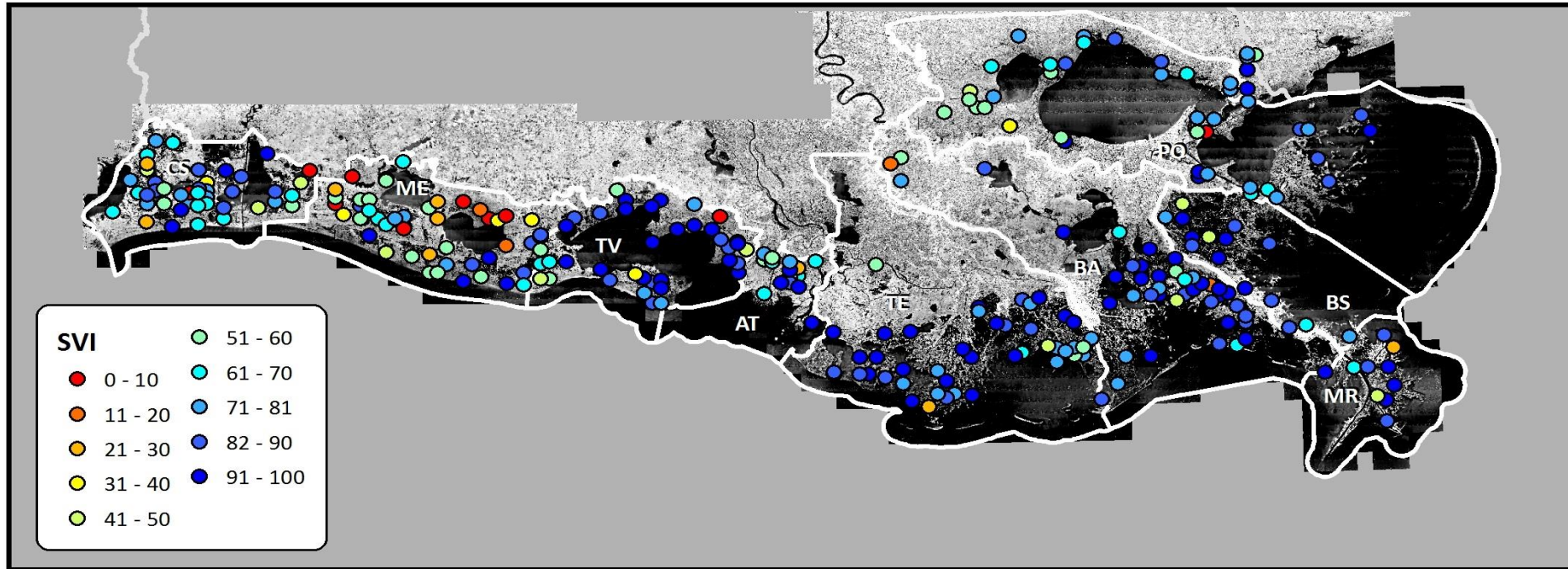
## Marsh Elevation is relatively high



Modest elevation gains are sufficient to offset submergence.



# 2015 Submergence Vulnerability Index Scores



**Analytical Objectives:** To understand factors that influence submergence vulnerability across the coastal landscape.

## Research Questions:

1. What processes influence submergence vulnerability, and does the relative influence vary across the landscape?  
Hypothesized initial wetland elevation, with respect to position within the tidal frame is important in determining marsh vulnerability-SVI
2. How does assessment using SVI compare to traditional assessments that only compare elevation change to RSLR?



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CRMS Support Documentation

[Administration](#)[Contacts](#)[Data Descriptions](#)

[Support Docs](#)[Publications](#)[Privacy](#)[Accessibility](#)[FOIA](#)[Disclaimer](#)[Data Citation](#)

Bass, A. S., C. F. Robertson, W. K. Rhinehart. 2003. [Office of Coastal Restoration quality management plan: 2003](#). Louisiana Department of Natural Resources. Bass, B., M. Fischer, H. Beck, and W. Sleavin. 2016. [Spatial configuration trends in coastal Louisiana from 1985 to 2010](#). Wetlands. 10.1007/s13157-016-0744-9.

Wetlands (2016) 36:347–359  
DOI 10.1007/s13157-016-0744-9



## ORIGINAL RESEARCH



# Spatial Configuration Trends in Coastal Louisiana from 1985 to 2010

Brady R. Couvillion<sup>1</sup> · Michelle R. Fischer<sup>1</sup> · Holly J. Beck<sup>1</sup> · William J. Sleavin<sup>2</sup>

Received: 19 August 2015 / Accepted: 21 January 2016 / Published online: 13 February 2016  
© US Government 2016

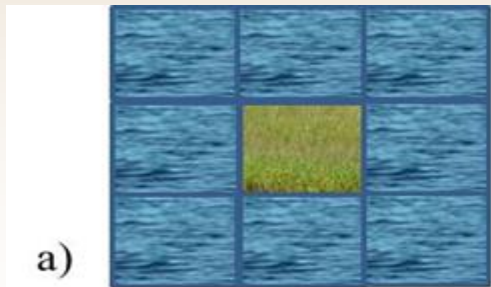
**Abstract** From 1932 to 2010, coastal Louisiana has experienced a net loss of 4877 km<sup>2</sup> of wetlands. As the area of these wetlands has changed, so too has the spatial configuration of the landscape. The resulting landscape is a mosaic of patches of wetlands and open water. This study examined the spatial and temporal variability of trajectories of landscape configuration and the relation of those patterns to the trajectories of land change in wetlands during a 1985–2010 observation period. Spatial configuration was quantified using multi-temporal satellite imagery and an aggregation index (AI). The results of this analysis indicate that coastal Louisiana experienced a reduction in the AI of coastal wetlands of 1.07 %. In general, forested wetland and fresh marsh types displayed the highest aggregation and stability. The remaining marsh types, (intermediate, brackish, and saline) all experienced disaggregation during the time period, with increasing severity of disaggregation along an increasing salinity gradient. Finally, a correlation ( $r^2=0.5562$ ) was found between AI

**Keywords** Wetland fragmentation · Wetland configuration · Land change · Wetland loss · Coastal Louisiana · Landscape fragmentation

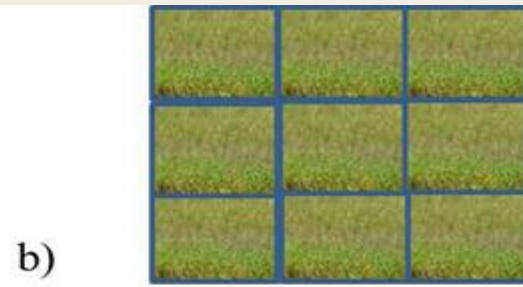
## Introduction

In coastal Louisiana, many areas that were once vast expanses of contiguous marsh are now comprised of a highly fragmented mosaic of patches (Suir et al. 2013). Other areas have now completely converted to open water. Landscape configuration and connectivity affect fundamental ecosystem processes, which determine the trajectories of ecological condition (O'Neill et al. 1997; Kupfer 2012). Habitat quality is not determined solely by the quantity of habitat, but also by its configuration in the landscape (Kelly et al. 2011). Additionally, most conceptual models of wetland loss in Louisiana suggest that fragmented marsh will convert to open

- Study takes into account wetland loss, mosaic of wetlands and open water patches
- Examined the spatial & temporal variability of landscape configuration and the relation of those patterns to the trajectories of wetland loss
- Spatial configuration was quantified using multi-temporal satellite imagery and an Aggregation Index (AI)
- AI uses land/water datasets to compute a percentage based on the ratio of possible vs. observed land for each pixel
- AI has a range of 0-100
- AI can be compiled at various spatial scales

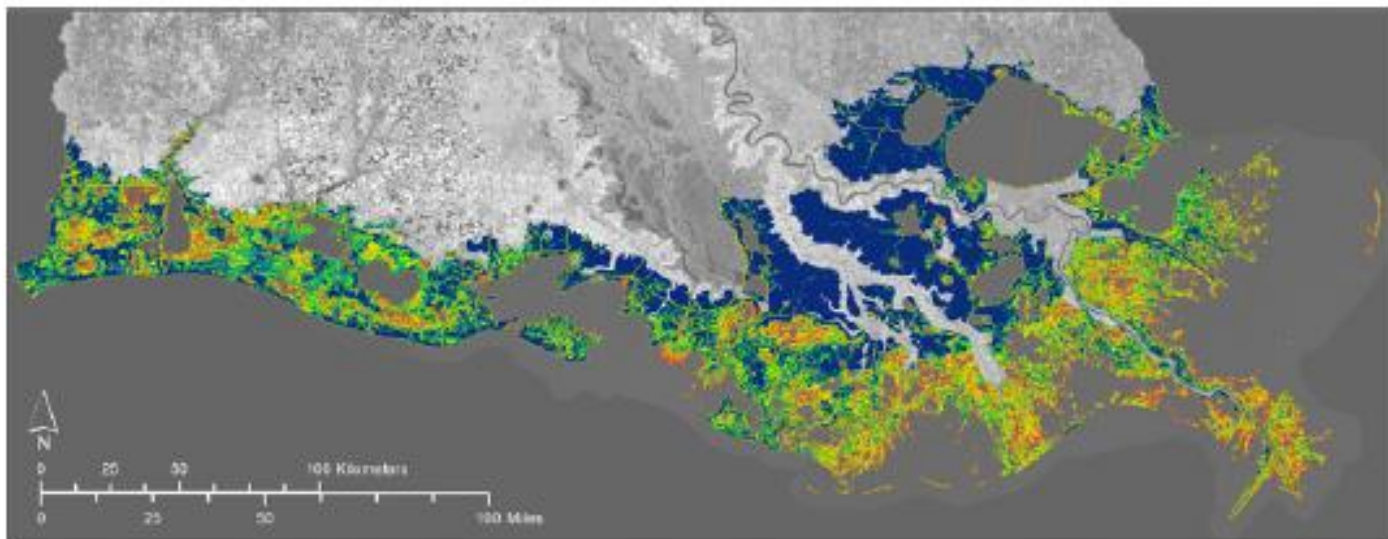


**Fully disaggregated**  
**AI=0**

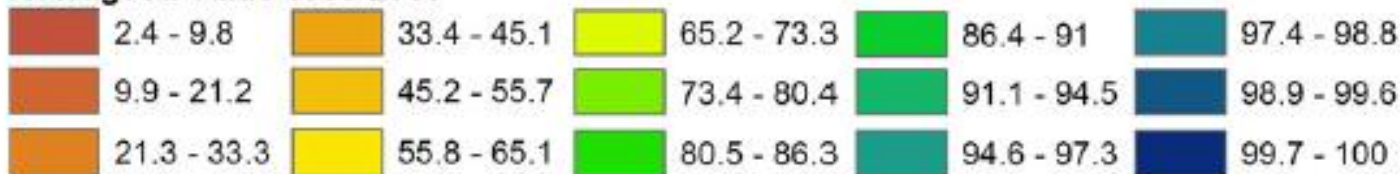


**Fully aggregated**  
**AI=100**

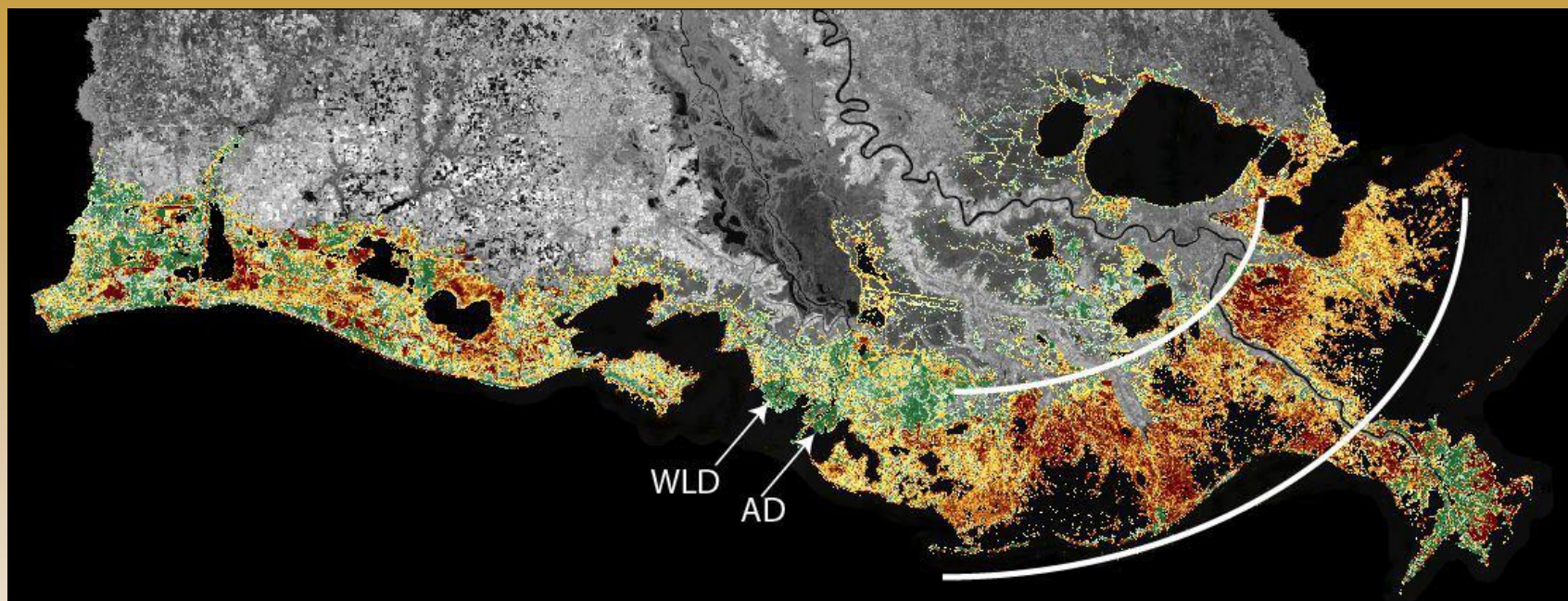
# Average AI from 1985 to 2010



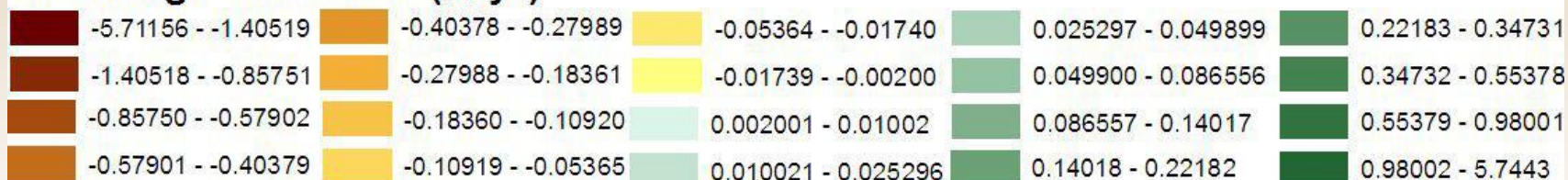
**Average AI Value 1985-2010**



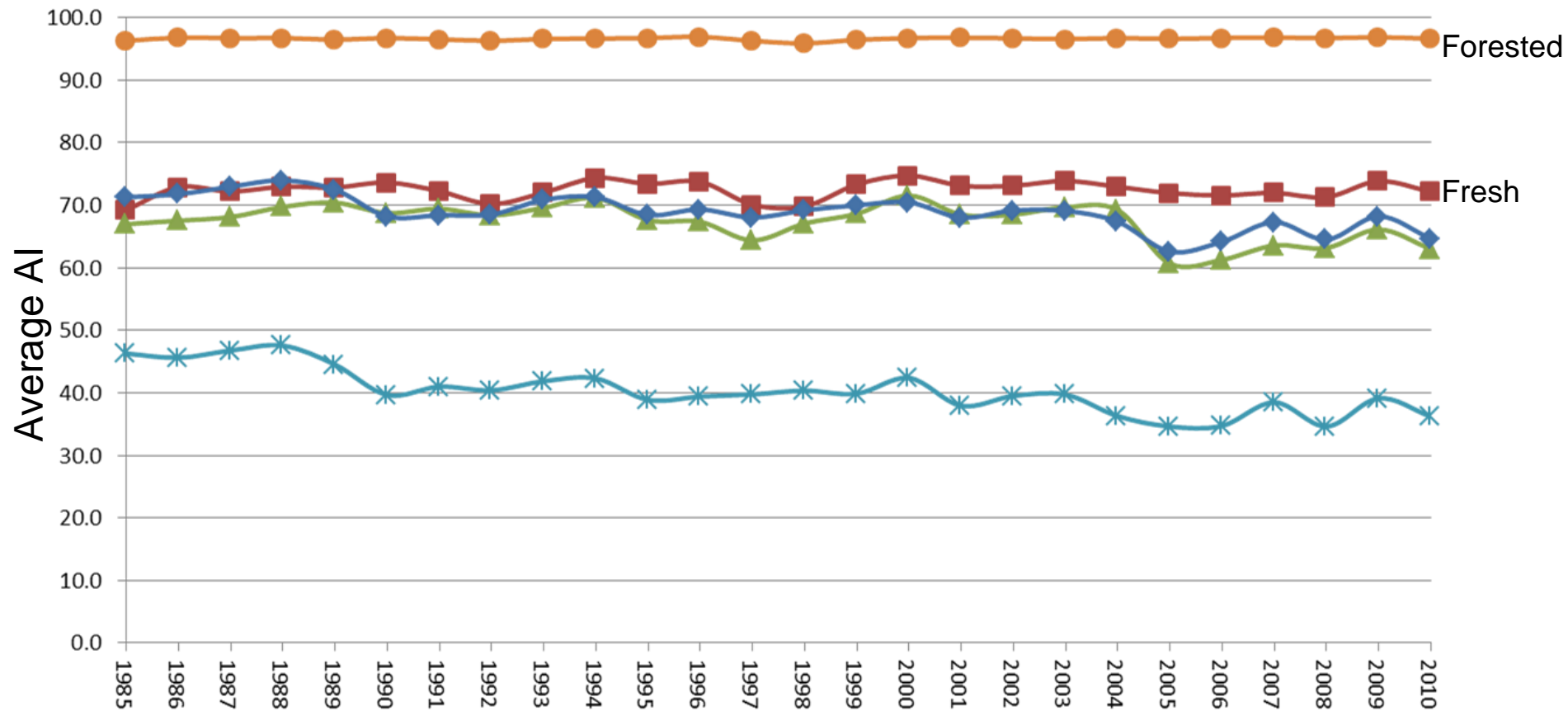
**Lower AI values represent wetlands that are more disaggregated.**



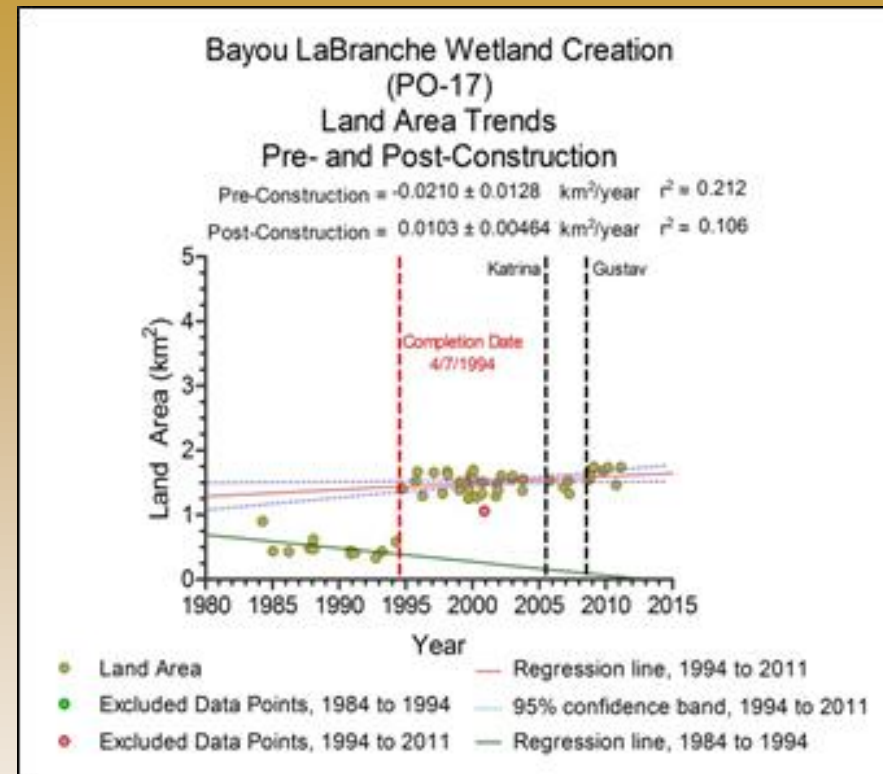
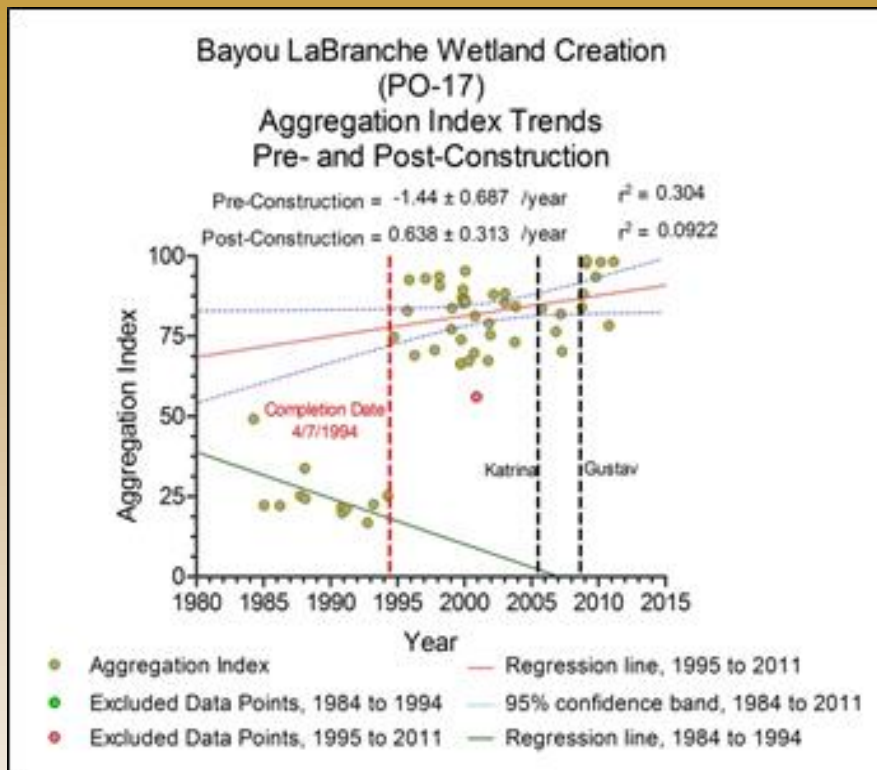
## AI Change 1985-2010 (%/yr)



- Areas of greatest negative AI change are potentially more susceptible to future wetland loss.
- Fragmentation is only one factor influencing wetland loss.

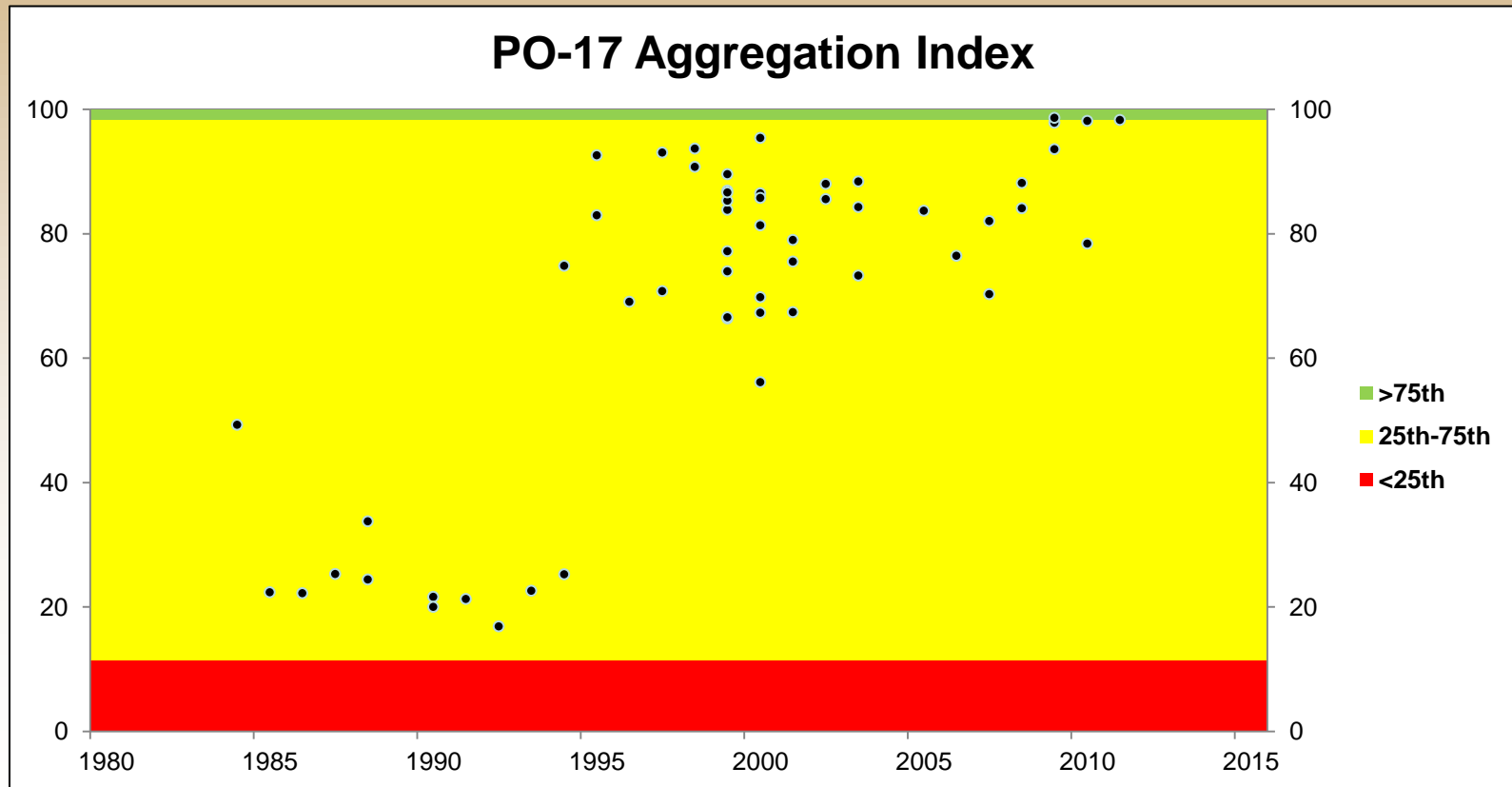


- **Forested wetland and fresh marsh displayed the highest aggregation and stability.**
- **For other marsh types disaggregation increased with increasing salinity gradient.**



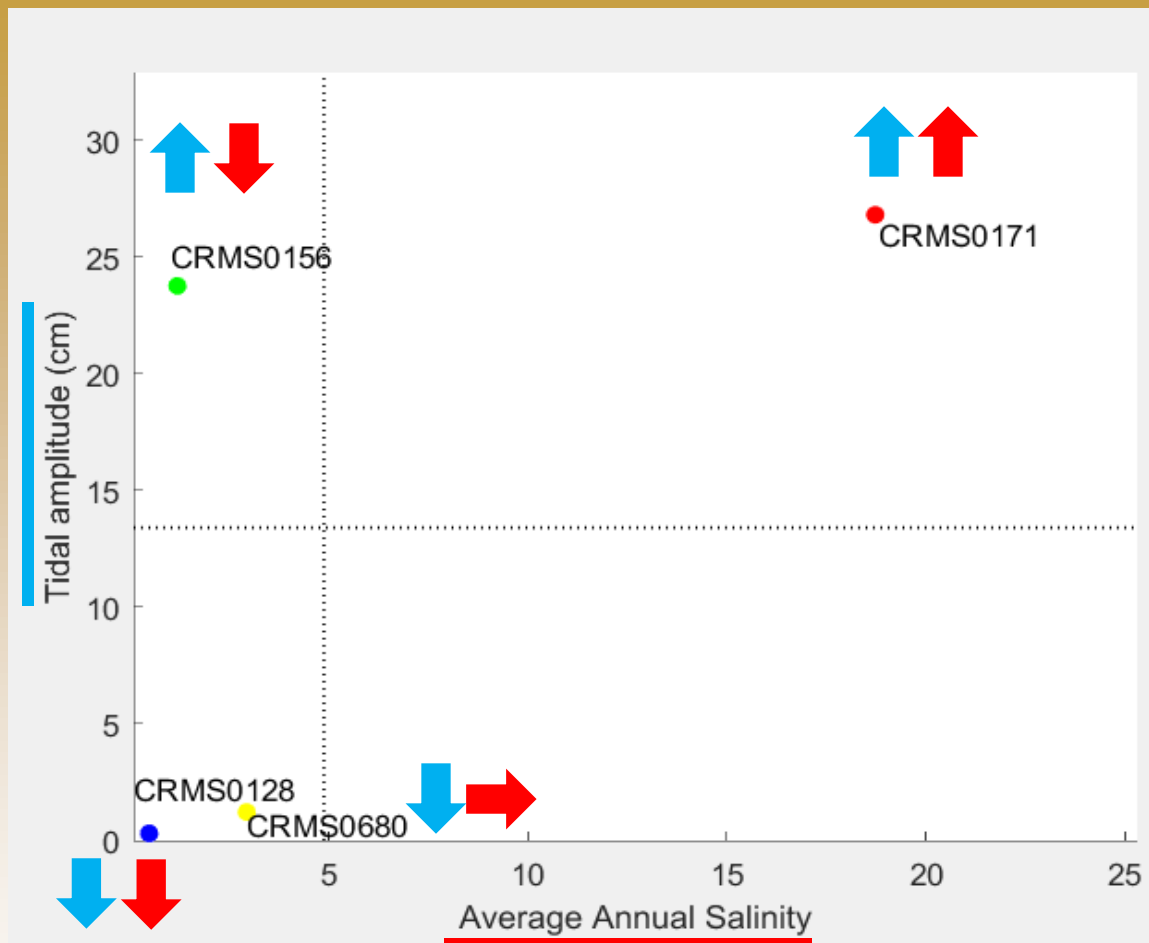
- 4 projects shown in paper.
- Increased aggregation and land area acres following construction.
- Implied the project area is not only maintaining itself but is more stable.
- Fluctuations in AI & land area due to water level.
- Michelle will introduce the AI to the EWG for planning purposes.

- Working to define thresholds for AI.
- Working with web delivery team to implement report card graphics.
- AI calculations will be made for each future cloud-free Landsat imagery.

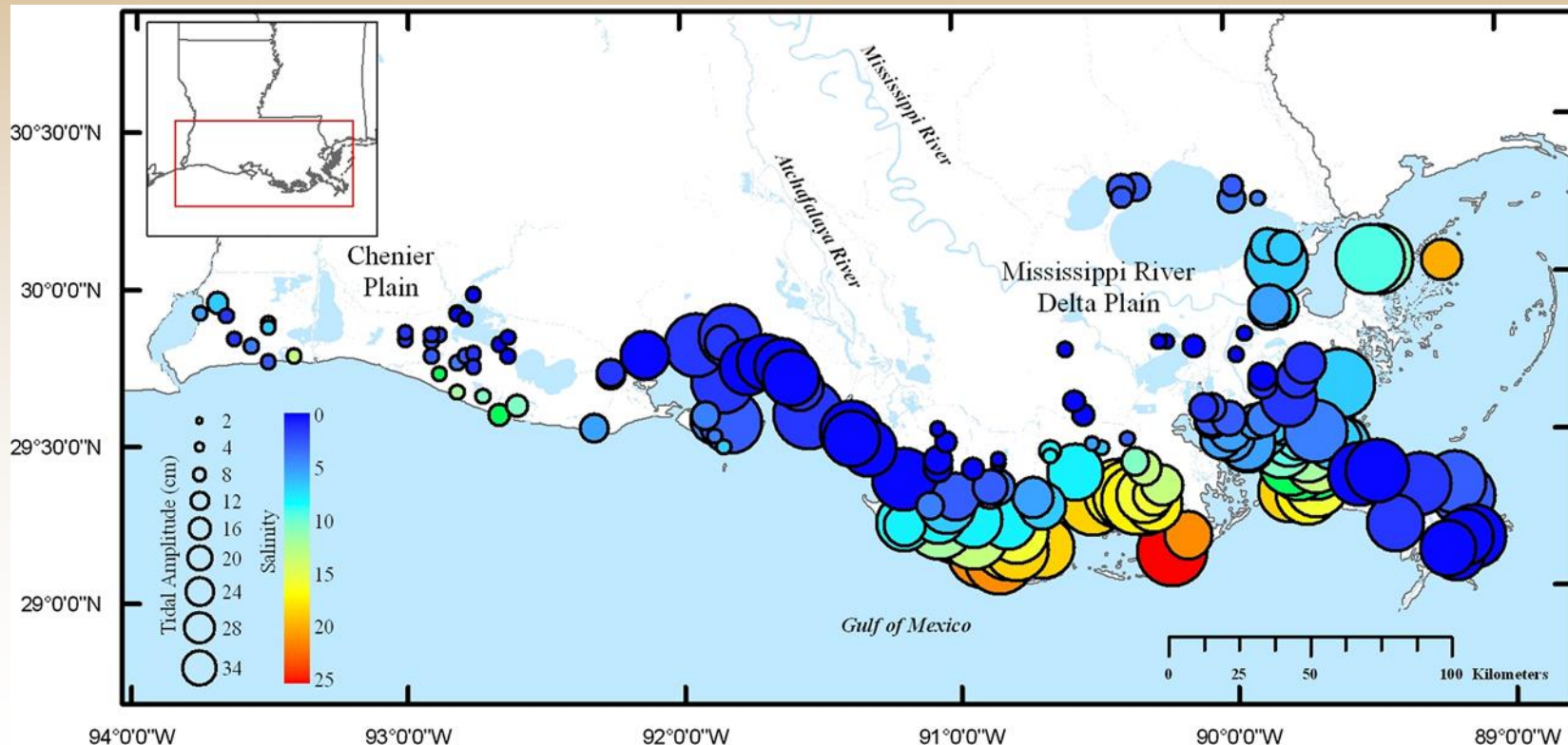
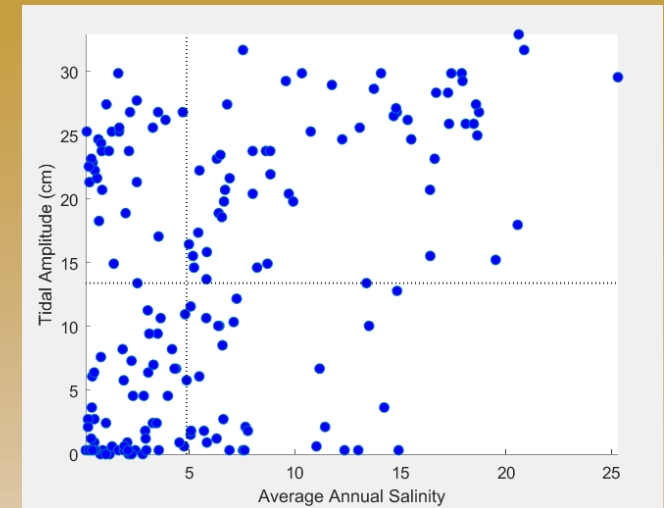


## Tidal amplitude and salinity

- 1) generally located at the coastal ends of the delta plain
- 2) generally at active delta sites- big tide range due to proximity to GOM, but low salinity because of river plumes
- 3) low tidal amplitude b/c distance from the coast (friction removes the tide) & low salinity because of upland drainage or river diversions
- 4) low tidal amplitude b/c of water management, higher salinity b/c of proximity to coastal salt input



- Tidal amplitude about a foot at “coastal sites” in the east, much less in Chenier Plain.
- Influence of AT and MS rivers visible in the salinities nearby.



Manuscript submitted to Ecological Applications



## Goals:

- What are the predictors of veg station loss?
  - Conversion to open water
- Do these predictors change with spatial scale?
- Do losses of veg stations reflect broader patterns of land loss?

Used data from 2008-2014 from 273 sites to develop a predictive model that outputs the probability of transition from vegetated marsh to open water at the station and site scales.



60 observed loss events at the **station** scale:

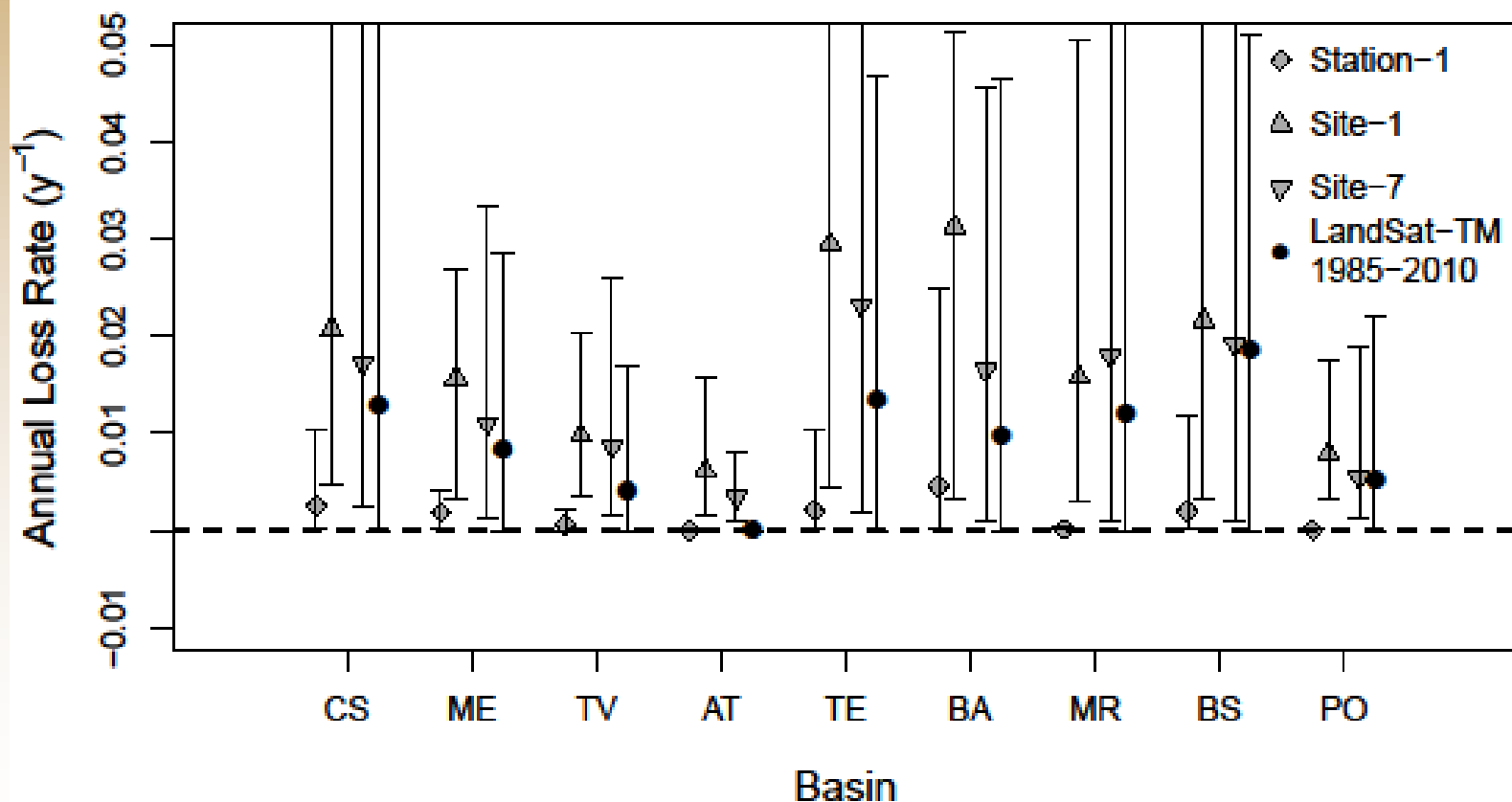
- Sparse vegetation cover
- Low values of % land
  - Probably indicates effects of increased exposure to wave power and other erosive forces.
- Low accretion at low elevations
  - Accretion is associated with stability in low elevation marshes.

25 observed loss events at the **site** scale:

- Sparse vegetation cover \*
- Low values of % land \*
  - Probably indicates effect of increased exposure to wave power and other erosive forces.
- Variation in cover across stations

\* Also an important predictor at the station level

- Do losses of vegetation stations reflect broader patterns?
- Comparison of model results with Landsat TM data





# What predicts loss of vegetation stations?

## Goals and Implications

- What are the predictors of loss?
  - station model: low veg cover, accretion, low % land
  - site model: low veg cover, low % land, variation in cover
- Do these predictors change with spatial scale? **Yes**
- Do losses of veg stations reflect broader patterns of land loss? **Yes**

Hope to use this model as a planning tool to estimate potential impacts of future restoration.

Ex: How much do we have to change flood frequency to reduce probability of land loss by 10%?

# Upcoming Analyses

- Questions:
  - How do different plant communities support ecosystem services such as accretion, elevation change or productivity (cover)?
  - Do the communities that best support ecosystem services vary across salinity gradients?
- Approach:
  - Using causal network models to allow quantitative partitioning of the effects of biomass, species diversity, traits, and identity on ecosystem services





Questions, data requests, ideas,  
specialized website training....

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225.578.7044

