CRMS Website Roadshow

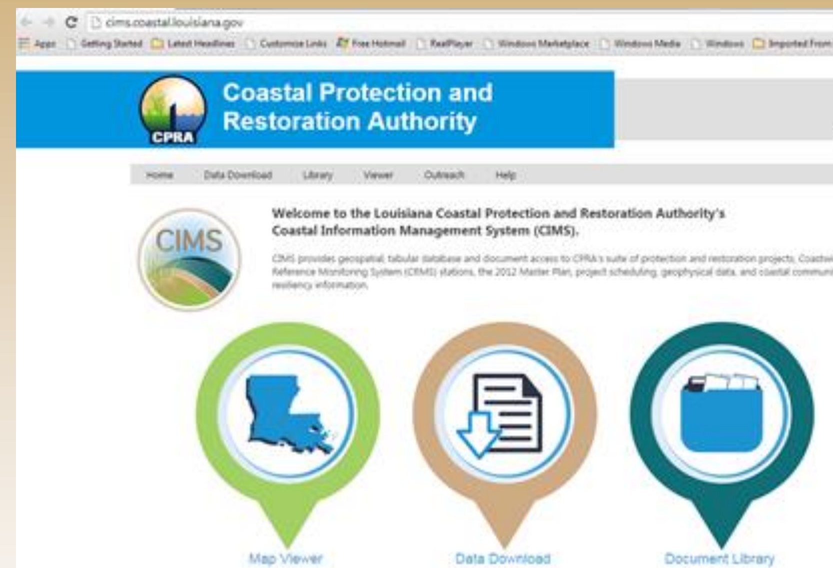
Summer 2016
NMFS-6/17/16, USFWS & NRCS-6/28/16, USACE-6/29/16, EPA-7/27/16

Reminder

CRMS

lacoast.gov/crms

CIMS



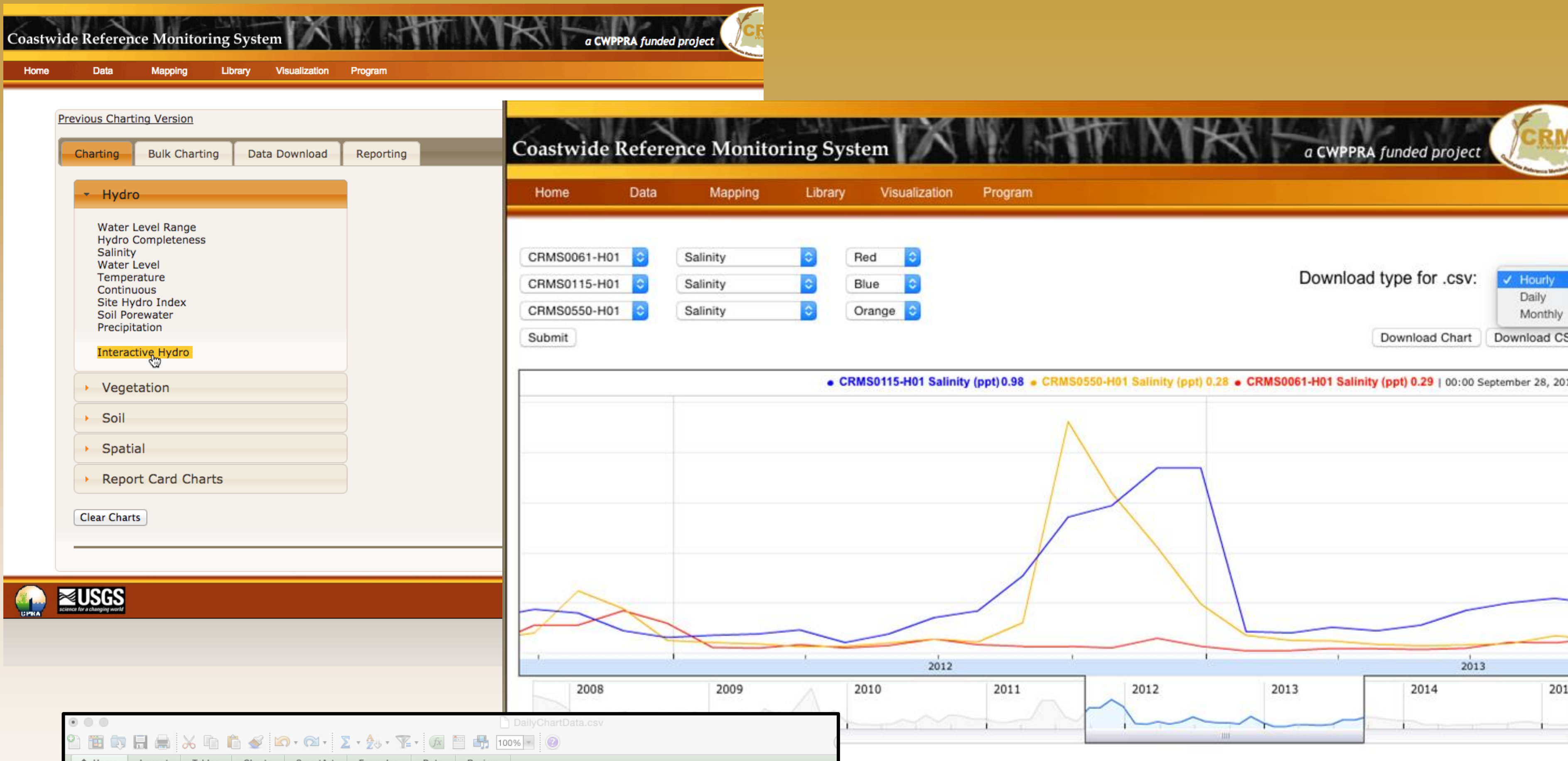
cims.coastal.louisiana.gov

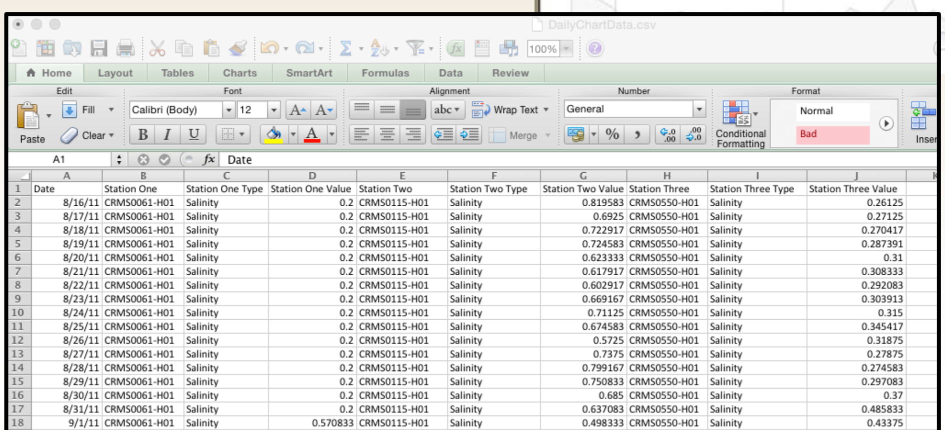
Reminder

Interactive charting

Reminder

Data download feature within interactive charting

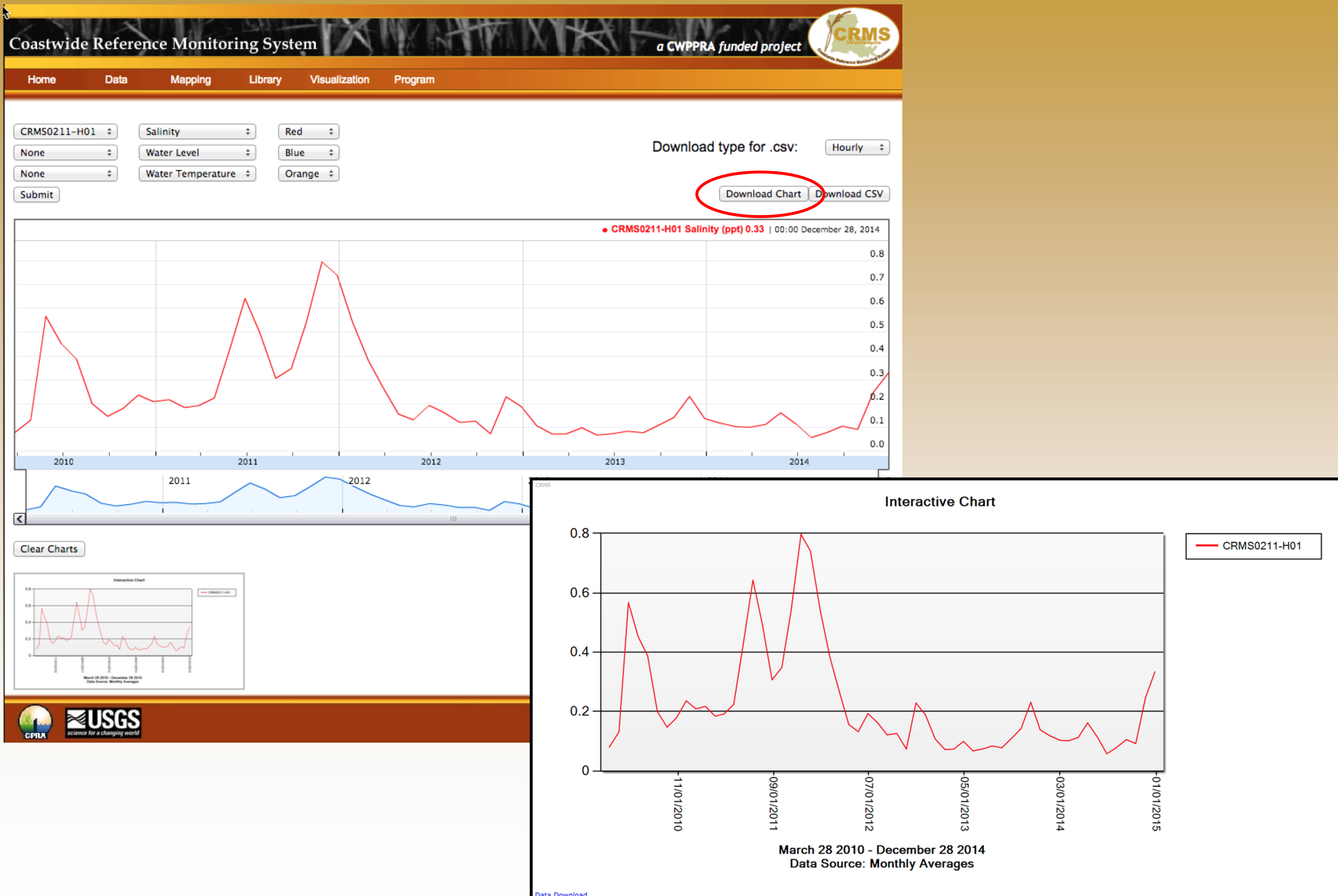




Date	Station One	Station One Type	Station One Value	Station Two	Station Two Type	Station Two Value	Station Three	Station Three Type	Station Three Value
8/16/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	0.819583	CRMS0550-H01	Salinity	0.26125
8/17/11	CRMS0061-H01	Salinity	0.2	CRMS0115-H01	Salinity	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.



Released on the Website

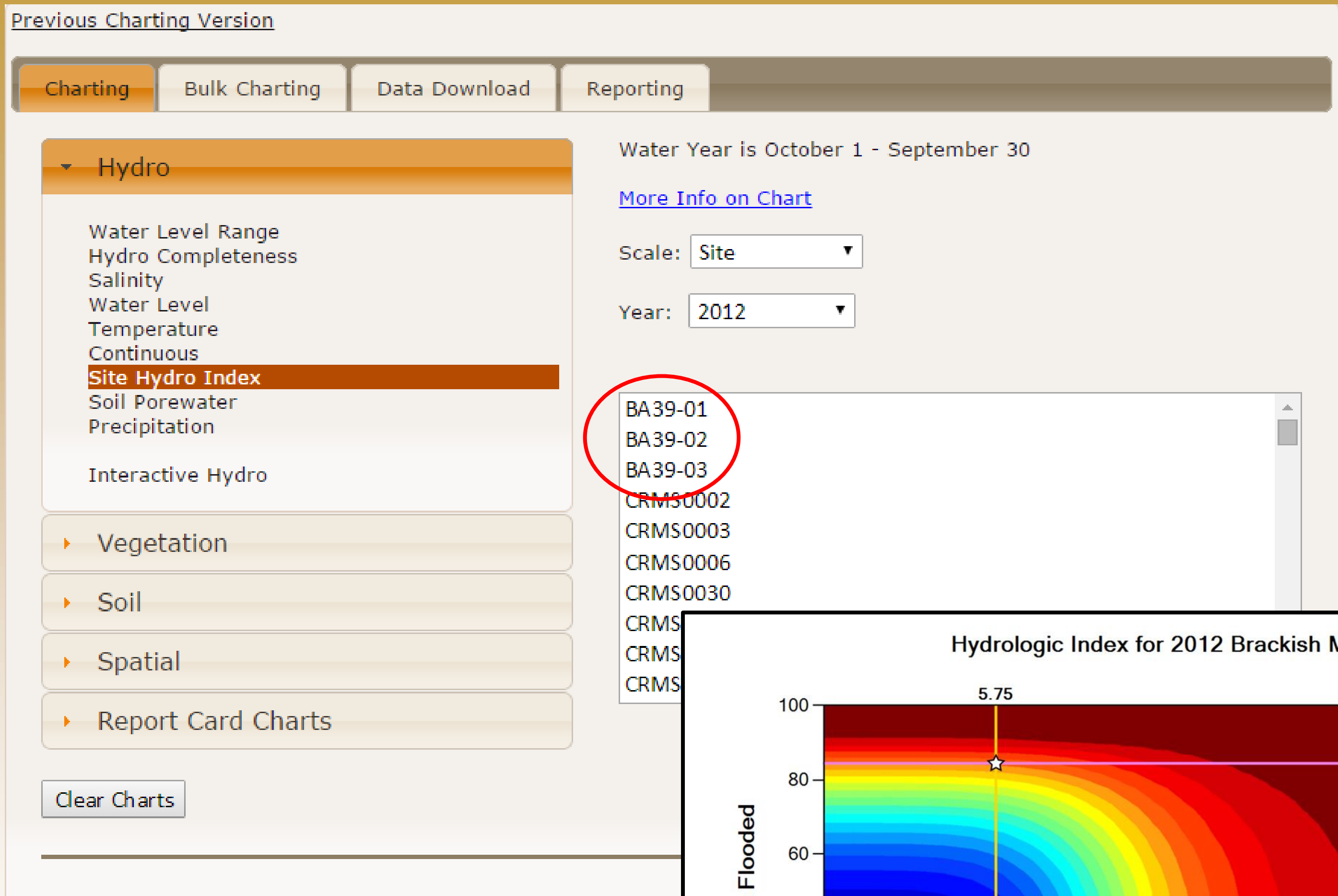
Updated CRMS Publications List

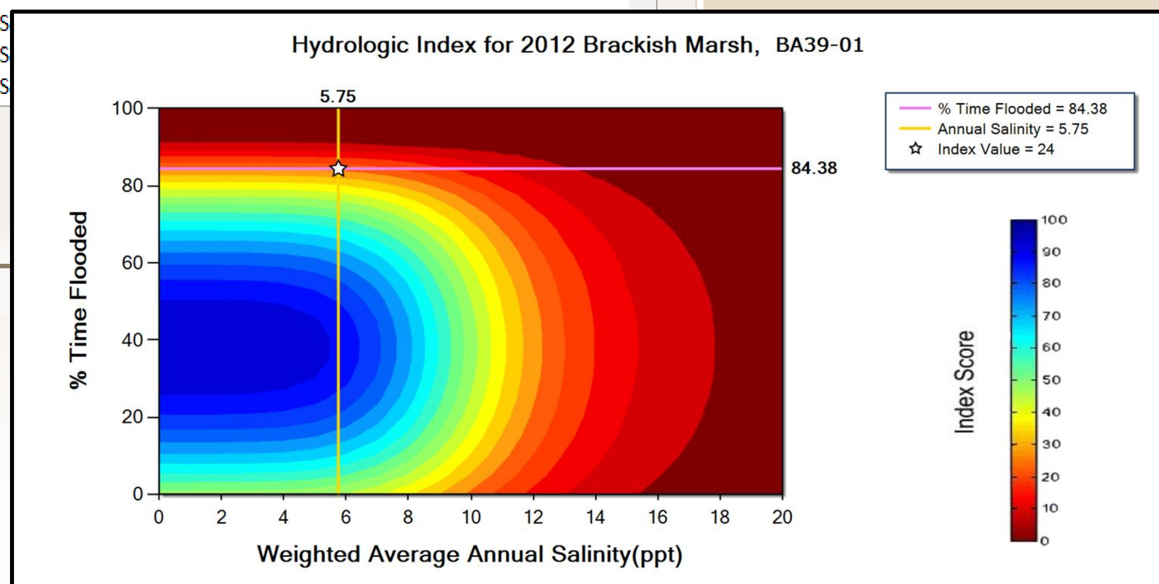
75+ pubs mention CRMS or use CRMS data

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

Released on the Website

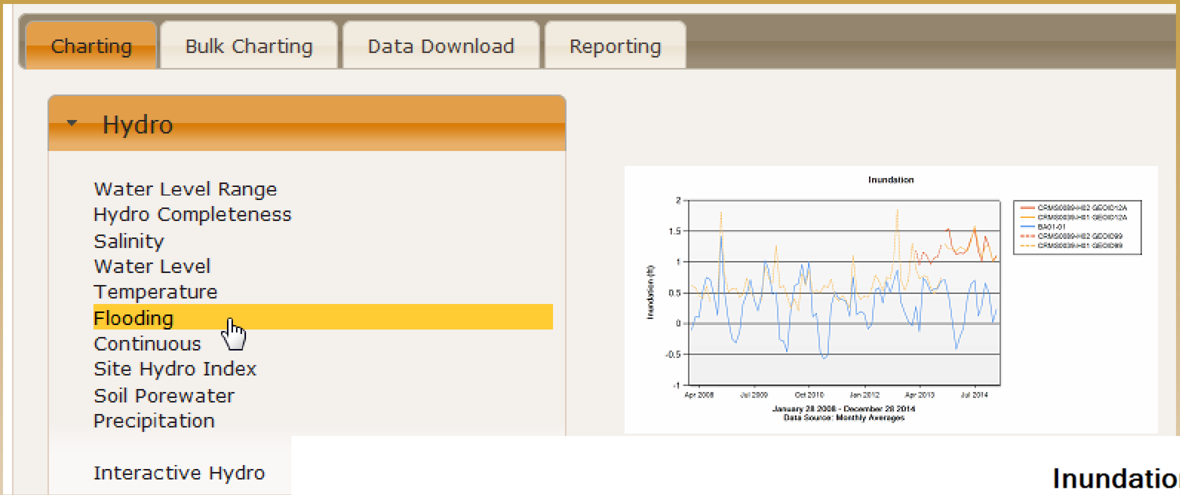
Create charts for sites that are “CRMS like” but have different naming convention

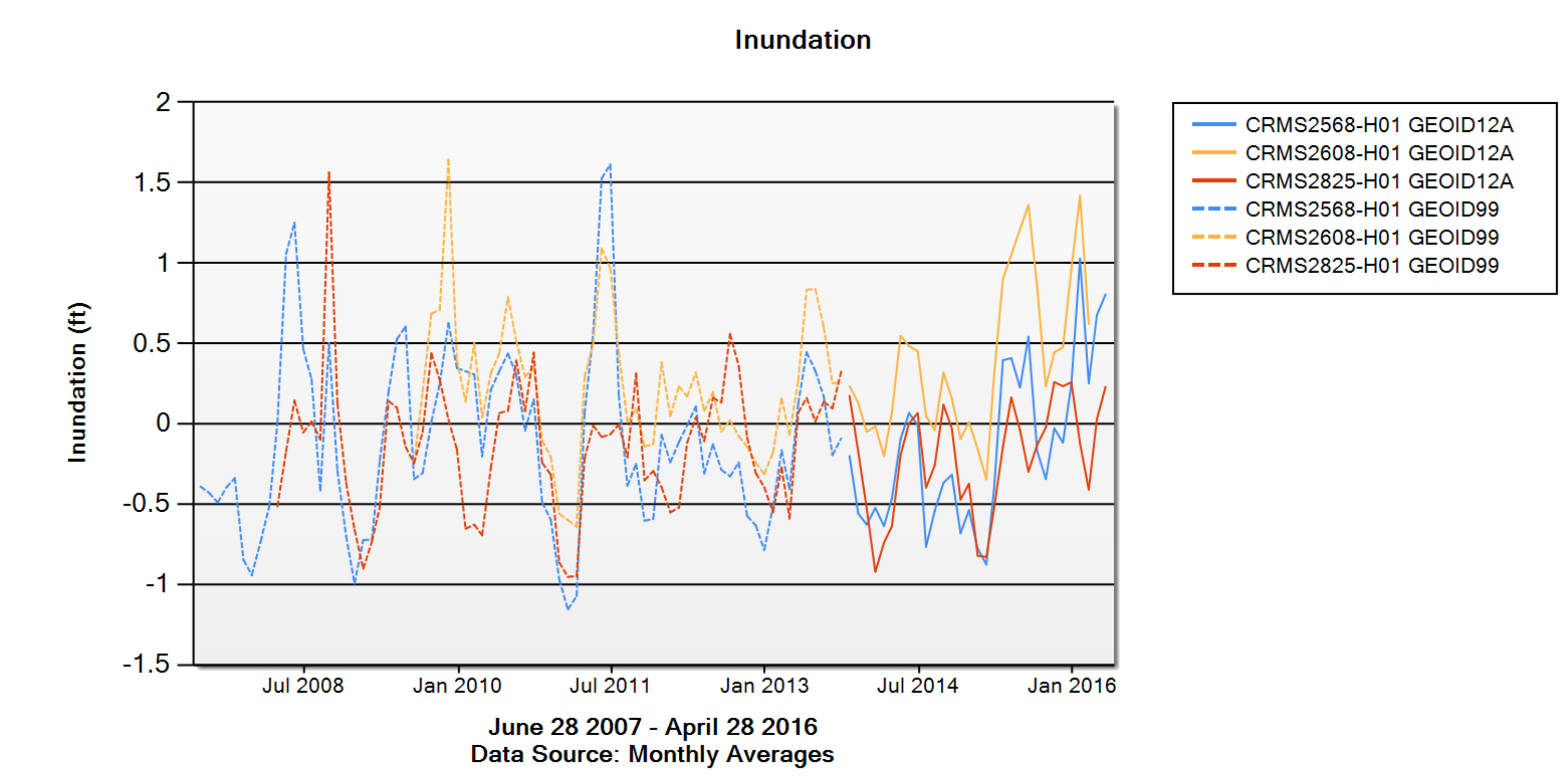




Released on the Website

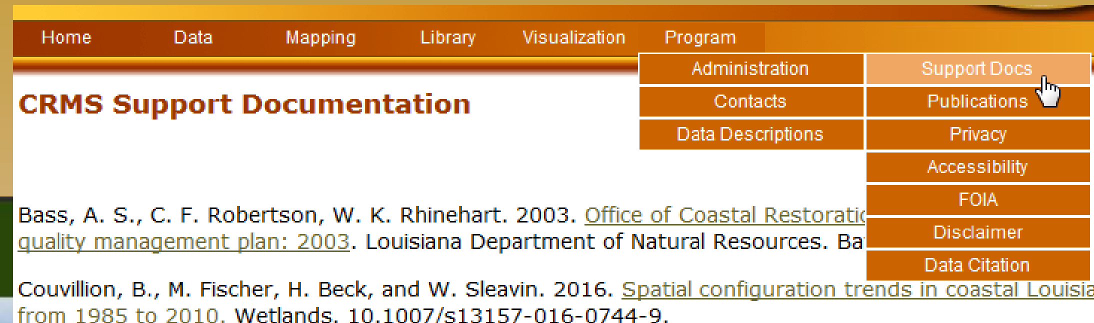
Inundation (Flooding) in charting

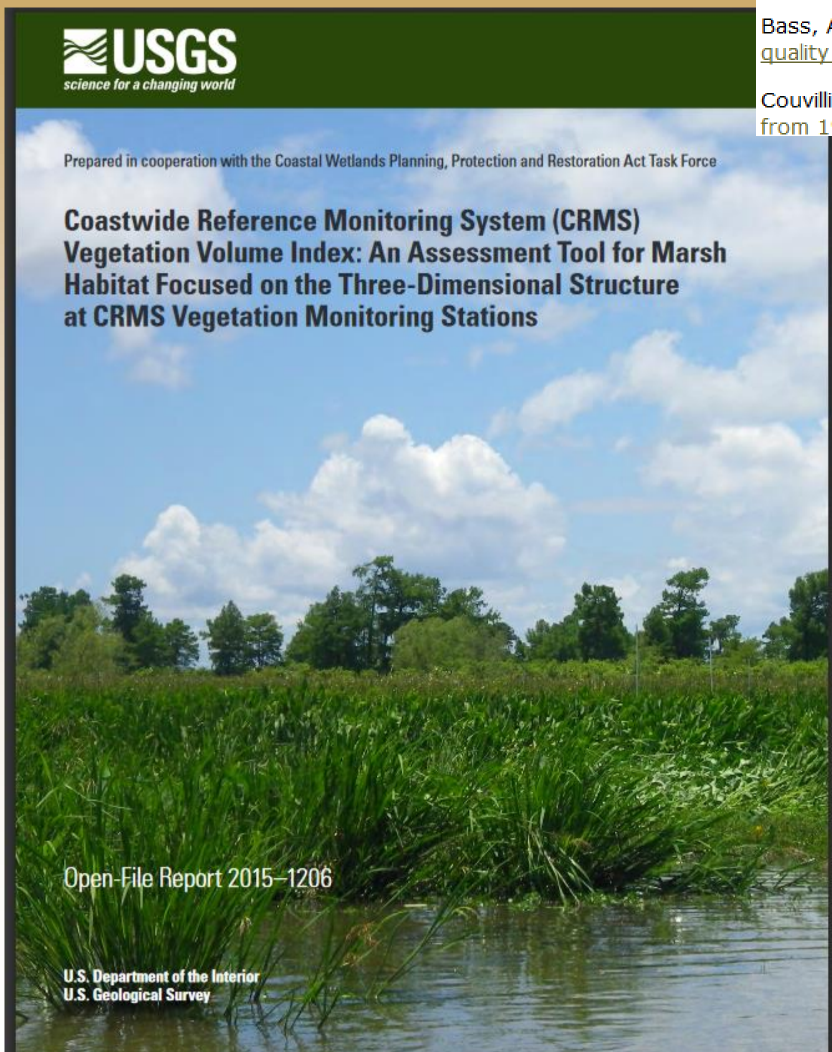




Released on the Website

VVI OFR released in Program/Admin/Support Docs

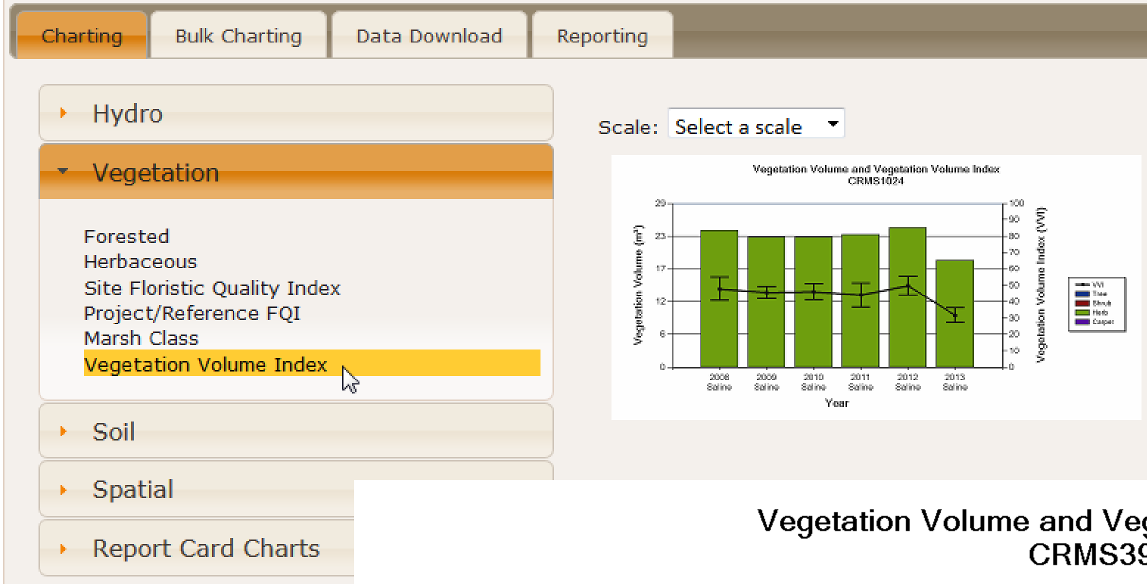


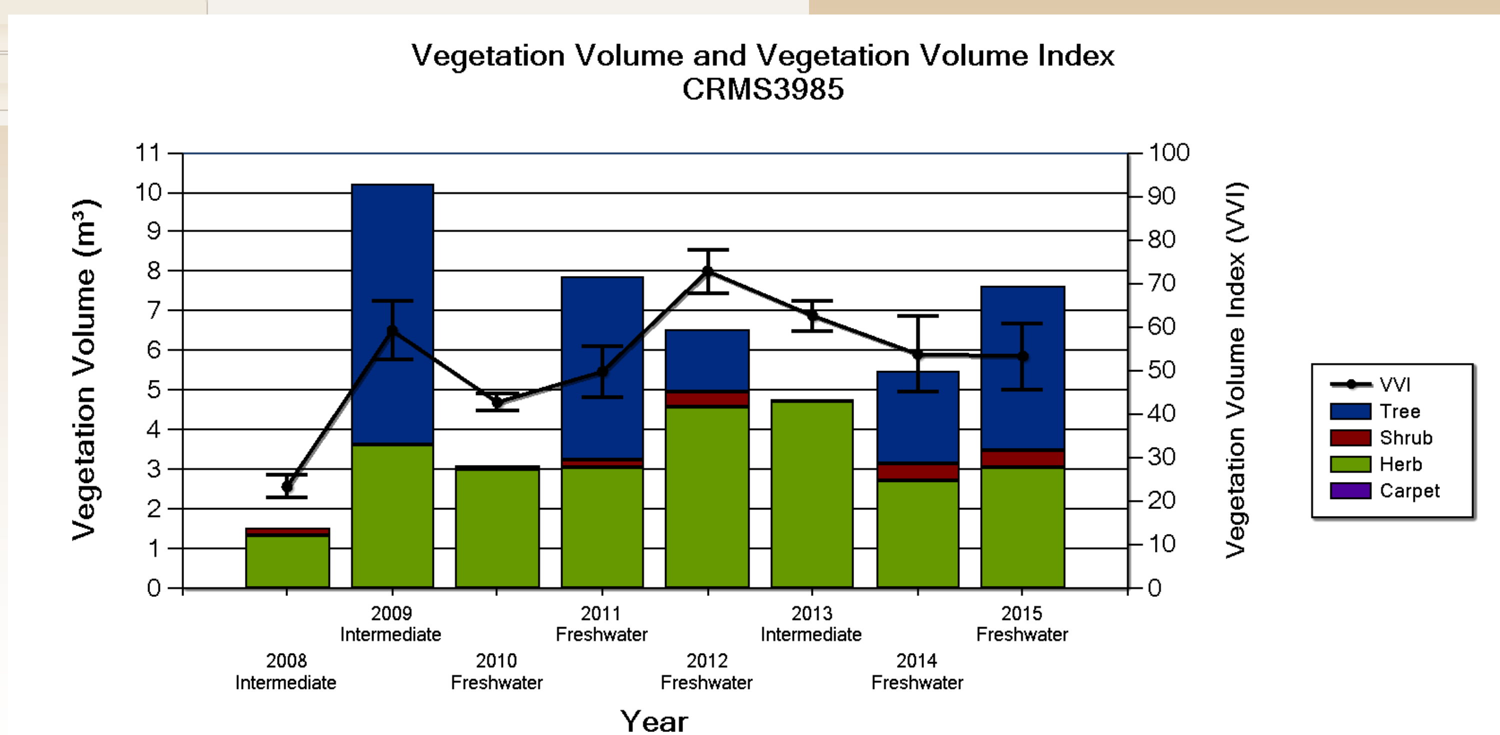


- Quantifies the volume of vegetation at a site (m^3) by incorporating cover AND height for each vegetation layer.
- Proxy for vegetation production, quantifying 3d structure.
- The VV values are indexed into VVI scores by marsh type.
- Developed to be paired with the FQI.

Released on the Website

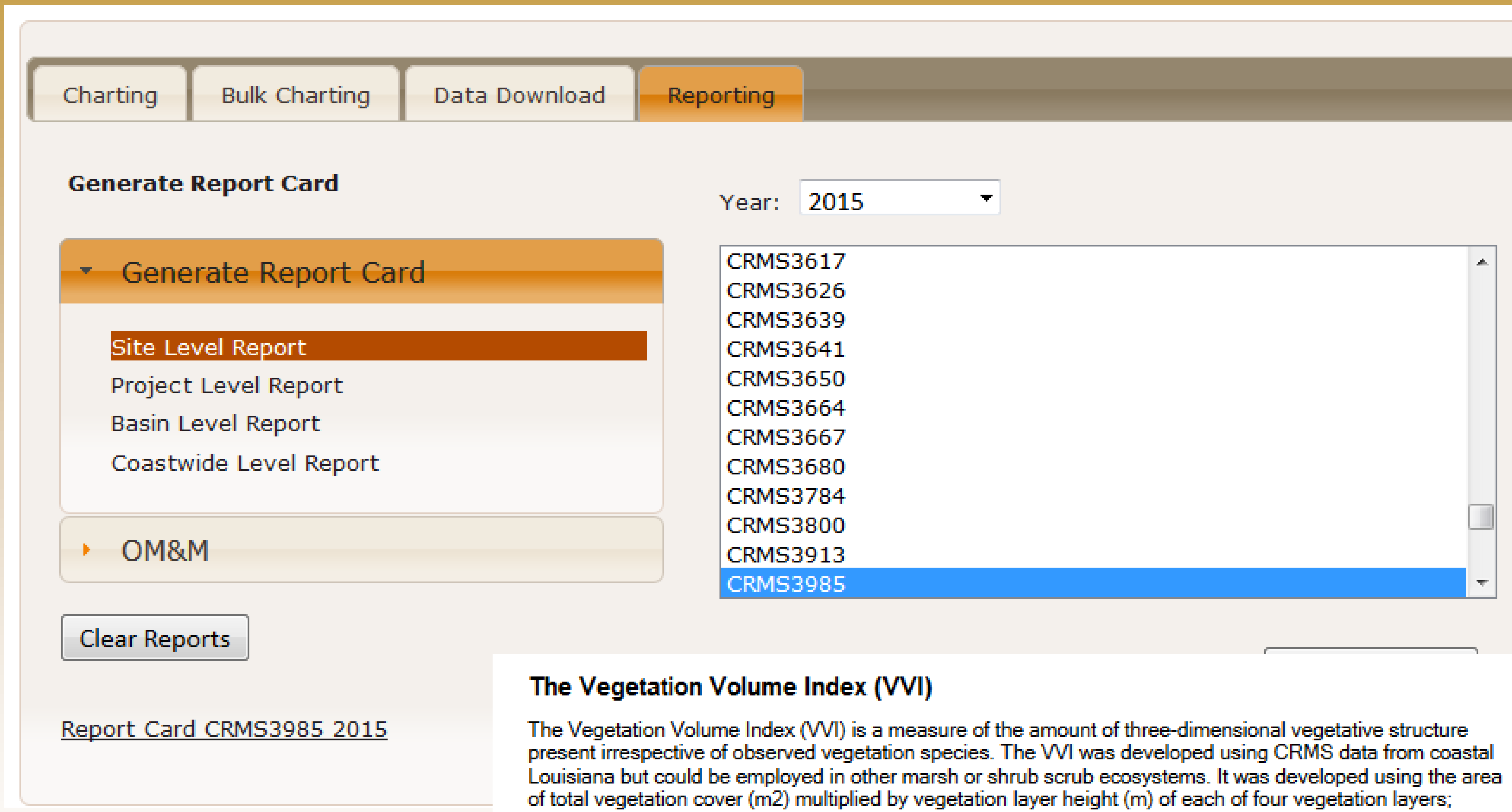
VVI in charting





Released on the Website

VVI in Report Card



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 (m2) 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.

Released on the Website

VVI implemented in report card

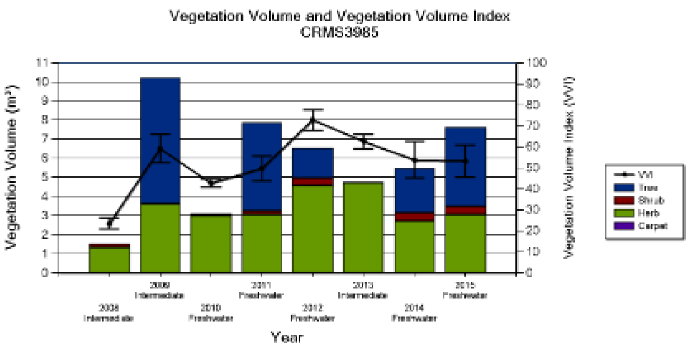


Figure 13. Vegetation Volume Index for CRMS3985.

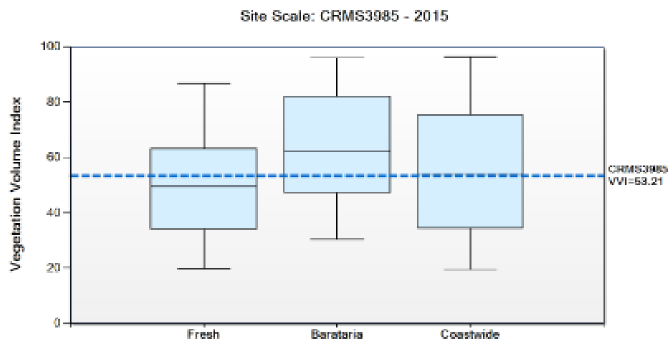


Figure 14. A CRMS site VVI score for a given year compared to the distribution of scores for all vegetation sites within the same marsh type, within the same hydrologic basin, and across the entire LA coastal zone.

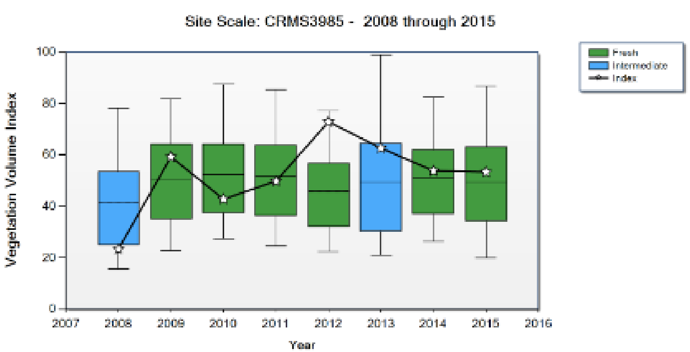


Figure 15. A time series of VVI scores for a CRMS site relative to the box plot of the scores for all the sites within the same marsh type each year.

Coastwide Scale Assessment: Vegetation Volume Index (VVI)

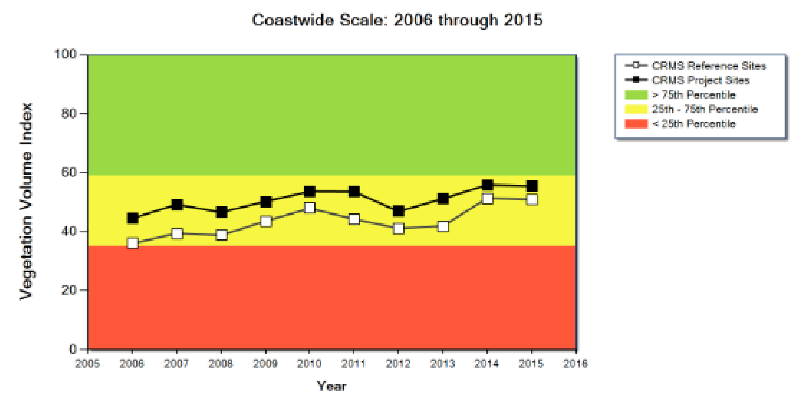
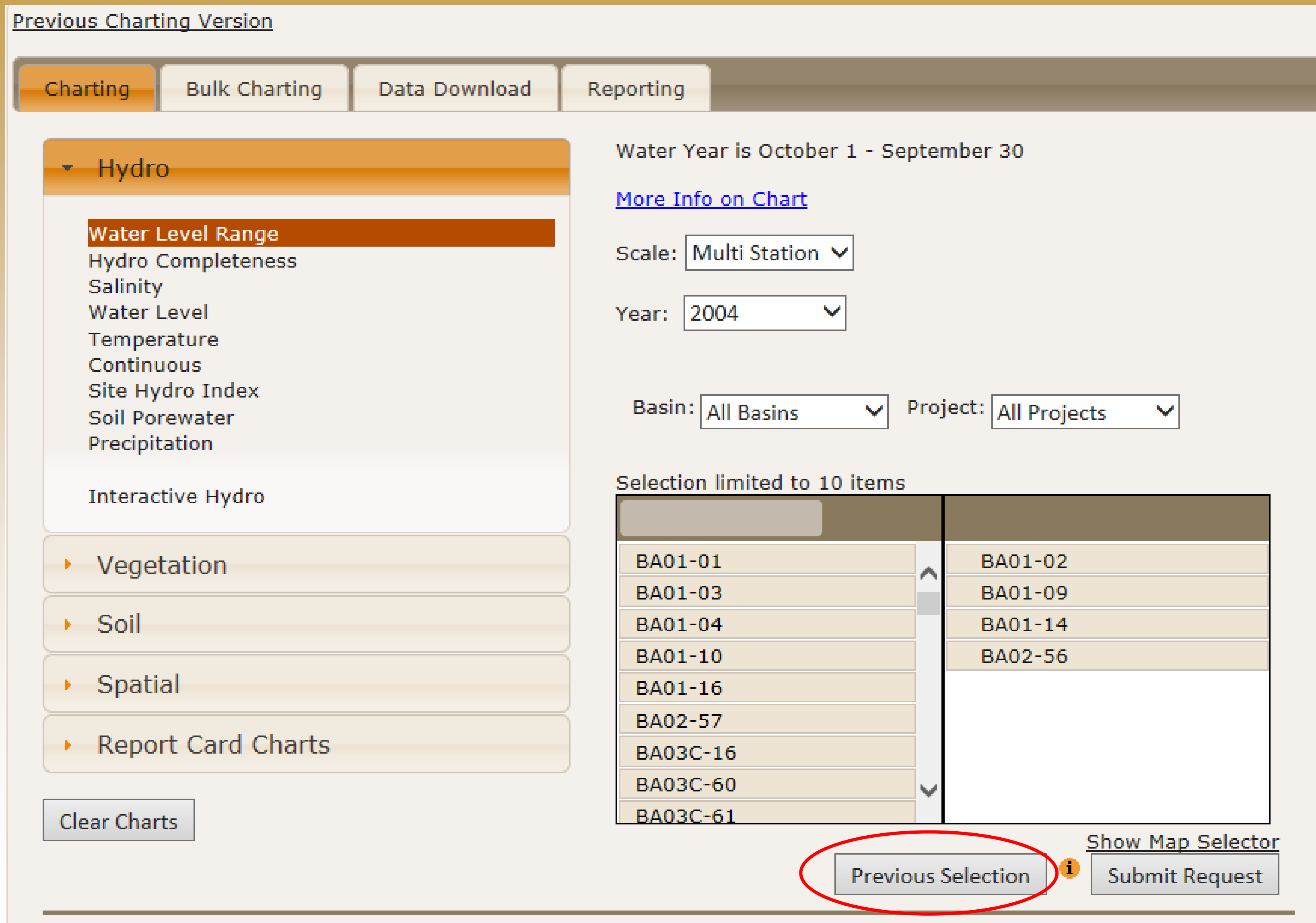


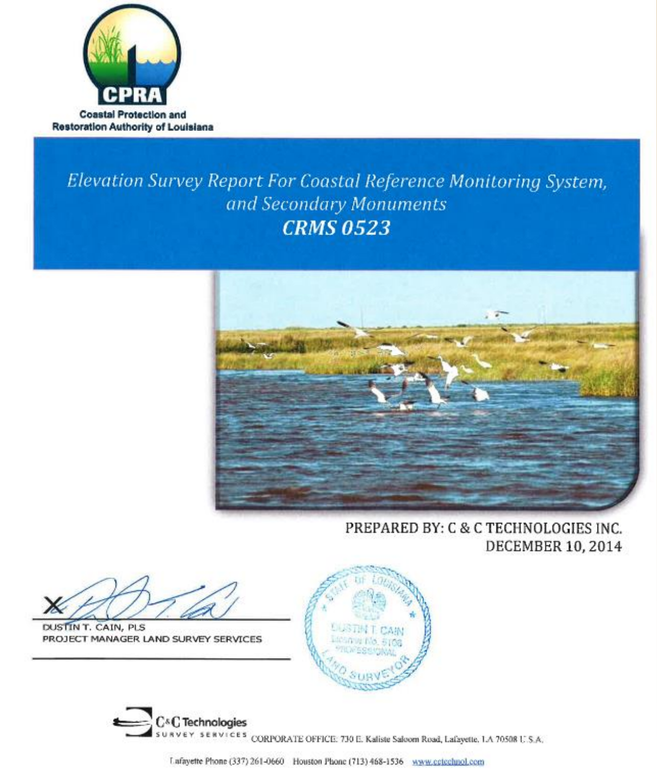
Figure 26. VVI scores across the coast are shown over time. The mean (± SE) VVI scores are calculated for all project and reference sites by year.
CRMS Project Sites - 2006 N = 1329; 2007 N = 2131; 2008 N = 2281; 2009 N = 2324; 2010 N = 2209; 2011 N = 2330; 2012 N = 2335; 2013 N = 2329; 2014 N = 2330;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

Released on the Website

Save a previous selection list for chart creation



- 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


CPRA
Coastal Protection and Restoration Authority of Louisiana

Elevation Survey Report For Coastal Reference Monitoring System, and Secondary Monuments
CRMS 0523

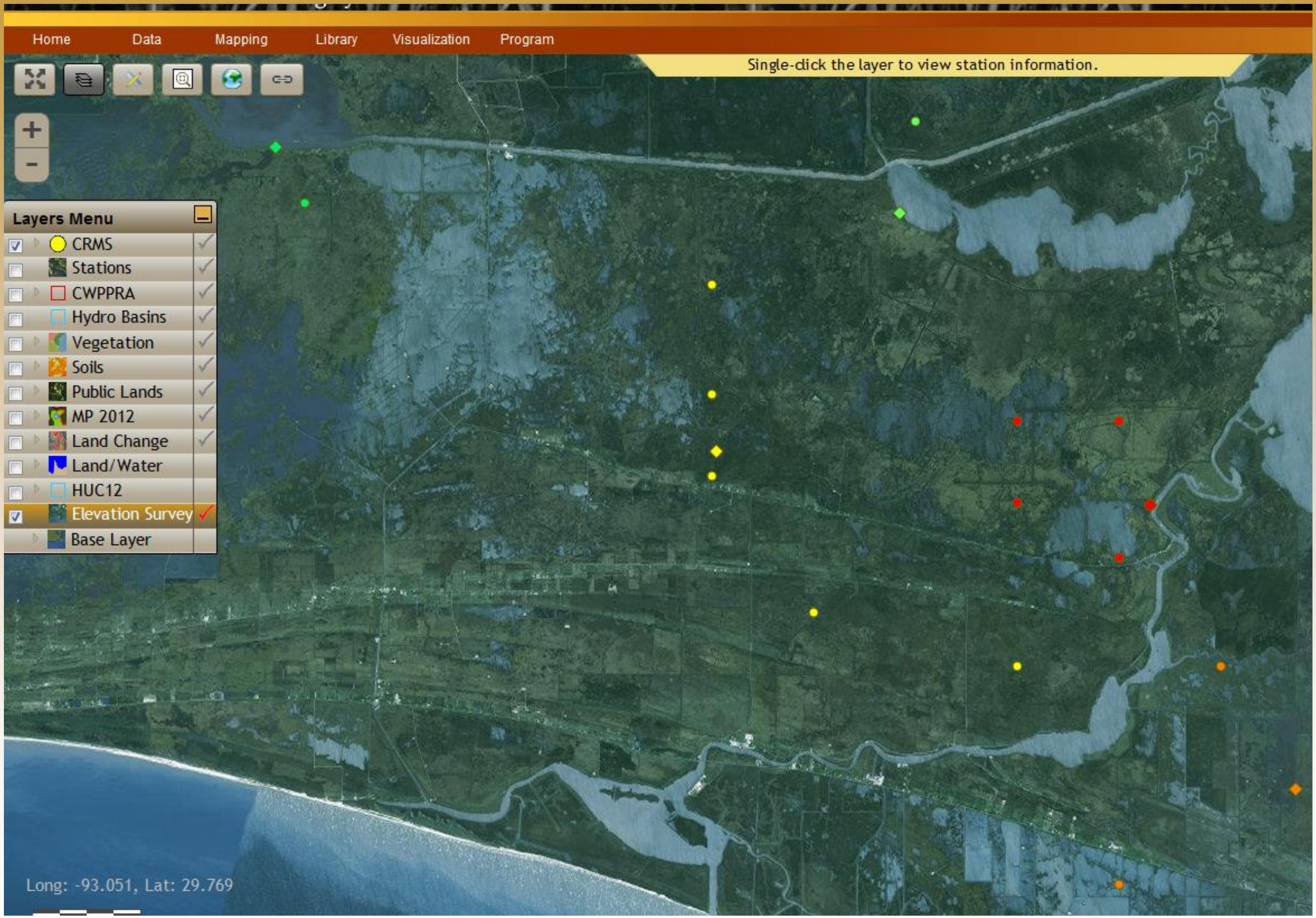
PREPARED BY: C & C TECHNOLOGIES INC.
DECEMBER 10, 2014

DUSTIN T. CAIN, PLS
PROJECT MANAGER LAND SURVEY SERVICES

C&C Technologies SURVEY SERVICES CORPORATE OFFICE: 730 E. Kaliste Saloom Road, Lafayette, LA 70508 U.S.A.
Lafayette Phone (337) 261-0660 Houston Phone (713) 468-1536 www.cctechnol.com

Released on the Website

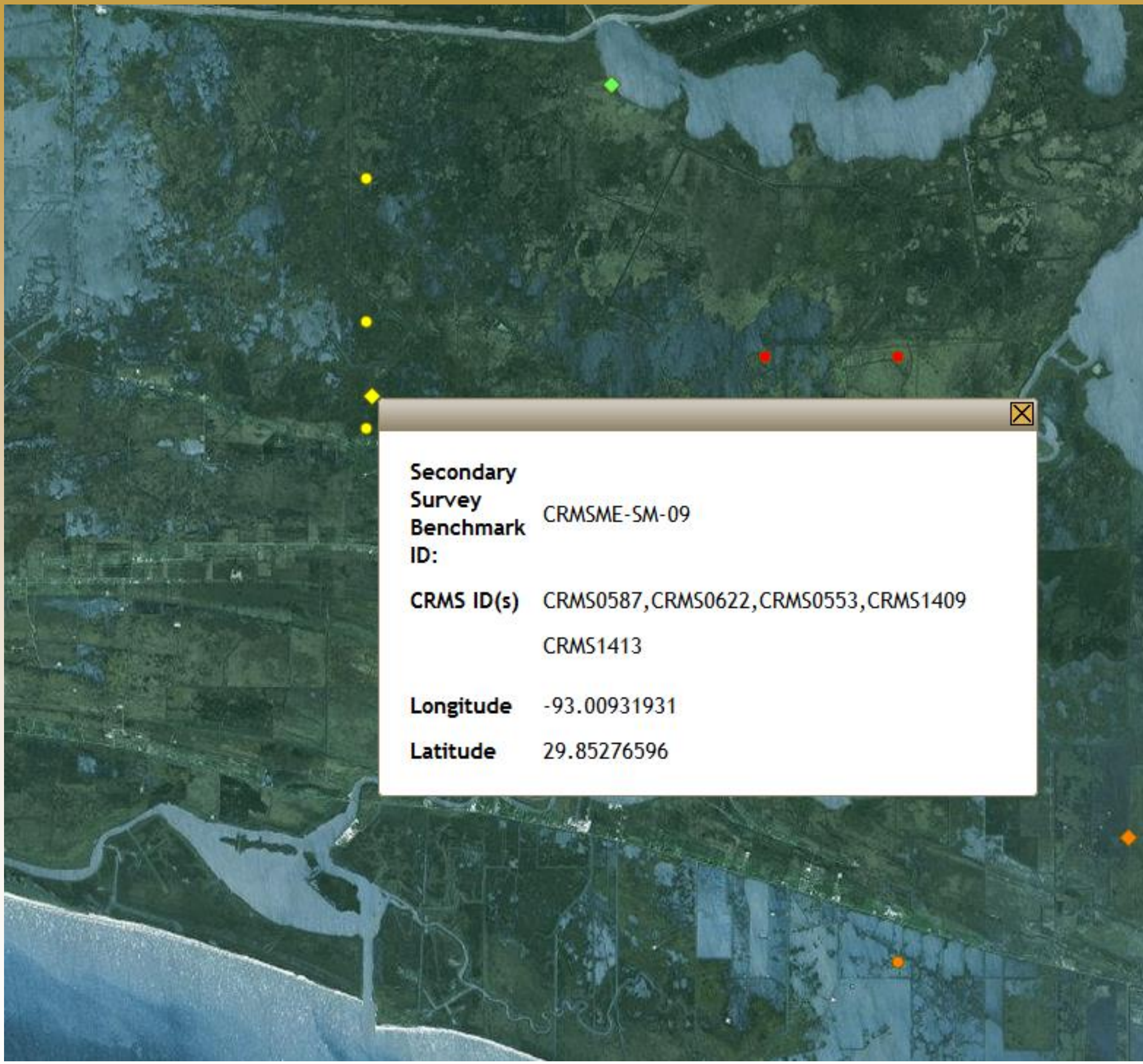
Display elevation survey benchmark network and associated CRMS sites



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

Released on the Website

Display elevation survey benchmark network and associated CRMS sites

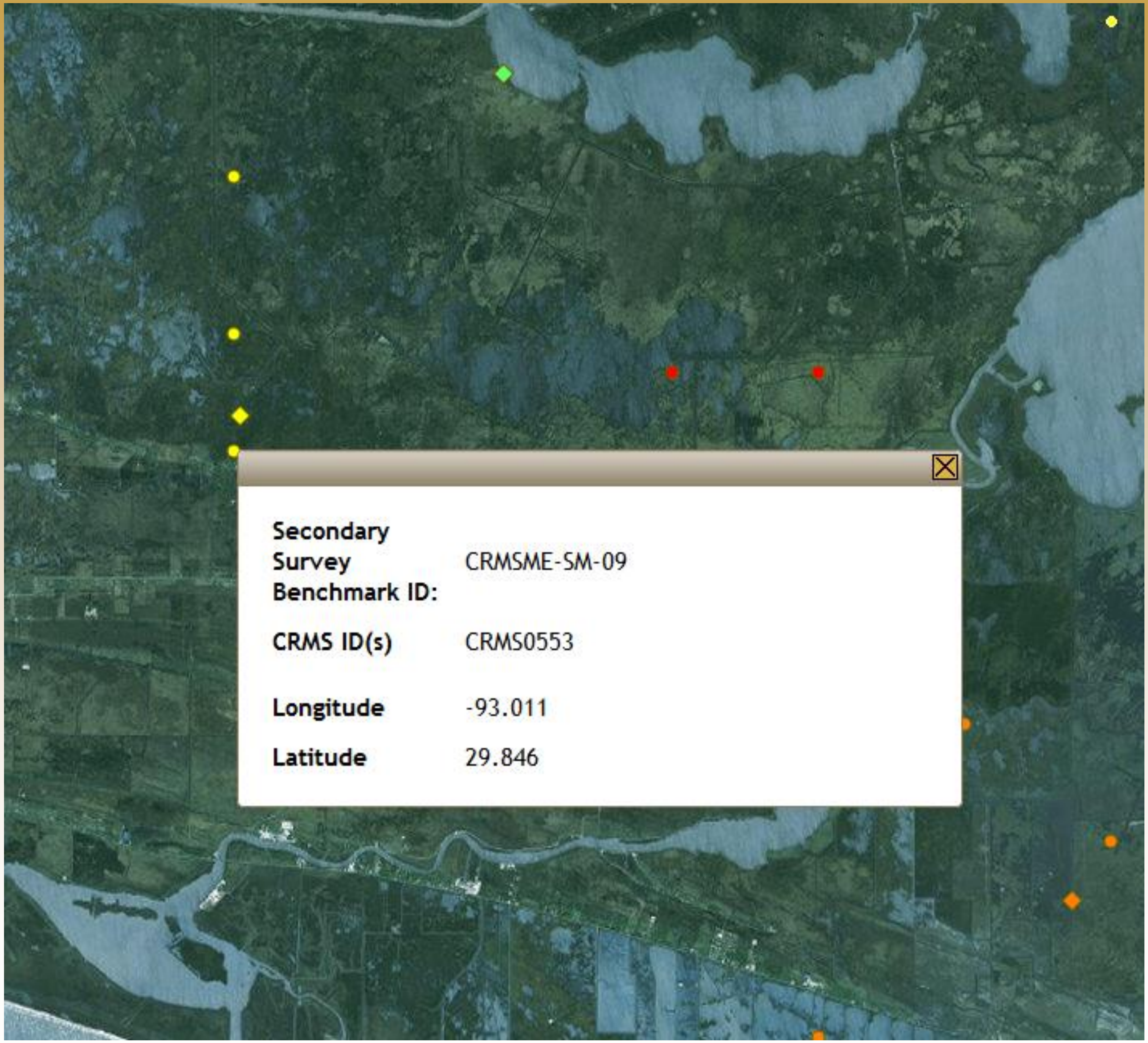


Benchmarks

CRMS Sites

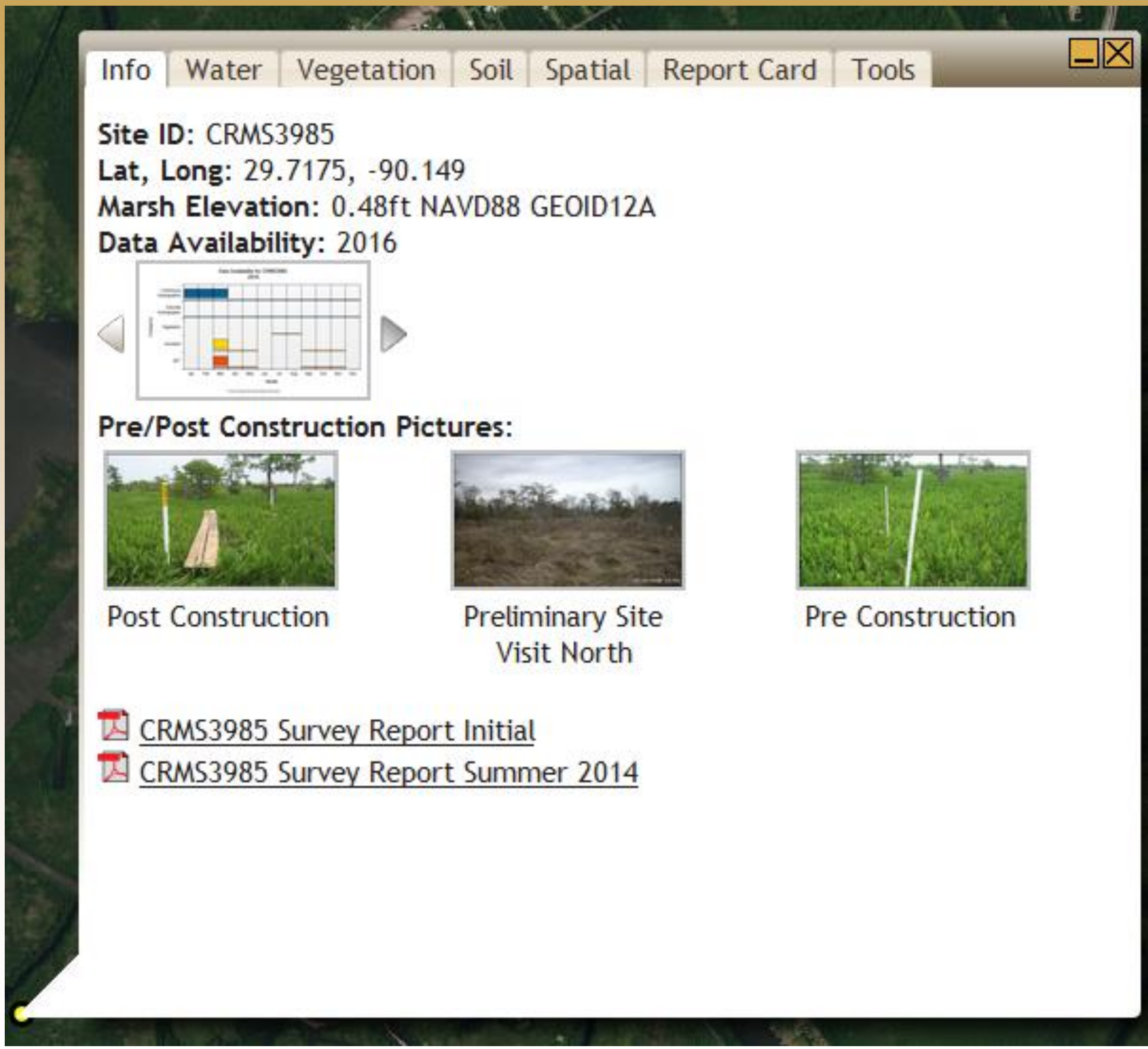
Released on the Website

Display CRMS site info and benchmark ID

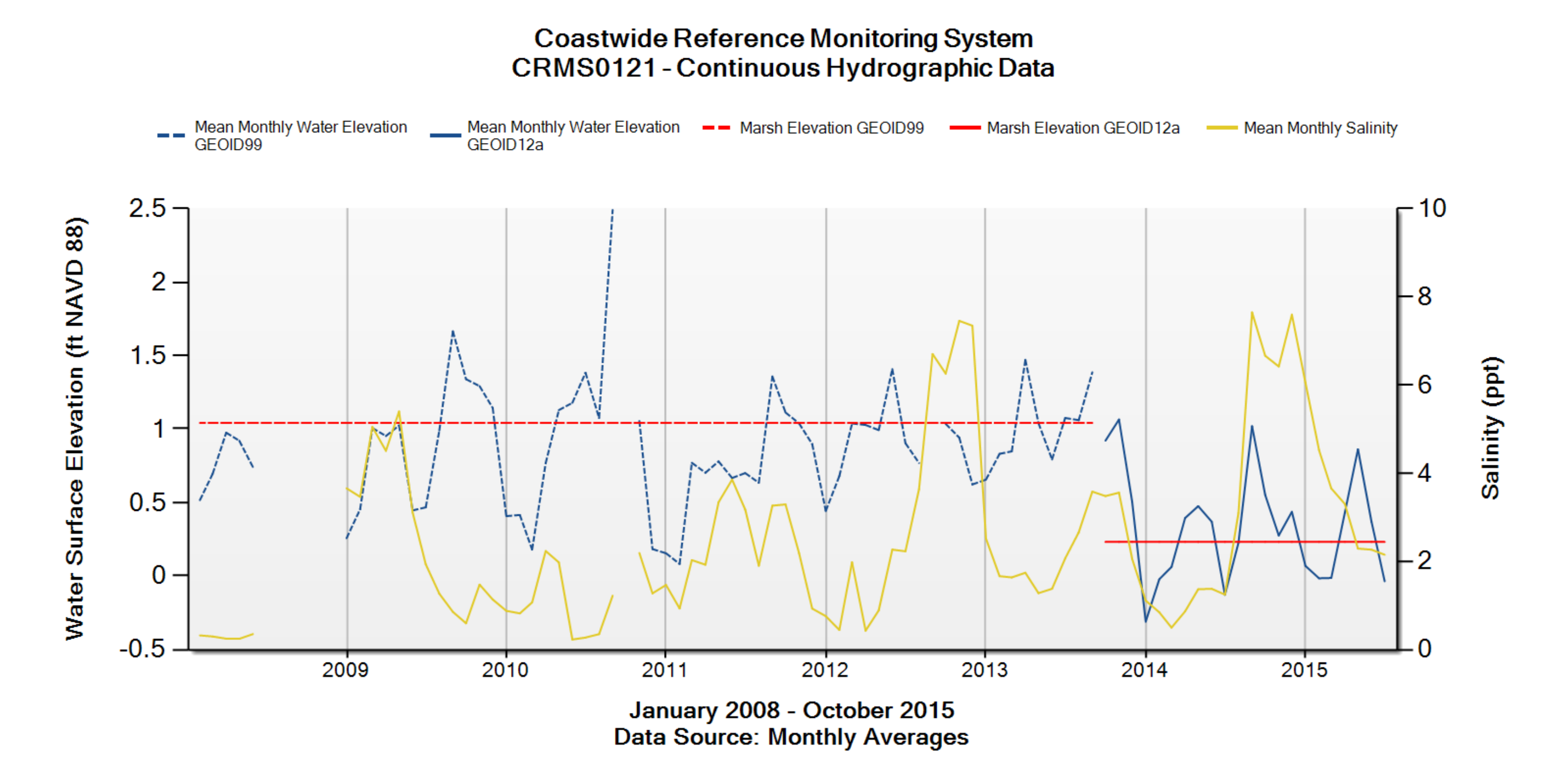


Released on the Website

2014 survey reports posted to site bubbles



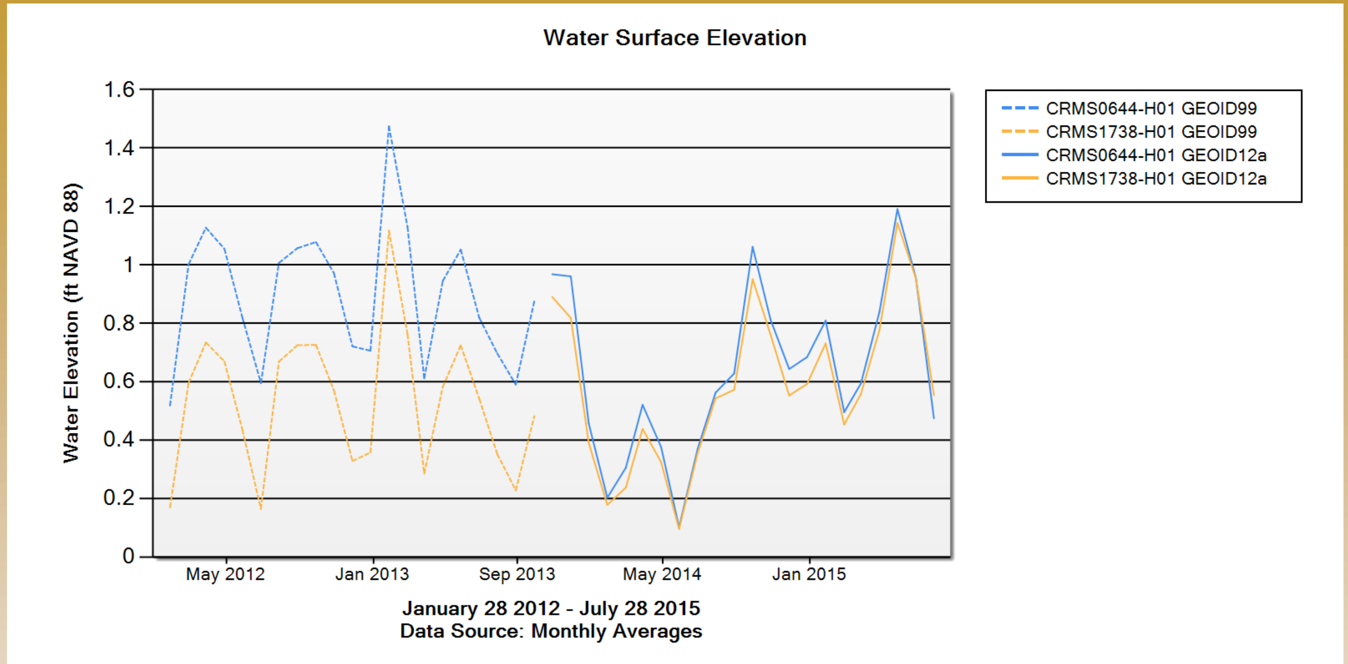
- Initial survey report and 2014 report are available in the site level bubble
- Revised visualizations to reflect new elevations (water elevation, marsh elevation, flooding, etc.)
- Provided correction factors to be applied to “old” data



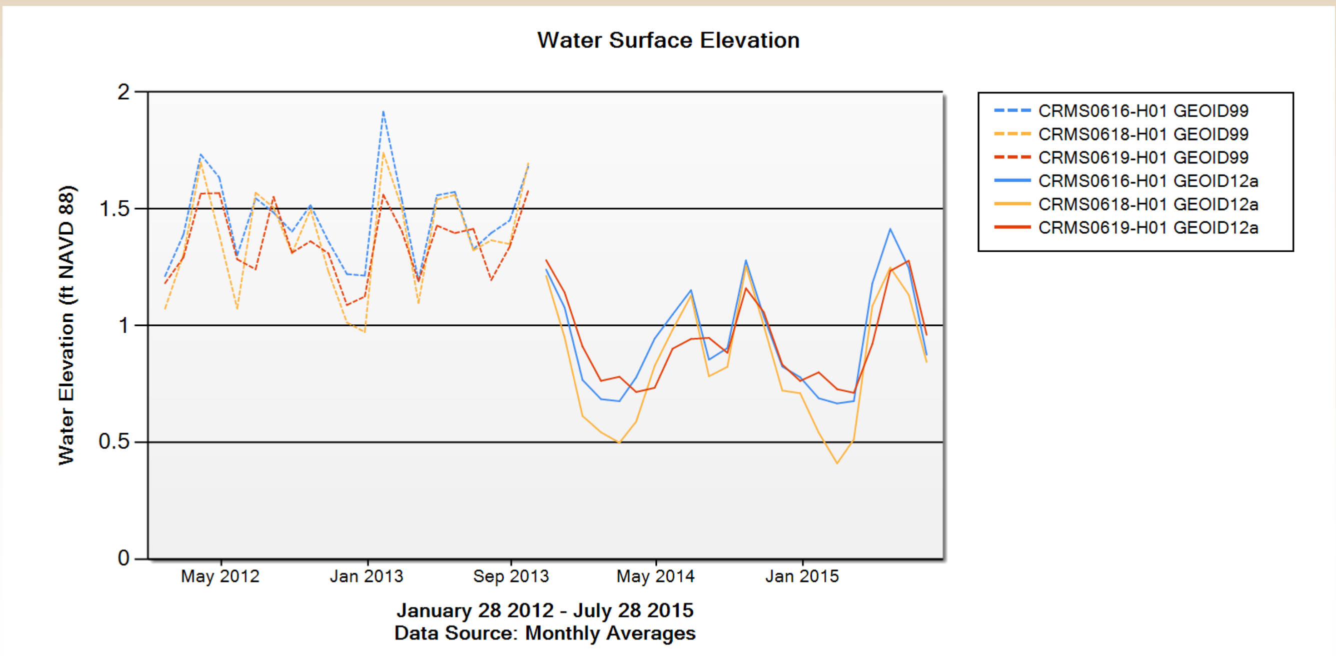
- Data shifts are visible due to resurveying in visualizations
- GEOID is identified for every elevation in charts and data downloads

Coastwide Elevation Survey

- The new survey tightens up differences between stations.

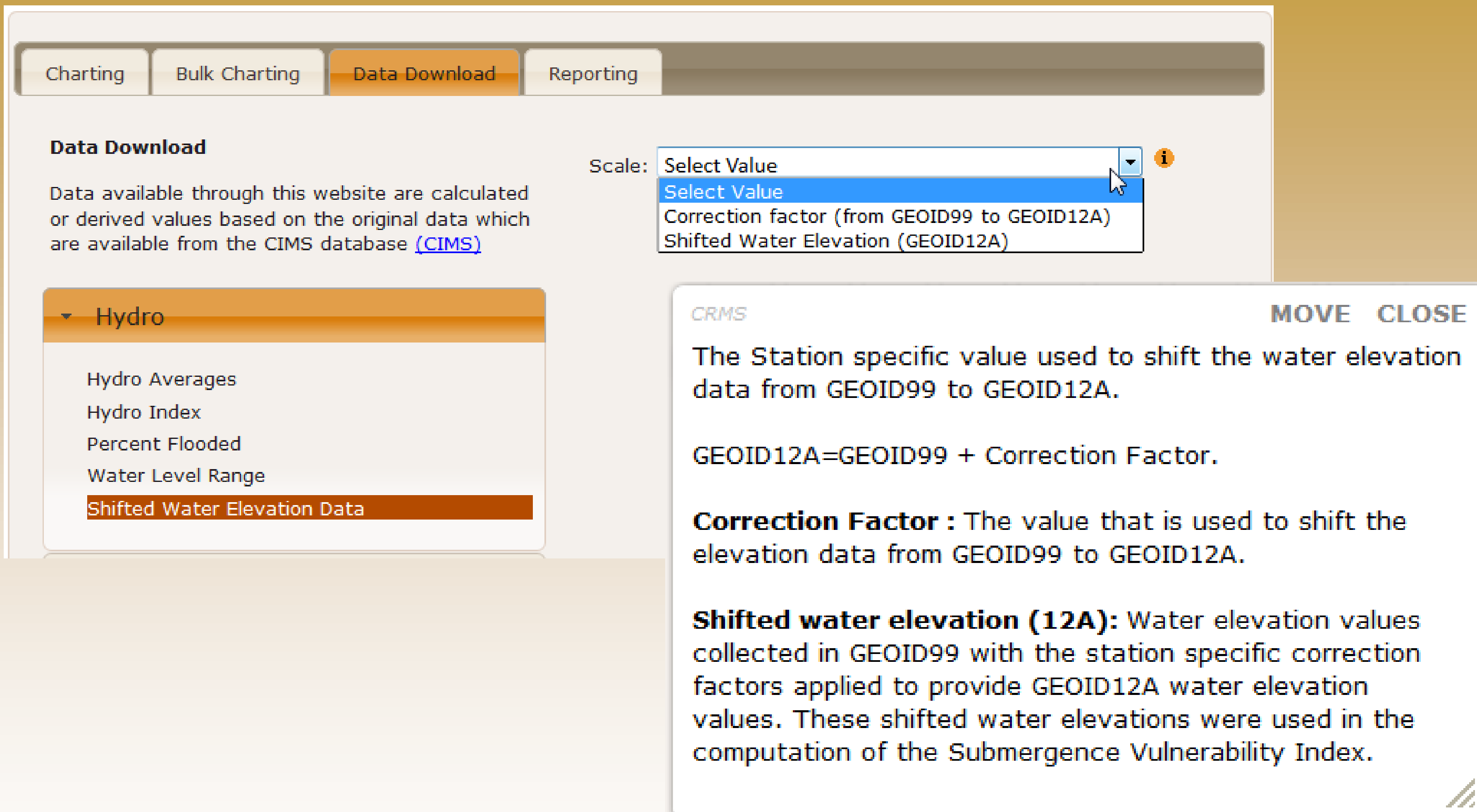


- Water elevations in GEOID12a are lower than they were in GEOID99 by around 0.5 to 1.0 feet.



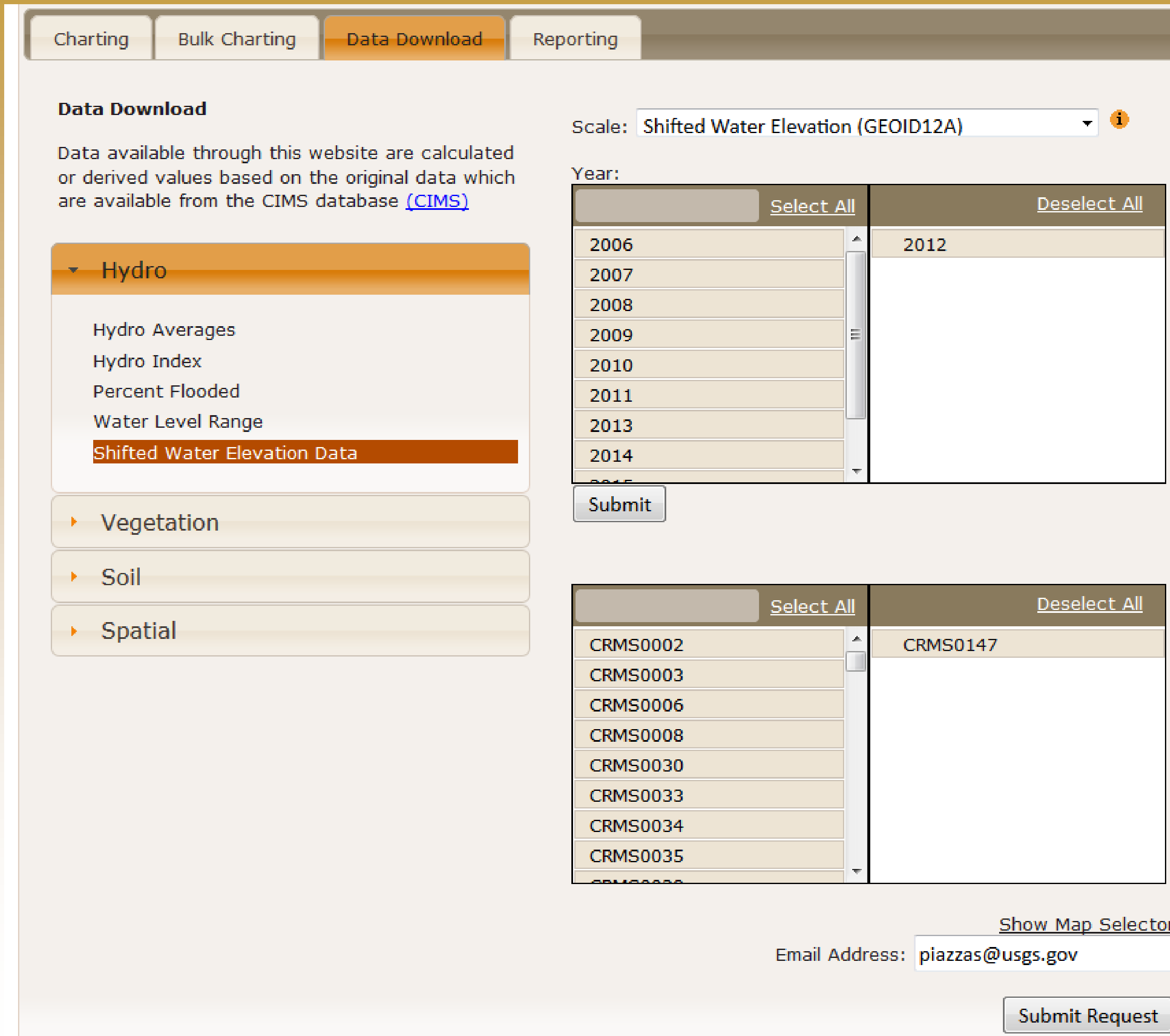
Released on the Website

Data download related to 2014 CRMS elevation survey



Released on the Website

Data download, shifted water elevation



Released on the Website

Data Download

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			

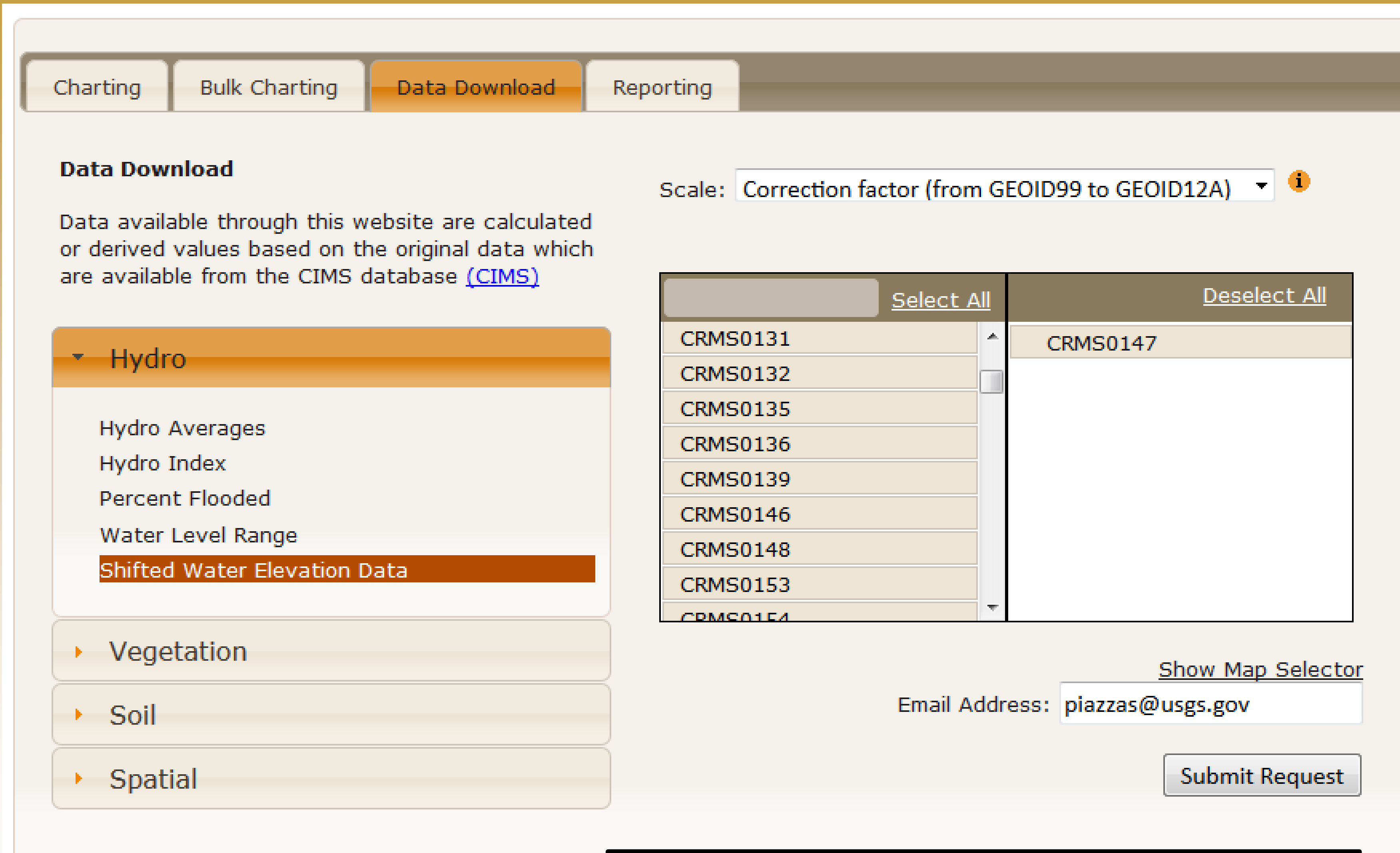
Disclaimer:
These water elevation data have been shifted from the GEOID in which they were observed (GEOID99) into the most recent GEOID (GEOID12A).

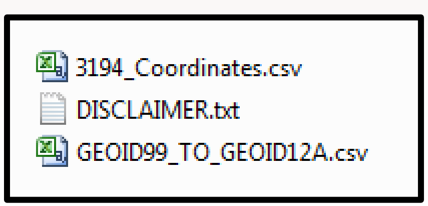
Stations were surveyed relative to GEOID12A in water year 2014. Uncertainty increases with time as values are shifted prior to water year 2014.

Corrections for subsidence have not been identified or applied.

Released on the Website

Data download CRMS site specific correction factors

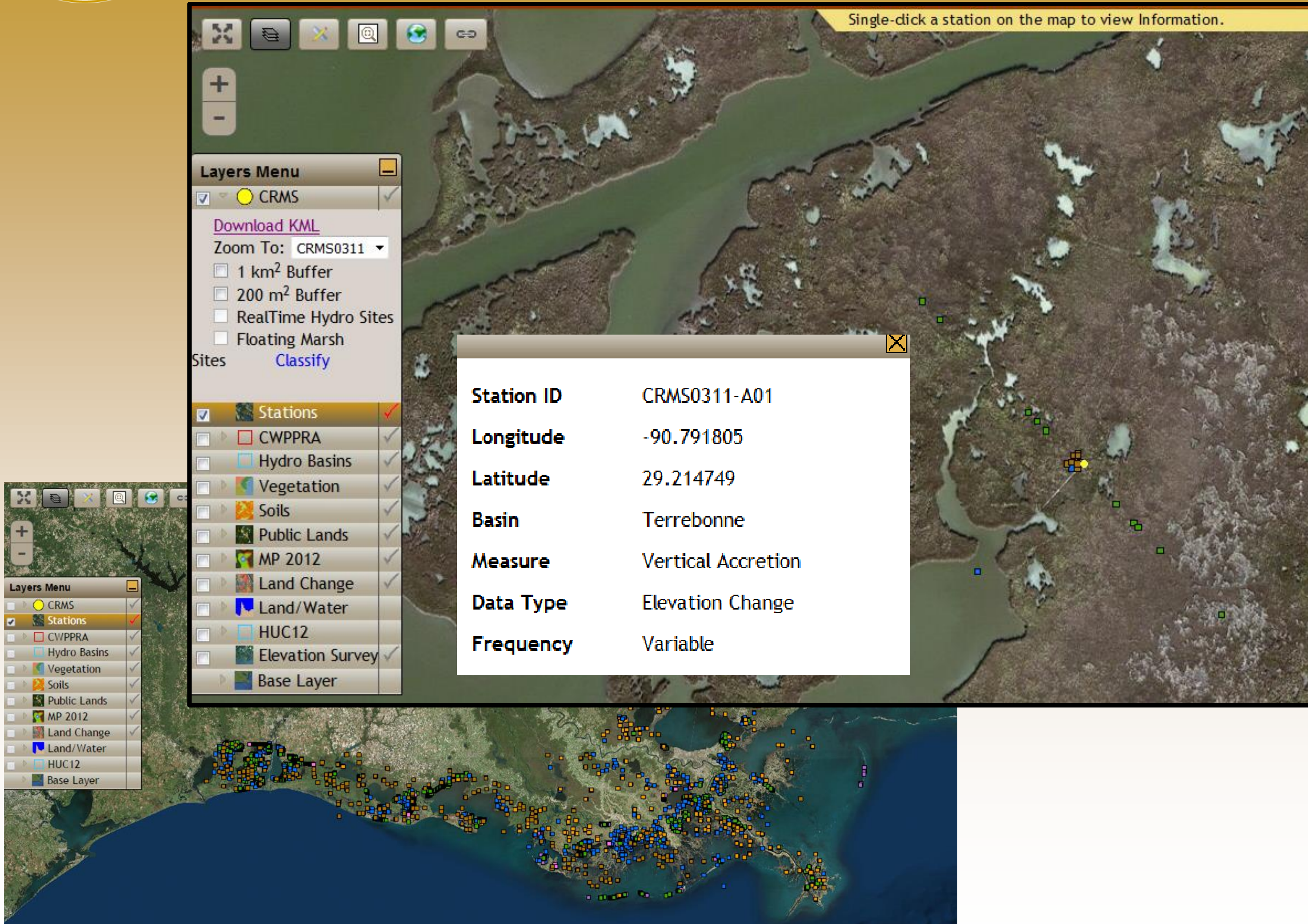




	A	B	C	D
	Station_ID	Correction_Factor (ft NAVD88)		
	CRMS0147-H01	-0.6		

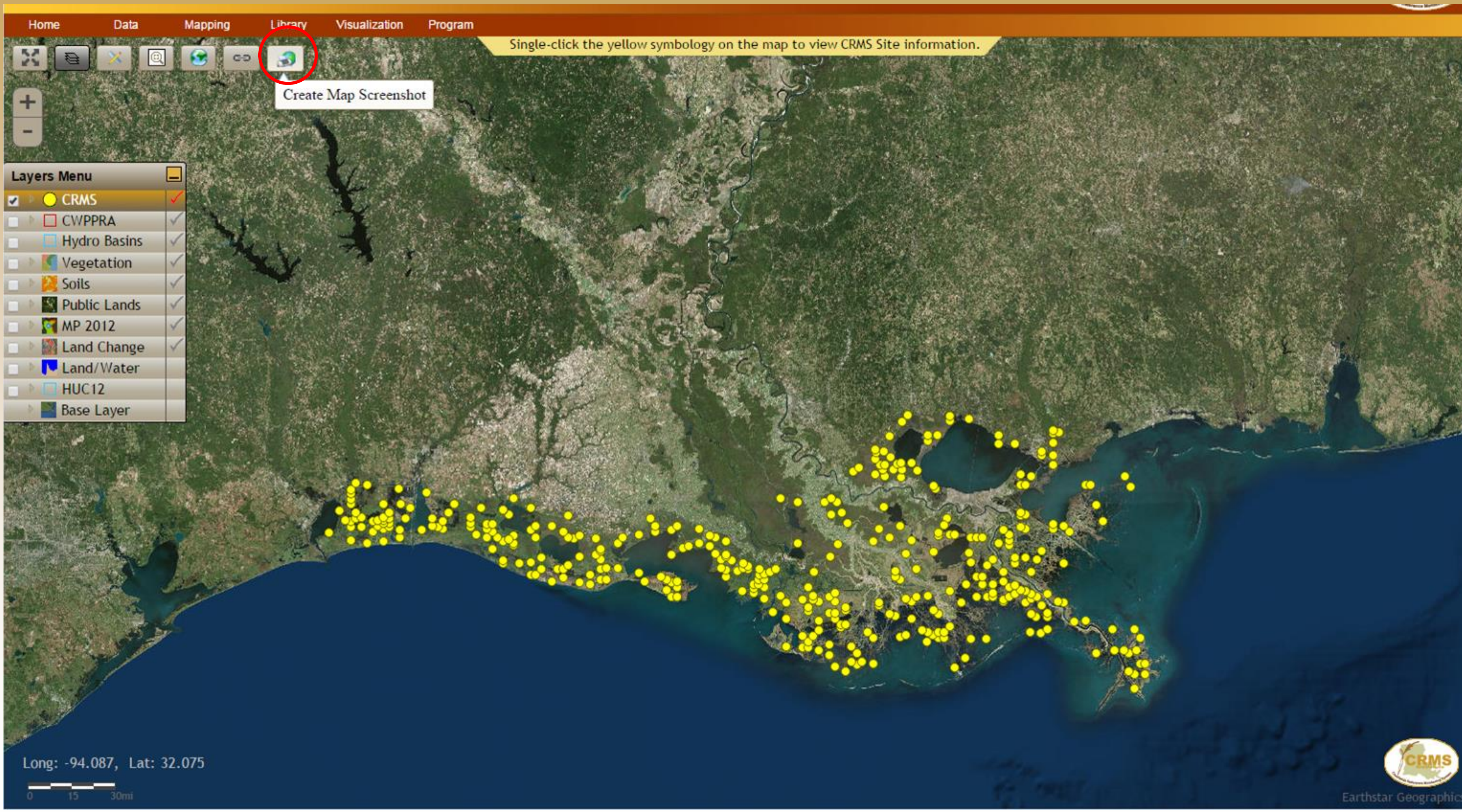
Released on the Website

CRMS station layer added to the map with station coordinates



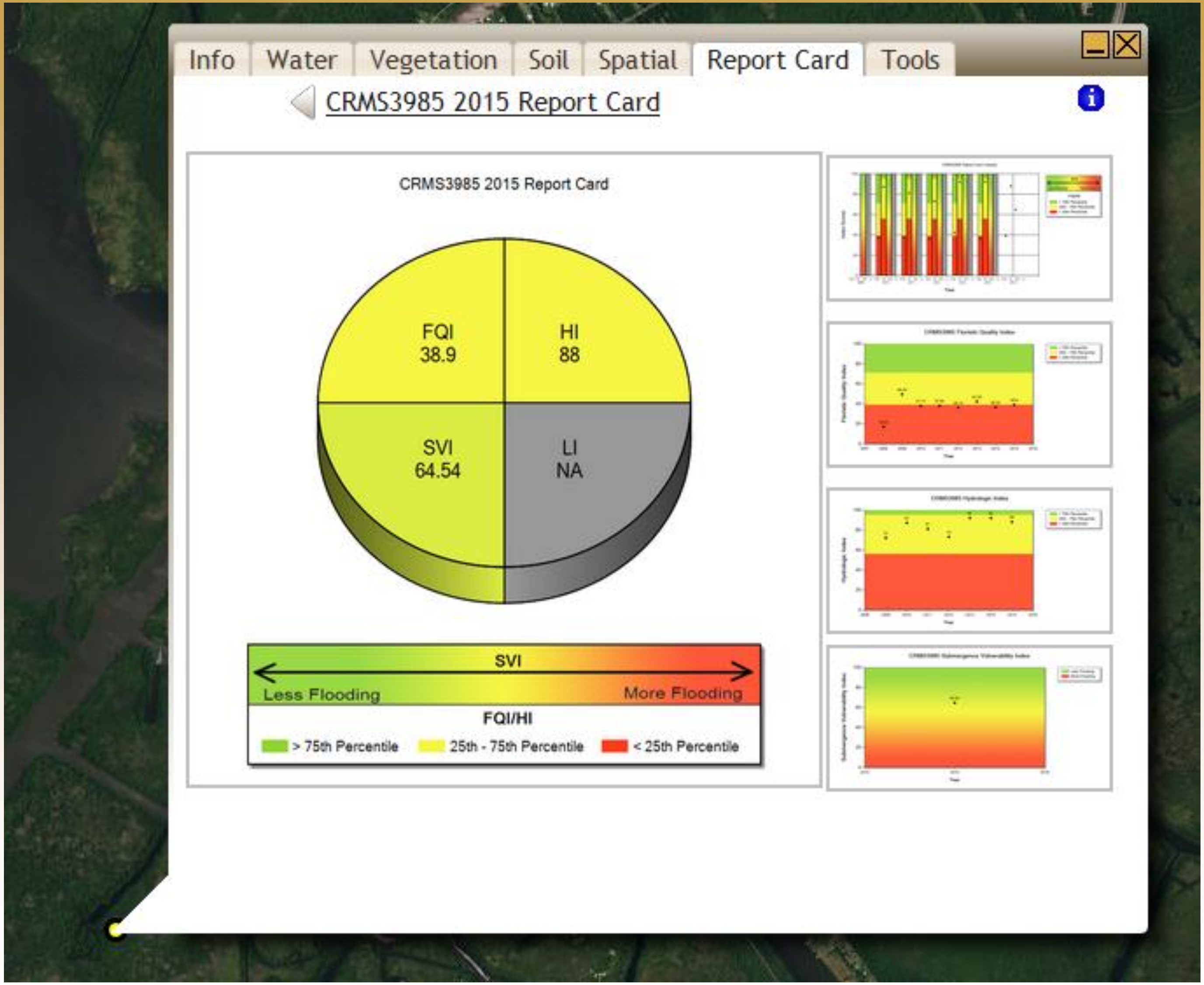
Released on the Website

Print your map



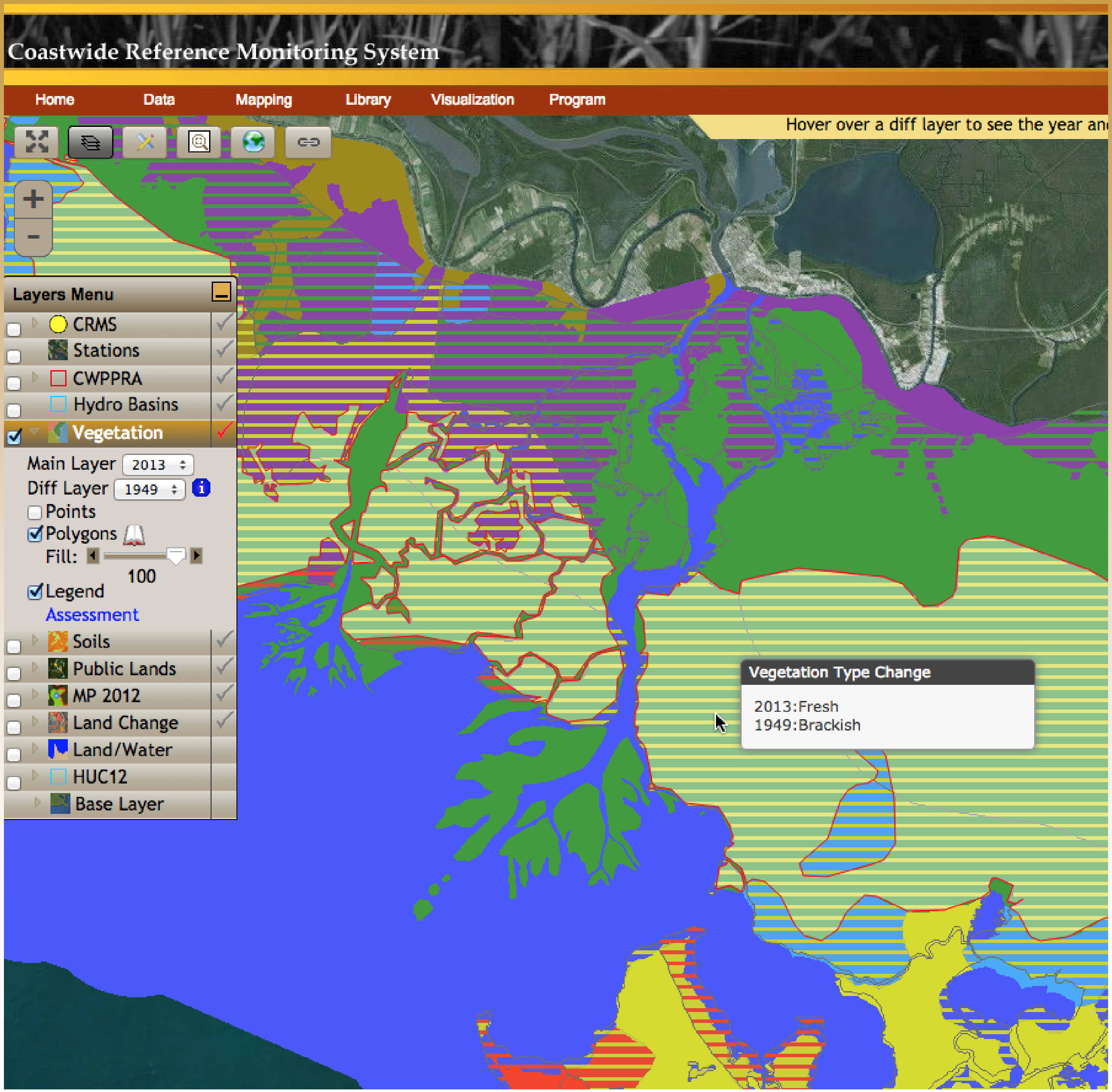
Coming Soon

Incorporation of VVI into site bubble summaries



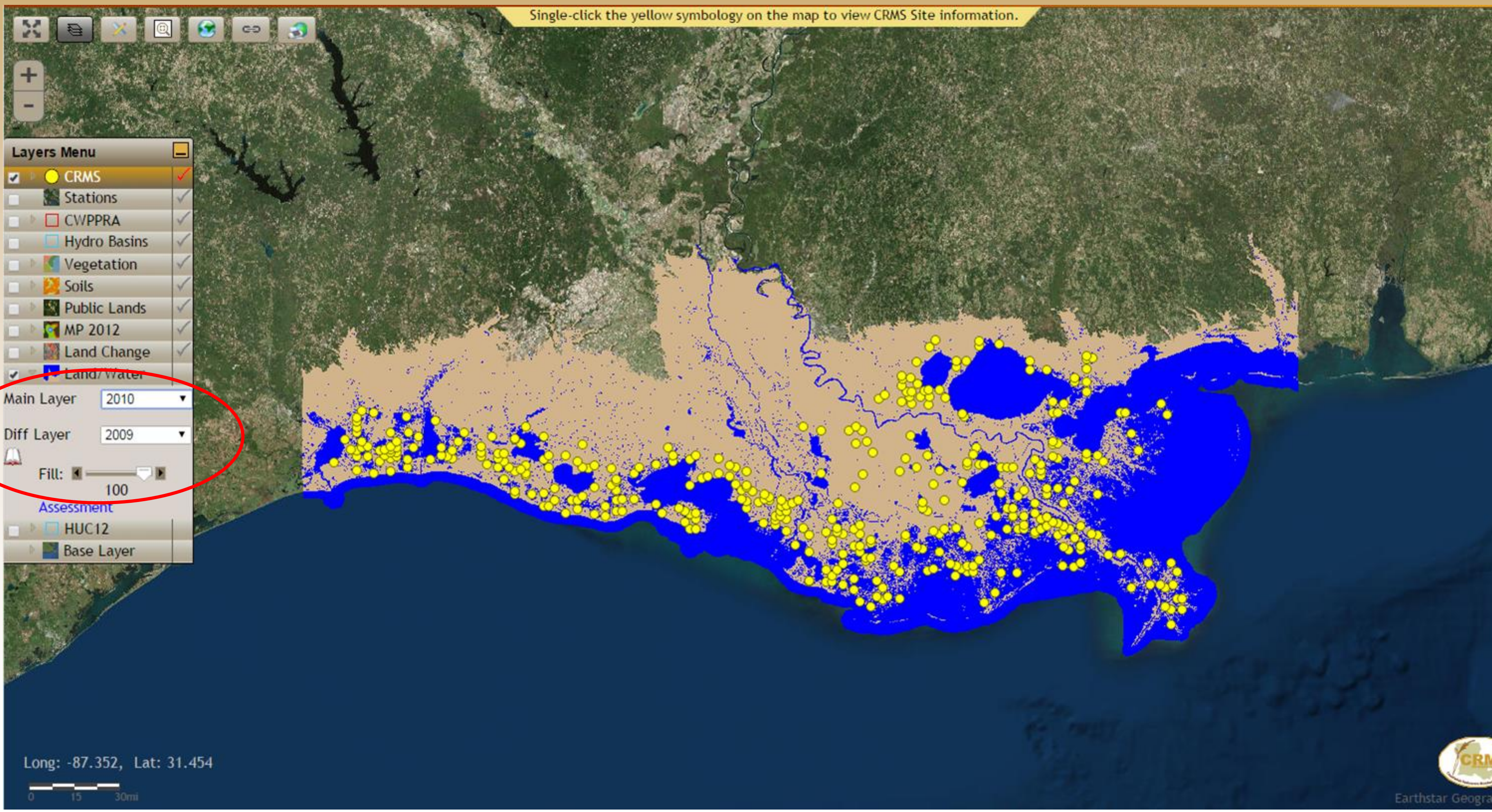
Coming Soon

Add a difference layer to the land/water layer



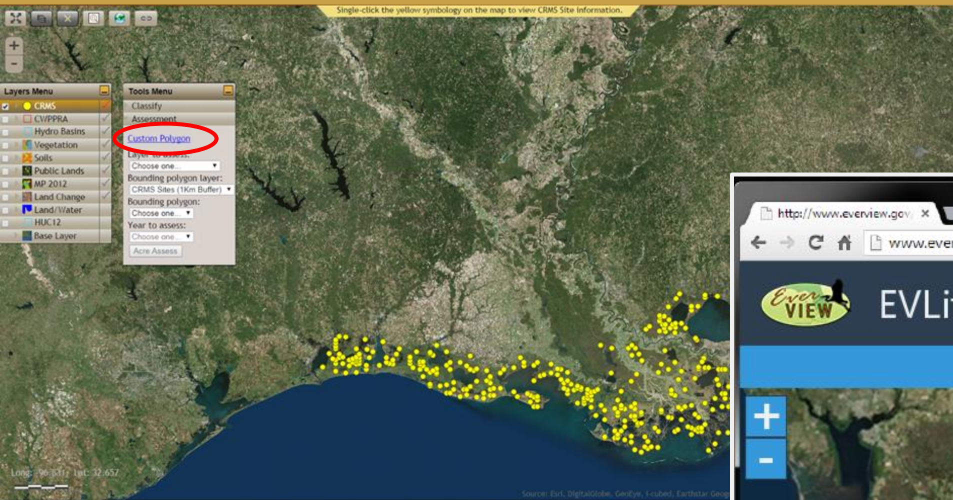
Coming Soon

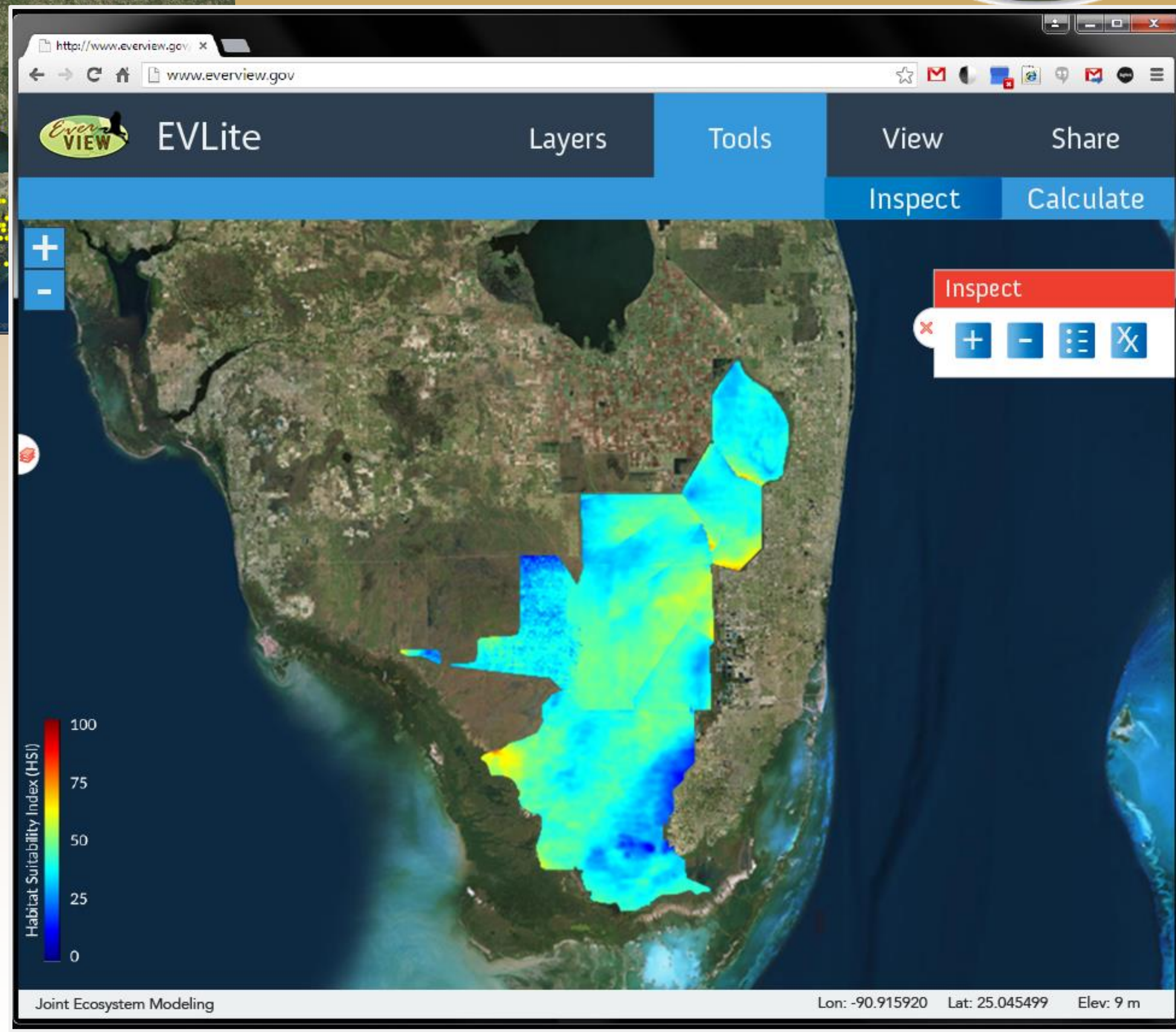
Add a difference layer to the land/water layer



In progress

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

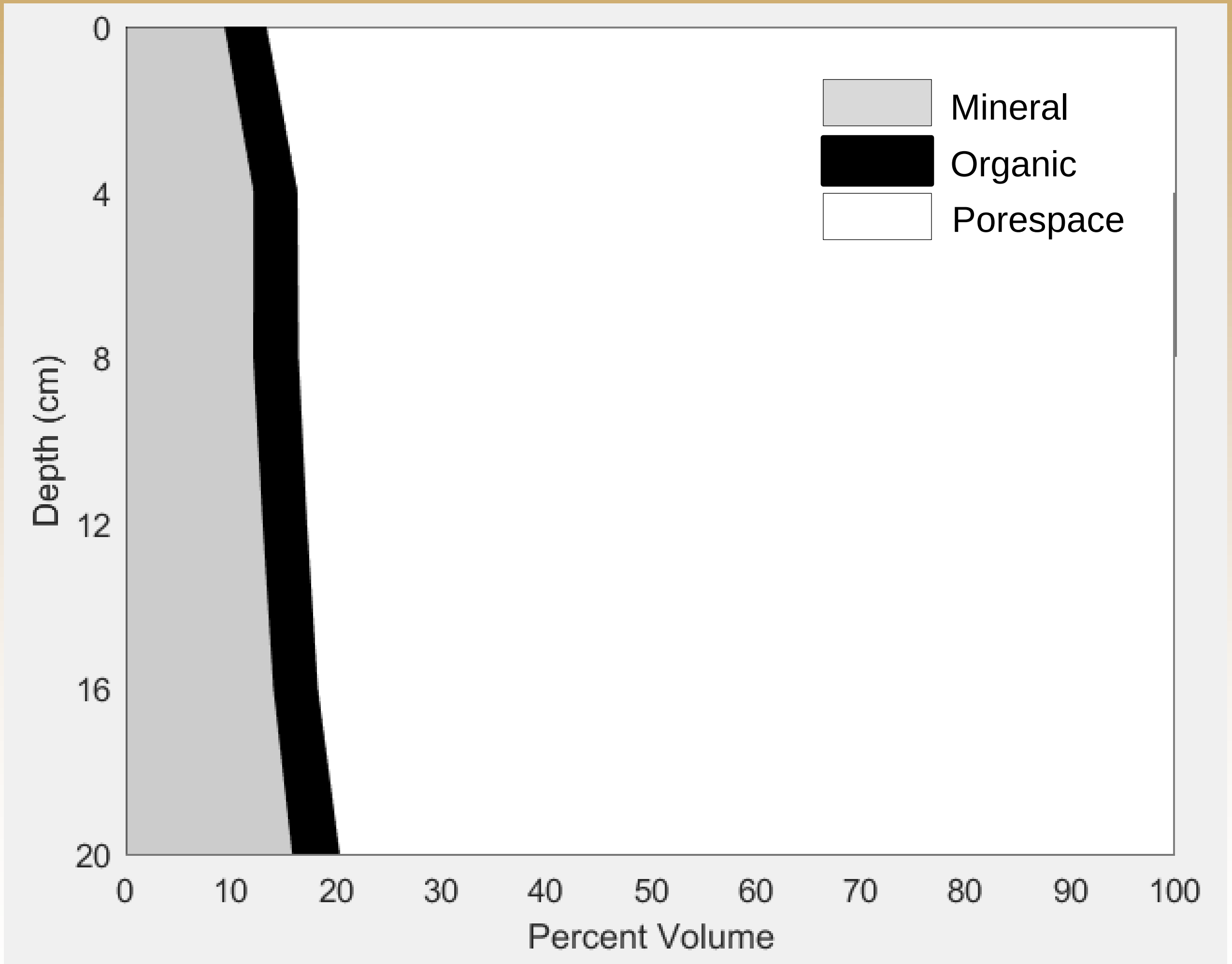




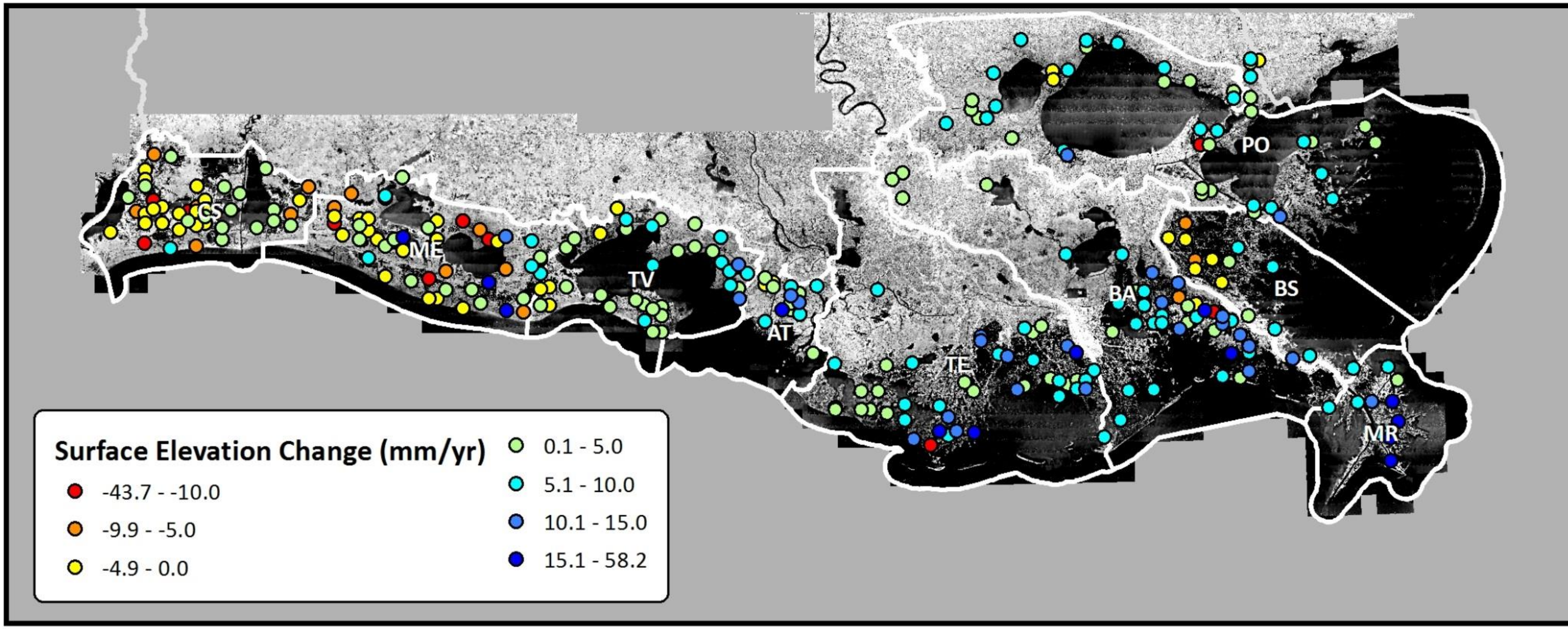
CRMS Analytical Team Updates

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:

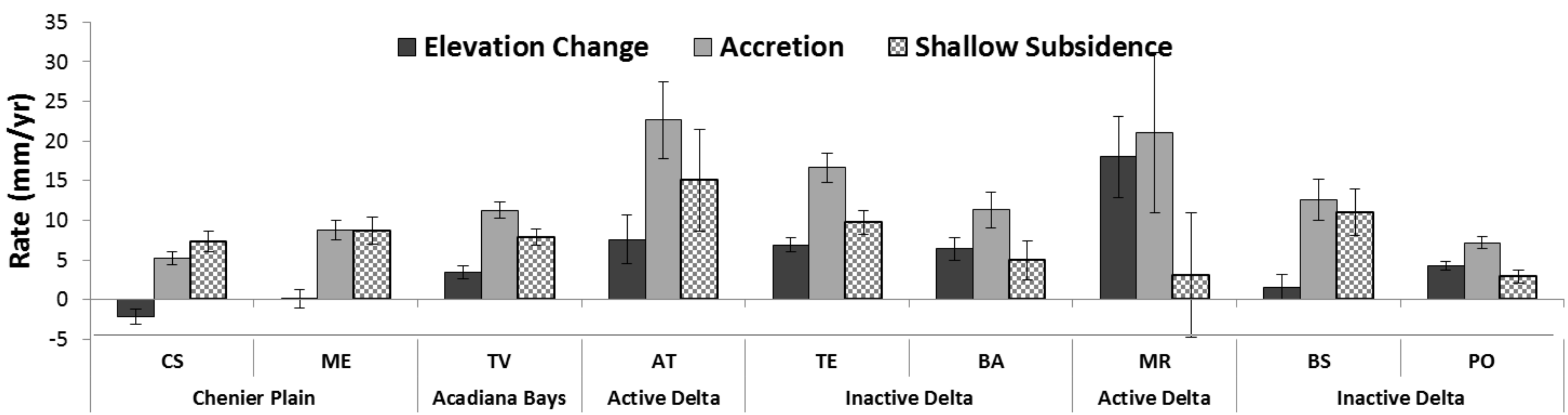
- **Tidal amplitude**
- **Inundation time**
- **Land change**

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

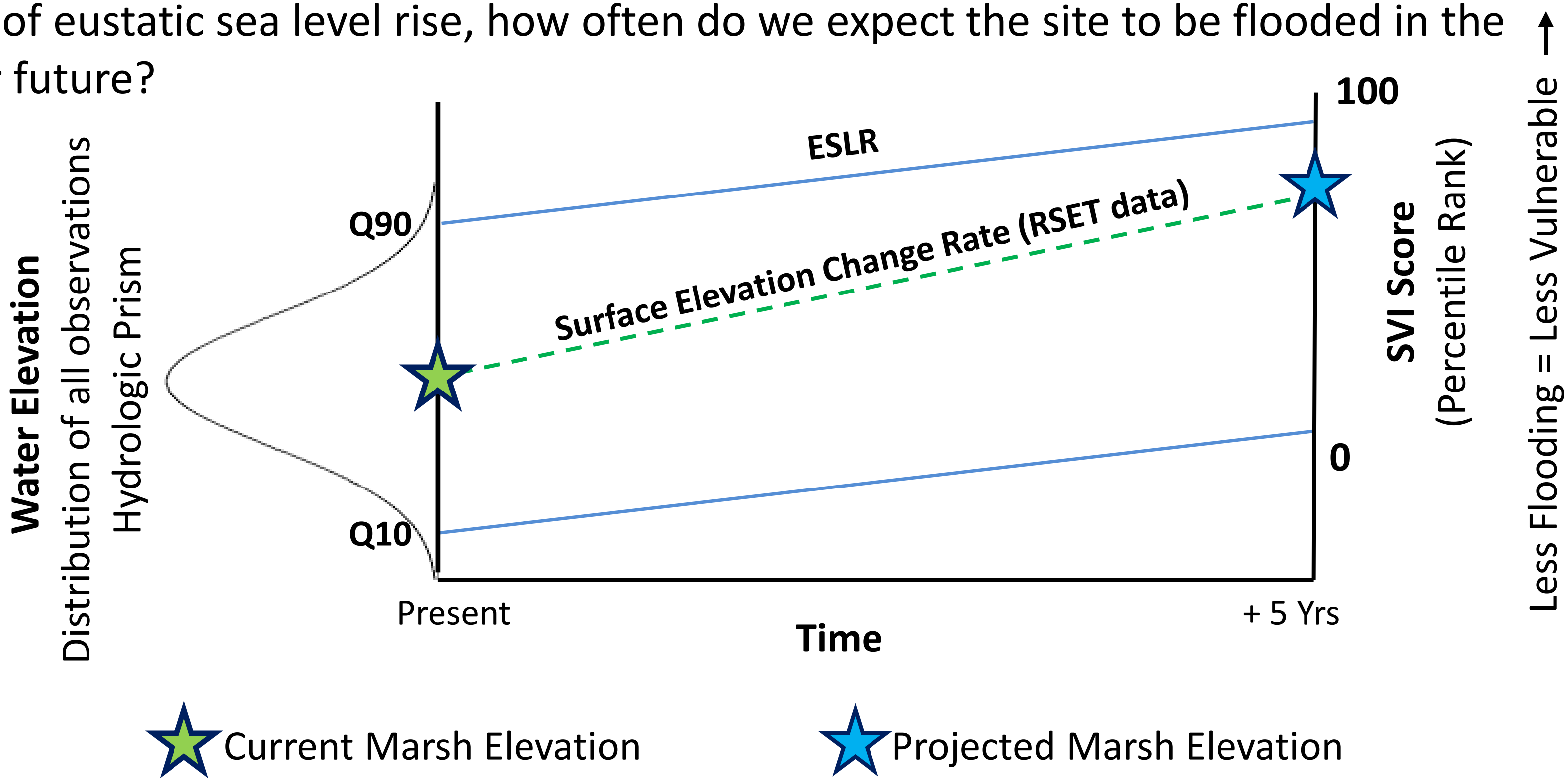
Shallow Subsidence
- There are no meaningful differences in shallow subsidence (AT is significantly higher than PO).



Submergence Vulnerability Index (SVI)

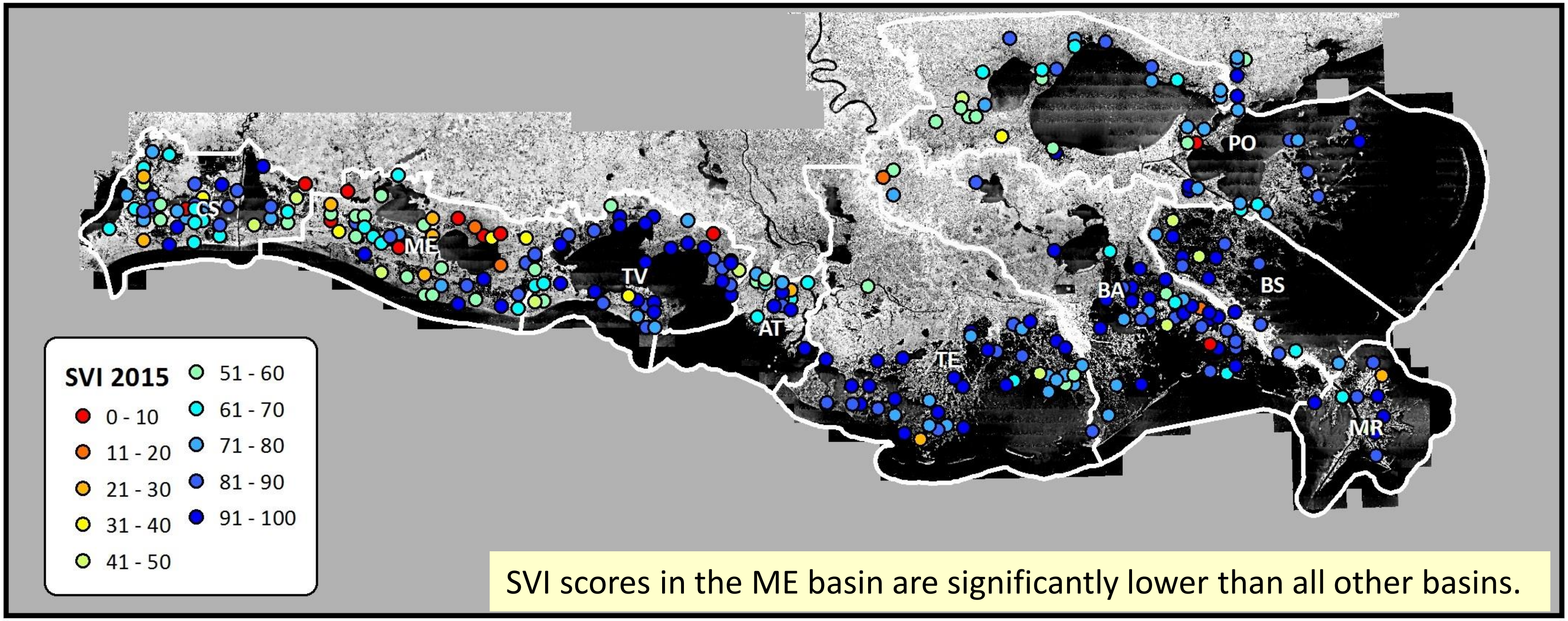
Where does the wetland surface sit within the site's tidal frame?

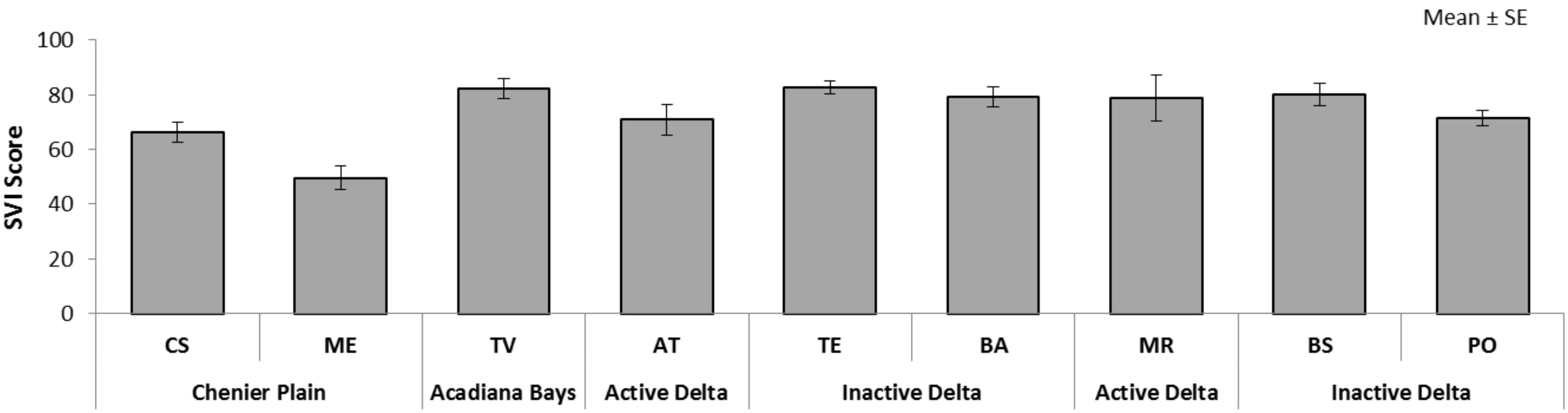
Given the distribution of all observed water elevations, surveyed marsh surface elevation and its measured rate of elevation change, and the reported (observed) rate of eustatic sea level rise, how often do we expect the site to be flooded in the near future?



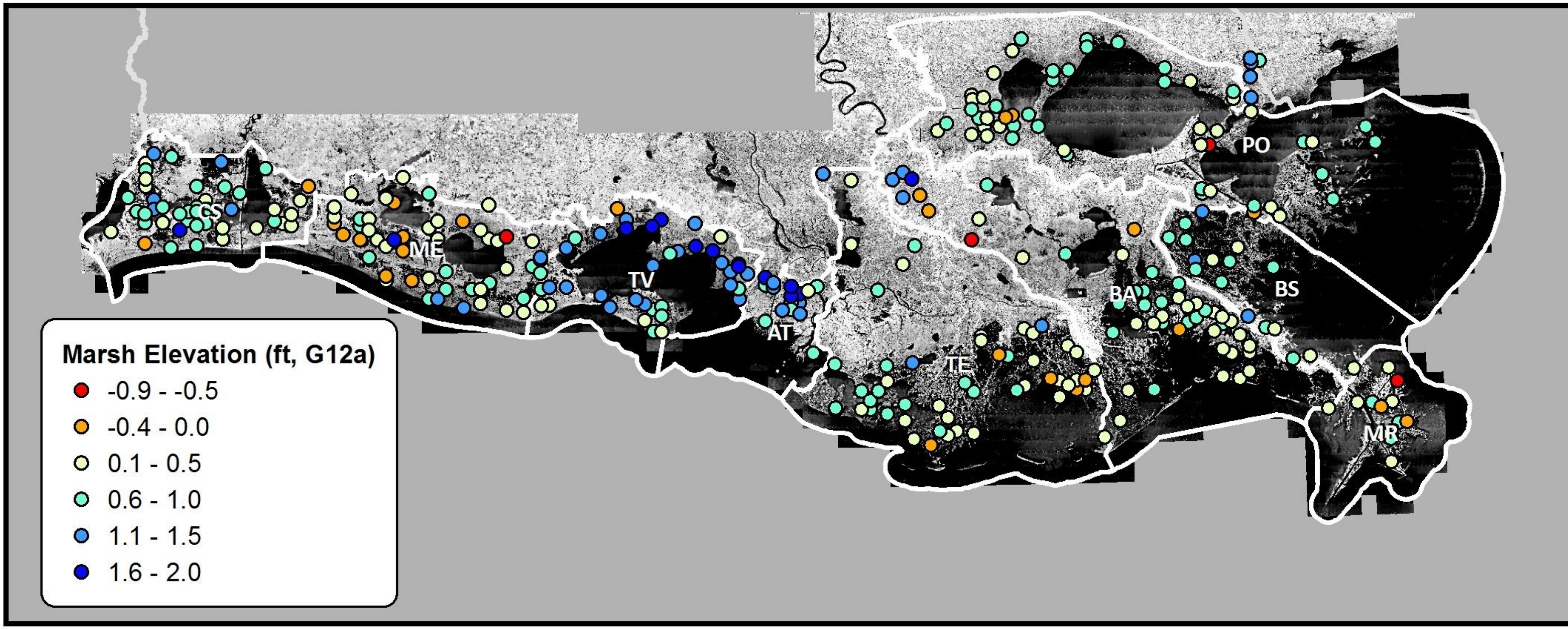
SVI Score = 90; Site predicted to be out of the water 90% of the time.

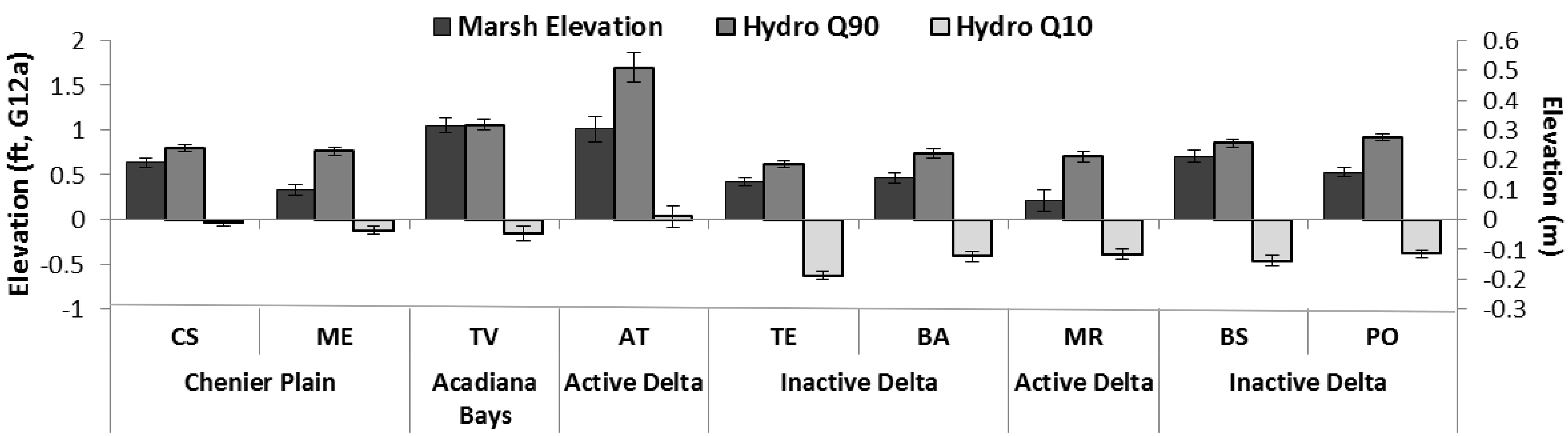
2015 Submergence Vulnerability Index Scores



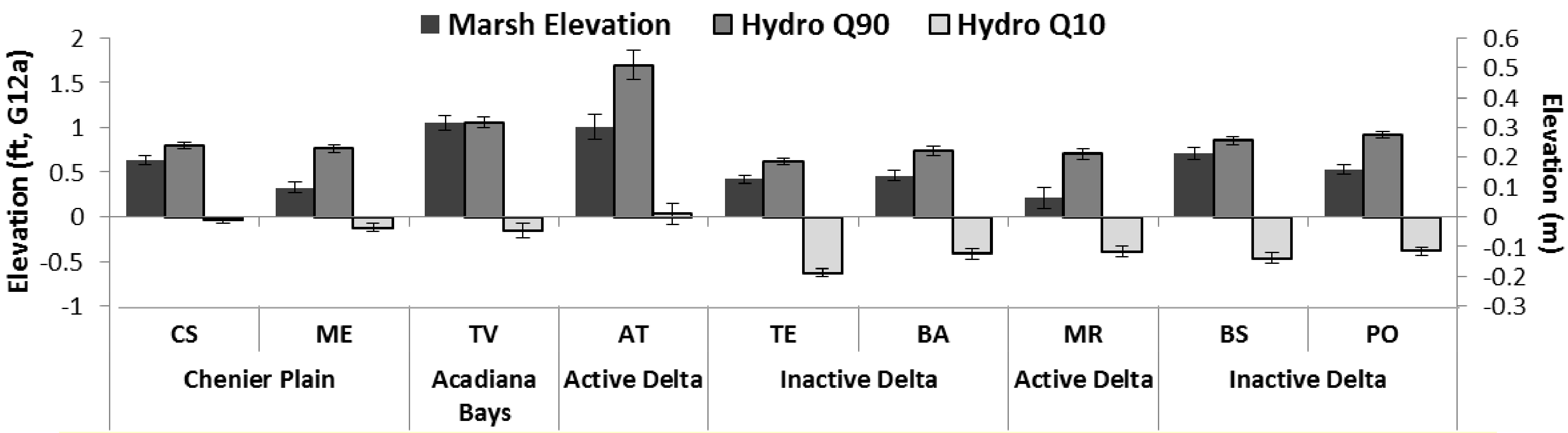


2014 Marsh and Water Elevations (ft, NAVD88, Geoid 12a)

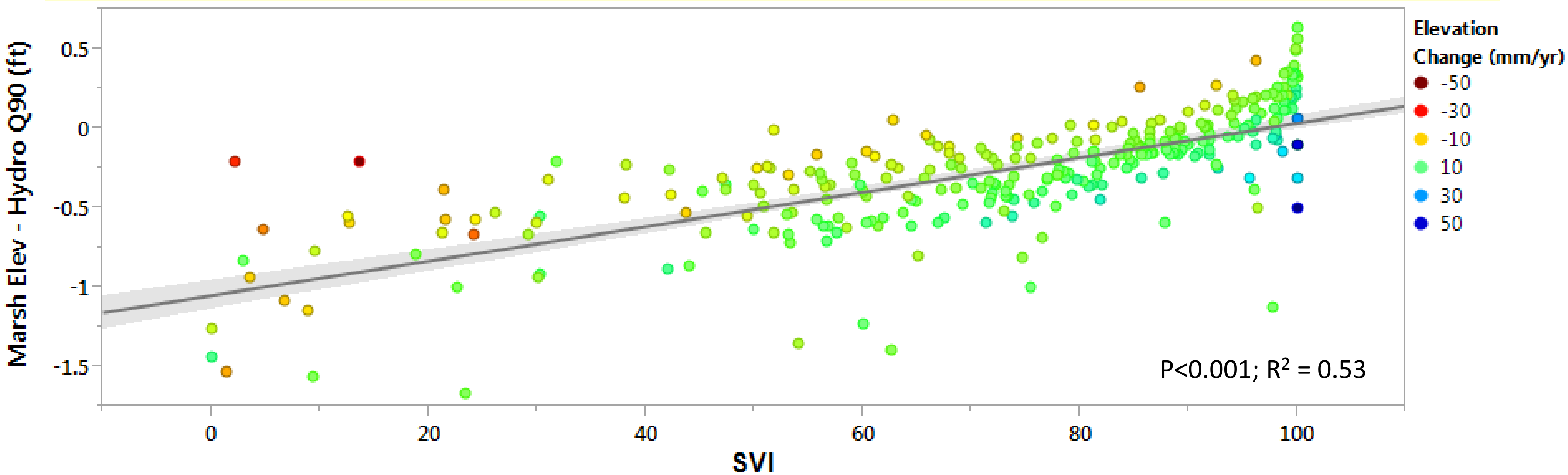




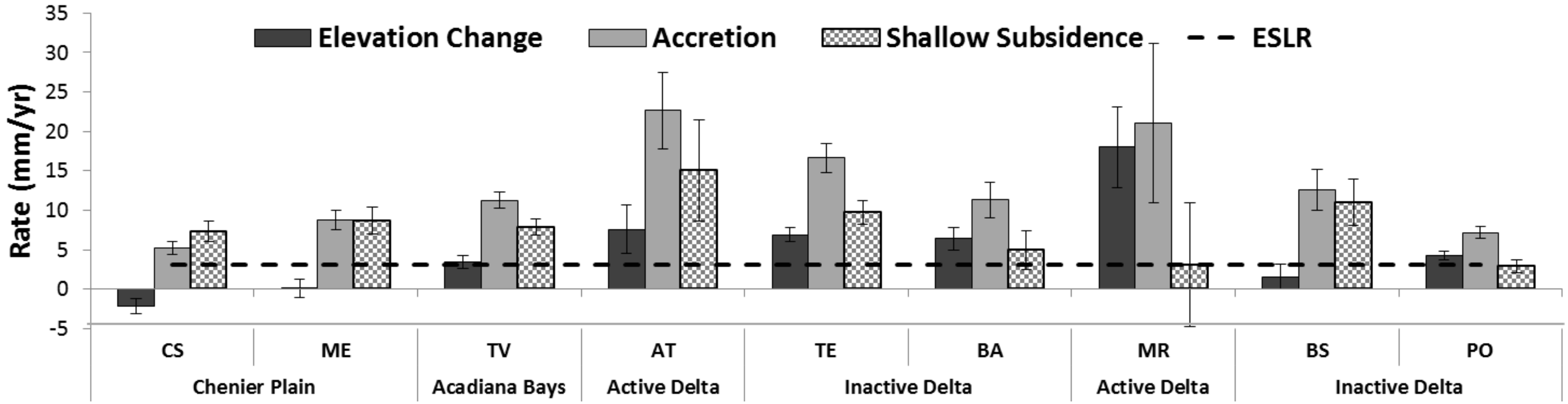
Factors Impacting SVI Scores – Preliminary results



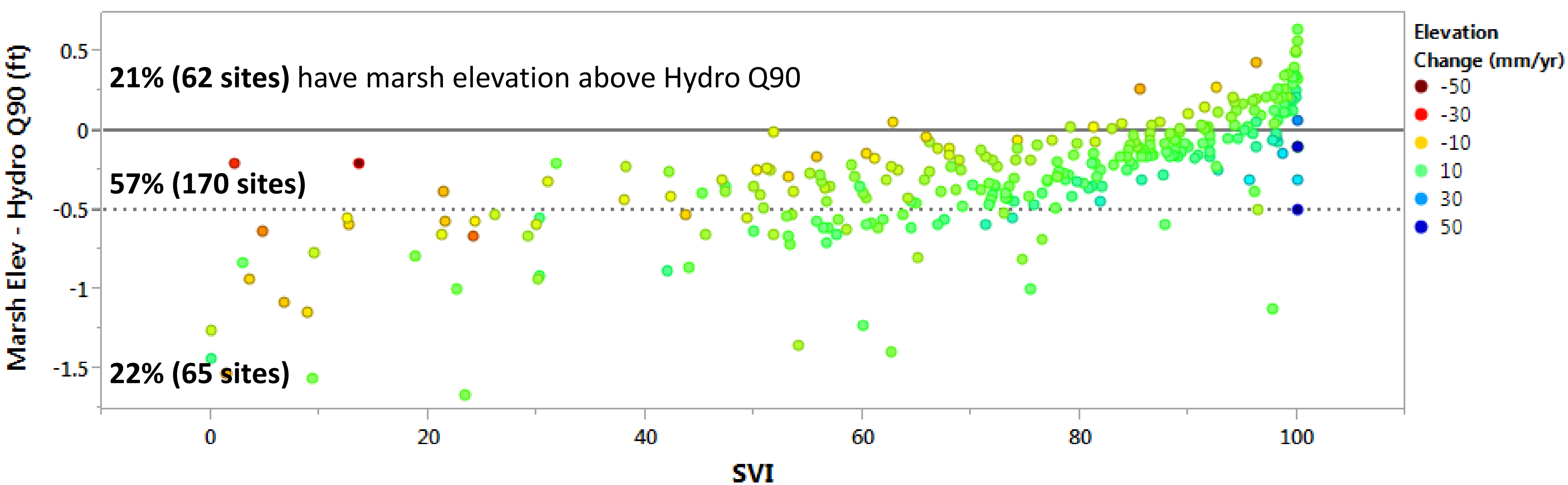
The difference between marsh elevation and the 90th Quantile of the hydrologic distribution accounts for most of the variability in SVI scores followed by elevation change rates.



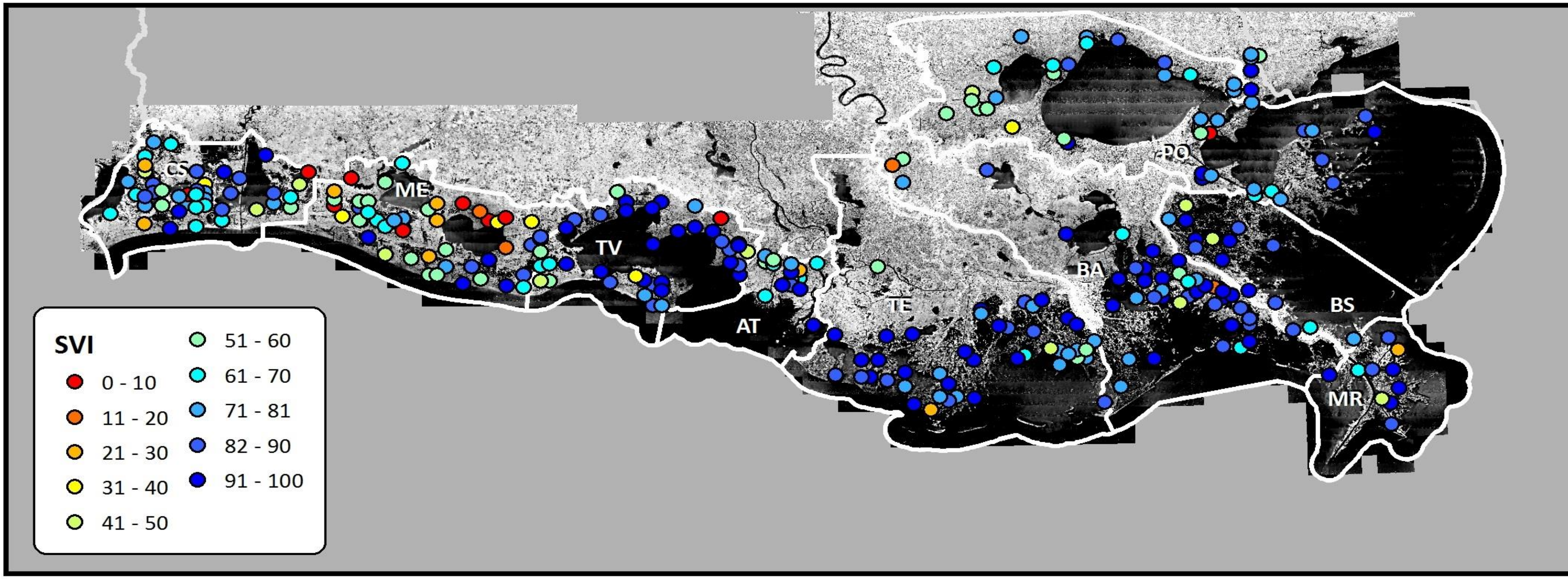
Factors Impacting SVI Scores
Marsh Elevation is relatively high



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?

Landscape Team

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Accessibility
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Data Citation

CRMS Support Documentation

Bass, A. S., C. F. Robertson, W. K. Rhinehart. 2003. Office of Coastal Restoratic 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 Louisian from 1985 to 2010. Wetlands. 10.1007/s13157-016-0744-9.

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

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ORIGINAL RESEARCH

SOCIETY of WETLAND SCIENTISTS

Spatial Configuration Trends in Coastal Louisiana from 1985 to 2010

Brady R. Couvillion[1] · Michelle R. Fischer[1] · Holly J. Beck[1] · William J. Sleavin[2]

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Abstract From 1932 to 2010, coastal Louisiana has experienced a net loss of 4877 km^2 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.

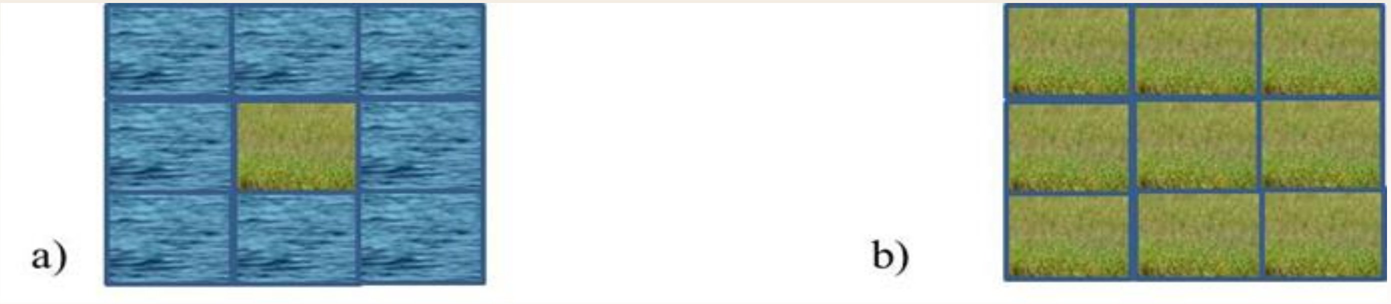
Keywords Wetland fragmentation · Wetland configuration · Land change · Wetland loss · Coastal Louisiana · Landscape fragmentation

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

Landscape Index

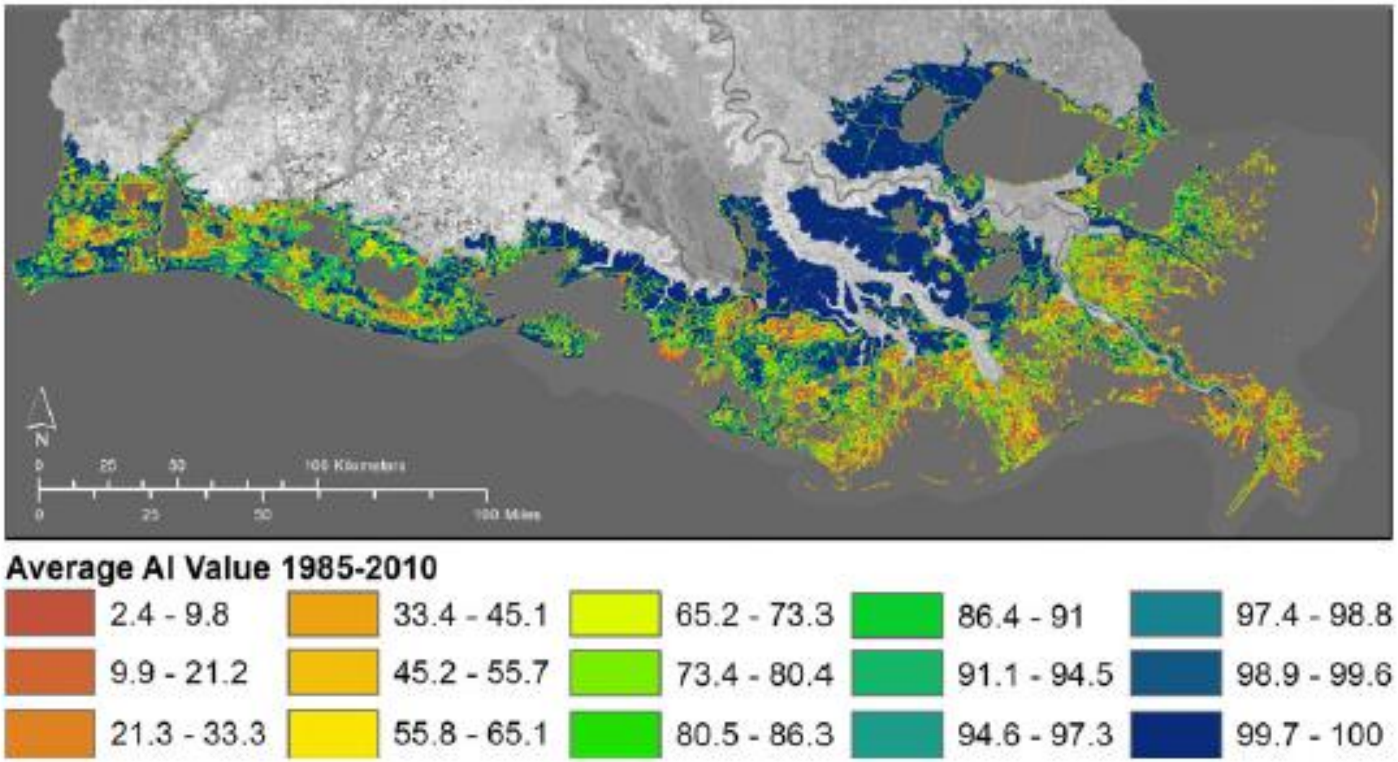
- Study takes into account wetland loss, mosaic of wetlands and open water patches
- Examined the spatial & temporal variability of landscape configuration and the relation of those patterns to the trajectories of wetland loss
- Spatial configuration was quantified using multi-temporal satellite imagery 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

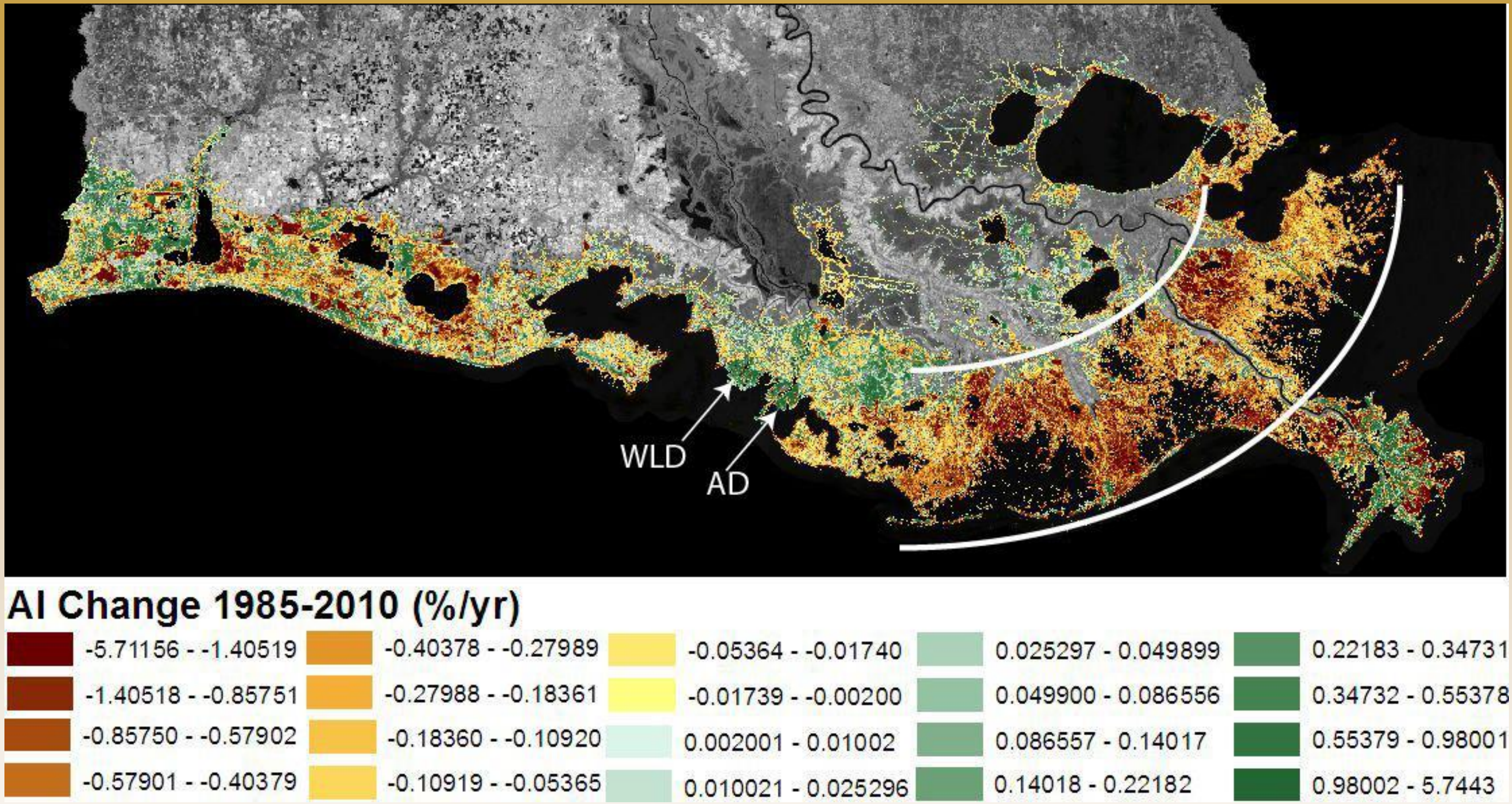
Fully aggregated
AI=100

Average AI from 1985 to 2010

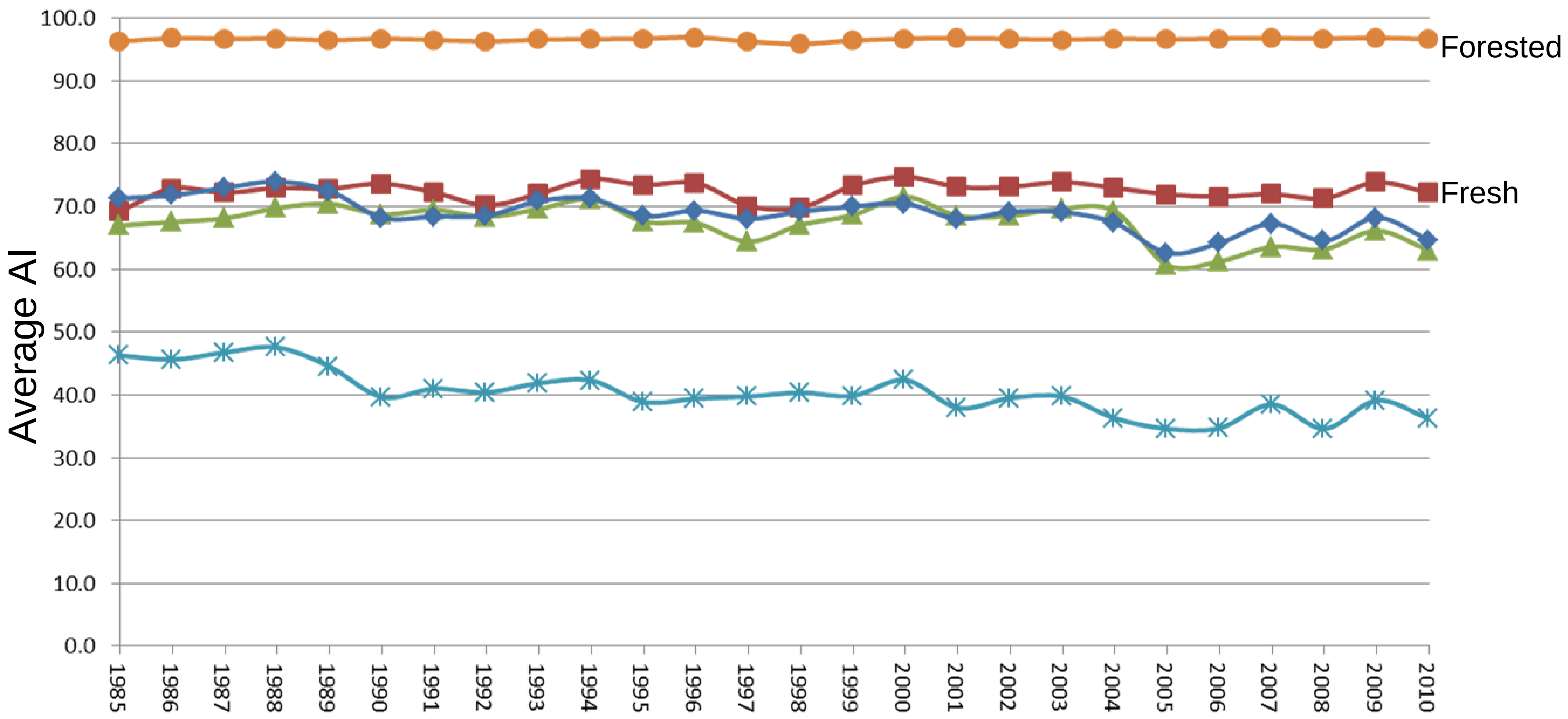


Lower AI values represent wetlands that are more disaggregated.

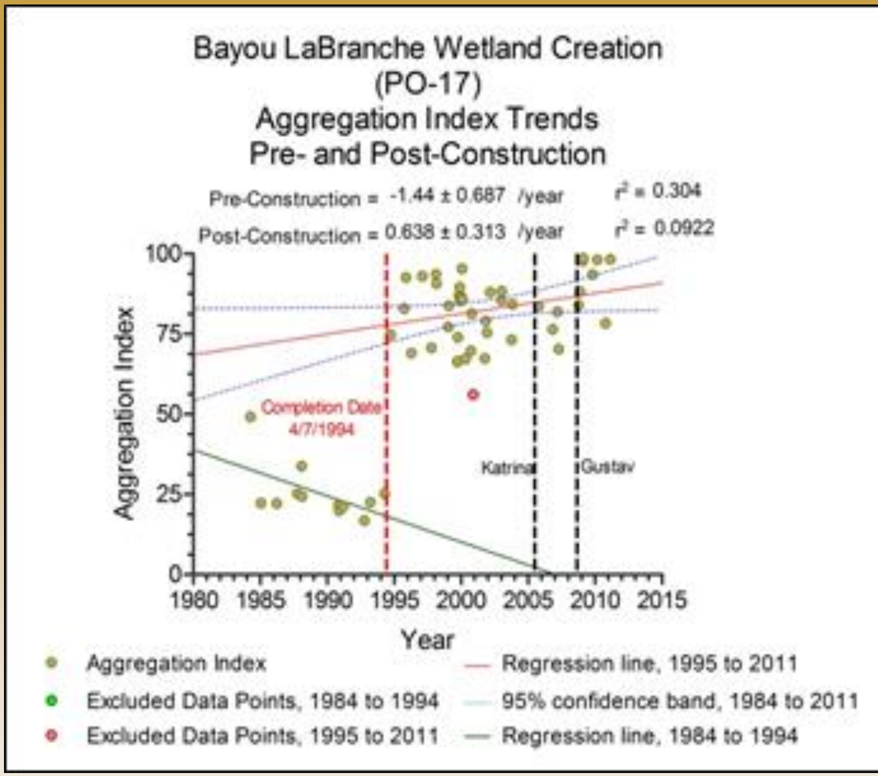
AI Change from 1985 to 2010

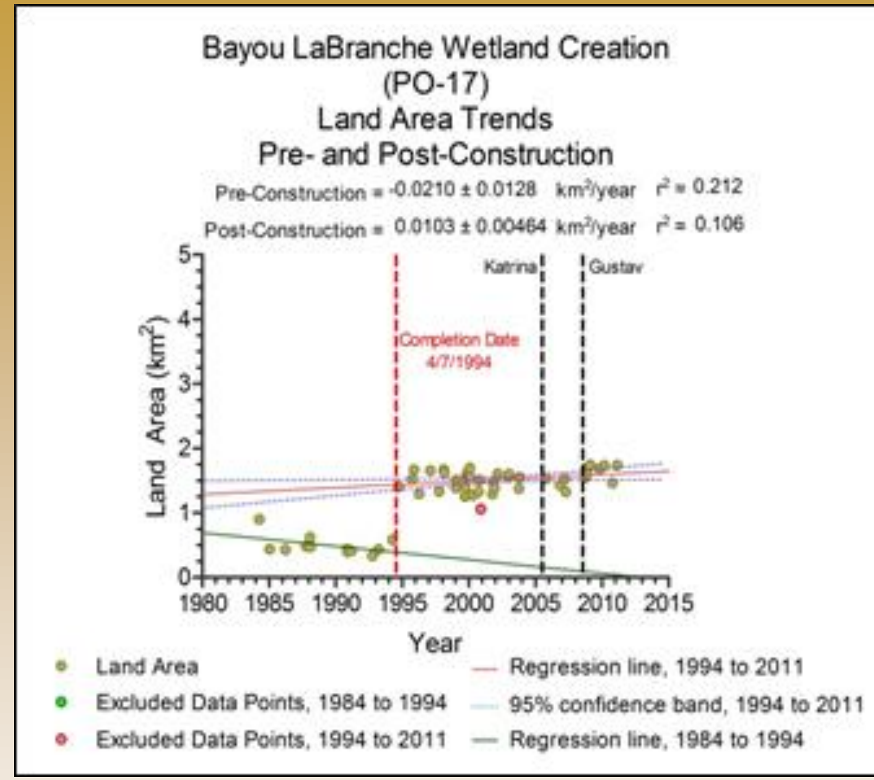


- **Areas of greatest negative AI change are potentially more susceptible to future wetland loss.**
- **Fragmentation is only one factor influencing wetland loss.**



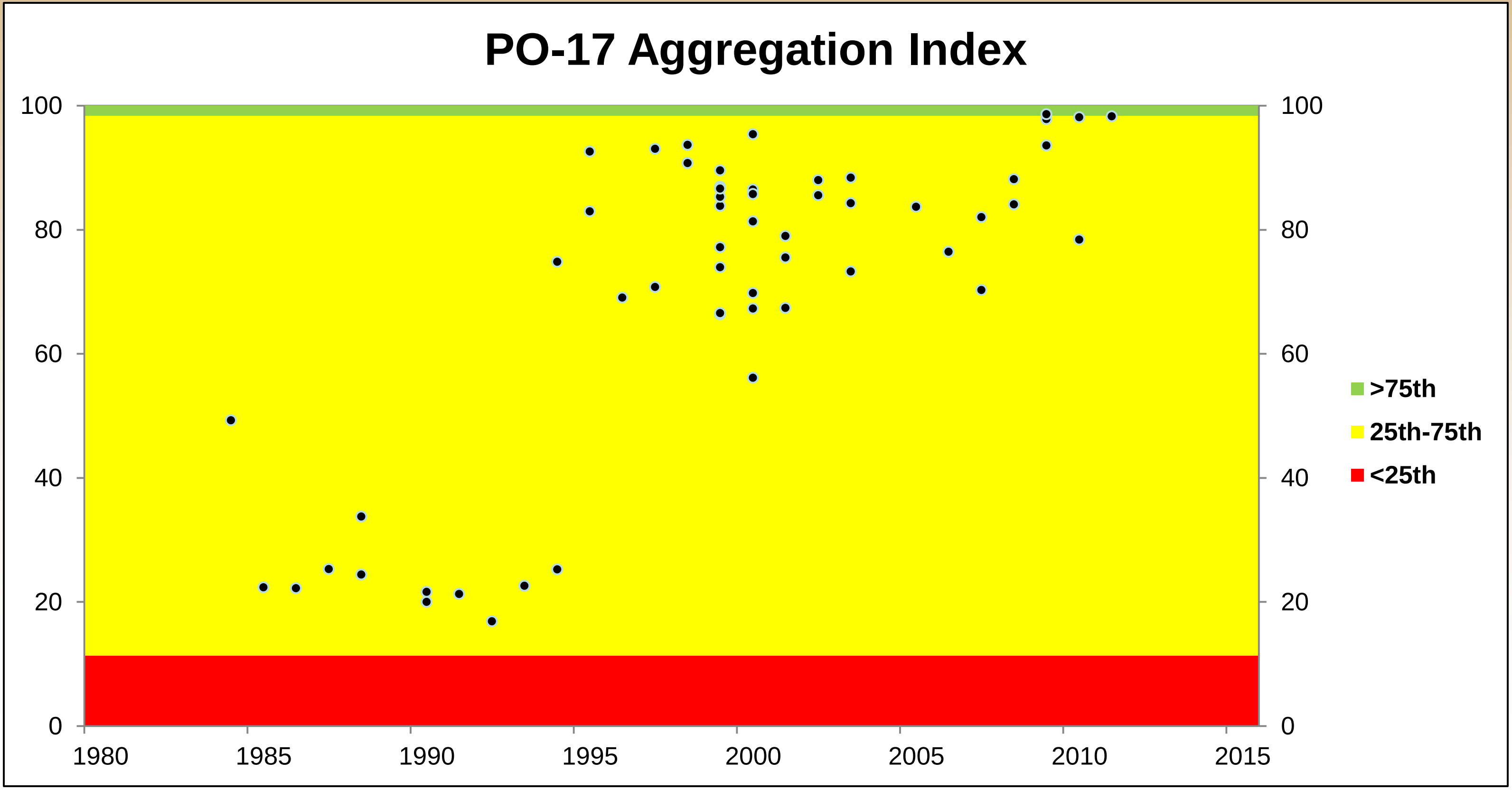
- **Forested wetland and fresh marsh displayed the highest aggregation and stability.**
- **For other marsh types disaggregation increased with increasing salinity gradient.**





- **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.



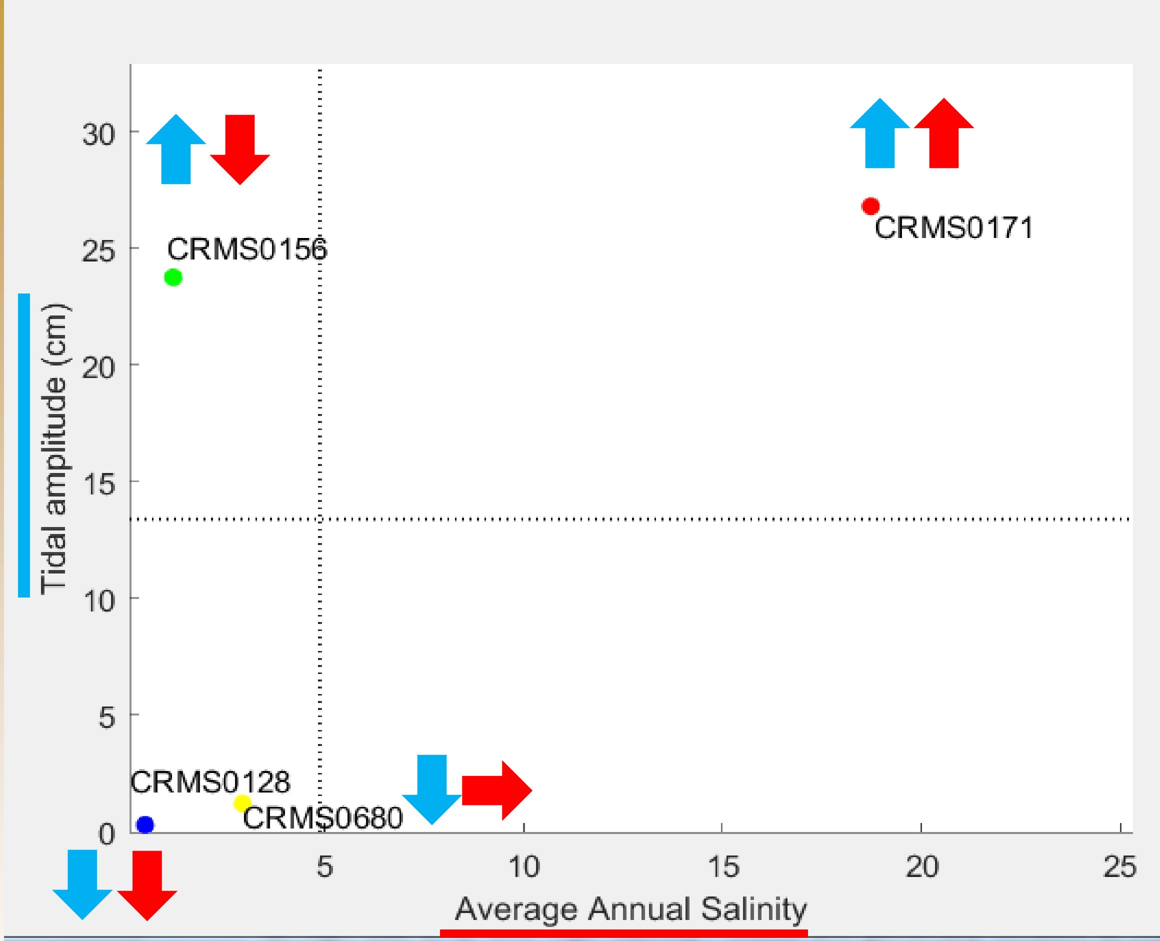
Tidal amplitude and salinity

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

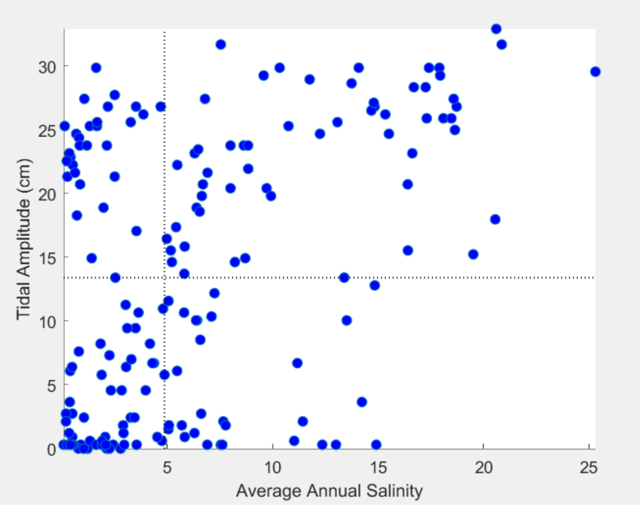
3) low tidal amplitude b/c distance from the coast (friction removes the tide) & low salinity because of upland drainage or river diversions

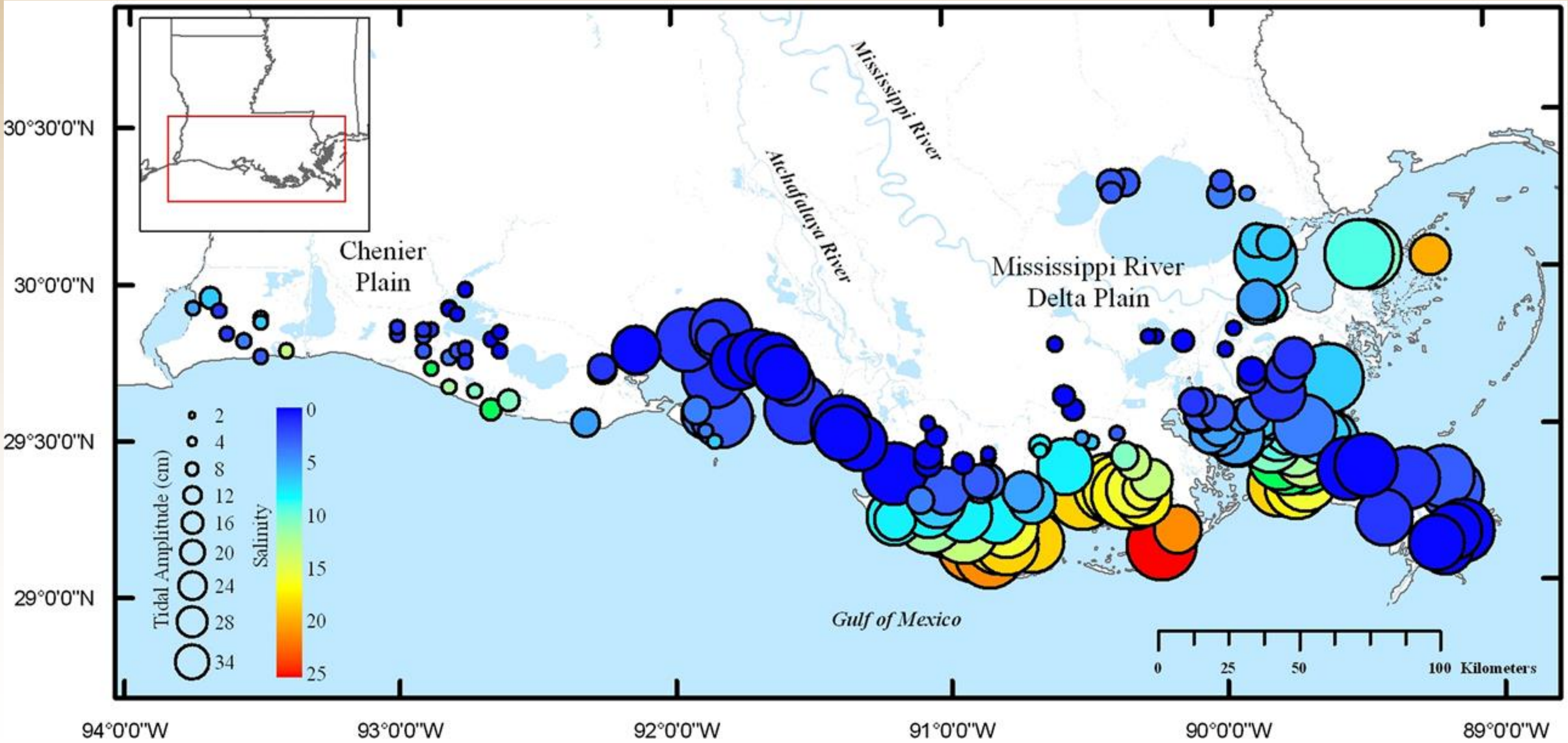
4) low tidal amplitude b/c of water management, higher salinity b/c of proximity to coastal salt input



Hydro Team
Hydrology of CRMS sites

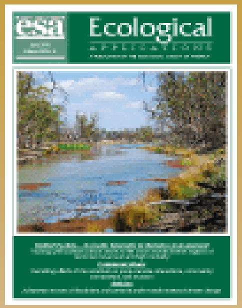
- Tidal amplitude about a foot at "coastal sites" in the east, much less in Chenier Plain.
- Influence of AT and MS rivers visible in the salinities nearby.





What predicts loss of vegetation stations?

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.

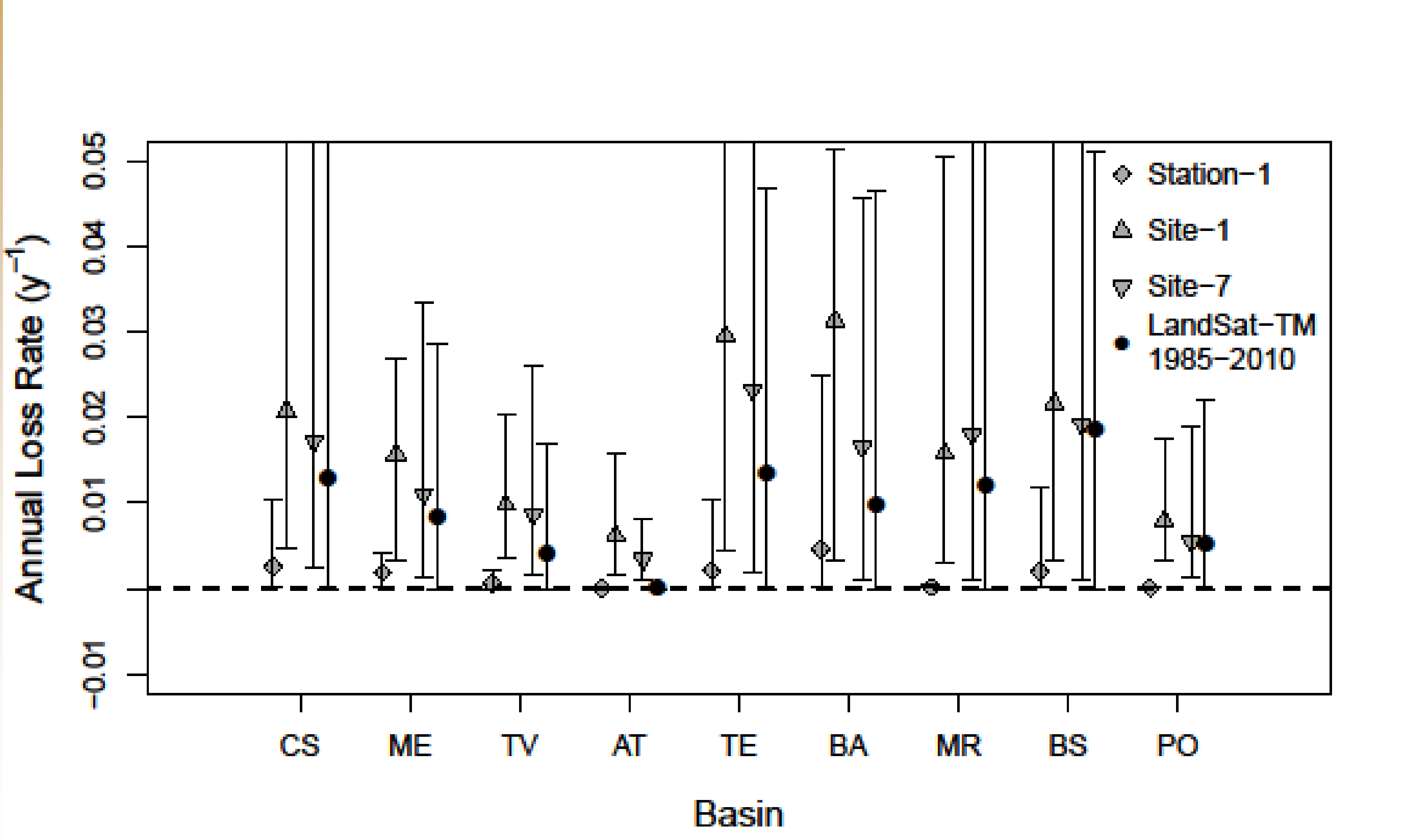
25 observed loss events at the **site** scale:

- 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

What predicts loss of vegetation stations?

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



- 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

CRMS Wetlands
Coastwide Reference Monitoring System

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

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CPRA
Coastal Protection and Restoration Authority of Louisiana

Coastal Wetlands Planning, Protection, and Restoration Act

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