CRMS Website Roadshow

Summer 2017

USFWS, NRCS, EPA-6/5/17, USACE-6/9/17, NOAA-6/16/17

Today's Plan

1. Website releases – per partner requests
2. Upcoming website functionality
3. Website survey
4. Analytical team updates

Released on the Website

Updated CRMS Publications List

100+ pubs mention CRMS or use CRMS data

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

ijver, K. Mills, S.A. Spaulding, P.A. Gell, S. Crawford, A.F. barton, . Potapova. 2014. Morphology, ecology, and biogeography of cillariophyta) and its transfer to the genus Envekadea. Diatom

Bianchette, 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.

Released on the Website

Persistent Suggested Data Citation

Released on the Website

Charting: Seasonal Precipitation

Coastwide Reference Monitoring System — a CWPPRA funded project

Home | Data | Mapping | Library | Visualization | Program

Charting | Bulk Charting | Data Download | Reporting

Hydro

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

Interactive Hydro

Selection

Lake Charles Airport (LCH)
New Orleans Armstrong Intl Airport (MSY)
Slidell Airport (ASD)
Lafayette Airport (LFT)
Boothville (ASOS)
Gulfport-Biloxi Airport (GPT)
Port Arthur Airport (BPT)

- **Equinox based seasons**
- **Annual data feed**
- **1993-2016**

Name	Type	Compressed size	Passv
readme.txt	Text Document	1 KB	No
SeasonalPrecipitationChart_101920...	PNG image	39 KB	No
SeasonalPrecipitationChart_101920...	Microsoft Excel Comma S...	1 KB	No
SeasonalPrecipitationChart_101920...	PNG image	26 KB	No

readme.txt - Notepad

File Edit Format View Help

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Seasonal Date Ranges:

Winter -- December 21 (of year prior) thru March 19 (of current year)
Spring -- March 20 thru June 19
Summer -- June 20 thru September 21
Fall   -- September 22 thru December 20
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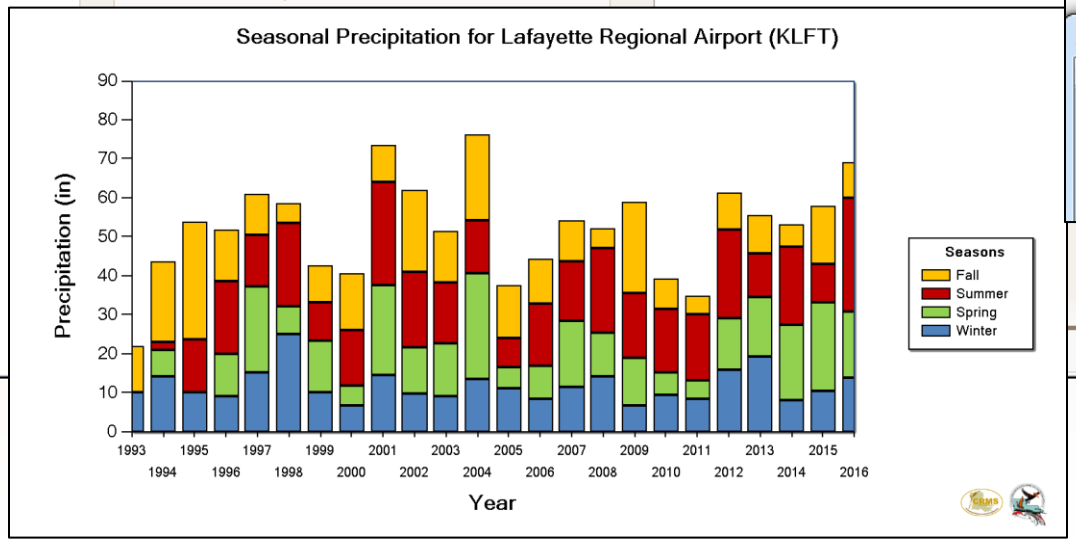
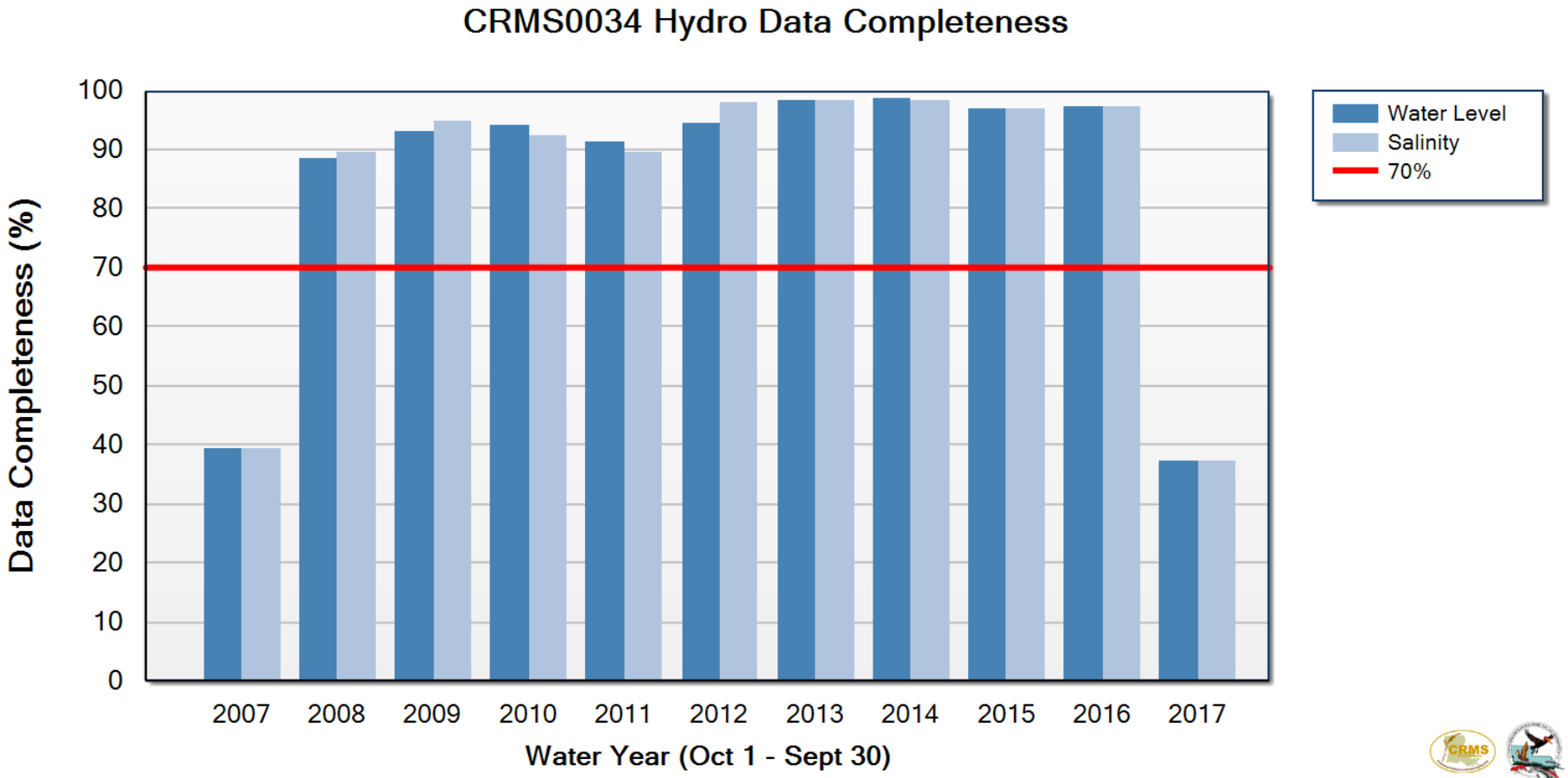


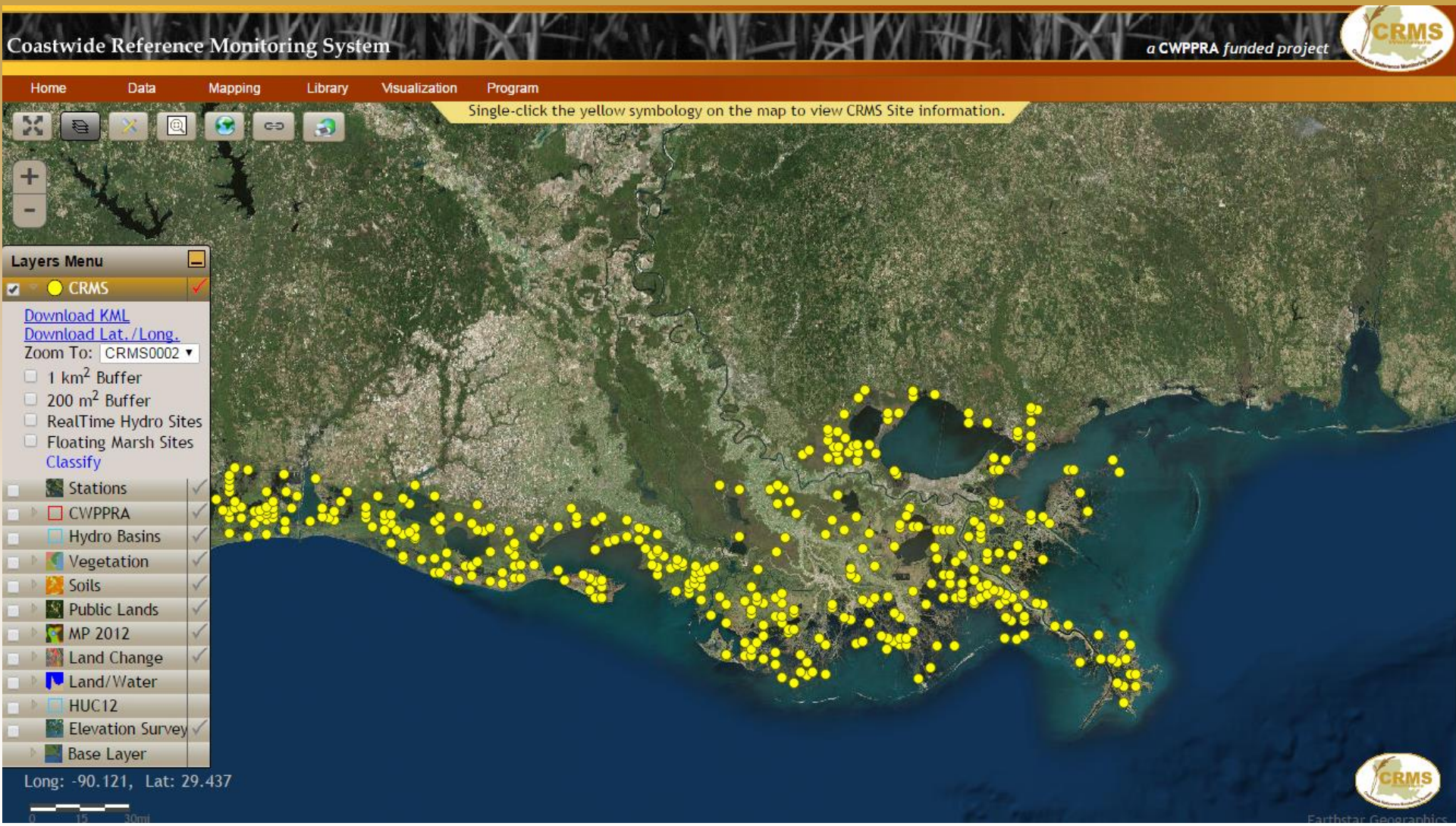
Released on the Website

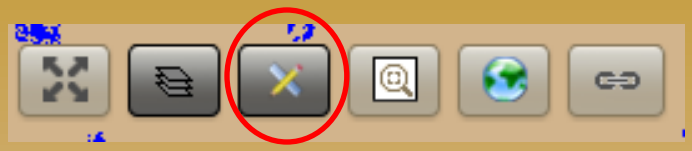
Charting: Inserted CWPPRA and CRMS logos

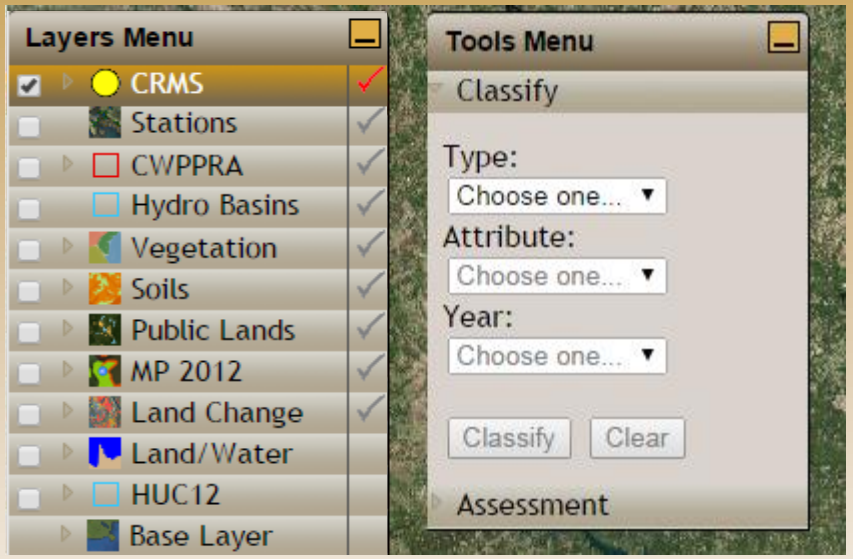


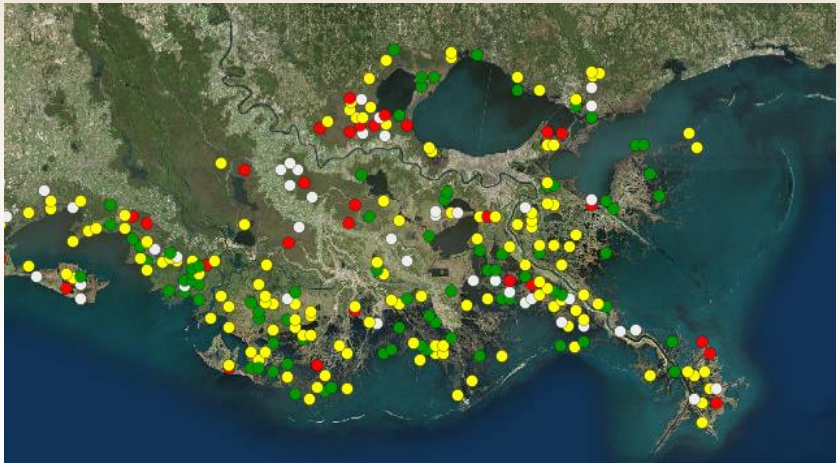
Released on the Website

Mapping: Ability to download site coordinates









Classify Tool-

A Type, Attribute, and Year must be chosen to Classify the CRMS sites.

Vegetation
- FQI
- Total Percent Cover
- Marsh Classification

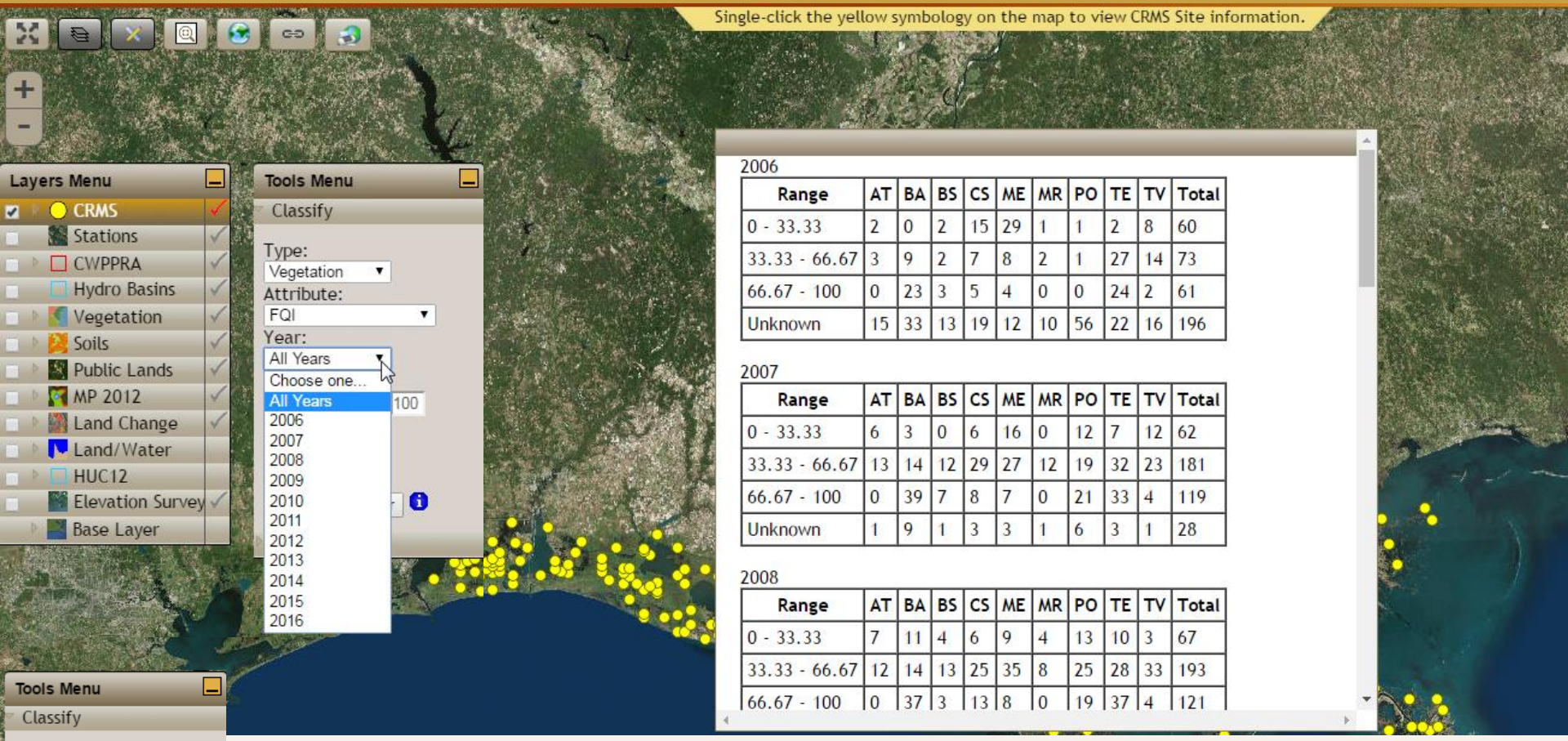
Hydro
- Flooding
- Hydro Index
- Salinity
- Water Level

Soil
- Surface Elevation Change Rate
- Submergence Vulnerability Index (SVI)
- Bulk Density (mean 0-16cm, 3 cores)
- % Organic (mean 0-16cm, 3 cores)

Spatial
- Land Acres
- Percent Land

Released on the Website

Tools- Classify Multi-Year Summaries



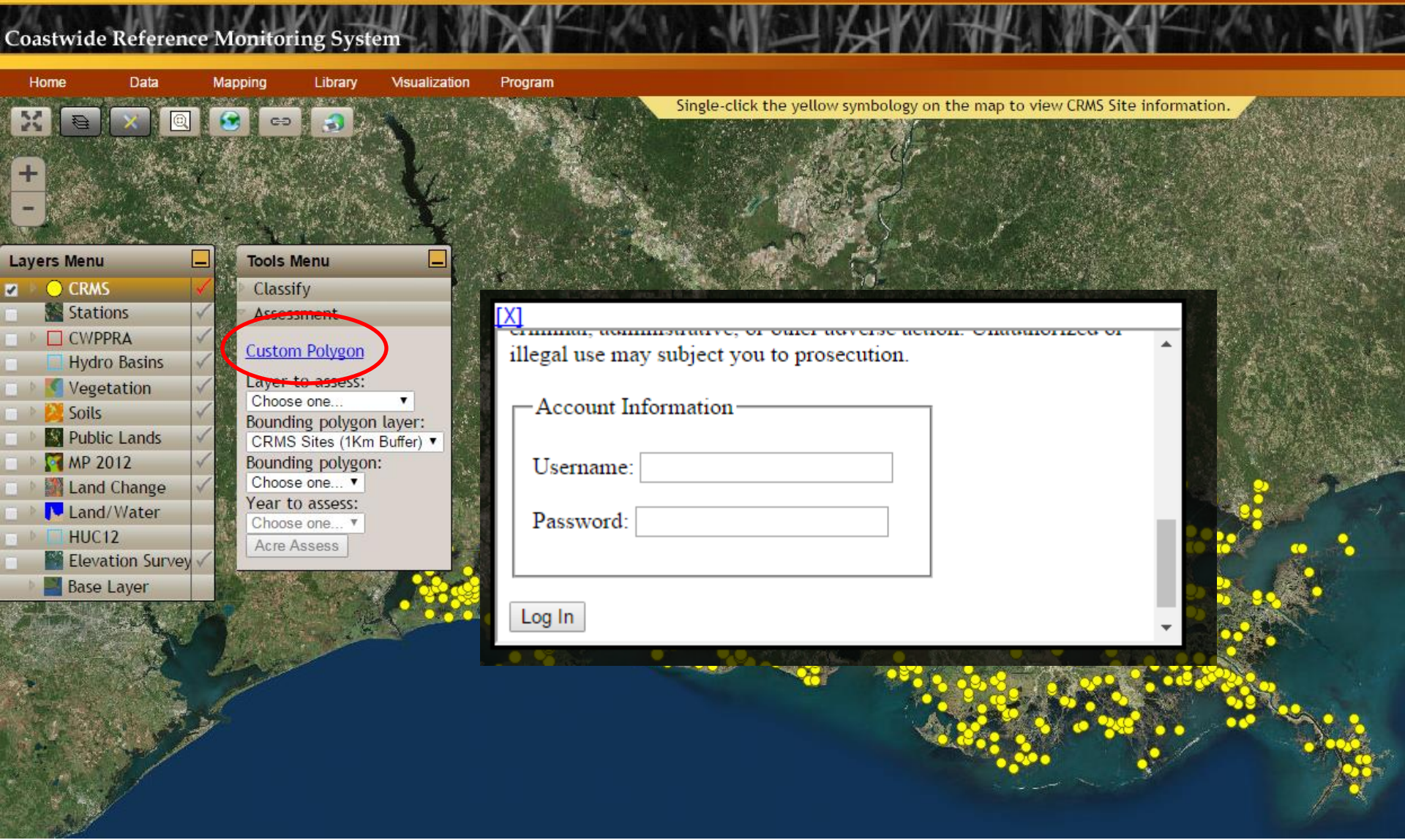
Summaries reflect the intervals chosen by the user.

Implementation for all types and attributes in progress.

Released on the Website

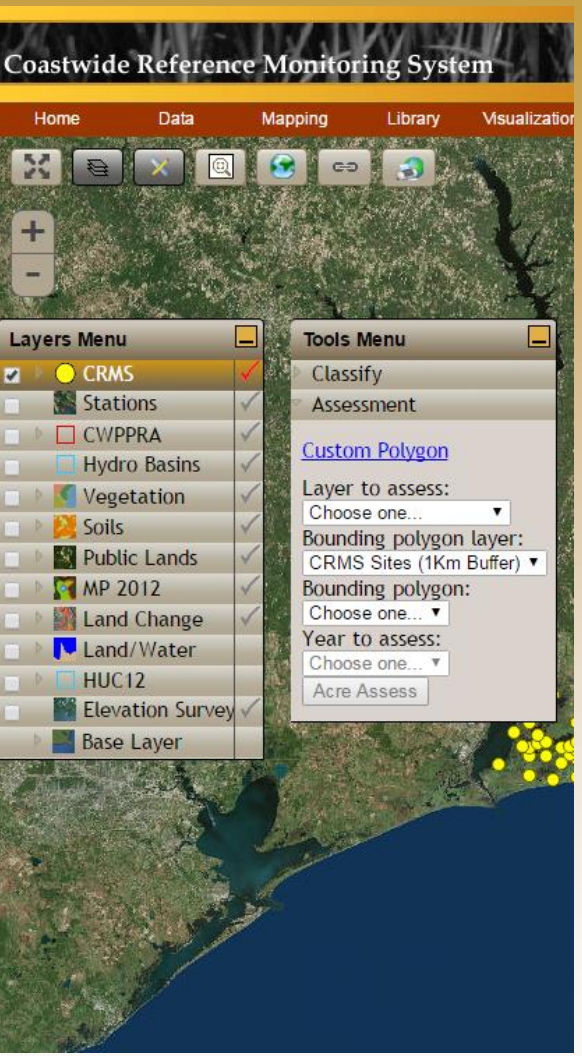
Tools: Acreage Assessment with Imported Shapefile

For credentials, email piazzas@usgs.gov



Released on the Website

Tools: Acreage Assessment with Imported Shapefile



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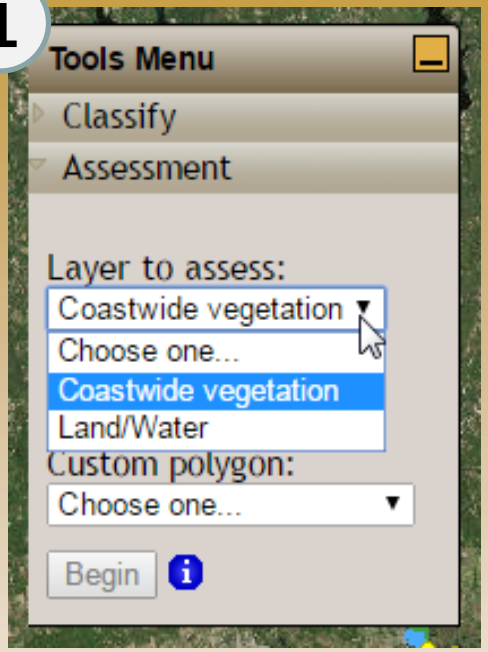

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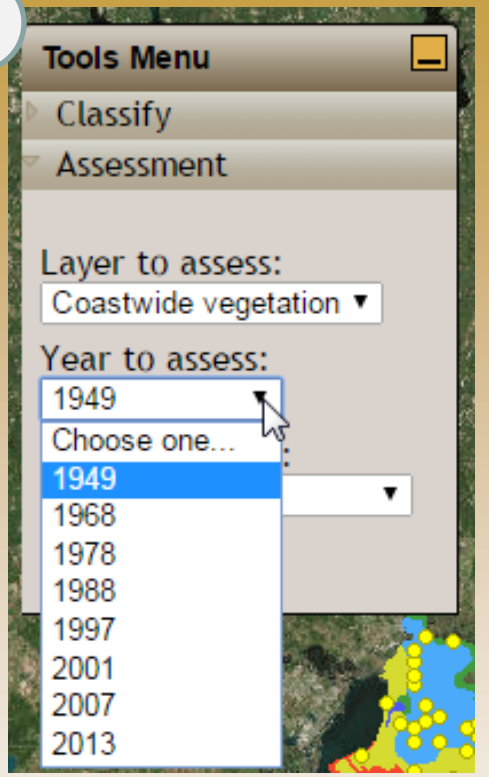

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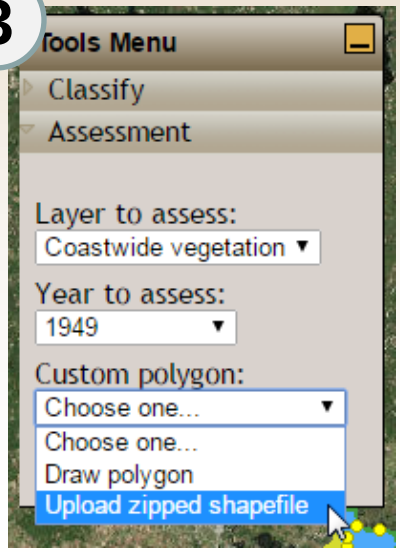

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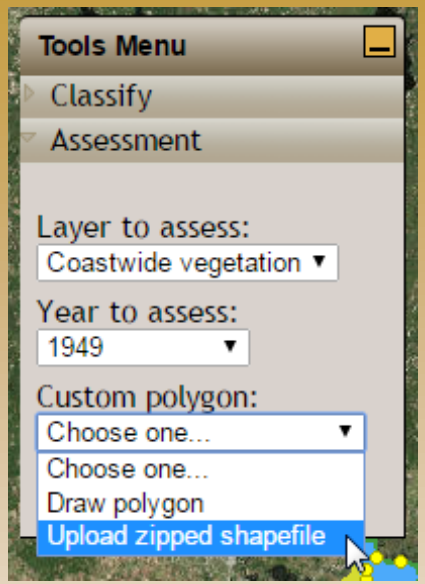
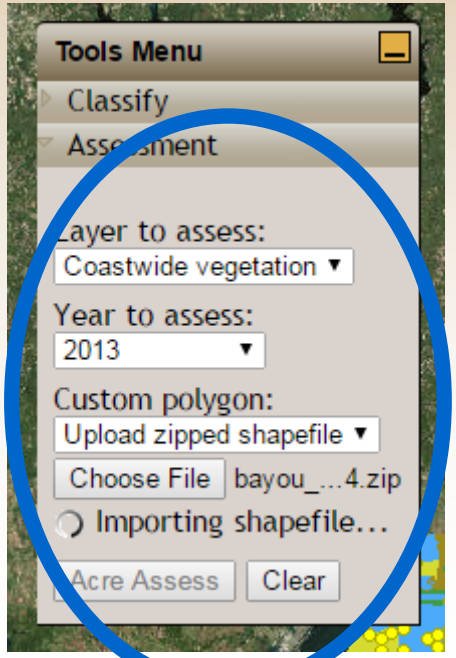
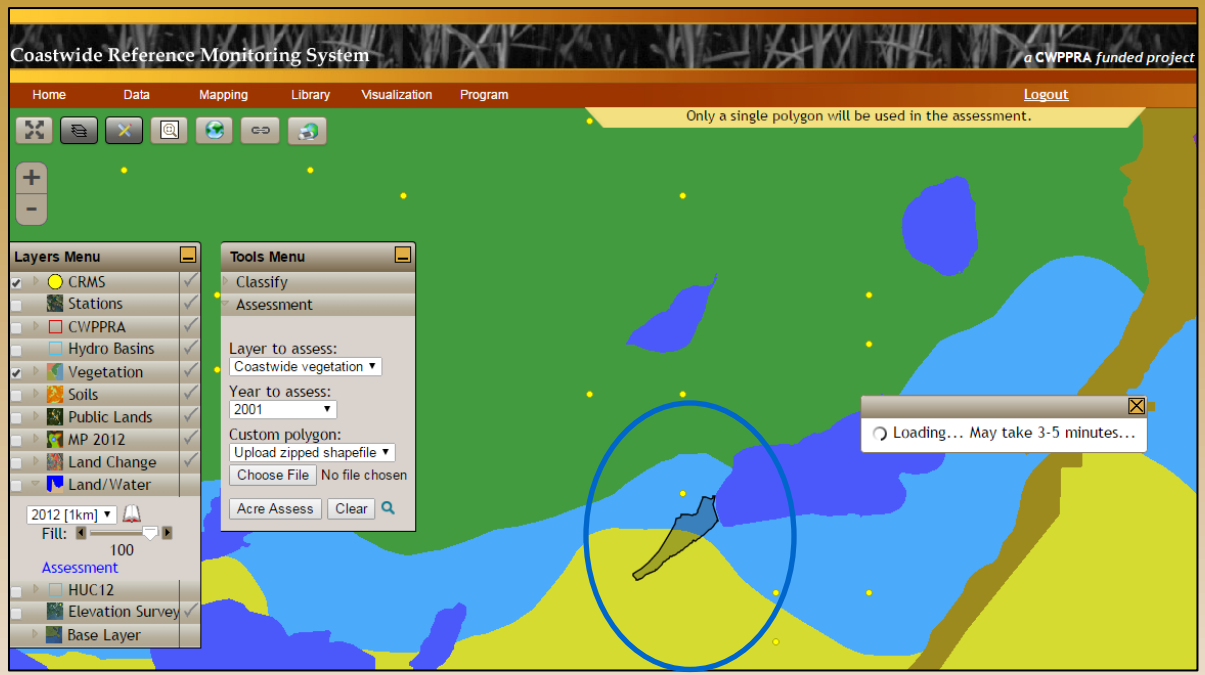
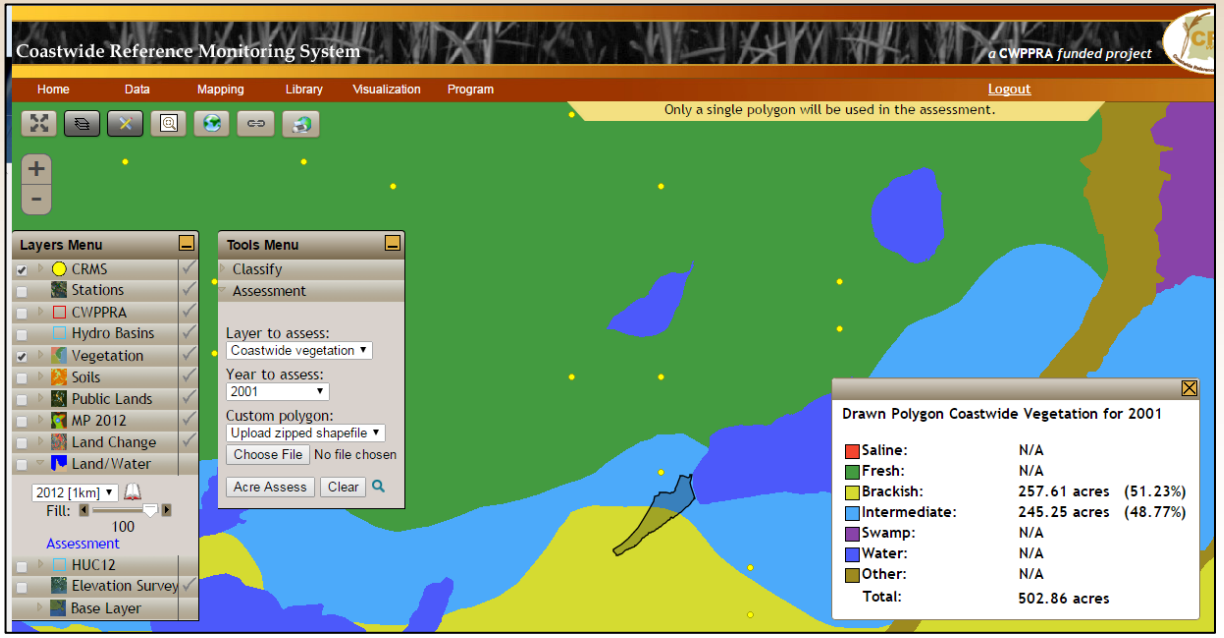
Tools: Acreage Assessment with Imported Shapefile









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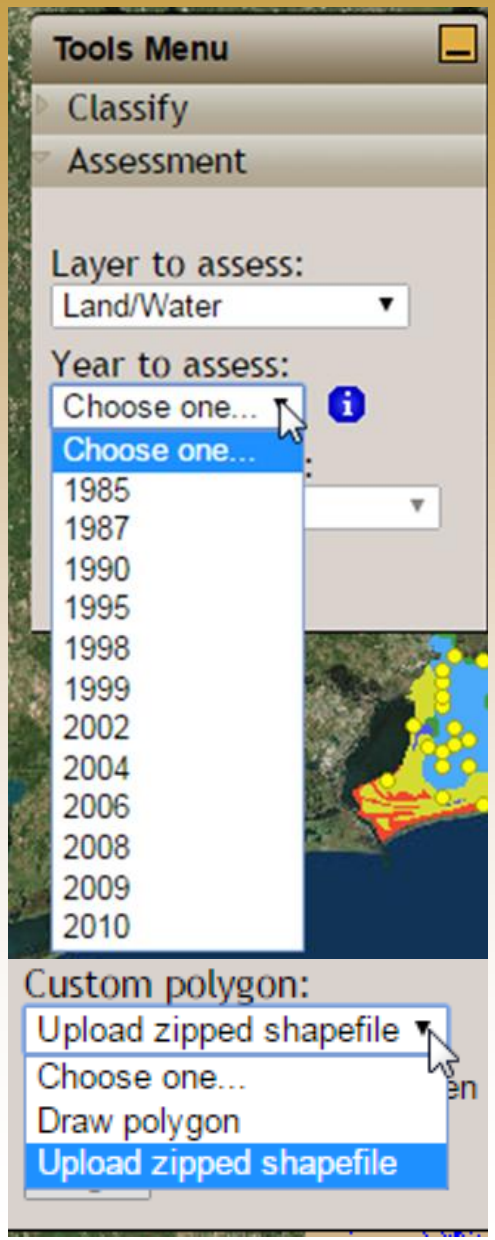
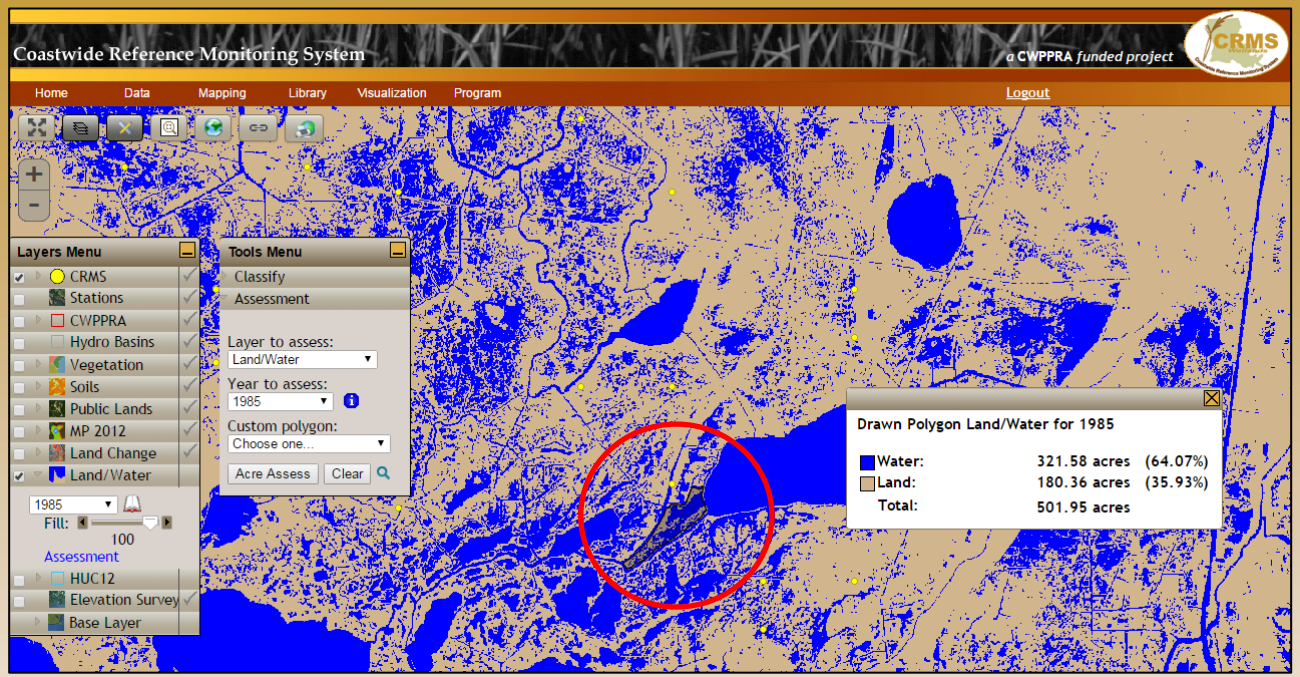
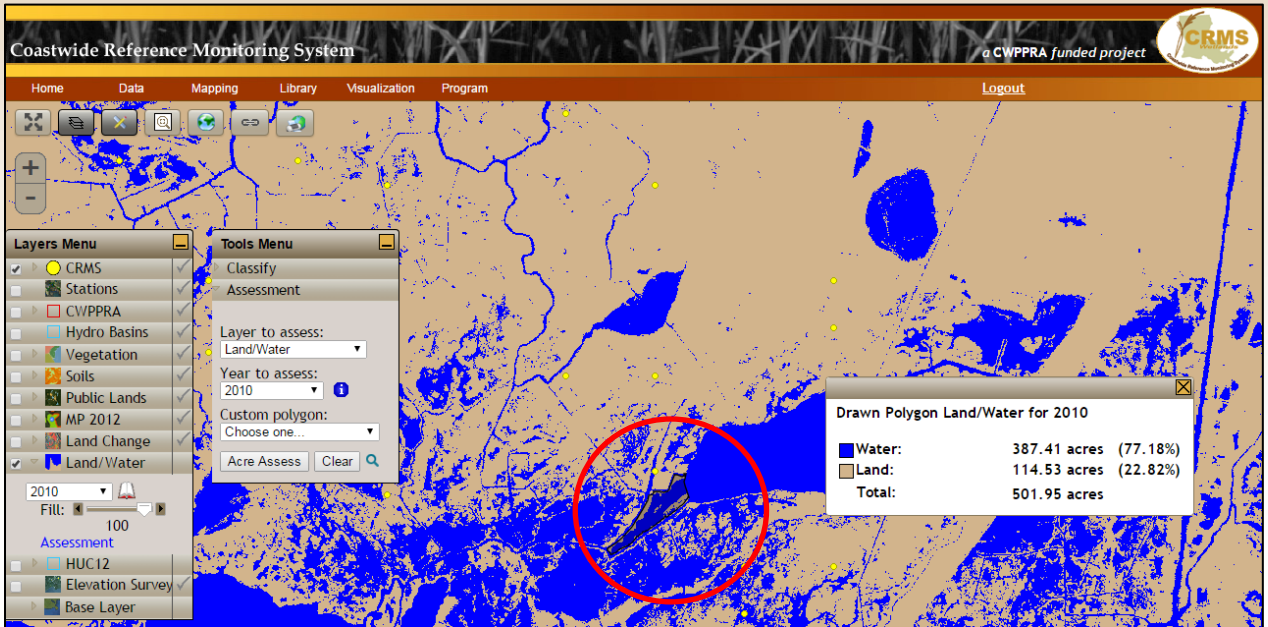
Tools: Acreage Assessment with Imported Shapefile







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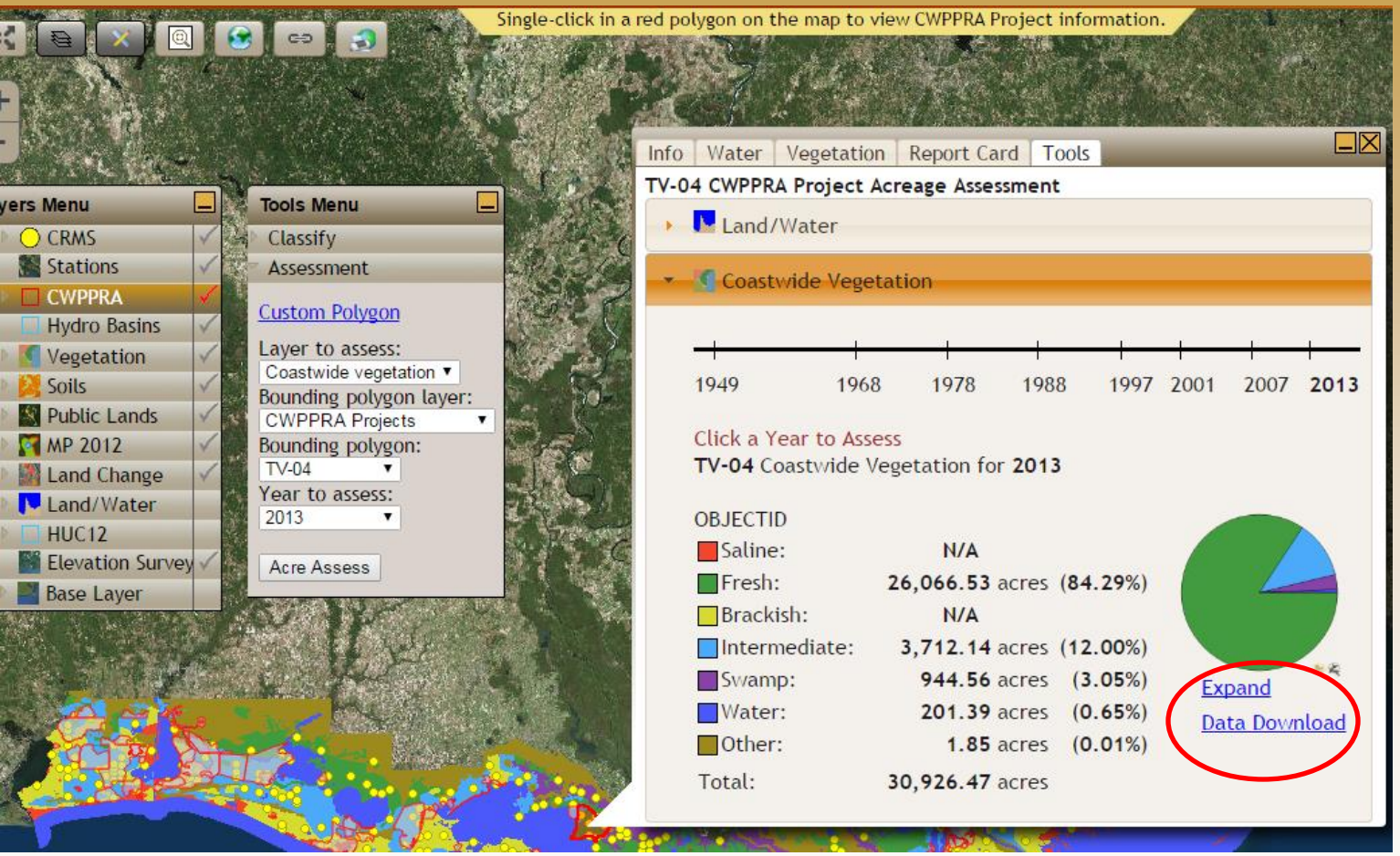
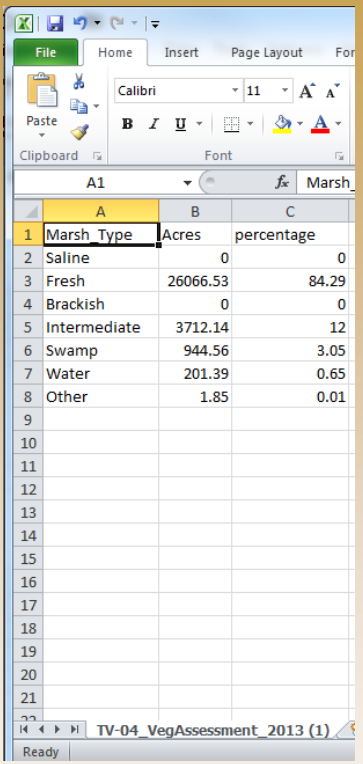
Tools: Acreage Assessment Data Download





	A	B	C
1	Marsh_Type	Acres	percentage
2	Saline	0	0
3	Fresh	26066.53	84.29
4	Brackish	0	0
5	Intermediate	3712.14	12
6	Swamp	944.56	3.05
7	Water	201.39	0.65
8	Other	1.85	0.01
9			
10			
11			
12			
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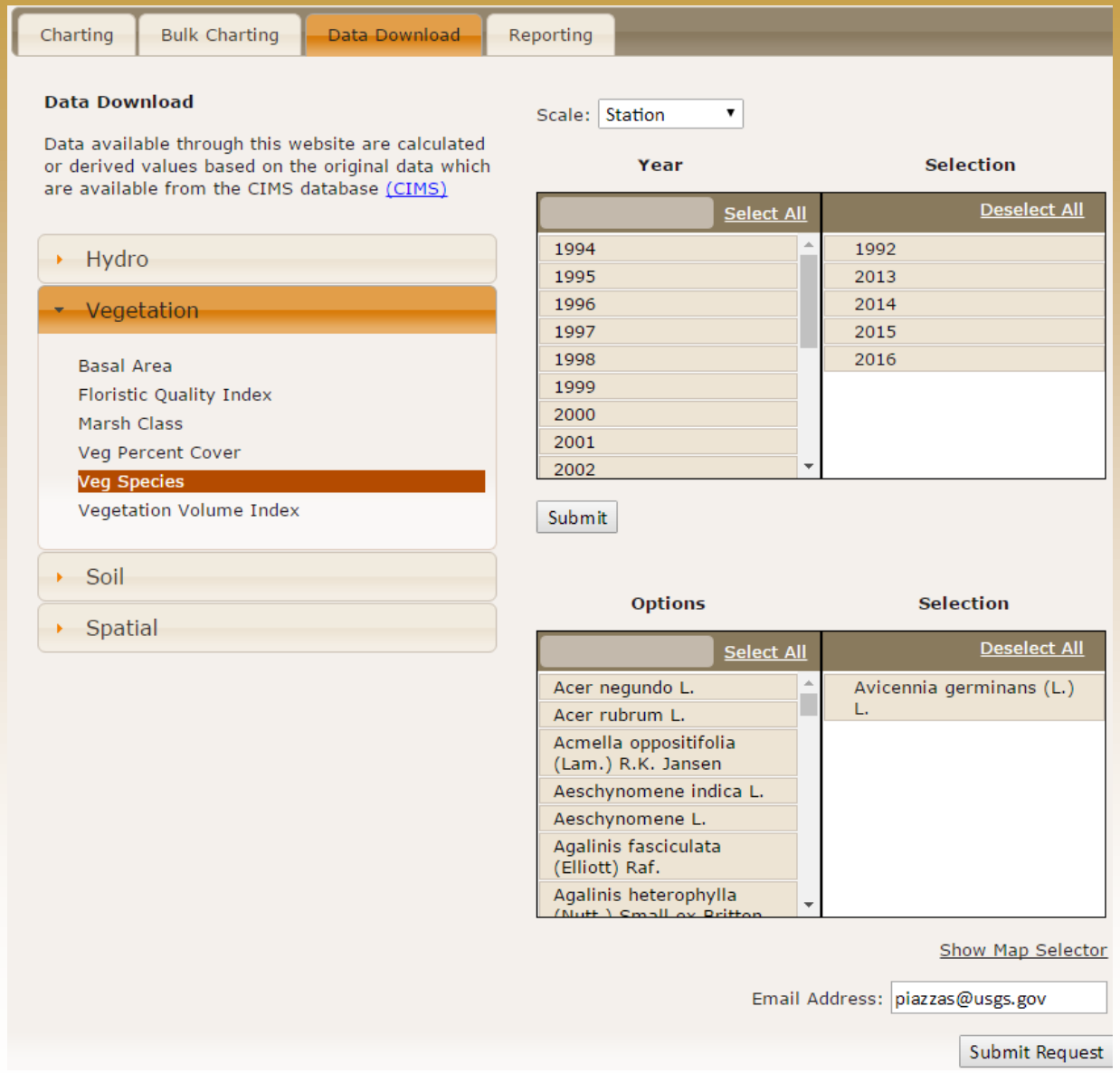
21			

TV-04_VegAssessment_2013 (1)

Released on the Website

Data Download: Vegetation Species Search



Search database for specific observations by vegetation species.

Scale:
1) Station
2) Site

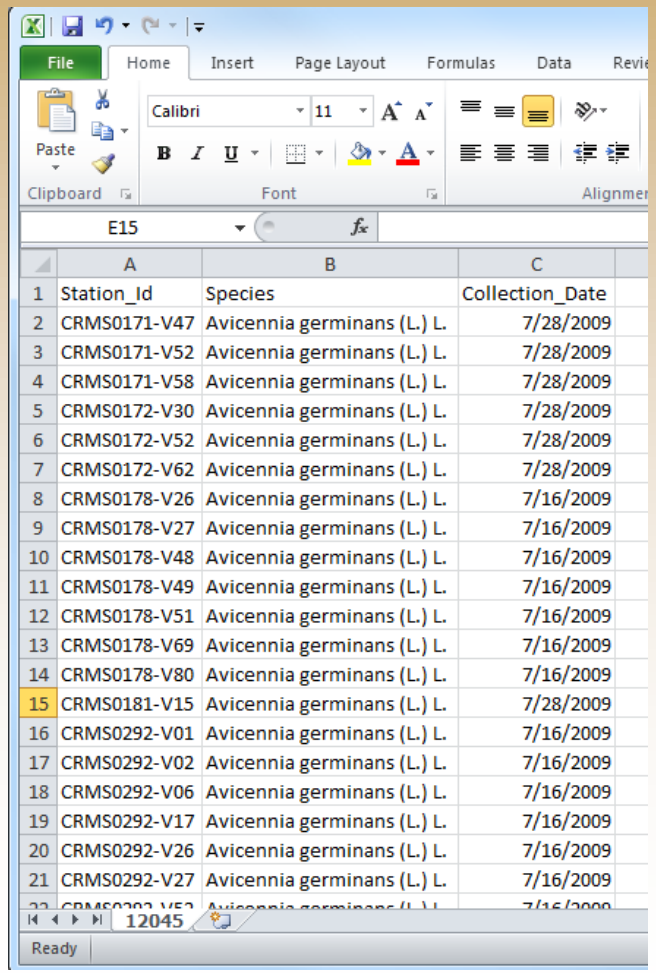
Years:
Any data in CIMS including pre-CRMS

Options:
All vegetation species in the database, text recognition to sort options

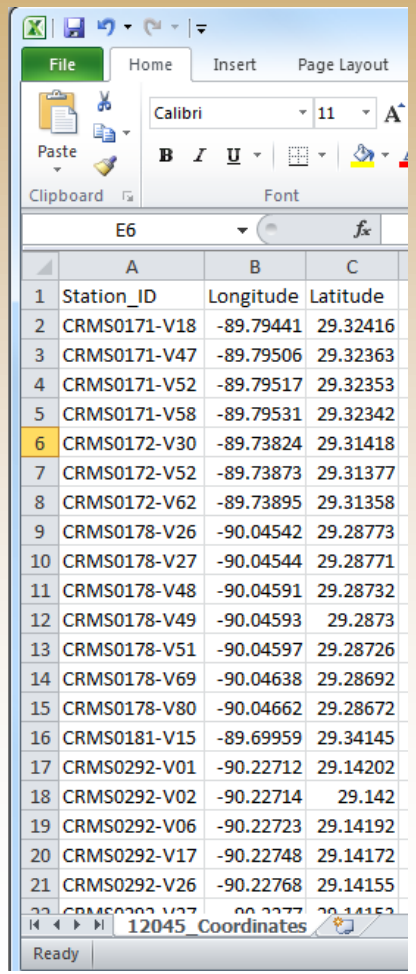
Released on the Website

Data Download: Vegetation Species Search

Name	Type	Compressed size	Password ...	Size	Ratio
12045.csv	Microsoft Excel Comma S...	1 KB	No	5 KB	92%
12045_Coordinates.csv	Microsoft Excel Comma S...	1 KB	No	2 KB	75%



	A	B	C
1	Station_Id	Species	Collection_Date
2	CRMS0171-V47	Avicennia germinans (L.) L.	7/28/2009
3	CRMS0171-V52	Avicennia germinans (L.) L.	7/28/2009
4	CRMS0171-V58	Avicennia germinans (L.) L.	7/28/2009
5	CRMS0172-V30	Avicennia germinans (L.) L.	7/28/2009
6	CRMS0172-V52	Avicennia germinans (L.) L.	7/28/2009
7	CRMS0172-V62	Avicennia germinans (L.) L.	7/28/2009
8	CRMS0178-V26	Avicennia germinans (L.) L.	7/16/2009
9	CRMS0178-V27	Avicennia germinans (L.) L.	7/16/2009
10	CRMS0178-V48	Avicennia germinans (L.) L.	7/16/2009
11	CRMS0178-V49	Avicennia germinans (L.) L.	7/16/2009
12	CRMS0178-V51	Avicennia germinans (L.) L.	7/16/2009
13	CRMS0178-V69	Avicennia germinans (L.) L.	7/16/2009
14	CRMS0178-V80	Avicennia germinans (L.) L.	7/16/2009
15	CRMS0181-V15	Avicennia germinans (L.) L.	7/28/2009
16	CRMS0292-V01	Avicennia germinans (L.) L.	7/16/2009
17	CRMS0292-V02	Avicennia germinans (L.) L.	7/16/2009
18	CRMS0292-V06	Avicennia germinans (L.) L.	7/16/2009
19	CRMS0292-V17	Avicennia germinans (L.) L.	7/16/2009
20	CRMS0292-V26	Avicennia germinans (L.) L.	7/16/2009
21	CRMS0292-V27	Avicennia germinans (L.) L.	7/16/2009



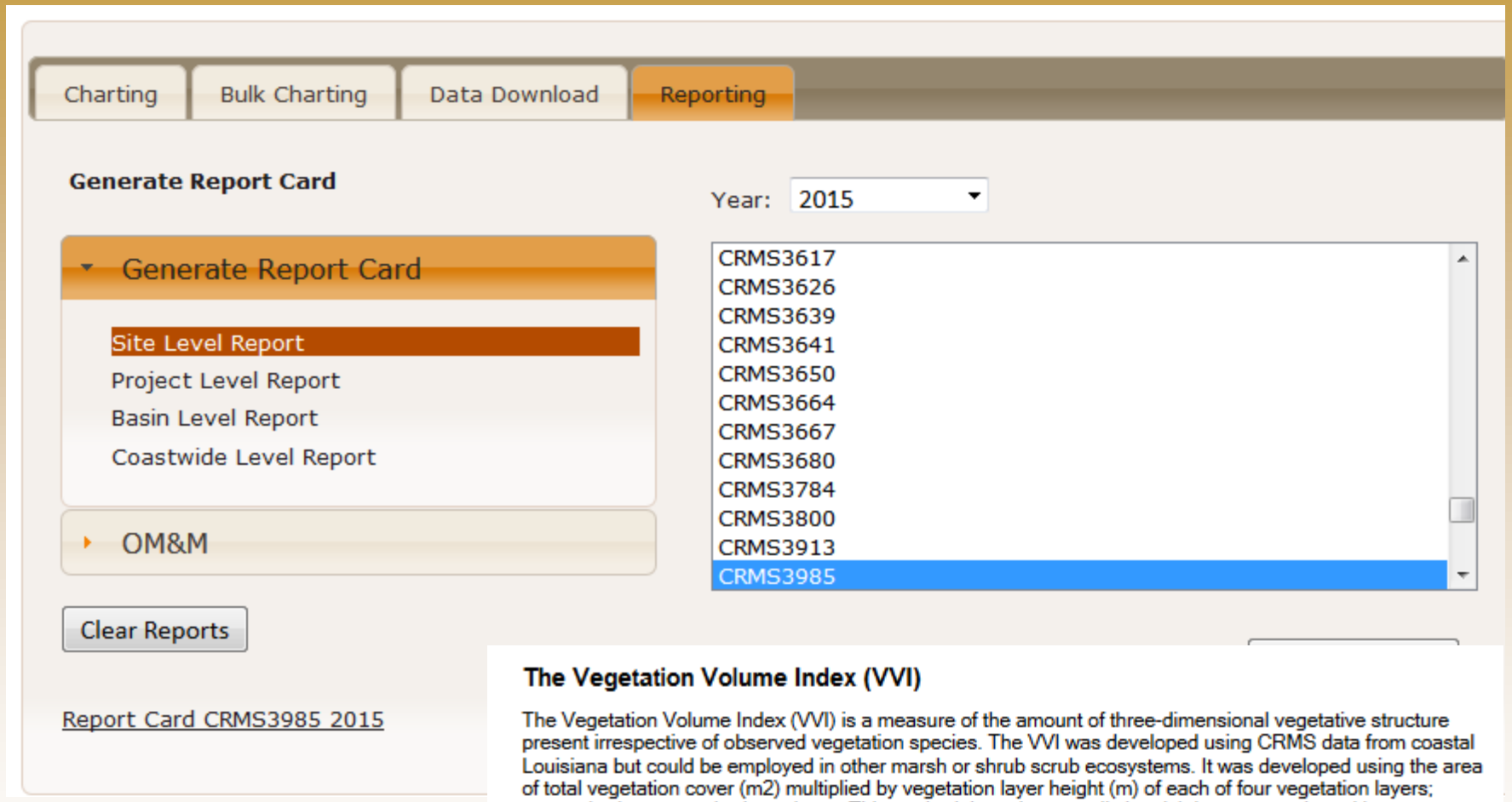
	A	B	C
1	Station_ID	Longitude	Latitude
2	CRMS0171-V18	-89.79441	29.32416
3	CRMS0171-V47	-89.79506	29.32363
4	CRMS0171-V52	-89.79517	29.32353
5	CRMS0171-V58	-89.79531	29.32342
6	CRMS0172-V30	-89.73824	29.31418
7	CRMS0172-V52	-89.73873	29.31377
8	CRMS0172-V62	-89.73895	29.31358
9	CRMS0178-V26	-90.04542	29.28773
10	CRMS0178-V27	-90.04544	29.28771
11	CRMS0178-V48	-90.04591	29.28732
12	CRMS0178-V49	-90.04593	29.2873
13	CRMS0178-V51	-90.04597	29.28726
14	CRMS0178-V69	-90.04638	29.28692
15	CRMS0178-V80	-90.04662	29.28672
16	CRMS0181-V15	-89.69959	29.34145
17	CRMS0292-V01	-90.22712	29.14202
18	CRMS0292-V02	-90.22714	29.142
19	CRMS0292-V06	-90.22723	29.14192
20	CRMS0292-V17	-90.22748	29.14172
21	CRMS0292-V26	-90.22768	29.14155

Zip file via email

1) Data file
2) Coordinates of relevant sites/stations

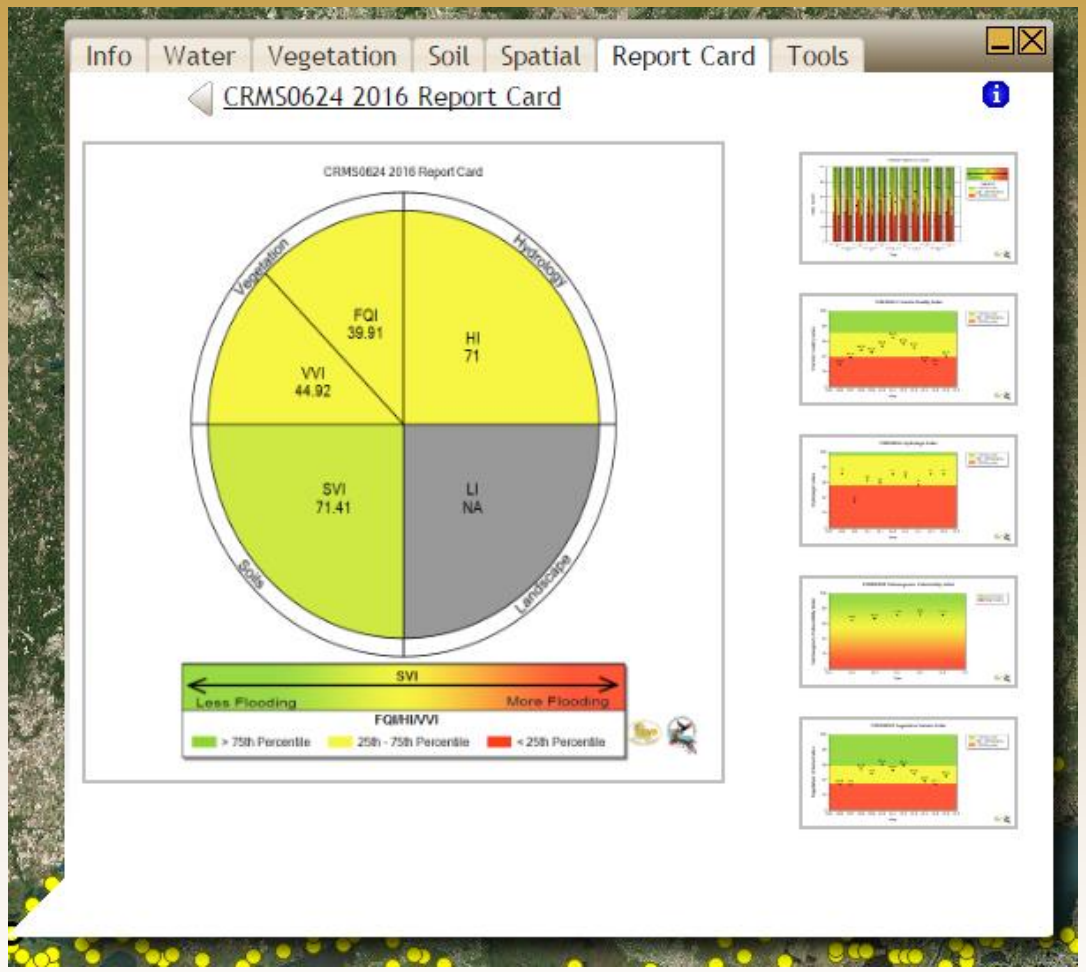
Released on the Website

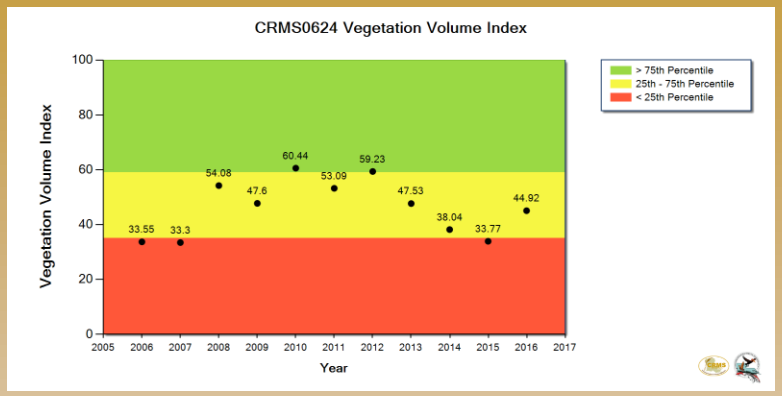
VVI in Report Card

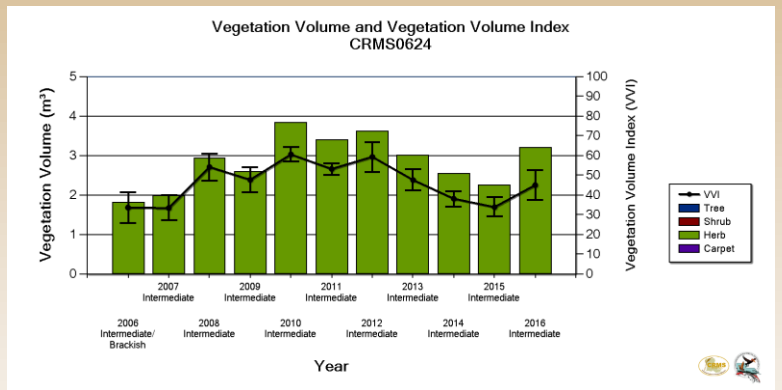


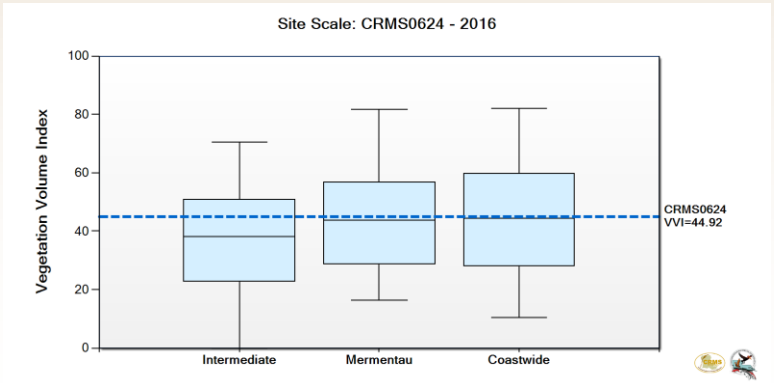
Released on the Website

VVI incorporated throughout website and report card tab



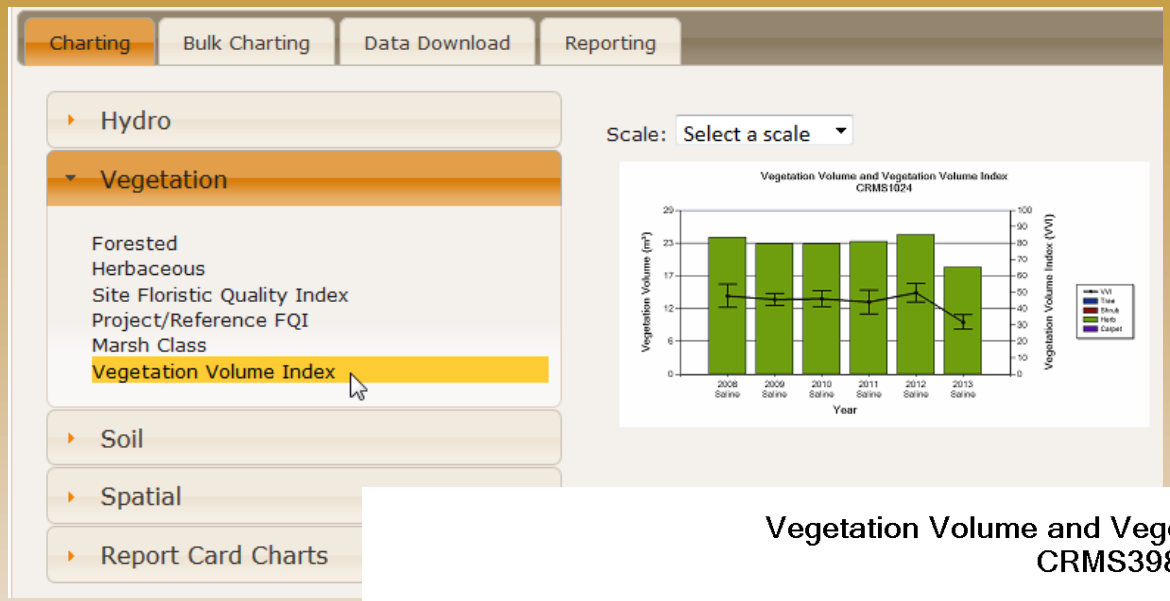


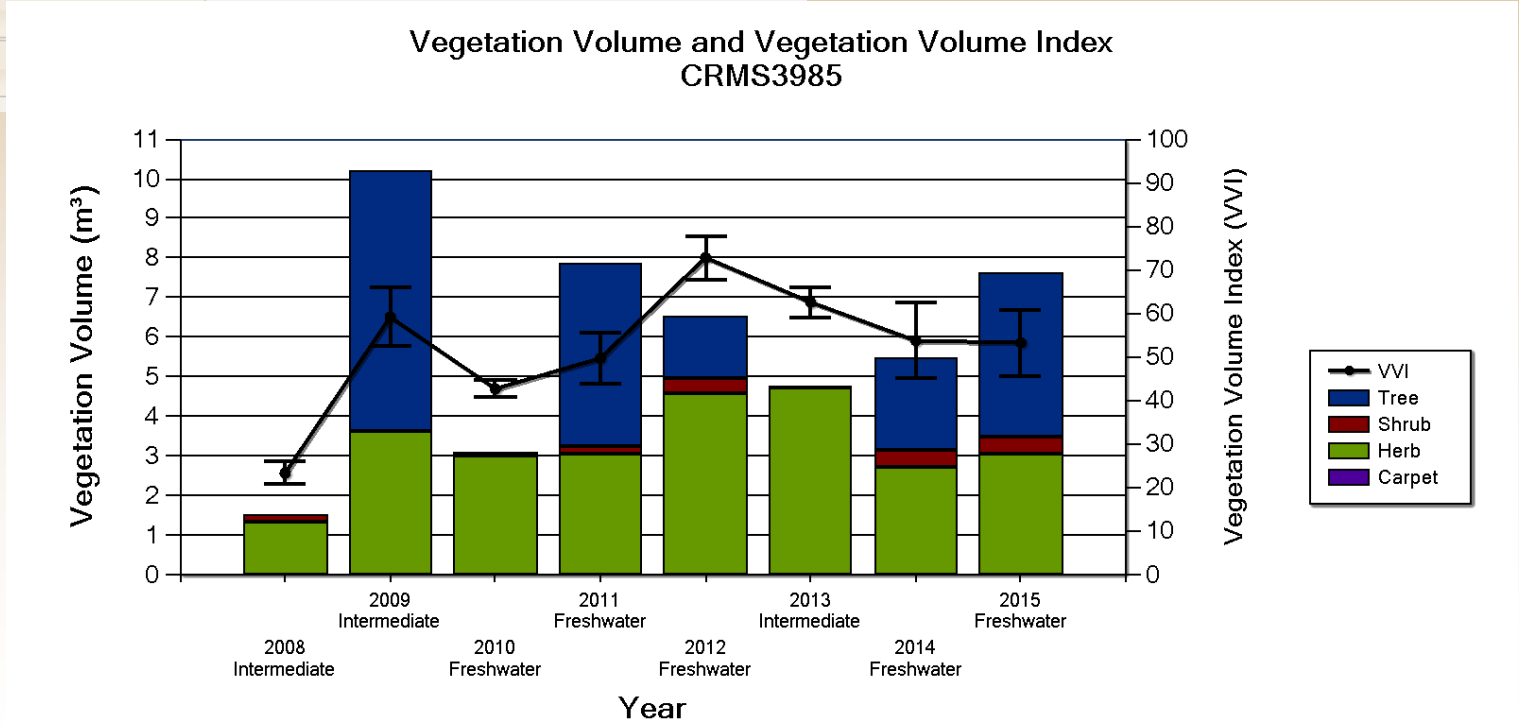




Released on the Website

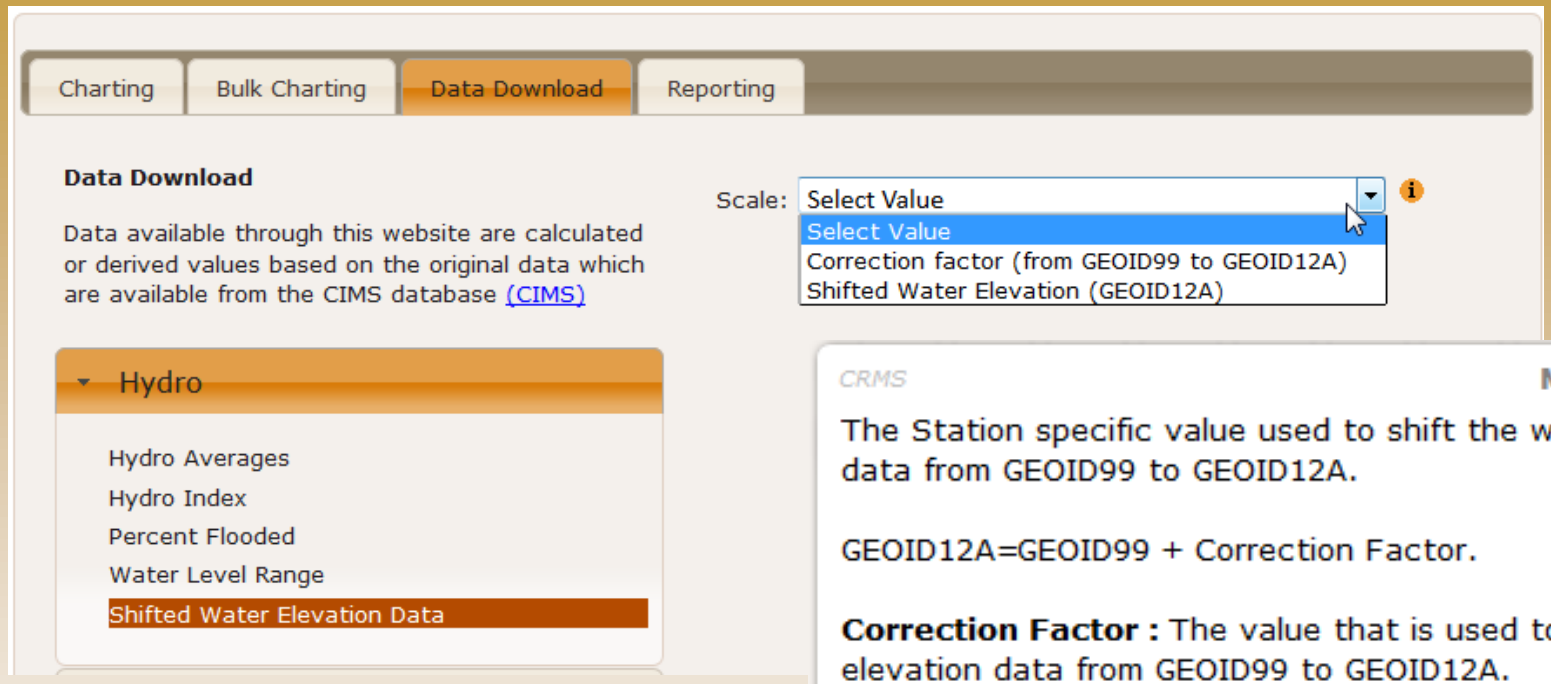
VVI in charting

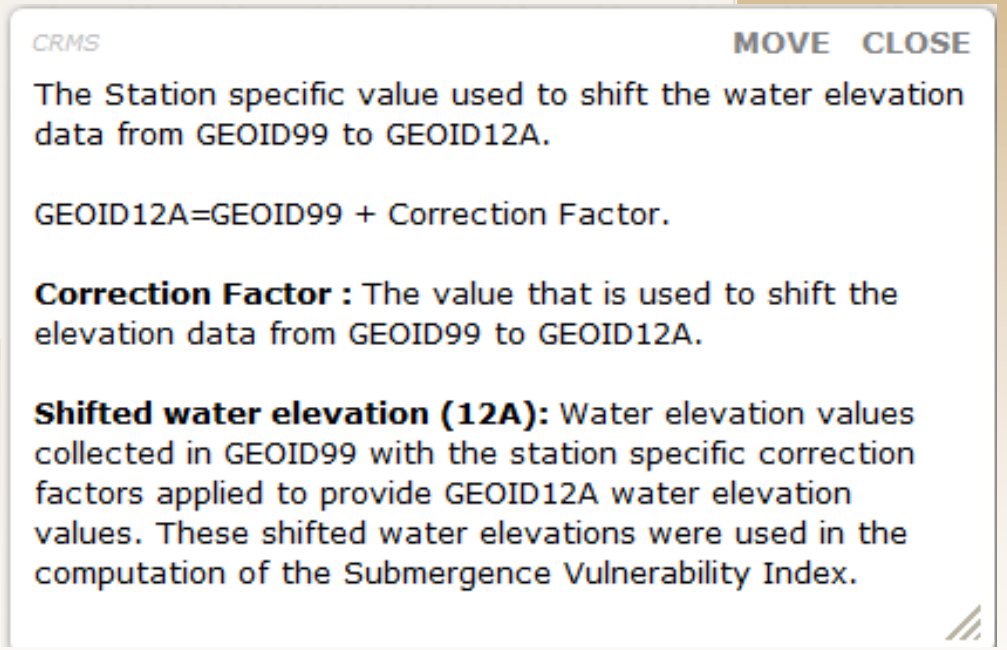




Reminder: Released on the Website

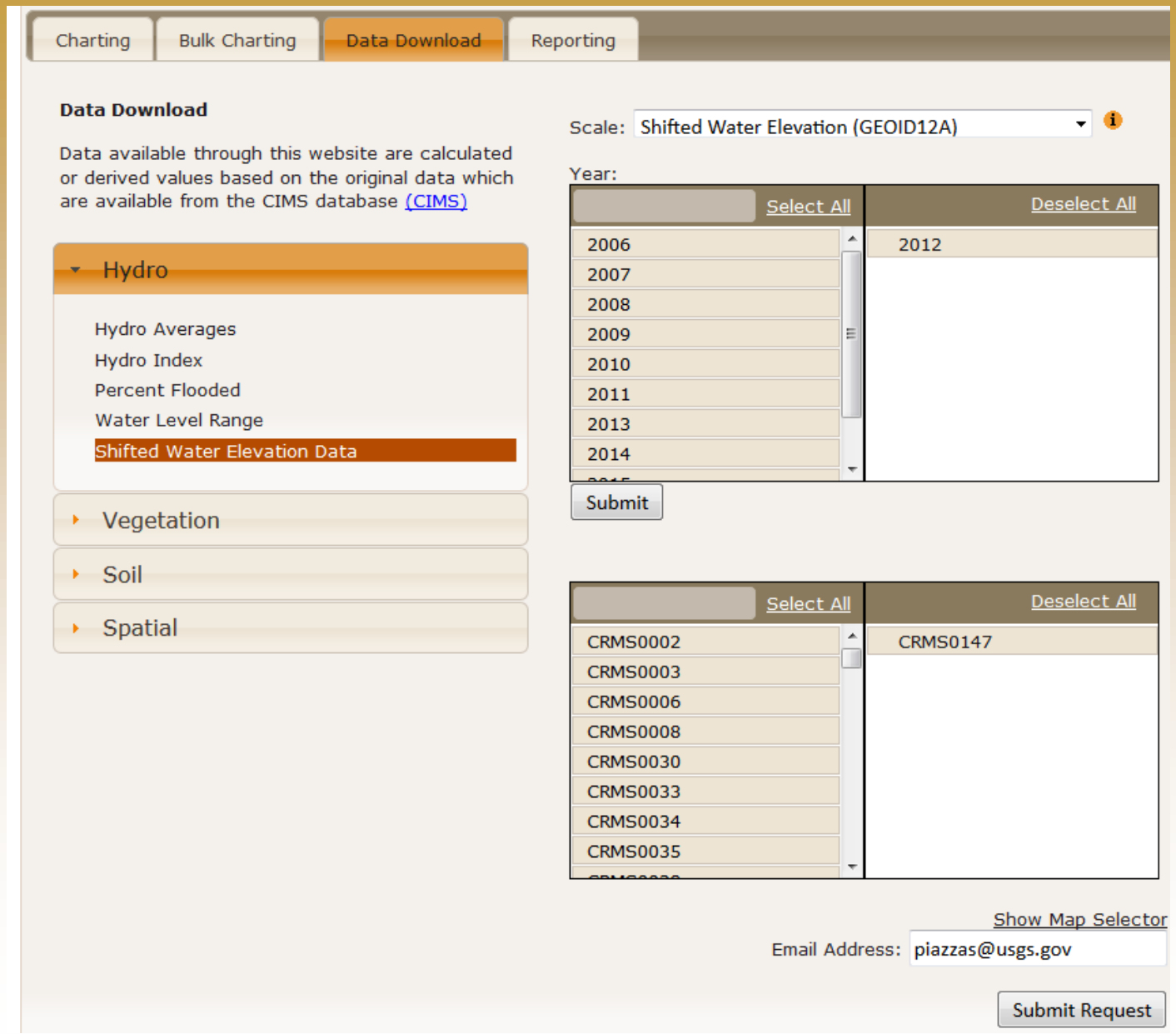
Data Download: 2014 Coastwide CRMS elevation survey





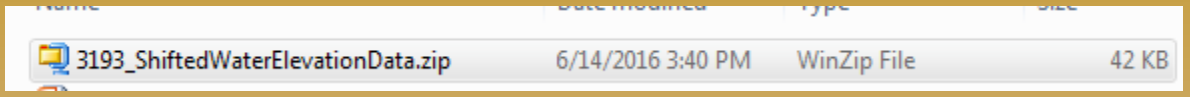
Reminder: Released on the Website

Data Download: Shifted Water Elevation



Reminder: Released on the Website

Data Download: Shifted Water Elevation



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			

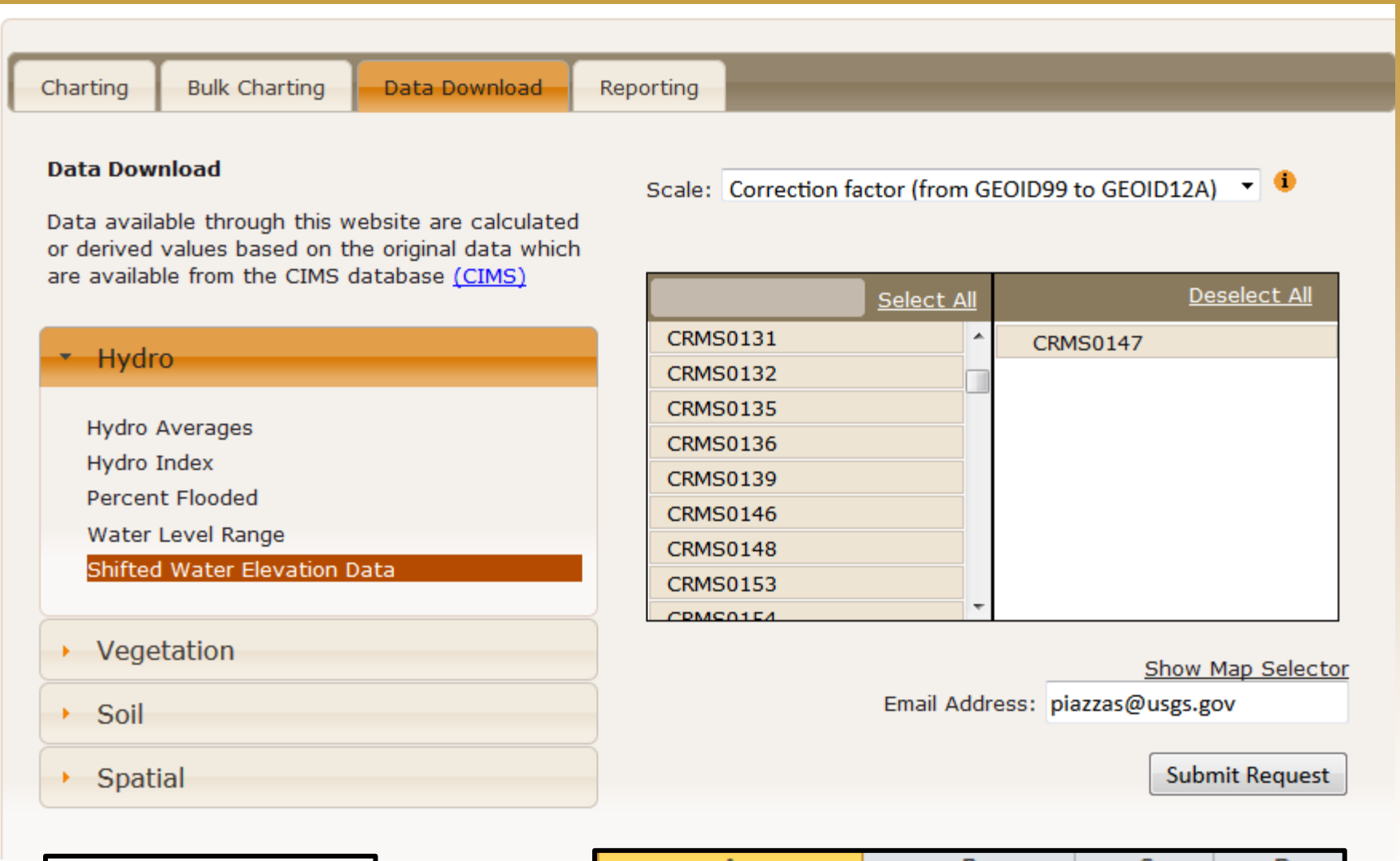
Disclaimer:
These water elevation data have been shifted from the GEOID in which they were observed (GEOID99) into the most recent GEOID (GEOID12A).

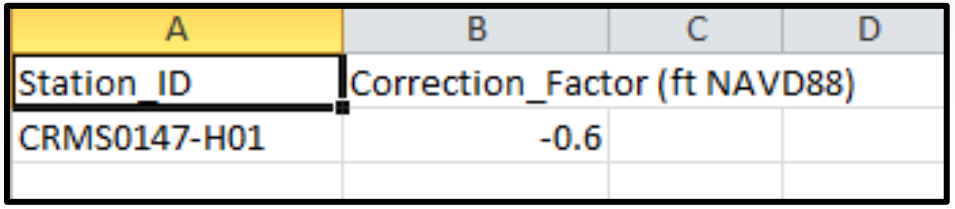
Stations were surveyed relative to GEOID12A in water year 2014. Uncertainty increases with time as values are shifted prior to water year 2014.

Corrections for subsidence have not been identified or applied.

Reminder: Released on the Website

Data download: CRMS site specific correction factors



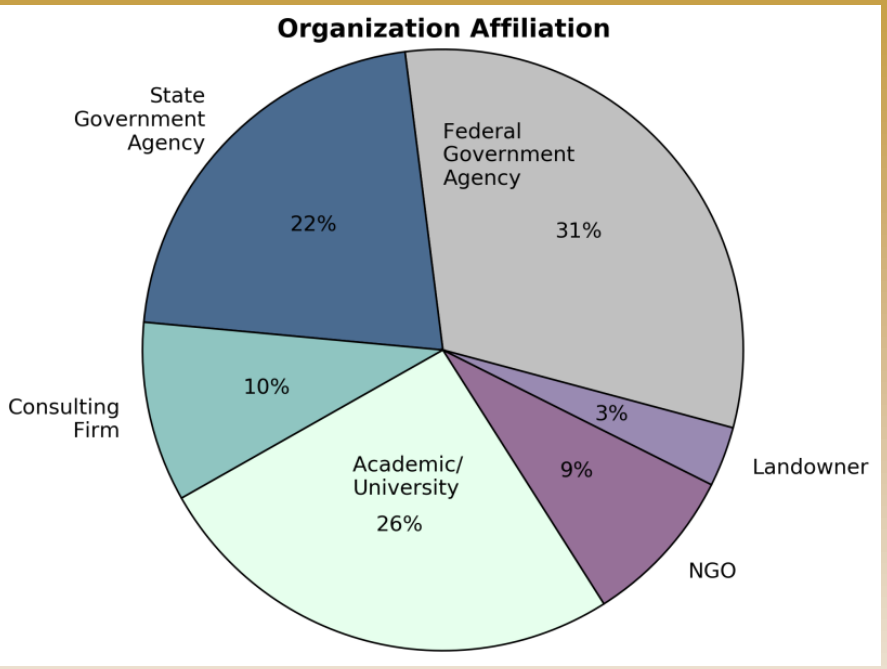


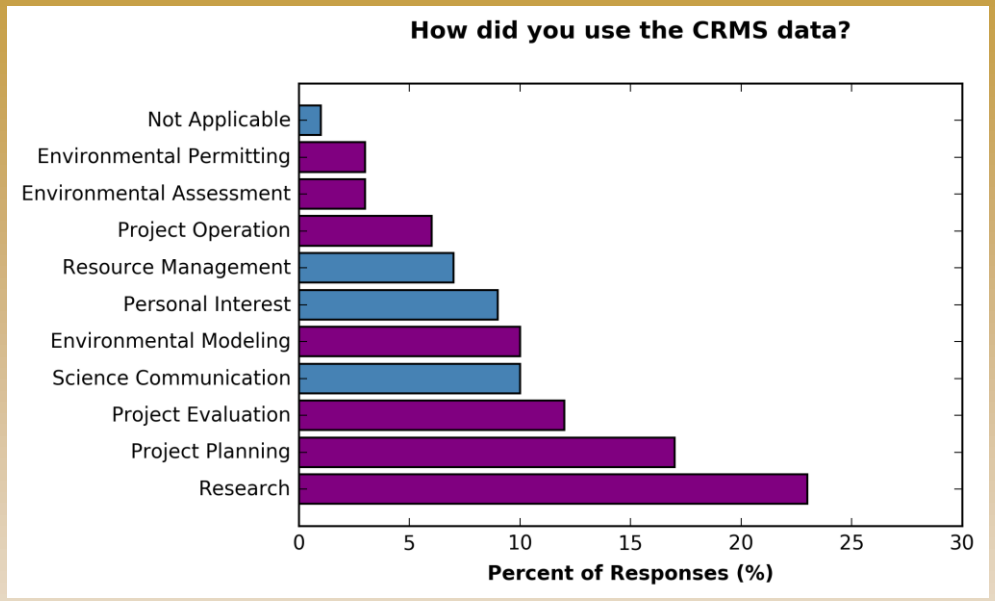
A	B	C	D
Station_ID	Correction_Factor (ft NAVD88)		
CRMS0147-H01	-0.6		

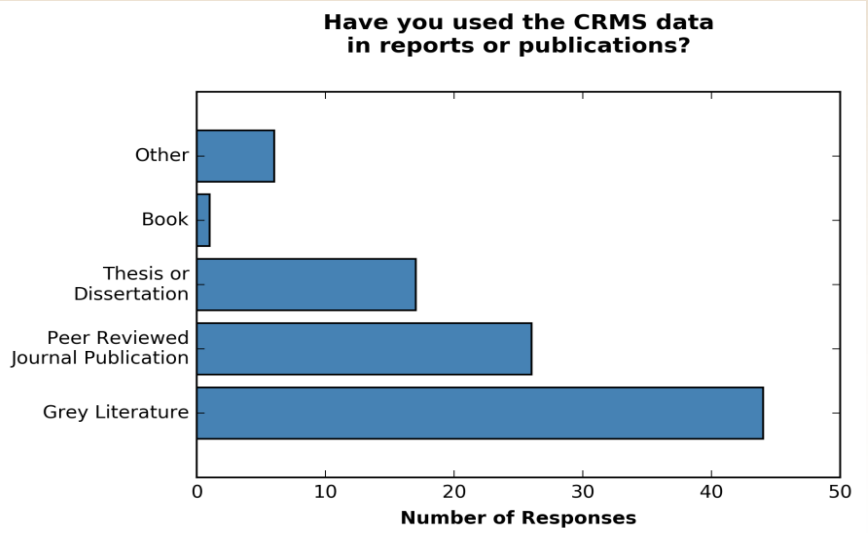
- FFQI and LI implementation throughout website
- Land area change 1932-2015 layer
- Map vegetation species search results
- Vegetation species search by parish
- Basin level percent inundation graphic
- Updated site photos

Website Survey Results

Website Usage Survey Results

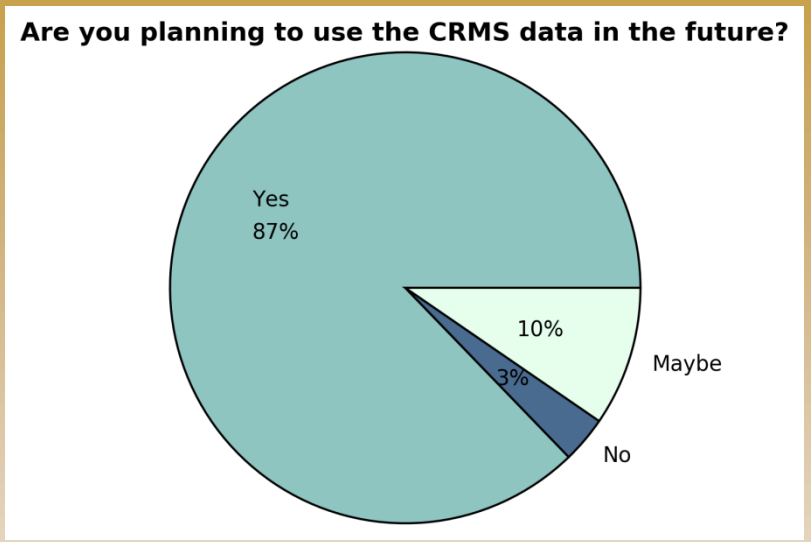


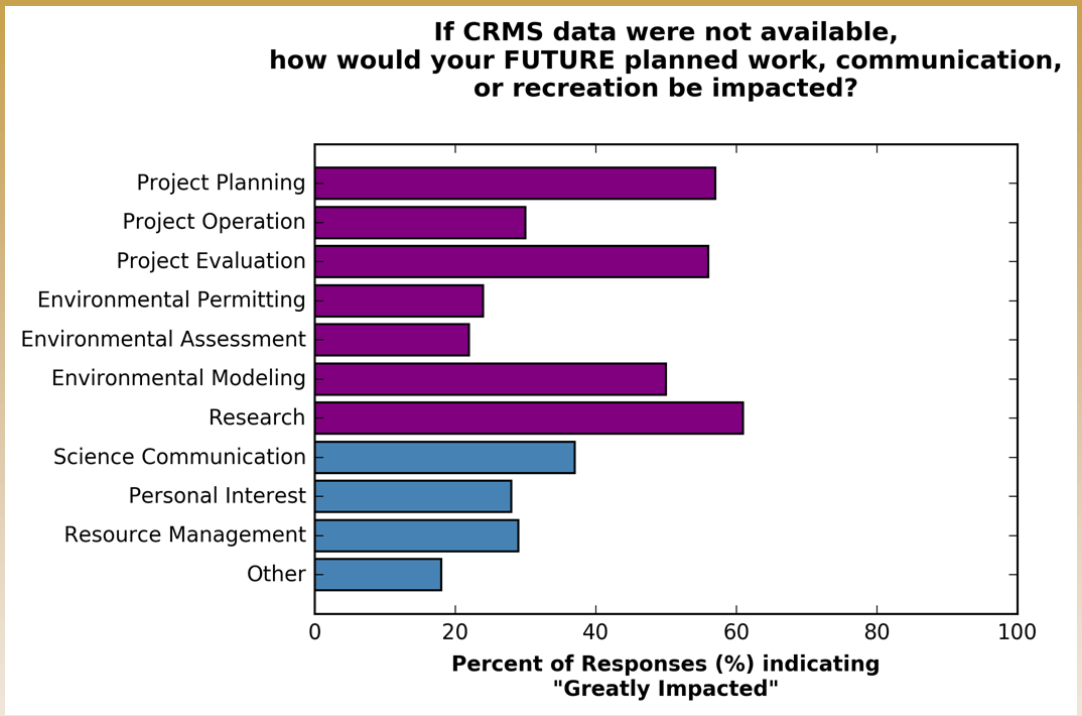




- Sent surveys to known website users
- Approx. 100 responses
- CWPPRA community 63% of responses
- Much of the data used for planning & evaluation process
- Most respondents used data for grey literature (agency reports, contract deliverables, OM&M, EIS, etc.)

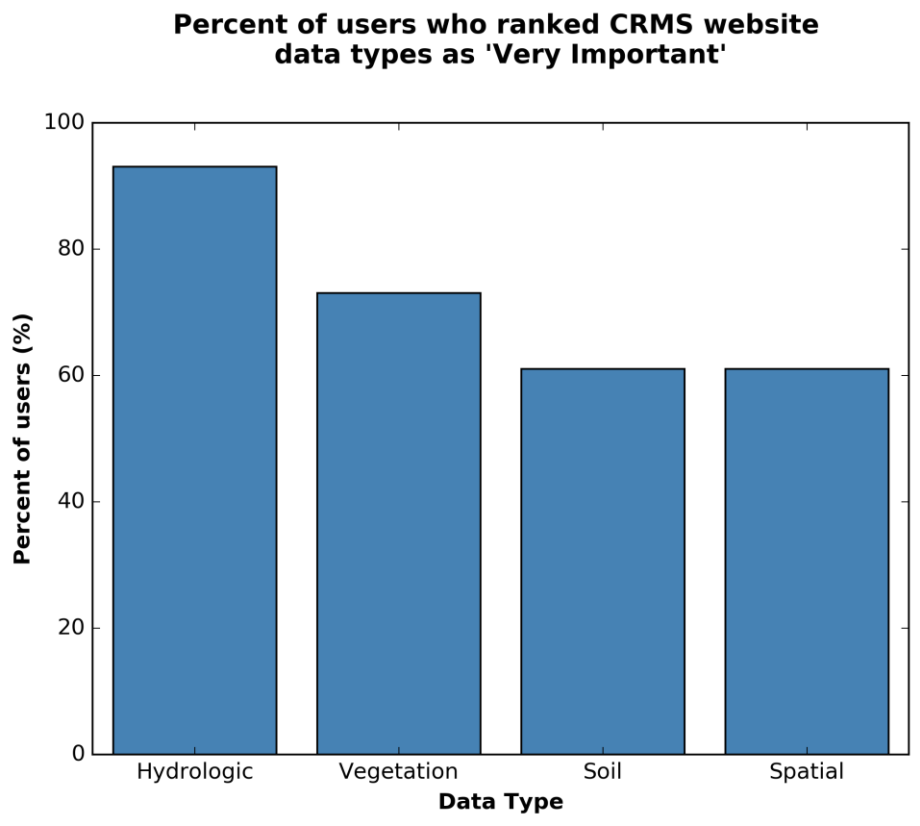
Website Usage Survey Results

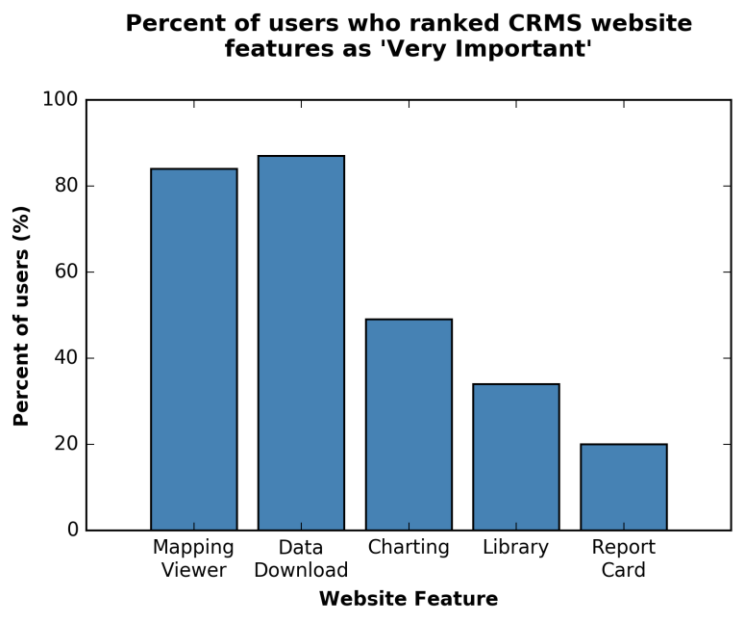




- **Vast majority of respondents plan to use CRMS data in the future**
- **Users identified many CWPPRA activities that would be “Greatly Impacted” without CRMS**

Website Usage Survey Results





User input confirms website statistics:

- **Hydro most used data type**
- **Users rely most on the map, data, and charting**

CRMS Analytical Team Updates

RSET Rod Extensions

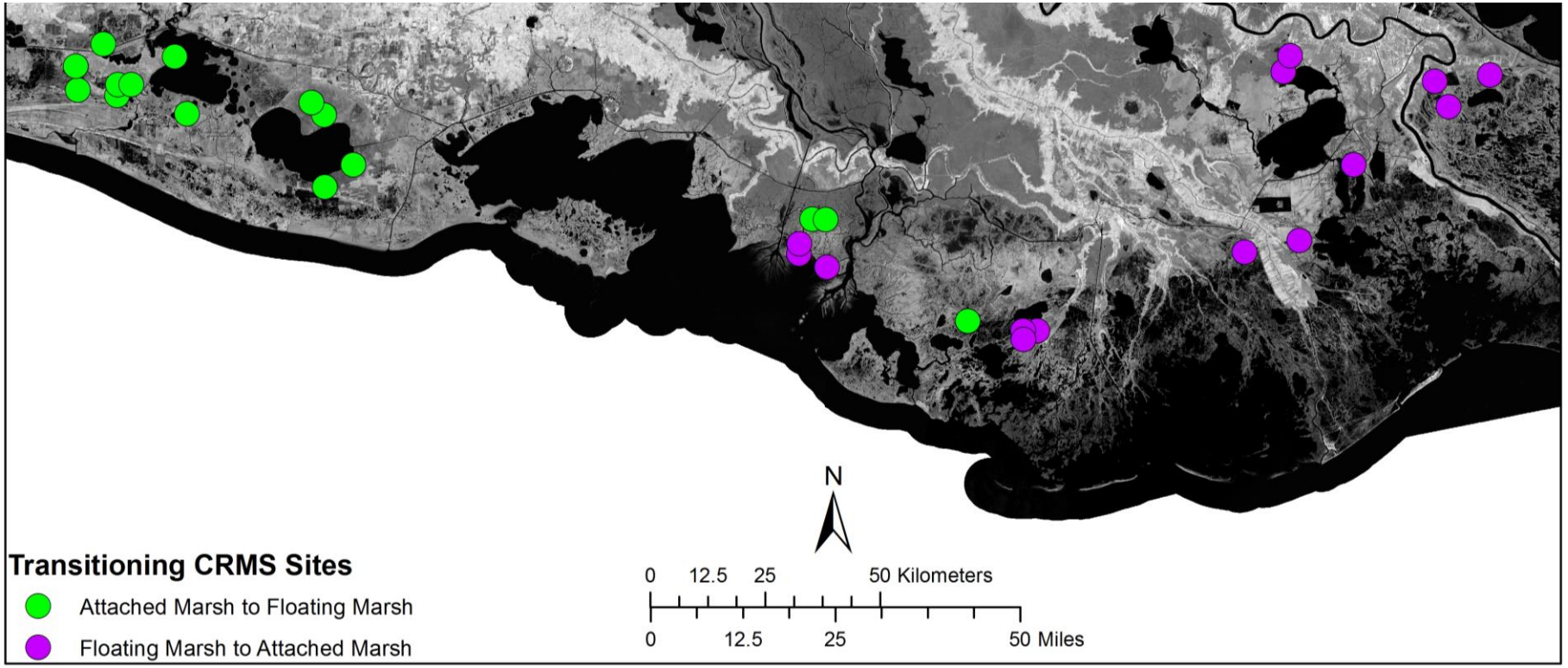
- Recently developed a method for extending RSET rods that were about to be buried. Deployed at 4 sites in the MR and 1 in BA.

MR, CRMS2726

BA, CRMS0174

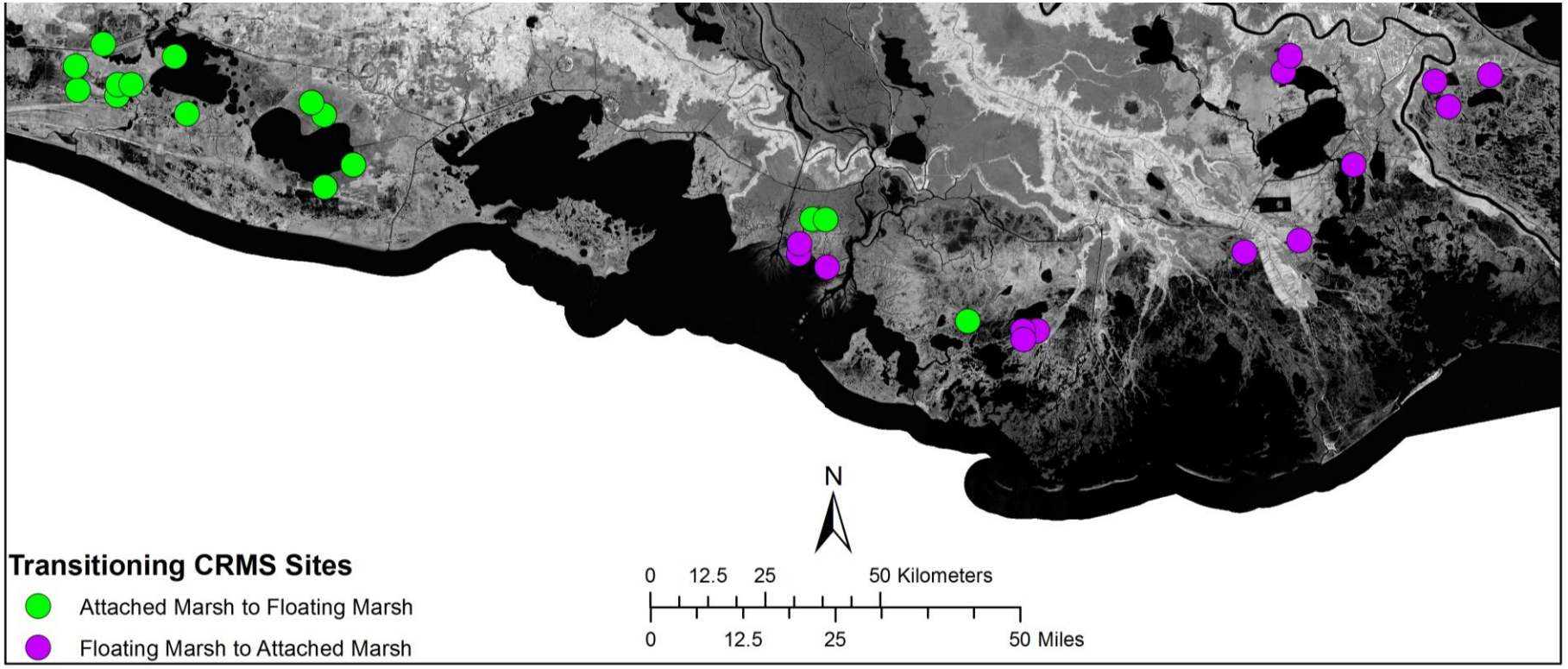
Floating Marshes now Attached

- We are currently verifying that information and, if found to be attached, we will drive RSET rods, add accretion plots, remove the marsh mat recorder and establish marsh elevation for flooding calculation.
- Elevation change and accretion measurements will begin in Spring 2018.



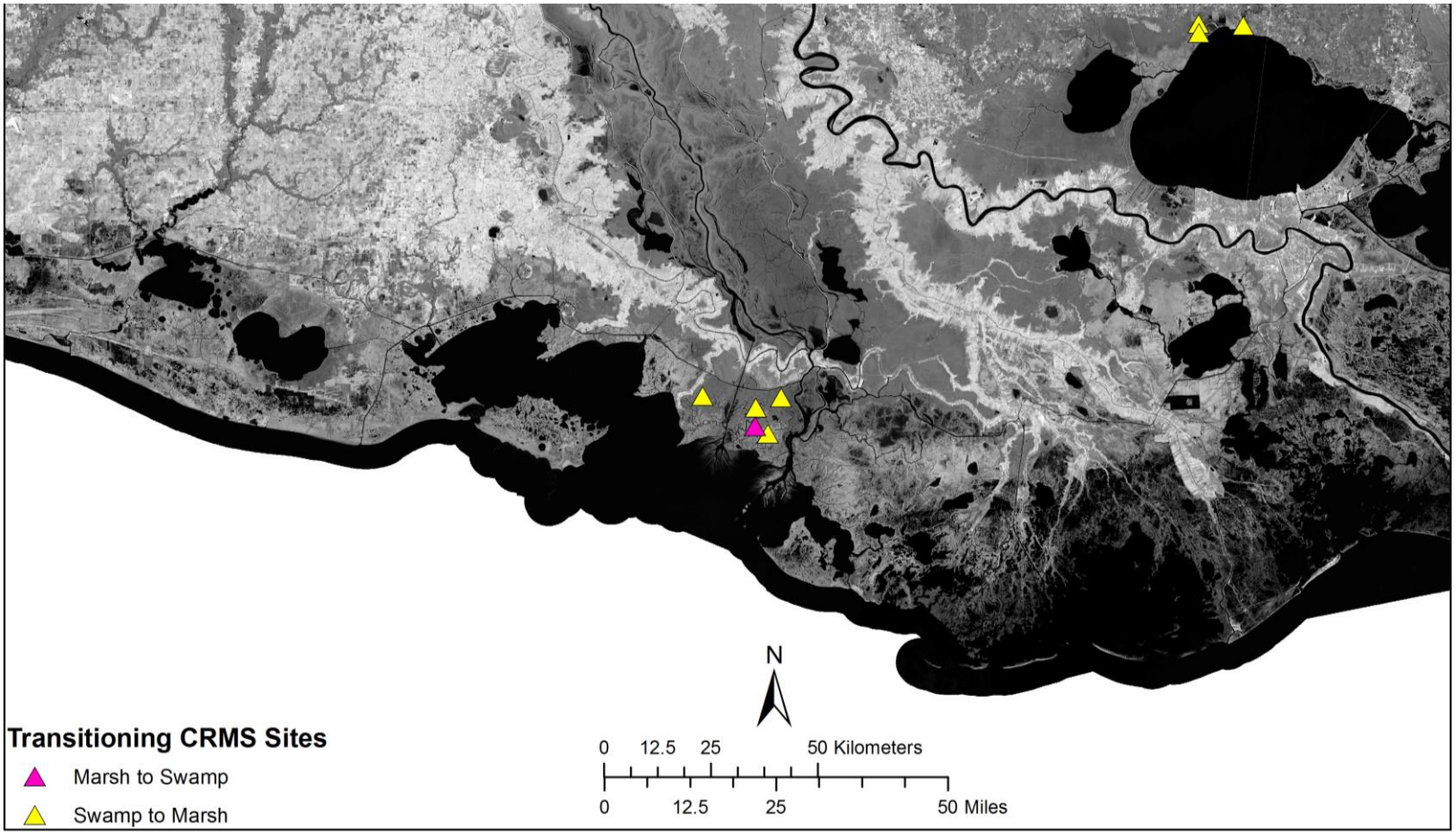
Attached Marshes now Floating

- We will continue monitoring as attached and will use the RSET and Accretion data to assess if and when they re-attach.



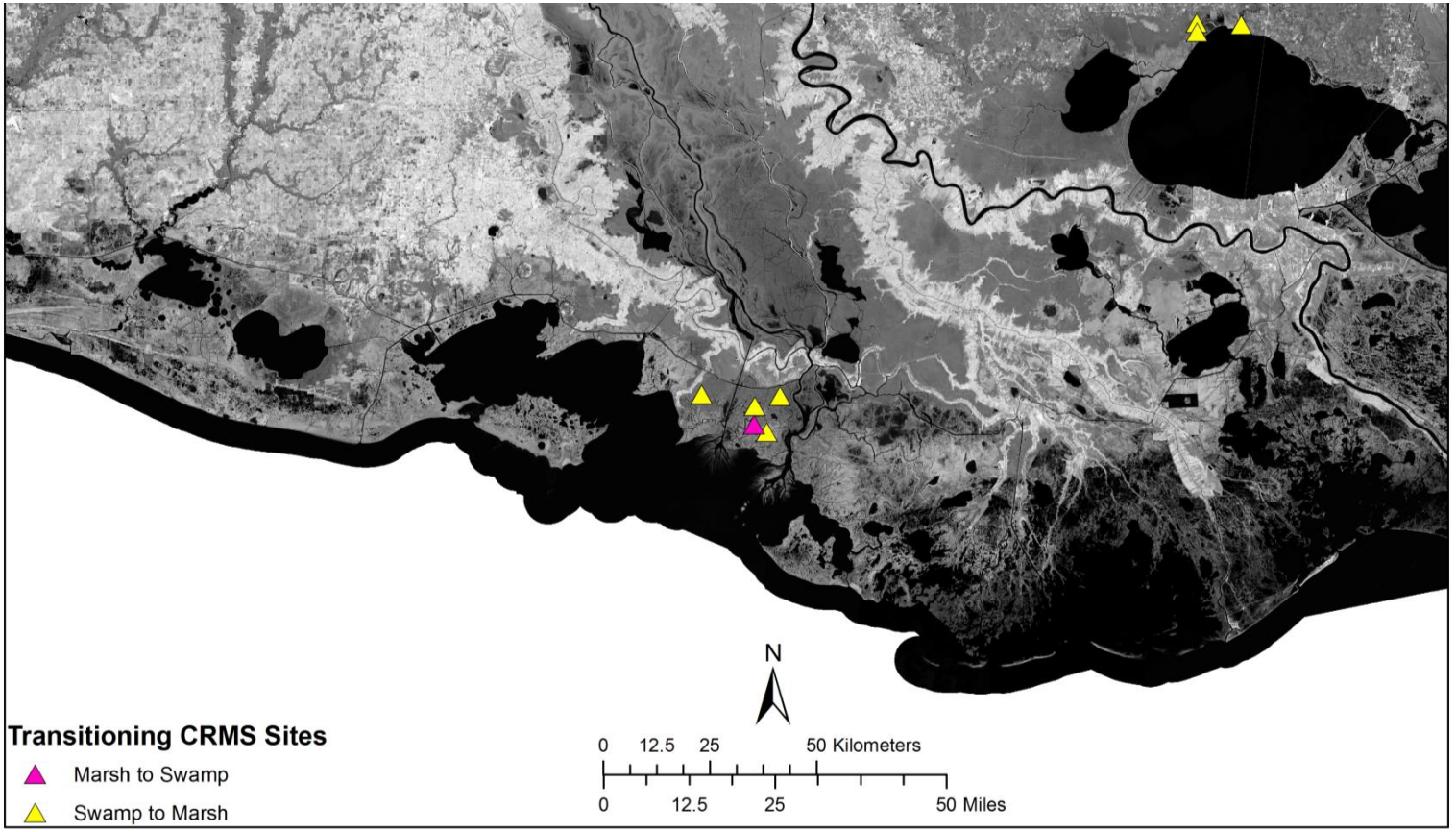
Fresh Marsh now Swamps

- Established as fresh marsh, now trees with dbh sufficient to consider measuring forested vegetation.
- We are assessing the sites and will add forest plots in the 2018 Forested Vegetation campaign if necessary.



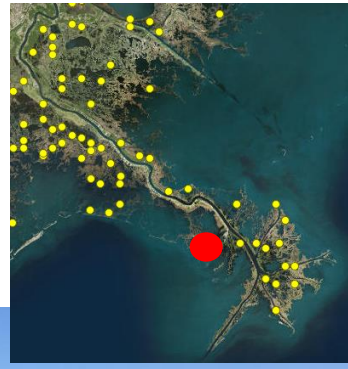
Swamps now Fresh Marsh

- 7 CRMS sites that were established as forested swamps have few trees and would now be considered marsh.
- We are assessing the sites and will cease forested data collection if necessary.
  - Sites would retain their low FFQI scores if the trees are gone.



Phragmites Scale

- We are aware of the Phrag Scale down in the MR delta. Field crews are on the lookout and will note the presence of scale during data collection.
  - Specific data will be captured if scale is found at CRMS vegetation stations or at boardwalks.
  - Preliminary investigation showed only CRMS0163 influenced
  - Destruction *en route* to a sites will be documented.

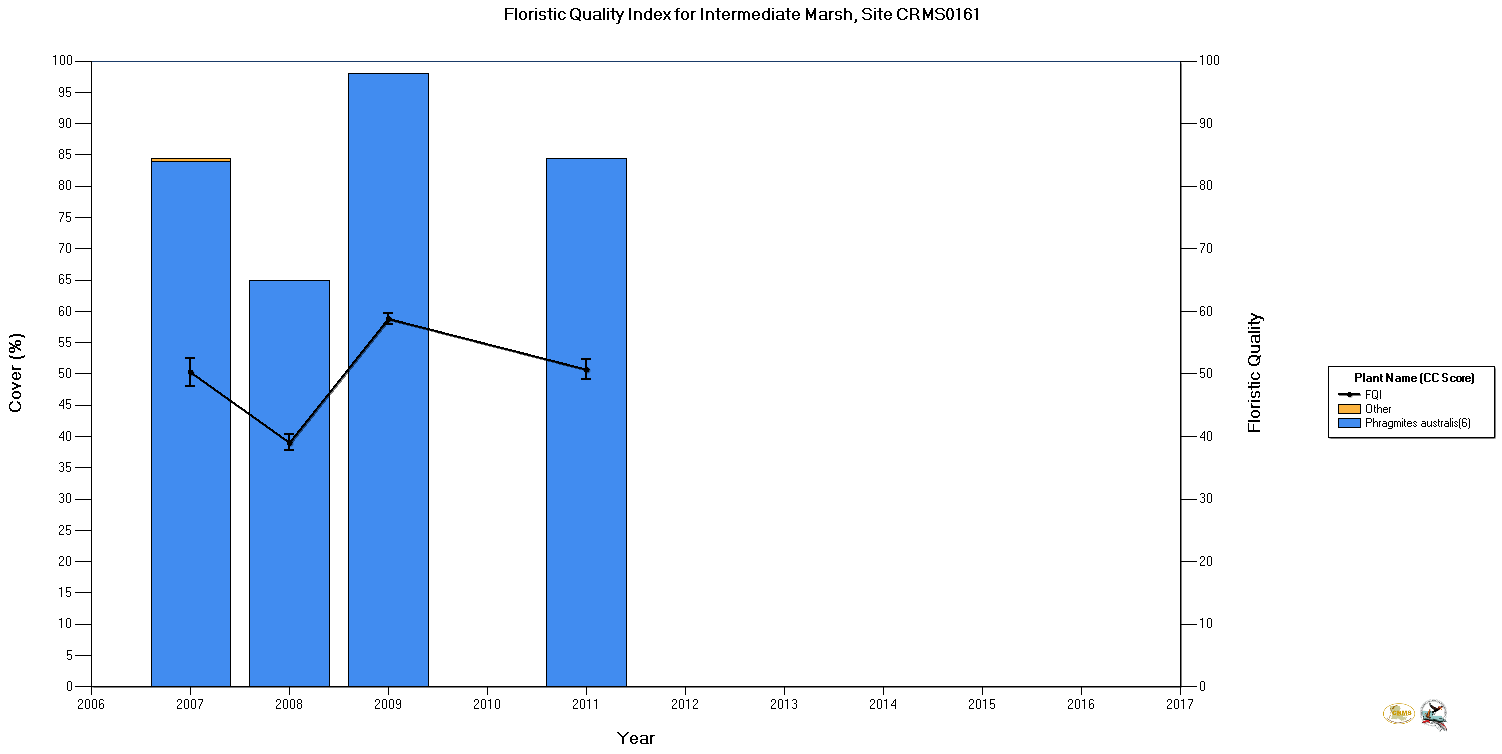


CRMS0163

Phrag scale destruction, not at a CRMS site

Phragmites Estimation

- We estimated Phrag at difficult to reach locations from 2012 to 2016. Many estimates were 100% cover which is high compared to Phrag sites where cover was not estimated.
- We adjusted the CIMS database to address estimated data and are re-assessing after this veg season.
- Charts currently do not show data for estimated years.



First Basin scale report is in draft and will be available for review soon.

State of Louisiana

Coastal Protection and Restoration Authority
(CPRA)

2016 Basin Summary Report

for

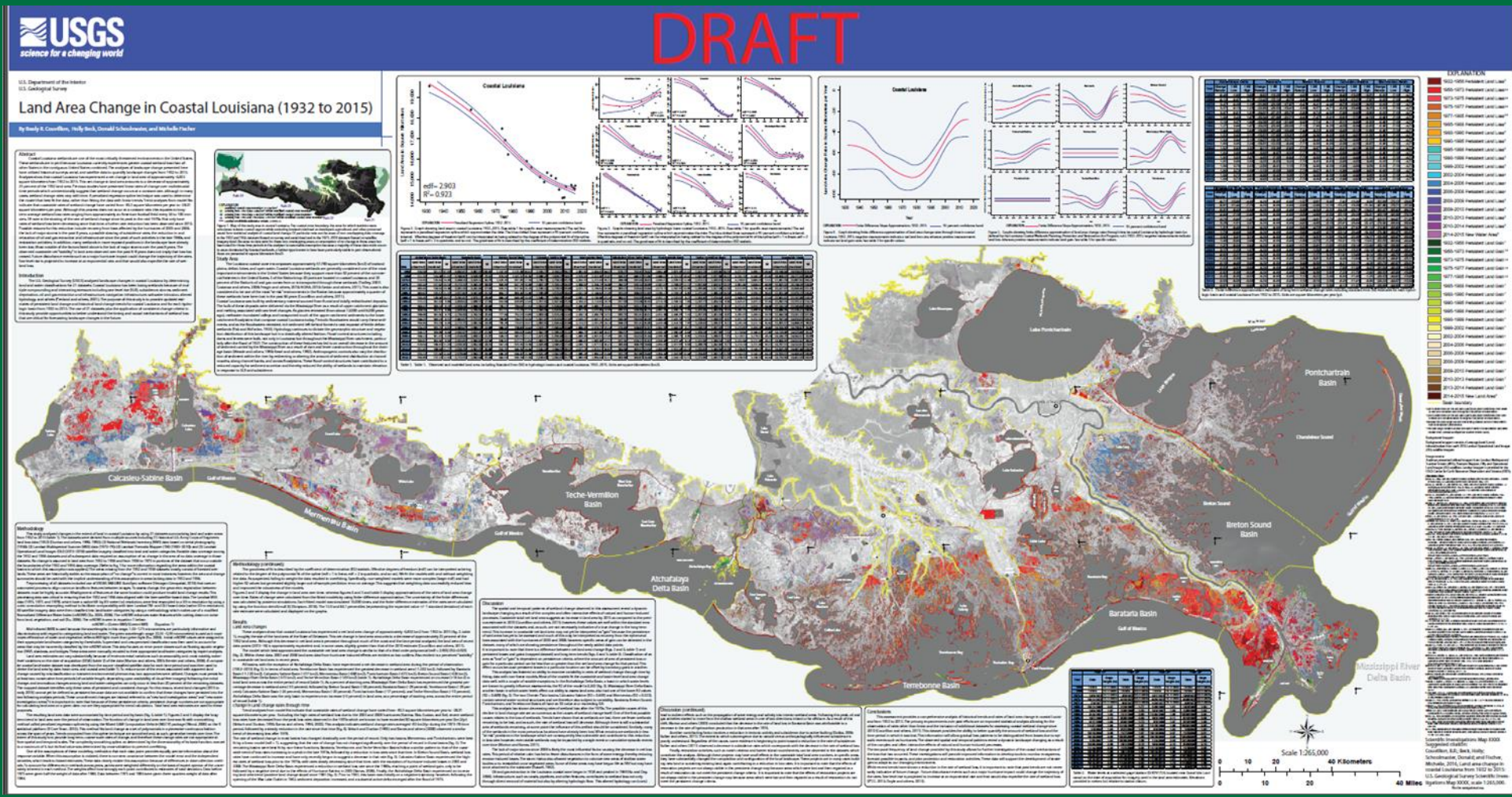
Mermentau Basin

June 2016
Cameron/Vermilion Parishes

Prepared by:
Mark Mouledous and Bernard Wood

Operations Division
Lafayette Regional Office
635 Cajundome Boulevard
Lafayette, LA 70506

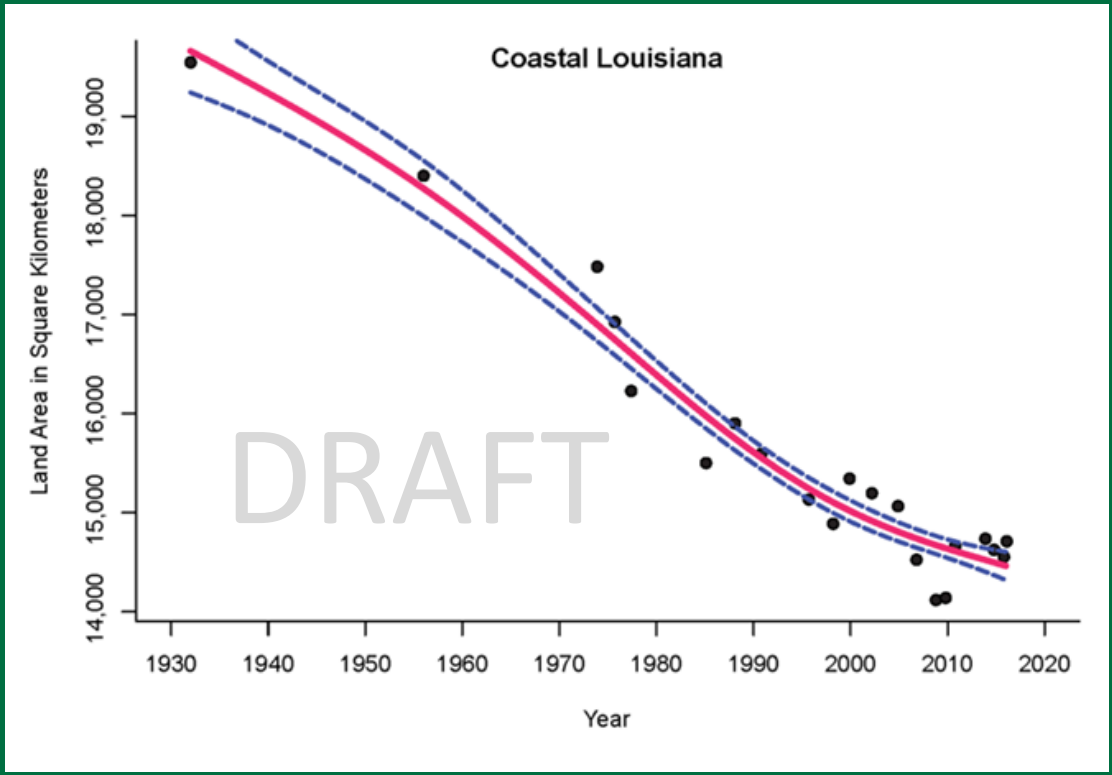
Land Area Change in Coastal Louisiana (1932 to 2015)



Couvillion et al.

- Change in land area over time was fit with penalized regression splines vs. prior work that was fit with a linear regression

- To account for differences in methods across years, points were weighted differently. The weight affects how strongly each point contributes to estimates of total deviation.
  - Prior to 1973: 1/2 the weight of data after 1984.
  - Between 1973 and 1984: ¾ weight of data after 1984.

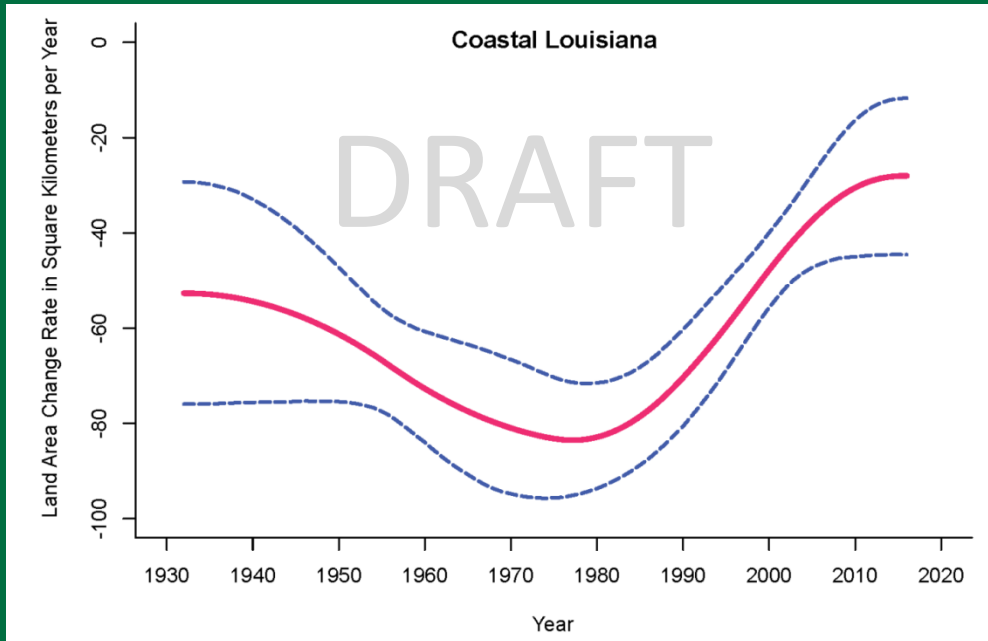


- Net change in land area of -4,833 km^2 from 1932-2015.

- Decrease of 25% of 1932 land area

- All basins experiencing net loss over study period except AT

- Land loss rate was greatest in the 1970's
- Variability in rates of change
- Decrease in loss rate
  - No major storms recently
  - Less land available for loss
  - Changes in subsidence rates
  - Land that is remaining is in less vulnerable position in the landscape
  - Changes in coastal development
  - Vegetation expansion



USGS

USGS
science for a changing world

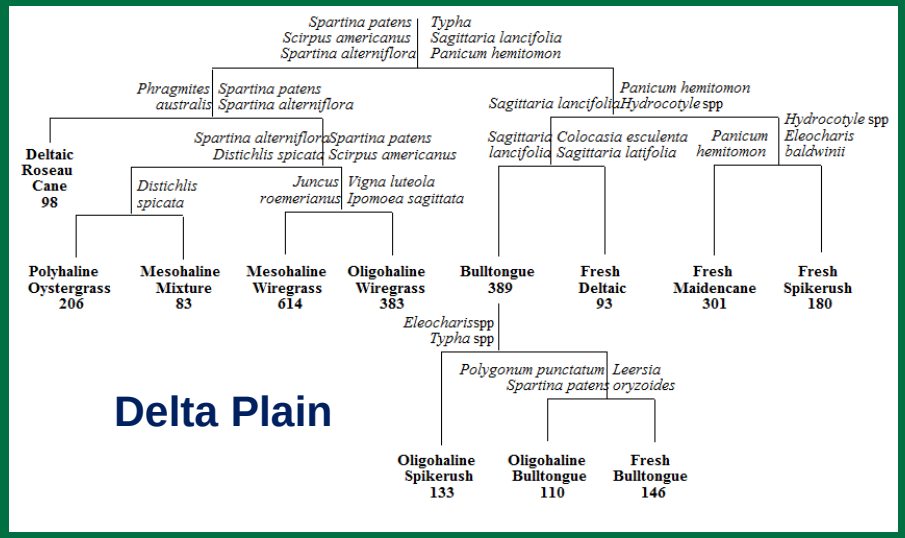
Using Artificial Neural Networks For Classifying Marsh Vegetation Communities in Louisiana

Gregg A. Snedden
USGS Wetland and Aquatic Research Center

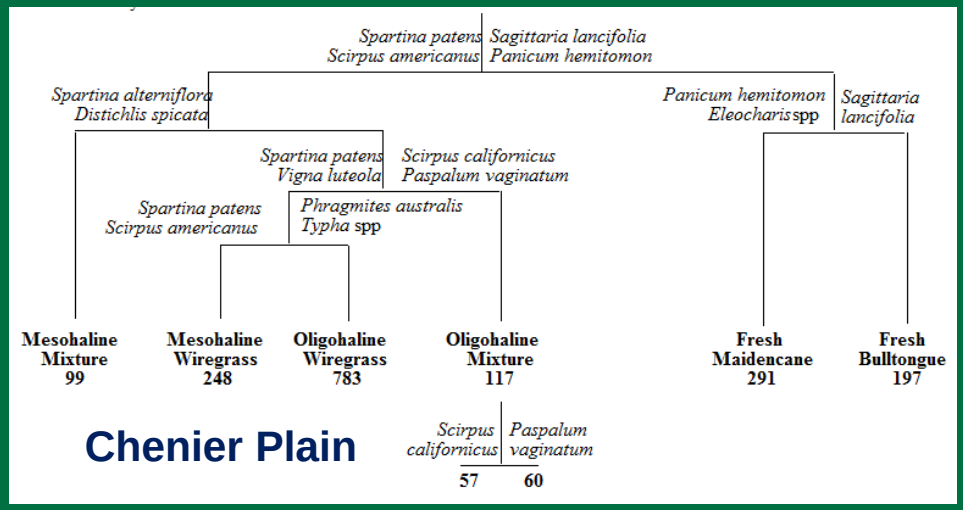
U.S. Department of the Interior
U.S. Geological Survey

Benefits

- **Eliminates issues with spatial comparisons**



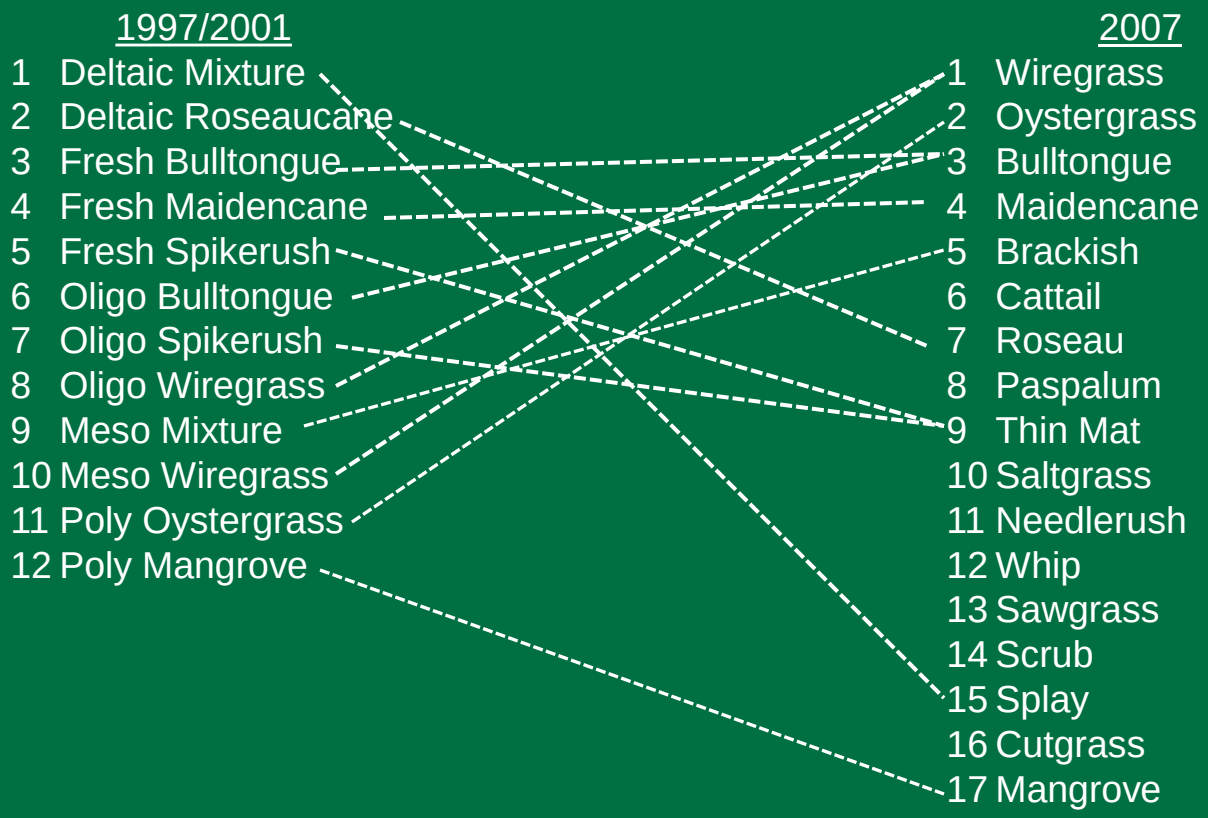
Visser et al. 1998



Visser et al. 2000

Benefits

- **Eliminates issues with temporal comparisons**

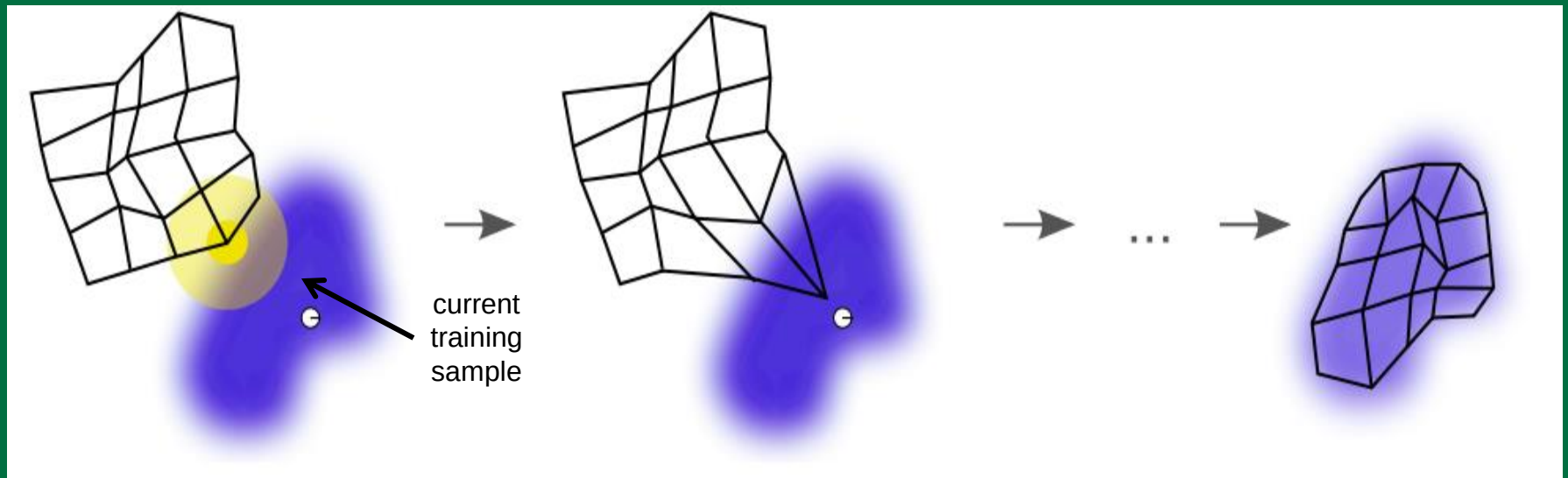


- **Static classifier built with robust dataset**

USGS

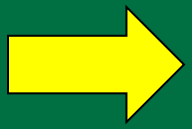
Creating a self-organized map (SOM)

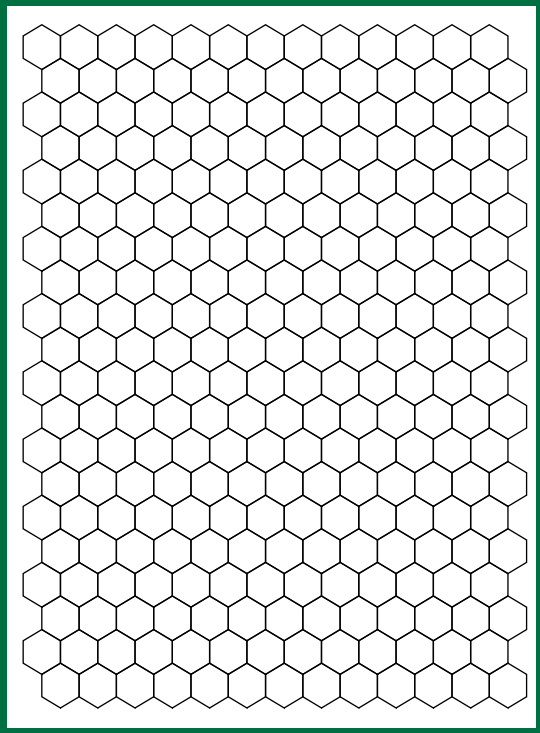
- Blue represents distribution of training data in multivariate space
- Each node initially has a random species composition
- Then nodes are added to represent similar species composition in neighboring nodes
- After repeating the process with all samples in training dataset the network approximates multivariate distribution of the training dataset



Trained with CRMS Vegetation Survey data

Species					
	Sp_1	Sp_2	Sp_3	···	Sp_{559}
$Sample_1$	85	0	5	···	0
$Sample_2$	0	42	30	···	4
⋮	···	···	···	···	
$Sample_{2526}$	2	76	20	···	0





- Surveys from 2006-2014
- 343 sites
- Swamp sites (56) removed
- 559 species included
- 2526 samples in training dataset (300ish sites, 7-9 years)

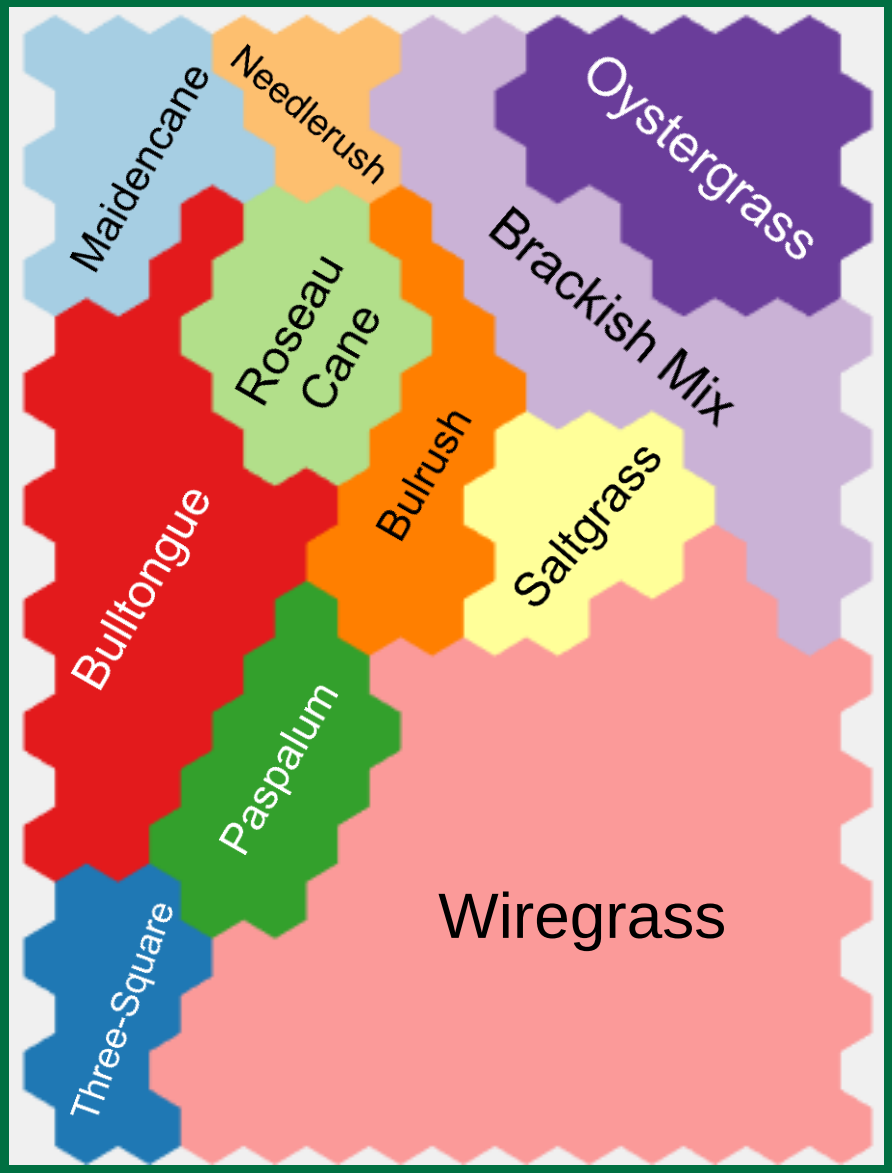
20 x 13 (260 cells)

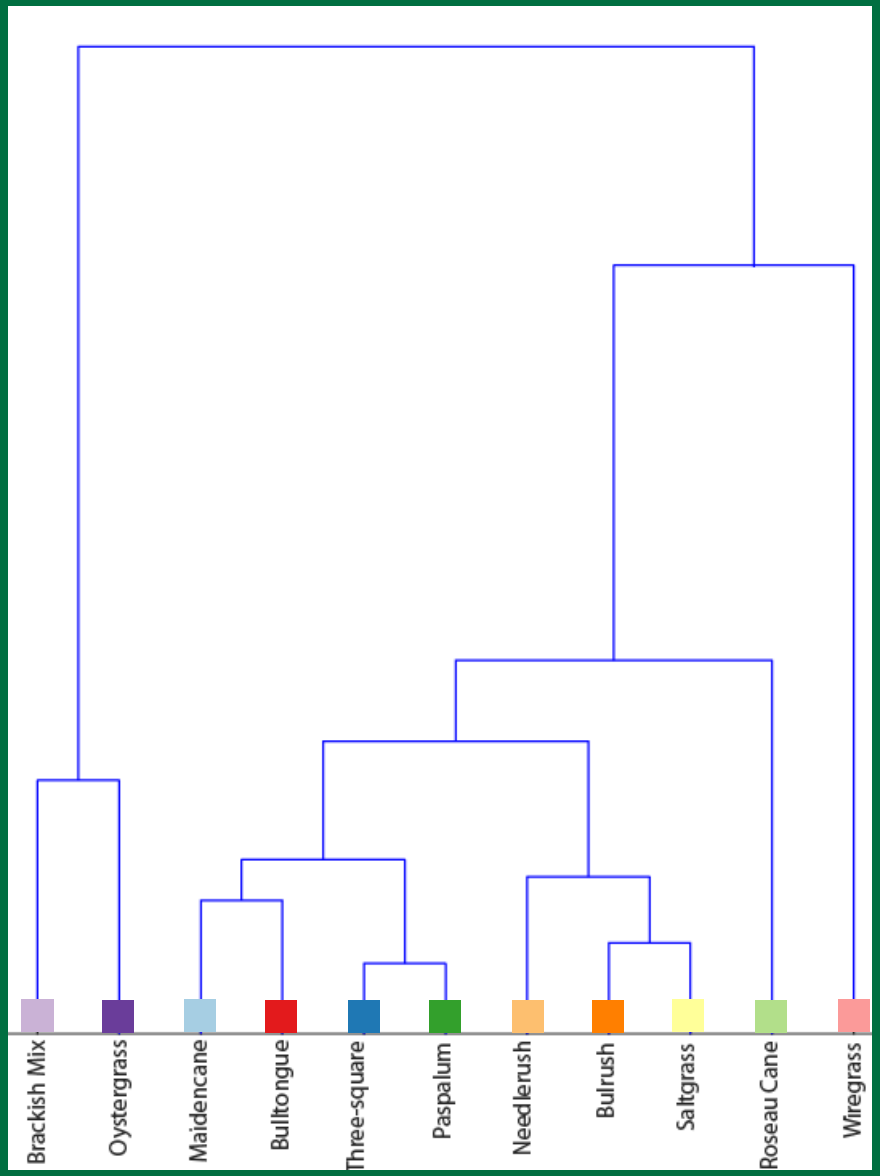
$$\#cells = 5\sqrt{\#samples}$$

Multivariate distribution in 2D

USGS

- Quantitatively determined the number and positions of dendrogram breaks
- 11 groups, named after dominant vegetation species



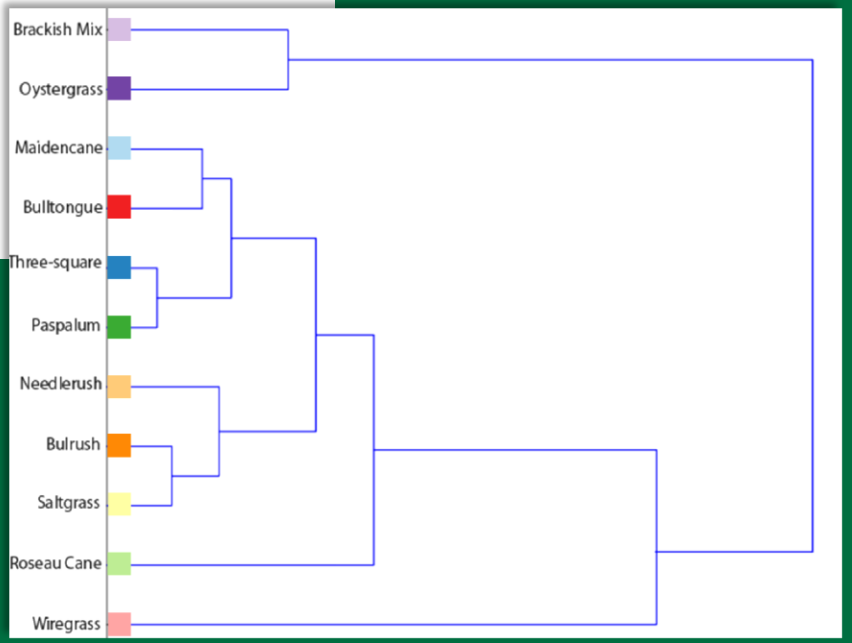


Dominant Species

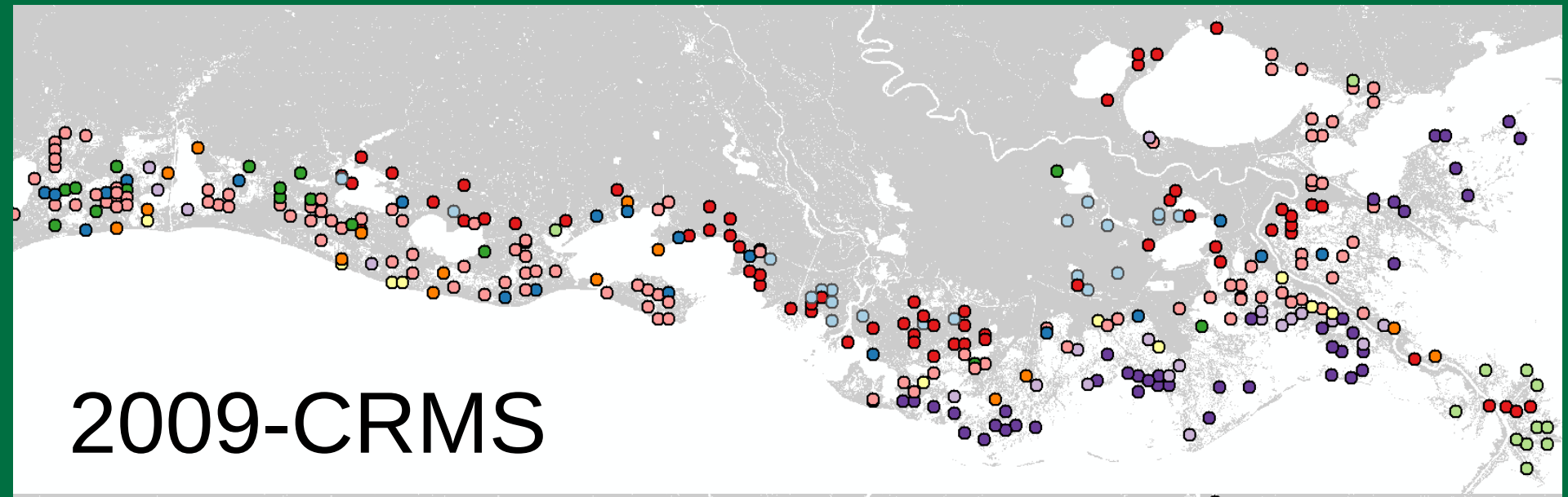
Maidencane		Three-square		Roseau Cane		Paspalum	
Panicum hemitomon	**34**	***Schoenoplectus americanus***	**27**	***Phragmites australis***	**71**	***Paspalum vaginatum***	**24**
Leersia hexandria	**11**	*Spartina patens*	19	*Spartina patens*	5	***Schoenoplectus californicus***	**13**
Sagittaria lancifolia	10	*Sagittaria lancifolia*	6	*Alternanthera philoxeroides*	4	*Spartina patens*	11
Eleocharis	**7**	***Lythrum lineare***	**5**	*Spartina alterniflora*	3	***Typha latifolia***	**10**
Thelypteris palustris	**5**	***Cladium mariscus***	**4**	*Typha domingensis*	2	***Ipomoea sagittata***	**6**
Alternanthera philoxeroides	4	***Eleocharis macrostachya***	**4**	*Zizaniopsis miliacea*	2	*Distichlis spicata*	3
Typha	**4**	*Distichlis spicata*	4	*Polygonum punctatum*	2	***Echinochloa walteri***	**3**

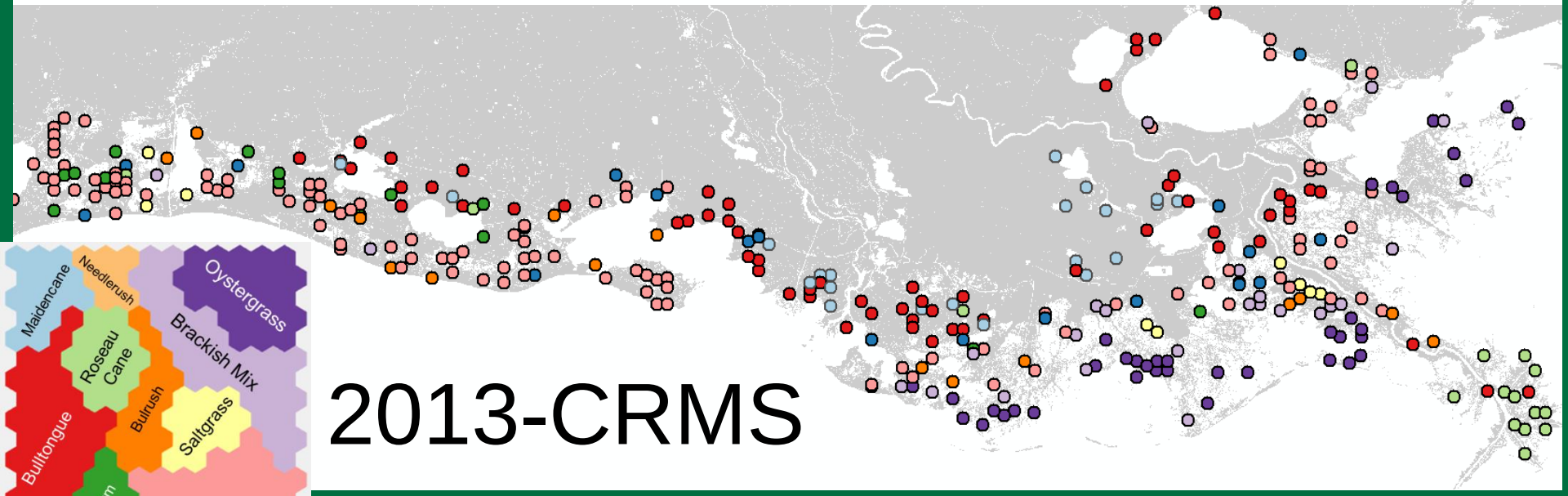
Wiregrass		Bulltongue		Needlerush		Bulrush	
Spartina patens	**65**	***Sagittaria lancifolia***	**16**	***Juncus roemerianus***	**54**	***Schoenoplectus robustus***	**24**
Distichlis spicata	7	***Polygonum punctatum***	**11**	*Spartina alterniflora*	15	*Distichlis spicata*	16
Schoenoplectus americanus	5	***Alternanthera philoxeroides***	**7**	*Spartina patens*	8	*Spartina patens*	13
Schoenoplectus robustus	3	***Ludwigia grandiflora***	**4**	*Distichlis spicata*	8	***Spartina cynosuroides***	**8**
Ipomoea sagittata	2	*Typha*	4	*Lythrum lineare*	2	*Spartina alterniflora*	7
Lythrum lineare	2	***Colocasia esculenta***	**3**	*Phragmites australis*	2	***Paspalum distichum***	**5**
Spartina alterniflora	2	***Sacciolepsis striata***	**3**	*Schoenoplectus robustus*	2	*Juncus roemerianus*	5

Brackish Mix		Oystergrass		Saltgrass	
Spartina alterniflora	53	***Spartina alterniflora***	**93**	***Distichlis spicata***	**49**
Spartina patens	20	*Juncus roemerianus*	4	*Spartina patens*	21
Juncus roemerianus	10	*Spartina patens*	1	*Spartina alterniflora*	15
Distichlis spicata	7	*Distichlis spicata*	1	*Schoenoplectus robustus*	6
Schoenoplectus robustus	3	*Batis maritima*	<1	*Schoenoplectus americanus*	2
Avicennia germinans	**3**	*Schoenoplectus robustus*	<1	*Iva frutescens*	1
Iva frutescens	2	*Avicennia germinans*	<1	*Juncus roemerianus*	1



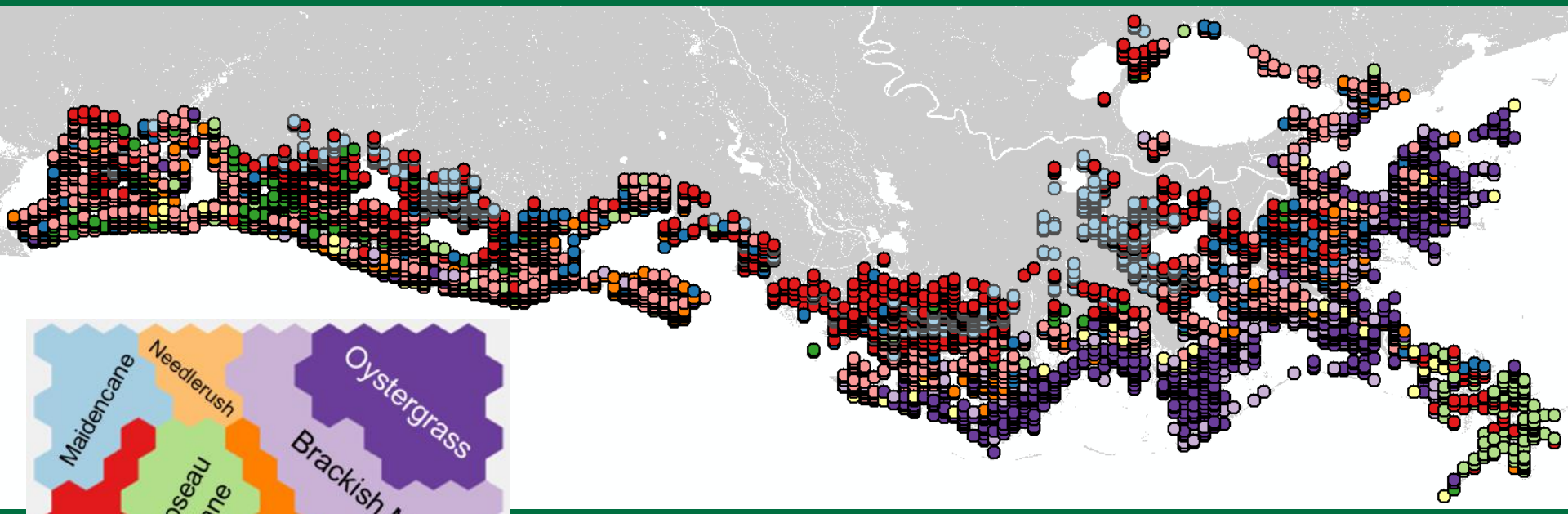
USGS


2009-CRMS


2013-CRMS

Maidencane
Needlerush
Oystergrass
Roseau Cane
Brackish Mix
Bulltongue
Bulrush
Saltgrass
Paspalum
Wiregrass
Three-Square

2007 Helicopter survey data classified



- Helicopter data was <u>not</u> used to train the model, classified the helicopter data with the model
- Good results especially because heli data are recorded as cover class, not percent cover

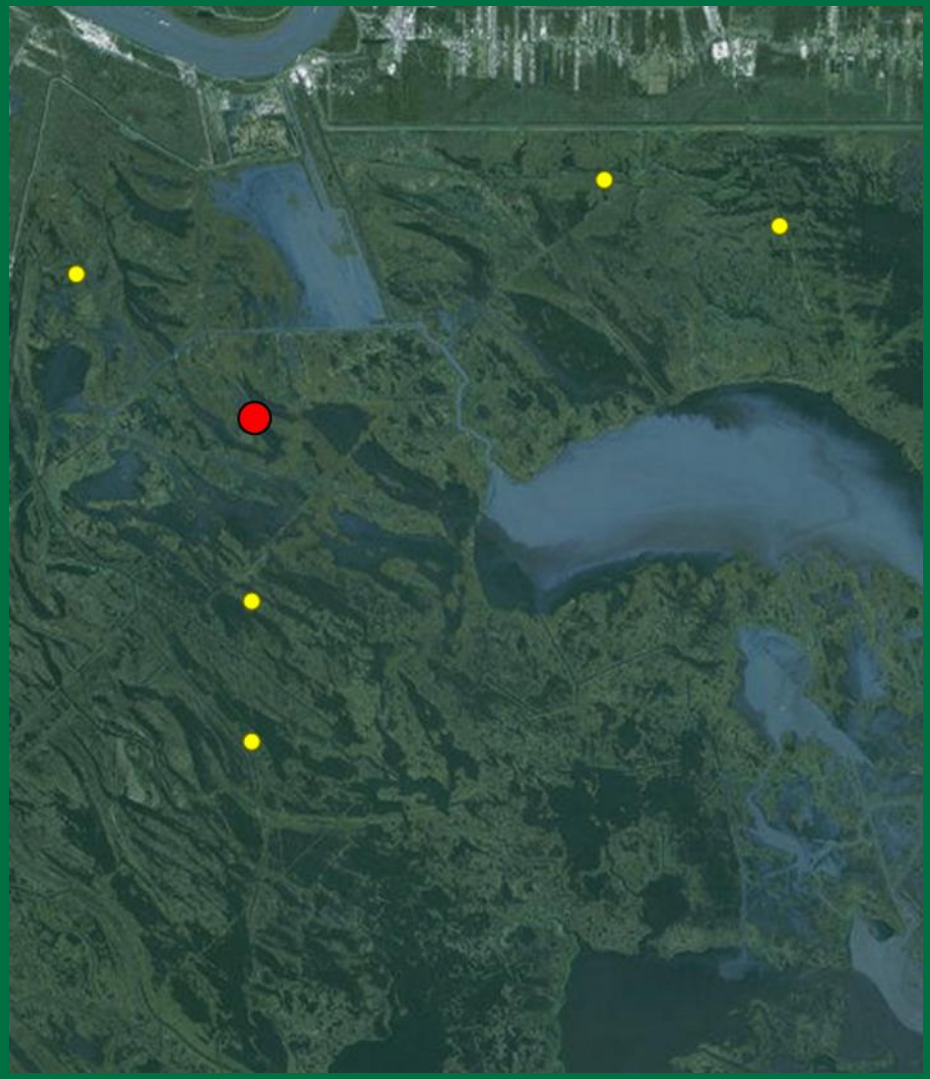
Environmental Conditions

Type	Average annual salinity	Percent time flooded	tidal amplitude	bulk density	organic matter	organic density
Needlerush	8.70	30.04%	17.68	0.37	22.1%	0.08
Brackish mix	11.09	37.62%	16.02	0.32	27.9%	0.09
Three-square	2.32	38.87%	8.80	0.19	42.2%	0.08
Maidencane	0.24	40.17%	8.46	0.18	44.5%	0.08
Wiregrass	5.34	42.51%	6.09	0.20	38.6%	0.08
Oystergrass	15.14	43.62%	21.23	0.36	21.7%	0.08
Saltgrass	9.28	44.09%	7.46	0.32	29.2%	0.09
Roseau cane	3.04	46.99%	7.97	0.34	31.0%	0.10
Bulltongue	1.03	49.88%	8.95	0.29	36.7%	0.11
Bullrush	7.07	50.41%	9.32	0.34	29.5%	0.10
Paspalum	2.50	68.00%	1.93	0.14	52.3%	0.07

USGS

Application: SOM Tracking Community Change in Upper BS, 1968 – 2016, CRMS0117

- Brackish salinity regime prior to Caernarvon operations wiregrass plant community present (pre-1991; Lane et al. 1999)
- Wiregrass community persisted through the years leading up to Katrina
- Vegetation community transitioned to bulltongue between 2003 and 2007, possibly disturbance-related
- Improved community change trajectory visualization possible



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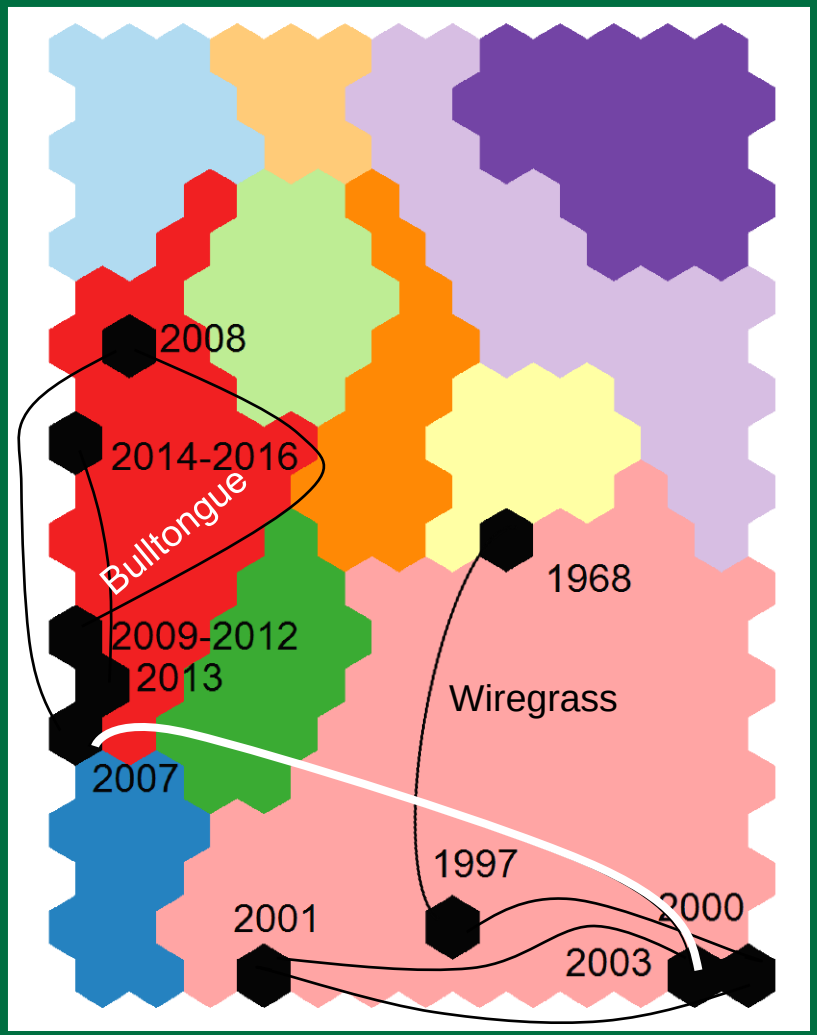
Application: SOM Tracking Community Change in Upper BS, 1968 – 2016, CRMS0117

- Brackish salinity regime prior to Caernarvon operations wiregrass plant community present (pre-1991; Lane et al. 1999)
- Wiregrass community persisted through the years leading up to Katrina
- Vegetation community transitioned to bulltongue between 2003 and 2007, possibly disturbance-related
- Improved community change trajectory visualization possible



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Questions?

Data requests,
ideas,
specialized
website training

USGS
science for a changing world

CPRA
Coastal Protection and Restoration Authority of Louisiana

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Website survey response:

"……Without CRMS, project development & evaluation would be set back by decades."