





# **CRMS Website Roadshow**



## Spring 2015 NRCS-5/8/15, NMFS-5/11/15, USFWS-5/18/15, USACE-5/21/15, EPA-6/11/15



# CRMS

# CIMS

C inscoastallouisiana.gov 🗄 Appe 🕥 Getting Stated 😩 Latest Headlines 🕥 Customize Links 🖉 Free Hatmal 🕐 ReadPlayer 🔿 Windows Marketylace 🕥 Windows Media 💿 Windows 🔛 Imported From Fre **Coastwide Reference Moniforing System** Coastal Protection and **Restoration Authority** CPRA Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring 10 Home Data Download Library Vewer Outreach Help the cumulative effects of all projects in Factsheet TAO Welcome to the Louisiana Coastal Protection and Restoration Authority's restoring, creating, enhancing, and protecting the coastal landscape. The effectiveness of the traditional paired-reference monitoring Coastal Information Management System (CIMS). CIMS approach in Louissiana has been limited CINS provides geospatial, tabular tababase and document access to CIRA's suite of protection and restoration projects, Coachvide because of difficulty in finding comparable Reference Monitoring System (CIMS) elations, the 2012 Marter Plan, project scheduling, geophysical data, and obertal community test sites. CRMS is a multiple reference residency information. approach that uses aspects of hydrogeomorphic functional assessments and probabilistic sampling. This approach includes a suite of sites that encompass the range of ecological conditions for each stratum, with projects placed on a continuum of conditions found for that atratum. Trajectories in reference sites are then compared with project trajectories through time. The approach could serve as a model for evaluating wetland ecosystems. ≥USGS Map Viewer Data Download Document Library

### cims.coastal.louisiana.gov

lacoast.gov/crms

Data

Charting

Hydro

Vegetation

Forested

Herbaceous

Marsh Class

Soil

Spatial

Clear Charts

≈USGS

Home

#### Coastwide Reference Monitoring System a C Mapping Visualization Program Library Previous Charting Version Bulk Charting Data Download Reporting 150 Scale: Multi Station \$ 100 Reference Mean Select an element below to populate the station selector. AT02 Site Floristic Quality Index AT03 Project/Reference FQI BA02 BA03C BA04 BA19 Deselect All Select All BA02-100 BA02-101 Report Card Charts BA02-150 BA02-151 BA02-152 150 Mean % Cover 100 50 -

2000

2005

2008

**Multi Station Project** 



Only one station on the project/ref chart instead of site FQI

Floristic Quality Index for BA02-100

2012

100

- 90

- 80

- 70

- 60

- 50

-40

- 30

-20 - 10

- 0

Floristic Quality Index



Small image: FQI includes all veg stations from BA02 Large image: FQI is based on BA02-100 only

0



Inundation (water relative to marsh) as a parameter within interactive charting

Reference Monitoring	System	am		a CWPPRA fu	nded project						
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- Hydro											
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CRMS

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Data download feature within interactive charting

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Charting Bulk Charting Data Dov	wnload Reporting	Coastwide Refer	rence Monitor	ring System	A PAG BUI	A RECEIPTION OF	a CWPPRA funde	d project
- Hydro		Home Data	Mapping	Library Visua	lization Program			
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CRMS0211-H01

-01/01/2015



Generate static hydro chart from within the interactive charting interface.

Coastwide Reference Monitoring System	a CWPPRA funded project
Home Data Mapping Library Visualization Program	
CRMS0211-H01 ÷     Salinity ÷     Red ÷       None ÷     Water Level ÷     Blue ÷       None ÷     Water Temperature ÷     Orange ÷       Submit     Submit     Submit	Download type for .csv: Hourly = Download Chart Download CSV
	CRMS0211-H01 Salinity (ppt) 0.33   00:00 December 28, 2014
	0.8 0.7 0.6 0.5
	0.4 0.3 6.2 0.1
2010 2011 2012	2013 2014
2011	Interactive Chart
Clear Charts	0.8
	-03/01/2014 -05/01/2013 -09/01/2012 -11/01/2010
	March 28 2010 - December 28 2014
	Data Download



Updated the site photos in the viewer's information bubble





% Land and Water for each year was added for download in the data download

#### Previous Charting Version

Charting Bulk Charting

1km Land/Water

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 (<u>CIMS</u>)

•	Hydro
•	Vegetation
•	Soil
•	Spatial
	Percent Land

Year:		
	Select All	Deselect All
1993	*	2008
2000		2012
2001		
2002		
2003		
2004		
2005		
2007		
2014	*	
Submit		

Basin: All Basins 

Project: All Projects

Select	All		D	eselect All	
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CRMS0008		CRMS0006			
CRMS0033		CRMS0030			
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	3	CRMS0006	2008	114	134	0	
	4	CRMS0030	2008	206	42	0	
_	5	CRMS0034	2008	217	31	0	
	6	CRMS0002	2012	125	123	0	
	7	CRMS0030	2012	208	40	0	
	8	CRMS0034	2012	219	29	0	
	9	CRMS0006	2012	117	131	0	
	10						
	11						
	12						



Data Download includes a csv that contains the regression slope and r<sup>2</sup>





#### More Land/Water Years

Couvillion, B.R., Barras, J.A., Steyer, G.D., Sleavin, William, Fischer, Michelle, Beck, Holly, Trahan, Nadine, Griffin, Brad, and Heckman, David, 2011, Land area change in coastal Louisiana from 1932 to 2010: U.S. Geological Survey Scientific Investigations Map 3164, scale 1:265,000, 12 p. pamphlet.





yers Menu
CRMS
CRMS
Stations
Stations
CWPPRA
Hydro Basins
CVegetation
SSoils
Public Lands
Public Lands
MP 2012
CMP 2012

Land/Water HUC12 Base Layer

#### **Released on the Website**

CRMS station layer added to the map



11.61

4.24

Added daily mean flooding column to the hydro averages download table (avg\_water\_level\_to\_marsh).

0.195833335 8.164583

pastwid	e Reference Monitoring	System			PPRA funded project	CRMS							
Home	Data Mapping Lib	orary Visualization P	Program										
Pro	evious Charting Version												
F	Charting Bulk Charting	Data Download	Reporting										
	Data Download		Water Year is October	1 - September 30									
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	are available from the CIMS d	database <u>(CIMS)</u>	Calendar Year	\$									
	- Hydro			Select All	Deselect All								
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	Percent Flooded		1994 1995										
	Water Level Range		1996										
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	> Soil		2000 Submit										
	> Spatial		Submit										
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	CRMS0002	1/1/2011	12.16	9.92	14.03	1.017917	0.84	1.22	0.574583327	13.77	11.58	16.13	
	CRMS0002	1/2/2011	9.539583	9.09	10.56	0.67	0.24	1.1	0.227499999	10.395	6.77	14.49	
	CRMS0002	1/3/2011	8.77	8.35	9.16	0.41875	0.14	0.67	-0.022916668	7.94	4.17	11.75	
	CRMS0002	1/4/2011	7.722917	7.31	8.36	0.367917	0.1	0.7	-0.074166667	11.77708	9.38	14.84	
	CRMS0002	1/5/2011	7.176667	6.96	7.61	0.289583	-0.01	0.56	-0.154583333	14.535	11.89	17.72	
	CRMS0002	1/6/2011	6.517917	6.11	7.07	0.18875	-0.09	0.54	-0.254166667	13.3475	9.77	16.85	
	CRMS0002	1/7/2011	6.137143	5.44	6.53	-0.18217	-0.53	0.12	-0.625217396	12.33182	10.93	14.66	
	CRMS0002	1/8/2011	5.281667	4.88	5.55	-0.425	-0.51	-0.26	-0.867499992	9.8275	8.08	11.25	
	CRMS0002	1/9/2011	5.182609	4.68	7.49	0.320417	-0.44	1.86	-0.123333334	9.18375	8.16	10.13	
	CRMS0002	#########	7.484167	6.26	9.12	1.457083	0.97	2.02	1.014999998	9.317083	8.62	10.25	

0.22

1.07

CRMS0002 ##########

6.71

9.18

0.6375

8.0325



CRMS0002-H01 Mean annual water level

level

(9/29/2007-1/27/2015) 0.87ft NAVD88

Mean growing season water

(9/29/2007-11/30/2014) <
0.98ft NAVD88

Growing season is March 1 - November 30

Added "Mean growing season water level" line





Show statistics for the entire dataset (along with the previously available year and various seasons).





Home

Data



Data Type	Parameter	Method	Scale	Frequency
Land	Land:Water Ratio	Satellite Imagery	Hydrologic Basin	3 years
change	Land:Water Ratio	Digital Aerial Photography	CRMS Site (1 km <sup>2</sup> )	3 years
Vegetation	Emergent Vegetation	Braun Blanquet: % Cover, Species Richness, Height of Dominant Species	(10) 2m x 2m plots per marsh site or (9) plots per swamp sites	Annually during peak biomass
	Forested Vegetation	DBH, Canopy Cover, Understory veg	(3) 20m x 20m Forested plots & (9) 6m X6m Understory plots per site	3 yrs during peak biomass
	Soil Characteristics	Core samples profiled into 4 cm increments to 24 cm. Bulk Density, OM%, Soil Salinity, pH, and Moisture.	3 cores, 18 archived samples per site	6 to 10 years
Soils	Vertical Accretion	Feldspar Plots/Cryogenic Cores	3 plots per site	Twice per year
	Marsh Elevation Change	Rod Surface Elevation Table (RSET)	4 directions per site	Twice per year
	Soil Porewater	10 and 30 cm syringe sippers	3 samples per depth per site and at vegetation plots	Variable and annually
nyarology	Surface Water Salinity, Temp and Water Level	Submersible Data Logger	in available water within 200m of CRMS site or in a well	Hourly

Visualization

Program

Library

Mapping

a CWPPRA funded project



**CRMS Data Collection Information and Schedule** 

Data/Tabular/CIMS



#### How do I interpret the CRMS station naming convention (ex., CRMS0002-V01 CRMS0002-A13, etc)?

CRMS site names are indicated by CRMSXXXX, where XXXX is a four digit number. CF station names begin with the CRMS site number, followed by a hyphen, and the stati number (ex., CRMS0002-A01). There are many stations within a CRMS site. For addit details of station naming conventions and general CRMS data collection schedule, click here

#### How do I download data?

Use cims.coastal.louisiana.gov if you are looking for raw data for a specific data type

Hydrographic: · Station number (H01): Continuous hourly salinity, temperature, and water level data

Download "raw" data from CIMS or the CRMS website homepage by clicking on

- are collected. At most sites the data recorder is in an open water body or bayou. · Station number (W01): Continuous hourly salinity, temperature, and water level data
- but the data recorder is in a well in the marsh instead of an open water body.
- · Station number (M01): Marsh mat stations are established in floating marshes where the marsh mat rises and falls with water level.

CRMS sites with realtime hydro gages: CRMS0061, 0282, 0411, 0465, 0568, 0609, 0615, 0651, 2418, 5373 -- Data

#### Soil Properties:

Station number (S01, S02, etc): Collected upon site establishment and approximately 10 years thereafter. Soil: pH, salinity, bulk density, soil moisture, percent organic matter, wet/dry volume

#### Soil Porewater Salinity:

Station number (P01, P02, P03): Discrete collections occur near the CRMS boardwalks: 1) intermittently throughout the year when the boardwalk is accessed, 2) twice annually during spring and fall RSET/accretion sampling, and 3) collected at each vegetation station

FAQ



2013 Color Infrared Imagery





Add a link to download the vegetation acreage assessment





# **Coming Soon**



100 90

80 70

60 50 40

30 20

10

Previous Charting Version Bulk Charting Reporting Data Download Charting Water Year is October 1 - September 30 Hydro More Info on Chart Water Level Range Scale: Site v Hydro Completeness Salinity Water Level Year: 2012 v Temperature Continuous Site Hydro Index Soil Porewater BA39-01 ...... Precipitation BA39-02 BA39-03 Interactive Hydro CRMS0002 CRMS0003 Vegetation CRMS0006 CRMS0030 Soil CRMS Hydrologic Index for 2012 Brackish Marsh, BA39-01 CRMS Spatial • CRMS 5.75 100 % Time Flooded = 84.38 Report Card Charts • Annual Salinity = 5.75 ☆ Index Value = 24 84.38 80 -Clear Charts % Time Flooded 60 -40-Index Score 20-0 10 0 2 4 6 8 12 14 16 18 20 Weighted Average Annual Salinity(ppt)







Coming Soon

Display elevation survey benchmark network and associated CRMS sites





### **Coming Soon**

Add a difference layer to the land/water layer

NOTE: Context of the new land/water too





Add a difference layer to the land/water layer





Save a previous selection list for chart creation

Previous Charting Version	
Charting Bulk Charting Data Download	Reporting
- Hydro	Water Year is October 1 - September 30 More Info on Chart
Water Level Range Hydro Completeness Salinity Water Level	Scale: Multi Station V
Temperature Continuous Site Hydro Index Soil Porewater	Basin: All Basins V Project: All Projects V
Precipitation Interactive Hydro	Selection limited to 10 items
Vegetation	BA01-01 BA01-02
> Soil	BA01-03 BA01-04 BA01-14 BA01-14
Spatial	BA01-10 BA01-16
Report Card Charts	BA02-57 BA03C-16
Clear Charts	BA03C-60 BA03C-61 Show Map Selector
	Previous Selection Submit Request



# Ideas...

### **Ideas!**



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







# CRMS Analytical Team Updates



### **Forested Floristic Quality Index (FFQI)**





- USGS Open-File Report completed peer review
- Uses basal area by tree species to assess quality and quantity of overstory & incorporates information about the herb layer
- Station level scores are aggregated to site level FFQI values
- By using basal area, percent tree canopy cover and information about the herbaceous layer enables differentiation between sites in different successional states, e.g. emerging or deteriorating forests



- USGS Open-File Report completed peer review
- Quantifies the volume of vegetation at a site (m<sup>3</sup>) 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.





# Landscape Index (LI)



## Landscape Index

- Manuscript completed USGS review, submitted for journal review.
- Wetland loss, mosaic of wetlands and open water patches
- Examined the spatial and 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





## **Coastwide and Basin Scale Analyses**



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

# Link between Spatial Configuration and Susceptibility to Wetland Loss



- Known that wetland loss contributes to fragmentation, and it is suspected that fragmentation contributes to wetland loss, few studies have actually tested that hypothesis at large scales over a large period of record.
- AI and wetland change rate for the subsequent period are correlated.
- Results suggest while various causal mechanisms of wetland loss may lead to the **initial fragmentation** of wetlands, the fragmentation itself then **contributes to increased exposure and vulnerability** of wetland landscapes, thereby **increasing the probability** of furthered **wetland loss**.



## **Restoration Project Scale Analysis**



- PO-17, marsh creation, constructed in 1994.
- Increased aggregation and land area acres following construction.
- Implied the project area is not only maintaining itself, but is also more stable.
- Fluctuations in AI & land area due to water level



# Submergence Vulnerability Index (SVI)



## **SVI Revisions: Initial Model**

2013



- Compares site specific water level data & surface elevation data.
- Water level and surface elevation are projected 5 years.
- Intersection of water and marsh surface are ranked.
- Predicted percent time flooded is calculated.
- SVI score is the inverse of predicted % time flooded.
- Ex: SVI = 80, would be flooded 20% of time.

## **SVI Revisions: Initial Model**

2013



- Original model used Local Relative Water Level Trend which incorporated ESLR and shallow subsidence.
- The model used surface elevation change data also, so it accounted for shallow subsidence twice.
- Removed shallow subsidence from water level constant.





- SVI scores were overly conservative due to influence of storm events on water elevation distribution
- Removed 5% on either end of distribution to remove episodic influences that artificially raise/lower local water elevations



# Hydrologic Data: De-trended ESLR



- Water level data from tide gages inherently incorporates ESLR.
- De-trended ESLR from water level data set before projecting into the future.

# **Revised SVI Model**



- The SVI model assesses the submergence vulnerability of a site based on the 5-year projection of it's relative position within the hydrologic prism.
- Wetland elevation is projected 5 years into the future by a regression of the SET data over time.
- The future hydrologic prism is calculated using a linear model with a slope equal to eustatic sea level rise.

CRMS0156 SVI score = 89.05 Data Period: 6/27/2007 - 9/17/2013



Percentile Rank





- Overall increase in SVI scores because ESLR is likely less than actual RSLR.
- Site specific rates of RSLR would be optimal, but need at least one epoch (18 yrs) of water level data to estimate local rates of RSLR that are accurate.



# **SVI Open File Report available:**

# http://pubs.er.usgs.gov/publication/

# Coming soon: Document revision addressing the modifications



# Coastwide Elevation Survey Update

- Sites were surveyed at the beginning of the program over several years and data were reported in NAVD88 Geoid99
- Spring/Summer 2014 all sites were surveyed in Geoid12a
- Elevations will be stored in the database with their Geoid information
- Will begin serving the Geoid12a elevations starting with October 1, 2013. Coincides with water year
- New average marsh elevations were calculated for each CRMS site



# **Coastwide Elevation Survey Update**

- Contractor adjusting staff gages now
- Data shift will be visible due to resurveying
- Geoid will be identified for every elevation
- Both survey reports are available in the site level bubble
- Revising visualizations to reflect new elevations (water elevation, marsh elevation, flooding, etc.)
- Working on potential data shift to be applied to "old" data

CRMS0527 Daily Mean Water Elevation in two Geoids







# Questions, Data Requests, Ideas????

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