Using Coastal Monitoring Data to Build Dynamic Reports and Visualizations Through the Coastwide Reference Monitoring System Website

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CEER – July 2014
Funded by CWPPRA in 2003

390 CRMS sites – Both inside and outside of existing CWPPRA Projects
- Hydrology, Herbaceous Marsh, Forest, Accretion/Compaction, Land/Water

CURRENT DATA HOLDINGS:
- 43 M – hydrology
- 261K – vegetation
- 151K – surface elevation / accretion
- 17K – forest vegetation

www.lacoast.gov/crms
The 4th Paradigm

“The speed at which any given scientific discipline advances will depend on how well its researchers collaborate with one another, and with technologists, in areas of eScience such as databases, workflow management, visualization, and cloud computing technologies”
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CRMS embraced the 4th Paradigm:
• Inter-disciplinary teams address problems from conception to completion

• Consistent data ensures automation across sites and scales
Why Dynamic Charting?

…the data is frequently updated
… … why not keep visualizations current
… … … it’s what the **users** want!
Why Dynamic Charting?

1. Numerous public consumers
2. Maintain the most up to date data
3. User driven access to consistent data

32 Unique Charts Available

9  Hydrology
6  Vegetation
4  Soils
1  Geospatial
12 Report Card
Concept to Completion (pre-automation)

Species Name (CC Score)
- Iva frutescens (4)
- Paspalum vaginatum (7)
- Amaranthus australis (2)
- Mikania scandens (3)
- Schoenoplectus americanus (8)
- Phragmites australis (6)
- Vigna luteola (3)
- Echinochloa walteri (5)
- Sagittaria lancifolia (6)
- Typha latifolia (2)
- Schoenoplectus californicus (7)
- Spartina patens (9)
- FQI

Required:
- ½ day effort
- Excel and SAS
Coastwide Reference Monitoring System - *Wetlands*
CRMS Data

Concept to Completion (version #1)

**Floristic Quality Index for ME11**

- **Required:**
  - 4 seconds
  - Web Browser
Concept to Completion (version #3)
Bulk Charting with User Defined Colors
Concept to Completion (version #3)
Bulk Charting with User Defined Colors

Species Name (CC Score)
- FQI
- Spartina patens (9)
- Typha latifolia (2)
- Echinochloa walteri (5)
- Sagittaria lancifolia (6)
- Paspalum vaginatum (7)
- Other
Replace Hog Island Gully Structures (CS-23) Project
Station CS23-05 (05/21/08 - 08/27/08)

FT (NAVD 88)

Date

ppt

0.00

2.00

4.00

6.00

8.00

10.00

-1.0

-0.5

0.0

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0

4.5

5.0

Shifted Depth

NAVD

ft

Marsh Elevation NAVD

ft

Shifted Salinity ppt
Coastwide Reference Monitoring System - Wetlands
CRMS Data

Concept to Completion (version #1)

Coast-wide Reference Monitoring System
CRMS4448 - Continuous Hydrographic Data

- Mean Daily Water Level
- Marsh Elevation
- Mean Daily Salinity

Water Level NAVD88 (ft)
Salinity (ppt)

January 2010 - December 2010

Data Source: Daily Averages
Coastwide Reference Monitoring System - Wetlands
CRMS Data

Concept to Completion (version #2)

MONTHLY AVERAGES

DAILY AVERAGES

HOURLY DATA

Download to CSV coming in Version 2.1
CRMS WEB OBJECTS

CRMS Charting/Bulk Charting

CRMS Spatial Viewer

CRMS Data Download

CRMS Report Cards

Web Site

Data

Charting

Reporting

Web Site
FROM RAW DATA TO REPORT

- Data
- Charting
- Reporting
- Web Site
CRMS DATA FLOW

- Analytical teams have developed a series of algorithms that are computationally intense AND use raw CRMS data.
- Decisions made using data-driven, science-backed charts.

Data
Science Analysis
Raw Real-Time / Monthly
Derived
CRMS Teams
Charting Visualization Decision Making

Data
Charting Reporting Web Site
CRMS CHARTING

- Popular charts pre-generated off-peak times
- User defined charts cached
- Highly optimized garbage collection routine
CRMS CHARTING – Soils Charts (4)

Available Charts:
- Percent Organic
- Bulk Density
- Surface Elevation/Accretion
- Submergence Vulnerability Index
CRMS CHARTING – Vegetation Charts (5)

Available Charts:
- Forested Sites
- Herbaceous Marsh Sites
- Site Floristic Quality Index
- Project/Reference FQI
- Marsh Class

Charting Engine

Performance Optimizer

Charting Services

Chart Images
Available Charts:
- Water Level Range
- Hydro Completeness
- Salinity
- Water Level
- Temperature
- Continuous Hydro
- Site Hydro Index
- Soil Pore-water
- Precipitation
- Interactive Hydro
Available Charts:

- Site Hydro Index
- Hydro Index
- Hydro Completeness
- Site Floristic Quality Index
- Floristic Quality Index
- Site Index and Marsh Type Box Plot
- Site Index and Multiple Spatial Scales Box Plot
- Index Site Scores
- Site Submergence Vulnerability Index
- Submergence Vulnerability Index
- Percent Land
- Data Availability
Coastwide Reference Monitoring System - Wetlands
CRMS Visualization

CHARTING INTERFACE

Select Mode - Drag the Mouse inside the map to select stations.

**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

CRMS Stations  CWPPRA Stations

BAG1-03
BAG1-04

Include major weather/storm events
Show Map Selector
Submit Request
Coastwide Reference Monitoring System - *Wetlands*

**CRMS Visualization**

**CHARTING INTERFACE**

**Coastwide Reference Monitoring System**

- Home
- Data
- Mapping
- Library
- Visualization
- Program

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**Previous Charting Version**

- Charting
- Bulk Charting
- Data Download
- Reporting

**Hydro**

- Water Level Range
- Hydro Completeness
- Salinity

**Water Year is October 1 - September 30**

**Scale:** Multi Station

**Date Range:**
2/25/1987 - 5/30/2014

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**Salinity**

- CRMS0575-H01
- CRMS0588-H01
- CRMS0680-H01

**July 28 2007 - May 28 2014**

**Data Source: Monthly Averages**

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**Data Download**
Coastwide Reference Monitoring System - *Wetlands*

**CRMS Visualization**

**CHARTING INTERFACE**

- **Previous Charting Version**
  - **Hydro**
    - Water Level Range
    - Hydro Completeness
    - Salinity
    - Water Temperature

- **Salinity**
  - Water Year is October 1 - September 30
  - Scale: Multi Station
  - Date Range: 2/25/1987 - 5/30/2014

- **July 28 2007 - May 28 2014**
  - Data Source: Monthly Averages

- **Data Download**
Coastwide Reference Monitoring System - *Wetlands*

CRMS Visualization

Leveraging Our Computer Science Capacity…

**Everglades National Park Automated Web Modeling**

**Everglades Wood Stork Foraging Potential Model**

A wood stork foraging suitability model developed to predict the relative suitability of foraging conditions for wood storks within Everglades freshwater marshes during the breeding season. This model calculates wood stork foraging probabilities surrounding colonies in Everglades freshwater marshes based on estimated water depth and recession rates.

**2013 2014**

![Map of Everglades Wood Stork Foraging Potential Model]
QUESTIONS