Coastwide Reference Monitoring System - Wetlands

Status Report for the CWPPRA Monitoring Work Group
March 6, 2007
**CRMS-Wetlands: Authorizations**

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<td>August 14, 2003:</td>
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<td>(PPL 1-8 and new funding)</td>
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<td><strong>Total Authorized To Date</strong></td>
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- Expenses through FY05: $1,568,109
- Expenses in FY06: $3,185,809
- **Total Expenses To Date**: $4,753,918

- **Balance (excluding current FY07 expenses)**: $15,498,863
CRMS-Wetlands: Milestones

- **Landrights**
  - 512 of 612 sites secured to date

- **Cost Share Agreement**
  - DNR-USGS finalized June 8, 2004

- **Contracting**
  - Data Collection - Coastal Estuary Services – finalized February 1, 2005
  - Equipment – Hach Environmental – Equipment to support 300 sites received August 05 – July 06
  - Presently working to secure remaining hydrologic sampling equipment (187 Units)

- **Methodologies-Training-QA/QC**
  - DNR, USGS and CES staff – phased training in March and August 2005 on SOP’s and QA/QC
  - DNR, USGS and CWPPRA agency personnel – monitoring data and information access through SONRIS and LaCoast
CRMS-Wetlands: Milestones

CRMS Implementation Status as of February 2007

Number of Sites

Data Collection | Site Construction | Site Approvals | Site Characterizations | Landrights

2005: 0 13 90 141 381
2007: 106 165 245 385 512

Legend:
- 2005
- 2007
February 2007 Landrights Status:

- SECURED: 512
- PENDING: 100

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CRMS-Wetlands: Implementation

- Site Characterization Report 385 completed to date

**Site Characterization Sheet (Page 1 of 3)**

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<th>Site: CRMS0489 (Annual)</th>
<th>Basin: TV</th>
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<tr>
<td>Date and Time (CST) of Site Visit: 06/19/2005 @ 08:46</td>
<td>Agency: CEB</td>
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1. Site Location and Access:
   - Has site been relocated from original CRMS center point? Yes
   - Easting: 641232
   - Northing: 9273496
   - Type of Water: Venetian
   - Directions from field office: Follow Hwy. 16 east to US 90. Take US 90 south to the Bl 317 exit. Leave US 90 and take Bl 317 to Burns Point. The Area will be on the right. To get on Bl 317, turn right on Bl 317. The ramp is at the end of the road.
   - Site Restrictions: Contact Clyde Brown (337-836-0481) for details and prior to visit.

2. Continuous Recorder Details:
   - Easting: 641232
   - Northing: 9273496
   - Recommended Set-up (1000 ft, Monopole, VHF): Wooded area
   - Description of area (wetland topography, drainage, hydrology): 150 ft wide, 50 ft deep, adequately drained, moderately fluctuating: depth, 10-20' 5-7', 2.5%', 3%.

3. Boardwalk Details:
   - Easting: 641232
   - Northing: 9273496
   - Approximate length of Access (Additional Boardwalk (ft)): No access boardwalk required
   - Approximate length of Boardwalk (ft): 130'

4. Site Layout Details: (airboat access direction, vegetation transect orientation, RSET location, etc)
   - Airboat access is from the SW, veg transect NE-SW, RSET SW of base boardwalk

5. Photos:

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CRMS-Wetlands: Implementation

- Construction of sites began in July 2005
  - Approximately 165 sites constructed

- All presently secured sites to be built & operational by July 2007
CRMS-Wetlands: Implementation

Data Collection (as of February 2007):

• 60 benchmarks incorporated into LDNR vertical control network
• 179 CRMS sites – post-hurricane assessments; 49 sites required repair
• 106 CRMS sites all parameters; 215 CRMS sites vegetation sampling
• Coastwide aerial photography and satellite imagery collected Fall 2005 available on lacoast.gov
• Land:water analysis complete on 55 CRMS sites using aerial photography and coastwide using satellite imagery (150 in peer review)
CRMS-Wetlands: Implementation

Data Availability (as of February 2007):

• 88 Continuous hydrographic stations
• 100 Pore water salinity stations
• 215 Vegetation sites (2,150 stations)
• 87 Soil properties stations
• 85 RSET/Accretion stations
• 55 Land:water analyses (150 in peer review)

Data available through DNR SONRIS, USGS, or CWPPRA Websites
CRMS-Wetlands: Projections through July 2007

- Meet with Monitoring Workgroup in Spring 2007
- Install remaining benchmarks
- Complete construction of all year 1 sites
- Data collection on all year 1 sites
- Web enable vegetation and sediment data and develop on-the-fly graphics
- Assemble analysis team to support basin-level assessments
CRMS Implementation Status:

Are we on Track/What have we learned?
• Slow start due to prolonged contractor selection process and contractor training.
• Landowner involvement/review in site placement (in-field) has slowed construction.
• Learning that landrights and uncertainty of access are more challenging than anticipated.
• Authorization for Access routes to sites involves additional landowners in many cases.

What obstacles are we encountering?
• Increased post-hurricane contractor costs (fuel costs, surveying costs, labor).
• More DNR & USGS involvement than anticipated (labor/work-in-kind, swamp uncertainties).
• Problems with reliability of electronic field equipment has been resource drain.
• Major hurricanes damaged some sites (early O&M costs), pushed schedule back, and raised costs.
• Higher O&M than anticipated due to high incident of marsh burning.

Fiscal and Technical Review:
• Can we take what we have learned over the past 18 months and develop a more streamlined approach that will reduce costs and effort, but maintain scientific integrity.

Questions?
Proposed Modifications to Coastwide Reference Monitoring System Design

- Fixed annual design rather than rotational stations
- Temporal power weighted greater than spatial power
Fixed annual rather than rotational sampling design
- Change from 612 stations over 3 years (200 fixed annual, 33% of remainder each year, Barataria pilot equals 342 sites per year)
- Fixed annual design – same 392 stations each year sampled
- Established rules to eliminate station overlap and clustering

Rationale
- Improved ability to assess finer temporal changes, with reduction in power (90% to 80% confidence) in assessing coastwide change (compensated with additional spatial data)
- Retains close to original station allocations to project/non-project areas, basins, and vegetation types within basins
- Overcomes difficulty in securing remaining landrights; does not require new deployments each year, reducing construction costs, learning curves on site logistics, and decreases uncertainties regarding resource requirements
Suggests approximately 400 randomly selected samples would detect a 20% change in marsh type between time one and time two 80% of the time.
CRMS Stations Proximity Analysis

- North-South Chabreck Linscombe samples taken at 0.8 km intervals – 1 km\(^2\) CRMS station size caused overlap
- 92 stations overlap at 1.6 km and 150 stations overlap at 2.4 km
- 2.4 km separation selected from USFWS Wetland Status & Trends design and from Emad Habib uncertainty assessment findings
### Station Allocations

#### 392 Design

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Original vs. Modified Design
Within Project Stations

- BA-33  30 stations to 9 (boundary changed since initial design)
- BS-10  1 station to 0
- CS-22  1 station to 0
- CS-27  5 stations to 4
- CS-29  12 stations to 10
- CS-30  1 station to 0
- ME-17  6 stations to 4
- TE-10  6 stations to 5
- TE-32a 3 stations to 2
- TE-34  17 stations to 13
- TV-04  8 stations to 7
- TV-11b 1 station to 0
- TV-19  5 stations to 4
Original vs. Modified Design
Sampling Frequency

- **Spatial Data:** Land:water analysis from aerial photography and satellite imagery from every 3 years to every 4 years
- **Vegetation:** Emergent marsh and forested stations from annual to every other year
- **Hydrologic:** Continue hourly collection of data but service gages from 12x/yr to 9x/yr, therefore sample porewaters 9x/yr
- **Sediments/Soils:** No change
392 Site Design (Chenier Plain)
392 Site Design (Deltaic Plain)
If Redesign is implemented:

• <38 sites remaining to secure landrights (progressing well).

• Estimate construction will be complete on all secured sites by July 2007.

• 2007 will be YEAR 1 of data collection.

• 2008 will produce summary report of first years’ data and status & trends.

• Costs:
  • Original 2003 pre-hurricane estimate on original design $66.7M
  • Post-hurricane cost increases (i.e., fuel, labor and landrights acquisition) have risen sharply
  • With redesign, costs will be higher but more closely in line with original estimate

• Potential outside funding sources/contributors
  • LCA
  • CIAP
  • OCS
Data and Information Availability

Coastwide Reference Monitoring System (CRMS)

Wetland restoration efforts conducted in Louisiana under the Coastal Wetlands Planning, Protection and Restoration Act require monitoring as well as documenting the cumulative effects of all projects in assessing, creating, enhancing, and protecting the coastal landscape. The real-time monitoring approach in Louisiana has been limited because of difficulty in finding comparable test sites. A multiple reference approach for hydrogeomorphic functional assessment and probabilistic sampling.

This approach includes a suite of sites that encompass the range of ecological condition for each stratum, with projects placed on a common spatial scale. Trajectories in reference sites through time are then compared with project trajectories through time. The approach proposed could serve as a standard for ecosystems.

Monitoring Data

Hydrographic, accretion, herbaceous marsh vegetation, soil properties, and surface elevation data collected by the LDNR / CRMS Monitoring Section are now available on-line. All downloaded files will be in zipped, comma-delimited format with headers that describe the data. For a detailed explanation of all data types, please review the Data Descriptions document.

Hydrographic Data

Hydrographic data are now available in two general formats: data collected monthly and data collected hourly. Parameters sampled generally include: water level, water temperature, specific conductance, and salinity. In some rare instances water velocity and wind speed / direction are sampled at stations where hourly data are collected.

Monthly Data

Monthly hydrographic data can be downloaded by either project or station number for any range of dates that data are available. These files are relatively small as there are only approximately 12 records per station per year. In general, there is a much larger spatial distribution of stations where monthly data are collected than where hourly data are collected. The LDNR currently monitors over 400 stations throughout the coastal zone for monthly hydrographic data.

Hourly Data

Hourly hydrographic data may also be downloaded by project or by station number; however these files are much larger than the monthly files. For example, since one year of hourly sampling will yield approximately 8,760 records, a file for a project collecting data at
Data Analysis & Reporting Approach
CRMS-Wetlands Data

- Site-scale
PROVISIONAL DATA SUBJECT TO REVISION

Station: BA02-56
FROM: Jun 24 1997 12:00AM TO: Oct 25 2006 12:00AM
Station Type: Continuous
Parameters: Salinity
Water Temp
Water Level
Days: 30 days
60 days
90 days
Start Date: 08/01/2006

Create Graph

BA02-56 Salinity (ppt)

August 01, 2006 - August 31, 2006
Herbaceous Marsh Vegetation Data
Station BA02-72
Sample Date 10/06/2005

Spartina patens (Ait.) Muhl. 90%
Ipomoea sagittata Poir. 20%
Bare Ground 10%
Sagittaria lancifolia L. 5%
Polygonum punctatum Ell. 5%
Alopecurus carolinianus Walt. <1%
Symphyotrichum subulatum (Michx.) Nesom (observed outside of sampling plot boundaries)*

* Also Observed Outside of Plot Boundaries

Percent Cover
Specific CRMS Station Data

Color Infrared Image TIFF
Color Infrared Image's World File

Land / Water Image TIFF
Land / Water Image's World File

The image files are about 1,000 x 1,000 pixels each.
CRMS-Wetlands Data Analysis

CRMS-Wetlands will facilitate the investigation of:

- Project-scale effects
CRMS-Wetlands Data Reporting

- Individual project effects
CRMS-Wetlands
Data Analysis
CRMS-Wetlands will facilitate the investigation of:

- Comparison of one project vs another project
CRMS-Wetlands
Data Analysis

CRMS-Wetlands will facilitate the investigation of:

- Basin-scale effects
  - Assessment Questions
  - Analysis Teams
Assessment Questions

Example Basin-scale Question:
Did the Breaux Act sustain a diversity of vegetation types in the hydrologic basins?

Explanation:
The habitat value of a wetland is not only dependent on the presence of emergent vegetation, but also on the diversity of habitats and how that diversity is maintained. For example, if all emergent vegetation was polyhaline oystergrass marsh, the quality of habitat would be reduced. Therefore, the program should maintain the salinity gradient typical for Louisiana coastal estuaries.

H₀:
The diversity of vegetation types in the hydrologic basin after the program is less than or equal to the diversity of vegetation types in the same hydrologic basin before the program.

Sub-question:
What are the salinity and flooding thresholds that contribute to species and community changes?
CRMS-Wetlands
Data Analysis Team Approach

- Component Teams
  - Landscape
  - Vegetation
  - Soils
  - Hydrology
- Coastwide Synthesis Team
  - Co-chaired by LDNR and USGS
  - Members include chairs of each Component Team
- Geospatial and Statistical Support to all teams
CRMS-Wetlands
Data Analysis Team Approach

• Component & Synthesis Teams:
  • Tasked with developing analytical framework and tools for synthesizing and reporting
  • Analytical framework designed for site, project, basin, & coastwide scales
  • Products intended to be responsive to the needs of CWPPRA restoration and management

• Approach
  • Develop a strawman analytical framework and product development for review and comment by CWPPRA agencies
  • Targeting September 2007
CRMS-Wetlands
Coastwide Reporting Approach

Suggestions

- Basin-level tools to be made available on-line, similar to “on-the-fly” graphics (single variable)
- Developing interpretive maps (overlays of multiple data layers)
- Coastwide synthesis (i.e., reports, workshops, MWG meetings)
CRMS-Wetlands
Coastwide Reporting Approach

Discussion

- What are agency thoughts towards the suggested products and reporting approaches?
- What products and reporting approach will best serve the restoration and management community?
CRMS-Wetlands
Potential Data Applications & Integrations

- CWPPRA funding CRMS-\textit{Wetlands} and LCA S&T funding Barrier Island Comprehensive Monitoring
- Link to EPA Rapid Assessments
- Refinement of LCA Desktop Models
- Establishment of Project-Specific and Basin-Level Performance Measures