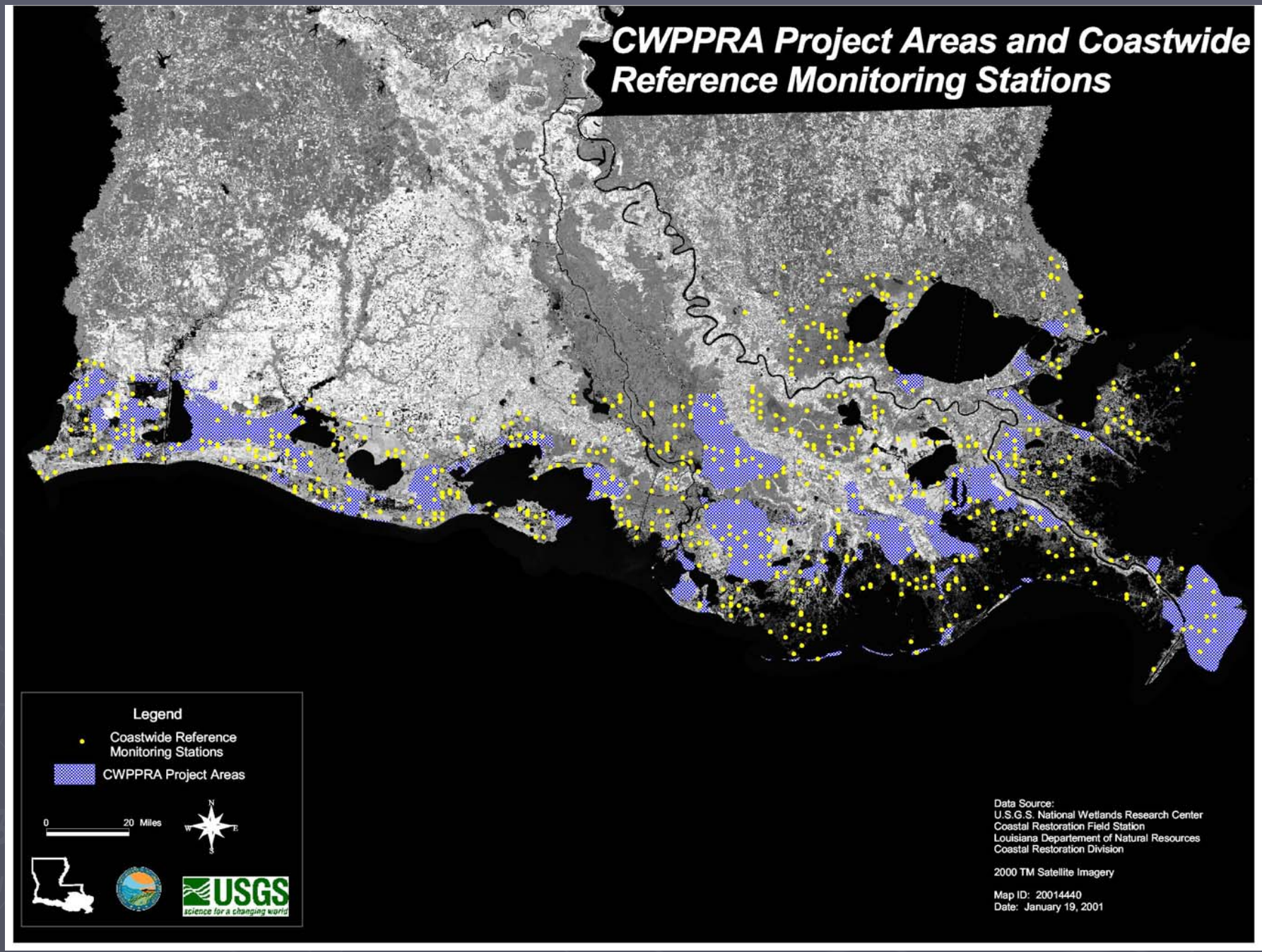
# Coastwide Reference Monitoring System - *Wetlands*

Status Report for the
CWPPRA Technical Committee
March 15, 2005

# CRMS-*Wetlands* Status Report Outline

- **BACKGROUND and APPLICATIONS**
- TRACKING PROCEDURES
  - Budget and Workflow
- MILESTONES
  - Landrights, CSA, Contracting, Implementation
- PRODUCTS AND DELIVERABLES
  - Data and Reports
- INFORMATION MANAGEMENT
  - Data Analysis Products and Information Distribution


CWPPRA Project Areas and Coastwide Reference Monitoring Stations
Legend
Coastwide Reference Monitoring Stations
CWPPRA Project Areas
0
20 Miles
N
W
E
S
USGS
science for a changing world
Data Source:
U.S.G.S. National Wetlands Research Center
Coastal Restoration Field Station
Louisiana Departement of Natural Resources
Coastal Restoration Division
2000 TM Satellite Imagery
Map ID: 20014440
Date: January 19, 2001

# CRMS-*Wetlands* Background

CRMS-*Wetlands* was developed to address Breaux Act Monitoring Program needs:

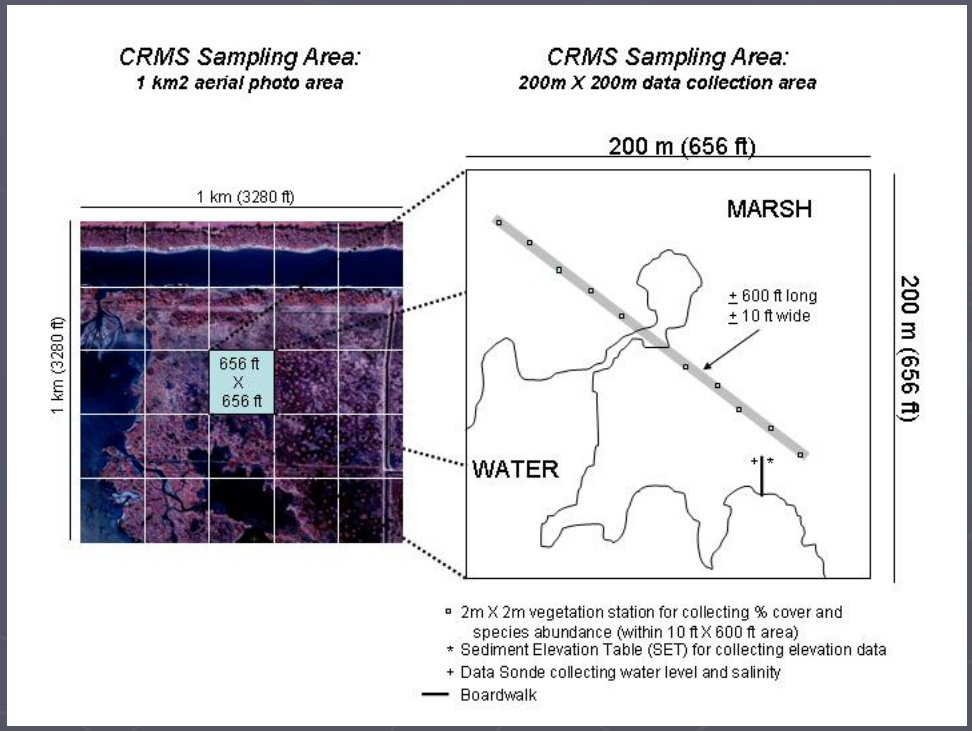
1) To improve the efficiency in determining the effectiveness of individual projects.

2) Provide information at multiple scales to evaluate coastal wetlands at the ecosystem scale, basin scale, and also restoration project scale.

3) To determine the ecological condition of the coastal wetlands based on the variables measured to ensure that the strategic coastal plan for Louisiana (Coast 2050 and LCA) is effective in recreating a sustainable coastal ecosystem.

# CRMS-*Wetlands* Variables

- Basin-scale satellite imagery classified into Land and Water (3-year frequency)
- Aerial photography of 1km2 surrounding each CRMS station, classified into Land and Water (3-year frequency)
- Hourly salinity and water level
- Marsh surface elevation - Surface Elevation Table (SET)
- Accretion – Feldspar
- Vegetation – percent cover, species abundance



# CRMS-*Wetlands* Value added

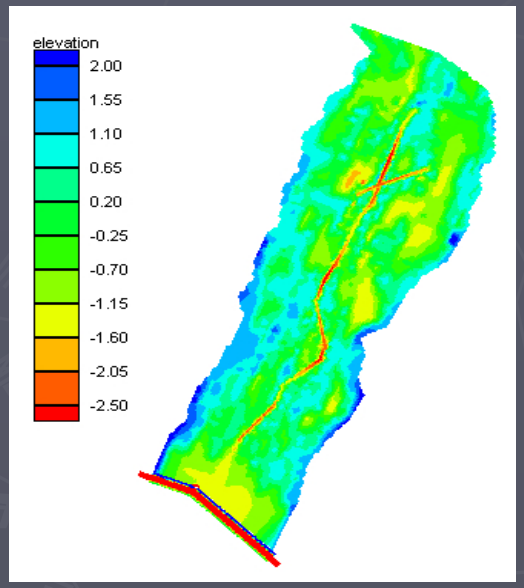
- Provide more useful information to evaluate impacts and mitigation for adverse climatic conditions, such as the Brown Marsh phenomenon, severe drought and tropical storms and hurricanes.

Drought effects at Mud Lake

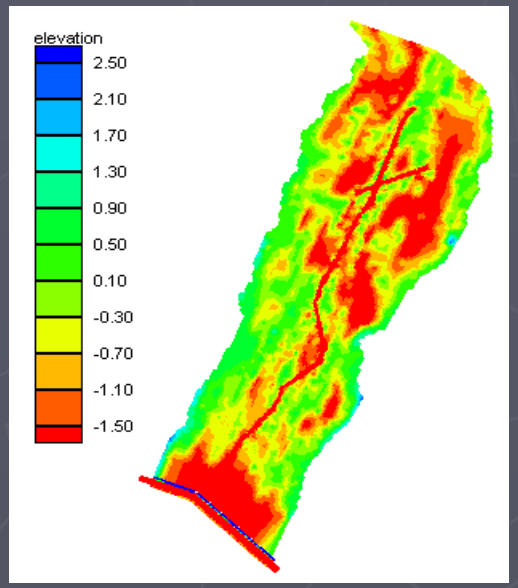
Brown Marsh in coastal Louisiana

# CRMS-*Wetlands* Value added

- Expedite the planning and implementation of new projects
- Better integration with various Hydrologic Modeling efforts (improved data distribution for model calibration and testing)




Base Condition



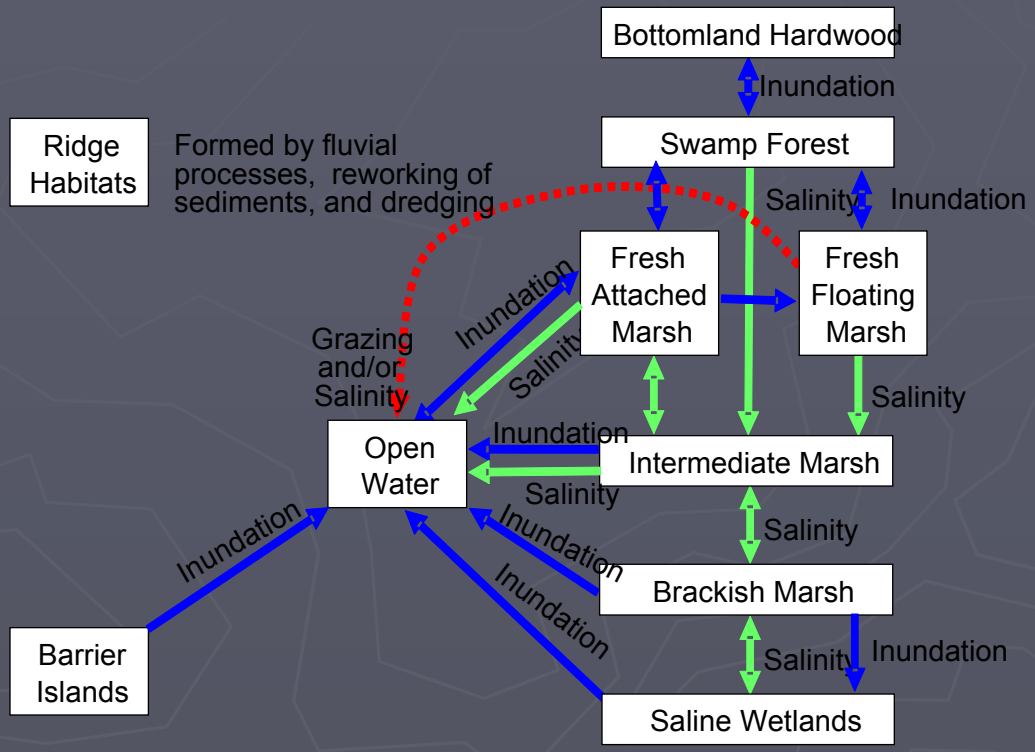

Future Condition

(From FTN's Bayou Lacache Model)

# Conceptual Models

- LCA conceptual models
  - Initial determination of the important structural and functional attributes to serve as performance measures – CRMS variables are consistent
  - CRMS data input into conceptual models will refine and improve predictive capabilities and identify research needed to test underlying hypotheses, verify assumptions, and guide management actions

# Draft Habitat Switching Conceptual Model



# Linkage to Coastal Waters Program

- CRMS stations will provide wetting and drying of marsh surface for hydrodynamic, water quality and landscape modeling
- CRMS stations will help refine land building models by assessing how sediments introduced into the system are getting on marsh surface
- CRMS stations will provide calibration of storm surge models

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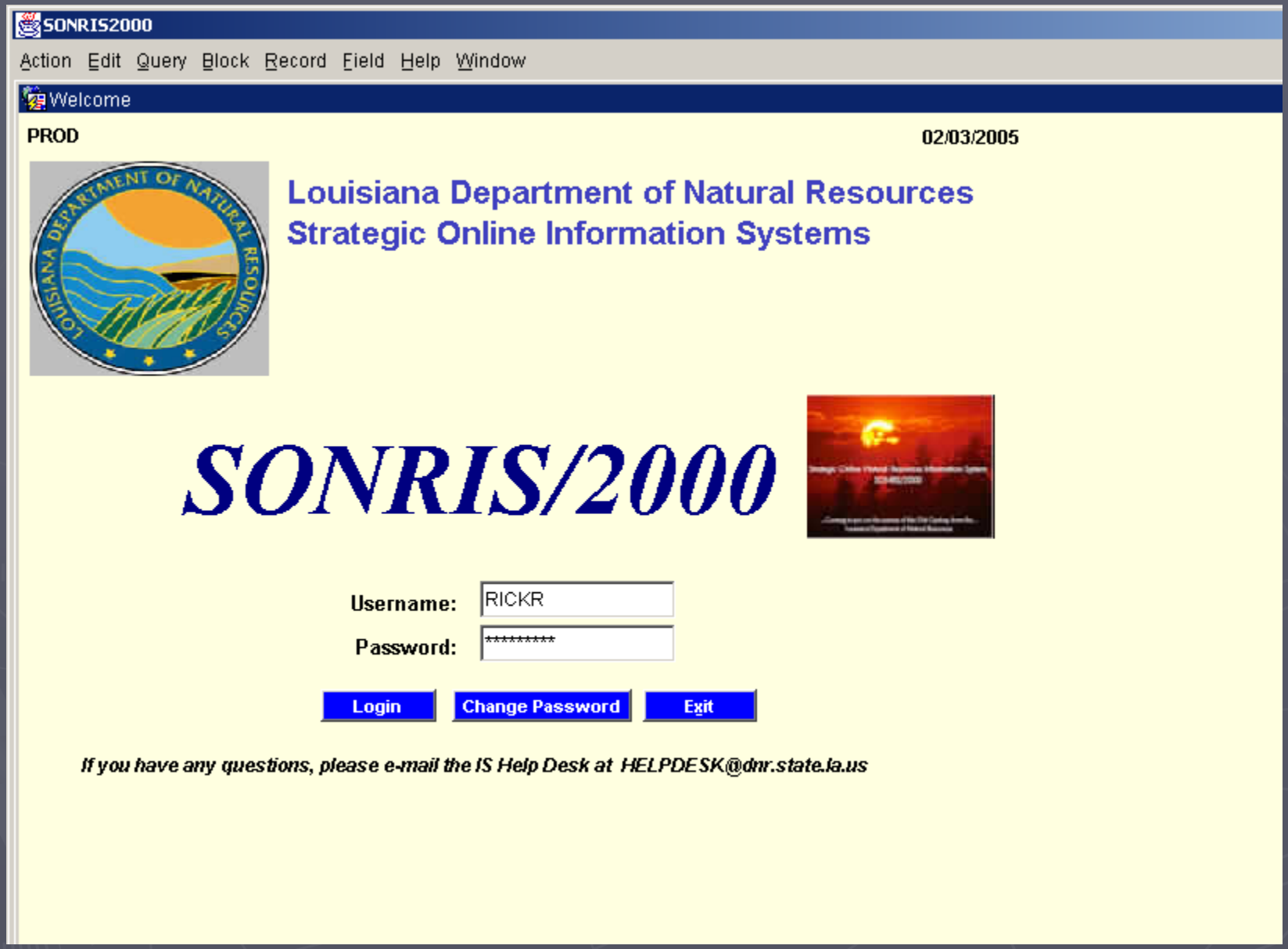
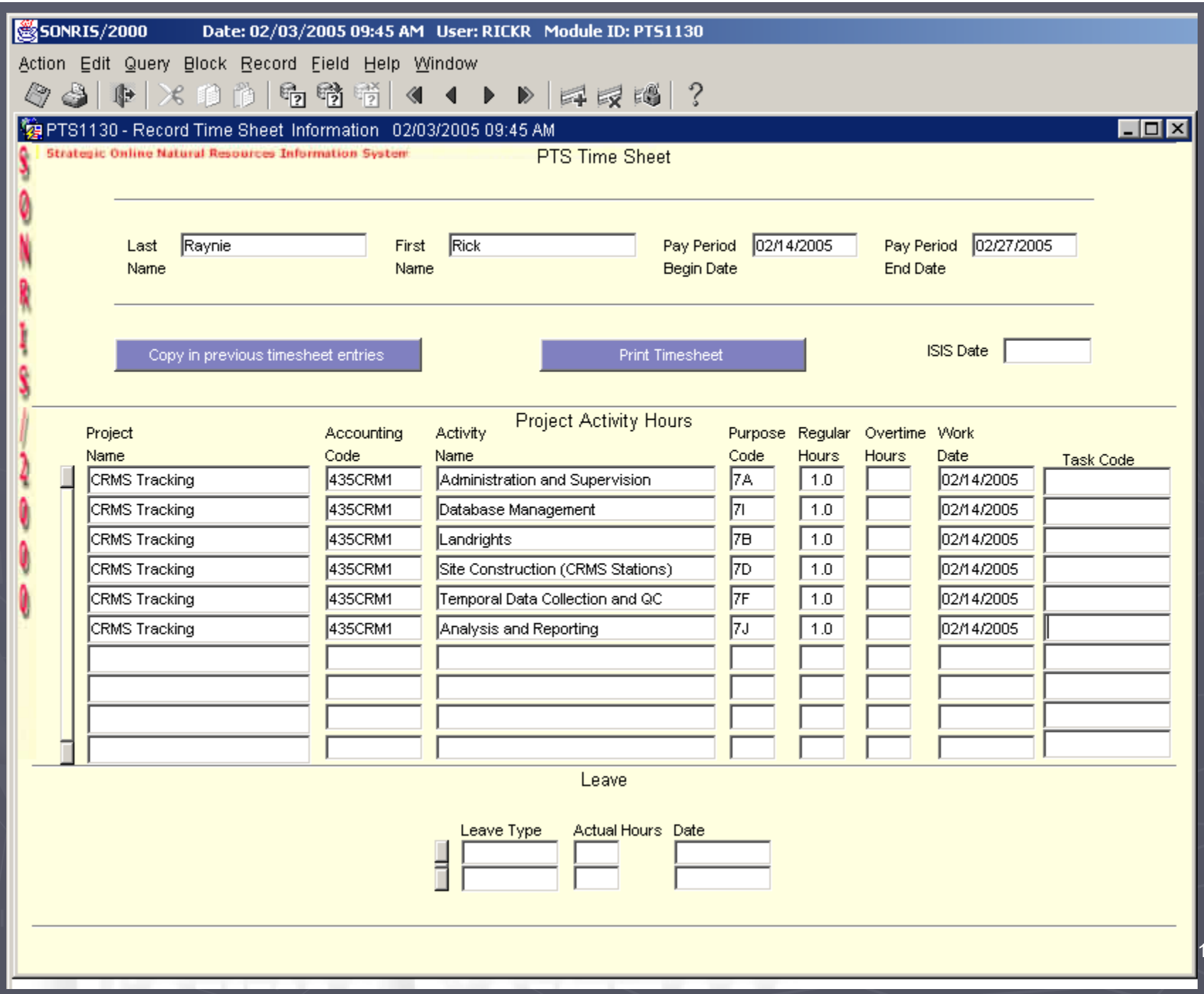
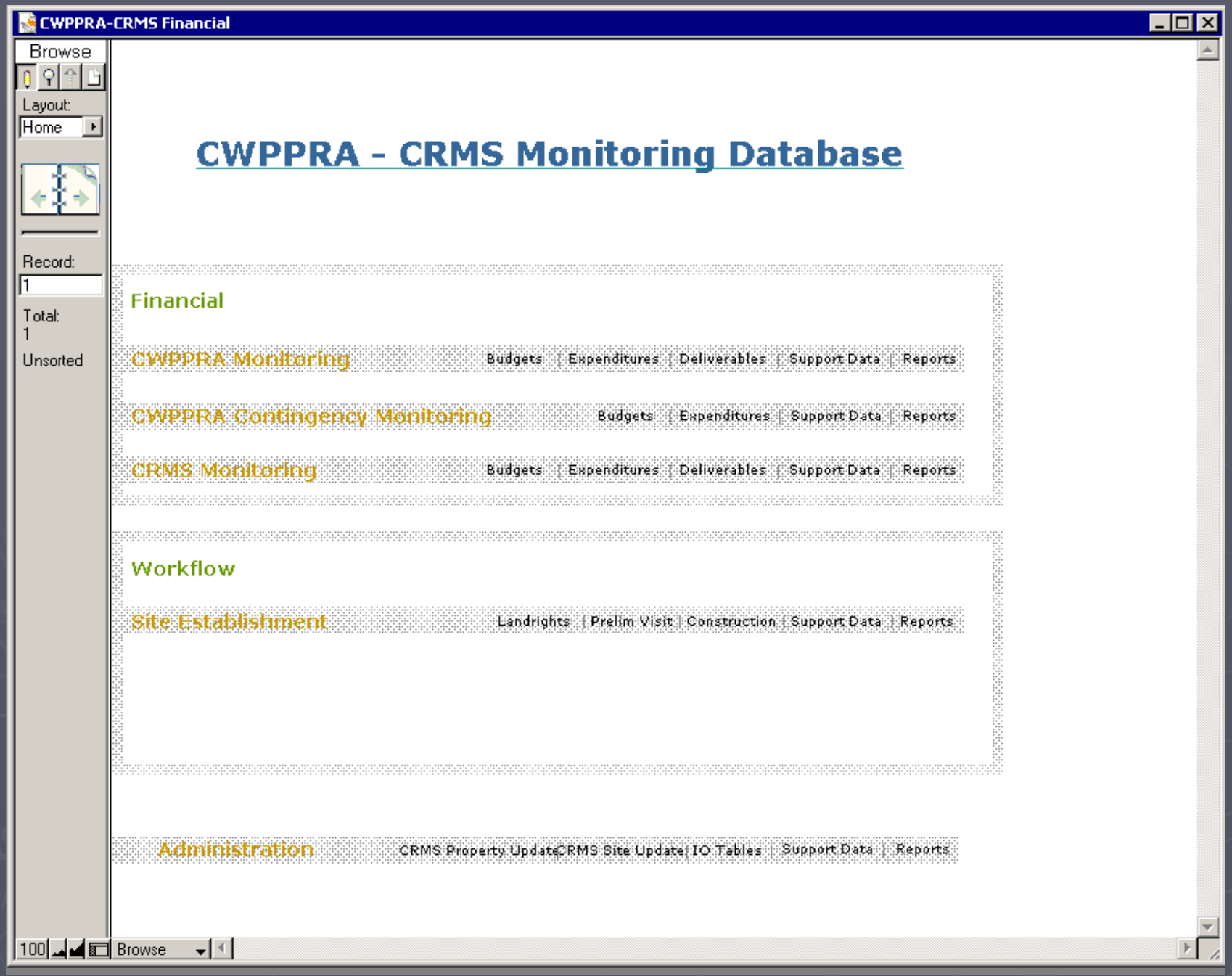
# CRMS- *Wetlands* Funding

- August 14, 2003:
  - (2003-2006) $12,397,506
  - (PPL 1-8 and new funding)
- January 28, 2004:
  - (2007) $3,101,357
- October 13, 2004:
  - (2008) $532,000
- Total Auth. To Date: $16,030,863
- Expenses through 2004: $750,950
  - (Landrights and Administration)
- Balance: $15,279,913


SONRIS2000
Action Edit Query Block Record Field Help Window
Welcome
PROD
02/03/2005
Louisiana Department of Natural Resources
Strategic Online Information Systems
SONRIS/2000
Username:
RICKR
Password:
*********
Login
Change Password
Exit
If you have any questions, please e-mail the IS Help Desk at HELPDESK@dnr.state.la.us


SONRIS/2000 Date: 02/03/2005 09:45 AM User: RICKR Module ID: PTS1130
Action Edit Query Block Record Field Help Window
PTS1130 - Record Time Sheet Information 02/03/2005 09:45 AM
Strategic Online Natural Resources Information System
SONRIS/2000
PTS Time Sheet
Last Name Raynie
First Name Rick
Pay Period Begin Date 02/14/2005
Pay Period End Date 02/27/2005
Copy in previous timesheet entries
Print Timesheet
ISIS Date
Project Activity Hours
Project Name
Accounting Code
Activity Name
Purpose Code
Regular Hours
Overtime Hours
Work Date
Task Code
CRMS Tracking 435CRM1 Administration and Supervision 7A 1.0 02/14/2005
CRMS Tracking 435CRM1 Database Management 7I 1.0 02/14/2005
CRMS Tracking 435CRM1 Landrights 7B 1.0 02/14/2005
CRMS Tracking 435CRM1 Site Construction (CRMS Stations) 7D 1.0 02/14/2005
CRMS Tracking 435CRM1 Temporal Data Collection and QC 7F 1.0 02/14/2005
CRMS Tracking 435CRM1 Analysis and Reporting 7J 1.0 02/14/2005
Leave
Leave Type
Actual Hours
Date


CWPPRA-CRMS Financial
Browse
Layout:
Home
Record:
1
Total:
1
Unsorted
CWPPRA - CRMS Monitoring Database
Financial
CWPPRA Monitoring
Budgets | Expenditures | Deliverables | Support Data | Reports
CWPPRA Contingency Monitoring
Budgets | Expenditures | Support Data | Reports
CRMS Monitoring
Budgets | Expenditures | Deliverables | Support Data | Reports
Workflow
Site Establishment
Landrights | Prelim Visit | Construction | Support Data | Reports
Administration
CRMS Property Update CRMS Site Update | IO Tables | Support Data | Reports
100
Browse

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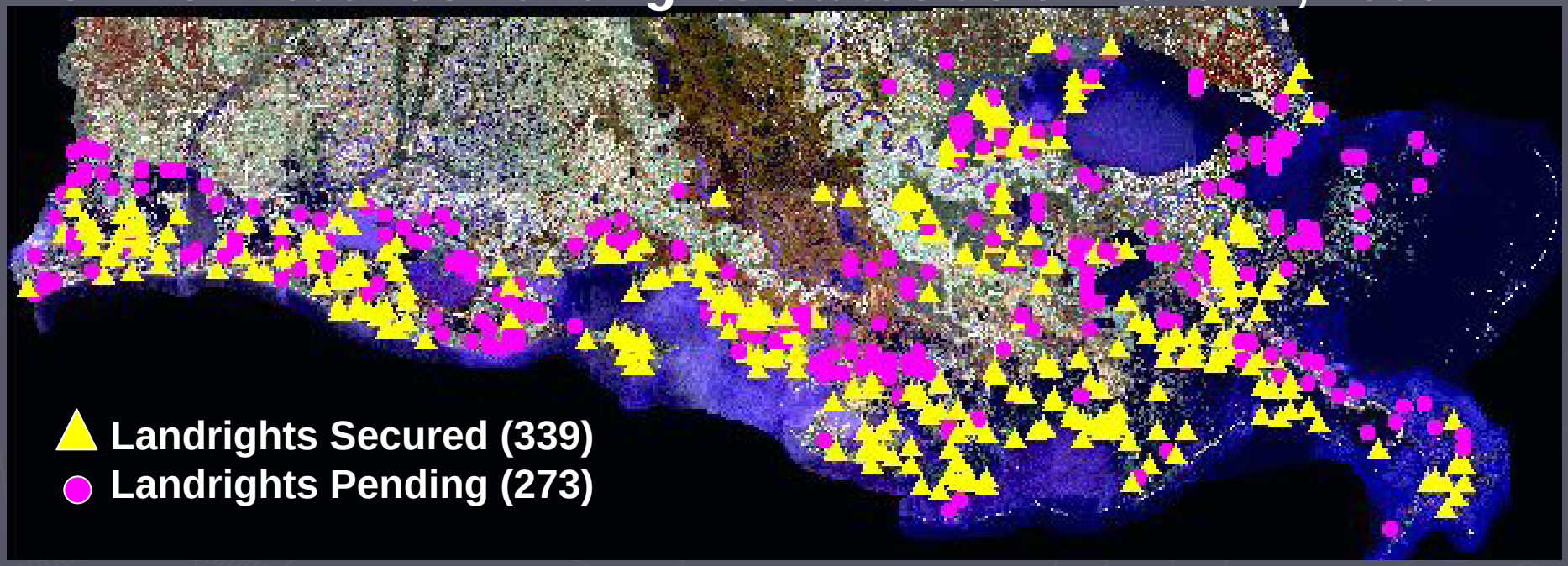
# CRMS-Wetlands Landrights Status as of March 1, 2005




| | Secured | Pending | Total |
|---|---|---|---|
| Annual Stations | 121 | 66 | 187 |
| Year 1 Stations | 74 | 70 | 144 |
| Year 2 Stations | 78 | 59 | 137 |
| Year 3 Stations | 66 | 78 | 144 |
| Total | 339 | 273 | 612 |

# CRMS-*Wetlands* : CSA

- The Cost Share Agreement (CSA) was finalized on June 8, 2004.
- USGS is the Federal Sponsor.
- CRMS-*Wetlands* project costs were included for 2003 – 2007. The CSA budget will be amended upon each new funding approval from the Task Force.

# CRMS-*Wetlands* : SOP

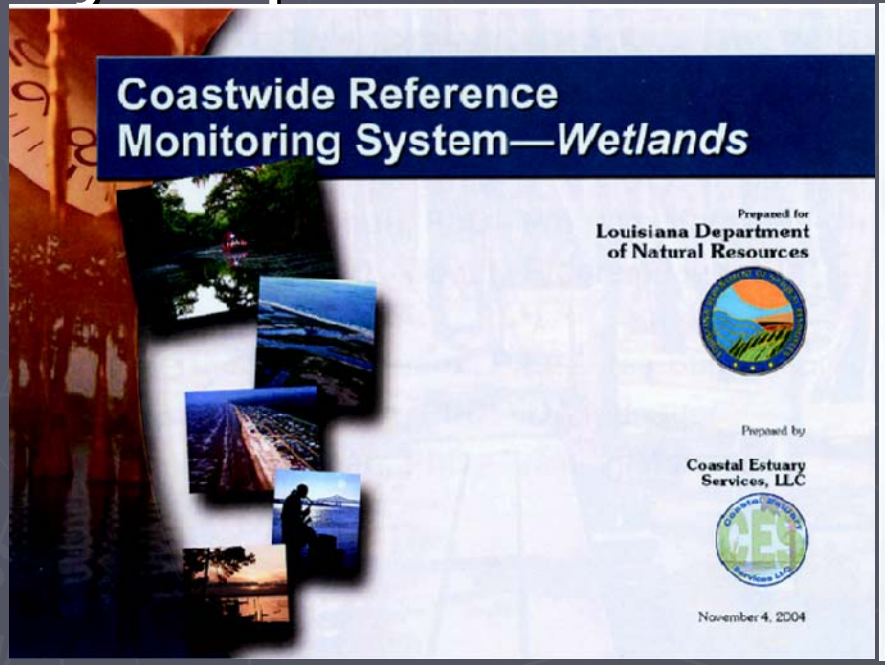
- A Standard Operating Procedures (SOP) manual (Folse and West 2004) was developed by LDNR with input from NWRC and Academia.
- 185-pages, expands on the CWPPRA Quality Management Plan (Steyer et al. 2000)
- Outlines activities and procedures for CRMS-*Wetlands* site construction, data collection, QA/QC, data processing, and deliverables requirements.
- Describes project-specific monitoring not covered by CRMS (such as shoreline surveys and SAV).
- Will be used by all contractors supporting CRMS-*Wetlands* implementation and provides the guidelines and requirements to ensure standardized implementation and consistency.

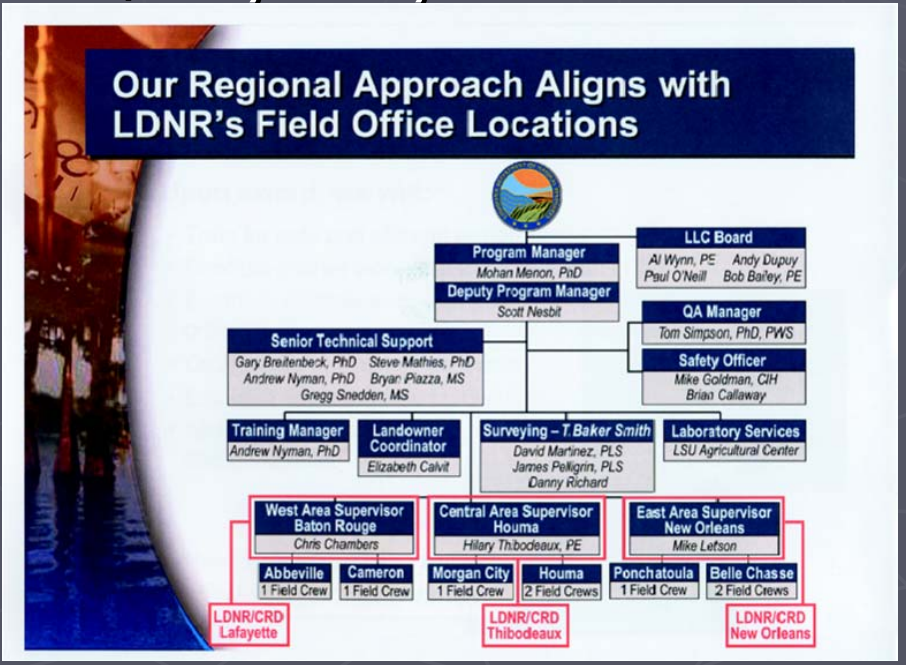
# CRMS-*Wetlands* : Contractor

- RFP prepared and processed through OSP to construct and service the CRMS-*Wetlands* stations for the first 3-years of implementation.
- RFP was released on June 22, 2004
- Pre-bid conference was held on July 7, 2004
- Bid-opening was August 17, 2004
- Recommendation to State Purchasing in November 2004
- Contract negotiations were completed on January 31, 2005
- Contract was initiated on February 1, 2005

# CRMS-*Wetlands* : Contractor

- Coastal Estuary Services, LLC (CES; a partnership between Shaw and CH2MHILL) was selected. The contract covers a three year period at a cost of $13,264,314.*




*also includes project-specific monitoring

# CRMS-*Wetlands* : Data Collection Equipment

- Specifications for the electronic equipment that will be necessary for CRMS-*Wetlands* were prepared and submitted to the Office of State Purchasing in January 2005.
- This is currently out for bid and it is anticipated that a vendor will be selected by the end of March 2005. Equipment should be ready for installation in the field in April 2005.

# CRMS-*Wetlands* : Training

- High quality data is imperative
- In-house training of the trainers to support Quality Assurance
  - Training Dates: October 19-21, 2004
- Contractor will be properly trained on procedures for site visit and characterization, site construction, data collection and QA/QC methods.
  - Training dates: March 8 and April 4-6, 2005
- CES will also initiate its own internal training and continued on-the-job QA/QC and review of procedures.
- DNR and USGS will QA/QC all phases of CRMS implementation.

# CRMS-*Wetlands* : Implementation

- Construction of CRMS-*Wetlands* sites is anticipated to begin in April 2005
- Equipment will be installed as sites are constructed
- Data collection will begin immediately

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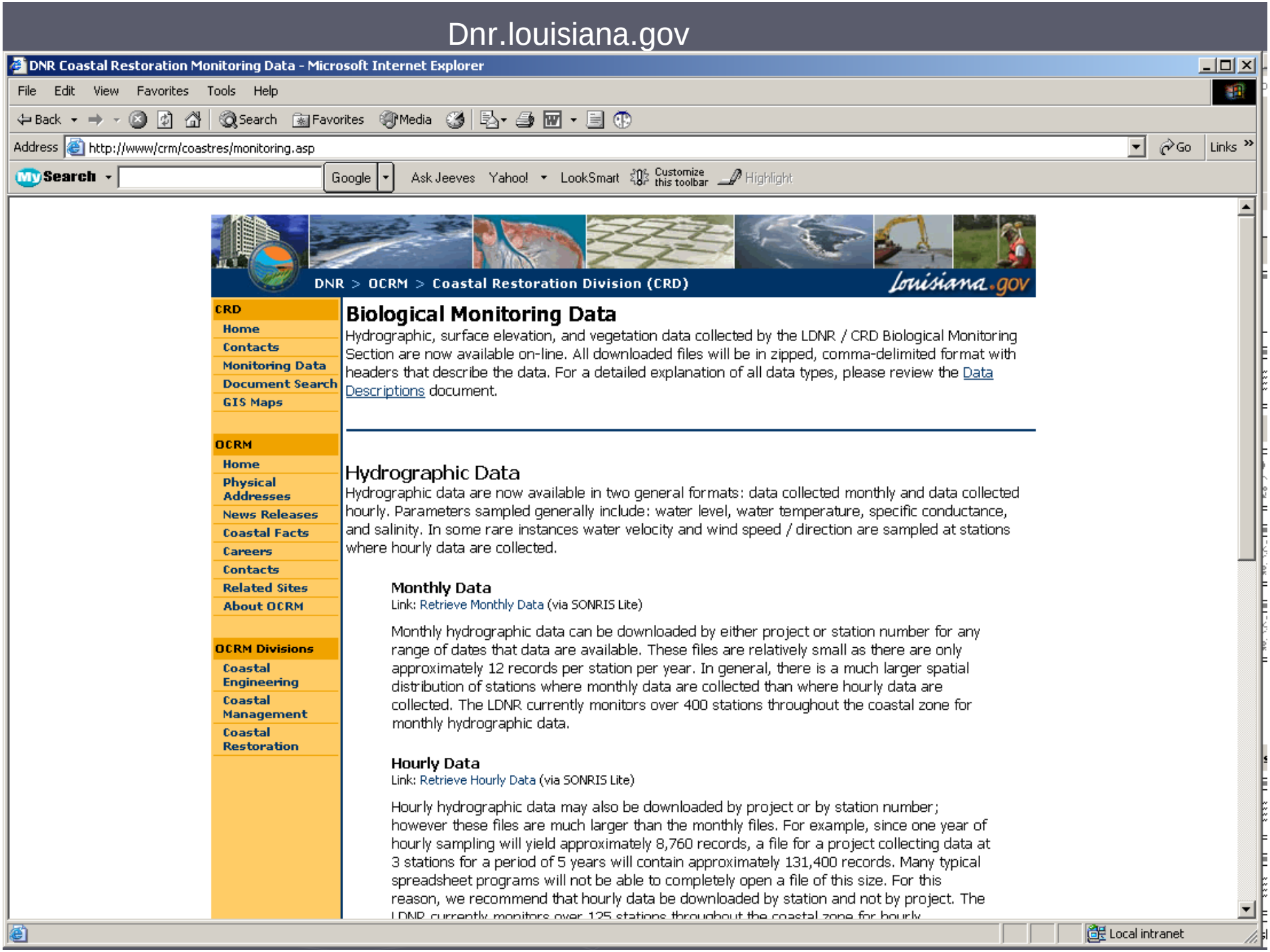
# Dnr.louisiana.gov



# www.LACoast.gov

Atchafalaya Sediment Delivery (AT-02) Overview - Microsoft Internet Explorer

File Edit View Favorites Tools Help

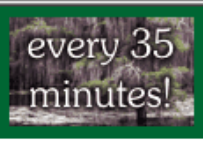
Back Search Favorites Media

Address http://www.lacoast.gov/projects/overview.asp?statenumber=AT%2D02

Go Links

My Search Google Ask Jeeves Yahoo! LookSmart Customize this toolbar Highlight

LaCoast








## Atchafalaya Sediment Delivery (AT-02) Overview

**Priority Project List:** 2

**Sponsors:** NMFS, LDNR

**Parishes:** St. Mary

**Reports:**

**AT-02 General Project Fact Sheet** (HTML, figures updated in real time)
AT-02 General Project Fact Sheet (PDF 325 KB)
AT-02 Monitoring Plan (PDF 165 KB)
AT-02 Progress Report 1 - Part 1 (PDF 3.07 MB)
AT-02 Progress Report 1 - Part 2 (PDF 1.96 MB)
AT-02 Adaptive Management Review Final Report (PDF 1.62 MB)
AT-02 AMR Workshop Presentation (PDF 537 KB)

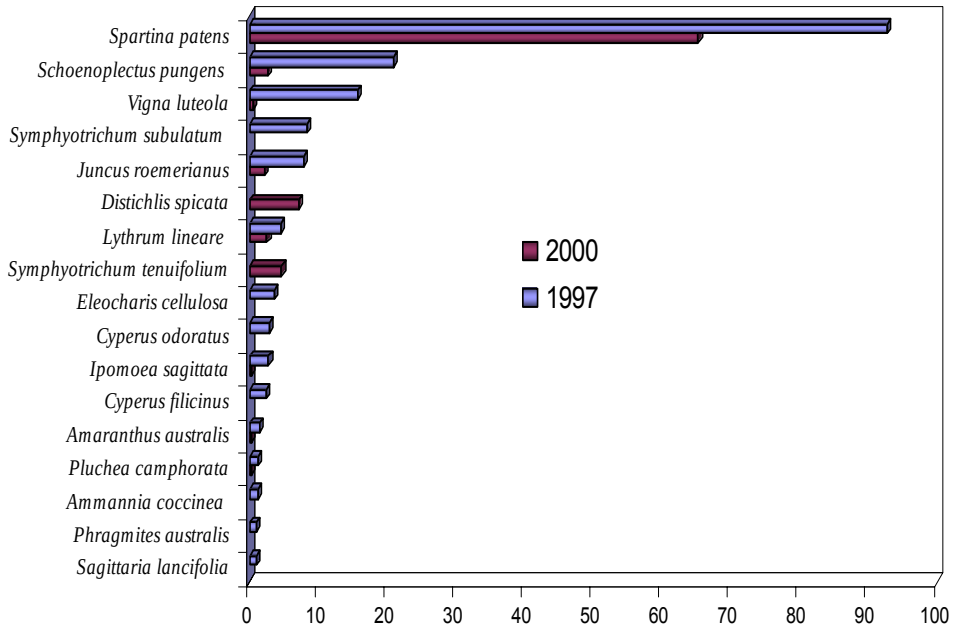
**Maps:**

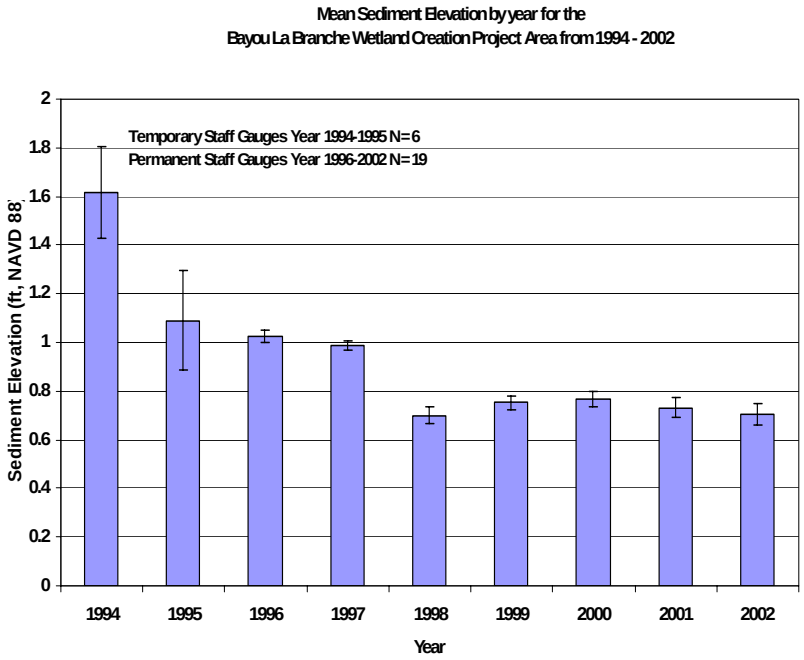
Spot Imagery 1993

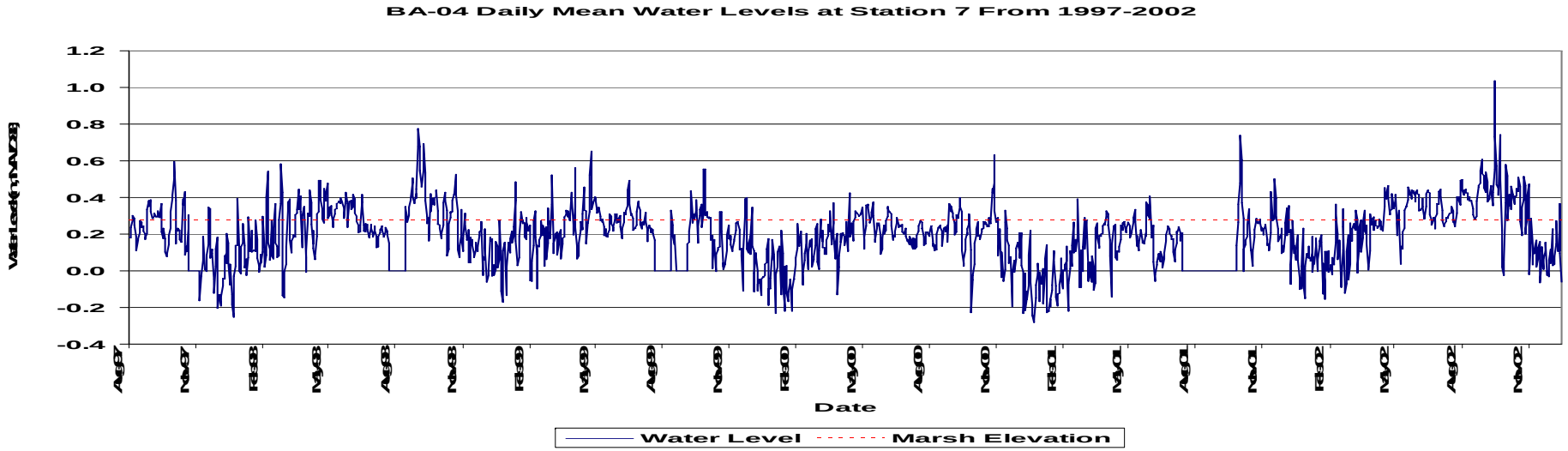
At-02 1994,1997,1998, and 2000 habitat anaysis

Done

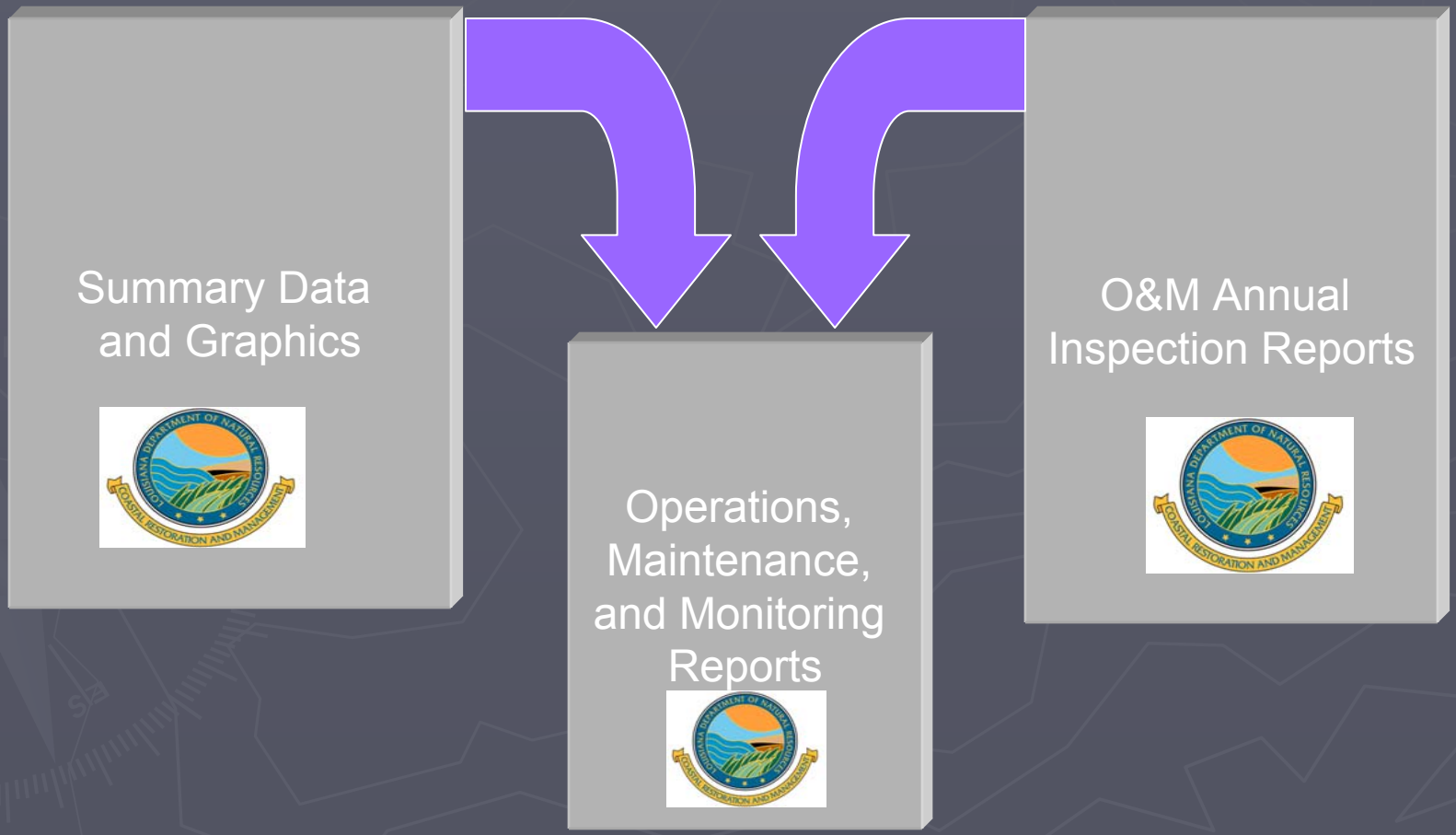
Internet


1997 and 2000 Mean % Cover of Selected Species
Spartina patens
Schoenoplectus pungens
Vigna luteola
Symphyotrichum subulatum
Juncus roemerianus
Distichlis spicata
Lythrum lineare
Symphyotrichum tenuifolium
Eleocharis cellulosa
Cyperus odoratus
Ipomoea sagittata
Cyperus filicinus
Amaranthus australis
Pluchea camphorata
Ammannia coccinea
Phragmites australis
Sagittaria lancifolia
2000
1997
0
10
20
30
40
50
60
70
80
90
100

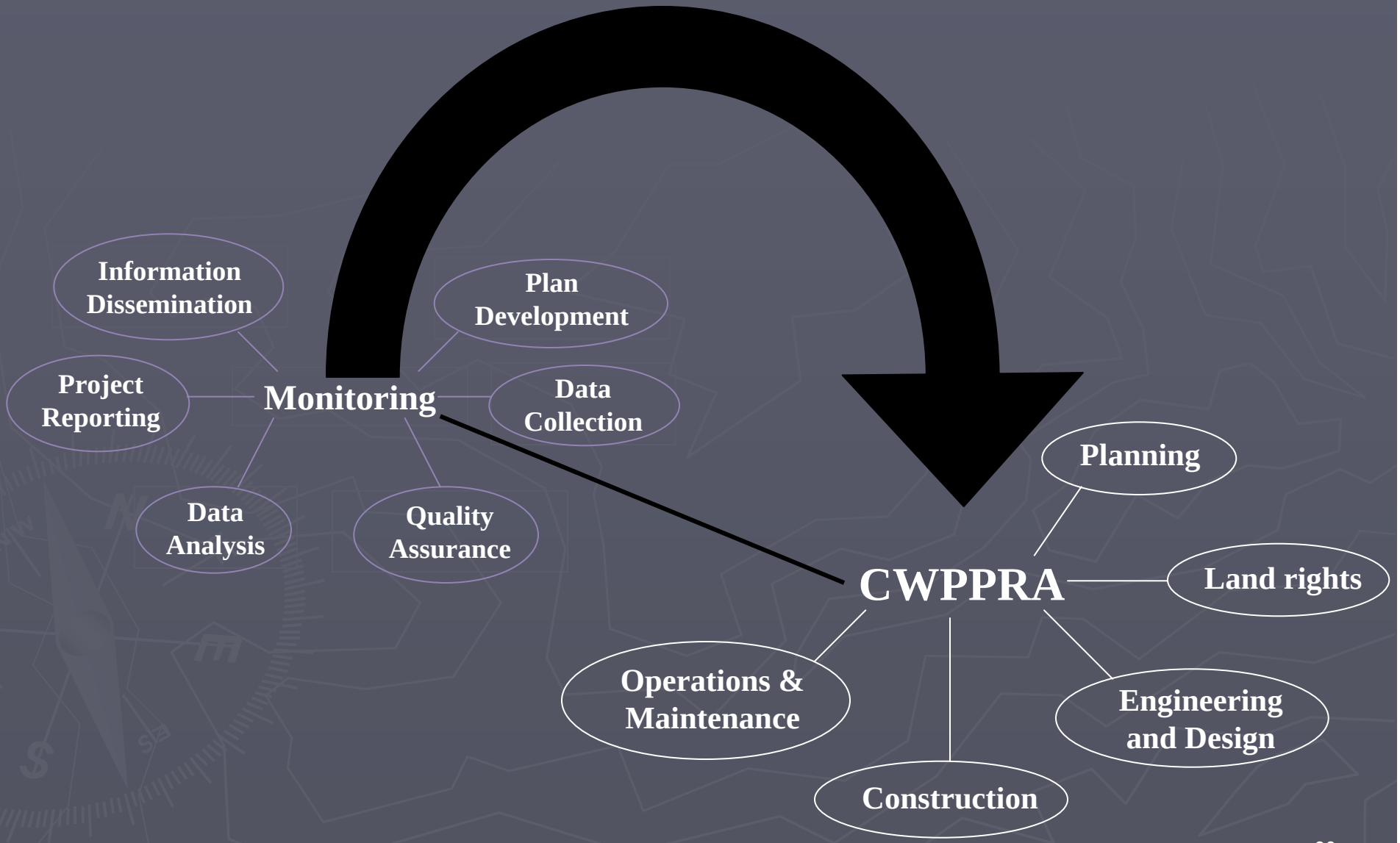

Mean Sediment Elevation by year for the
Bayou La Branche Wetland Creation Project Area from 1994 - 2002
Temporary Staff Gauges Year 1994-1995 N=6
Permanent Staff Gauges Year 1996-2002 N=19
Sediment Elevation (ft, NAVD 88)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
Year


BA-04 Daily Mean Water Levels at Station 7 From 1997-2002
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
Date
Water Level
Marsh Elevation

# Operations, Maintenance, and Monitoring Reports



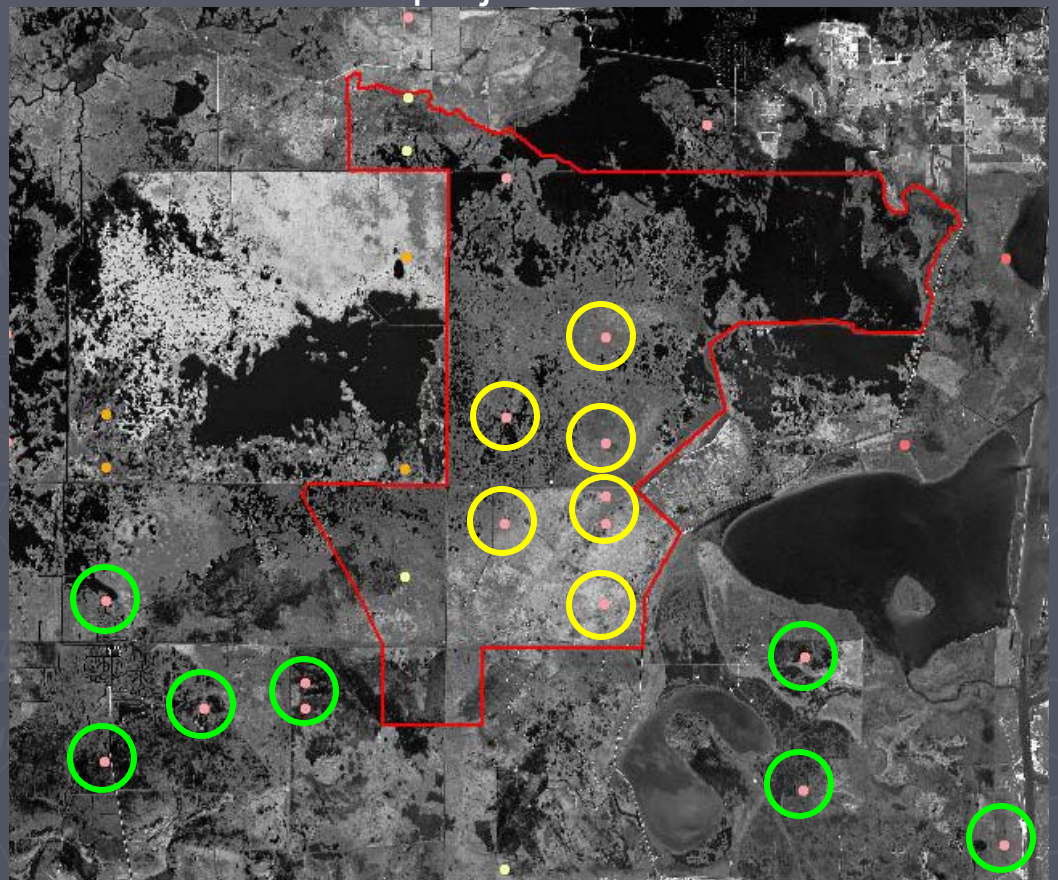
# Adaptive Management



# CRMS-*Wetlands* Data Analyses

CRMS-Wetlands will facilitate the investigation of:

- Individual project effects



CRMS Stations
- DELTAIC MIXTURE
- DELTAIC ROSEAU CANE
- FRESH BULLTONGUE
- FRESH MAIDENCANE
- FRESH SPIKERUSH
- MESOHALINE MIXTURE
- MESOHALINE WIREGRASS
- OLIGOHALINE BULLTONGUE
- OLIGOHALINE MIXTURE
- OLIGOHALINE SPIKERUSH
- OLIGOHALINE WIREGRASS
- POLYHALINE OYSTERGRASS
- SWAMP
- CWPPRA Polygons

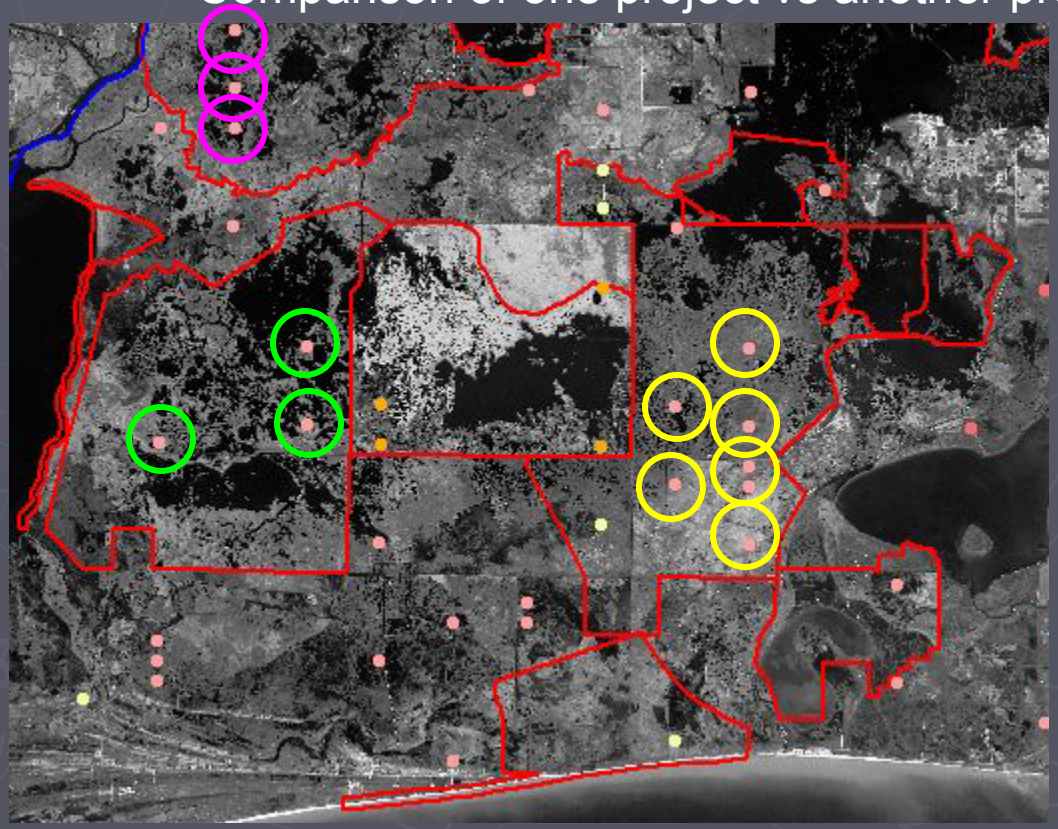
Project Oligohaline Wiregrass

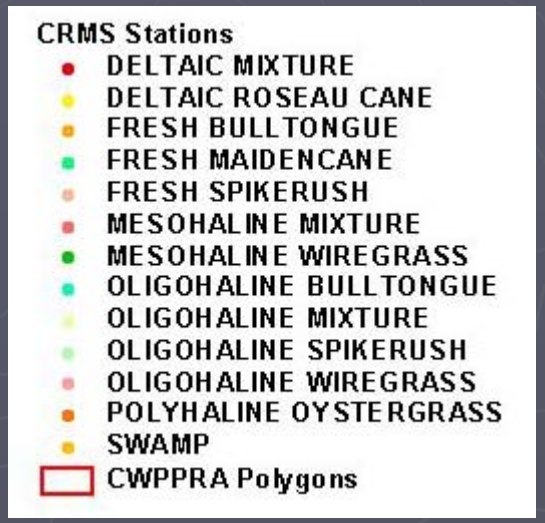
Reference Oligohaline Wiregrass

# CRMS-*Wetlands* Data Analyses

CRMS-Wetlands will facilitate the investigation of:

- Comparison of one project vs another project






CS-23 Oligohaline Wiregrass

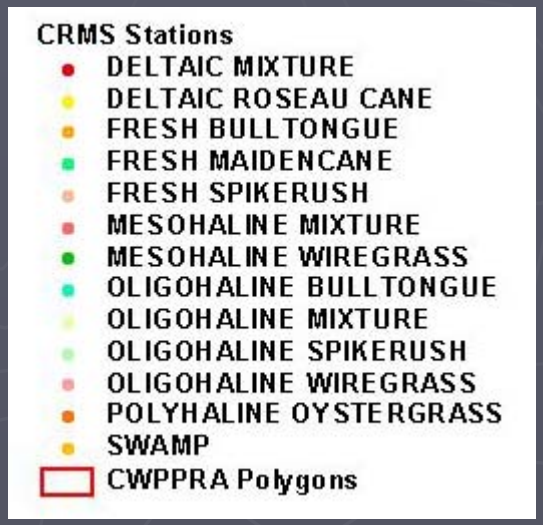
CS-32 Oligohaline Wiregrass

CS-27 Oligohaline Wiregrass

# CRMS-*Wetlands* Data Analyses

CRMS-Wetlands will facilitate the investigation of:

- Comparison of all projects within a basin vs non-project stations within a basin



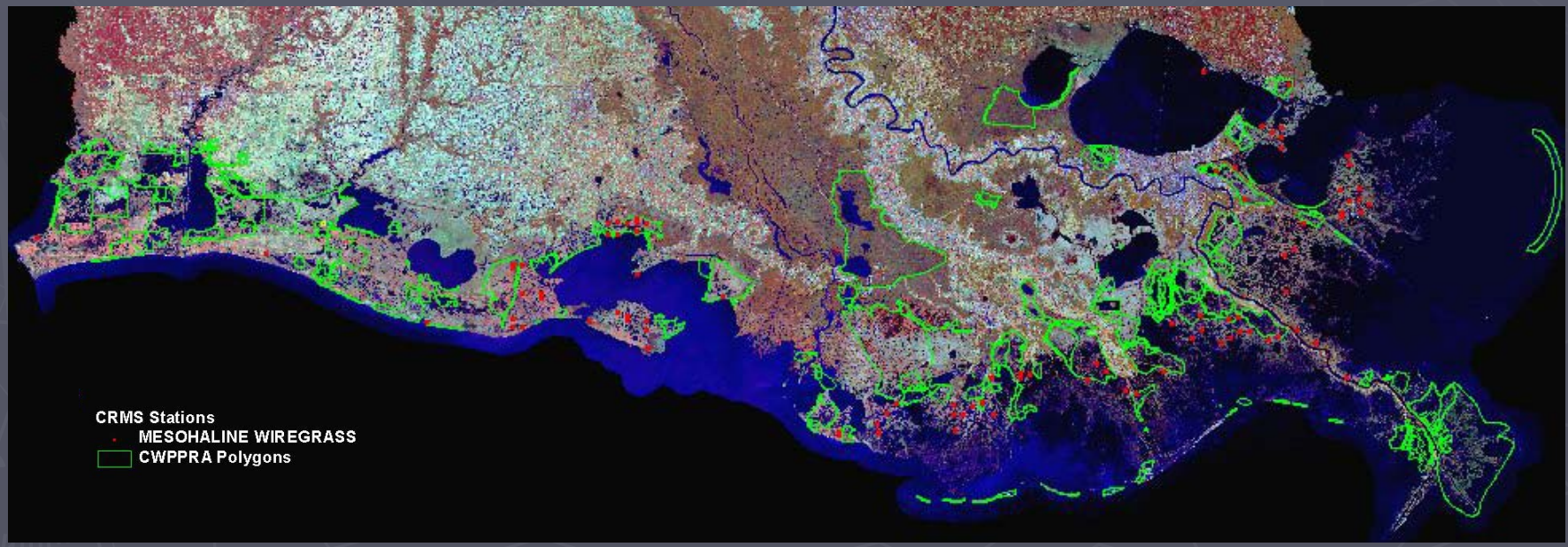

Project Oligohaline Wiregrass

Reference Oligohaline Wiregrass

# CRMS-*Wetlands* Data Analyses

CRMS-Wetlands will facilitate the investigation of:

- Comparison of a all projects across the coast vs non-project stations across the coast



# Basin-scale Reporting

- Will occur on a 3-year cycle.
- Collective project effects, habitat characterization, episodic events, etc.
- Basin-level teams will be assembled and include representatives of DNR, USGS, academia, and federal partners.

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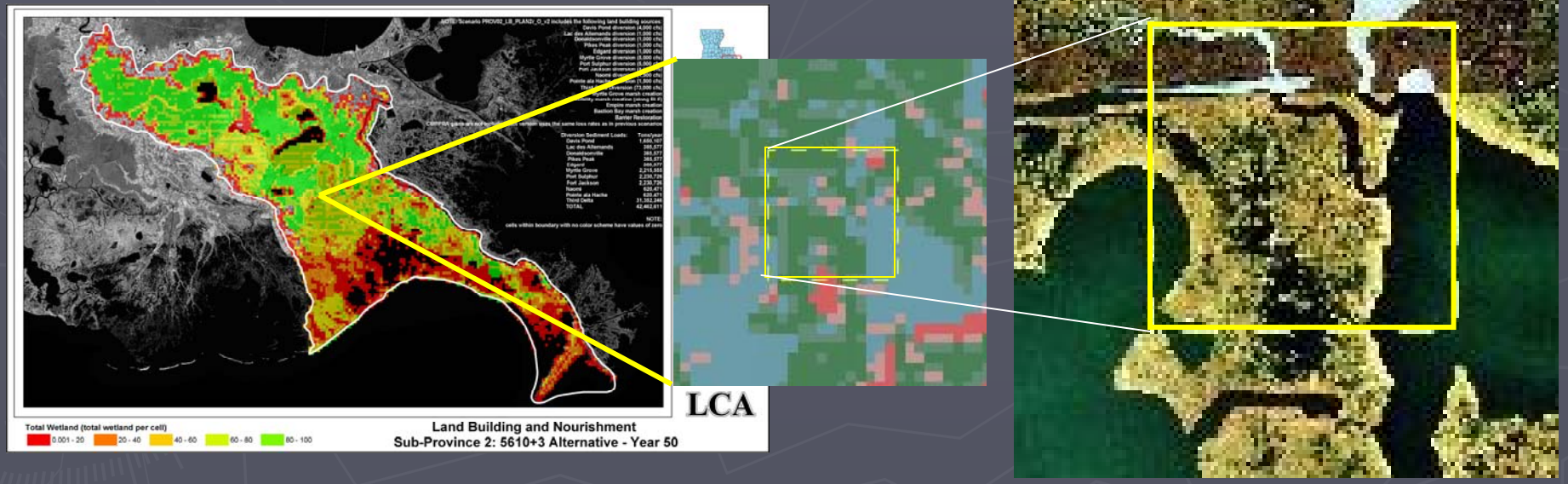
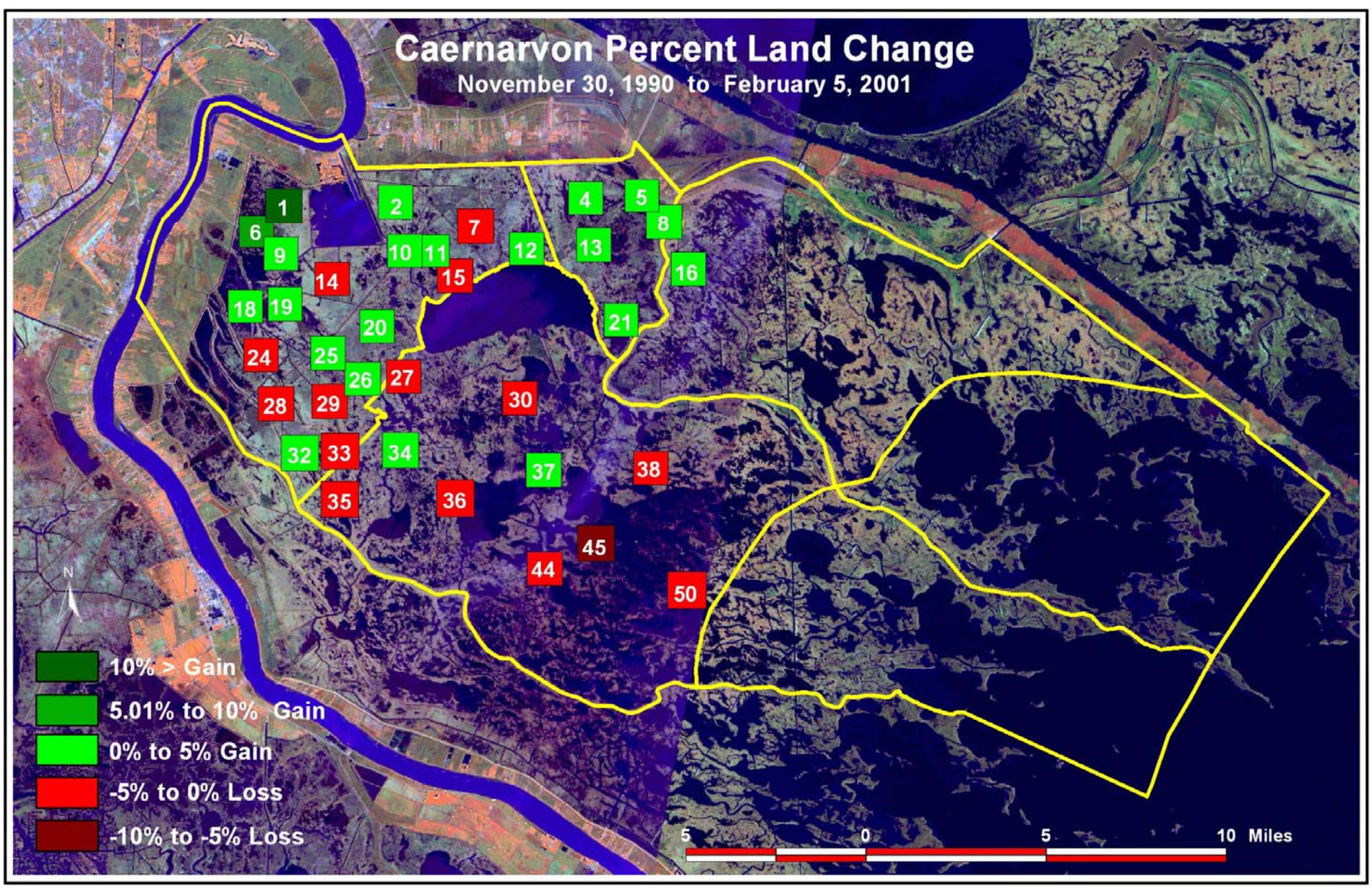
# CRMS-*Wetlands*
# Data Analyses Products

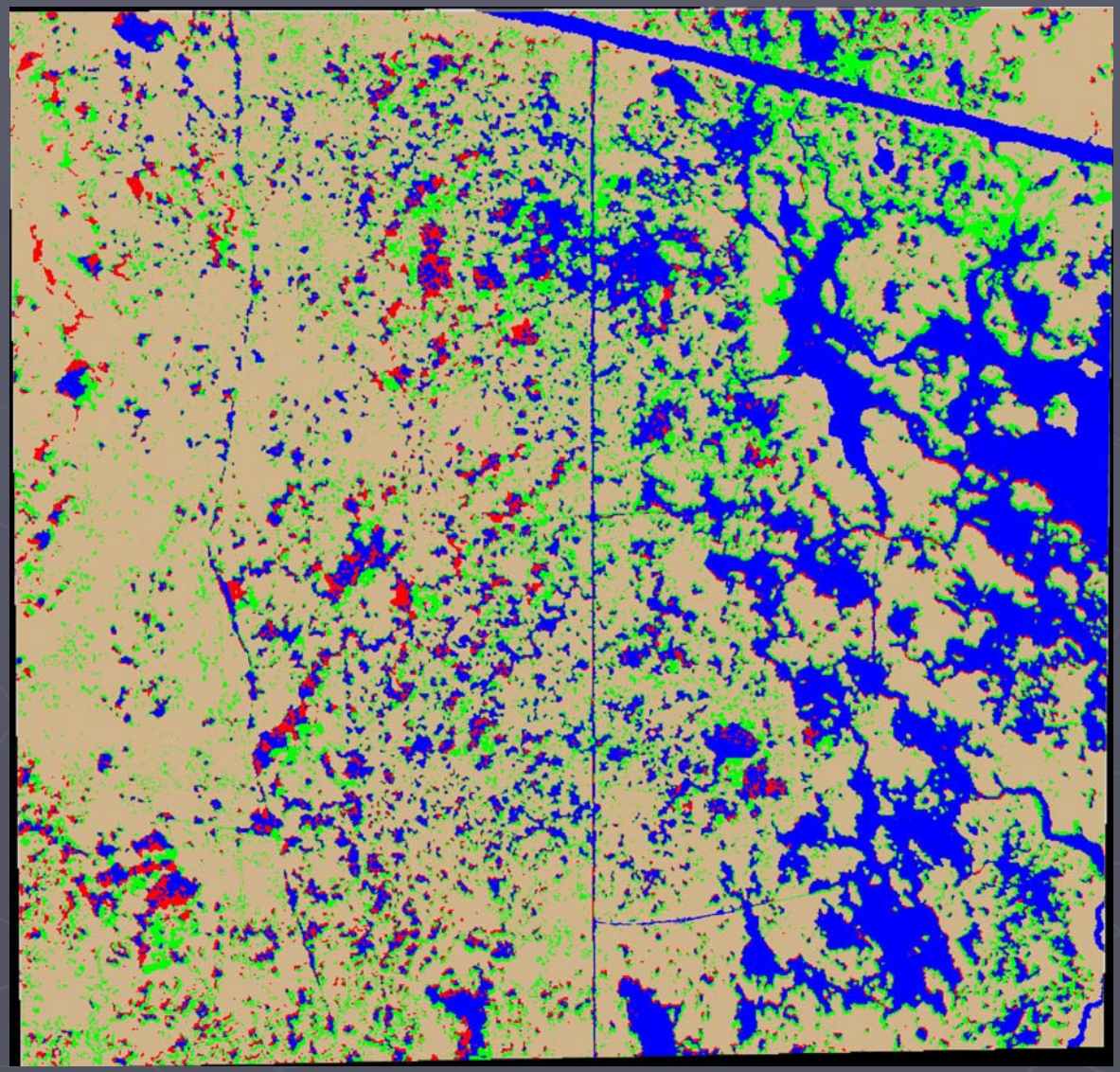
CRMS-Wetlands will facilitate the development of products that:

- Compare actual changes at individual stations against predicted changes from ecosystem forecasting models




Caernarvon Percent Land Change
November 30, 1990 to February 5, 2001
1
2
4
5
6
7
8
9
10
11
12
13
14
15
16
18
19
20
21
24
25
26
27
28
29
30
32
33
34
37
38
35
36
45
44
50
N
10% > Gain
5.01% to 10% Gain
0% to 5% Gain
-5% to 0% Loss
-10% to -5% Loss
5
0
5
10 Miles

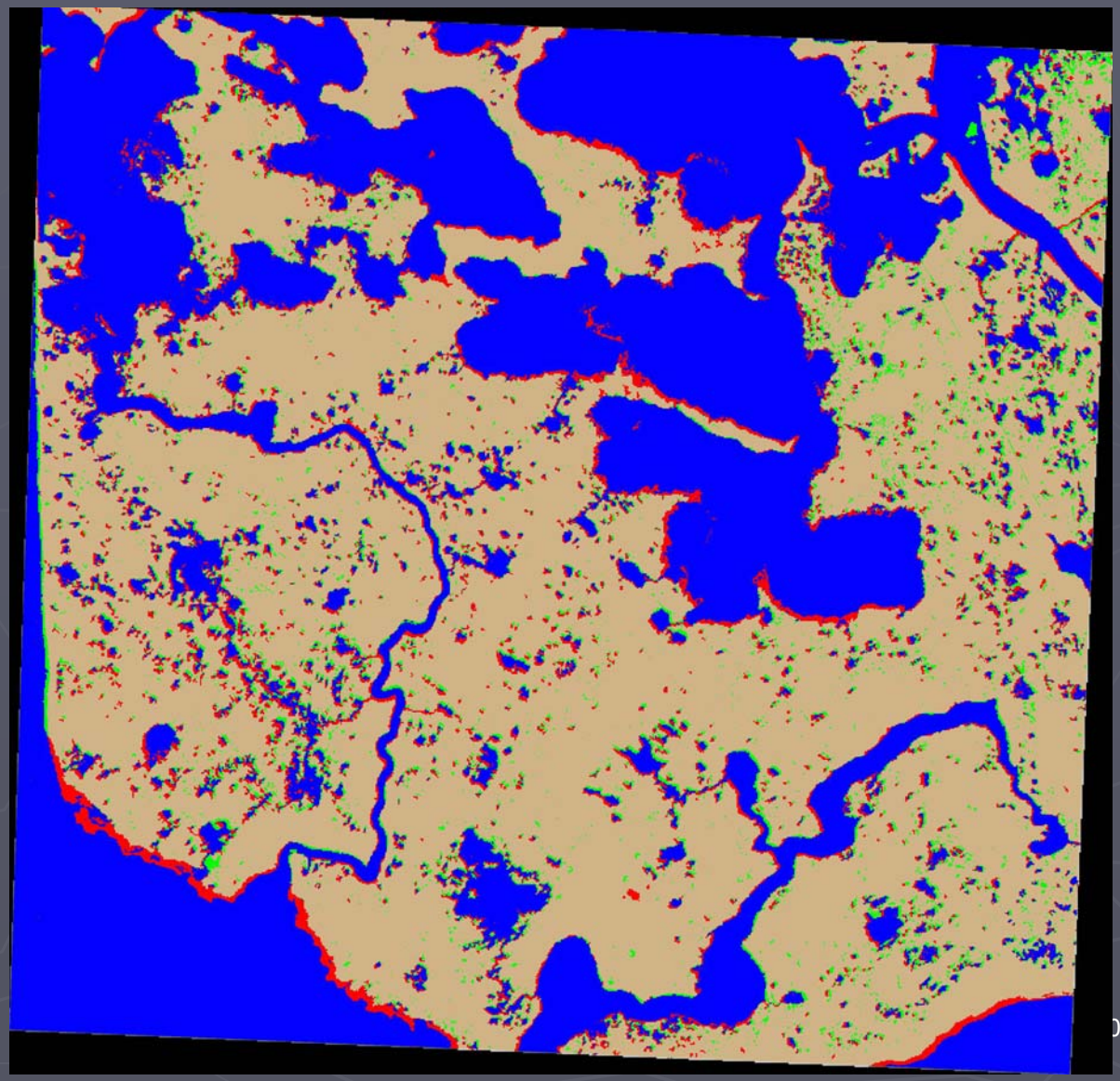
Site 20
1990 – 2001
Land – Water Change



| | |
|---|---|
| Water | 116.74 |
| Land | 328.04 |
| Loss | 26.22 |
| Gain | 79.42 |

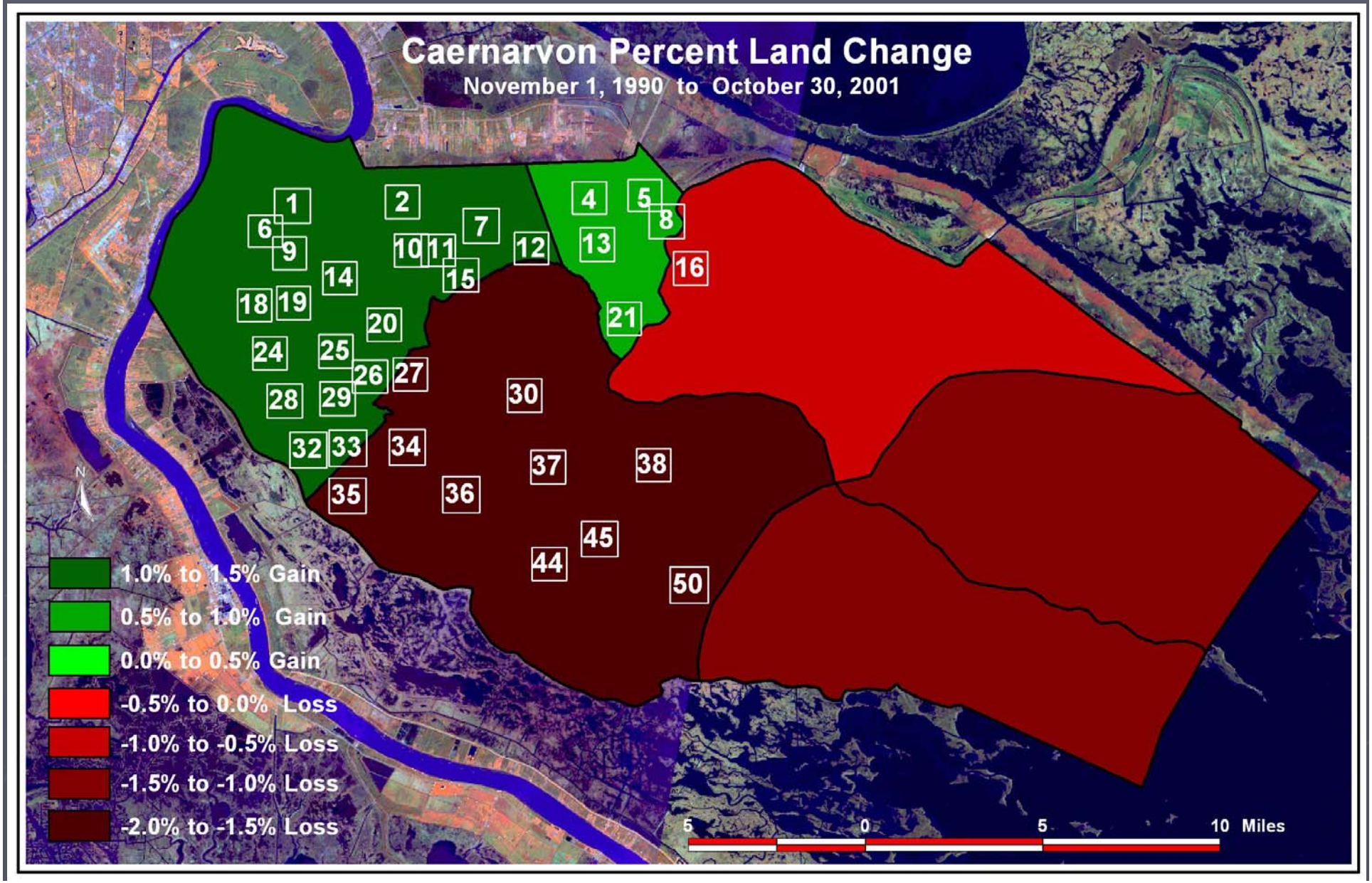
Figures are in acres

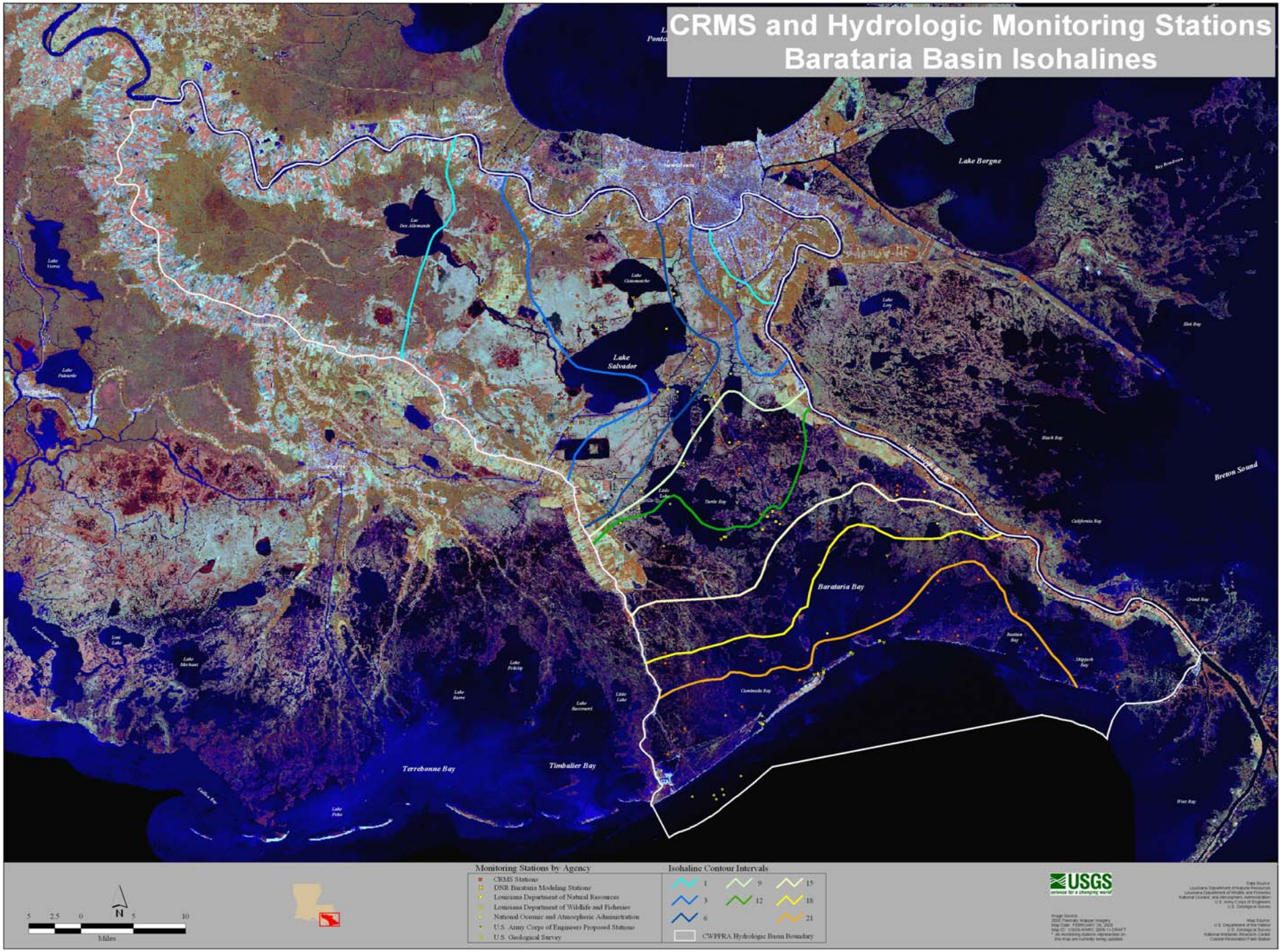
Site 37
1990 – 2001
Land – Water Change

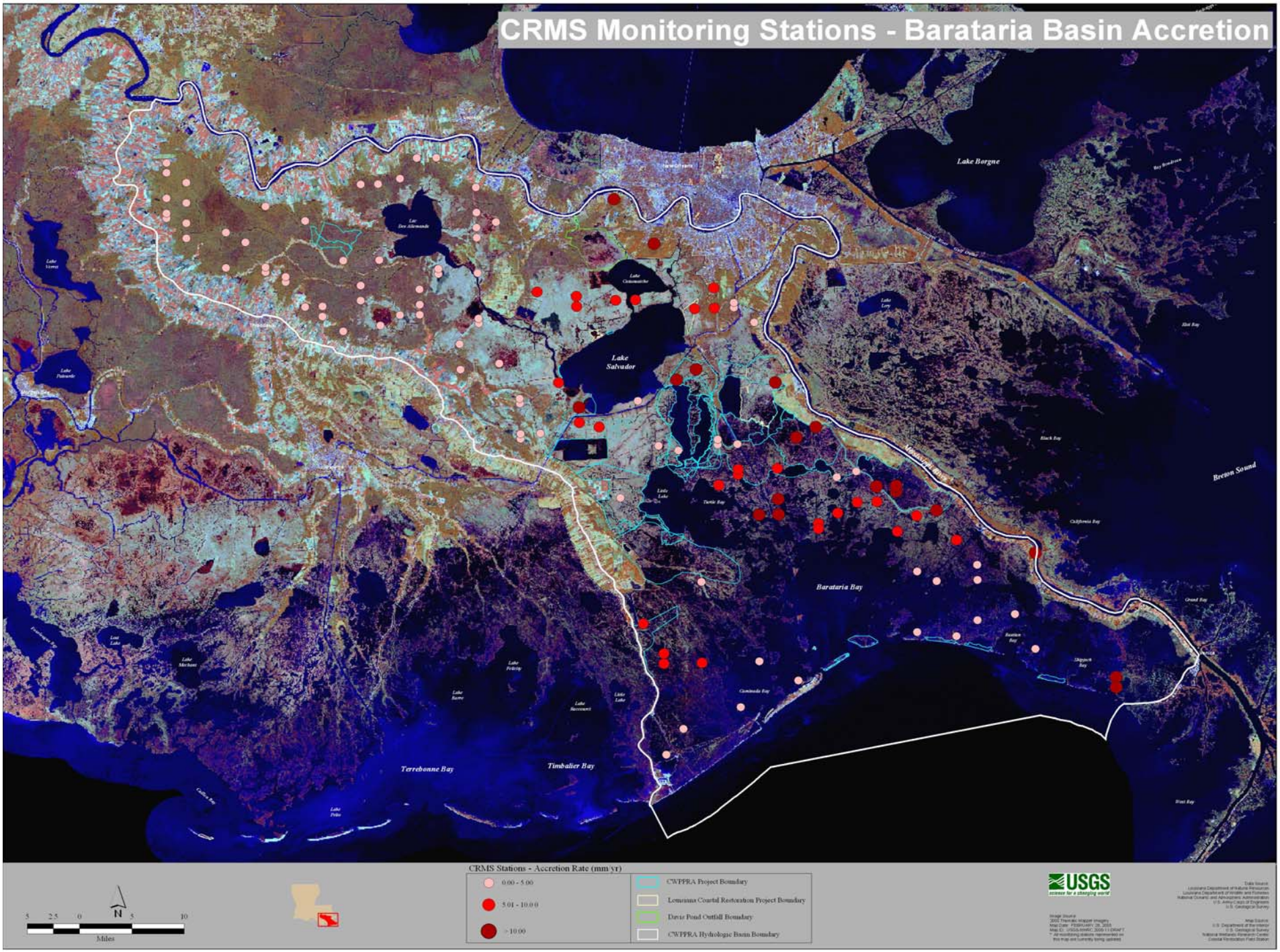


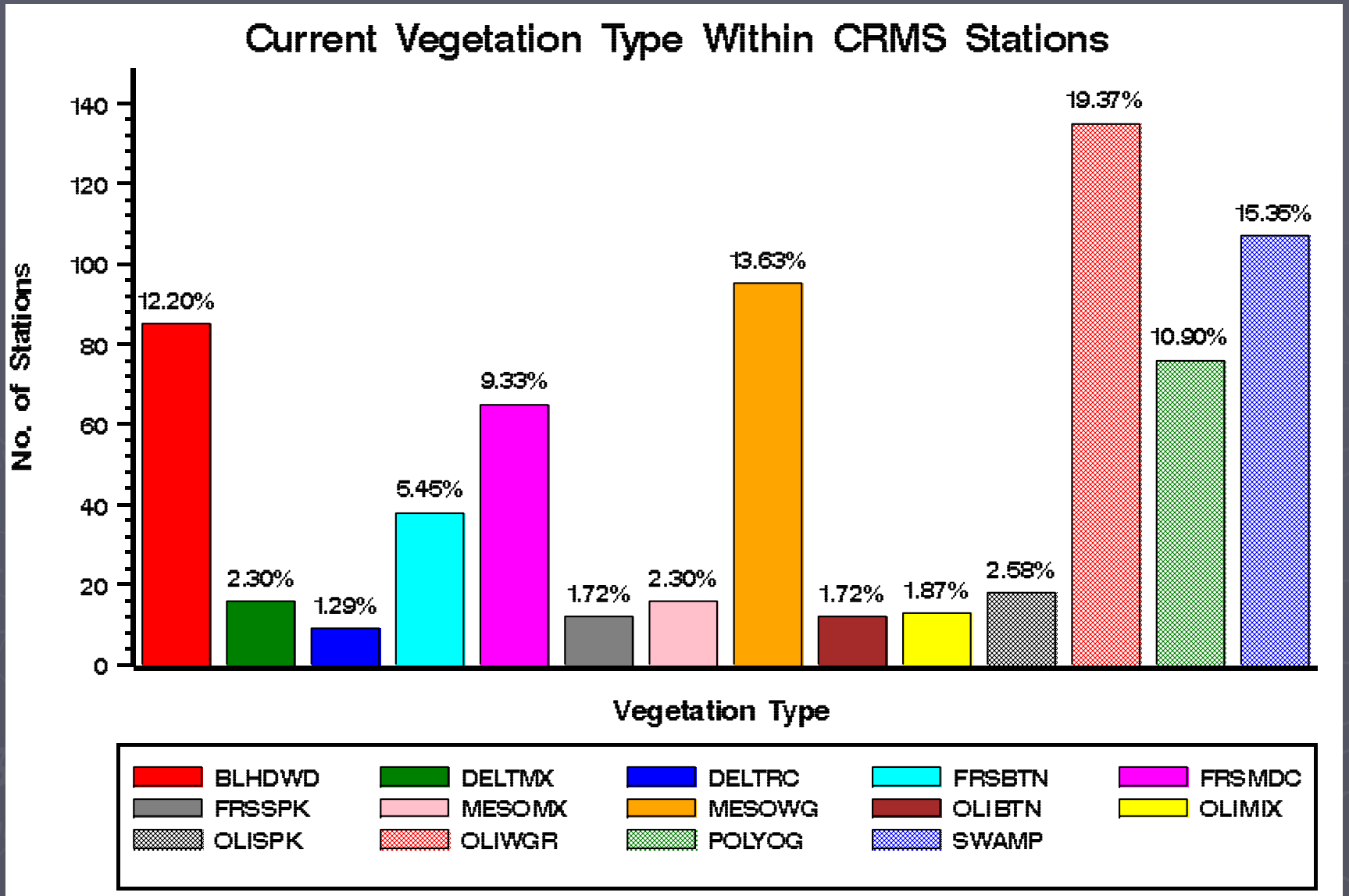
| | |
|---|---|
| Water | 202.76 |
| Land | 289.91 |
| Loss | 39.98 |
| Gain | 22.27 |

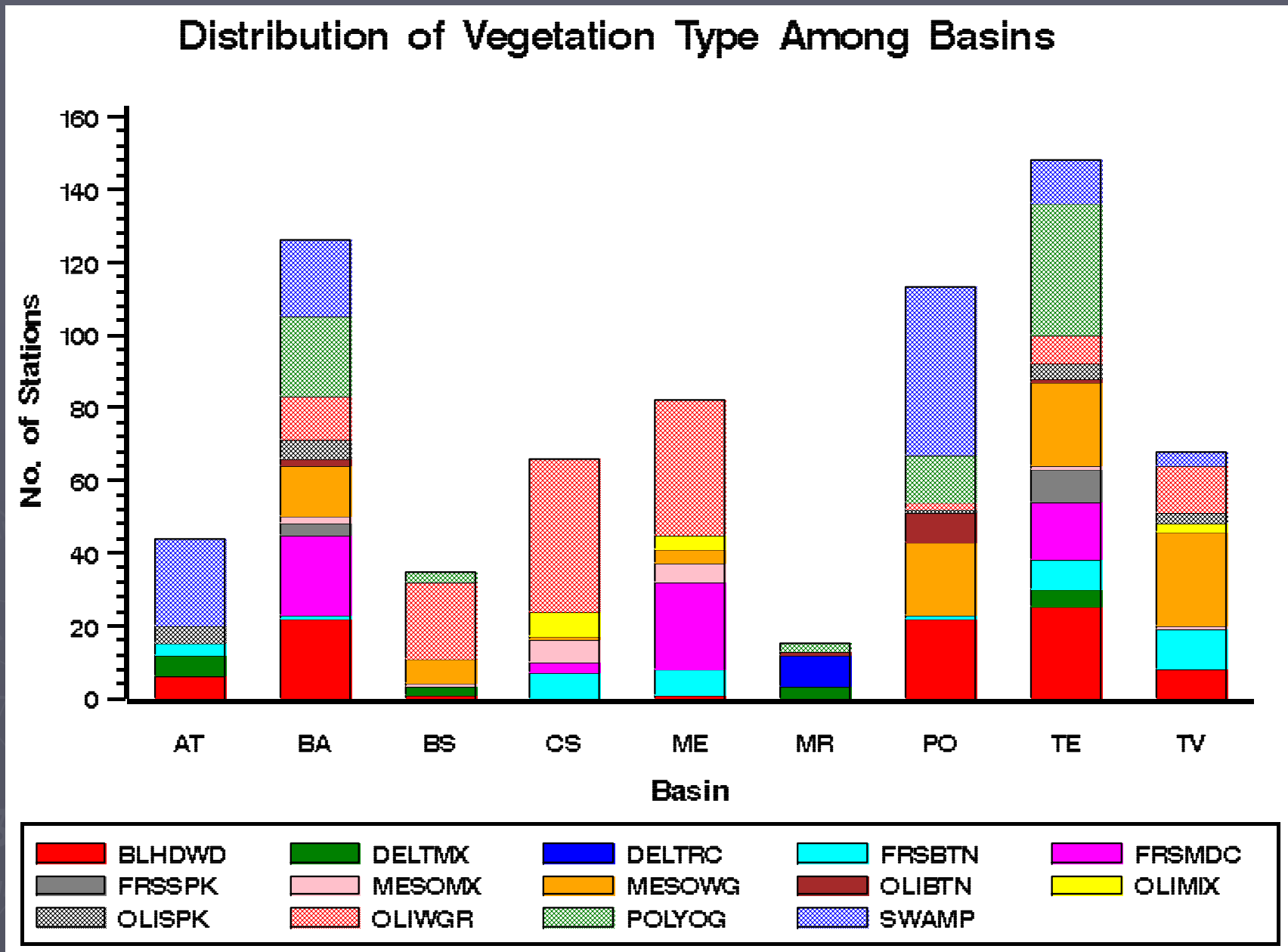
Figures are in acres

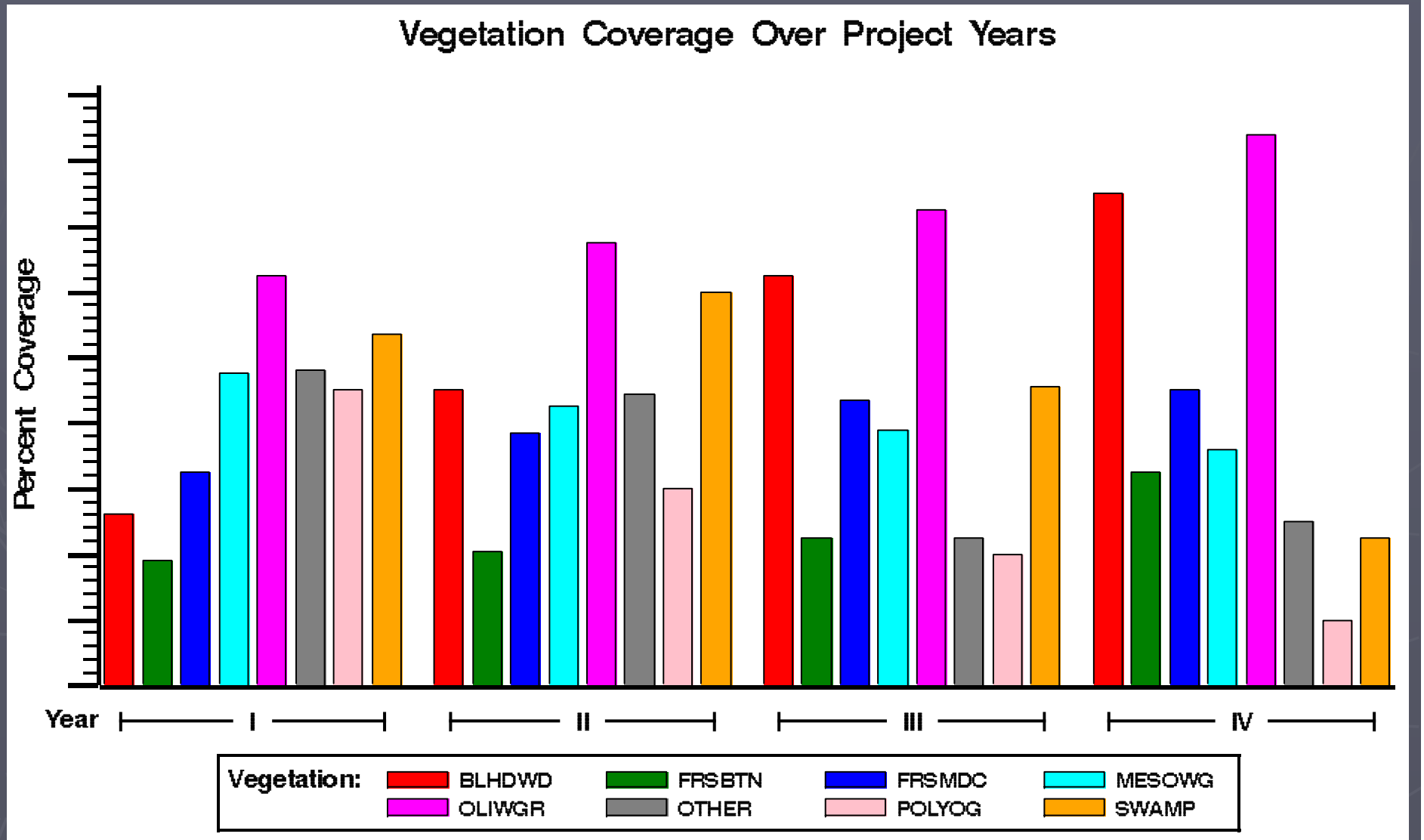

Caernarvon Percent Land Change
November 1, 1990 to October 30, 2001
1
2
4
5
8
6
9
7
10
11
12
13
16
14
15
18
19
20
21
24
25
26
27
28
29
30
32
33
34
37
38
35
36
45
44
50
N
1.0% to 1.5% Gain
0.5% to 1.0% Gain
0.0% to 0.5% Gain
-0.5% to 0.0% Loss
-1.0% to -0.5% Loss
-1.5% to -1.0% Loss
-2.0% to -1.5% Loss
5
0
5
10 Miles

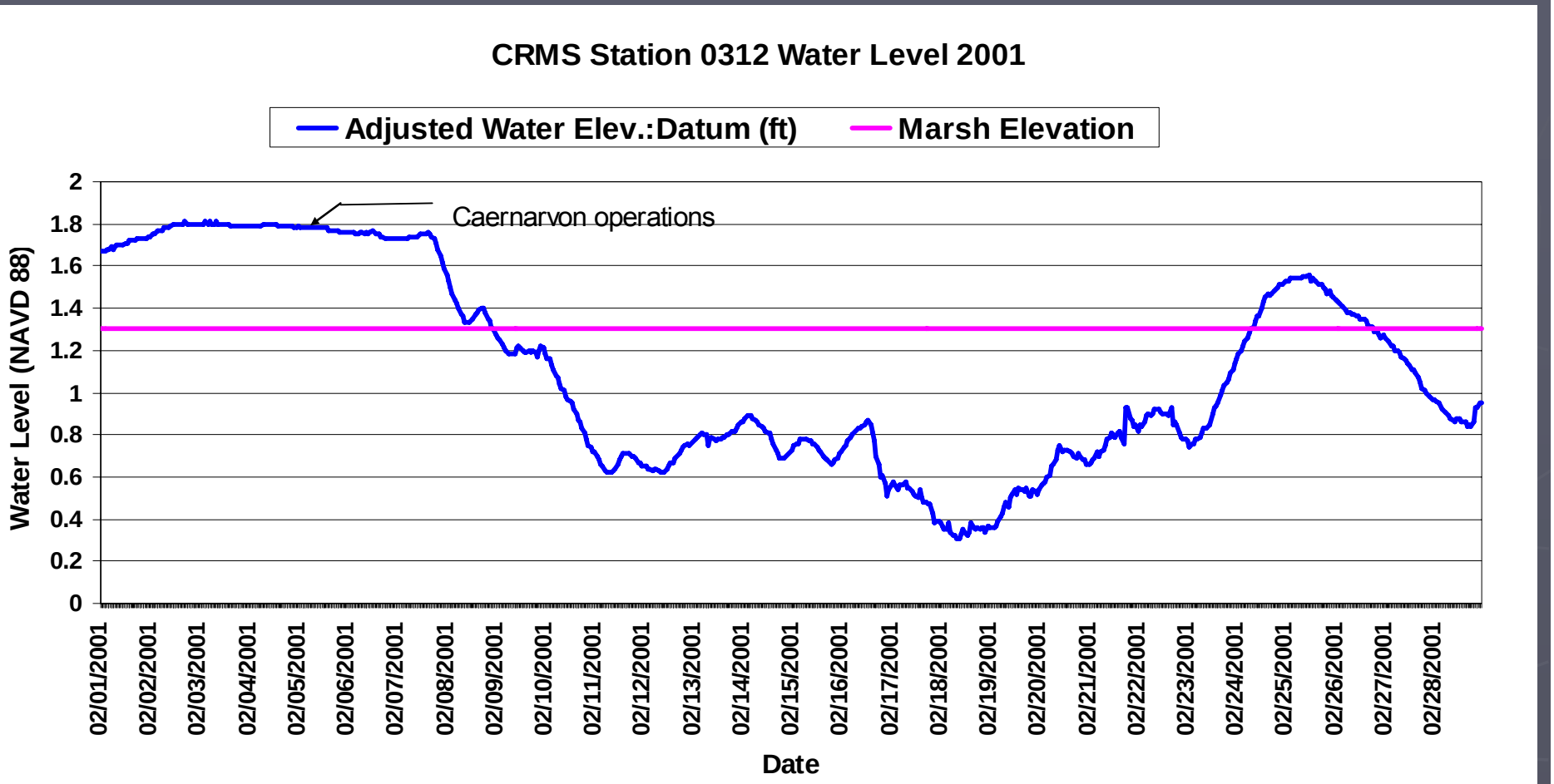

CRMS and Hydrologic Monitoring Stations
Barataria Basin Isohalines
Lake Borgne
Lake Pontchartrain
Lake Des Allemands
Lake Cataouatche
Lake Salvador
Lake Verret
Lake Palourde
Lake Cocodrie
Lake Long
Bay Boudreau
Bay Dupre
Mississippi River
Black Bay
Breton Sound
California Bay
Little Lake
Turtle Bay
Barataria Bay
Grand Bay
Bastian Bay
Shipyard Bay
Caminada Bay
Lost Lake
Lake Mechant
Lake Pelto
Lake Barre
Lake Boudreaux
Little Lake
Terrebonne Bay
Timbalier Bay
Caillou Bay
West Bay
Monitoring Stations by Agency
CRMS Stations
DNR Barataria Modeling Stations
Louisiana Department of Natural Resources
Louisiana Department of Wildlife and Fisheries
National Oceanic and Atmospheric Administration
U.S. Army Corps of Engineers Proposed Stations
U.S. Geological Survey
Isohaline Contour Intervals
1
3
6
9
12
15
18
21
CWPPRA Hydrologic Basin Boundary
5 2.5 0 N 5 10
Miles
USGS
science for a changing world

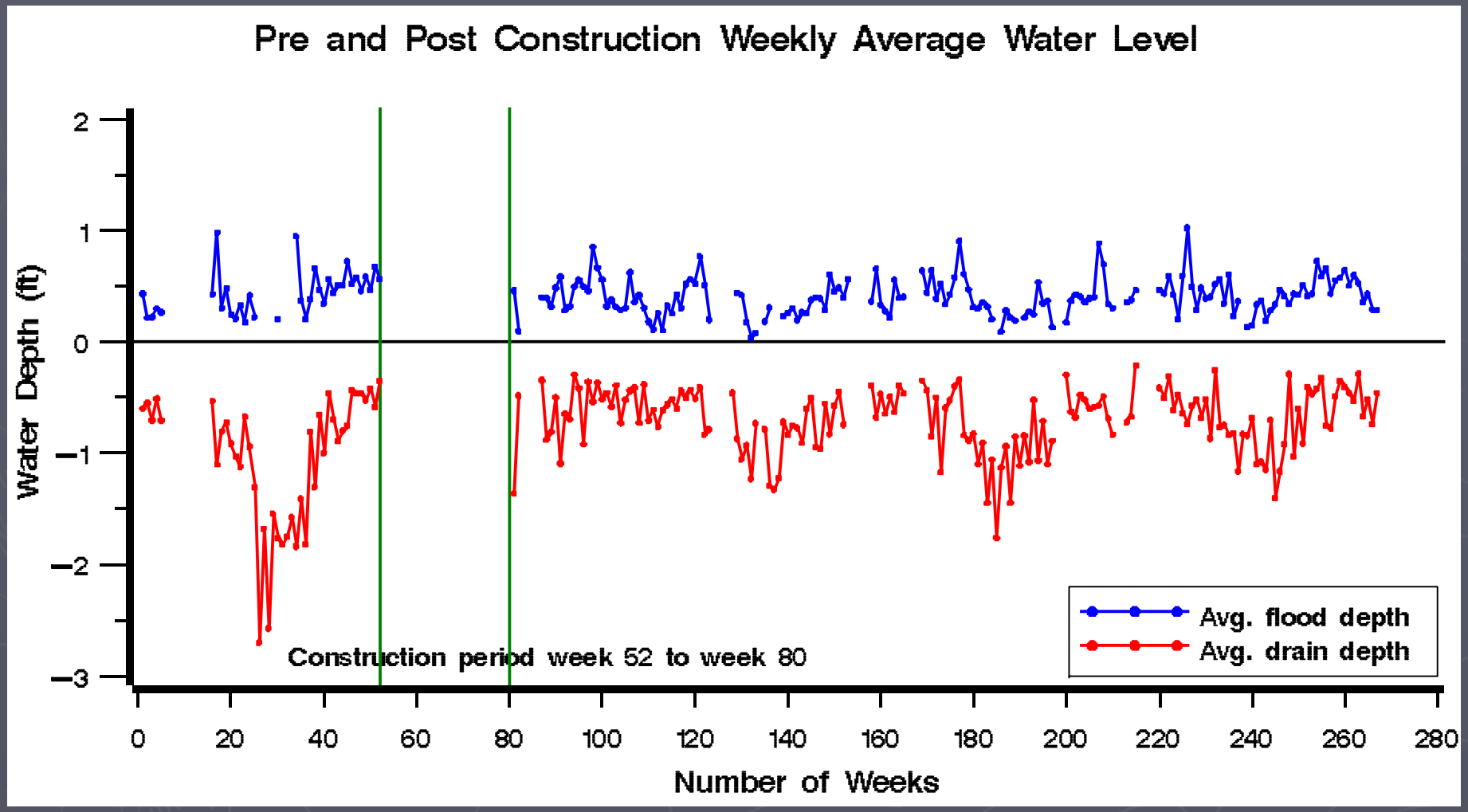

CRMS Monitoring Stations - Barataria Basin Accretion
Lake Borgne
Lake Salvador
Breton Sound
Barataria Bay
Terrebonne Bay
Timbalier Bay
CRMS Stations - Accretion Rate (mm/yr)
0.00 - 5.00
5.01 - 10.00
> 10.00
CWPPRA Project Boundary
Louisiana Coastal Restoration Project Boundary
Davis Pond Outfall Boundary
CWPPRA Hydrologic Basin Boundary
Miles
USGS

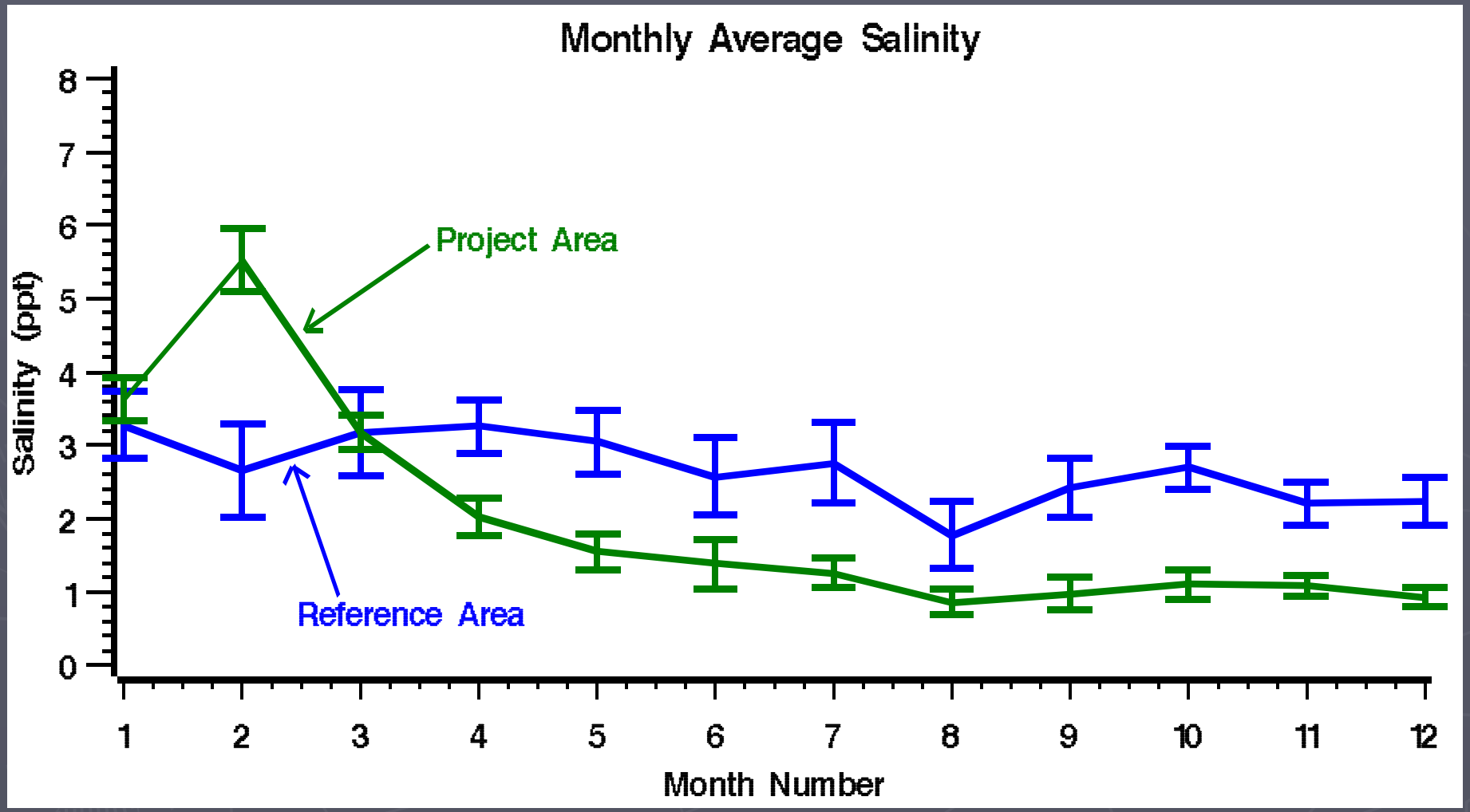

Current Vegetation Type Within CRMS Stations
No. of Stations
0
20
40
60
80
100
120
140
12.20%
2.30%
1.29%
5.45%
9.33%
1.72%
2.30%
13.63%
1.72%
1.87%
2.58%
19.37%
10.90%
15.35%
Vegetation Type
BLHDWD
DELTMX
DELTRC
FRSBTN
FRSMDC
FRSSPK
MESOMX
MESOWG
OLIBTN
OLIMIX
OLISPK
OLIWGR
POLYOG
SWAMP

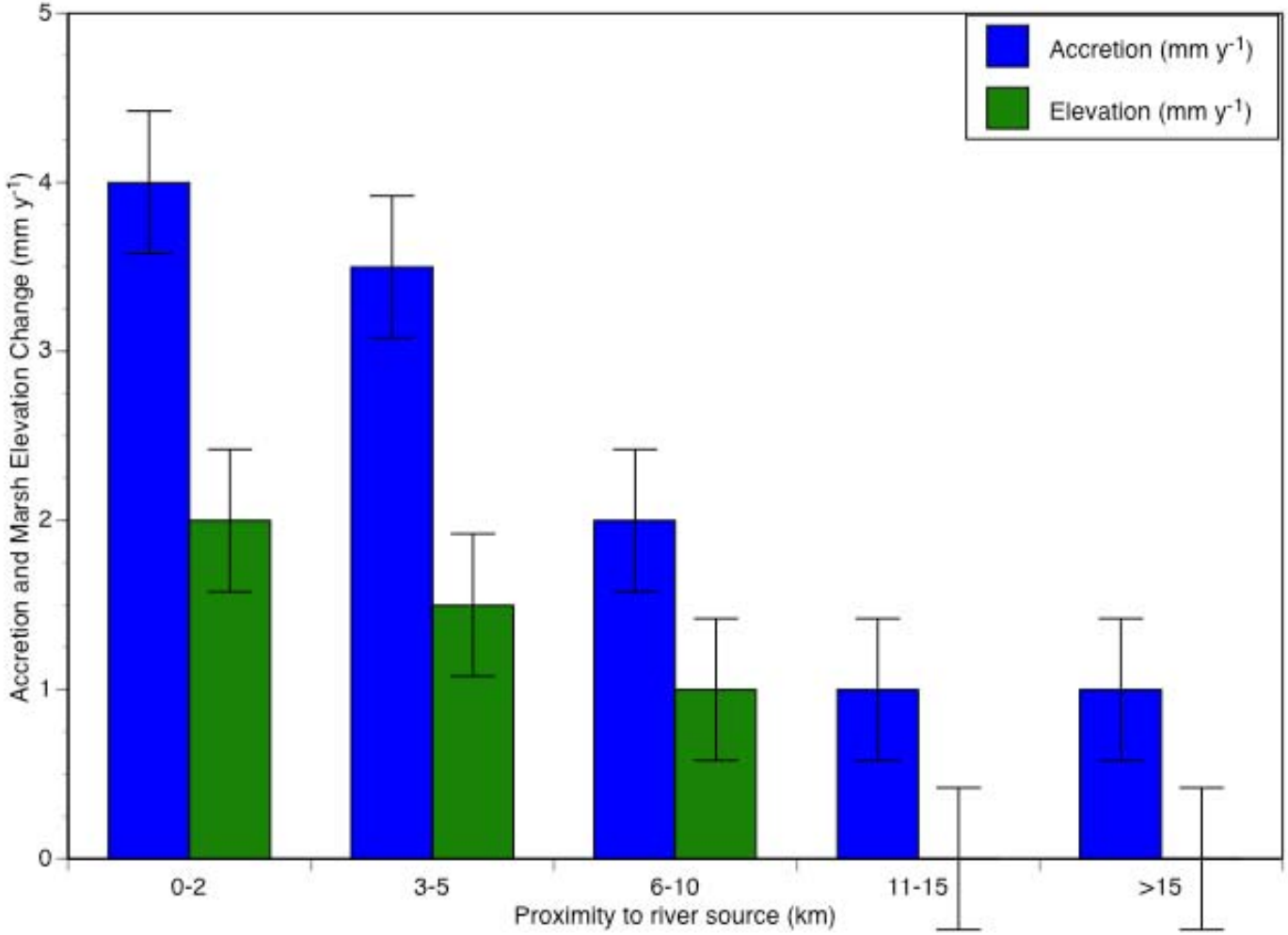

Distribution of Vegetation Type Among Basins
No. of Stations
160
140
120
100
80
60
40
20
0
AT
BA
BS
CS
ME
MR
PO
TE
TV
Basin
BLHDWD
DELTMX
DELTRC
FRSBTN
FRSMDC
FRSSPK
MESOMX
MESOWG
OLIBTN
OLIMIX
OLISPK
OLIWGR
POLYOG
SWAMP

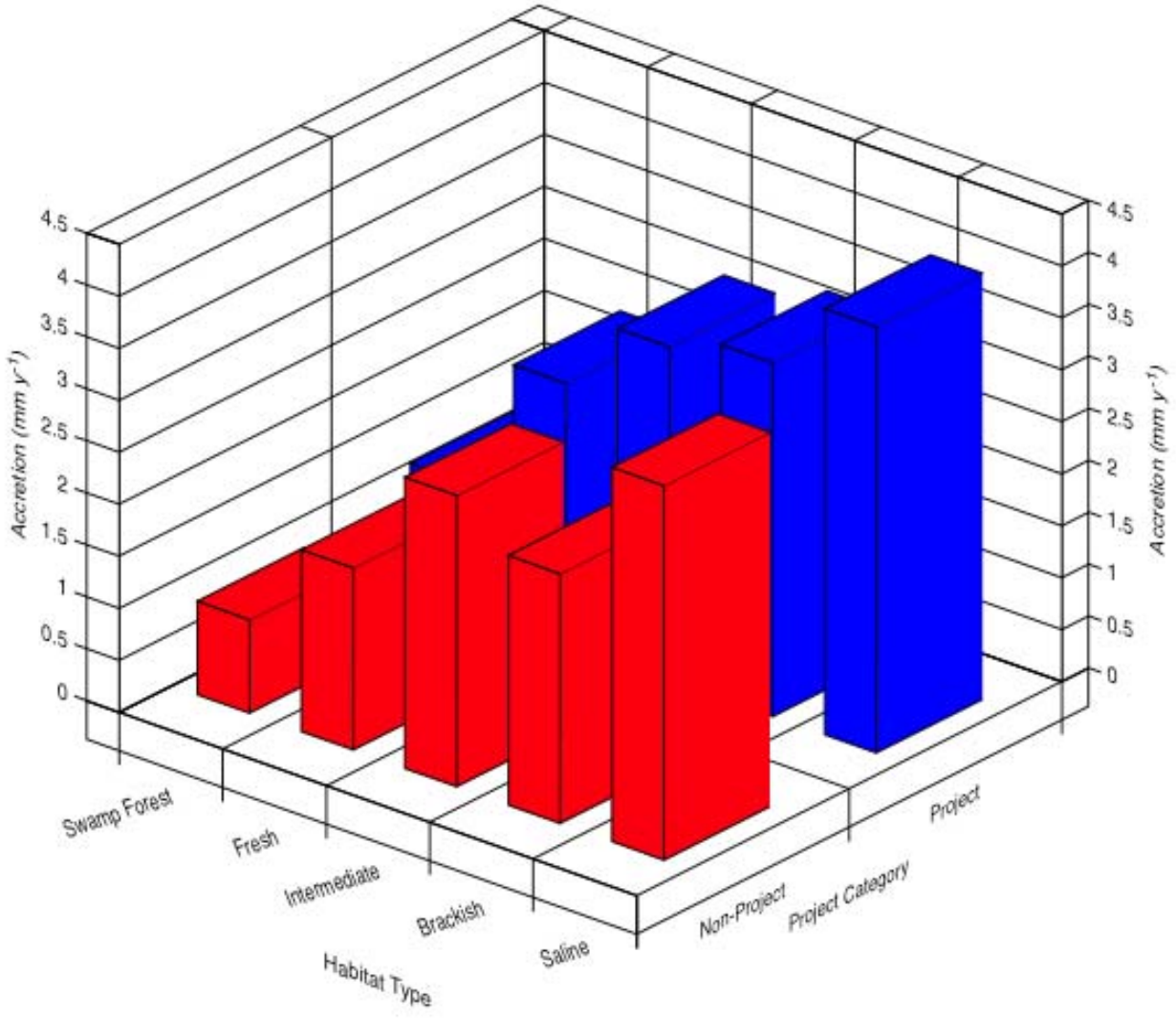

Vegetation Coverage Over Project Years
Percent Coverage
Year
I
II
III
IV
Vegetation:
BLHDWD
FRSBTN
FRSMDC
MESOWG
OLIWGR
OTHER
POLYOG
SWAMP

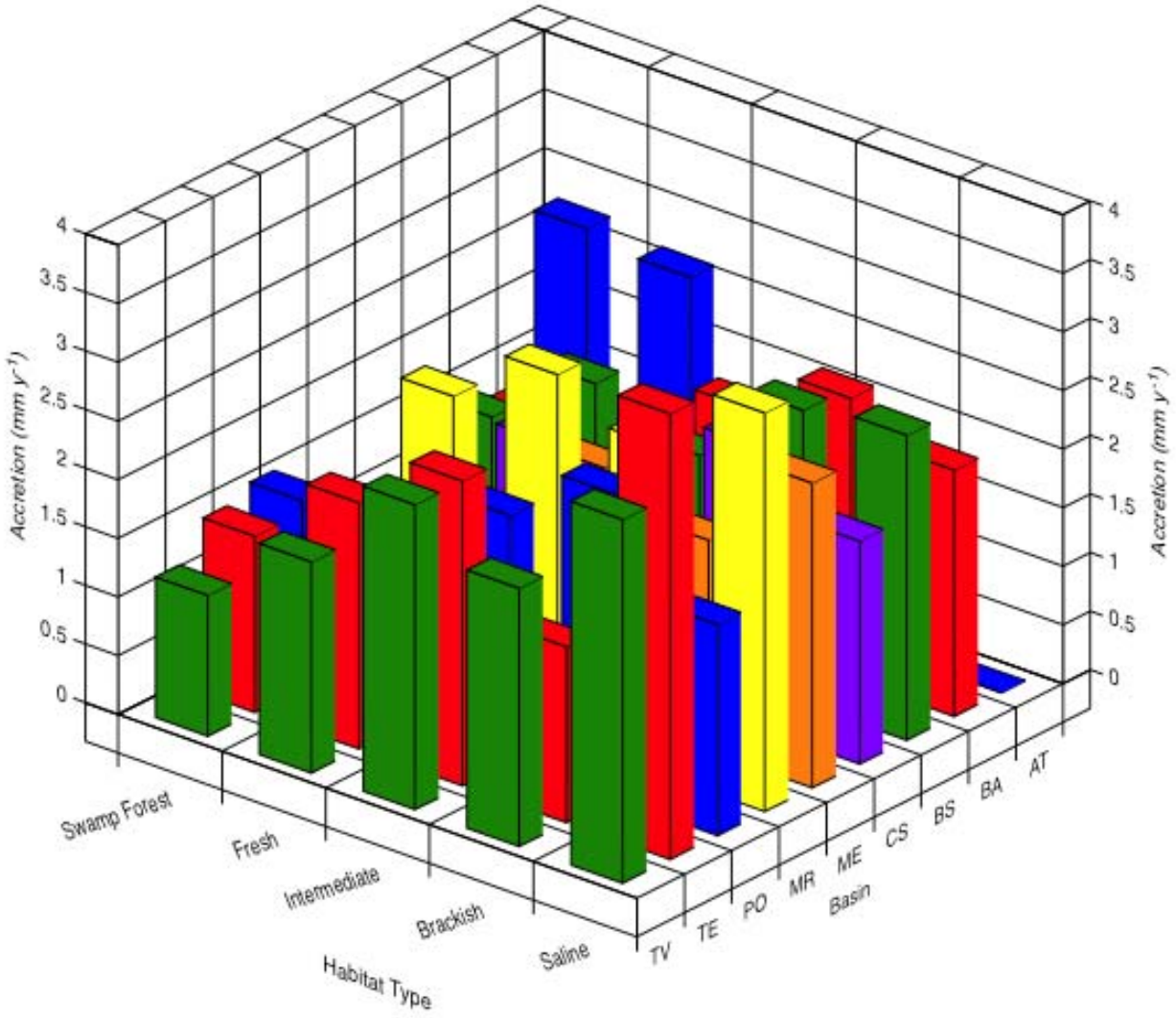

CRMS Station 0312 Water Level 2001
Adjusted Water Elev.:Datum (ft)
Marsh Elevation
Caernarvon operations
Water Level (NAVD 88)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
02/01/2001
02/02/2001
02/03/2001
02/04/2001
02/05/2001
02/06/2001
02/07/2001
02/08/2001
02/09/2001
02/10/2001
02/11/2001
02/12/2001
02/13/2001
02/14/2001
02/15/2001
02/16/2001
02/17/2001
02/18/2001
02/19/2001
02/20/2001
02/21/2001
02/22/2001
02/23/2001
02/24/2001
02/25/2001
02/26/2001
02/27/2001
02/28/2001
Date

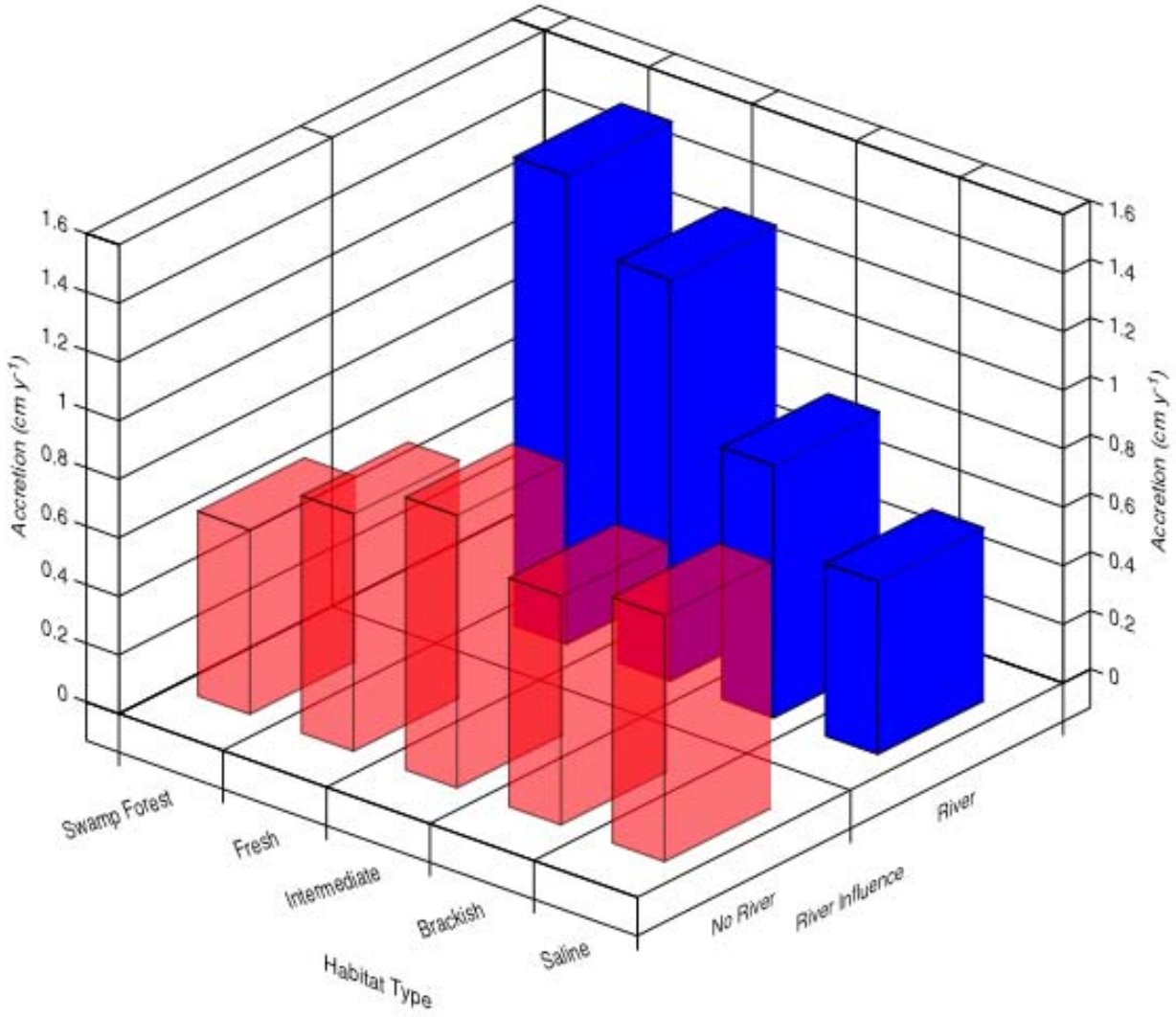

Pre and Post Construction Weekly Average Water Level
Water Depth (ft)
2
1
0
−1
−2
−3
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
Number of Weeks
Construction period week 52 to week 80
Avg. flood depth
Avg. drain depth

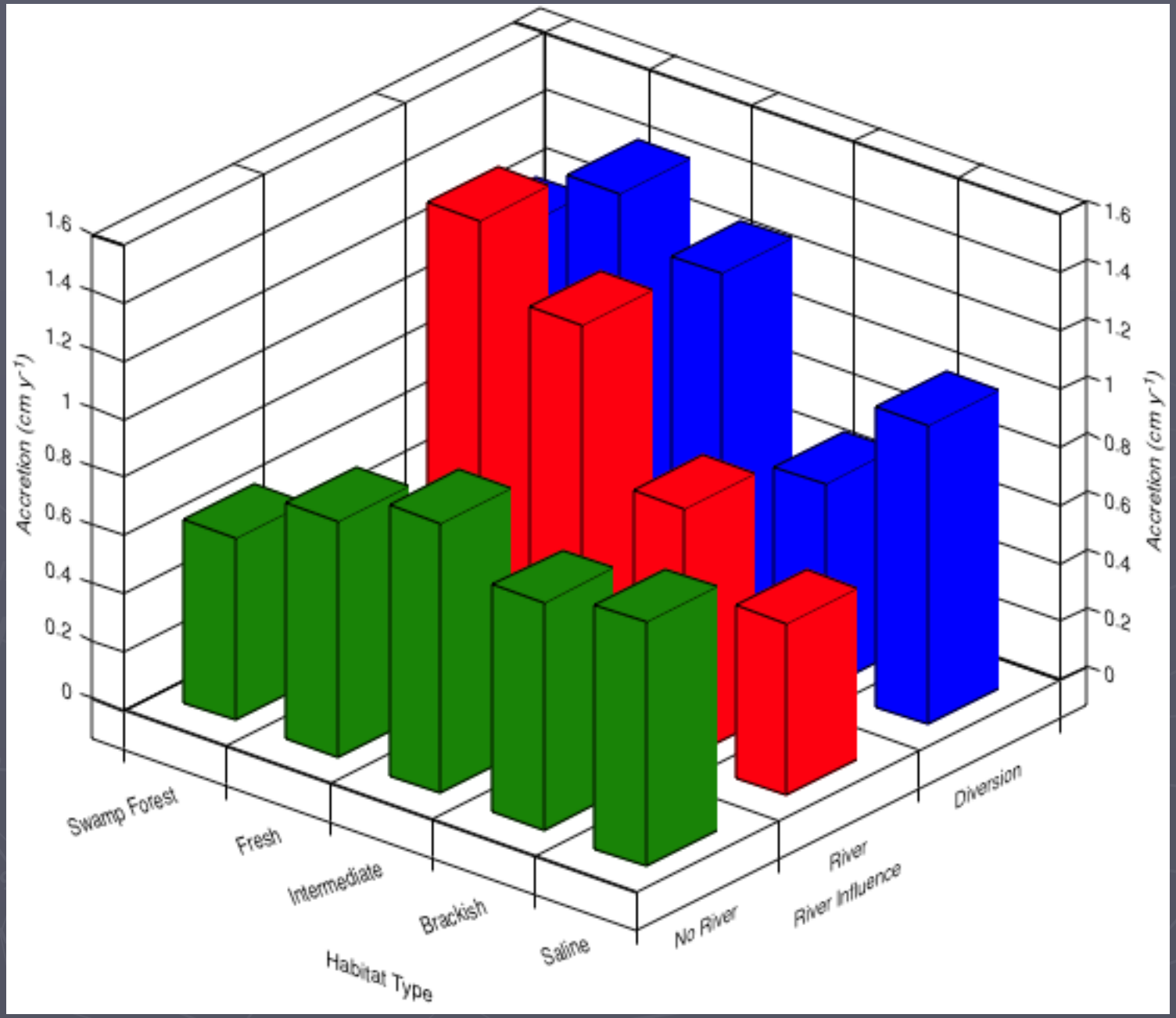

Monthly Average Salinity
Salinity (ppt)
0
1
2
3
4
5
6
7
8
Project Area
Reference Area
1
2
3
4
5
6
7
8
9
10
11
12
Month Number

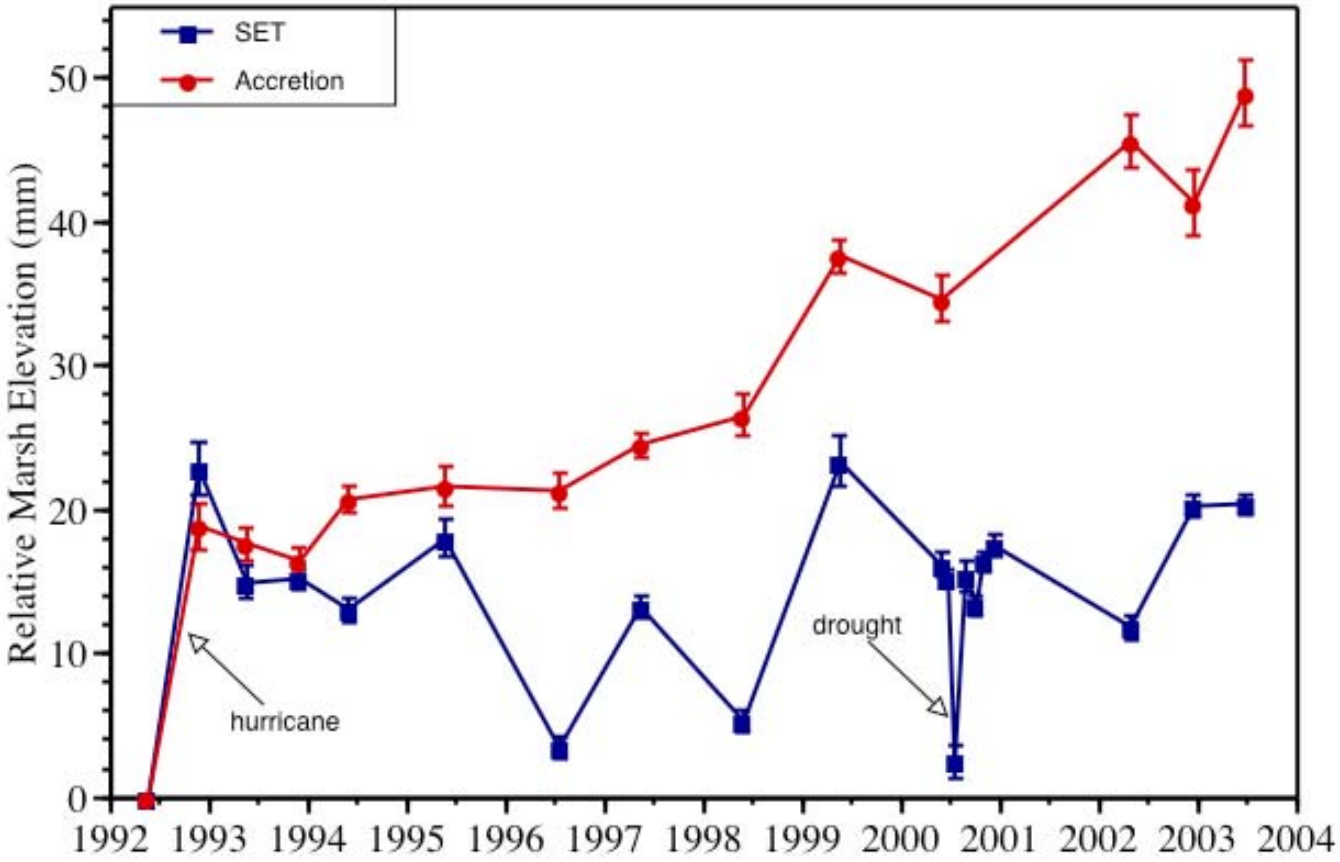

Accretion (mm y-1)
Elevation (mm y-1)
Accretion and Marsh Elevation Change (mm y-1)
0
1
2
3
4
5
0-2
3-5
6-10
11-15
>15
Proximity to river source (km)


Accretion (mm y-1)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Swamp Forest
Fresh
Intermediate
Brackish
Saline
Habitat Type
Non-Project
Project
Project Category
Accretion (mm y-1)


Accretion (mm y-1)
4
3.5
3
2.5
2
1.5
1
0.5
0
Swamp Forest
Fresh
Intermediate
Brackish
Saline
Habitat Type
TV
TE
PO
MR
ME
CS
BS
BA
AT
Basin
Accretion (mm y-1)

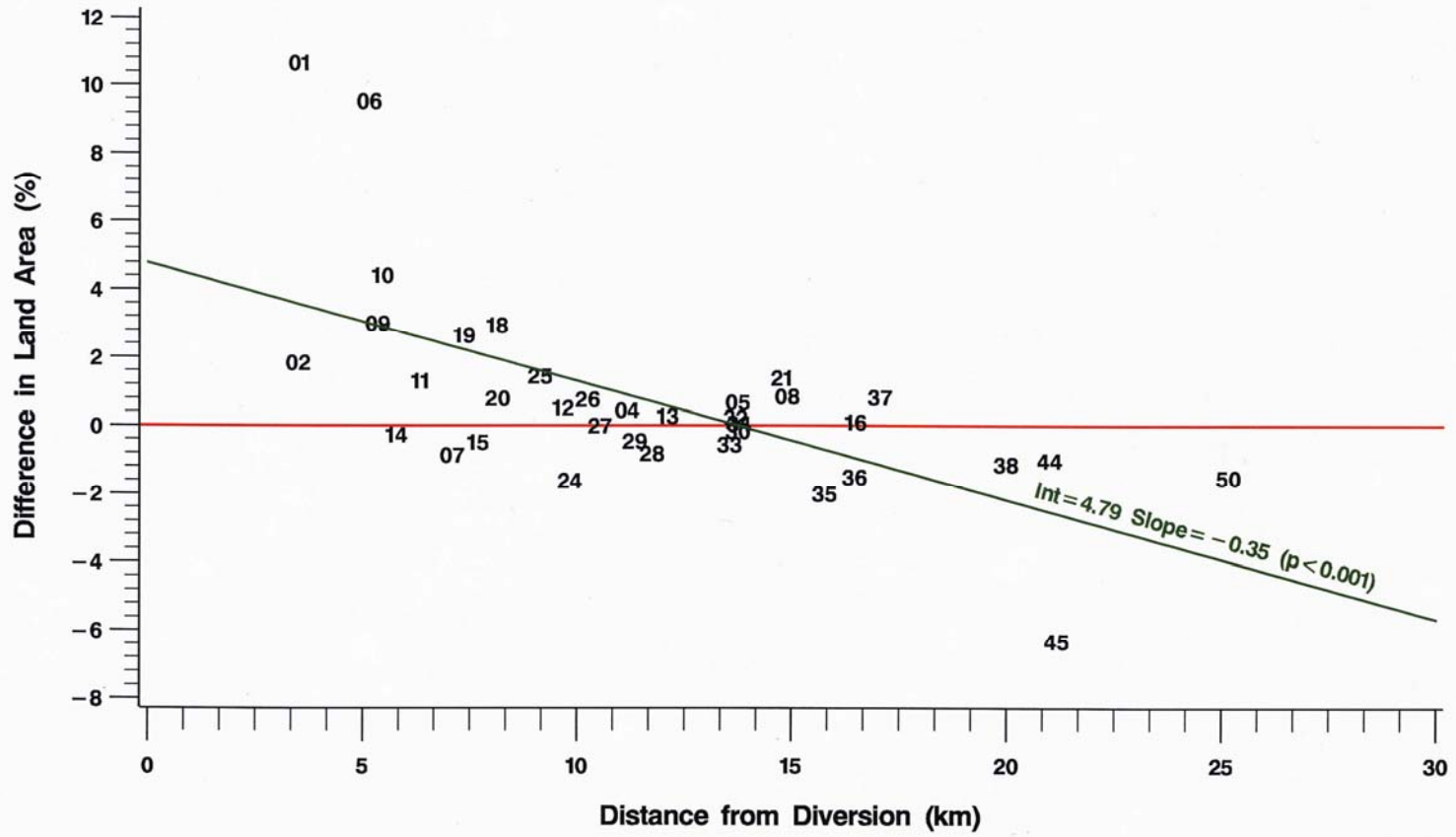

Accretion (cm y⁻¹)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Swamp Forest
Fresh
Intermediate
Brackish
Saline
Habitat Type
No River
River Influence
River


Accretion (cm y-1)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Swamp Forest
Fresh
Intermediate
Brackish
Saline
Habitat Type
No River
River
River Influence
Diversion


SET
Accretion
Relative Marsh Elevation (mm)
0
10
20
30
40
50
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
hurricane
drought

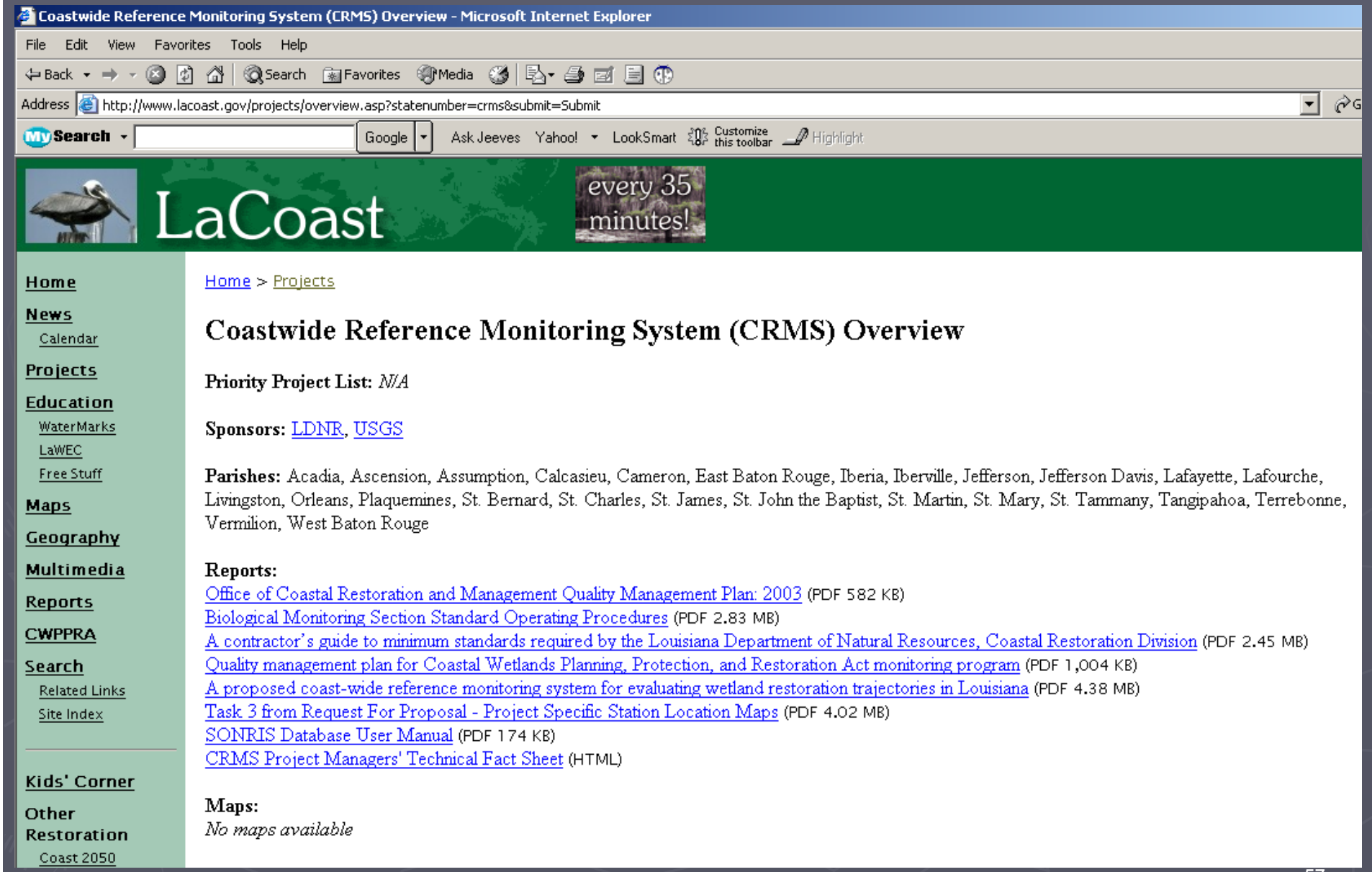
# Caernarvon Land:Water Analysis

## Percent Change in Land Area (1990 vs 2001) from TM Imagery




Numbers in the plot indicate project sites

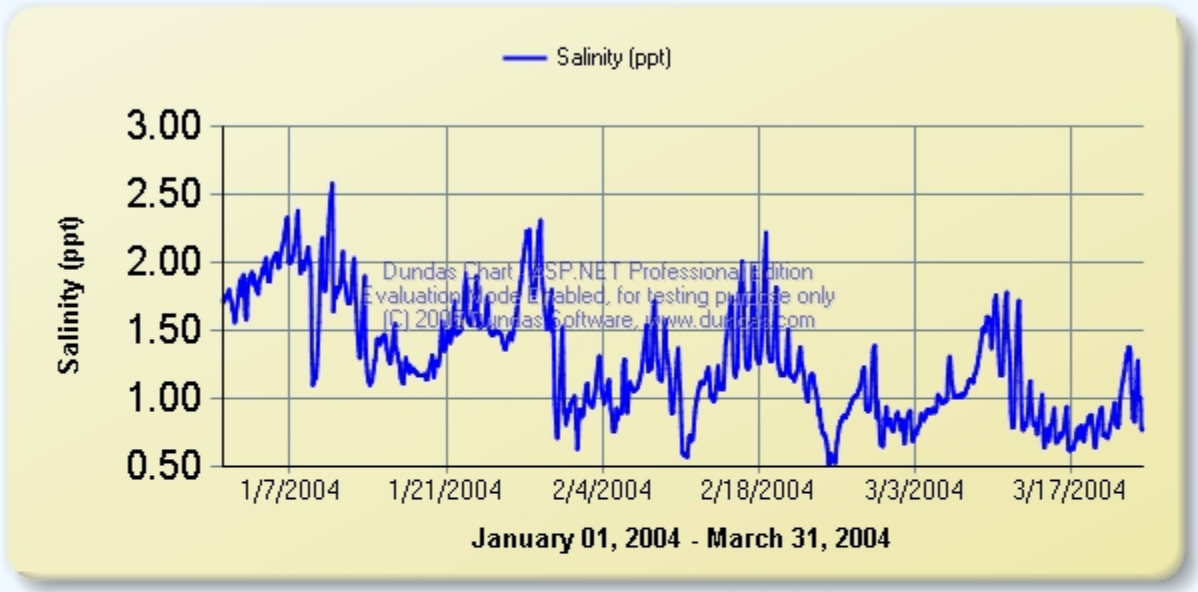
Project sites above the red reference line show land gain

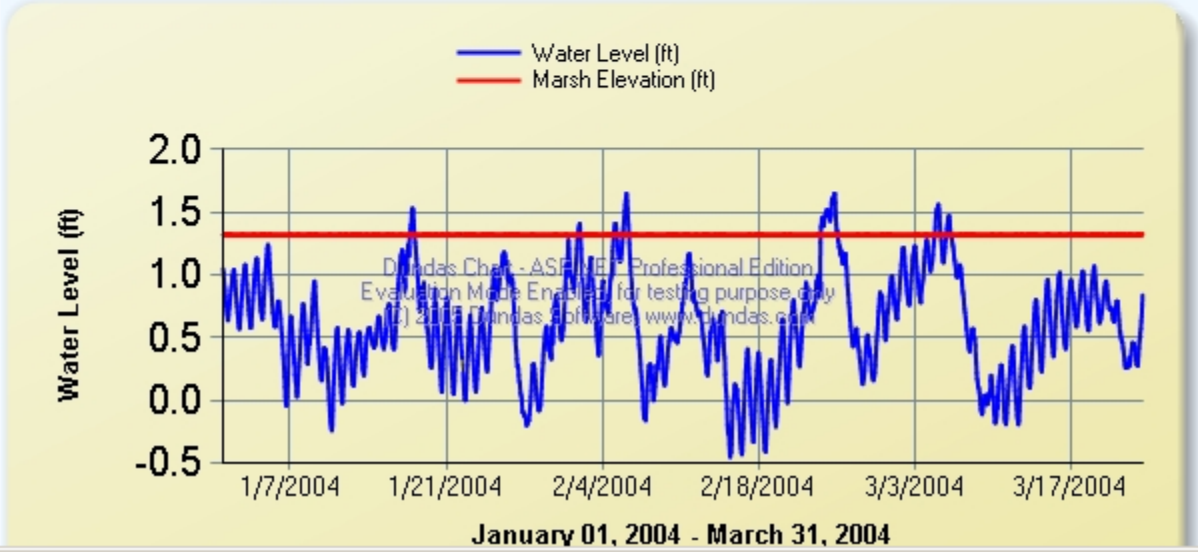

Coastwide Reference Monitoring System (CRMS) Overview - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://www.lacoast.gov/projects/overview.asp?statenumber=crms&submit=Submit
MySearch Google Ask Jeeves Yahoo! LookSmart Customize this toolbar Highlight
LaCoast
every 35 minutes!
Home
News
Calendar
Projects
Education
WaterMarks
LaWEC
Free Stuff
Maps
Geography
Multimedia
Reports
CWPPRA
Search
Related Links
Site Index
Kids' Corner
Other Restoration
Coast 2050
Home > Projects
Coastwide Reference Monitoring System (CRMS) Overview
Priority Project List: N/A
Sponsors: LDNR, USGS
Parishes: Acadia, Ascension, Assumption, Calcasieu, Cameron, East Baton Rouge, Iberia, Iberville, Jefferson, Jefferson Davis, Lafayette, Lafourche, Livingston, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Martin, St. Mary, St. Tammany, Tangipahoa, Terrebonne, Vermilion, West Baton Rouge
Reports:
Office of Coastal Restoration and Management Quality Management Plan: 2003 (PDF 582 KB)
Biological Monitoring Section Standard Operating Procedures (PDF 2.83 MB)
A contractor's guide to minimum standards required by the Louisiana Department of Natural Resources, Coastal Restoration Division (PDF 2.45 MB)
Quality management plan for Coastal Wetlands Planning, Protection, and Restoration Act monitoring program (PDF 1,004 KB)
A proposed coast-wide reference monitoring system for evaluating wetland restoration trajectories in Louisiana (PDF 4.38 MB)
Task 3 from Request For Proposal - Project Specific Station Location Maps (PDF 4.02 MB)
SONRIS Database User Manual (PDF 174 KB)
CRMS Project Managers' Technical Fact Sheet (HTML)
Maps:
No maps available

**Station:** BA02-53 ▾ | ○ 30 days | Create Graph

**Parameter:** ☑ Salinity ☑ Water Level ☑ Water Temp | ○ 60 days | ◉ 90 days

**Start Date:** 01/01/2004




Done

# Analytical Opportunities

1. RSET and accretion
   a. Are elevation and accretion rates greater in proximity to sediment source/river influence?
   b. Are elevation and accretion rates different in areas near river diversion vs areas with “natural” river influence vs. areas isolates from river influence?
   c. Do elevation and accretion rates differ by habitat type?
   d. What are elevation and accretion rates inside project boundaries vs outside?
   e. What are elevation and accretion rates within each Basin?
   f. What are elevation and accretion rates across the coast?
   g. What are the shallow subsidence rates across the coast, basins, habitat types, etc. How do they differ with proximity to river influence?

# Analytical Opportunities

1. RSET and accretion
2. Water Level (marsh flooding frequency and duration)
   a. Are marshes flooded more frequently and longer within and between basins, habitat types, and project vs reference areas?
   b. Are marshes flooded more often and longer in areas isolated from riverine influence?
   c. Does marsh flooding frequency and duration change over time with increasing river influence? (i.e., does the marsh become more “stable”?)
   d. How do storm events and wind events influence water levels on all scales?
3. Salinity (surface and pore water)
4. Soil Properties (bulk density and percent organic content)
5. Vegetation (species composition, biomass, productivity)