Webcast sponsored by EPA's Watershed Academy

Assessing Wetland Loss/Conditions and Restoration

September 26, 2007 Webcast

Kerry St. Pé, Executive Director, Barataria-Terrebonne National Estuary Program

Michael Scozzafava, Environmental Protection Specialist, USEPA

Jan Smith, Director, Massachusetts Bays National Estuary Program

1

Resurrection of the Bayou People, 2007 A.D.

Wetlands, Hurricanes, and Restoration in the Deep Delta Region of the Mississippi River

PROTECTING AND RESTORING
20
YEARS

BTNEP
BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

2

"Pouring down out of North America's heart, the Mississippi nears the end of its long travels; and suddenly it finds itself in a new land, a region in some ways like no other in the world …and it can be admitted that the terrain and the population alter before the eye.

To some it has a sodden almost terrifying aspect. Others have observed more closely and more accurately, to discover here a rare and untamed quality, beauty in rich profusion and turbulence."

Deep Delta Country, by Harnett T. Kane, 1944

3

BTNEP is one of the 28 estuary programs throughout the United States

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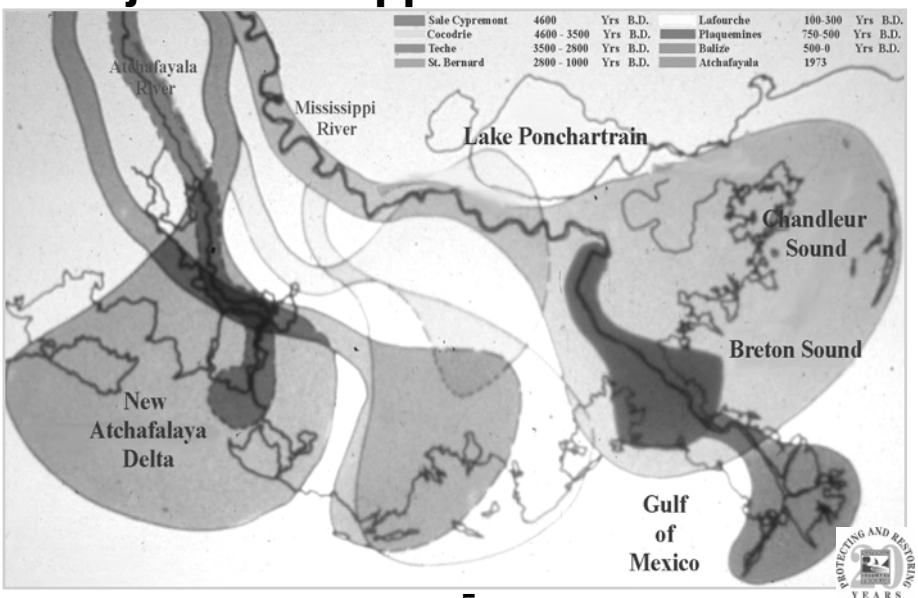
Major Mississippi River Delta Lobes



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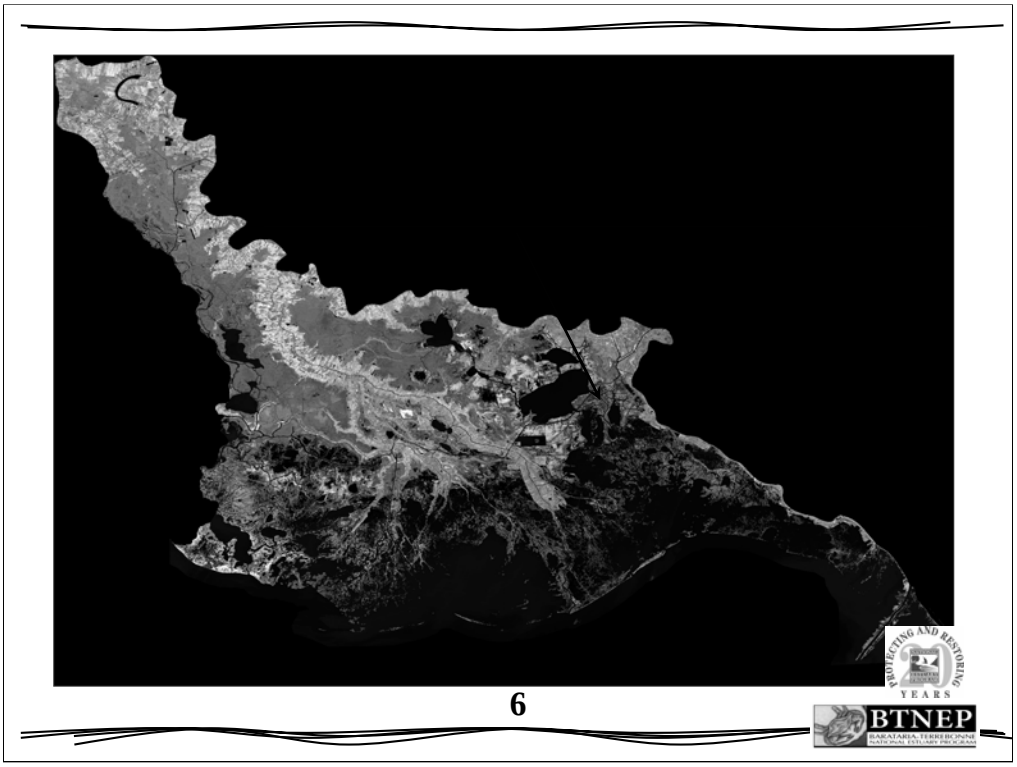
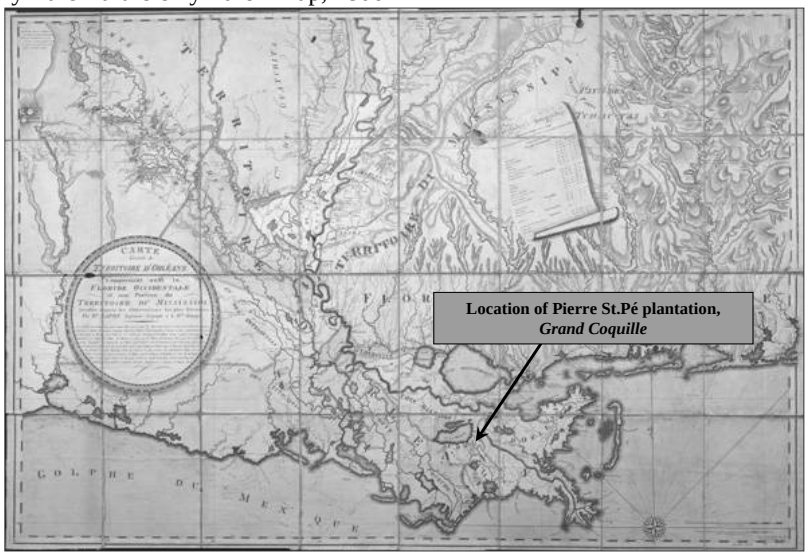


BTNEP is one of the 28 estuary programs throughout the United States

Very Rare Barthélémy Lafon Map, 1806

Bartholemy Lafon was a New Orleans surveyor and nationally recognized scientist who was involved in President Jefferson's efforts to map and understand the area covered by his Louisiana Purchase.
This map was a direct result of Thomas Jefferson's interests.

Very Rare Barthélémy Lafon Map, 1806



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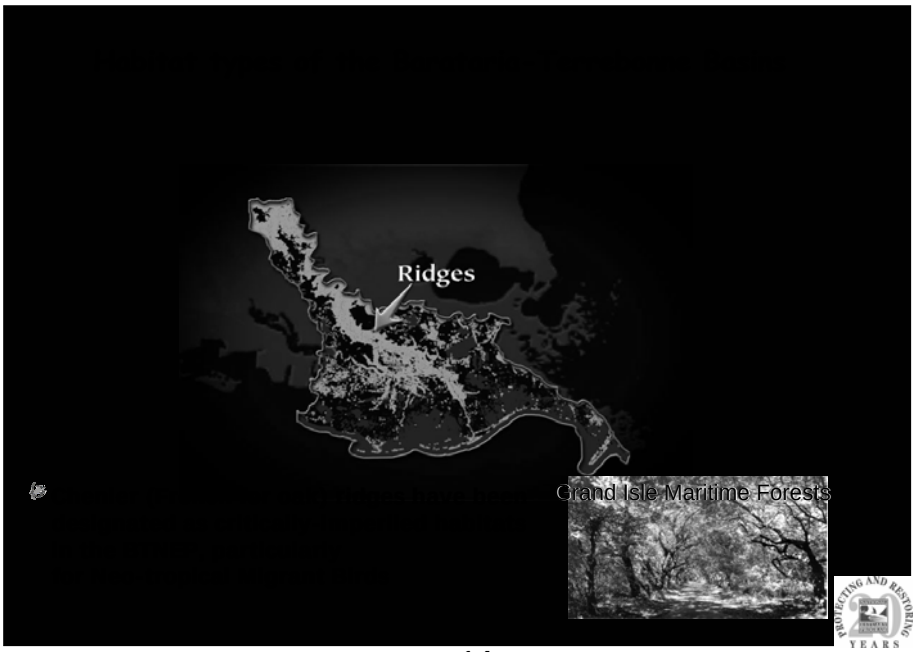


14

The BTNEP nomination document (in 1989) identified 7 Priority issues affecting the region:

Wetland Loss Issues
- Hydrologic Modification
- Reduced Sediment Inflow
- Habitat Loss / Modification

Water Quality Issues
- Eutrophication
- Pathogen Contamination
- Toxic Substances

Wildlife Issues
- Changes in Living Resources

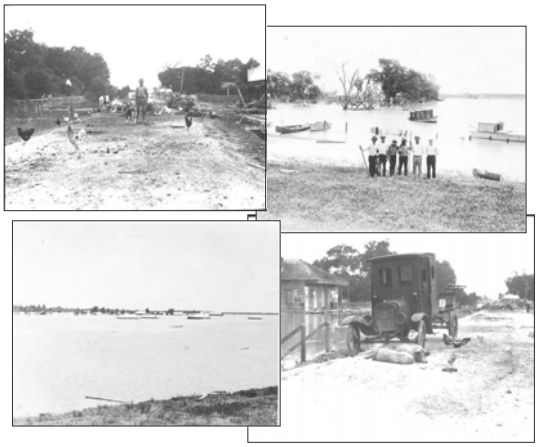
15

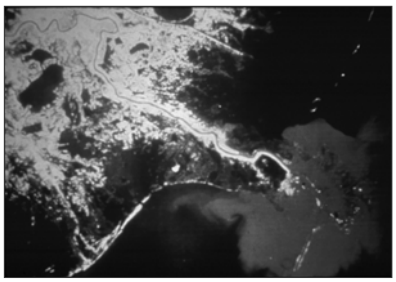
Hydrologic Modification

Man-made changes in the way water moves through the system

16

Reduction in Sediment Availablity





Silt deposition in wetlands no longer offsets subsidence

17

The Father of Waters…

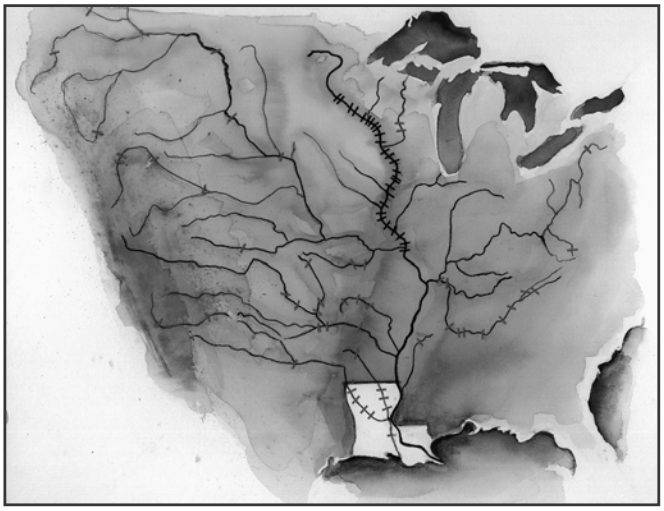
The Beginning at Lake Itasca

The Father of Waters…
The Mother of the
Barataria-Terrebonne National Estuary

At the Gulf of Mexico

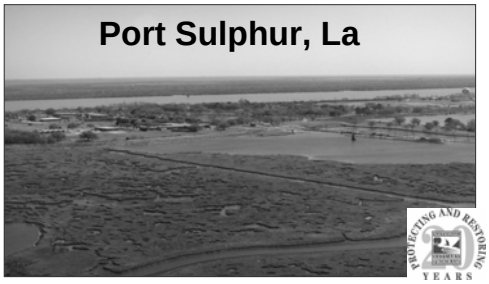
19

Since 1850, the suspended sediment load in the Miss. River has declined by 80% !



Habitat Loss

Barataria-Terrebonne is disappearing faster than any other area in the world



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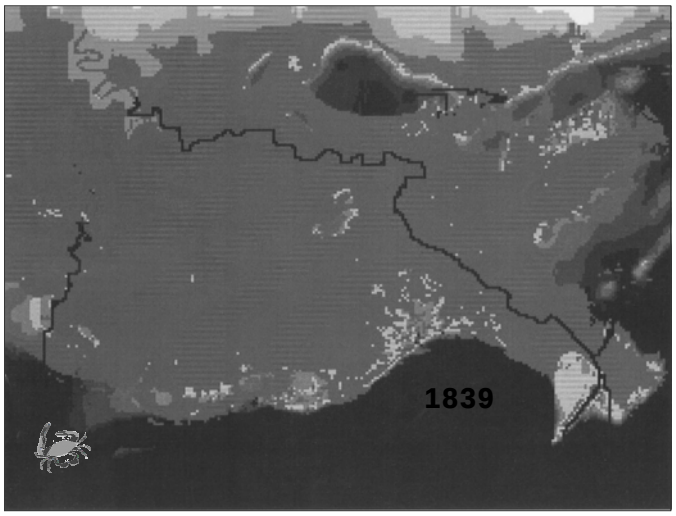
21

Past and Projected Wetland Loss in the BTNEP (1839 to 2020)



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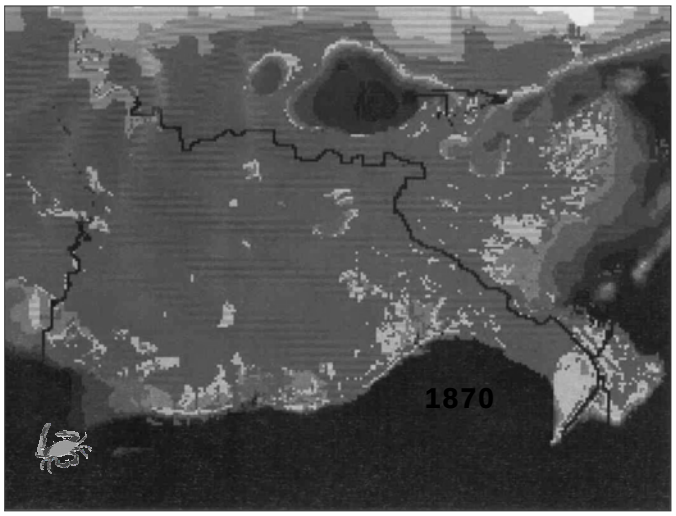

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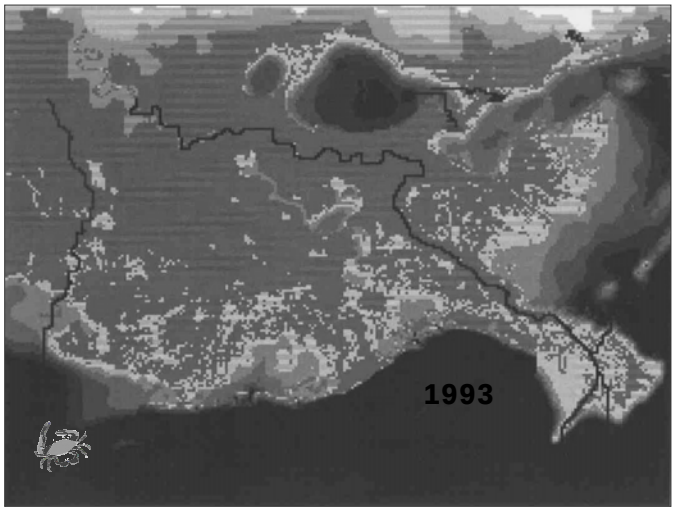

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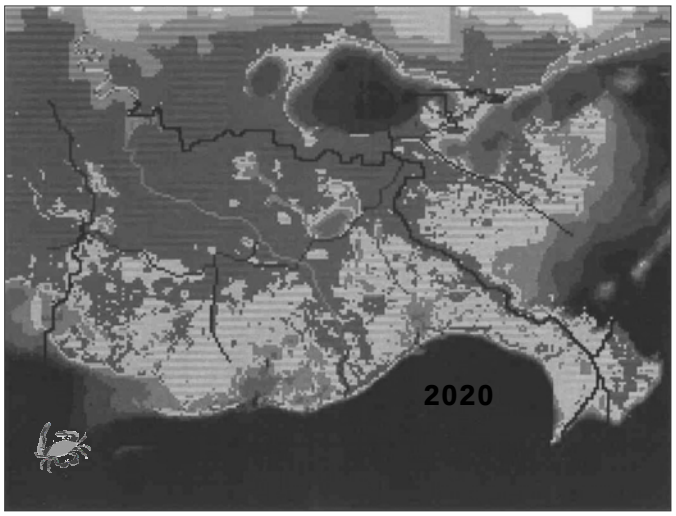

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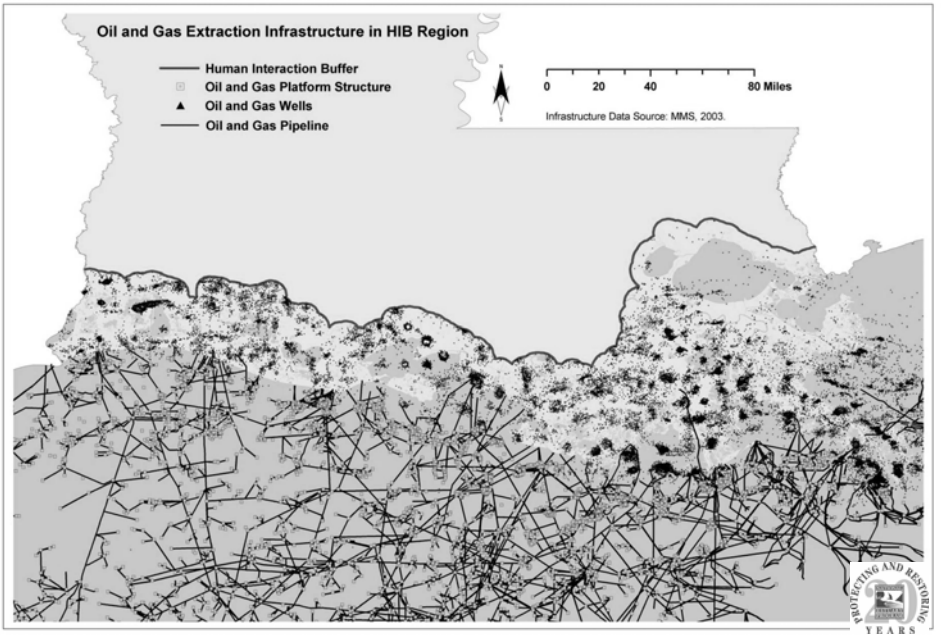
Oil and Gas Extraction Infrastructure in HIB Region
Human Interaction Buffer
Oil and Gas Platform Structure
Oil and Gas Wells
Oil and Gas Pipeline
0
20
40
80 Miles
Infrastructure Data Source: MMS, 2003.
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YEARS
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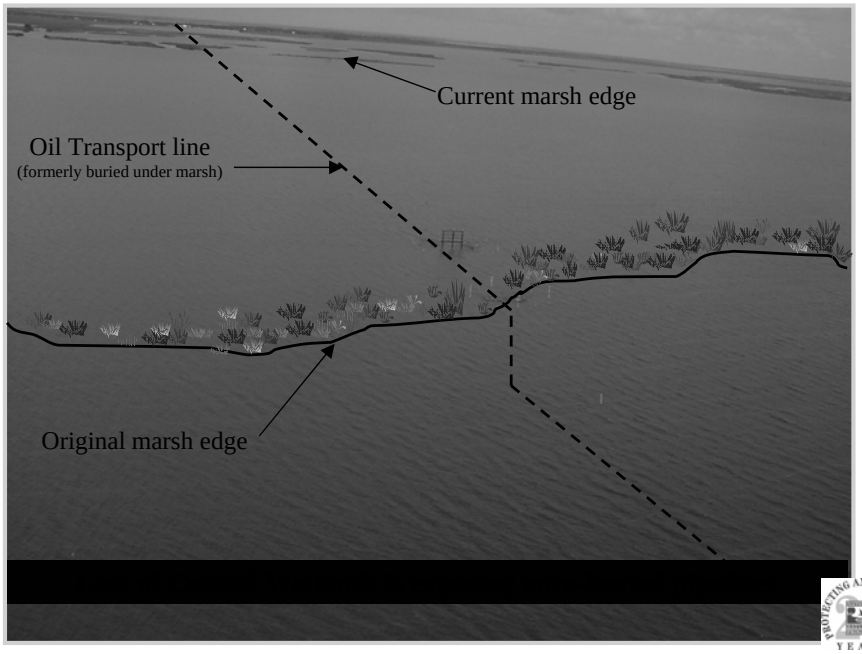
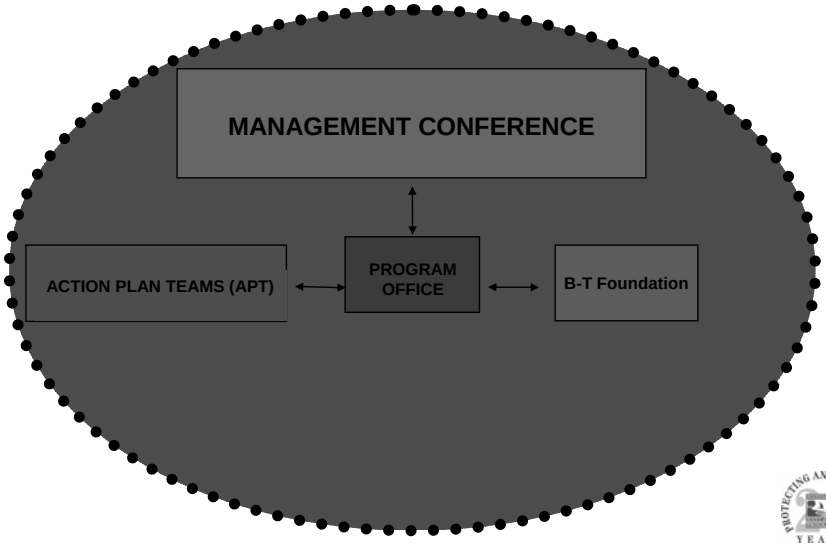
BARATARIA-TERREBONNE
NATIONAL ESTUARY PROGRAM


Current marsh edge
Oil Transport line
(formerly buried under marsh)
Original marsh edge

27

BTNEP

Implementation Phase Structure



28

US Environmental Protection Agency, EPA
Natural Resources Conservation Service
La Dept. of Environmental Quality
La Dept of Economic Development
Coalition to Restore Coastal La.
The Nature Conservancy
National Park Service
La. Assoc. of Levee Boards
US Geological Survey
Plaquemines Parish
NOAA Sea Grant
US Coast Guard
Jefferson Parish
La Science Teachers Assoc.
South La Economic Council
La Dept of Natural Resources
American Sugar Cane League
Greater Lafourche Port Commission
La Independent Oil and Gas Assoc.
La. Assoc. of Conservation Districts
NOAA, National Marine Fisheries Service

The B-T Management Conference

La. Universities Marine Consortium, LUMCON
La Dept of Culture, Recreation and Tourism
La Dept of Health and Hospitals
La Mid Continent O & G Assoc
US Army Corp. of Engineers
US Fish & Wildlife Service
La Wildlife Federation
Nicholls State Univ.
Assumption Parish
Lafourche Parish
St Charles Parish
Land Owners. Assoc.
La Dept of Education
Terrebonne Parish
La Oil Spill Coordinators Office
La. Dept. of Wildlife & Fisheries
La Seafood Management Council
Coastal Conservation Assoc of La.
La. Dept of Agriculture & Forestry
Bayou Lafourche Freshwater District
Gov. Office of Coastal Activities
South Central Planing & Development Com.

29

BTNEP

A Conceptual Model for the BTNEP Approach to System Restoration

"Most people are concerned about the environment but feel overwhelmed by the complexity and scale of the problems." - Maurice Strong, Chairman of the Earth Council, 2001

Question:

Given the overwhelming complexity and scale of our problems, what factors need to be considered in a restoration plan?

Answer:

Any and All Factors that result in a holistic, consensus driven *agreement*.

PROTECTING AND RESTORING 20 YEARS

BTNEP BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

30

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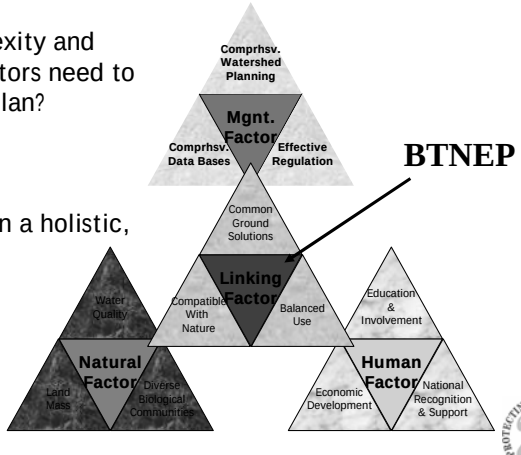


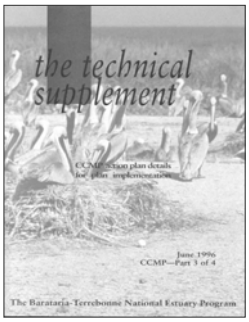
Barataria-Terrebonne National Estuary Program Comprehensive Conservation and Mgt. Plan

51 Action Plans address living resources, habitat, and water quality issues

PLUS…

Cultural Heritage, Education, National Recognition, Economic Development, and Coordinated Planning.

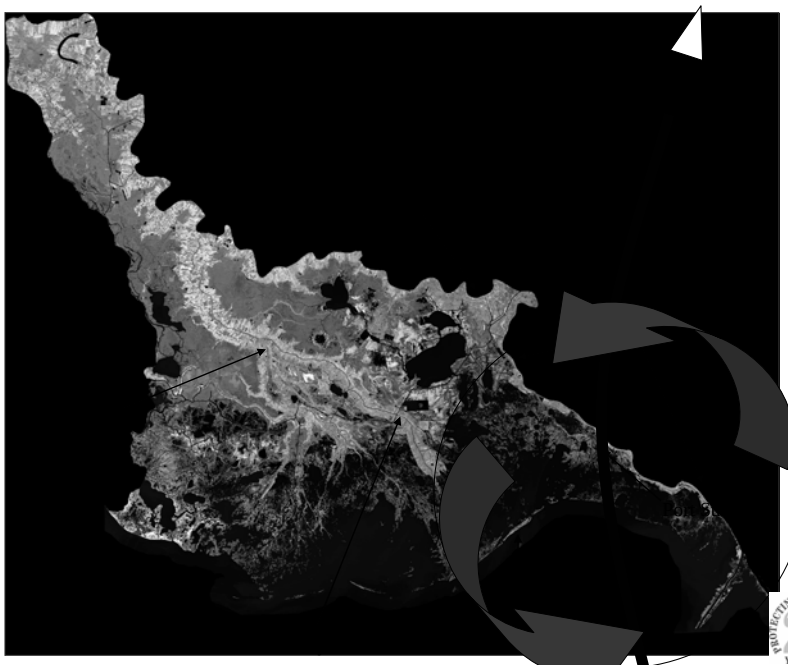
- **This broader, holistic approach is the greatest strength of the NEPs and can be used to effect positive change among program partners.**

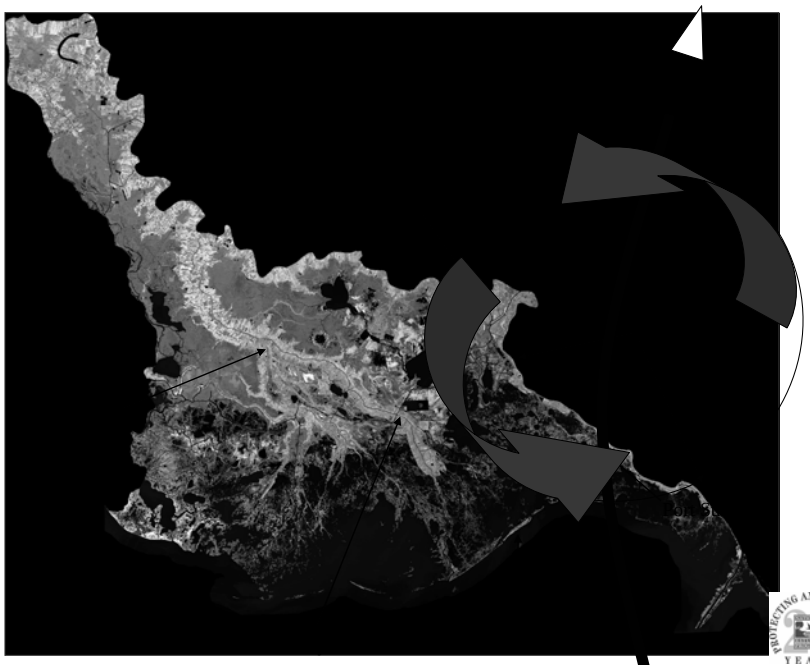


32

Hurricane Katrina

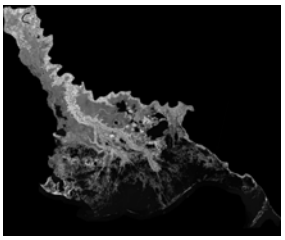
August 29, 2005





Port Sulphur, La.

Plaquemines Parish



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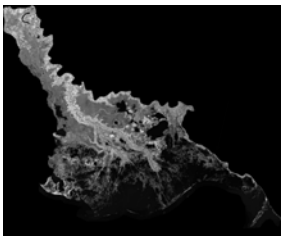
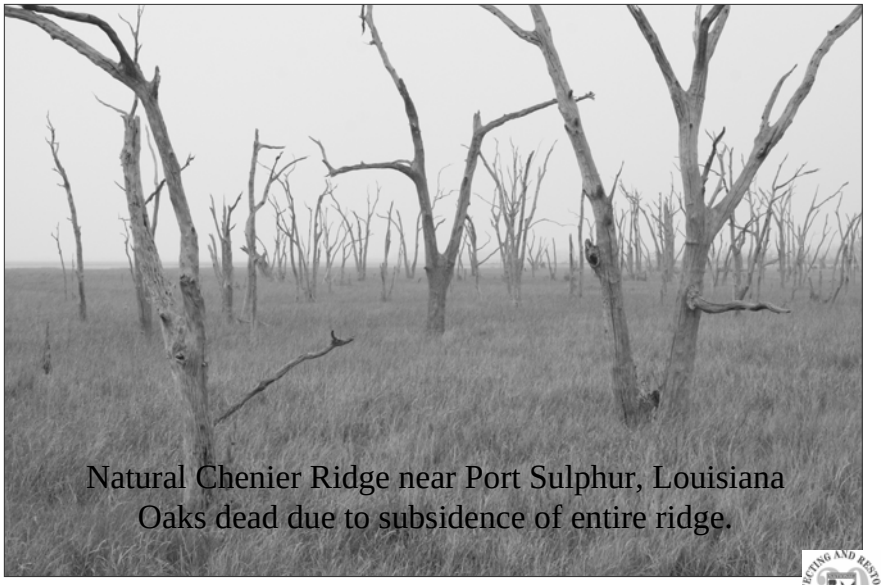


37

The St.Pé Childhood home Post Katrina

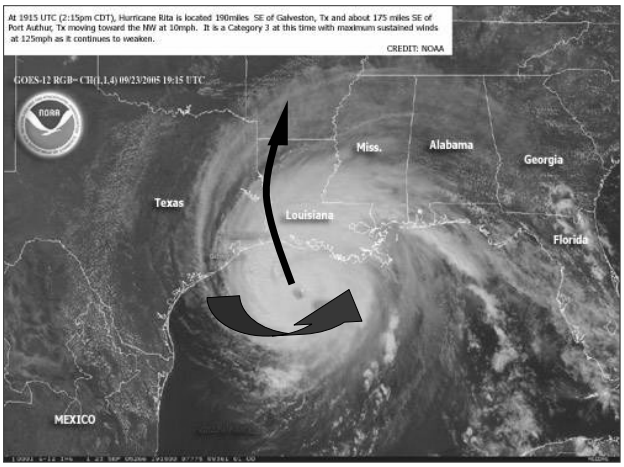
Port Sulphur, LA



Natural Chenier Ridge near Port Sulphur, Louisiana
Oaks dead due to subsidence of entire ridge.

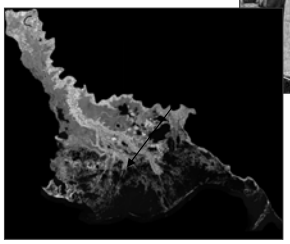
Hurricane Rita

September 24, 2005


At 1915 UTC (2:15pm CDT), Hurricane Rita is located 190miles SE of Galveston, Tx and about 175 miles SE of Port Authur, Tx moving toward the NW at 10mph. It is a Category 3 at this time with maximum sustained winds at 125mph as it continues to weaken.
CREDIT: NOAA
GOES-12 RGB=CH(1,3,4) 09/23/2005 19:15 UTC
noaa
Miss.
Alabama
Georgia
Texas
Louisiana
Florida
MEXICO

41

Levee Breach at Montegut, Terrebonne Parish, La.



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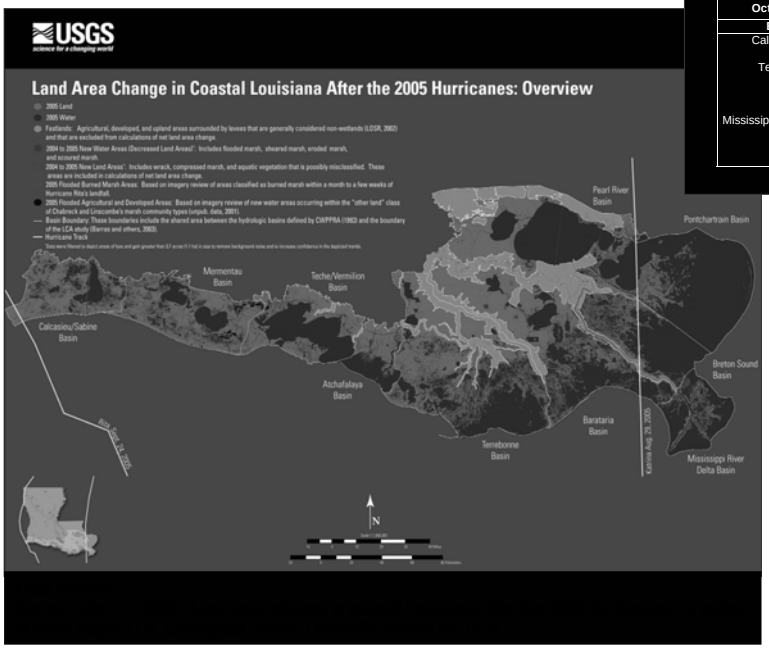

Land Area Changes October 2004 to October 2005	
Basin	**Land area (mi^2)**
Calcasieu/Sabine	-22
Mermentau	-62
Teche/Vermilion	-5
Atchafalaya	-9
Terrebonne	-19
Barataria	-18
Mississippi River Delta	-18
Breton Sound	-41
Pontchartrain	-19
Pearl River	-4
Total	-217

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43

FACTS

Each of us agree that restoration must occur.

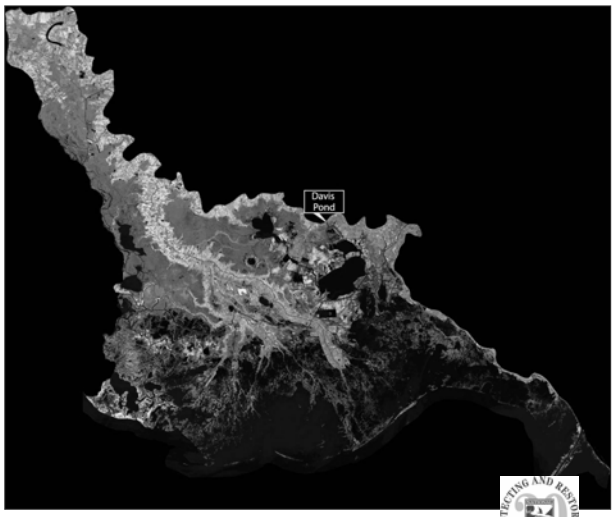
1000s of individual ideas of what should be done.

We will never succeed until we implement from a point of agreement.

So how can we "fix" our coastal landscape?

Davis Pond Freshwater Diversion

- **Largest diversion to date in the Barataria Basin**
- **Completed in 2002**
- **Cost = $119.6 million**
- **10,650 cubic feet per second (max)**



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20
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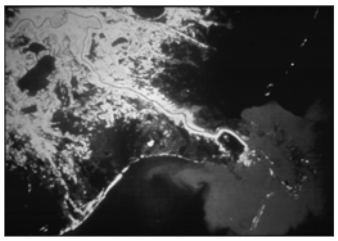
NATIONAL ESTUARY PROGRAM

Sediment Delivery from Miss and Atchaf. River Bottoms

- **Need? Obviously, we need sediments! (Barrier Islands, marshes, ridges, etc.)**
- **Public Support? Get needed sediment with little water, so publicly acceptable!**
- **Is this possible? …We've been doing it for decades!**



Miss. and Atchafalaya convey over 180 million cu. yds. sediment annually.

Corps N.O. District alone dredges about 22 million cu. yds annually (net) from Miss. River

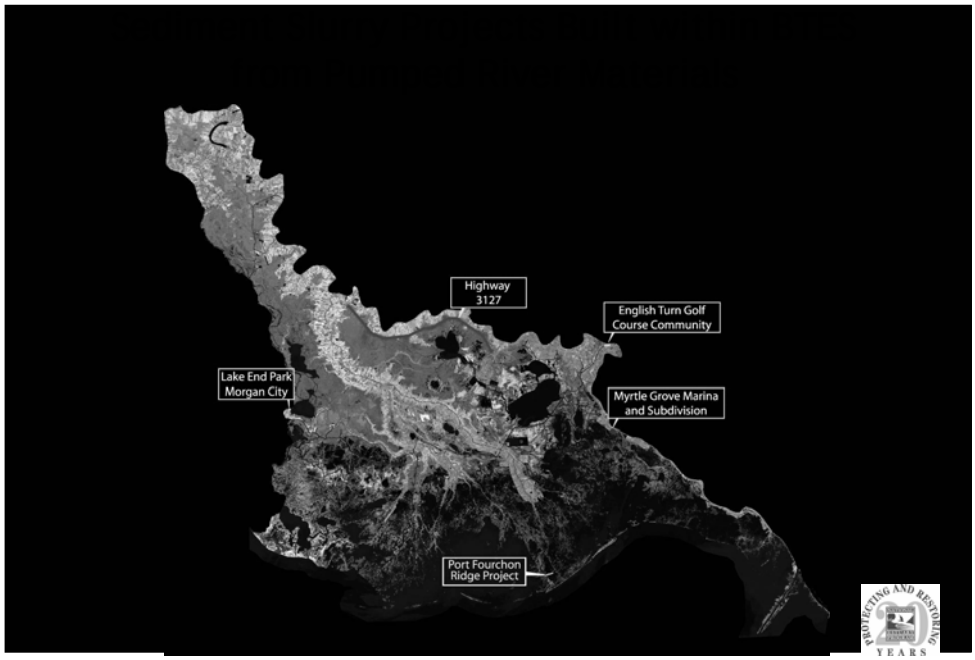
100 million metric tons annually flows off continental shelf (Miss.)

Dredged from Atchaf. 1996 to 2006*:

178,112,814 total cubic yards @ cost of $136,102,281.
(Annual average = 5,238,612 cubic yards @ cost of $4,124,312.

***U.S. Army Corps of Engineers data**

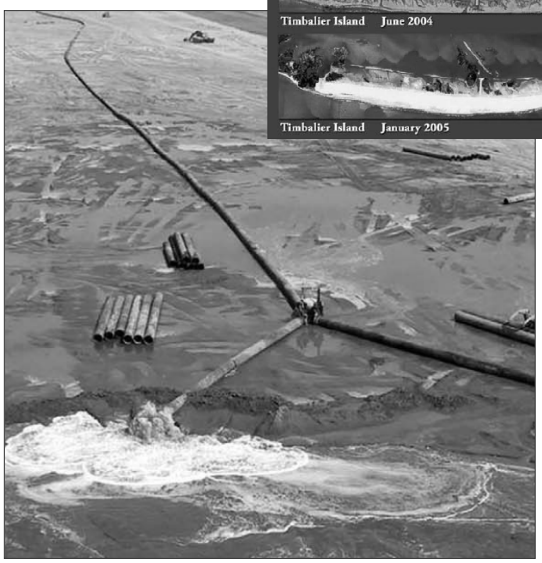
47


Highway
3127
English Turn Golf
Course Community
Lake End Park
Morgan City
Myrtle Grove Marina
and Subdivision
Port Fourchon
Ridge Project

48

Recent Barrier Island Restoration using dredge-harvested sediment.

Timbalier Island, La.



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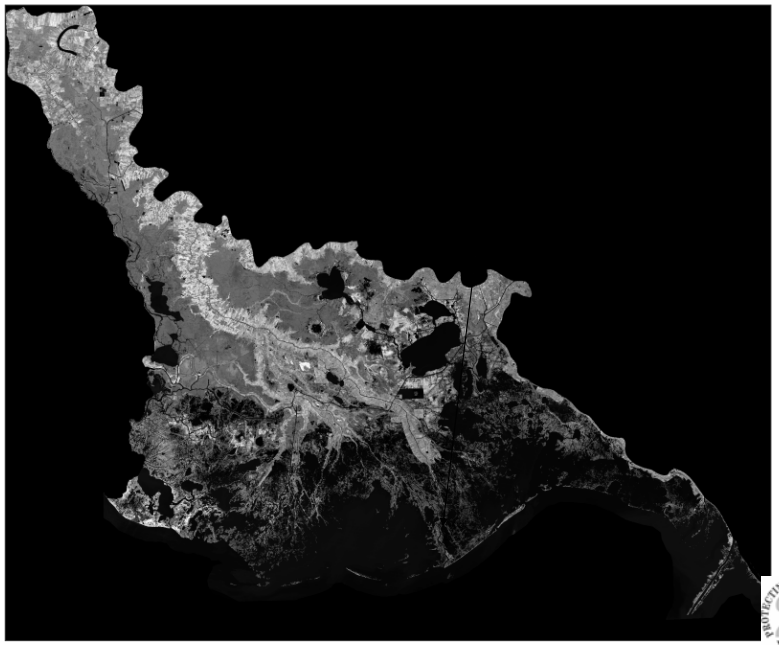
BTNEP BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

49



BTNEP Ridge Project…Post Katrina

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Wetlands and ridges can be restored from sediments transported through pipelines with minimal amounts of water

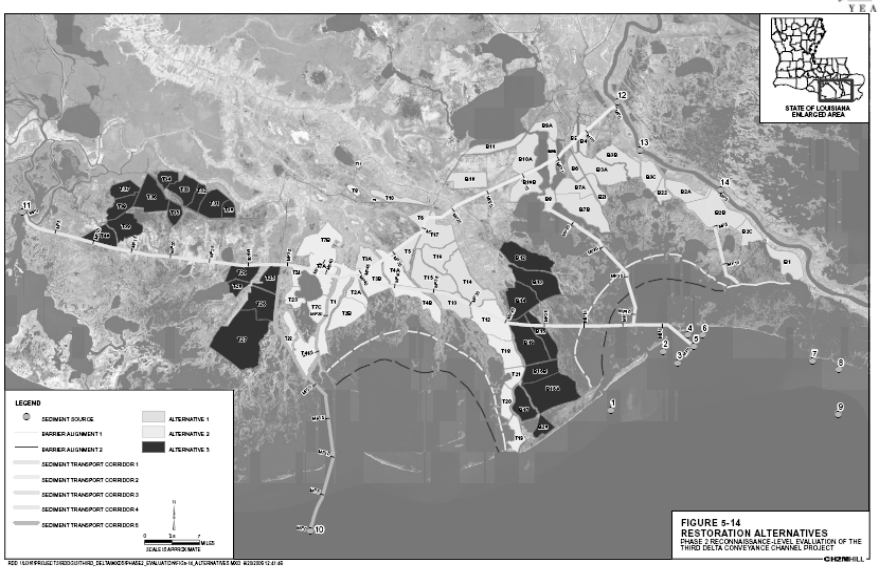

STATE OF LOUISIANA
ENLARGED AREA
LEGEND
SEDIMENT SOURCE
BARRIER ALIGNMENT 1
BARRIER ALIGNMENT 2
SEDIMENT TRANSPORT CORRIDOR 1
SEDIMENT TRANSPORT CORRIDOR 2
SEDIMENT TRANSPORT CORRIDOR 3
SEDIMENT TRANSPORT CORRIDOR 4
SEDIMENT TRANSPORT CORRIDOR 5
ALTERNATIVE 1
ALTERNATIVE 2
ALTERNATIVE 3
SCALE IS APPROXIMATE
FIGURE 5-14
RESTORATION ALTERNATIVES
PHASE 3 RECONNAISSANCE-LEVEL EVALUATION OF THE
THIRD DELTA CONVEYANCE CHANNEL PROJECT
CH2MHILL

TABLE 5-30
Summary of Planning-level Project Costs
Phase 2 Reconnaissance-level Evaluation

Restoration Project	Cost (billion $)	Cost per Acre vs. Future with No Action (at 2060 $)
Pipeline Conveyance Alternative 1	9.4	72,000
Pipeline Conveyance Alternative 2	21.1	94,000
Pipeline Conveyance Alternative 3	31.7	116,000

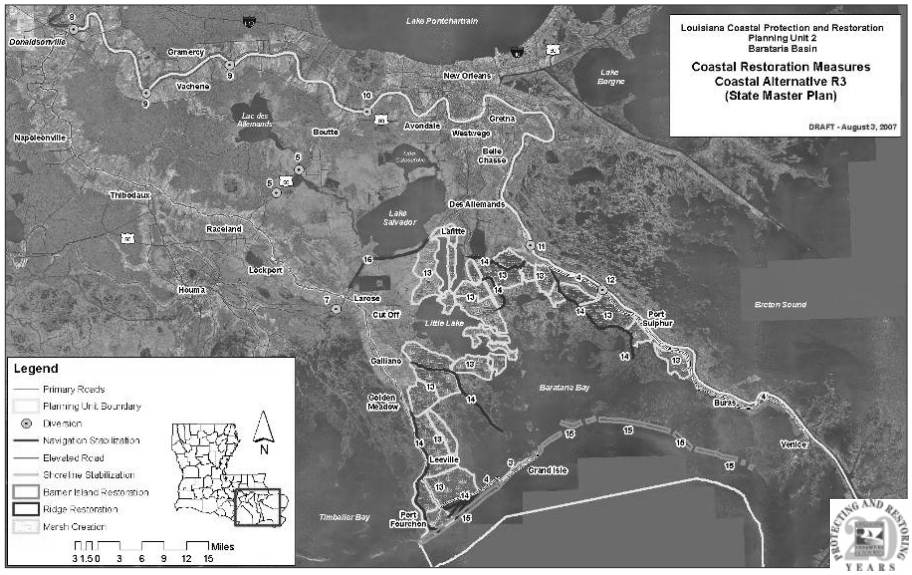
* Costs are for 50-year period.

Annualized costs for Pipeline Sediment Transport

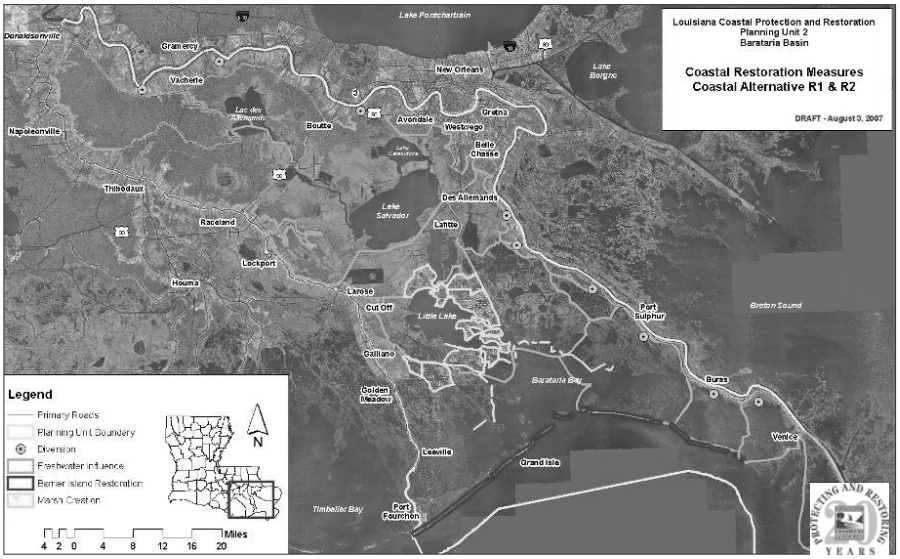
Alt. 1……$180 million per yr.
Alt. 2……$422 million per yr.
Alt. 3……$634 million per yr.

54

State Master Plan
Barataria Basin



Corps of Engineers Restoration Alternative (LaCPR)
Barataria Basin



56

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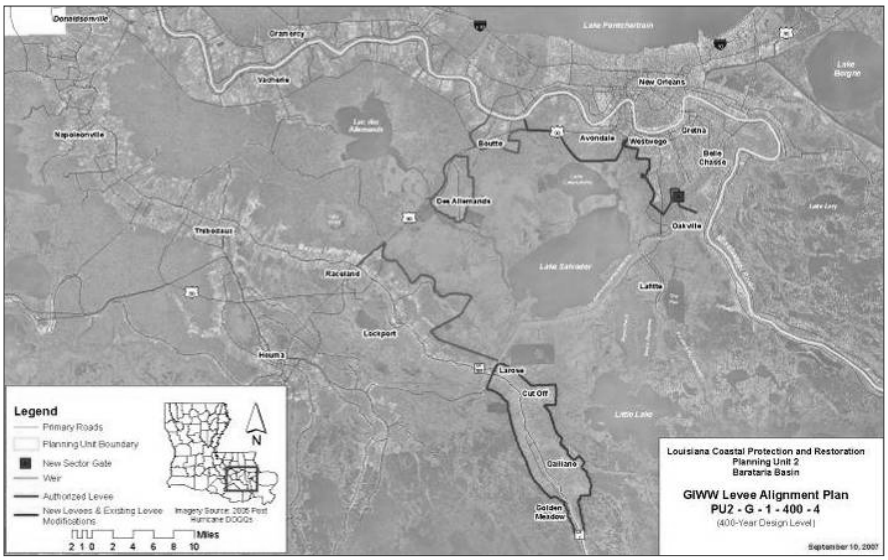
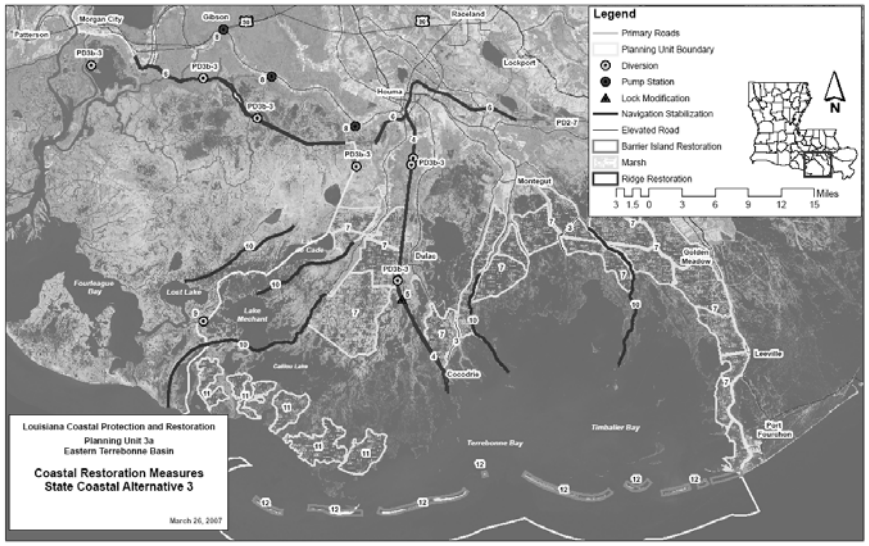
BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

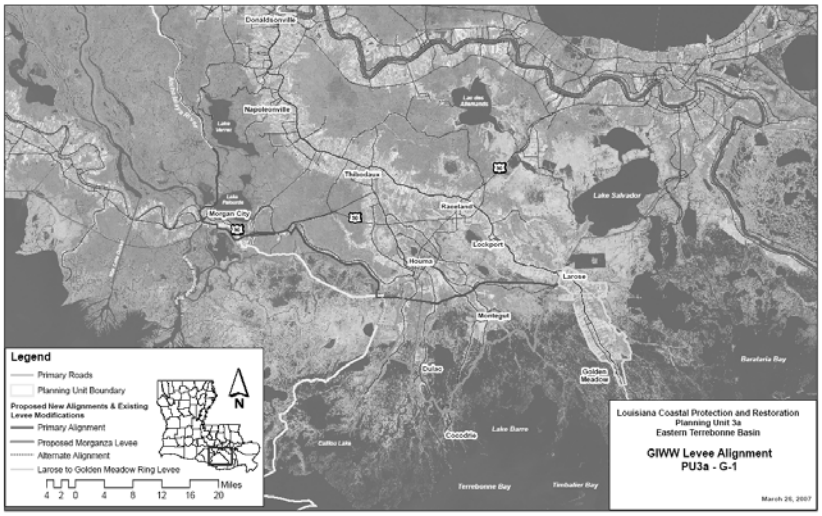
Corps of Engineers Levee Alignment Alternative Barataria Basin



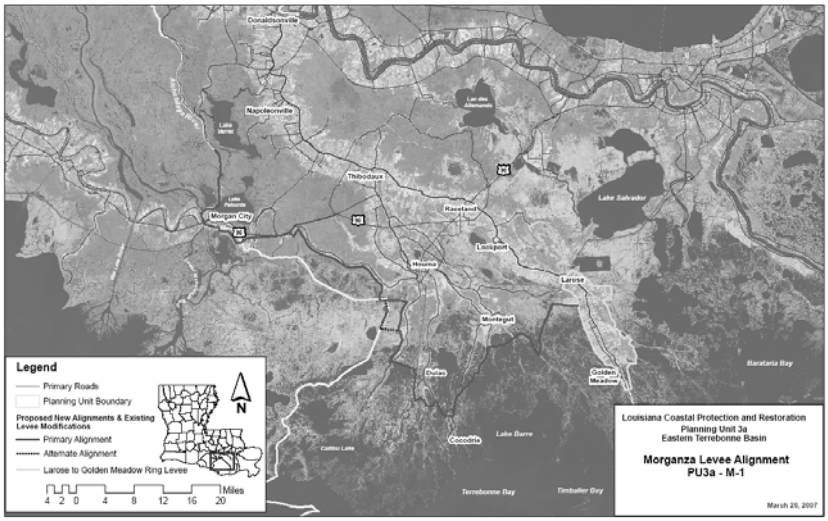
State Master Plan
Terrebonne Basin

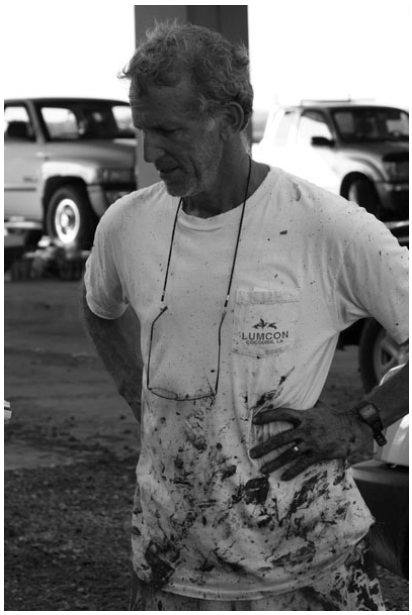


Corps of Engineers Levee Alignment Alt 1
Terrebonne Basin



Corps of Engineers Levee Alignment Alt 2
Terrebonne Basin





Resurrection

But when the rain comes,
resurrection fern
springs up in a green mass
of strong backs and arched fronds
making leaf out of water
and the reservoirs of hope
hidden in their wiry roots…

If you listen you can hear them singing
the gospel of life's stubborn return.

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and the reservoirs of hope
hidden in their wiry roots…

If you listen you can hear them singing
the gospel of life's stubborn return.

PROTECTING AND RESTORING 20 YEARS

BTNEP BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

Resurrection

But when the rain comes,
resurrection fern
springs up in a green mass
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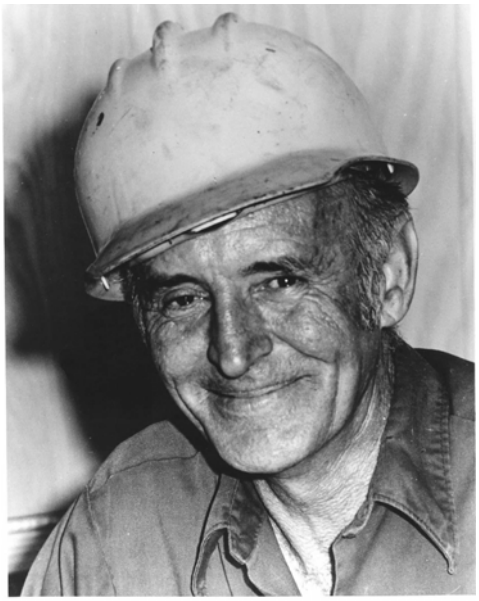

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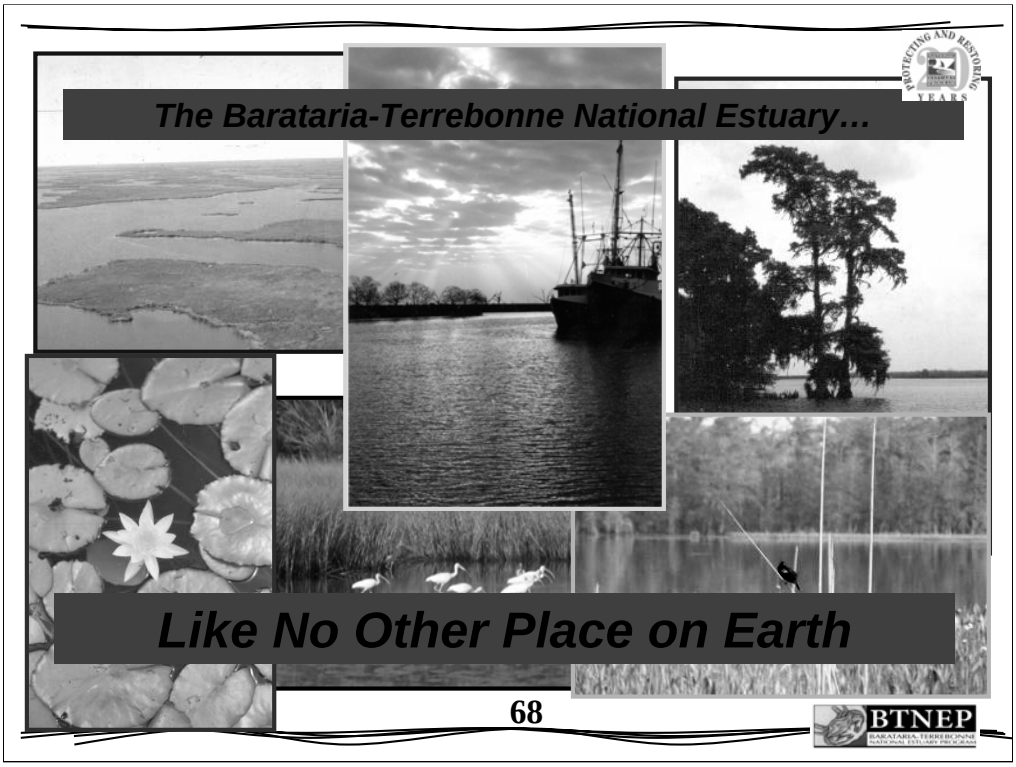

The Barataria-Terrebonne National Estuary…
Like No Other Place on Earth
68
BTNEP

Questions?

Kerry St. Pé, Executive Director,
Barataria-Terrebonne National Estuary Program (BTNEP)

Wetlands Monitoring and Assessment

- EPA's National Program
- The National Wetland Condition Assessment
- Gulf of Mexico Coastal Wetland Pilot
- Wetland Assessment Data to Inform Decisions-Making

Michael Scozzafava
U.S. EPA
Office of Wetlands, Oceans, and Watersheds
September 26, 2007

70

3-Level Technical Approach

Level 1 - Landscape Assessment:

Use GIS and remote sensing to gain a **landscape view of watershed and wetland condition.** Typical indicators include wetland coverage (NWI), land use, and land cover.

Level 2 – Rapid Wetland Assessment:

Evaluate the **general condition of individual wetlands using relatively simple field indicators**. Assessment is often based on the characterization of stressors known to limit wetland function. (e.g. road crossings, tile drainage, ditching).

Level 3 – Intensive Site Assessment

Produce quantitative data with known certainty of wetland condition within an assessment area. Used to refine rapid wetland assessment methods and diagnose the causes of wetland degradation. Typically accomplished using indices of biological integrity or HGM function

National Wetland Condition Assessment (2011)

Scientific issues Policy issues Supplemental data analysis Methods refinement	Target population Indicators Field/ Lab practices Quality assurance plan	Training Site reconnaissance Sample collection Field quality assurance	Lab analysis Lab quality assurance Data entry Data quality assurance	Data analysis Presentations Peer review Final report

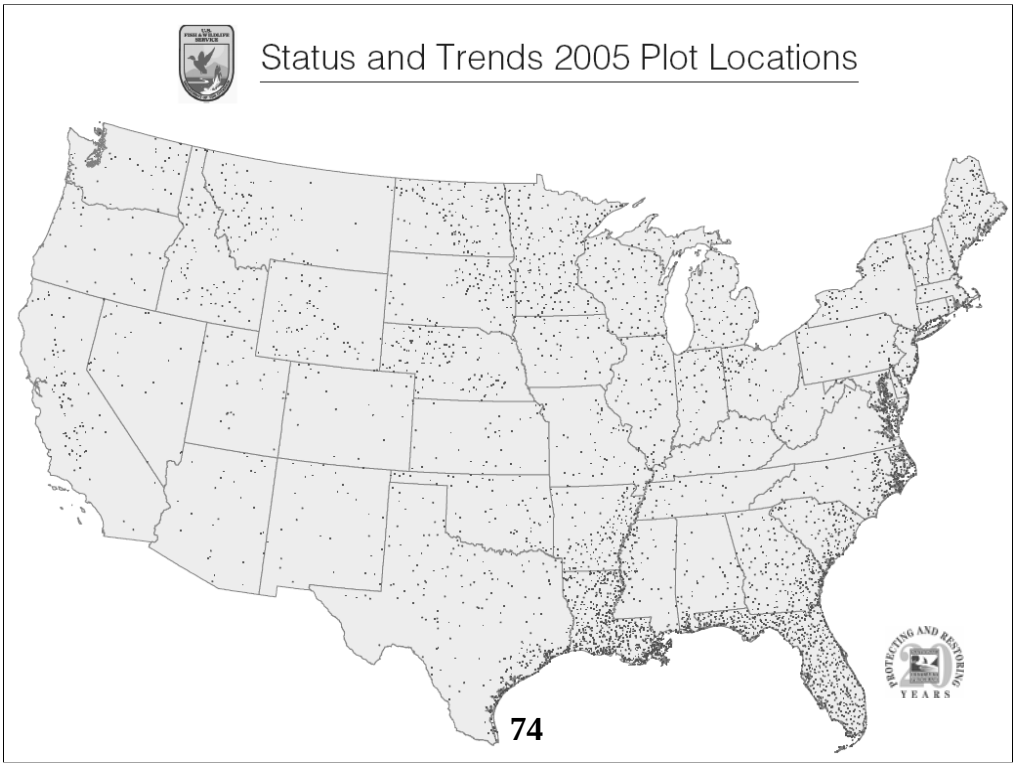
72

72

Collaboration with FWS

- FWS Status and Trends reports document trends in wetlands acreage
- NWCA will evaluate the ambient condition of the nation's wetlands resources.
- EPA will collaborate with FWS in designing NWCA
  - ensure the national condition assessment most effectively complements the Service's Wetlands Status and Trends Study.
- Together these reports will offer the most comprehensive ecological evaluation

73


Status and Trends 2005 Plot Locations
74

Gulf of Mexico Coastal Wetlands Pilot Survey

- Objectives
  - Evaluate feasibility of implementing probability survey design for wetlands on regional scale
  - Evaluate applicability of condition indicators across multiple wetland types
  - Assess condition of GoM coastal wetlands
- Partnership between EPA & USGS
  - ORD Gulf Ecology Division
  - National Wetlands Research Center

75

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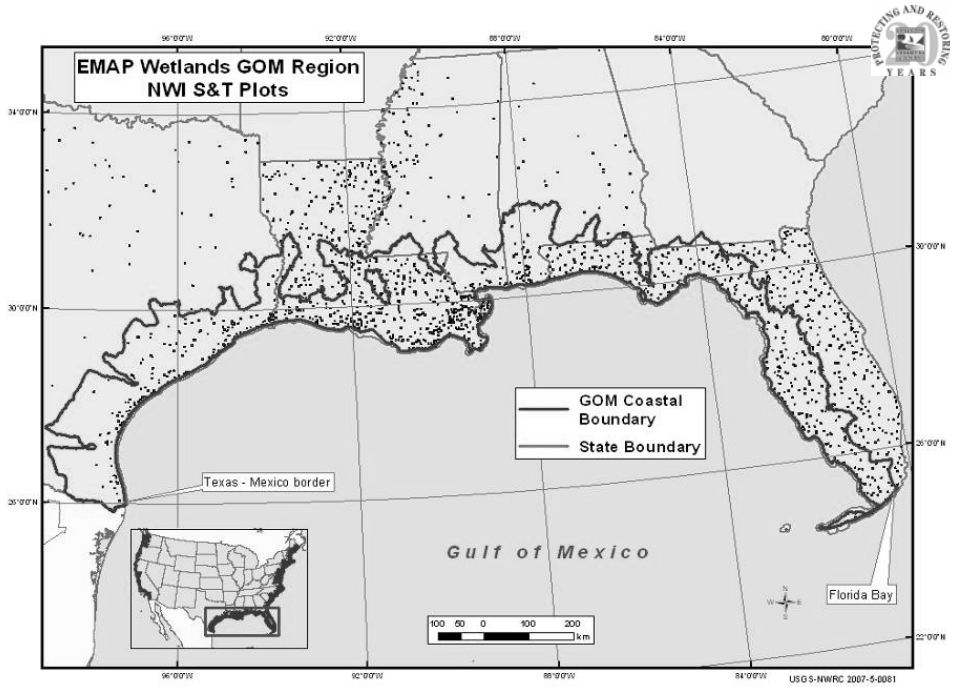
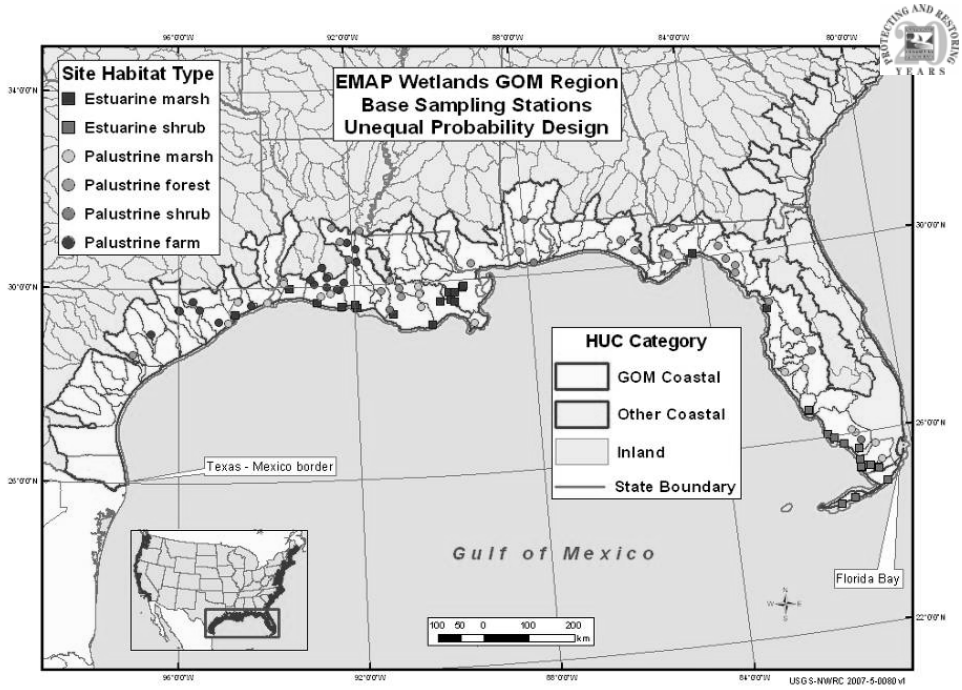
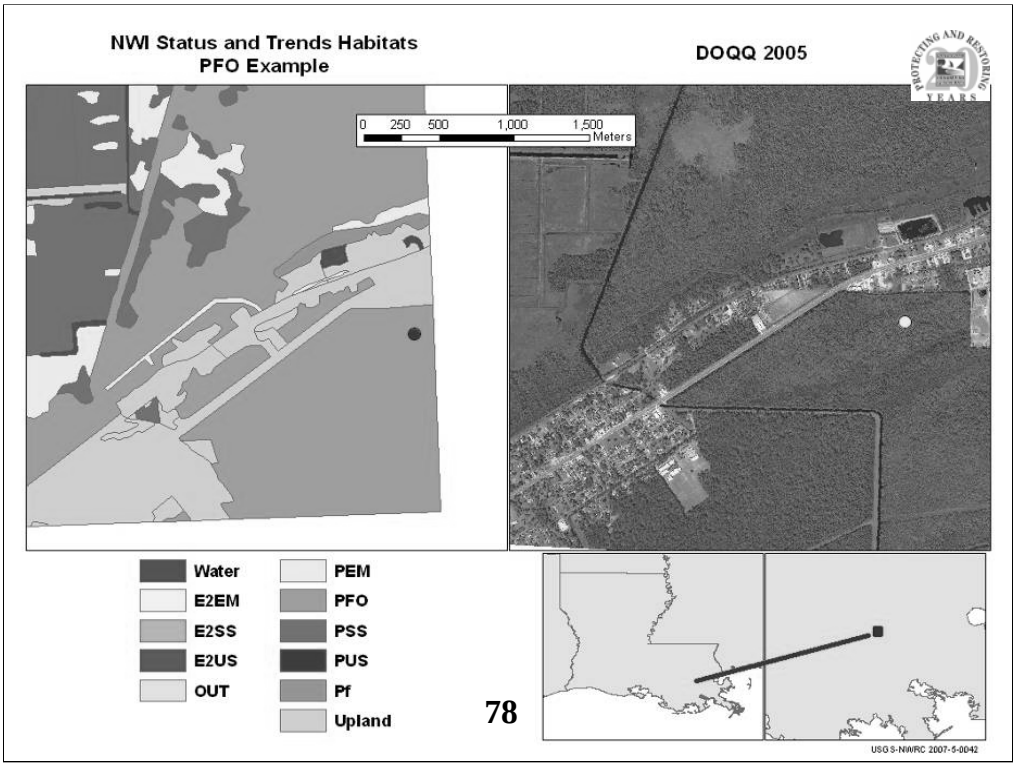
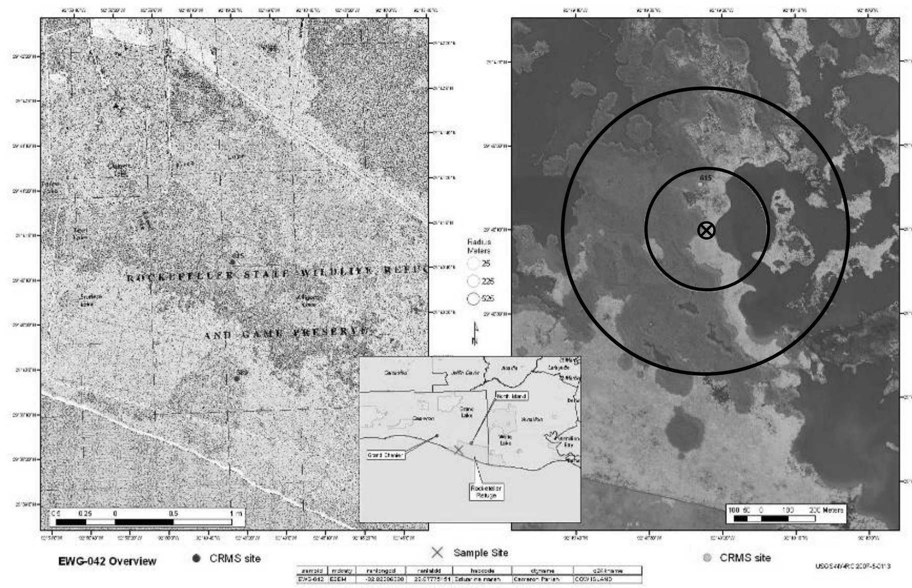

EMAP Wetlands GOM Region
NWI S&T Plots
GOM Coastal Boundary
State Boundary
Texas - Mexico border
Gulf of Mexico
Florida Bay
100 50 0 100 200
km
USGS-NWRC 2007-5-0081

76


EMAP Wetlands GOM Region
Base Sampling Stations
Unequal Probability Design
Site Habitat Type
Estuarine marsh
Estuarine shrub
Palustrine marsh
Palustrine forest
Palustrine shrub
Palustrine farm
HUC Category
GOM Coastal
Other Coastal
Inland
State Boundary
Texas - Mexico border
Gulf of Mexico
Florida Bay
100 50 0 100 200
km
USGS-NWRC 2007-5-0080 vl

77


NWI Status and Trends Habitats
PFO Example
DOQQ 2005
0 250 500 1,000 1,500
Meters
Water
E2EM
E2SS
E2US
OUT
PEM
PFO
PSS
PUS
Pf
Upland
78
USGS-NWRC 2007-5-0042


ROCKEFELLER STATE WILDLIFE REFUGE
AND GAME PRESERVE
Radius
Meters
25
225
525
Grand Chenier
Rockefeller Refuge
White Lake
Vermilion Bay
100 50 0 100 200 Meters
EWG-042 Overview
CRMS site
Sample Site
CRMS site

79

79

3-Tiered Assessment

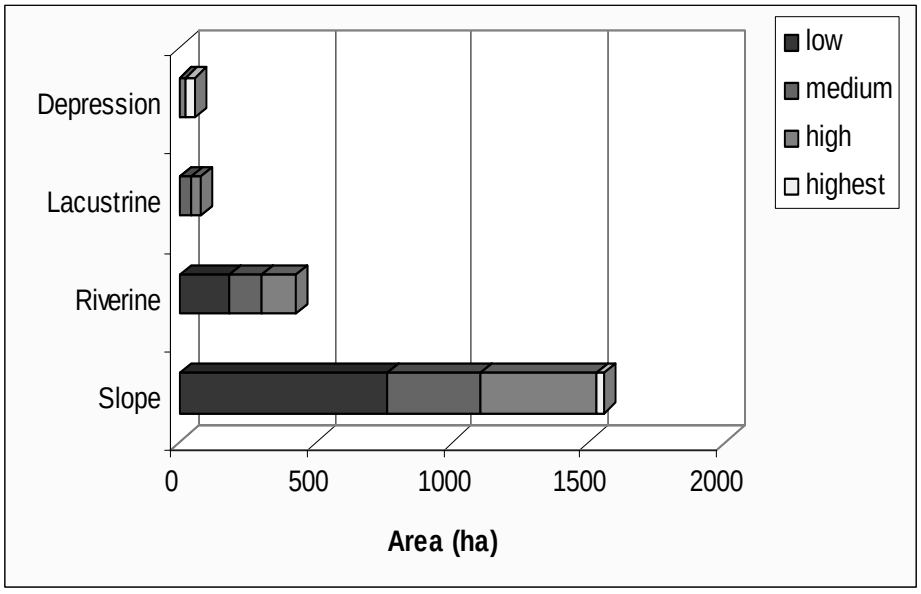
- Tier 1 – Landscape Assessment
  - GIS, remote sensing, ATtILA
  - Landscape, Stressors, Physical, & Hydrologic characteristics
- Tier 2 – Rapid Assessment
  - On-site field observations
  - Measure condition & stressors
  - Scores, metrics
- Tier 3 – Intensive Assessment
  - On-site sample collection
  - Calibrate and validate Tiers 1& 2
  - Vegetation, water, soils

Application of Elements of a State Water Monitoring and Assessment Program For Wetlands
http://www.epa.gov/owow/wetlands/monitor/#elements

80

80

Condition Profile



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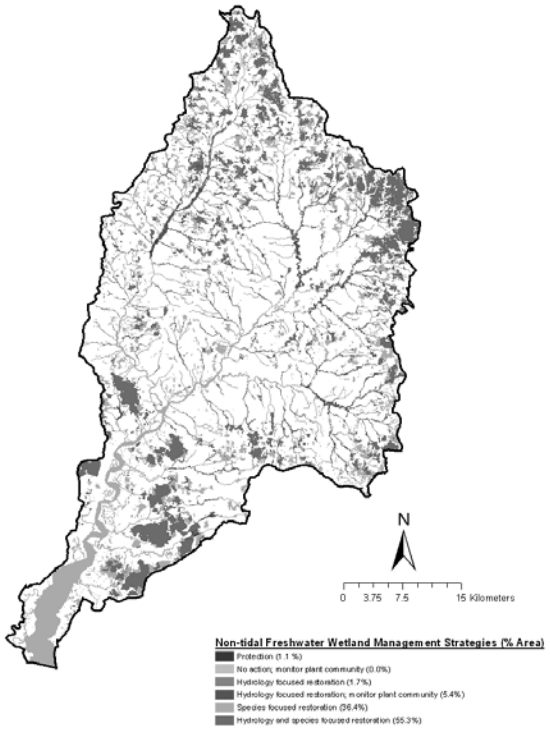
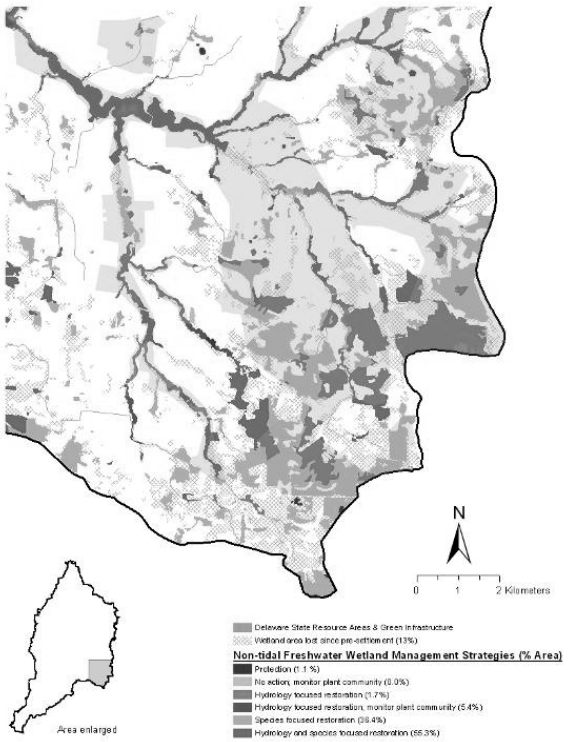


Use wetland assessment information to establish management categories for all wetlands in the watershed

82



Integrate with other conservation strategies and current land use to prioritize efforts

83

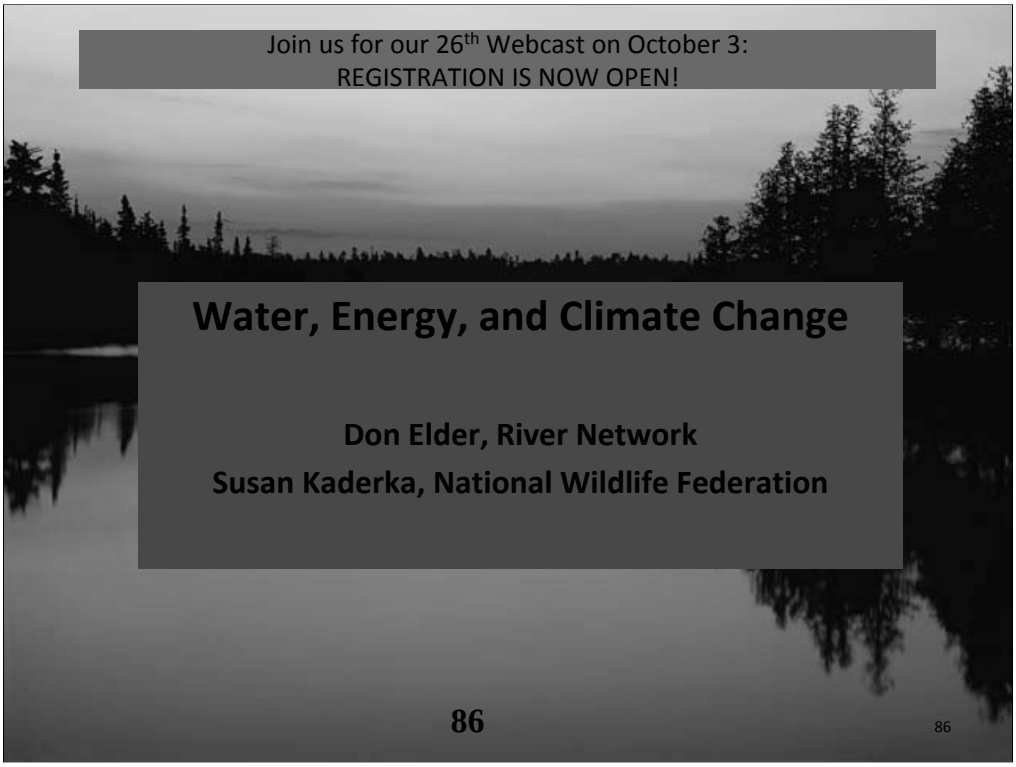
83

Additional Resources

- Wetlands Program Development Grants
  - CWA 104(b)(3) – Demonstration Projects
  - http://www.epa.gov/owow/wetlands/grantguidelines/
- *Elements of a State Water Monitoring and Assessment Program for Wetlands*
  - Development of a State or Tribal Wetlands Monitoring Strategy
  - http://www.epa.gov/owow/wetlands/pdf/Westland_Elements_Final.pd
- Wetlands Monitoring Webpage
  - http://www.epa.gov/owow/wetlands/monitor/
- National Wetlands Monitoring and Assessment Work Group (NWMAWG)
  - Webpage: Coming Soon
  - QuickPlace Site:
    - Email Elizabeth Riley (riley.elizabeth@epa.gov)

Questions?

Michael Scozzafava,
Environmental Protection Specialist, USEPA


Join us for our 26th Webcast on October 3:
REGISTRATION IS NOW OPEN!
Water, Energy, and Climate Change
Don Elder, River Network
Susan Kaderka, National Wildlife Federation
86
86

Massachusetts Coastal Zone Management
Massachusetts Bays National Estuary Program

Wetland Assessment Program

87

Program Goals

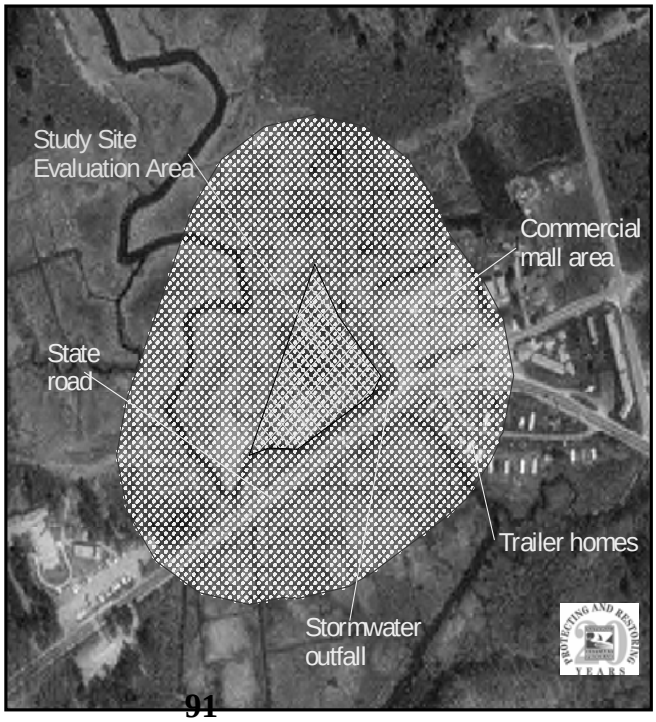
- To develop and evaluate techniques for assessing the ecological integrity of coastal wetlands
- To utilize information for management action:
  - ✓ Identifying degraded wetland sites
  - ✓ Monitoring restoration efforts
  - ✓ Inventory of wetland sites in localized area
- To transfer techniques to interested parties

89

Human Disturbance

- Accurate assessment of the “quality” of a natural system must involve the measurement of [some] biological response to human disturbance
- Human disturbance comes in all shapes and sizes:
  - toxic contamination •urbanization •fill / dumping
  - impervious surface •eutrophication •draining / ditching
  - pesticide application •stormwater •septage
- The challenge is to develop method(s) to capture these stressors in a quantitative score/output
- CZM and MBP utilize two human disturbance scales:
  - Land Use Index
  - Tidal Restriction Ratio

Land Use Index: GIS Analysis 100m Buffer



91

Key Components of Assessment Technique

- Utilize direct measurements of biology, supported by hydrology and chemistry:
  - Vegetation • Macro Invertebrates
  - Avifauna • Fish/Nekton (as of 2000)
- Relies on a comparative design approach: study sites and reference (or control) sites
- Consistent Quality Assurance Project Plan (QAPP) protocol with standardized evaluation areas
- Biological data analyzed in a multi-metric framework, generating a quantitative index score

Biological Multi-Metric Indices

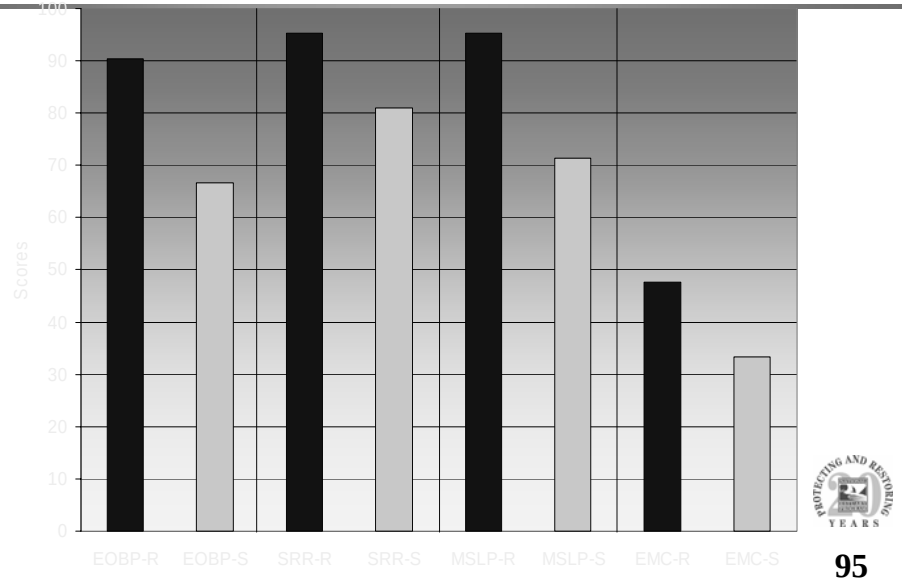
- Index is a tool utilized to integrate a number of different metrics (measurements, variables or attributes) into a single rank or score (ex: Dow Jones Industrial Average)
- Metrics might include, for example:
  - species diversity
  - community composition
  - abundance of rare or pollution-tolerant species
- Multi-metric approaches/protocols have been widely used for wadeable rivers and streams fish
- Metrics are scored based on reference site or control criteria then summed to produce final index score

93

Output: Index Scores and Use of Data

- Four biological indices:
  - Index of Vegetative Integrity > Fish&Nekton Integrity Index
  - Invertebrate Community Index > Avifauna Integrity Index
- Cumulative: Wetland Ecological Condition
- Individual and cumulative index scores can be examined in many ways:
  - compare many sites to one another: inventory
  - same site over time: track degradation
  - same site after restoration action: track restoration
  - sites versus human disturbance variables: land use and tidal restrictions

Cape Cod 2000
Tidal Restriction Investigation :
Vegetation Integrity Index Scores



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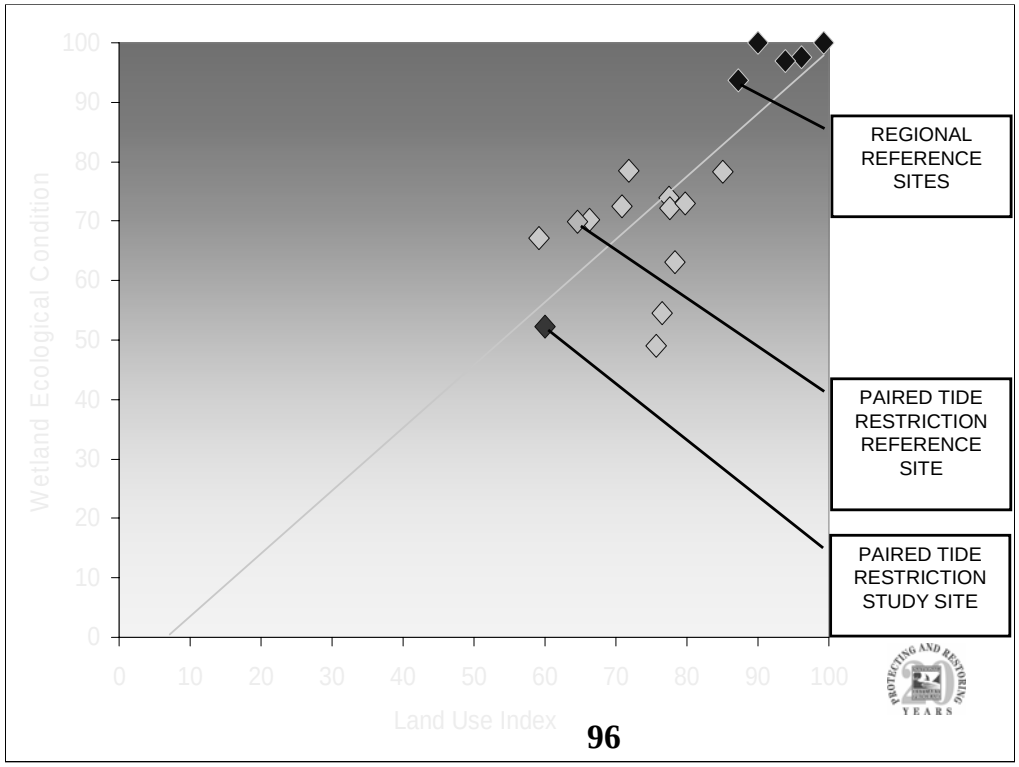
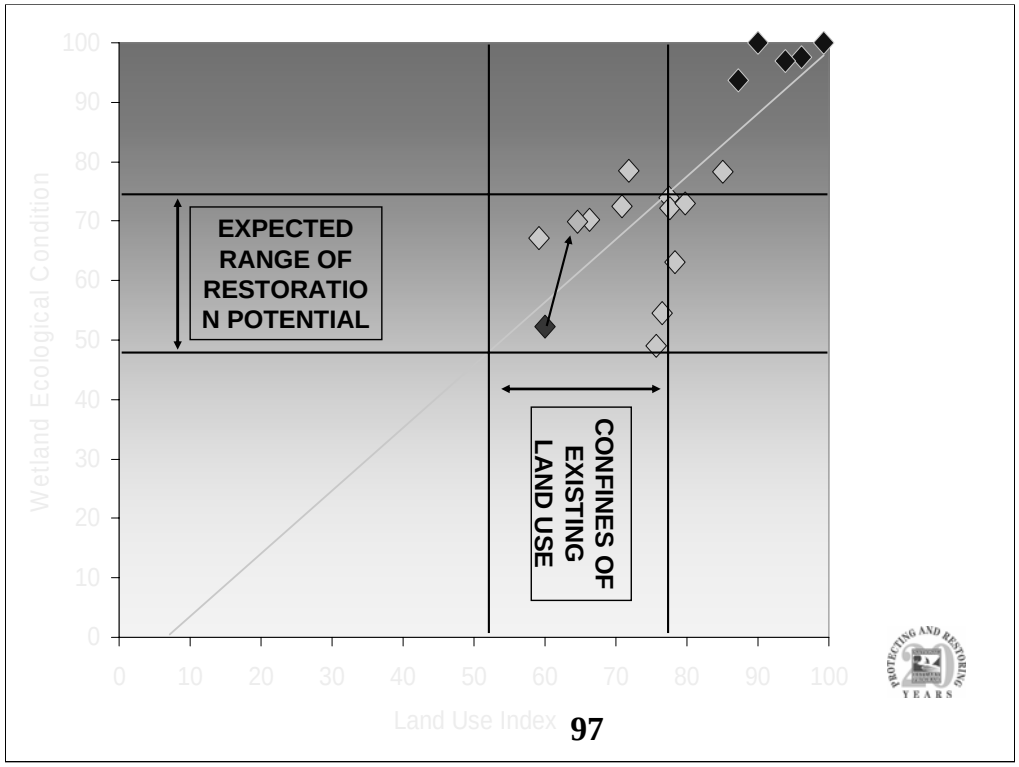

Wetland Ecological Condition
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Land Use Index
REGIONAL REFERENCE SITES
PAIRED TIDE RESTRICTION REFERENCE SITE
PAIRED TIDE RESTRICTION STUDY SITE
PROTECTING AND RESTORING
YEARS

96


EXPECTED RANGE OF RESTORATIO N POTENTIAL
CONFINES OF EXISTING LAND USE
Wetland Ecological Condition
Land Use Index
0
10
20
30
40
50
60
70
80
90
100
PROTECTING AND RESTORING
YEARS

97

NERAM Characterization Indicators

- Landscape Position
- Size
- Shape
- Exposure
- Aquatic Edge
- Connected Habitat
- Tidal Flushing

Disturbance Indicators

- Land Use in Unit Buffer
- Ditching; Draining
- Fill/Fragmentation
- Diking/Restriction
- Land Use at Survey Point
- Point Sources of Pollution
- Barriers to Landward Migration

99

Condition Indicators

- Plant Communities
- Plant Species
- Bearing Capacity
- Plant Fragments
- Invasive Plants
- Higher Trophic Levels

OPERATIONAL DRAFT: For internal use only

Rapid Method for Assessing Estuarine (Salt) Marshes in New England

Version 1.4 -- Oct 2006

Introduction

This document is an operational draft of a Rapid Method for Assessing Estuarine (Salt) Marshes in New England (version 1.4). It was developed by the authors and contributors listed in Appendix 3. The intent of this rapid assessment method is obtain sound information on selected estuarine marshes with a relatively small investment of time and effort (as compared to intensive, long-term studies). The data will serve to characterize the selected study sites (units) in terms of geomorpholoigcal properties, types and degree of stressors and disturbances, and the relative integrity of selected biotic and abiotic components of the salt marsh.

101

Examples of Disturbance Metrics

- Percent Area of Natural Condition
- % Area in Developed Land Uses
- Extent of Ditching
- Type and Extent of Stressors
- Extent of Filled and Fragmented Marsh
- Extent of Flushing

Examples of Condition Metrics

- % Salt Marsh Obligate Species
- # of Marsh Habitat Types
- % of High Marsh Species
- % of Invasive Species
- Average Area of High Marsh Habitat
- % of short form Spartina alterniflora

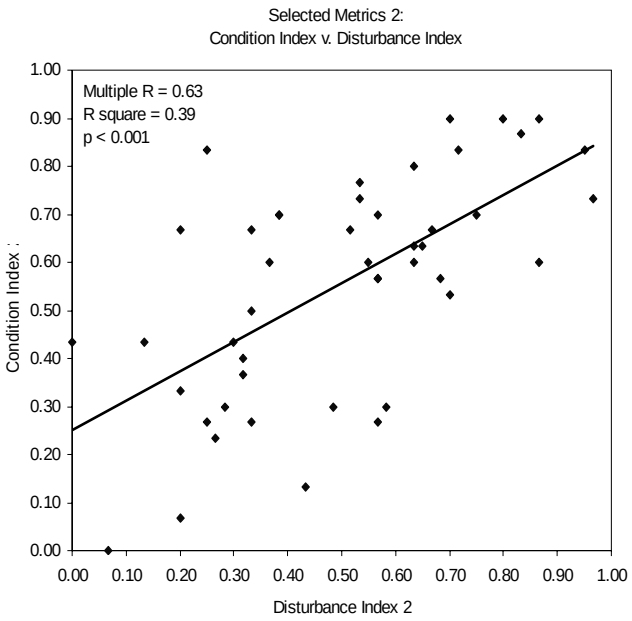


Figure 4.4. Scatter plot showing the relationship between Condition and Disturbance Indices for Selected Metrics 2.

QUESTIONS?

Kerry St Pé, Barataria-Terrebonne National Estuary

Michael Scozzafava, USEPA

Jan Smith, Massachusetts Bays Program

105

Want to Find Out More Information? Check Out Our List of Additional Resources…

http://www.cluin.org/conf/tio/owawlcr/resource.cfm

What Did You Think of the Webcast? Let Us Know by Filling Out Our Evaluation Form…

http://www.cluin.org/conf/tio/owawlcr/feedback.cfm

106

106