Economics: The Dollars & Sense of Coastal Restoration

Objectives

Students will be able to

- Research the definition of economics
- Research the use of economics in coastal restoration decisions
- Take roles of members of the CWPPRA Task Force, CWPPRA agencies, local governments, public citizens, and the media to help to learn how coastal restoration projects are chosen
- Solve the problem of how to choose which project will be selected based on criteria.
- Evaluate how the choices were made
- Analyze if the choices were made on sound economics

Overview

This two-part lesson provides students with a background in economics which leads to a role play activity helping students understand the economics of Louisiana's coastal restoration initiatives.

Materials

- Student Coastal Restoration Economics Backgrounder sheets
  —Make one set and use from year to year
- Role play cards (laminated, if possible)
  —Make one set and use from year to year
- Props for roles—students can choose a simple prop to represent their profession or occupation
- Props for CWPPRA Task Force meeting
- Flip chart, easel, markers or chalkboard

Economics

Preparation

- Run off student *"Coastal Restoration Economic Backgrounder"* and student answer sheet.
- Laminate the role play cards
- Collect props for CWPPRA Task Force meeting scene or ask students to create props.
- Familiarize yourself with *Robert's Rules of Order* for the meeting.

Procedure

This activity has two parts.

Part 1: Coastal Restoration Economics Backgrounder
Reading, Writing and Summary—This will take one class period.

Have the students read in small groups the *Coastal Restoration Economics Backgrounder*. Students will work in groups to answer the related questions on the student answer sheets as a team. Students will reconvene as a whole group and review the answers. Teacher answer key has the correct answers to share with the students.

Once the reading, writing, and summary of the economics backgrounder is complete, students will conduct the role playing activity.

Coastal Restoration Economics Is Similar to Personal Economics

What is Economics?

Do you spend money? Where does the money come from? Do you want it now or later? Can you spend it on needs or wants? How do you decide how to spend it?

These questions deal with economics or the science and math of the production of goods, services, and the welfare of humankind.

What exactly is economics? Numerous definitions exist, but simply put:

> **Economics is the study of how *limited or scarce resources* are *allocated* amongst *competing needs.***

The **"allocation"** part of this definition is based on the concept of efficiency, or the idea that limited resources should be used in an optimal manner and not wasted.

You are an economist!
Given this simple definition, anyone who has ever tried to get the most out of something —their money, time, labor, or any other "resource" at their disposal—is acting as an "economist."

What is the Role of Economics in Restoration?

How should limited funding be allocated to restore coastal Louisiana? What are the challenges in measuring ecosystem restoration benefits and prioritizing projects? Who gets to decide what projects should be funded? How can location, risk, sustainability, time, and discounting influence project selection?

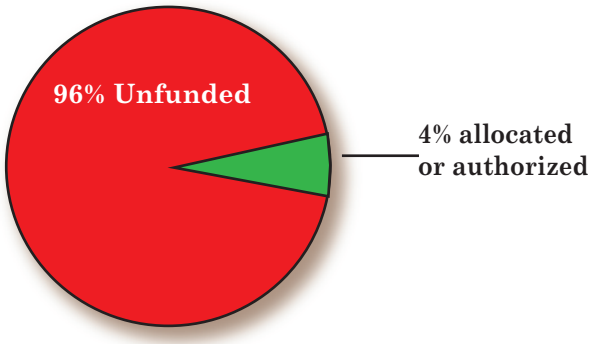
activity

Coastal Restoration Economics Backgrounder—CONT'D.

How does economics apply to coastal restoration?

When it comes to coastal restoration, project funding is perhaps our most "limited" resource. The current 2012 State of Louisiana Coastal "Master Plan" estimates a need of $100 BILLION.

Use the graph below to determine how much of the $100 billion do we have?



Currently, allocated and authorized restoration funding is only ~ 4% of what would be needed to hold on to our remaining coastal land. At an estimated cost of **$10 billion**, 96% of the needed funds for coastal restoration have yet to be secured. This scarcity of available funding creates a tremendous economics challenge—ensuring we get the most out of our limited restoration dollars.

As Future Voters You Need To Be Aware of "Decision-Making 101"

So, if our Louisiana restoration needs greatly exceed our current budget, how do we select projects (allocate limited dollars) in the most optimal way?

At a minimum, we should try to allocate funding towards projects whose benefits are greater than their costs. Mathematically speaking, we refer to this as a ***"benefit-to-cost ratio"***, which ideally should be greater than or equal to one.

$$\text{B:C Ratio} = \frac{\text{Project Benefits (\$)}}{\text{Project Costs (\$)}} \geq 1.0$$

This ratio approach sounds simple, but it's a difficult challenge when it comes to ecosystem restoration because it requires standardizing the way costs and benefits are measured across of a wide range of projects. It also requires some level of consensus on the relative importance of individual performance measures.

activity

Coastal Restoration Economics Backgrounder—CONT'D.

How do we measure costs and benefits?

Projects Costs are usually easier to calculate than benefits, and are almost always expressed using a standard unit of measurement: dollars.

What Does A Coastal Restoration Project Cost?

Coastal restoration projects can be very expensive, with some requiring several hundred million dollars to implement depending on size and location. **Regardless of scale, costs for most projects are usually divided into three parts.** Roughly 10% of project costs go towards planning and design, 85% towards construction, and about 10% is budgeted for monitoring and maintenance over the project life time—usually a 20-year or 50-year horizon.

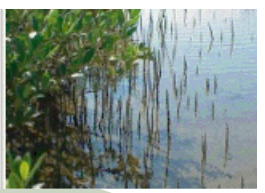
Project Benefits are more difficult to standardize because most of the benefits we seek from coastal restoration are not traded in financial markets.

Habitat units—The first major restoration program in Louisiana was the Coastal Wetland Planning, Protection, and Restoration Act (CWPPRA). The CWPPRA program developed a sophisticated method for standardizing these ecosystem services into common "habitat units."

> For this program, "cost-efficacy" analysis is the way in which economic efficiency is pursued. Under this non-monetary approach to benefit estimation, various types of restoration projects can be compared by the costs incurred with delivery of a common habitat unit.

$$\text{Cost-efficacy} = \frac{\text{Costs (\$)}}{\text{Habitat Units (\$)}}$$





What is a brown pelican worth?

What is the storm protection value of a barrier island?

How much would you pay for a unit of fish habitat?

activity

Coastal Restoration Economics Backgrounder—CONT'D.

Ecosystem Valuation—More recently, restoration managers have looked to environmental economists to develop actual dollar values for ecosystem services. Through the use of stated and revealed preference methods, economists can develop "non-market" estimates of the annual service values derived from coastal wetland ecosystems. Non-market services may include the fact that wetlands clean water or act as water purifiers. Wetlands also support rich biodiversity of plants and animals. The habitats help in flood water storage or flood abatements. They help in carbon sequestration and act as sediment traps. All of these services at this point still have non-market values.

Regardless of the method, all benefit standardization and valuation estimates should be context-specific and based on objective, science-based methodology.

Whose Benefits Are We Really After?

An additional difficulty of standardizing project benefits involves reconciling the competing needs and interests of different stakeholders. Because preferences for ecosystem services vary, coastal policy is highly dependent on who is at the table when priorities are set.

To be effective, restoration programs should involve a diverse, balanced range of stakeholders. To the extent possible, the prioritization process should be open and transparent to the public. This democratic process is especially important for when programs attempt to identify and weight benefit metrics and indices as a substitute for financial estimates of project benefits.

activity

Coastal Restoration Economics Backgrounder—CONT'D.

Comparing Alternatives

What are the different types of coastal restoration projects?

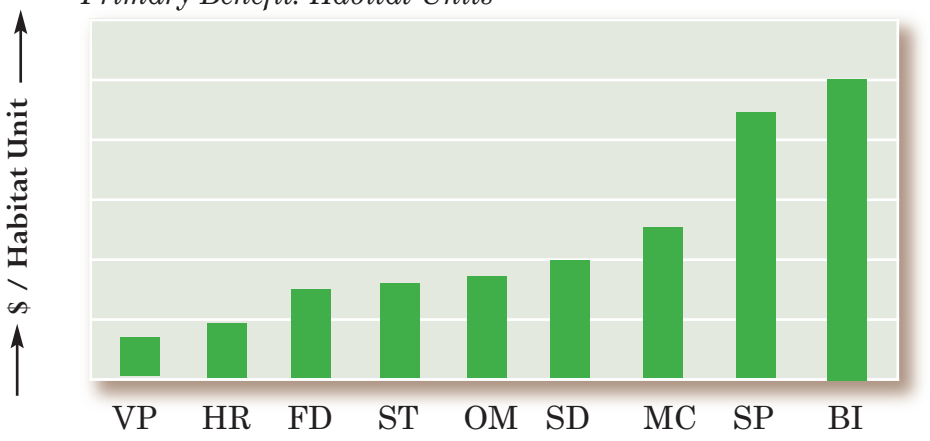
(VP) Vegetative Planting	(HR) Hydrologic Restoration	(SP) Shoreline Protection
(MC) Marsh Creation	(FD) Freshwater Diversion	(SD) Sediment Diversion
(OM) Outfall Management	(ST) Sediment Trapping	(BI) Barrier Island

So how do the costs of these different project types compare to each other, and which project type is the most efficient?

To allocate restoration dollars efficiently, we must first identify what benefits are being targeted. Below are two conceptual examples of how the efficiency rankings of the 9 project types listed above can vary depending on how benefits are defined.

Restoring Wildlife Habitat

Primary Benefit: Habitat Units



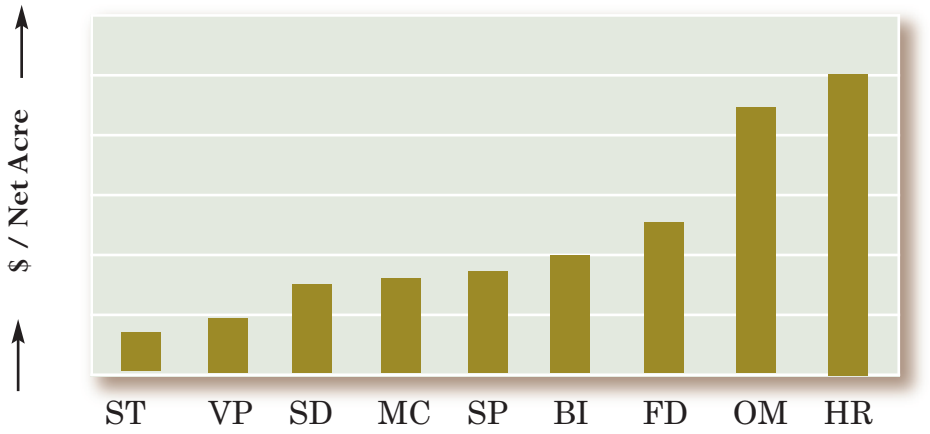
In the figure above, the 9 coastal restoration project types are ranked from lowest to highest costs based on their cost-efficiency in delivering a standard unit of habitat for each restoration dollar spent. In this example, vegetative planting (VP) is the most efficient (lowest cost per unit) and barrier islands (BI) are the least efficient (highest cost per unit).

activity

Coastal Restoration Economics Backgrounder—CONT'D.

Restoring Coastal Land

Primary Benefit: Net Acres



In the figure above, the project types are ranked from lowest to highest costs based on their cost-efficiency in delivering net acres for each restoration dollar spent. In this example, sediment trapping (ST) is the most efficient (lowest cost per unit) and hydrologic restoration (HR) is the least efficient (highest cost per unit).

Additional Restoration Considerations

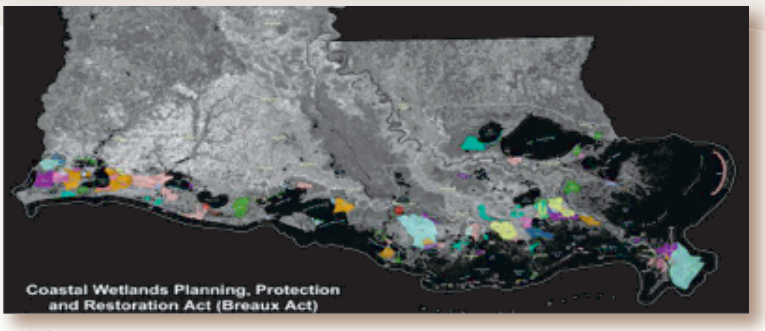
Okay... so once we decide on a way to standardize benefits (based on sound science and balanced public input) we then simply allocate available funds to the projects that are the most cost-efficient, right?

Once again, it's not that simple. There are ***at least 4 additional factors that come into play when prioritizing funding for coastal restoration projects:***

Location is always a principle consideration of any type of project. If you look at a map of wetland restoration projects in coastal Louisiana, you will see many different types of methods. The reason for this variation is that our coastal zone contains numerous sub-regions, each with its own diverse geographic characteristics. Some of these regions can only be restored using specific types of coastal restoration.

activity

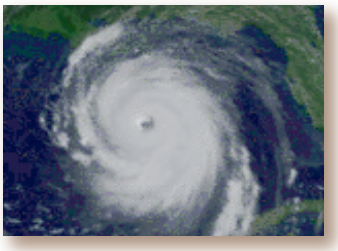
Coastal Restoration Economics Backgrounder—CONT'D..



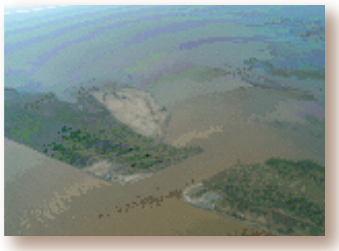
For example, sediment trapping (ST) is a relatively low cost method of building small amounts of coastal land, but it is only well-suited for the southwestern region of the coast. Only in this sub-region are the underlying mineral sediments strong enough to support the heavy weight of ST terraces constructed in coastal lakes and bays.

Barrier island (BI) restoration, though very expensive from both a habitat and land-building perspective, is also by definition very location-specific. Given their unique geology, BI projects require a combination of sand mining and vegetative planting for the purposes of beach nourishment and dune stabilization.

Risk is another vital consideration, and one highly related to project location.



Environmental Risk



Economic Risk

Social Risk

Environmental risk to coastal restoration projects includes threats related to ongoing coastal erosion, subsidence, sea level rise, tropical storms and hurricanes. The vulnerability of coastal restoration to these factors is dependent on a project's type, location, scale, and degree of completion.

Economic risks to coastal restoration primarily pertain to continuation of support funding. Over time, program dollars can diminish or be eliminated altogether. Moreover, individual projects could become too expensive to maintain once constructed. For example, the West Bay Sediment Diversion was recently de-authorized due to unexpectedly high dredging costs associated with channel shoaling linked to the project.

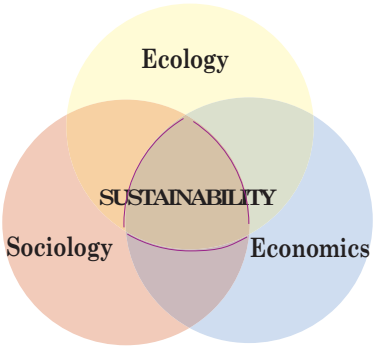
activity

Coastal Restoration Economics Backgrounder—CONT'D.

Social opposition can pose an even greater risk to coastal restoration than environmental and economic risk combined. Social risk pertains to the potential for stakeholders or communities to block a project's construction or to severely limit its use. Such opposition is typically due to perceived or actual threats to private commercial interests that might result from project implementation.

Sustainability is factor increasingly cited by coastal managers as a criterion of major importance for project selection. Unfortunately, application of the term is often limited to simply a description of a project's resiliency to environmental risk. Given this narrow interpretation, projects with self-renewing features like sediment accretion are automatically and incorrectly described as having relatively higher levels of "sustainability."

In reality, sustainability is a three-tiered concept that involves not only environmental factors, but economic and social considerations as well.



For example, a large-scale sediment diversion might offer the potential for long-term land building through alluvial processes. However, the project may prove unsustainable due to socioeconomic constraints. Examples of such constraints might include concerns from coastal communities over project-based flooding or opposition from fishermen concerned about salinity-based displacement of traditional harvest areas. Thus, application of "sustainability" as a project selection criterion requires simultaneous consideration of ecological integrity, economic prosperity, and social viability.

Time is perhaps the most important economic criteria of all—and one that is often overlooked when it comes to project comparisons.

activity

Coastal Restoration Economics Backgrounder—CONT'D.

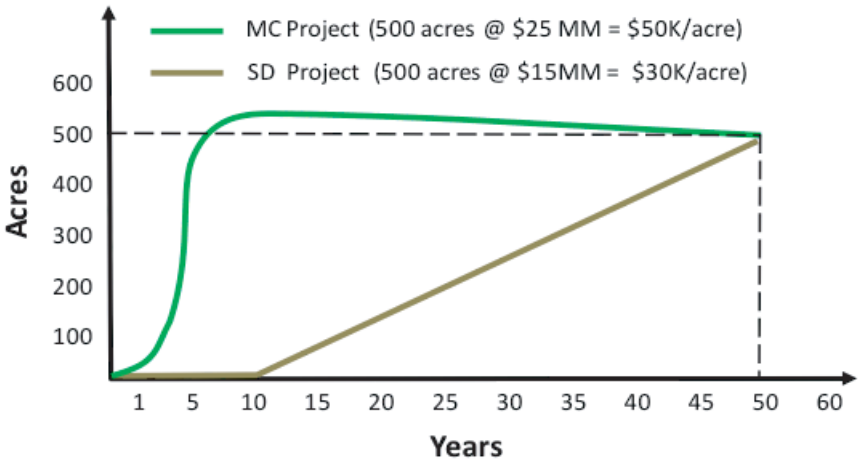
Would you rather I give you a dollar today? ...Or would you prefer that I give you that same dollar 50 years from now?

This simple question is often used by economists to demonstrate the fact that most individuals prefer benefits sooner, rather than later. In short, time matters. Given the prospects of economic, environmental, and social risk, the certainty of a unit of restoration in the present day is usually preferred over the uncertainty of that same unit of promised in the future.

What does the *"restoration trajectory"* look like?

The way that ecosystem benefits accrue over time can be referred to as the restoration trajectory. The shape of this *benefits time-line* can be used to compare the ecosystem service provisions (e.g. surge protection, habitat provision, etc.) provided by different project alternatives at a given location.

Comparing Acreage Endpoints

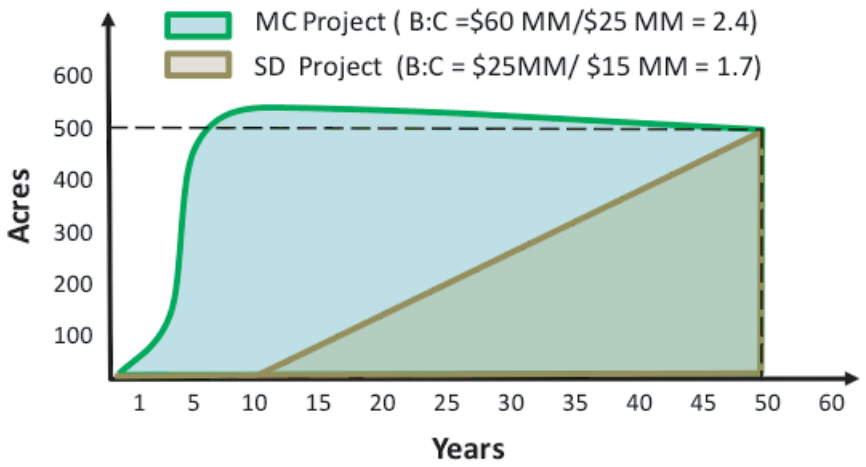


Consider the sample restoration trajectories for marsh creation (MC) and sediment diversion (SD) in the graphic above. Each of these projects converges on a common level of 500 net acres of coastal land in 50 years. If we consider final costs and acreages only, the SD project is the apparent better deal, with a cost of $30K/acre compared to $50K/acre for the MC project.

activity

Coastal Restoration Economics Backgrounder—CONT'D.

Comparing Ecosystem Service Flows



A different conclusion emerges; however, when we consider the flow of ecosystem services over time. In the graphic above, the shaded area under each trajectory represents the aggregate ecosystem services (non-market values) accruing from restored wetlands for the two alternative project types.

Due to a more rapid rate of restoration, the total ecosystem benefits accrued by the MC project ($60 MM) are more than twice the ecosystem benefits accrued by the SD project ($25 MM). From the perspective of ecosystem services provisioning over the 50 year project life time, the MC project outperforms the SD project (B:C=2.4 vs. B:C= 1.7).

activity

Coastal Restoration Economics Backgrounder—CONT'D.

Discounting is a method by which the future value of ecosystem benefits and costs can be expressed in current day terms. As applied in the example above, the aggregate flow of ecosystem services over 50 years is expressed in terms of present day dollars for both the MC and SD projects. The net sum of these benefits and costs over time is incorporated into the B:C ratio as:

$$\text{B:C Ratio} = \frac{\text{Project Benefits (\$)}}{\text{Project Costs (\$)}} = \frac{\sum_{t=1}^{T} \frac{B_t}{(1+R)^t}}{\sum_{t=1}^{T} \frac{C_t}{(1+R)^t}} \geq 1.0$$

Here *Bt* is the ecosystem benefits accruing in year *t* during the time period *T*, and *Ct* is the ecosystem restoration costs accruing in year *t* during the time period *T*. Finally, *R* is a risk-adjusted discount rate that ranges from 0-15% according to the environmental, economic, and social uncertainties of a given project.

Generally speaking, zero or low discount rates tend to favor the feasibility of slower-performing projects like sediment diversions. Higher discount rates tend to favor the feasibility of more aggressive restoration, such as that seen with pipeline-based marsh creation.

As a result, the appropriate use of environmental benefit-cost analysis (and the choice of discount rates in particular) is the subject of considerable debate both within and outside the ecosystem restoration community.

activity

Coastal Restoration Economics Backgrounder—CONT'D.

Bringing It All Together

So how does it all fit together and how can economics be used to improve coastal restoration spending in Louisiana?

In the past 25 years, coastal restoration in Louisiana has evolved from a state and federal program (CWPPRA) spending $30-$50 million annually to a 2012 state master plan calling for more than $50 billion worth of restoration projects to protect and sustain our rapidly eroding coast.

Economics in early restoration programs was predicated on a cost-efficacy approach. Recent advances in "non-market" valuation allow for the use of financially based benefit-cost models for the purpose of project comparison.

Though some scientists and advocates shun the use of economic criteria for examining coastal restoration, there is no escaping the reality that restoration needs far outweigh available funding. Thus, there will always be a need to compare benefits to costs—whether formally or informally—to maximize the return on limited restoration funding.

activity

Student Summary and Review of Coastal Restoration Backgrounder

1. Define economics:

2. Explain how you are an economist in your everyday life. Give 2 examples.

3. Mathematically explain the "benefit-to-cost" as a ratio or an equation.

4. What are the three basic parts of the cost of a restoration project?

activity

Student Summary and Review of Coastal Restoration Backgrounder—CONT'D.

5. How are project benefits calculated under the CWPPRA program?

6. Name things that are hard to quantify when you are discussing benefits of restoration.

7. What are ecosystem services that currently don't have a "market" value?

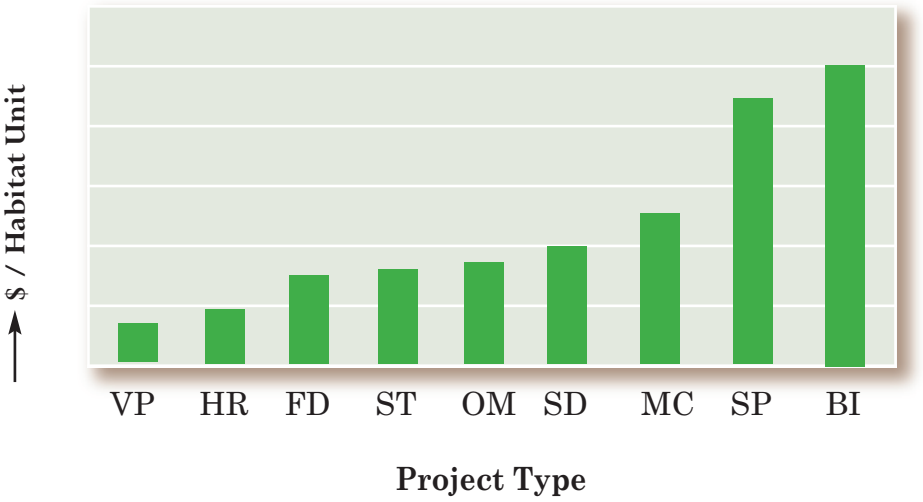
activity

Student Summary and Review of Coastal Restoration Backgrounder—CONT'D.

Using the graphs below, answer the following questions.

VP—Vegetative Planting	HR—Hydrologic Restoration	FD—Freshwater Diversion
ST—Sediment Trapping	OM—Outfall Management	SD—Sediment/Water Diversion
MC—Marsh Creation	SP—Shoreline Protection	BI—Barrier Island Restoration

Graph of Cost Efficiency Using Standard Habitat Units



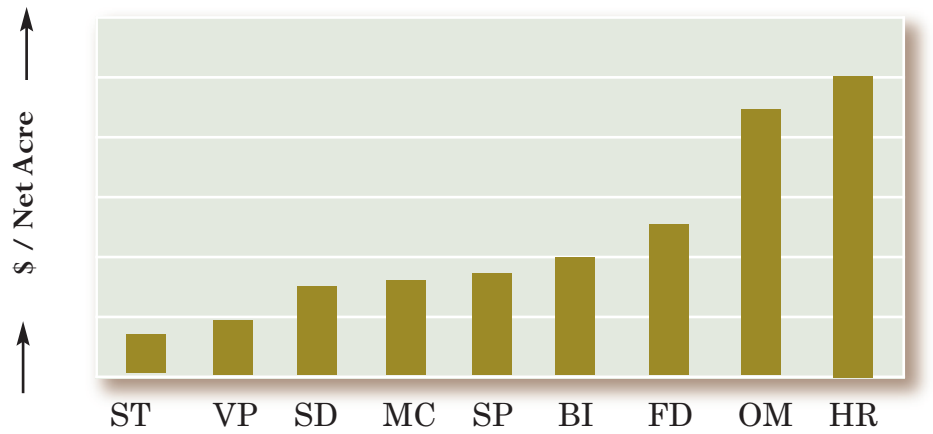
8. Which project costs the most to build per habitat unit?

   Which project costs the least?

activity

Student Summary and Review of Coastal Restoration Backgrounder—CONT'D.

Graph of Cost Efficiency Based on Cost per Net Acre Created



Project Type

9. Which project cost the most to build per net acre?

   Which projects costs the least per net acre?

10. Name 4 additional factors that come into play when deciding the efficiency of a coastal restoration project.

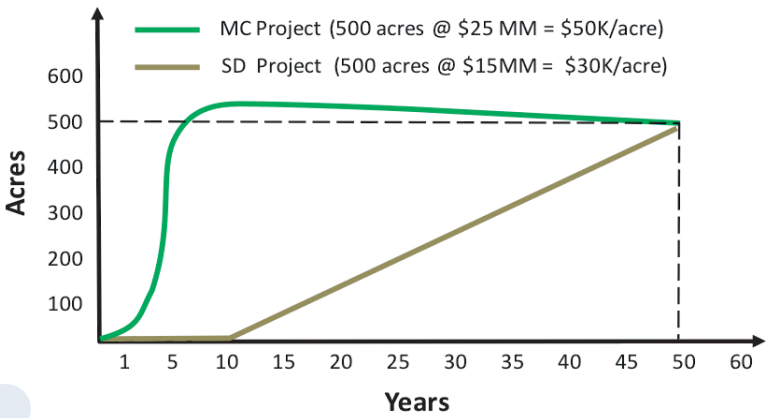
11. What is a "restoration trajectory?"

activity

Student Summary and Review of Coastal Restoration Backgrounder—CONT'D.

Graph Comparing Marsh Creation and Sediment Diversion Projects Over Time

MC—Marsh Creation
SD—Sediment/Water Diversion



12. How many acres of land are created in 5 years using Marsh Creation?

13. How many acres of land are created in 5 years using Sediment/Water Diversion?

14. How many acres of land are created in 10 years using Marsh Creation?

15. How many acres of land are created in 10 years using Sediment/Water Diversion?

16. How many acres of land are created in 30 years using Marsh Creation?

17. How many acres of land are created in 30 years using Sediment/Water Diversion?

18. How many acres of land are created in 50 years using Marsh Creation?

19. How many acres of land are created in 50 years using Sediment/Water Diversion?

20. Using the graph above, explain the cost of each type of project.

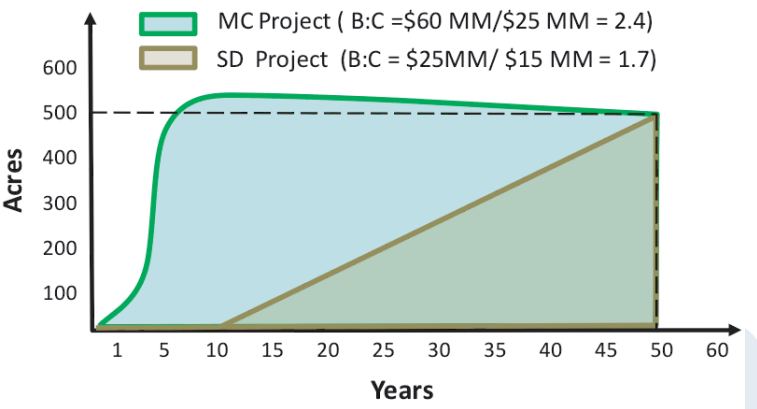
activity

Student Summary and Review of Coastal Restoration Backgrounder—CONT'D.

21. Name 4 events or activities that could cause the project to be derailed between 0 & 50 years?

Comparing Ecosystem Service Flow

MC—Marsh Creation
SD—Sediment/Water Diversion



22. How do the ecosystem service benefits compare when looking at marsh creation projects verses sediment/water diversions?

23. What is discounting?

24. Evaluate how sound economics can be used to improve coastal restoration spending in Louisiana?

Economics

Teacher Answer Key

1. Define economics:

Economics is the study of how limited or scarce resources are allocated amongst competing needs.

2. Explain how you are an economist in your everyday life. Give 2 examples.

Student answers will vary. Examples may include purchasing jeans that cost less but last longer than other brands; purchasing food items that are on sale due to being "in season" or going to a student car wash instead of an expensive chain car wash.

3. Mathematically explain the "benefit-to-cost" as a ratio or an equation.

$$\text{B:C Ratio} = \frac{\text{Project Benefits (\$)}}{\text{Project Costs (\$)}} \geq 1.0$$

4. What are the three basic parts of the cost of a restoration project?

Roughly 10% of project costs go towards planning and design, 85% towards construction, and about 10% is budgeted for monitoring and maintenance over the project life time—usually a 20-year or 50-year horizon.

Teacher Answer Key—CONT'D.

5. How are project benefits calculated under the CWPPRA program?

For this program, "cost-efficacy" analysis is the way in which economic efficiency is pursued. Under this non-monetary approach to benefit estimation, various types of restoration projects can be compared by the costs incurred with delivery of a common habitat unit.

$$\text{Cost-efficacy} = \frac{\text{Costs (\$)}}{\text{Habitat Units (\$)}}$$

6. Name things that are hard to quantify when you are discussing benefits of restoration. Student answers may vary. Below is a list of possible answers.

What is a brown pelican worth?
What is the storm protection value of a barrier island?
How much would you pay for a unit of fish habitat?

7. What are ecosystem services that currently don't have a "market" value?

Non-market services may include the fact that wetlands clean water or act as water purifiers. Wetlands also support rich biodiversity of plants and animals. The habitats help in flood water storage or flood abatements and reduce storm surge. They help in carbon sequestration and act as sediment traps. All of these services at this point still have non-market values.

Teacher Answer Key—CONT'D.

Using the graphs below, answer the following questions.

VP—Vegetative Planting
ST—Sediment Trapping
MC—Marsh Creation
HR—Hydrologic Restoration
OM—Outfall Management
SP—Shoreline Protection
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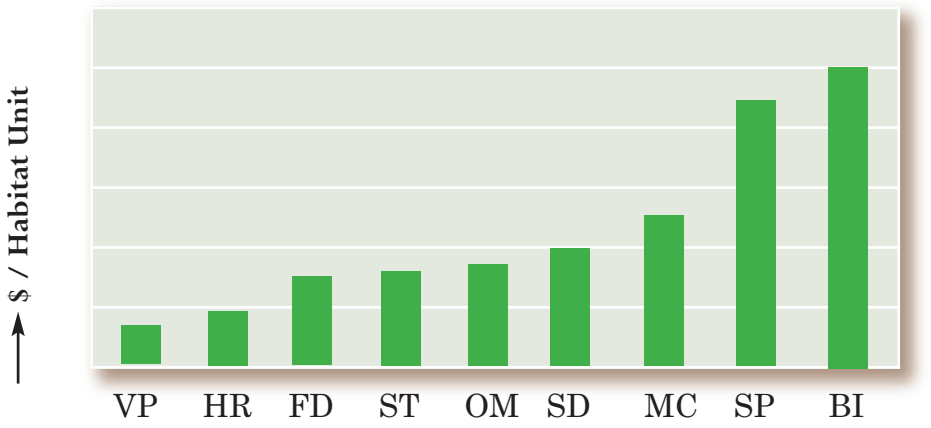
BI—Barrier Island Restoration

Graph of Cost Efficiency Using Standard Habitat Units



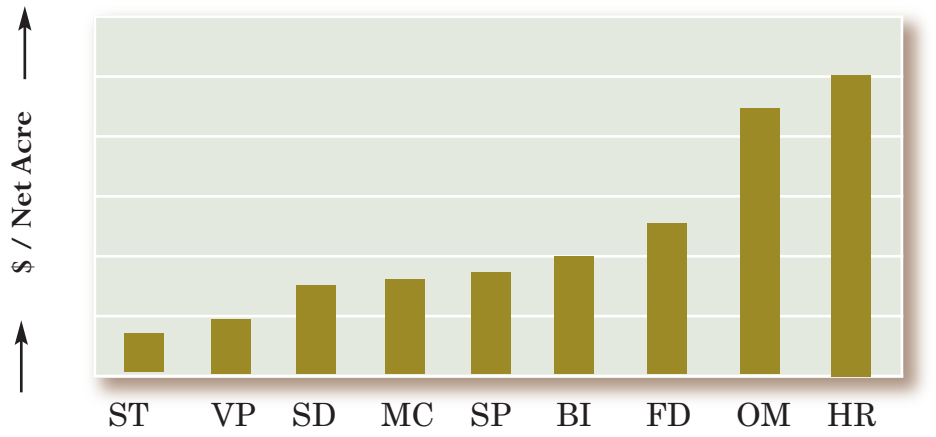
Project Type

8. Which project costs the most to build per habitat unit? Barrier Island Restoration

Which project costs the least? Vegetative Planting

Teacher Answer Key—CONT'D.

Graph of Cost Efficiency Based on Cost per Net Acre Created



9. Which project cost the most to build per net acre? Hydrologic Restoration

   Which projects costs the least per net acre? Sediment Trapping

10. Name 4 additional factors that come into play when deciding the efficiency of a coastal restoration project.

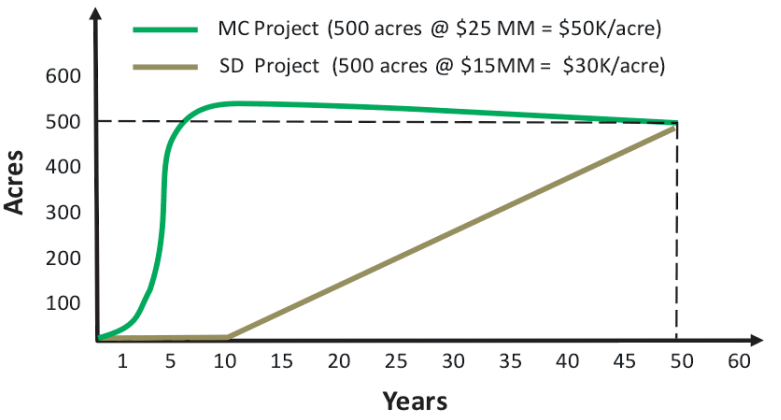
    Location, risk, sustainability, and time are four additional factors.

11. What is a "restoration trajectory?"

    The way that that ecosystem benefits accrue over time can be referred to as the restoration trajectory. The shape of this benefits time-line can be used to compare the ecosystem service provisions (e.g. surge protection, habitat provision, etc.) provided by different project alternatives at a given location.

Teacher Answer Key—CONT'D.

Graph Comparing Marsh Creation and Sediment Diversion Projects Over Time



MC—Marsh Creation
SD—Sediment/Water Diversion

12. How many acres of land are created in 5 years using Marsh Creation? about 400 acres

13. How many acres of land are created in 5 years using Sediment/Water Diversion? 0 acres

14. How many acres of land are created in 10 years using Marsh Creation? about 525 acres

15. How many acres of land are created in 10 years using Sediment/Water Diversion? 0 acres

16. How many acres of land are created in 30 years using Marsh Creation? about 510 acres

17. How many acres of land are created in 30 years using Sediment/Water Diversion? about 250 acres

18. How many acres of land are created in 50 years using Marsh Creation? about 500 acres

19. How many acres of land are created in 50 years using Sediment/Water Diversion? about 500 acres

20. Using the graph above, explain the cost of each type of project.

Each of these projects converges on a common level of 500 net acres of coastal land in 50 years. If we consider final costs and acreages only, the SD project is the apparent better deal, with a cost of $30K/acre compared to $50K/acre for the MC project. However, ecosystem services over time should also be taken into account. Due to a more rapid rate of restoration, the total ecosystem benefits accrued by the MC project ($60 MM) are more than twice the ecosystem benefits accrued by the SD project ($25 MM). From the perspective ecosystem services provisioning over the 50 year project life time, the MC project outperforms the SD project (B:C=2.4 vs. B:C= 1.7

Teacher Answer Key—CONT'D.

21. Name 4 events or activities that could cause the project to be derailed between 0 & 50 years?

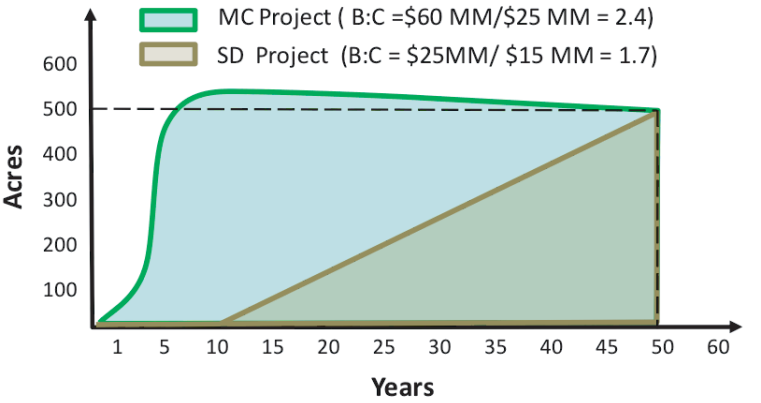
Student answers will vary. Consider these ideas:

Public use of wetlands may change
Funding changes
Public perception of the value of wetlands may change
Political changes

Hurricanes may change the landscape dramatically as in the storms of 2005. Hurricanes are one of the most common natural drivers of coastal disturbance and widespread morphological change.

Comparing Ecosystem Service Flow

MC—Marsh Creation
SD—Sediment/Water Diversion



22. How do the ecosystem service benefits compare when looking at marsh creation projects verses sediment/water diversions?

Due to a more rapid rate of restoration, the total ecosystem benefits accrued by the MC project ($60 MM) are more than twice the ecosystem benefits accrued by the SD project ($25 MM). From the perspective ecosystem services provisioning over the 50 year project life time, the MC project outperforms the SD project (B:C=2.4 vs. B:C= 1.7)

23. What is discounting?

Discounting is a method by which the future value of ecosystem benefits and costs can be expressed in current day terms

24. Evaluate how sound economics can be used to improve coastal restoration spending in Louisiana?

Student answers will vary.

Economics

Part 2: The CWPPRA Task Force Meeting—Coastal Restoration Economics Decisions

Role Play—This will take two 50 minute class periods

In the first part each student receives a role card describing the position of a community member who will participate in a Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA pronounced quip'-ruh) public meeting. After preparing their statements, the students will prepare props to role play a public meeting at which they try to get their coastal restoration project picked for funding and eventual construction.

Economics

Role Play—CONT'D.

In the next phase of the activity, the students assume the roles. The meeting will unfold as follows:

- The CWPPRA Task Force meeting is called to order by the CWPPRA Chairman.
- Each of the CWPPRA Task Force members introduces themselves.
- The Chairman explains that the agenda for today will identify various coastal restoration projects that will be brought before the Task Force and then voted on for funding. The Chairman notes that after each agenda item the public will be allowed to comment.
- The agenda is followed. Members of the local governments and concerned citizens are allowed to speak. At the end of the meeting projects totaling no more than $79 million dollars are chosen.

In the last phase of the activity, a group from the "media" writes local articles for the paper, TV and radio.

At the completion of the activity students will be asked to write an essay about how projects were chosen, how the public had an effect on the choices and if the choices were made with sound economics in mind.

This activity plays out differently with each group of students. The important lesson is that students understand that the economics of restoration are an important factor in choosing restoration.

Procedure for Task Force Role Play

The Task Force Meeting

1. Read the introductory paragraphs (below) to the students. Embellish the story and explain the situation in any way you wish to help your students grasp the central dilemma.

> "Students, you are about to enter the world of coastal restoration by taking on alternate personalities. You are each going to be a member of the community that has a vested interest in coastal restoration.
>
> The real problem is, of course, economics. Louisiana restoration needs greatly exceed our current budget. The goal today is encourage the CWPPRA Task Force to select the best projects with limited funds. What stands before you will be a list of projects totaling $162.7 million dollars. The CWPPRA program only has $79 million to spend. At the end of this mock meeting, the CWPPRA Task Force must choose the best projects.
>
> As you take on different roles you will be trying to persuade the Task Force to chose your project. ALL of these projects are good restoration ideas. You must help the Task Force understand "your alternate personality's" reason for supporting a project. The goal is to provide the taxpayers (the real you) with the most efficient use of public funds."

2. Your job is to work to decide what coastal restoration projects should be funded based on sound economics. You will be given many options. Remember, however, that the cost of restoring coastal habitats is very variable based on a host of factors. As you think about the dilemma, bear in mind all the things you have learned about the functions and values of wetlands and the problems of coastal land loss and the urgent need for restoration we have discussed.

3. Here are 30 role cards. (**Activity 1—See Role Play cards, pages 133-141.**) You must play a role in the restoration community. Listen to the names and descriptions as I read them. Raise your hand to volunteer to play that role. *Students can play more than one role, as is*

The Task Force Meeting—CONT'D.

the case in real life. You can also create additional roles if desired. You should be sure that at least all of the bulleted roles are given to the students.

Allow students time to familiarize themselves with their roles and the proposed projects as explained on the role cards and project fact sheets.

4. Conduct a meeting, with the CWPPRA TASK FORCE and other members of the meeting, at which the students assume their roles and state their positions as described in the CWPPRA meeting agenda. Students who are not on the agenda can speak during the time that the Chairman asks for remarks from the public

5. At the end of the meeting the CWPPRA Task Force will have to recommend no more than $79M worth of projects for construction. Allow the students to "mingle" for 5 minutes as the "public" after the meeting. During the meeting the media folks should be "creating" their story.

The Media Report

6. A report is prepared and provided to the daily news.

The Evaluation and Analysis Report

7. After projects have been chosen and eliminated ask the students to evaluate:
    a. why do they think certain projects were chosen and others were eliminated,
    b. if the projects were chosen based on sound economics,
    c. how do they think it felt not to be chosen.

The Task Force Meeting—CONT'D.

List of Characters

CWPPRA TASK FORCE

Chairman representing the US Army Corps of Engineers (USACE)	• Col. John D. Diplomatie
Member representing the State of Louisiana Coastal Protection & Restoration Authority-CPRA	• Mr. Robert Bargainette
Member representing the Environmental Protection Agency (EPA)	• Mr. James Millieu
Member representing the US Fish and Wildlife Service (USFWS)	• Ms. Elizabeth Brown
Member representing NOAA National Marine Fisheries Service	• Ms. Linda Angler
Member representing the USDA National Resources Conservation Service	• Mr. Michael Agrarian

CWPPRA FINANCIAL OFFICER

CWPPRA Financial Officer	• Ms. Grace Sharpe'

LOCAL GOVERNMENT REPRESENTATIVES

Terrebonne Parish Coastal Zone Manager	Mr. Marcus Belanger
Plaquemines Parish Coastal Zone Manager	Mr. Terry Dean
Jefferson Parish Coastal Zone Manager	Ms. Wendy Lafitte
Cameron Parish Coastal Zone Manager	Ms. Carolyn Audrey
St. Charles Parish Coastal Zone Manager	Mr. Lee Schexnayder

FEDERAL GOVERNMENT SCIENTIFIC AND TECHNICAL STAFF

• Gabrielle Arceneaux	Government Scientist Representing USFWS
• Glenn Authement	Government Scientist Representing EPA
• Mary Babin	Government Scientist Representing USACE
• Wilton Blanchard	Government Scientist Representing NOAA NMFS
• Louis Boudreaux	Government Scientist Representing USDA NRCS

The Task Force Meeting—CONT'D.

List of Characters—CONT'D.

BUSINESS INTERESTS

Bill Mouton	Floating Highway Construction Company
Adrienne Nunez	Seaside Designers Corporation
Sherri Pitre	Coastal Ecosystem Engineers, Inc.
Margaret Wilton	Industialist
Philip Steerman	Navigation
Michael Scour	Dredger

ENVIRONMENTAL GROUP MEMBERS

Jacques Thibodaux	National Habitat Protection (Not For Profit)
Andre Verret	Louisiana Department of Wildlife and Fisheries

ADDITIONAL STAKEHOLDERS

•Jane Broussard	Private Landowner
•Martin Chauvin	Oil and Gas Landowner
•Rachel Chaisson	Concerned Citizen
•Paul Fontenot	Concerned Citizen
•Mary Guidry	Educator
•Adele Landry	Historian
•Bill Plume	Birder

MEDIA / REPORTERS

Madeline Stringer	Newspaper Reporter
Zachary Pacquette	TV Reporter

The Task Force Meeting—CONT'D.

Project List

	Project Number	Project Name	Parish	Cost	Agency
1	BA - 27c	Barataria Basin Landbridge Shoreline Protection (3)	Jefferson	$46.2 M	NRCS
2	PO - 17	Bayou LaBranche Wetland Creation	St. Charles	$3.8 M	USACE
3	TV - 21	East Marsh Island Marsh Creation	Iberia	$23.0 M	EPA and NRCS
4	ME - 16	Freshwater Introduction South of Hwy. 82	Cameron	$6.3 M	USFWS
5	PO - 33	Goose Point / Point Platte Marsh Creation	St. Tammany	$15.9 M	USFWS
6	TE - 40	Timbalier Island Dune and Marsh Creation	Terrebonne	$17.5 M	EPA
7	MR - 03	West Bay Sediment Diversion	Plaquemines	$50.0 M	USACE

At maximum only 48% of the projects can be built. Which projects will the students choose?

TOTAL	**162.7M**

CWPPRA

Coastal Wetlands Planning, Protection and Restoration Act Task Force Meeting Agenda

DATE: **9:30AM**

LOCATION:
Estuarine Fisheries and Habitat Center
Conference Room 119
646 Cajundome Blvd.
Lafayette, Louisiana

Documentation of Task Force meetings may be found at:
http://www.mvn.usace.army.mil/pd/cwppra_mission.htm

1. Meeting Initiation —*Colonel J.D. Diplomatie and Task Force Members*

Introduction of each of the Task Force Members to include opening remarks of Task Force Members.

2. Report: Status of CWPPRA Program Funds and Projects —*Grace Sharpe', CWPPRA Financial Officer and staff member of the USACE*

Ms.Sharpe' will provide an overview of the status of CWPPRA accounts and available funding in the program for the upcoming year.

3. Report: Discussion of Candidate Projects to Evaluate for Priority Project List (PPL) 22

Each member of the federal government scientific and technical staff will report on the projects listed below in the order that they projects appear on the sheet below

Fact Sheets have been provided for each of the **government scientists** and **scientific and technical staff.** Remember, not all the projects can be funded; so, this is the time the staff is to let the Task Force know how important each project is. After each project

is proposed by the scientific and technical staff, the **public, local government representatives, business interests, environmental groups, and stakeholders** will have a turn to comment on each of the projects as the are proposed.

PPL 22 candidates for analysis as listed below:

	Project Number	Project Name	Parish	Cost	Agency
1	BA - 27c	Barataria Basin Landbridge Shoreline Protection (3)	Jefferson	$46.2 M	NRCS
2	PO - 17	Bayou LaBranche Wetland Creation	St. Charles	$3.8 M	USACE
3	TV - 21	East Marsh Island Marsh Creation	Iberia	$23.0 M	EPA and NRCS
4	ME - 16	Freshwater Introduction South of Hwy. 82	Cameron	$6.3 M	USFWS
5	PO - 33	Goose Point / Point Platte Marsh Creation	St. Tammany	$15.9 M	USFWS
6	TE - 40	Timbalier Island Dune and Marsh Creation	Terrebonne	$17.5 M	EPA
7	MR - 03	West Bay Sediment Diversion	Plaquemines	$50.0 M	USACE

CWPPRA

Coastal Wetlands Planning, Protection and Restoration Act Task Force Meeting Agenda—CONT'D.

4. Additional Public Comments — ***Colonel Diplomatie*** requests that any member of the public who has not had a chance to speak be allowed to share their ideas.

5. Vote and Decision: Using the economic criteria given, the CWPPRA Task Force must now choose the PPL 22 projects.

The Task Force will have 5 minutes to rank their top 4 projects on a flip chart or chalkboard. With 1 being the best project and 2, 3, and 4, the next important projects. Remember, only 4 of the 7 projects can be picked by each Task Force member. The scientific and techical staff will then tally the votes and report to the public which projects will be funded.

6. Request for Additional and Final Public Comments —*Col. Edward Fleming, USACE*

7. Announcement: Media Members will announce when to expect their reports to be published.

8. Decision: Adjourn

CWPPRA Task Force Meeting Role Play Cards

Col. John D. Diplomatie

Chairman
US Army Corps of Engineers (USACE)

Ladies and Gentlemen, welcome to the CWPPRA Task Force meeting. I am the Chairman of the CWPPRA Task Force representing the USACE. I'd like to call the meeting to order and invite each of the CWPPRA Task Force members to introduce themselves, and then we will be following the agenda before us. Remember, we are here today to decide which coastal restoration projects we will be able to fund. This year we have $79 million dollars. After each agenda item, the public will have a chance to make comments on each of the agenda items.
NOTE: *As Chairman, you must keep the meeting going forward to the end. You are in favor of PO-17 and MR-03 during the meeting and must rank these two projects highest during voting.*

Mr. Robert Bargainette

Task Force Member
State of Louisiana—Coastal Protection & Restoration Authority—CPRA

I am here representing the State of Louisiana. I am pleased to see the federal government investing in our state. For each project you approve, the State will match the project funds for 15%. We have a master plan for restoration and want to be sure that all the projects are a part of our master plan. I understand that I won't be able to vote on the projects but I will want to make comments about each of the projects the State supports.

NOTE: *As the State representative, during the meeting you have to pick the projects you really like and then encourage the Task Force to vote in favor of your preferences.*

Mr. James Millieu

Task Force Member
Environmental Protection Agency (EPA)

I am here representing the EPA. I am encouraged to know the CWPPRA program is working to save important wetland habitats that protect our drinking water. As you all know, protecting the environment is everyone's responsibility. At EPA, we implement regulations that are written into law by Congress. By building new wetlands and protecting healthy wetland habitats we are also protecting water supplies because wetlands act as water purifiers.

NOTE: *As the EPA representative, during the meeting you will be in support of two projects, TV-21 and TE-40. You must rank these two projects highest during the voting part of the meeting.*

Ms. Elizabeth Brown

Task Force Member
US Fish and Wildlife Service (USFWS)

I am here representing the USFWS. I am happy to say that the projects that CWPPRA builds helps to protect, conserve, and enhance fish, wildlife, and plants and their habitats for the continued benefit of the American people. We have worked with local communities to help design projects that improve fish and wildlife resources and may even be used to improve ecotourism. Habitat conservation and restoration are fundamental to achieving our agency's goals. As a reminder, the Endangered Species Act with relation to terrestrial and freshwater organism is administered through USFWS.
NOTE: *As the USFWS representative, during the meeting you will be in support of two projects, ME-16 and PO-33. You must rank these two projects highest during the voting part of the meeting.*

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Ms. Linda Angler

Task Force Member
NOAA National Marine Fisheries Service

I am here representing NOAA NMFS. NOAA Fisheries is responsible for the management, conservation, and protection of living marine resources within the US economic zone. It is our expressed goal to be stewards of living marine resources for the benefit of the nation through science-based conservation and management. We also administer the Endangered Species Act for the protection of marine organisms. Because many marine organisms spend part of their life cycles in wetland habitats we are happy to be a part of the CWPPRA program.
NOTE: *As the NOAA representative, during the voting part of the meeting you should support projects that you think improve fisheries.*

Mr. Michael Agrarian

Task Force Member
USDA National Resources Conservation Service

For CWPPRA, I am here representing the USDA NRCS. NRCS's mission is to provide leadership in the conservation of soil, water, and related natural resources. The NRCS has a reputation of providing balanced technical assistance in land conservation and wetlands restoration and enhancement. Wetlands are a home to many species of migratory and resident birds, reptiles and amphibians, fish, insects, and plants. They also benefit society by storing floodwaters, filtering pollutants, serving as a carbon sink, and providing recreation sites for boating and fishing.
NOTE: *As the NRCS representative, during the voting part of the meeting you should support the TV-21 project and rank it first.*

Ms. Grace Sharpe'

CWPPRA Financial Officer

For this year, the CWPPRA program will have $79 million dollars to spend on restoration. What will be brought to you today by federal government scientific staff are 7 projects for a total value of $162.7 million dollars. Task Force, you can ONLY allocate a total of $79 million dollars, so you will have to evaluate the projects during this meeting, and at the close of the meeting select through voting. Any remaining funds that you have will be used in next year's budget.

NOTE: *Ms. Sharpe' is always polite and will keep a tally of all funds that are to be spent on restoration.*

Gabrielle Arceneaux

Government Scientist
US Fish and Wildlife Service (USFWS)

We have two projects to present to the Task Force today. The projects are:
ME-16 Freshwater Introduction South of Hwy 82 in Cameron Parish on the southwest side of the state and PO-33 Goose Point/Point Platte Marsh Creation in St. Tammany Parish just north of Lake Pontchartrain.
I have prepared fact sheets so you can learn about each of the projects but I would like to highlight these interesting aspects of each project.

NOTE: *YOU MUST READ BOTH Project FACT SHEETS and EXPLAIN THE PROJECTS in under 3 minutes.*

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Glen Authement

Government Scientist
Environmental Protection Agency (EPA)

We have two projects to present to the Task Force today. The projects are:
TE-40 Timbalier Island Dune and Marsh Creation in Terrebonne Parish on the southeast side of the state and TV-21 East Marsh Island Marsh Creation in Iberia Parish in the central part of the state.
I have prepared fact sheets so you can learn about each of the projects, but I would like to highlight these interesting aspects of each project.

NOTE: *YOU MUST READ BOTH Project FACT SHEETS and EXPLAIN THE PROJECTS in under 3 minutes.*

Mary Babin

Government Scientist
US Army Corps of Engineers (USACE)

We have one project to present to the Task Force today. The projects is:
MR-03 West Bay Sediment Diversion in Plaquemines Parish down river of New Orleans.

I have prepared a fact sheet so you can learn about the projects but I would like to highlight these interesting aspects of each project.

NOTE: *YOU MUST READ THE Project FACT SHEETS and EXPLAIN THE PROJECT in under 3 minutes.*

Wilton Blanchard

Government Scientist
NOAA National Marine Fisheries Service

Today, we don't have any of our own projects to bring before the Task Force, but we would like to comment on projects that we think would be most beneficial for fisheries. The projects we are in support of today are:

PICK 3 Projects

Because:
Give the reasons why you support these projects.

Louis Boudreaux

Government Scientist
USDA National Resources Conservation Service

We have two projects to present to the Task Force today. The projects are:
BA-27c Barataria Basin Landbridge Shoreline Proetection (3)- in Jefferson Parish just south and east of New Orleans and
TV-21 East Marsh Island Marsh Creation in Iberia Parish.
We are partnering with EPA on the second project so we will let them share that one with you.
I have prepared a fact sheet on BA-27a so you can learn the projects but I would like to highlight these interesting aspects of each project.

NOTE: *YOU MUST READ the Project FACT SHEETS and EXPLAIN THE PROJECT in under 3 minutes.*

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Mr. Marcus Belanger

Representative
Terrebonne Parish Coastal Zone Manager

I would like to speak in support of TE-40 Timbalier Island Dune and Marsh Creation. I think the project is very important because:

List three things based on the fact sheet.

1.
2.
3.

Mr. Terry Dean

Representative
Plaquemines Parish Coastal Zone Manager

I would like to speak in support of MR-03, the West Bay Sediment Diversion project. I think the project is very important because:

List three things based on the fact sheet

1.
2.
3.

Ms. Wendy Lafitte

Representative
Jefferson Parish Coastal Zone Manager

I would like to speak in support of BA-27c, the Barataria Basin Landbridge Shoreline Protection Phase 3 project. I think the project is very important because:

List three things based on the fact sheet

1.
2.
3.

Ms. Carolyn Audrey

Representative
Cameron Parish Coastal Zone Manager

I would like to speak in support of MR-03 the West Bay Sediment Diversion project. I think the project is very important because:

List three things based on the fact sheet

1.
2.
3.

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Mr. Lee Schexnayder

Representative
St. Charles Parish President

I would like to speak in support of PO-17 Bayou LaBranche Wetland Creation project. We are excited about this project not only for its environmental benefits, but it will also help with ecotourism. Environmentally, I think the project is very important because:

List three things based on the fact sheet

1.
2.
3.

Bill Mouton

Business Representative
Floating Highway Construction Co.

I think the Bayou LaBranche Wetland Creation project is important to New Orleans residents as the project is bounded by U.S. Interstate 10 to the south and Lake Pontchartrain to the north. This project would protect the road that is a major hurricane evacuation route out of New Orleans. When you are thinking about coastal restoration, you need to keep in mind that there are people living here, too. And people need to be taken care of as well as the birds and bunnies.

Adrienne Nunez

Business Representative
Seaside Designers Corporation

We are in support of the MR-03 West Bay Sediment Diversion. I know it may seem like the only reason we are interested in this project is because it the largest project on the list today and we are the largest wetlands contractors in the State. But honestly, we want to see the sediment of the Mississippi River used wisely. We believe that the material that is dredged during the building of the channel for this large scale diversion as well as the water that will be coming into the area will create a healthy wetland in an area that was once open water.

Sherri Pitre

Business Representative
Coastal Ecosystem Engineers, Inc.

Our business is a small women-owned business in Lake Charles and we are excited to see that there is a project in Cameron Parish. One third of all businesses in the US are women-owned and we are excited to have an opportunity to work with people right here in our local community. We strongly support ME-16 Freshwater Introduction South of Hwy 82 in Cameron parish. Not only will the project protect fragile marsh. It has the potential to also generate jobs for our local community.

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Margaret Wilton

Business Representative
Industrialist

I am here to complain about the P0-33 project. It is titled the Goose Point/Point Platte Marsh Creation project. For years my business has been trying to purchase the land inside the St. Tammany Wildlife Management Area from the State of Louisiana to create a new neighborhood. Since Hurricane Katrina, people continue to move to the north shore of Lake Pontchartrain. We need land to build new neighborhoods. There are plenty of wetlands on the north shore for people to use. We don't need any additional "protected" areas.

Philip Steerman

Business Representative
Navigation

I am here to comment on the West Bay Sediment Diversion—MR-03. The problem with this project is that you must maintain an anchorage area at Pilottown in the Mississippi River. You must meet with the Mississippi River Commission and the River Boat Pilot Association prior to moving this project forward. We want to be involved. I strongly suggest that you take this project off of this year's list and move it to next year. I feel that we have been left out of the planning for this project and no one knows the river better than the river boat pilots.

Michael Scour

Business Representative
Dredger

I am here representing the dredging industry. We want to assure you that no matter what your needs are we are always willing and able to help with coastal restoration. We have 37 different dredging companies in Louisiana and we have a fleet of dredges, backhoes, and pumps that get the job done no matter how big or small. As Louisiana residents, we are so thankful for the 1990 landmark legislation the Coastal Wetlands Planning, Protection and Restoration Act. Many states are fighting to save these precious wetland resources. I just want you to know the dredging industry stands ready to play a leading role in many of these environmental restoration projects.

Jacques Thibodaux

Environmental Representative
National Habitat Protection
(Not For Profit)

We are in strong support of the West Bay Diversion, MR -03. We know that the river built the wetlands of Louisiana. The longer we starve our wetlands from the nutrients of the river the more coastal land loss we will experience. We can't wait one more day for this project. Our Board of Directors has asked me to attend this meeting so that I could convey to you the urgent need for this project. I hope that you will consider putting MR-03 at the top of your list when we get to the voting part of the meeting today.

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Andre Verret

Environmental Representative
LA Department of Wildlife & Fisheries

We strongly support the Goose Point/Point Platte Marsh Creation project TE-40 and the East Marsh Island Marsh Creation project because they are both on public property. Allowing citizens to access as much of the land that we restore is very important. New wetlands provide home to a wide variety of plants, birds, alligator, and deer. Creating these new lands on public property is a great way to also reconnect people with nature.
We also support the restoration of Timbalier Island TE-40 as it is of vital importance to the fisheries along coastal Louisiana.

Jane Broussard

Stakeholder
Private Landowner

I am here to support the BA-27a Barataria Basin Land Bridge Shoreline Protection Project BA-27c. This land bridge protects those of us who are land owners just north of the project. As hurricanes come into the area, the land bridge acts as a buffer to storm surge breaking down the tall waves and absorbing wind and water energy. While I understand that the project is expensive, the rocks and structures that will be built will provide protection for us.

Martin Chauvin

Stakeholder
Natural Gas Company Landowner

I am from Erath, Louisiana. Henry Hub is a distribution hub of the natural gas pipeline system in Erath, Louisiana. Due to its importance, this small Louisiana town lends its name to the pricing point for natural gas futures contracts traded on the New York Mercantile Exchange. It interconnects with nine interstate and four intrastate pipelines. Based on the economic need, I think we need to build as many projects as close to Erath as possible. Therefore, I support the East Marsh Island Marsh Creation Project and the Freshwater Introduction South of Hwy 82.

Rachel Chaisson

Stakeholder
Concerned Citizen

I am from St. Charles Parish. Because we are not right on the very edge of our coast, we seldom get picked for CWPPRA projects. But what you must remember is that it is much less expensive to save and repair wetlands that are not completely lost. Currently we have only 4 of the 148 CWPPRA projects in our parish. Notice how for just $3.8 million dollars you can build 487 acres of land with the Bayou LaBranche Wetland Creation project P-17. The project also protects important infrastructure. As you saw from the earlier description, Interstate 10 would be protected as an evacuation route if we build this modest project.

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Paul Fontenot

Stakeholder
Concerned Citizen

I am a fisherman, hunter, and general outdoorsman. I am here in support of the East Marsh Island project. The Marsh Island Wildlife Refuge, owned and operated by the state of Louisiana, is located between Vermilion Bay and the Gulf of Mexico. Marsh Island is very important as wintering grounds for blue and snow geese. Recently, 30,000 geese and 50,000 ducks have been documented using the refuge. Besides waterfowl, Marsh Island's major commercially important inhabitants are alligators, fisheries, and furbearers. Commercial harvests of shrimp in Vermilion Bay and the gulf, as well as recreational harvests on the refuge, are due to shrimp utilization of Marsh Island as a nursery ground. The economics of this project is not just about the cost per acre. You must consider the importance of this habitat.

Mary Guidry

Stakeholder
Educator

As a high school economics teacher I want to remind you all the monies you spend here today are public funds and must be spent as wisely as possible. Do not forget that the money we have for restoration is limited and must be divided among competing needs. Our Louisiana needs greatly exceed our current budget. When you select projects today be careful to think about which benefits you are trying to achieve. You cannot please everyone. Don't forget about risk, sustainability, and ecosystem services. Though scientists and advocates shun the use of economics for examining coastal restoration, there is no escaping the reality that Louisiana's restoration needs far outweigh available funding. I urge you to choose carefully!

Adele Landry

Stakeholder
Historian

I am a member of the Louisiana Historical Society. I strongly encourage you to save the barrier islands. You can do so by supporting the Timbalier Island Dune and Marsh Creation project TE-40. At one time, many islands of Terrebonne Parish were connected as one piece of land called Isle Derniere or Last Island. This island was a resort for the rich and powerful many years ago in the 1800s. By saving this island you would be helping to protect and preserve history. Who can put a price on that?

Bill Plume

Stakeholder
Birder

I am a member of the Louisiana Audubon Society. It is not an easy decision to let you know how we feel about restoring coastal habitats. Louisiana is home to many migratory and resident bird populations. We were unable to chose just one project to support but our top four projects include: West Bay Sediment Diversion, East Marsh Island Marsh Creation, Timbalier Island Dune and Marsh Creation and Goose Point/Point Platte Marsh Creation. We know this decision will be difficult but we certainly hope you will agree with us on those four as the top projects.

CWPPRA Task Force Meeting Role Play Cards—CONT'D.

Zachary Pacquette

Stakeholder
TV Reporter

Your job is to listen to the entire meeting, interview any of the people you like and then create a 4-minute story that will air on tonight's local TV news station.

Be sure to get all the sides of the story.

Did the Task Force make an economically wise decision in its choice of projects?

Madeline Stringer

Stakeholder
Newspaper Reporter

Your job is to listen to the entire meeting, interview any of the people you like and then create a 300-word story that will run in the local morning newspaper.

Be sure to get all the sides of the story.

Did the Task Force make an economically wise decision in its choice of projects?

follow up

Assessments

- Write a short summary of how the public must work together to solve wetland issues.

- Write an evaluation of how restoration projects are chosen. Evaluate how economics plays a role in coastal restoration.

Resources

Websites:

www.LaCoast.gov Provides a review of all CWPPRA coastal restoration projects and links to CWPPRA Task Force meeting agendas and binders.

http://www.cnrep.lsu.edu/ **The Center for Natural Resource Economics and Planning** is helping Louisiana to meet the challenge of resource management involving reconciling the duel needs for economic viability and environmental integrity by improving the efficiency and equity of the state's natural capital management and allocation.

Rules Online website, no date, **Robert's Rules of Order Revised, by General Henry M. Robert, 1915 4th Ed., Public Domain**, accessed July 8, 2005 at http://www.rulesonline.com/
Online reference for Robert's Rules of Order.

Holmstrom, Laurel, Sonoma State University, May 13, 2003, **Robert's Rules of Order Made Simple**, accessed July 8, 2005 at http://www.sonoma.edu/Senate/Roberts_Simple.html
Summary of Robert's Rules of Order.

follow up

References:

Sylvester, Nancy. 2004. **The Complete Idiot's Guide to Robert's Rules**. Penguin Group (USA), 352 pp. ISBN: 1592571638.

*A book on **Robert's Rules** that is loaded with understandable and easy to read information.*

Jennings, C. Alan. 2004. **Robert's Rules for Dummies** (Dummies Series). Wiley, John & Sons, Inc., 338 pp. ISBN: 0764575740

*A book on **Robert's Rules** that walks readers through assembling a quorum, the order of agenda, the steps for making a motion, nominating and electing officers, and becoming involved in committees.*

GLE's

Science
7: GLE-38 Analyze the consequences of human activities on ecosystems (SE-M-A4)

Biology
HS Biol-27 Analyze the positive and negative effects of human actions on ecosystems (SE-H-D4) (SE-H-A7)

Environmental Science
HS Env. Sci-22 Analyze the risk-benefit ratio for selected enviornmental situations (SE-H-C4)

Lesson Source

CNREP
Center for
Natural Resource Economics
& Policy

Sea Grant
LOUISIANA

COASTAL WETLANDS PLANNING, PROTECTION, AND RESTORATION ACT

rev. September 2010
Cost figures as of: July 2012

East Marsh Island Marsh Creation (TV-21)

Project Status

Approved Date: 2005 **Project Area:** 362 acres
Approved Funds: $22.6 M **Total Est. Cost:** $23.0 M
Net Benefit After 20 Years: 169 acres
Status: Construction
Project Type: Marsh Creation
PPL #: 14

Location

The project is located in the Teche/Vermilion Basin at the east end of Marsh Island Wildlife Refuge southeast of Lake Sand in Iberia Parish, Louisiana.

Problems

Substantial areas of interior emergent marsh on Marsh Island have been converted to open water, primarily because of Hurricane Lili (2002). Areas targeted under this project are those with the greatest historical land loss and within close proximity to East Cote Blanche Bay.

Restoration Strategy

This project is designed to re-create brackish marsh habitat in the open water areas of the interior marsh primarily caused by hurricane damage. Based on 2007 aerial photography analysis, approximately 197 acres of marsh will be nourished and 165 acres of open water will be restored to interior emergent marsh habitat. The loss rates for the interior ponded areas are estimated to be reduced by 50 percent. This project provides a synergistic effect with CWPPRA's Marsh Island Hydrologic Restoration (TV-14), a project constructed in December 2001.

Aerial view of the east end of Marsh Island after commencement of construction activity.

Aerial view of the east end of Marsh Island where material dredged from East Cote Blanche Bay will be deposited to fill in open ponds and nourish marsh.

Progress to Date

The Louisiana Coastal Wetlands Conservation and Restoration Task Force approved funding for engineering and design at their February 2005 meeting. The U.S. Environmental Protection Agency and the Natural Resources Conservation Service, working through the Louisiana Department of Natural Resources, completed the engineering and design of the project and construction began in March 2010.

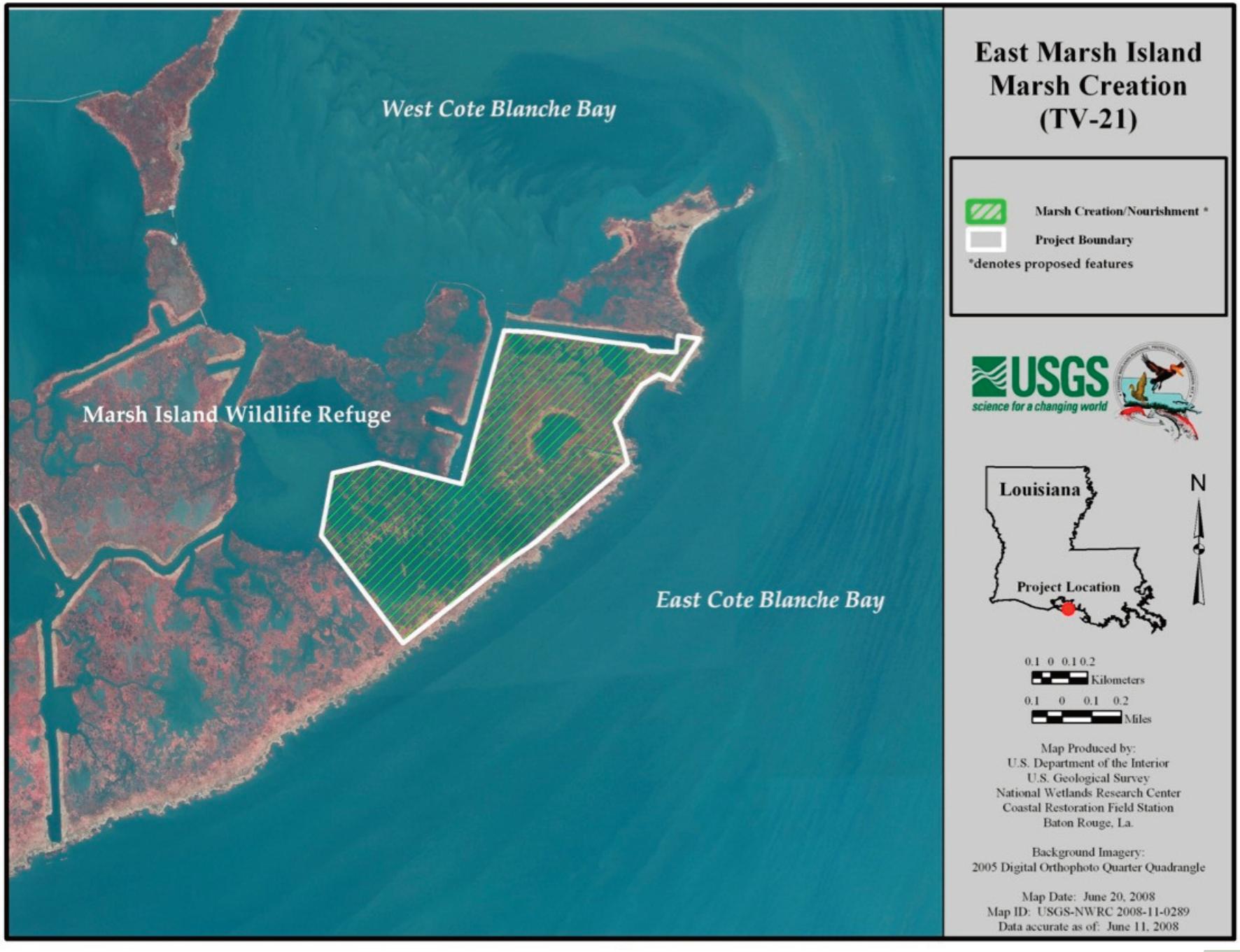
This project is on Priority Project List 14.

For more project information, please contact:

Federal Sponsors:
U.S. Environmental Protection Agency
Dallas, TX
(214) 665-7459

Natural Resources Conservation Service
Alexandria, LA
(318) 473-7756

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, LA
(225) 342-4736


West Cote Blanche Bay
Marsh Island Wildlife Refuge
East Cote Blanche Bay
East Marsh Island
Marsh Creation
(TV-21)
Marsh Creation/Nourishment *
Project Boundary
*denotes proposed features
USGS
science for a changing world
Louisiana
Project Location
N
0.1 0 0.1 0.2
Kilometers
0.1 0 0.1 0.2
Miles
Map Produced by:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Baton Rouge, La.
Background Imagery:
2005 Digital Orthophoto Quarter Quadrangle
Map Date: June 20, 2008
Map ID: USGS-NWRC 2008-11-0289
Data accurate as of: June 11, 2008

March 2010 (rev)
Cost figures as of: July 2012

Barataria Basin Landbridge Shoreline Protection, Phase 3 (BA-27c)

Project Status

Approved Date: 2000 **Project Area:** 2,380 acres
Approved Funds: $37.2 M **Total Est. Cost:** $46.2 M
Net Benefit After 20 Years: 264 acres
Status: Engineering and Design
Project Type: Shoreline Protection
PPL #: 9

Location

The project is located along the west bank of Bayou Perot and the north shoreline of Little Lake in Lafourche Parish and along the east bank of Bayou Perot and the east and west banks of Harvey Cutoff in Jefferson Parish, Louisiana.

Problems

The Barataria Landbridge is a critical land form that retards marine tidal forces which, among other things, threaten the upper Barataria basin. The highly organic soils in the project area are particularly susceptible to shoreline erosion. With increased tidal action, erosion rates in the project area range up to about 75 feet/year. With continued erosion, the landbridge function will be lost in the near future.

Restoration Strategy

This project encompasses about 41,000 feet of shoreline protection. About 20,000 feet of protection will be along the west bank of Bayou Perot and the north shore of Little Lake in Lafourche Parish. In Jefferson Parish, about 15,000 feet of the protection will be along the east bank of Bayou Perot and about 3,000 feet along each bank of the Harvey Cutoff.

Progress to Date

Approximately 11,000 feet of shoreline protection was completed in 2004 and another 10,000 feet of shoreline protection was completed in 2009. Approximately 20,000 feet of shoreline protection has recently been funded for construction.

This project is on Priority Project List 9.

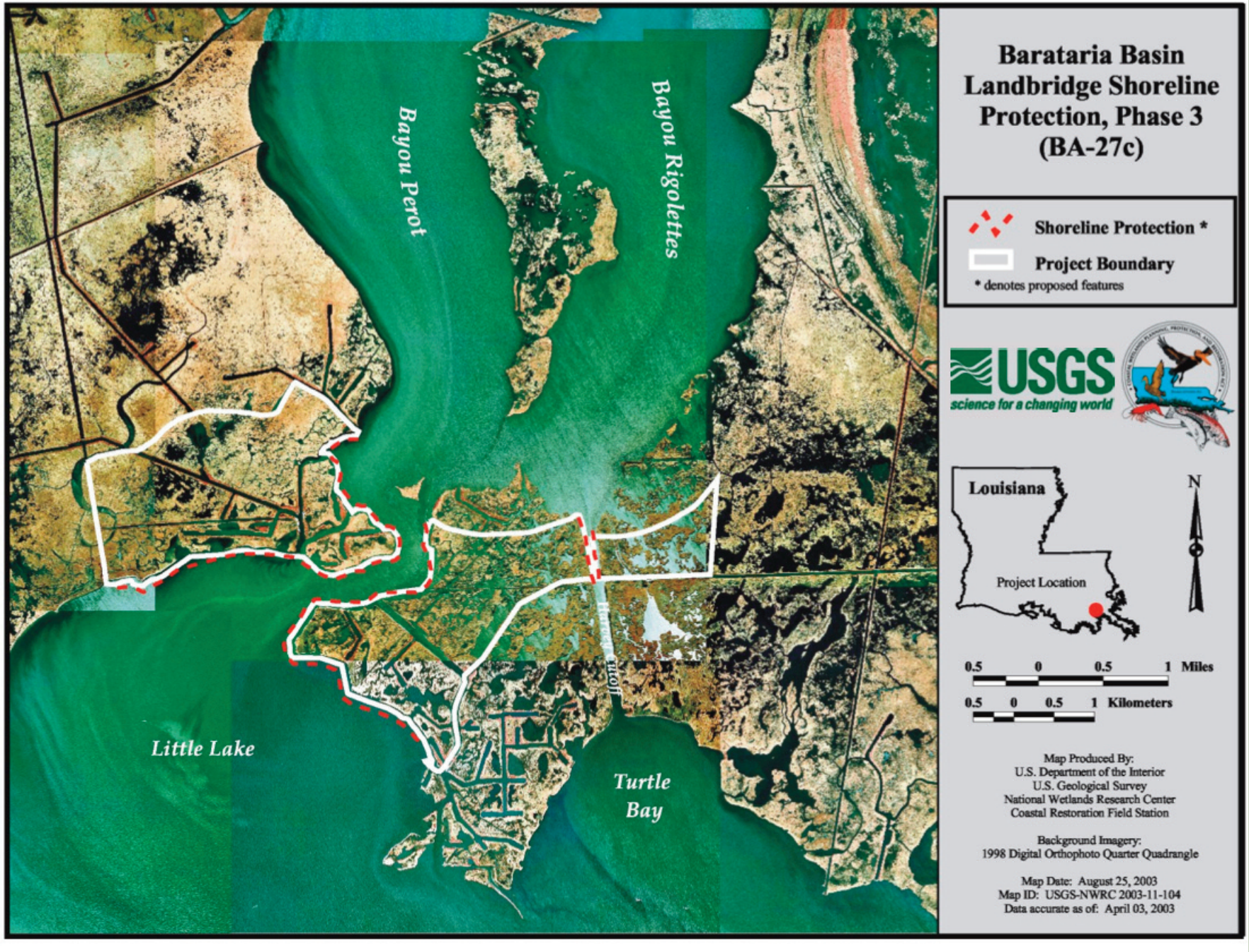
Protection will be provided to a total of 41,000 feet of shoreline in order to preserve the effectiveness of these areas in preventing marsh loss.

For more project information, please contact:

Federal Sponsor:
Natural Resources Conservation Service
Alexandria, LA
(318) 473-7756

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, La.
(225) 342-4736

www.LaCoast.gov


Barataria Basin
Landbridge Shoreline
Protection, Phase 3
(BA-27c)
Shoreline Protection *
Project Boundary
* denotes proposed features
USGS
science for a changing world
Louisiana
Project Location
N
0.5 0 0.5 1 Miles
0.5 0 0.5 1 Kilometers
Map Produced By:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Background Imagery:
1998 Digital Orthophoto Quarter Quadrangle
Map Date: August 25, 2003
Map ID: USGS-NWRC 2003-11-104
Data accurate as of: April 03, 2003
Bayou Perot
Bayou Rigolettes
Little Lake
Turtle
Bay

September 2010 (rev)
Cost figures as of: July 2012

Freshwater Introduction South of Highway 82 (ME-16)

Project Status

Approved Date: 2000 **Project Area:** 19,988 acres
Approved Funds: $5.15 M **Total Est. Cost:** $6.34 M
Net Benefit After 20 Years: 296 acres
Status: Completed 2006
Project Type: Hydrologic Restoration
PPL #: 9

Location

The project is located in the north central and eastern portions of Rockefeller State Wildlife Refuge and Game Preserve and Miami Corporation property in Cameron and Vermilion parishes, Louisiana, 9 miles southwest of Pecan Island, LA.

Problems

The Chenier Subbasin of the Mermentau Basin, located south of Highway 82, has been experiencing saltwater intrusion due to lack of freshwater and nutrient input from the Lakes Subbasin. Excess freshwater in the Lakes Subbasin, located north of Highway 82, is available to reduce salinities further south in the Chenier Subbasin.

Restoration Strategy

The project components included: installation of four freshwater introduction water control structures; plug removal; modification of the Little Constance structure; and canal enlargement north and south of Louisiana Highway 82 to allow water flow under the highway from the Lakes Subbasin south into the Chenier Subbasin. A small "spray dredge" was used to enlarge the freshwater introduction channels that spread the dredged sediment in a thin layer over the existing marsh eliminating spoil banks and impacts to adjacent marsh. Higher water levels in the Lakes Subbasin afford the opportunity to divert water into the Chenier Subbasin. 26,000 linear feet of "duck-wing" earthen terraces were also constructed west of Rockefeller's Unit 14 impoundment.

Progress to Date

The project was approved for engineering and design in January 2000 and for construction in October 2004. Hydrologic modeling and final designs were completed in September 2003 and December 2004 respectively. Construction began in June 2005 and was completed in October 2006.

Monitoring Results

The various project features, with the exception of rock revetment, are in excellent condition and the structures are functioning as designed. Salinity levels were reduced in the target brackish marshes in southeastern Rockefeller Refuge. Operation of the structures to improve drainage allowed the area to recover in the fall of 2006 after Hurricane Rita. The vegetative recovery was greater in the project area after Hurricane Rita compared to that recorded in adjacent reference sites. Preliminary information in the 2008 monitoring report indicated that the project-area brackish marsh site showed a gain in elevation compared to other sites.

Early stages of the construction of a water control structure to move freshwater to brackish marshes to the south.

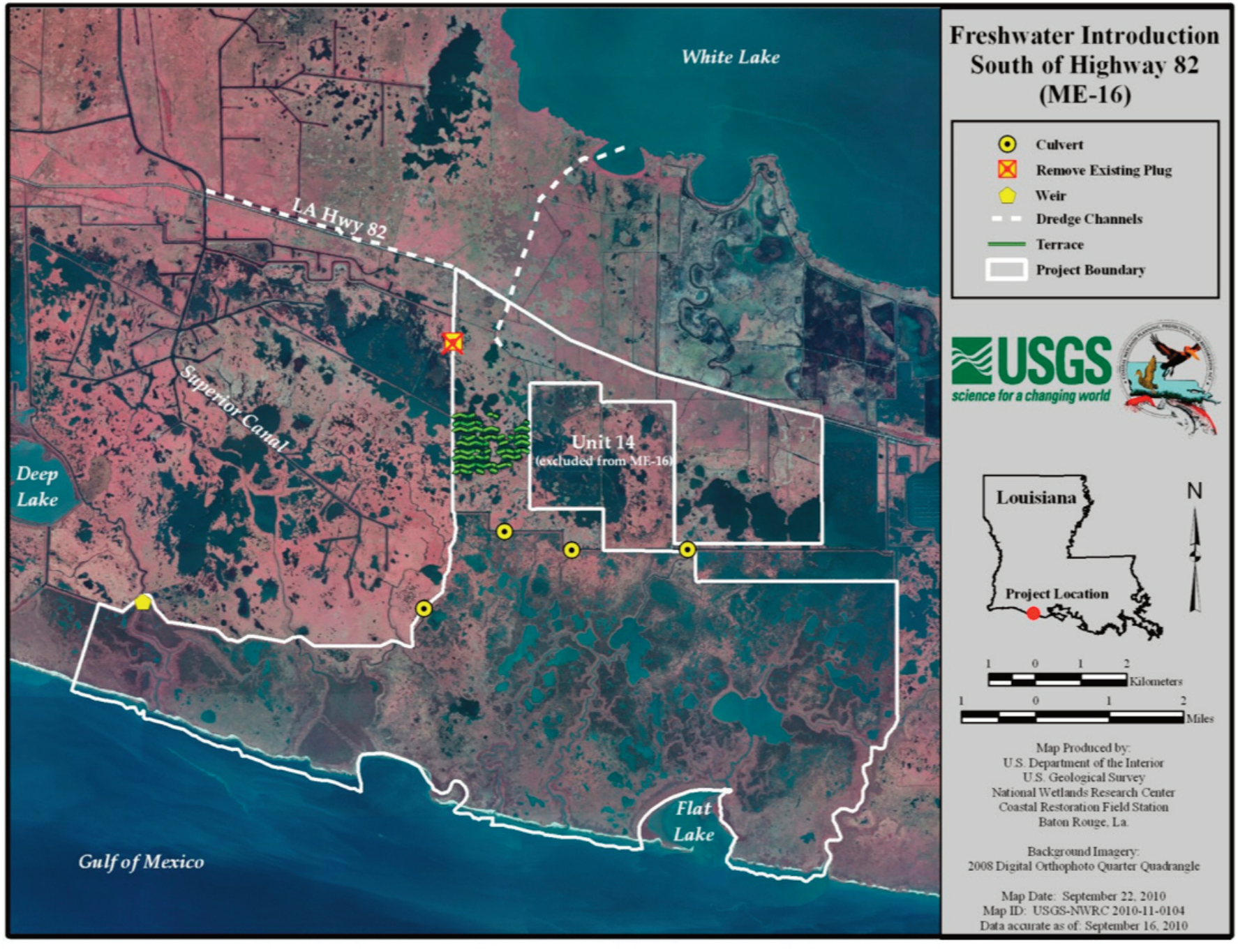
Small spray dredge enlarging the Grand Volle Ditch and spraying the spoil over existing marsh.

For more project information, please contact:

Federal Sponsor:
U.S. Fish and Wildlife Service
Lafayette, LA
(337) 291-3100

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, LA
(225) 342-4736

www.LaCoast.gov


White Lake
LA Hwy 82
Superior Canal
Unit 14
(excluded from ME-16)
Deep Lake
Flat Lake
Gulf of Mexico
Freshwater Introduction South of Highway 82 (ME-16)
Culvert
Remove Existing Plug
Weir
Dredge Channels
Terrace
Project Boundary
USGS
science for a changing world
Louisiana
Project Location
N
1 0 1 2
Kilometers
1 0 1 2
Miles
Map Produced by:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Baton Rouge, La.
Background Imagery:
2008 Digital Orthophoto Quarter Quadrangle
Map Date: September 22, 2010
Map ID: USGS-NWRC 2010-11-0104
Data accurate as of: September 16, 2010

June 2004 (rev.)
Cost figures as of: July 2012

West Bay Sediment Diversion (MR-03)

Project Status

Approved Date: 1992 **Project Area:** 12,910 acres
Approved Funds: $33.3 M **Total Est. Cost:** $50.8 M
Net Benefit After 20 Years: 9,831 acres
Status: Completed Nov. 2003
Project Type: Water Diversion
PPL #: 1

Location

The diversion site is located on the west bank of the Mississippi River, in Plaquemines Parish, Louisiana, 4.7 miles above Head of Passes. The project diverts Mississippi River water and sediments into West Bay.

Problems

Marshes along the lower Mississippi River are subsiding and converting to open water because of a lack of riverine sediment inputs and fresh water.

Restoration Strategy

The objective of the project is to restore vegetated wetlands in an area that is currently shallow open water. The project diverts sediments to create, nourish, and maintain approximately 9,831 acres of fresh to intermediate marsh in the West Bay area over the 20-year project life.

The project consists of a conveyance channel for the large-scale diversion of sediments from the river. The conveyance channel is being constructed in two phases: (1) construction of an initial channel with an average discharge of 20,000 cubic feet per second (cfs); (2) after a period of intensive monitoring, enlargement of the channel to a 50,000 cfs discharge. Material from the construction of the initial channel was used to create wetlands in the diversion outfall area.

The diversion may induce shoaling in the main navigation channel of the Mississippi River and the adjacent Pilottown anchorage area. Dredging of the main channel is accomplished under the U.S. Army Corps of Engineers' ongoing Operations and Maintenance Program for the river, but additional dredging of the anchorage area would be an added feature and cost of the project. The material dredged from the anchorage area will be used to create wetlands in the West Bay diversion outfall area.

The conveyance channel allows fresh water and sediment to flow from the Mississippi River (bottom of picture) to restore vegetated wetlands in an area that is currently shallow open water.

Progress to Date

An Environmental Impact Statement was completed in March 2002. Final project plans and specifications were approved in September 2002. Project construction began in September 2003 and was completed in November 2003. Monitoring of the channel and receiving area is currently underway.

The Louisiana Coastal Wetlands Conservation and Restoration Task Force approved proceeding with the project at the current price of $22 million at their January 2001 meeting. Most of the increase in the project cost is for dredging of the anchorage area and the relocation of a 10-inch oil pipeline.

This project is on Priority Project List 1.

For more project information, please contact:

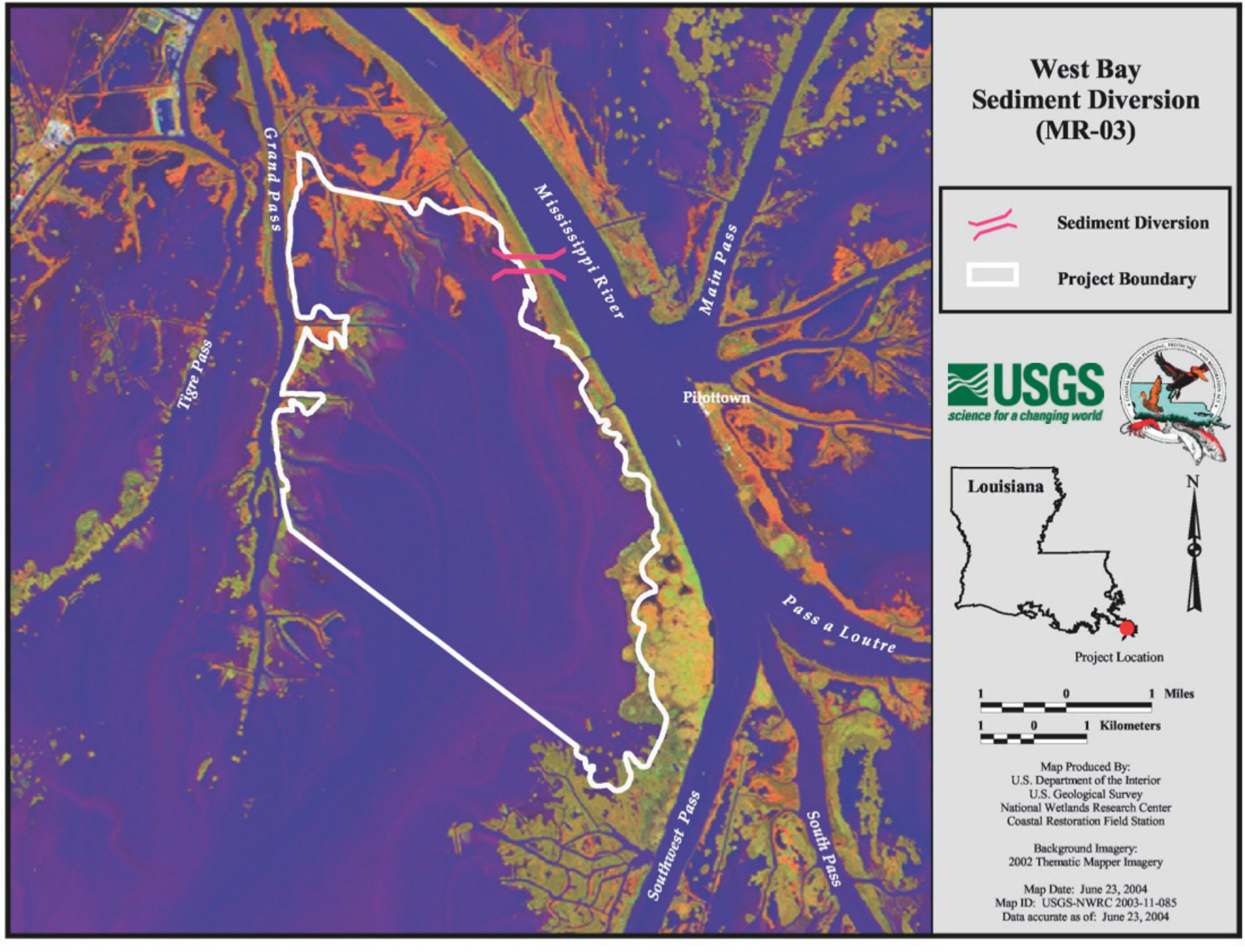
US Army Corps of Engineers
New Orleans District

Federal Sponsor:
U.S. Army Corps of Engineers
New Orleans, LA
(504) 862-1597

CPRA

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, LA
(225) 342-4736

www.LaCoast.gov


West Bay
Sediment Diversion
(MR-03)
Sediment Diversion
Project Boundary
Grand Pass
Mississippi River
Main Pass
Tigre Pass
Pilottown
Pass a Loutre
Southwest Pass
South Pass
USGS
science for a changing world
Louisiana
N
Project Location
1 0 1 Miles
1 0 1 Kilometers
Map Produced By:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Background Imagery:
2002 Thematic Mapper Imagery
Map Date: June 23, 2004
Map ID: USGS-NWRC 2003-11-085
Data accurate as of: June 23, 2004

rev. June 2006
Cost figures as of: July 2012

Timbalier Island Dune and Marsh Restoration (TE-40)

Project Status

Approved Date: 2000 **Project Area:** 663 acres
Approved Funds: $16.6 M **Total Est. Cost:** $17.4 M
Net Benefit After 20 Years: 273 acres
Status: Construction
Project Type: Barrier Island Restoration
PPL #: 9

Location

Timbalier Island is located south of Terrebonne Bay and west of East Timbalier Island in Terrebonne Parish, Louisiana.

Problems

Timbalier Island is migrating rapidly to the west/northwest, which is a clear indication of the dominant influence of longshore sediment transport processes (the movement of beach material by waves and currents) along the island. Thus, the western end of Timbalier Island is undergoing lateral migration by spit-building processes, at the expense of erosion along the eastern end, while the island overall is shortening and narrowing. This loss can be attributed to an inadequate sediment supply, relative sea-level rise, and the passage of storms. Without mitigating efforts, Timbalier Island was projected to disappear by the year 2050.

Restoration Strategy

The objective of this project is to restore the eastern end of Timbalier Island through the direct creation of dune and marsh habitat. The project boundary is divided into Areas A and B. Area A was restored through direct creation of dune and marsh on the east end of Timbalier Island. Area B will be enhanced through addition of sediment into the nearshore system, maintaining the west/northwest migration of the island and attenuation of wave energy.

Specifically, the project introduced sediment from the Gulf of Mexico to restore 2.2 miles of the beach rim and dune system and create a marsh platform on the bay side of the island. The marsh platform was built around existing marsh with minimal impact. Approximately 4.6 million cubic yards of material was dredged from the Little Pass borrow area about 14,000 feet away from the project and 22,750 linear feet of sand fencing was placed. Over 110,000 container grown plants consisting of eight species were initially planted. This is the most diverse plantings to date for a CWPPRA barrier island project. The sand fencing and vegetative plants help capture and retain wind-blown sand.

The plants and sand fencing shown above will help to maintain the integrity of Timbalier Island by capturing and retaining wind-blown sand.

Progress to Date

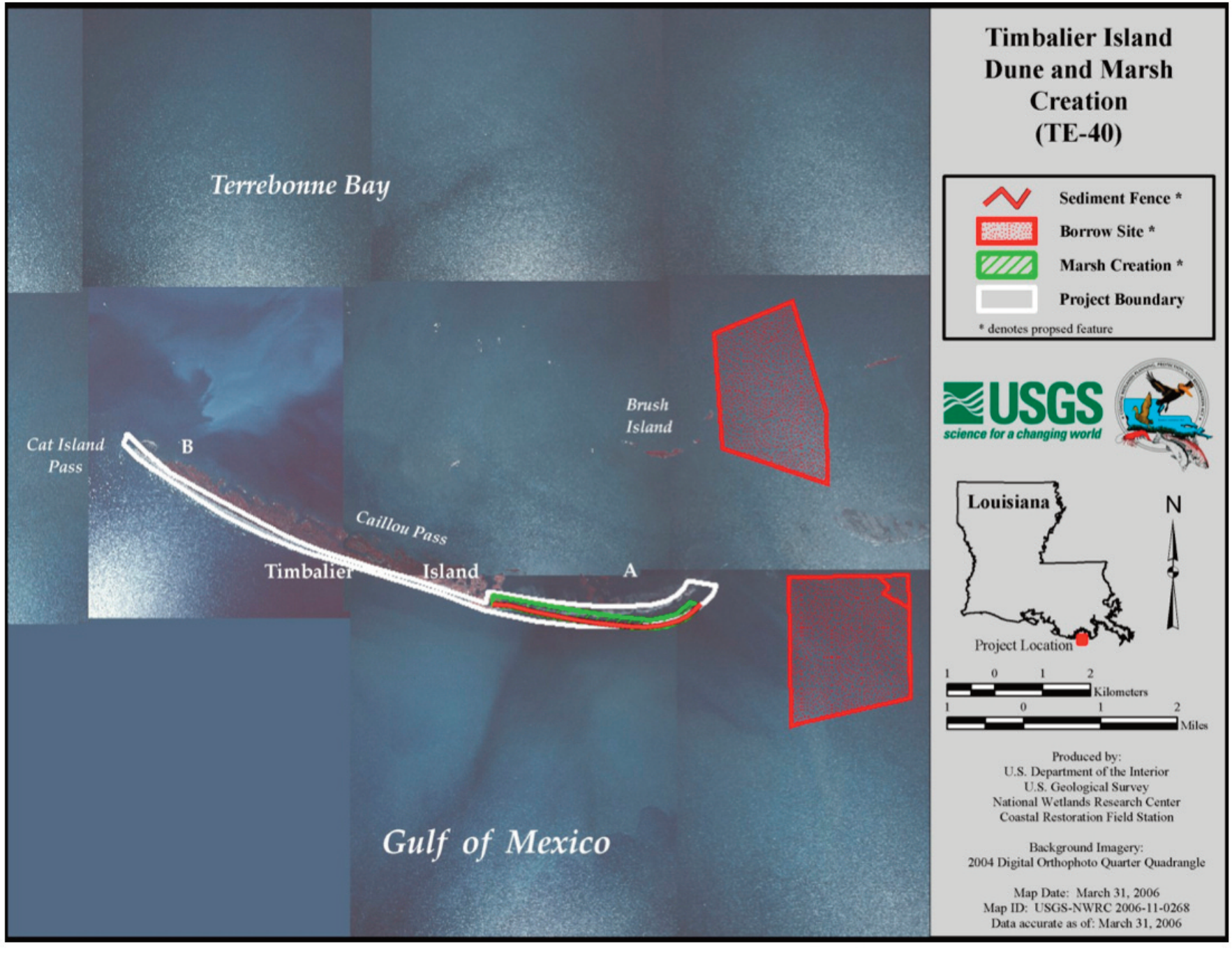
Construction funding was approved by the Louisiana Coastal Wetlands Conservation and Restoration Task Force in January 2003. Construction began June 2004 and dredging from the borrow site was completed in December 2004. This portion of the project was accepted in January 2005. The initial vegetative planting component began March 2005 and was completed in June 2005. The total cost of construction was $13,761,336. An additional row of sand fencing will be installed in spring 2006 along with an additional 40,000 plugs of smooth cord grass and 2,000 bitter panicum container plants.

This project is on Priority Project List 9.

For more project information, please contact:

Federal Sponsor:
U.S. Environmental Protection Agency
Dallas, TX
(214) 665-7255

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, LA
(225) 342-4736


Terrebonne Bay
Brush Island
Cat Island Pass
B
Caillou Pass
Timbalier Island
A
Gulf of Mexico
Timbalier Island Dune and Marsh Creation (TE-40)
Sediment Fence *
Borrow Site *
Marsh Creation *
Project Boundary
* denotes propsed feature
USGS
science for a changing world
Louisiana
N
Project Location
1 0 1 2
Kilometers
1 0 1 2
Miles
Produced by:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Background Imagery:
2004 Digital Orthophoto Quarter Quadrangle
Map Date: March 31, 2006
Map ID: USGS-NWRC 2006-11-0268
Data accurate as of: March 31, 2006

rev. March 2010
Cost figures as of: July 2012

Bayou LaBranche Wetland Creation (PO-17)

Project Status

Approved Date: 1991 **Project Area:** 487 acres
Approved Funds: $3.81 M **Total Est. Cost:** $3.81 M
Net Benefit After 20 Years: 203 acres
Status: Completed October 2000
Project Type: Marsh Creation
PPL #: 1

Location

The project is bounded by U.S. Interstate 10 to the south and Lake Pontchartrain to the north. It is approximately 3 miles northeast of Norco, Louisiana, in St. Charles Parish.

Problems

Construction of Interstate 10 (with its associated construction access canals), the Illinois Central Railroad, and an abandoned agricultural development resulted in altered hydrology and increased salinity.

The primary cause of wetland loss in the area was the failure of agricultural impoundments and subsequent flooding.

An unnamed hurricane in 1915 and Hurricane Betsy (1965) caused salt water to overflow the banks of Lake Pontchartrain and flow unchecked through canals. This overflow resulted in excessive salt water in the project area marsh and a subsequent loss of intermediate marsh vegetation.

Restoration Strategy

The project's goal was to create an area of 70% land and 30% water within 5 years of construction. Depositing 2.7 million cubic yards of sediments dredged from Lake Pontchartrain within an earthen containment berm created new, emergent marsh in what had formerly been an open water area.

Project effectiveness was evaluated by monitoring emerging wetland vegetation growth, water quality, and both the elevation and compaction rates of the deposited sediment.

Aerial view looking north depicting the marsh created within the Bayou LaBranche project area. Lake Pontchartrain is in the foreground, U.S. Interstate 10 can be seen running east to west near the top, and the emergent marsh (open water prior to 1994) is the large, vegetated area in the center.

Progress to Date

Land and water analysis in 1997 showed 300 acres of open water had been converted to land 3 years after construction was completed in 1994. The project had created 80% land and 20% percent water in 3 years, which was well within the target schedule. As of January 1999, sediment elevation was within target range at all monitoring stations.

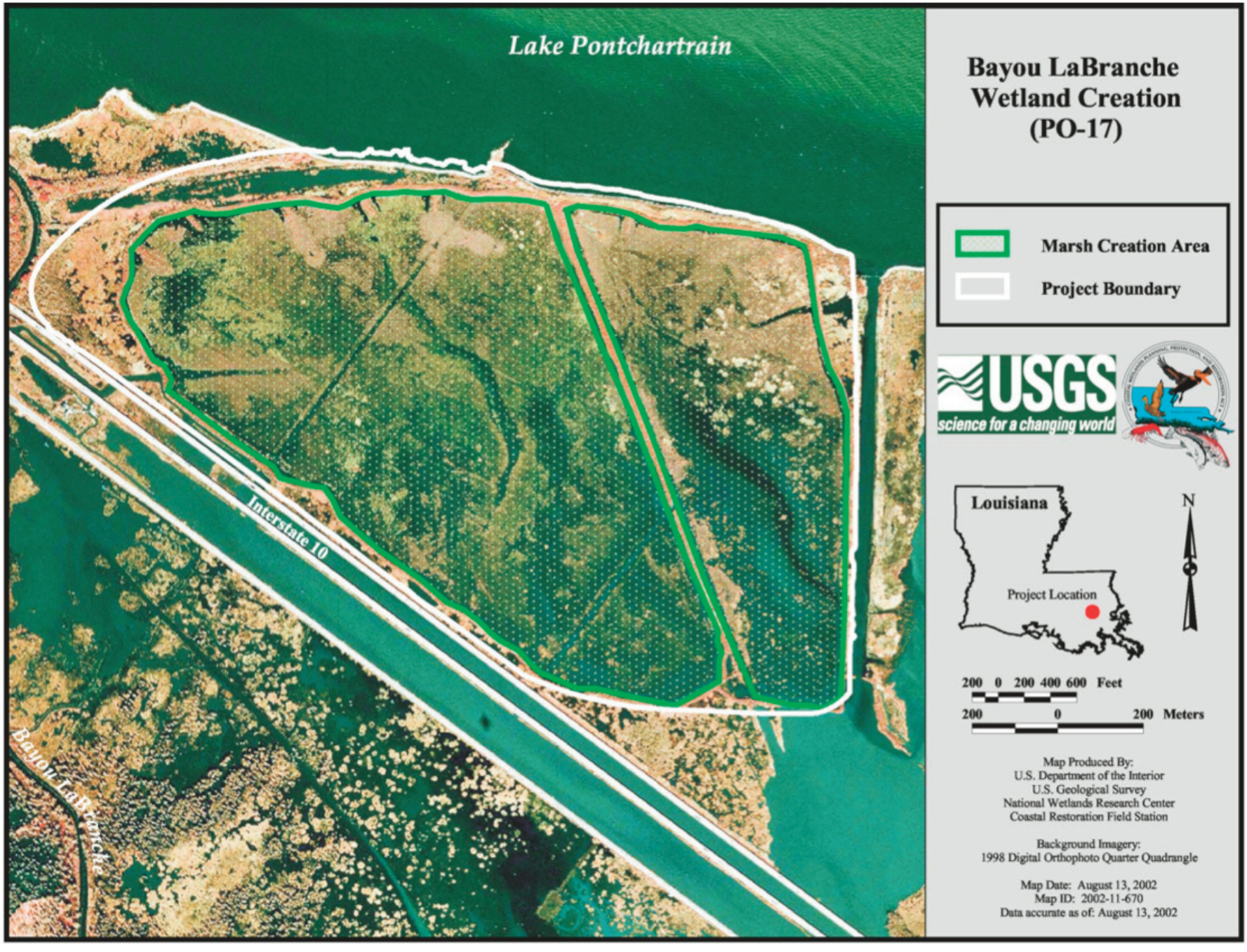
The goal of creating a shallow water habitat conducive to the natural establishment of wetland vegetation seems to have been partially met. As sediment continues to consolidate and water is maintained in the area, upland vegetation is expected to be supplanted by more oblilgate wetland species. The project goal of creating a minimum of 70% marsh and 30% open water in the project area may still be attained as sediment elevation continues to decline. The project will be monitored for 20 years.

This project is on Priority Project List 1.

For more project information, please contact:

Federal Sponsor:
U.S. Army Corps of Engineers
New Orleans, LA
(504) 862-1597

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, LA
(225) 342-4736


Lake Pontchartrain
Interstate 10
Bayou LaBranche
Bayou LaBranche Wetland Creation (PO-17)
Marsh Creation Area
Project Boundary
USGS
science for a changing world
Louisiana
Project Location
N
200 0 200 400 600 Feet
200 0 200 Meters
Map Produced By:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Background Imagery:
1998 Digital Orthophoto Quarter Quadrangle
Map Date: August 13, 2002
Map ID: 2002-11-670
Data accurate as of: August 13, 2002

(rev) March 2009
Cost figures as of: July 2012

Goose Point/Point Platte Marsh Creation (PO-33)

Project Status

Approved Date: 2004 **Project Area:** 1,384 acres
Approved Funds: $15.7 M **Total Est. Cost:** $15.9 M
Net Benefit After 20 Years: 436 acres
Status: Construction Completed
Project Type: Marsh Creation
PPL #: 13

Location

The project is located on the north shore of Lake Pontchartrain between Fountainebleu State Park and Louisiana Highway 11 and within the Big Branch Marsh National Wildlife Refuge in St. Tammany Parish, Louisiana. The project area at Goose Point also includes a portion of the St. Tammany State Wildlife Refuge.

Problems

Interior ponding and, to a lesser extent, shoreline erosion are the major causes of wetland loss in the project area. Loss rates were highest during the period from 1956 to 1978. Those high loss rates were associated with hydrologic alterations which allowed salt water to penetrate the fresher marshes. During the transition to a more brackish plant community, large ponds were formed. A narrow strip of land separates those ponds from Lake Pontchartrain. Although the shoreline erosion rates are relatively low, the shoreline is already breached in several areas, and marsh loss in the interior ponds is expected to increase if the shoreline fails.

Restoration Strategy

The goal of this project is to re-create marsh habitat in the open water behind the shoreline. This new marsh will maintain the lake-rim function along this section of the north shore of Lake Pontchartrain by preventing the formation of breaches into interior ponds.

Sediment will be dredged from Lake Pontchartrain and contained in cells within the interior ponds to create approximately 417 acres of marsh. In addition, 149 acres of degraded marsh will be nourished with dredged material. Marsh will be created to widen the shoreline so that the ponds will not be breached during the course of normal shoreline retreat.

View looking south toward Lake Pontchartrain showing the narrow strip of shoreline between the lake and the interior marsh pond near Point Platte.

Progress to Date

On February 12, 2009, a final inspection of the project site was conducted. All construction activities are complete.

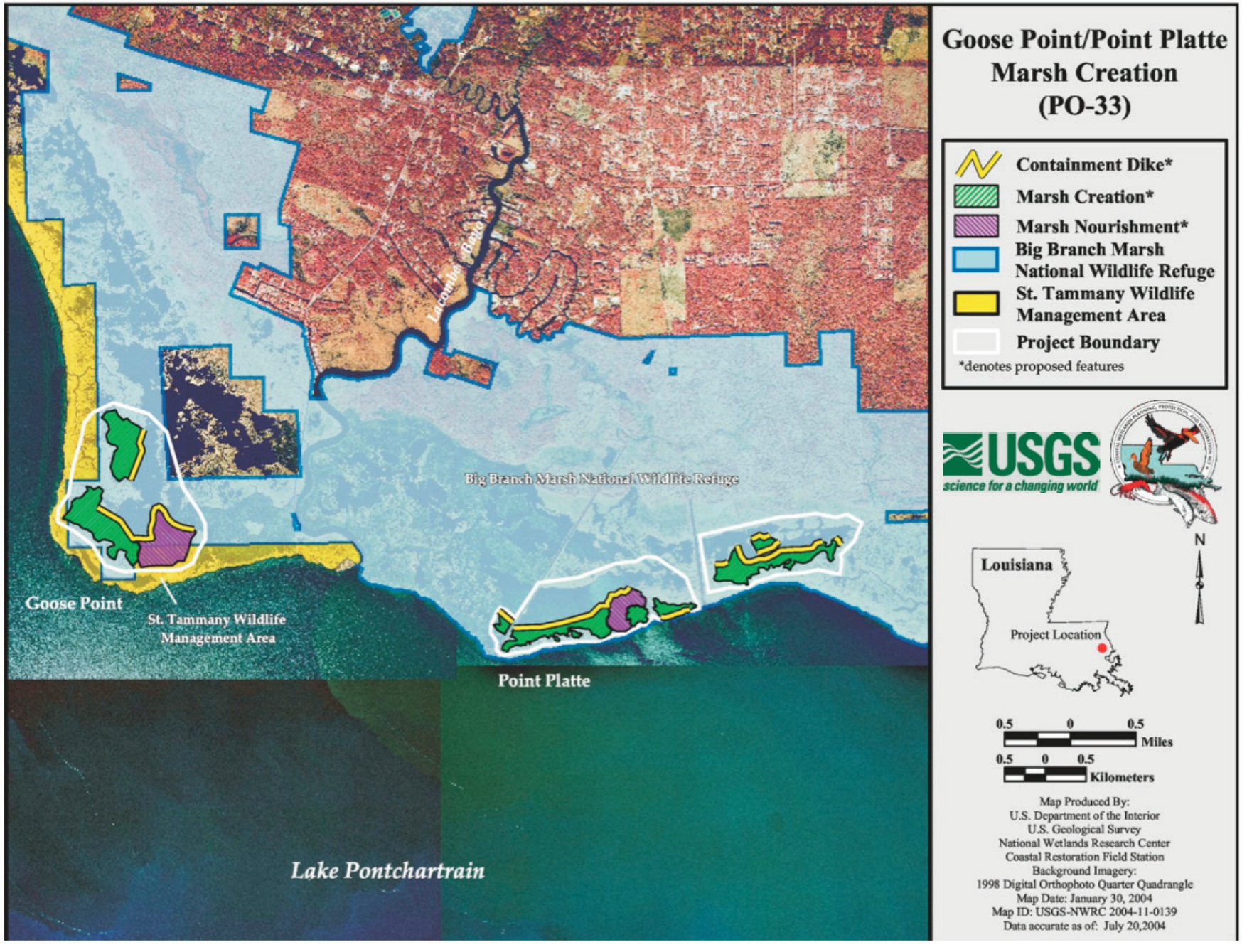
This project is on Priority Project List 13.

For more project information, please contact:

Federal Sponsor:
U.S. Fish and Wildlife Service
Lafayette, LA
(337) 291-3100

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, LA
(225) 342-4736

www.LaCoast.gov


Goose Point/Point Platte
Marsh Creation
(PO-33)
Containment Dike*
Marsh Creation*
Marsh Nourishment*
Big Branch Marsh
National Wildlife Refuge
St. Tammany Wildlife
Management Area
Project Boundary
*denotes proposed features
USGS
science for a changing world
Big Branch Marsh National Wildlife Refuge
Goose Point
St. Tammany Wildlife
Management Area
Point Platte
Lake Pontchartrain
Louisiana
Project Location
N
0.5 0 0.5
Miles
0.5 0 0.5
Kilometers
Map Produced By:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Background Imagery:
1998 Digital Orthophoto Quarter Quadrangle
Map Date: January 30, 2004
Map ID: USGS-NWRC 2004-11-0139
Data accurate as of: July 20,2004