

# Alabama and Mississippi Estuarine Habitat Creation and Restoration Workshop

Abstract Proceedings  
Pelican Landing Conference Center  
Moss Point, Mississippi

February 14-15, 2005



Sponsored by the Mississippi-Alabama Sea Grant Consortium and Auburn  
University Department of Fisheries and Allied Aquacultures



with support from the  
Mississippi Department of Marine Resources  
and the University of South Alabama



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MASGP-05-010



On behalf of the Mississippi-Alabama Sea Grant Consortium (MASGC), I welcome you to what may be the first workshop on estuarine habitat restoration/creation for the bi-state region of Mississippi and Alabama. There are a couple of objectives we hope to accomplish during the workshop. First, a workshop such as this is a very good vehicle for bringing together restoration/creation practitioners to exchange information about ongoing or completed projects. These groups include conservation groups, sport fishing associations, environmental non-profit groups, federal/state agencies, and institutions of higher learning. Interspersed in the agenda are other important presentations including discussions of funding, methods of pollution abatement, and discussions of long-range comprehensive estuarine habitat planning. The second objective is to seek input on the development of an estuarine habitat restoration/creation plan for the five coastal counties in Alabama and Mississippi.

Discussions about having this workshop began just a few months ago. It amazes me how easy it is to organize such a workshop when people share a common interest. The University of South Alabama Oyster Restoration Initiative and the Mississippi Department of Marine Resources joined with MASGC and Auburn University to provide financial support to host the workshop. Without the support of the speakers who agreed to make presentations, the workshop would not have been possible. After reading through the book of abstracts, I realize how much good work is being accomplished by numerous groups with similar goals. Estuarine habitat restoration is gaining momentum and I believe minimizing or abating the causes for habitat decline will lead to more and larger-scale projects in the near future.

A handwritten signature in blue ink that reads "LaDon Swann".

**LaDon Swann, Director  
Mississippi-Alabama Sea Grant Consortium**

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# **Alabama and Mississippi Estuarine Habitat Creation and Restoration Workshop**

**Pelican Landing – Moss Point, MS  
February 14-15, 2005**

**FEB 14**

**DAY ONE**

- 8:00 – 8:20                    **The Honorable Gene Taylor** – United States House of Representatives, Mississippi 4<sup>th</sup> District
- 8:20 – 8:30                    **Workshop Goals and Objectives**  
LaDon Swann – Mississippi-Alabama Sea Grant Consortium and Auburn University  
Department of Fisheries and Allied Aquacultures
- 8:30 – 9:00                    **Recent Estuarine Habitat Losses in Mississippi and Alabama**  
Ken Heck and D. A. Byron – Dauphin Island Sea Lab, University of South Alabama
- 9:00 – 9:20                    **NOAA Community-Based Restoration Program: Supporting Local Efforts  
to Restore Coastal and Marine Habitats**  
Leslie Craig – NOAA Restoration Center
- 9:20 – 9:40                    **Discussion**
- 9:40 – 10:00                   **Break**
- 10:00 – 10:20                   **Creation of Oyster Reefs to Improve Coastal Water Quality and Critical Fish  
Habitat**  
Joseph Jewell – Mississippi Department of Marine Resources
- 10:20 – 10:40                   **Alabama Fishery Habitat Creation and Restoration**  
Jim Duffy – Alabama Department of Conservation and Natural Resources, Division of  
Marine Resources
- 10:40 – 11:00                   **Mobile Bay National Estuary Program Oyster Gardening Program  
And Strategic Assessment of Habitat Protection Needs in Alabama Using a Coastal  
Habitat Coordinating Team Approach**  
David Yeager – Mobile Bay National Estuary Program
- 11:00 – 11:20                   **Oyster Reef Restoration in Bon Secour Bay, Alabama**  
Scott Rikard – Auburn University Shellfish Laboratory  
Chris Nelson – Bon Secour Fisheries and  
Richard Wallace – Auburn University Marine Extension and Research Center/Sea Grant  
Extension
- 11:20 – 11:40                   **Habitat Restoration in the Saw Grass Point Salt Marsh: The Use of Constructed  
Reefs to Minimize the Negative Effects of Boat Wash and Erosion**  
LaDon Swann – Mississippi-Alabama Sea Grant Consortium and Auburn University  
Department of Fisheries and Allied Aquacultures
- 11:40 – 12:00                   **Discussion**

12:00 – 1:00	<b>Lunch</b>
1:00 – 1:20	<b>Weeks Bay Estuarine Habitat Restoration</b> Eric Brunden – Weeks Bay Reserve, Nature Trail Restoration Project L. G. Adams – Weeks Bay Reserve, Coastal Section, State Lands Division, ADCNR
1:20 – 1:40	<b>The Role of Monitoring in Restoration Activities: Examples From Grand Bay National Estuarine Research Reserve</b> Chris May – Grand Bay National Estuarine Research Reserve David Ruple – Grand Bay National Estuarine Research Reserve
1:40 – 2:00	<b>Restoration of Living Reefs in the Back Bays of Orange Beach, Alabama</b> Don Blancher – Strand and Associates, Inc. Phillip West – City of Orange Beach
2:00 – 2:20	<b>University of South Alabama’s Alabama Oyster Reef Restoration Program</b> Sean Powers – Dauphin Island Sea Lab and Robert Shipp – Dauphin Island Sea Lab and University of South Alabama
2:20 – 2:40	<b>Discussion</b>
2:40 – 3:00	<b>Break</b>
3:00 – 3:20	<b>Brackish Marsh Restoration at Fowl River and Mobile Bay</b> Barry A. Vittor and Barry P. Vittor – Barry A. Vittor & Associates, Inc. and Alabama Coastal Foundation
3:20 – 3:40	<b>Cat Island Restoration Following Hurricane Georges</b> John Dindo – Dauphin Island Sea Lab
3:40 – 4:00	<b>Wetlands Restoration/Creation Using Dredge Material Within Mississippi Coastal Areas</b> Leah Bray – Mississippi Department of Marine Resources
4:00 – 4:20	<b>Fish Reef Restoration Using Bridge Rubble</b> Chris Lagarde – Congressman Gene Taylor's Office
4:20 – 4:40	<b>U.S. Fish and Wildlife Service Estuarine Restoration in Alabama</b> Larry Goldman – Daphne Field Office
4:40 – 5:00	<b>Discussion and Wrap-up</b>
5:00	<b>Adjourn</b>

**FEB 15**

**DAY TWO**

8:00 – 8:20

**Purpose of Day Two**

8:20 – 8:40

**Funding Opportunities with the National Fish and Wildlife Foundation**

Chris Rigby – National Fish and Wildlife Foundation

8:40 – 9:00

**U. S. Army Corps of Engineers Habitat Restoration Programs**

Susan Ivester Rees and Jennifer L. Jacobson – U.S. Army Corps of Engineers

9:00 – 9:20

**Mississippi’s Basin Management Approach - “An Evolving Process”**

Steve Goff, Mississippi Department of Environmental Quality

9:20 – 9:40

**Coastal Alabama Clean Water Partnership**

Jody Scanlan, Auburn University Marine Extension and Research Center/Sea Grant Extension

9:40 – 10:00

**Creation of a Natural Beach Landscape Along the Manmade Beach in Biloxi, Mississippi**

Pete Melby, Tom Cathcart, and Richard Harkess – Mississippi State University

10:00 – 10:20

**Break**

10:20 – 10:40

**Mississippi Sound Reef Restoration Project**

Nicole Vickey and Cynthia Ramseur – The Nature Conservancy

10:40 – 11:00

**Northern Gulf of Mexico Eco-regional Planning – The Nature Conservancy**

Rafael Calderon – The Nature Conservancy

11:00 – 11:20

**Operation Green Shores Project, Pensacola, FL**

Sava Varazo – Restoration Consultant

11:20 – 11:40

**Consequences of Not Addressing Habitat Loss and Restoration and a Vision for the Future**

George Crozier – Dauphin Island Sea Lab

11:40 – 12:00 p.m.

**Development of a Regional Estuarine Habitat Restoration Plan for the Five Coastal Counties in Alabama and Mississippi**

LaDon Swann – Mississippi-Alabama Sea Grant Consortium

12:00 – 12:30

**Wrap-up and Next Steps**

LaDon Swann – Mississippi-Alabama Sea Grant Consortium

12:30

**Adjourn**

## **Recent Estuarine Habitat Losses in Mississippi and Alabama**

**K.L. Heck, Jr.<sup>1,2</sup> and D.A. Byron<sup>1</sup>**

**<sup>1</sup>Dauphin Island Sea Lab, <sup>2</sup>University of South Alabama**

Using the best available data, we estimated habitat losses and gains in Mississippi Sound and in Mobile and Perdido Bays for three important estuarine nursery habitats: salt marshes, seagrass meadows and oyster reefs. The paucity of data and inconsistencies in collection and sampling methods require caution in drawing conclusions. Nevertheless, it seems clear that there have been large losses of salt marsh and seagrass habitat during both the distant and recent past. Existing evidence does not suggest major changes in the coverage area of oyster reefs in Alabama, while the lack of data prevent conclusions about changes in oyster reef area in Mississippi. To permit useful assessments of nursery habitats in the future, it is imperative to establish regular monitoring programs with standardized methods and analytical techniques. Given the well-documented importance of these nursery habitats for the production of economically important finfish and shellfish, the development of state of the art monitoring efforts should be a high priority for both Mississippi, Alabama and federal partners.

## **NOAA Community-Based Restoration Program: Supporting Local Efforts to Restore Coastal and Marine Habitats**

**Leslie Craig - Habitat Restoration Specialist**

Habitat restoration replaces, revitalizes and repairs environments and natural resources that have been compromised by human activities. However, resource agencies are unable to restore coastal and marine habitats by themselves. It is vital that local stakeholders play an active role in developing and implementing conservation, protection and restoration activities. The NOAA Community-based Restoration Program (CRP) began in 1996 to catalyze local efforts to conduct meaningful, on-the-ground restoration of marine, estuarine and riparian habitat. The role of the NOAA Restoration Center (RC) is to help identify sound projects, strengthen their development and implementation and generate long-term national and regional partnerships to provide funds and support for community-based restoration efforts around the country. Partnerships allow communities to reach significant milestones faster, and the cooperative nature of the community-based restoration process fosters a sense of collective stewardship and respect for the environment as a result of grass-roots habitat restoration activities. Project proposals are requested several times each year, either directly by the RC or through its numerous partners. RC field staff conduct site visits and meet with potential grantees to answer questions and guide them through the restoration process. Proposals undergo a competitive review, and projects are selected based on their technical merit, ecological benefits to marine and anadromous fish habitat, cost-effectiveness, the level of community involvement and partnership opportunities. In 2004, \$10 million was available to support community-based habitat restoration projects and partnerships.

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## **Creation of Oyster Reefs to Improve Coastal Water Quality and Critical Fish Habitat**

**Joseph Jewell, Mississippi Department of Marine Resources**

**Location and date of restoration project:** St. Louis Bay Malini Bayou Shell plant took place on May 5, 2004. Biloxi Bay Spoil Island plant took place on May 2, 2004.

**Funding:** Gulf of Mexico Foundation Funded the St. Louis Bay site for \$24,990 and the Fish America Foundation funded the Biloxi Bay site for \$29,990.

**Project Contact:** Joe Jewell, Mississippi Department of Marine Resources and Cynthia Ramseur – The Nature Conservancy.

**Project partners:** MS DMR, Mississippi Alabama Sea Grant Consortium, The Nature Conservancy, Gulf Ecological Management Sites (GEMS), USM J.L. Scott Marine Education Center and Aquarium, MS Gulf Fishing Banks, Coastal Conservation Association, Congressman Gene Taylor's Office, and the Mississippi Wildlife Federation.

**Type of habitat restored:** Oyster Reef

**Acreage restored:** Approximately 5 acres at St. Louis Bay and approximately 5 acres at Biloxi Bay.

**Project summary:** Approximately 10 acres of reef was created within Bay St. Louis and Biloxi Bay, Mississippi that will provide new shellfish and finfish habitats. The J.L. Scott Marine Education center and Aquarium provided public outreach and education by the creation of displays and exhibits.

**Rationale for project:** The creation of these reefs using oyster shell serves two important ecological functions. First, planting clutch material using oyster shell provides important habitat for the setting of oyster larvae. Second, the creation of critical fisheries habitat on and around oyster reefs is equally important.

**Permits obtained (federal, state, and locale):** A waiver request for these projects was submitted to the Coastal Ecology Office of the Mississippi Department of Marine Resources on March 30, 2004 and granted on April 2, 2004.

**Outreach and education:** Outreach activities occurred in two areas. First, displays and exhibits were created and updated at the J.L. Scott Marine Education Center in Biloxi, MS. A marine aquarium was renovated so that it demonstrates an oyster shell reef and all associated biota for the public to view. A large wall painting/mural was updated that demonstrates the bio-complexity of an oyster shell reef. Finally, several aquarium back drops were created or updated to reflect the diversity created by establishing oyster shell reefs. Second, several newspaper articles and television segments were generated from these projects are listed below.

**Follow-up monitoring and evaluation:** The MS DMR will monitor these sites for several years to ensure success. Monitoring efforts include dissolved oxygen, salinity water temperature, turbidity, pH, Secchi disk readings, tide, wind, and air direction. Once established, square meter sampling to determine density and morality will be conducted. Side scan sonar was used to access substrate suitability, uniform cultch deployment, and final reef orientation and size.

**Challenges encountered and lessons learned:** The first challenge was site selection. Valuable comments from the public and project partners led to selection of the most suitable sites. Public involvement from the beginning allowed many problems to be addressed and solved as the project developed. Stakeholder involvement was critical to the overall project accomplishments.

## **Alabama Fishery Habitat Creation and Restoration**

**Jim Duffy - Alabama Department of Conservation and Natural Resources  
Marine Resources Division**

The Alabama Marine Resources Division has been involved in fishery habitat restoration and creation since the 1950s. Offshore, our agency has built the largest and most active reef system in the country, and in the past ten years, has overseen and participated in the deployment of over 1,000 individual reefs per year. Inshore, the rehabilitation and creation of oyster reef habitat and sport fish habitat has boomed, with such programs as the wildly popular Roads to Reefs effort, and annual oyster cultch plantings. Collectively, these programs have resulted in excellent and sustainable fisheries for sport fish and shellfish, and have garnered the attention and appreciation of conservation groups and management agencies across the Gulf of Mexico and throughout the world.

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## **Mobile Bay National Estuary Program Oyster Gardening Program**

### **David Yeager – Mobile Bay National Estuary Program**

Based on the successful Chesapeake Bay Oyster Gardening Program, the Mobile Bay Oyster Gardening Program was established in 2001. Since that time the program has experienced steady growth in the number of volunteers participating. The program has risen from 30 volunteers in 2001 to 62 volunteers in 2004. The volunteers have restored at least 50,000 oysters each year (with the exception of 2004 due to Hurricane Ivan). Oyster Gardening consists of volunteers growing oysters in cages for reef restoration. The program educates citizens living on the bay on the importance of oyster reef restoration and benefits the ecology of the bay. Oyster reefs are home to over 300 species and serve as filter feeders for Mobile Bay. It also gives the public a chance to make a difference in the environment in their own backyard.

The volunteers attend an educational workshop in early May to learn about the roll of oysters in the bay's ecology and how to care for their oysters and cages. Volunteers are also shown how to build their own cages at the workshop. Training manuals are given to each volunteer. The manual includes oyster predators, history of the oysters in Mobile Bay, oyster biology etc. In April, dried oyster shell is bagged and placed on Cedar Point Reef for spat collection. After the spat have set, the shell is retrieved. The spat is delivered to the volunteers in June if the salinity levels do not interfere with the growth of the spat. The volunteers monitor the oysters once a week to remove predatory blue crabs and spray off algae from cages once a week. The young oysters are protected from predation in the cages, so most of them survive to a less vulnerable size (2 inches) for oyster reef restoration. The Oyster Gardening Coordinator visits each site once a month to measure the oyster's growth and take water quality readings. The volunteers care for the oysters until November when they are placed on a relic oyster reef. The following spring the oysters are old enough to spawn.

In 2001, the program began with 30 volunteers. There was a high survival of oysters and approximately 50,000 oysters were released onto Boykin, Denton, and Shell banks Reef.

In 2002, the program added 10 new gardeners. The volunteers grew approximately 25,000 oysters supplemented by another 45,000 provided by Auburn Marine Extension and Research Center (AUMERC). These oysters were placed on a broodstock reserve established by Bon Secour Fisheries.

In 2003, the program had a total of 51 gardeners. The season was slow to start due to low salinity levels in Mobile Bay. However, 74,000 oysters were released onto Denton Reef.

The 2004 season had a record 62 gardeners. However, Hurricane Ivan hit the Alabama coastline in September and many of the oysters were lost. Only 26, 640.63 oysters were released onto Denton Reef.

## **Strategic Assessment of Habitat Protection Needs in Alabama Using a Coastal Habitat Coordinating Team Approach**

**David Yeager – Mobile Bay National Estuary Program**

Habitat protection is identified as a priority issue in coastal Alabama. Through a consensus process the coastal communities agreed on a set of habitat objectives and documented these in the Mobile Bay National Estuary Program's Comprehensive Conservation and Management Plan. *The primary habitat objective of the Mobile Bay National Estuary Program is to provide optimum fish and wildlife habitat in the Mobile Bay system by effectively preserving, restoring, and managing resources to maintain adequate extent, diversity, distribution, connectivity and natural functions of all habitat types.* Sub-objectives include:

- Protect, restore, enhance and manage valuable public lands and work with private property owners to accomplish habitat protection goals on important privately held lands, including the acquisition of 15 additional high priority sites by 2009.
- Maintain and protect all types of coastal wetlands within the MBNEP study area and increase acreage by 5% of those types that have declined by 2006.
- Maintain and protect nesting habitat for colonial and migratory birds to reduce declines in nesting habitat due to human disturbance.
- Maintain existing native submerged aquatic vegetation at 2001 levels and increase by 3% of known areas where native SAV's occur by 2006.
- Protect existing natural shoreline, beach and dune habitat and restore previously altered habitats including the rehabilitation of altered shoreline by 1000 feet per year.

Many groups, organizations, governments and agencies are actively pursuing habitat acquisition, preservation restoration, and management activities in our area. Often our efforts are ineffective in protecting and managing critical habitat because we lack effective ways to prioritize efforts and communicate among ourselves as to what individual organizations or groups are doing to acquire, preserve and restore habitat.

Partnering with The Nature Conservancy to build on their existing processes for assessment (Effromsyn workshop methodology) and using funding provided by the Gulf of Mexico Program, the Mobile Bay National Estuary Program put in place a Coastal Habitat Coordinating Team to make a strategic assessment of our priorities for habitat protection and restoration in coastal Alabama. The result of this assessment was identification of 16 priority sites for conservation protection or acquisition and the identification of other priority sites for restoration. Additional workshops will be scheduled to put appropriate stakeholders together who may partner to undertake acquisition or restoration actions. This process will help us better work together on habitat goals and objectives by guiding individual efforts toward more well-defined regional objectives, better utilize and target existing sources funding and assist in preventing diffusion of our individual efforts. Results of the assessment will be available in various forms from the MBNEP.

## **Oyster Reef Restoration in Bon Secour Bay, Alabama**

**Scott Rikard – Auburn University Shellfish Laboratory**

**Richard K. Wallace – Auburn University Marine Extension and Research Center and  
Mississippi-Alabama Sea Grant Extension**

**Chris Nelson – Bon Secour Fisheries**

Bon Secour Bay, once known for producing choice oysters, has not supported any commercial harvest since the 1960's. Reasons reported for the decline of oysters in the area include overfishing, increased freshwater input and silt load, lack of larval supply, and periodic oxygen depletions. The Auburn University Marine Extension and Research Center (AUMERC) began studying Bon Secour Bay in the late 1990's to determine the feasibility of restoring relic reefs. Initial surveys of oyster reefs in the area indicated low population densities relative to commercially productive reefs in Mobile Bay. Research studies focusing on Fish River Reef revealed that periodic hypoxia events would hinder restoration efforts in the area. As a result, a recommendation was made that new shell planting in the area be mounded so that spat could set above hypoxic conditions found near bottom.

With hypoxia identified as a problem in Bon Secour Bay, a research project was initiated in the summer of 2004 at the Auburn University Shellfish Laboratory (AUSL) to investigate the potential for developing oysters tolerant to hypoxic conditions. Adult oysters were subjected to anoxic conditions in the laboratory to determine if oysters from areas known to experience low oxygen have an increased tolerance relative to control oysters. Survivors from the anoxia challenge were spawned and the resulting F<sub>1</sub> generation subjected to anoxia to test the hypothesis that tolerance to hypoxia can be increased through selection.

A lack of a sufficient larval supply was also identified as a problem for reef restoration in Bon Secour Bay. In 2002, AUMERC entered into a partnership with Bon Secour Fisheries, Inc. (BSF), a commercial seafood company, and Ocean Trust to establish a brood stock reserve. BSF planted 400 cubic yards of shell to build up the bottom profile of a one-acre plot of leased bottom. AUMERC planted oysters set on whole shell on the reserve through a cooperative effort with the Mobile Bay National Estuary Program's volunteer oyster gardening project. Single oysters from both John Supan at LSU's Grand Isle hatchery and AUSL have also been planted on the reserve. AUMERC continues to monitor the success of the reef.

## **Habitat Restoration in the Saw Grass Point Salt Marsh: The Use of Constructed Reefs to Minimize the Negative Effects of Boat Wash and Erosion**

**LaDon Swann – Mississippi-Alabama Sea Grant Consortium and  
Auburn University Department of Fisheries and Allied Aquacultures**

**Location and date of restoration project:** Dauphin Island, Alabama. Project period March, 2004 – May 30, 2005

### **Funding**

- a. Primary source(s) and total amount: Gulf of Mexico Foundation \$30,8940
- b. Match source(s) and total amount
  - i. Non-Federal: \$76,720 from ExxonMobil, Auburn University, Town of Dauphin Island, Boy Scouts of America Troop 5, Dauphin Island Elementary School, and Coastal Restoration, Inc.
  - ii. Federal: Mississippi-Alabama Sea Grant Consortium - \$14,524

**Project Contact:** LaDon Swann, Director, Mississippi Alabama Sea Grant Consortium and Assistant Research Professor, Auburn University Department of Fisheries and Allied Aquacultures.

**Project partners:** Town of Dauphin Island, Mobile County Commission, Auburn University Shellfish Laboratory, the Mississippi-Alabama Sea Grant Consortium, Bridgestone Firestone Cooperation, Dauphin Island Cub Scout and Boy Scout Troops, ExxonMobil, Mobile Bay National Estuary Program, AL DCNR – State Lands Division

**Type of habitat restored:** Tidal Marsh (*Juncus sp.*)

**Acreage restored:** 2.25 acres

**Project summary:** Removal of four derelict vessels along the southeastern edge of Saw Grass Point Salt Marsh. Create and monitor constructed breakwaters along the eastern edge of the Saw Grass Point Salt Marsh. Replant and monitor marsh grasses and native woody plants behind the newly established breakwaters. Provide educational opportunities and foster community participation in the restoration project.

**Rationale for project:** Although there is a no-wake zone in Fort Gaines Harbor and Pass Drury Channel, this area of high boat traffic creates coupled with frequent strong easterly winds, has led to erosion in nearby environmentally sensitive areas. One of these, Saw Grass Point Salt Marsh, is immediately West of the ferry landing. This saline tidal marsh, one of only two on Dauphin Island, consists of 25.12 acres of wetlands bordered to the south by 2.68 acres of pine savannah.

**Permits obtained (federal, state, and locale):** Good question. I think I received a nationwide permit from the Alabama Department of Environmental Management at a cost of \$250.

**Outreach and education:** Due to the 4 boat ramps, a camp ground, and a ferry, the area around the marsh is the busiest on Dauphin Island. A 3-4 foot sign will be erected at the site and will have education information and illustrations.

**Follow-up monitoring and evaluation:** Auburn University Shellfish Lab personnel will monitor the project for years to determine if erosion has been abated and habitat created.

**Challenges encountered and lessons learned:** Obtaining the necessary permits from the Corps of Engineers and State.

## **Weeks Bay Estuarine Habitat Restoration**

**Eric Brunden – Weeks Bay Reserve, Nature Trail Restoration Project**  
**L. G. Adams – Weeks Bay Reserve, Coastal Section, State Lands Division, ADCNR**

On January 1, 2003 staff of Weeks Bay National Estuarine Research Reserve (Reserve) initiated a restoration effort within a sixty-three acre tract of estuarine wetland forest and tidal marsh. The tract is adjacent to the Reserves interpretive center and contains a publicly accessible nature trail established for educational outreach and recreational purposes. Primary funding for restoration efforts came from a Gulf of Mexico Foundation grant of \$37,580.00. Volunteer and professional services provided \$37,580.00 of in-kind match.

Restoration was deemed necessary due to the tracts previous agricultural use. Drainage ditches installed within the tract have altered hydrology and exotic invasive species found throughout the disturbed area have negatively impacted native flora composition.

To date exotic invasive flora have been repetitively treated with herbicide or physically removed and dams have been built within the drainage ditches. Additional filling of the ditches will occur when conditions are favorable for the use of heavy machinery. The treatment of exotics will continue semi-annually until native flora is established.

Partners and participants along with their contributions towards restoration efforts are listed below.

1. University of South Alabama (groundwater monitoring)
2. University of Eastern Illinois (lichen study)
3. Weeks Bay Volunteer Association (trail maintenance/flora survey/exotics removal)
4. Fairhope and Robertsedale High Schools (exotics removal/tree planting/trail clearing)
5. Baker University (seedling planting),
6. Alabama Department of Conservation and Natural Resources (installation of fire lanes/controlled burn)
7. Auburn University (interpretive signs)
8. Mobile County Environmental Planning Department (fire lanes/firefighter training).

Primary outreach and education has been via the incorporation of the above listed participants with restoration efforts. Additionally, relevant interpretive displays can be viewed within the Reserves Interpretive building and along the Nature Trail.

Follow up monitoring will include the continued collection and evaluation of data regarding flora composition, ground water flow and chemistry, near shore abiotic water conditions and terrestrial abiotic conditions

Numerous revisions to the original restoration plan were necessary as the project was pursued. The basis of these many revisions will be addressed during the presentation.

# **The Role of Monitoring in Restoration Activities: Examples from Grand Bay National Estuarine Research Reserve**

**Chris May – Grand Bay National Estuarine Research Reserve**

**Location/Date of Project:** Ongoing projects at Grand Bay NERR

**Funding:** Federal

**Project Contact:** Christopher May, Stewardship Coordinator, Grand Bay NERR

**Project partners:** USFWS, MS DMR, TNC, Private Landowners

**Type of habitat restored:** Seagrass beds, oyster reefs, pine savanna

**Acreage restored:** To be determined

**Project summary:** Traditionally, funding for restoration projects has been used to conduct actual, tangible restoration activities; that is, funding is provided to move dirt, plant vegetation, and install structures. I discuss the importance of pre- and post-monitoring of restoration sites.

**Rationale for project:** Basic biological and environmental monitoring at sites where restoration projects will occur or have occurred is a critical project component. Such monitoring allows assessment of the success of a project and identification of potential improvements in restoration techniques.

**Permits obtained:** A permit for pesticide use on upland habitats was coordinated through the USFWS.

**Outreach and education:** Outreach and education activities are a core element of the NERR system, and these activities will be incorporated into any restoration activities that occur at Grand Bay NERR.

**Follow-up monitoring and evaluation:** See above.

**Challenges encountered and lessons learned:** Finding funds for pre- and post-monitoring of restoration sites can be challenging or impossible.

## **Restoration of Living Reefs in the Back Bays of Orange Beach, Alabama**

**Don Blancher – Strand and Associates, Inc.**

**Phillip West – City of Orange Beach**

This project is designed to restore living reefs at ten locations in the back bays of Orange Beach, AL: Wolf Bay, Arnica Bay, Bay La Launch, and Terry Cove. This \$104K project is funded by the NOAA Restoration Center, Community-based Restoration Program, (\$52K) with matching funds provided by the City of Orange Beach, AL (\$52K). The project is currently funded from 9/30/03-4/30/2006. Project partners include the City of Orange Beach, the Alabama Coastal Foundation and Strand Associates, Inc. The primary contact for this project is Phillip West, Environmental Planner for the City of Orange Beach.

This project, currently underway, is designed to establish a volunteer-based oyster shell recycling program and build ten living reefs with these shells in the above mentioned back bays of Orange Beach, AL. This project includes a monitoring plan to assess the success or failure of the restoration effort, when completed. The oyster shell reefs will provide habitat for fish, shellfish, and invertebrates. We anticipate that 0.5 acres of actual habitat will be restored, when the project is completed. However, the effective impact from the increased “hard bottom” community will be much larger. The rationale for this project stems from observations of increased sedimentation in back bays of Orange Beach, due to urban/residential development and agricultural land use activities, which has resulted in loss of hard bottom substrate for reef building organisms. Loss of reefs diminishes finfish and shellfish habitat and reduces shoreline protection and water quality. Prior to the arrival of Hurricane Ivan, we had scoped out sites, obtained permits from the Alabama Department of Public Health while permits from the US Army Corps of Engineers are still pending. Local restaurants were on board to donate oyster shell and volunteers were recruited to help collect, bag and place bagged shell in habitat locations. Monitoring will include visual observation of living reef development and taxonomic identification and biomass determinations in restored versus un-restored areas. Outreach activities to date include disseminating explanatory brochures and flyers, recruiting volunteers, and development of educational and descriptive web page on the Alabama Coastal Foundation web site ([http:// www.alcoastalfoundation.org](http://www.alcoastalfoundation.org)). Hurricane Ivan has greatly delayed progress on this project and efforts are on hold while the city rebuilds. The biggest challenges encountered, aside from the hurricane, were in keeping lines of communication open among project partners and volunteers and misjudging the length of time needed to obtain necessary permits.

Abstract prepared for Alabama and Mississippi Estuarine Habitat Restoration and Creation Workshop, February 14-15, 2005, Moss Point, MS.

## University of South Alabama's Alabama Oyster Reef Restoration Program

Sean P. Powers – Dauphin Island Sea Lab and  
Robert Shipp – Dauphin Island Sea Lab and University of South Alabama

**Location and date of restoration projects:** Mobile Bay (Cedar Point, Bon Secour), Little Dauphin Island, and Dauphin Island (2003-2005).

**Funding:** National Marine Fisheries Service (Congressional earmark).

**Project Contacts:** Drs. Sean P. Powers ([spowers@disl.org](mailto:spowers@disl.org)) and Robert Shipp ([rshipp@jaguar1.usouthal.edu](mailto:rshipp@jaguar1.usouthal.edu))

**Project partners:** Dauphin Island Sea Lab, Auburn Shellfish Lab, Mobile Bay NEP

**Types of habitat restored:** Subtidal oyster reef

**Acreage Restored:** 28 large reefs totaling 5.0 acres

**Project summary:** Because healthy oyster reefs are integral to the biotic health of Alabama estuaries, the University of South Alabama has initiated a program to enhance and restore oyster habitat in the Bay. The program consists of three complimentary components: (1) large-scale reef creation activities; (2) targeted research projects performed by individual University of South Alabama researchers; and (3) education and outreach activities.

**Project rationale:** The Eastern Oyster, *Crassostrea virginica*, is an integral component of coastal ecosystems and local economies along the Gulf and Atlantic coasts of the United States. Biogenic reefs formed by the aggregation of this species provide high quality habitat for numerous species of fishes and invertebrates many of which are of commercial and recreational significance (*e.g.*, spotted sea trout, red drum, sheepshead, blue crabs). Oysters also serve as filters for estuarine water and have probably exerted a high level of control on energy flow and nutrient fluxes in estuarine ecosystems in the past.

**Permits:** All reef creation activities are performed in collaboration with AL MRD under there existing permits.

**Outreach and education:** Two projects funded by the program, “Alabama Oyster Reef Restoration Program: Public outreach and K-12 education” (John Dindo, Dauphin Island Sea Lab) and “Maintaining a balance between sustainability and harvesting practices: a socioeconomic characterization” (Steve Picou) are designed to convey the research results of the project to a variety of potential stakeholders

**Follow-up monitoring and evaluation:** Oyster density twice a year, monthly sampling for finfish utilization, oyster recruitment, and water quality.

**Challenges encountered and lessons learned:** Multiple challenges associated with proper restoration siting and construction. Funded research projects are designed to provide the necessary information to overcome these problems.

## **Brackish Marsh Restoration at Fowl River and Mobile Bay**

**Barry A. Vittor and Barry P. Vittor  
Barry A. Vittor & Associates, Inc.**

The Alabama Coastal Foundation's Mon Louis Island/Fowl River tidal marsh restoration project involves excavation of accumulated dredged material from a diked disposal site created in the 1970s for the dredging of the Fowl River navigation channel. The re-graded area will be planted with several indigenous marsh species, primarily smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*). Site preparation began in August 2004, and the contractor immediately faced significant challenges in reaching and removing overburden from the restoration areas. The dredged material was very unstable, requiring twice the normal number of trackhoe mats, and the machine could not be left at the excavation site overnight. Weather conditions were often unfavorable. Hurricane Ivan and several smaller storms interrupted work, but did not damage the project site. The heavy *Phragmites* cover and root mass, plus the sloppy nature of the soil required extra handling of the excavated material. Despite these problems, Esfeller Construction completed the effort as specified, and the site has been stabilizing in preparation for planting in February-March. ACF will organize a volunteer team to plant the marsh transplants which are now being stockpiled around the restored site. Approximately 12,000 plants will be used to establish the restored marsh.

## Cat Island Restoration Following Hurricane Georges

### John Dindo – Dauphin Island Sea Lab

**Location:** Cat Island is located approximately 3 ½ miles south of the mouth of West Fowl River. The restoration project was started in 1999 and completed in the spring of 2001.

**Funding:** a. Primary Funding – National Fish and Wildlife Foundation \$11,500  
b. Match – Dauphin Island Sea Lab \$12,700

**Project Coordinator  
and implementation:** Dr. John Dindo, Dauphin Island Sea Lab

**Project Partners:** Auburn University School of Architecture, Landscape Architect Division

**Habitat Type:** Semi-woody vegetation, above high tide (*Iva frutescens*, *Baccharis halimifolia*)

**Acreage Restored:** approximately 4 acres

**Project Summary:**  
Cat Island's vegetation supports a large and critical colonial nesting habitat for herons and egrets. Hurricane Georges caused the loss of 90% of the breeding habitat and this project had resulted in reestablishment of this habitat and a return of the nesting population to levels before the hurricane.

**Rationale:** Restore critical habitat in which two species that utilize the site are threatened and of special interest in the State of Alabama

**Permits:** At the time U.S. Fish and Wildlife Banding Permit

**Outreach:** Presentations to local groups as well as utilization of project in school programs at the sea lab

**Follow-up:** Dr. Dindo has been studying Cat Island for the past 18 years and will continued that effort

**Challenges:** Needed a larger dollar commitment from NFWF, the plants alone Costs \$10,000 the investment by the sea lab was closer to \$15,000

## **Wetlands Restoration/Creation Using Dredge Material Within Mississippi Coastal Areas**

**Leah Bray – MS Department of Marine Resources**

Maintenance dredging for private and public projects is an integral component of the Mississippi coastal regulatory program. Currently, requirements for disposal of dredge material are off-site at an approved upland site or in an approved ocean dump site.

Based on an assessment of need and in order to utilize the valuable resource of material lost from these regular maintenance dredging projects, MS Department of Marine Resources has initiated a program to determine a methodology for the beneficial use of dredge material. As part of this program, DMR is partnering with other regulatory agencies, including US Army Corps of Engineers, US Fish and Wildlife Service, National Marine Fisheries Service, Mississippi Department of Environmental Quality and Mississippi Secretary of State Public Trust Tidelands Office to formulate a general permit for wetlands restoration/creation using dredge material within Mississippi coastal areas.

The purpose of the General Permit would be to provide an environmentally desirable alternative to upland disposal or ocean dumping of dredge material. The general permit will provide detailed plans for site design to restore or create wetlands within nine proposed sites along the Mississippi Gulf Coast, or three sites per county. A mechanism for increasing the number of restoration sites will be included within the permit.

DMR and its partners are looking for ways to maximize the benefits of this program to the end-users, the environment, and the regulatory partners through cost-sharing of site planning, including cultural resource surveys, restoration planning, site preparation (e.g., armoring or other site requirements to ready for the placement of the dredge material) and dredge material testing, and closing out of a site, planting where appropriate using the prepared plan.

## **Fish Reef Restoration Using Bridge Rubble**

**Chris Lagarde – Congressman Gene Taylor's Office**

Anyone who has been down Highway 90 through Pass Christian lately may have noticed some activity just Northeast of Cat Island in the Sound. Also, anyone who has been down I-10 through Hancock County in the last two years is certainly aware of the construction at the I-10 Jordan River bridge. These two linked projects are working examples of what can happen when agencies and people work together. The Square Handkerchief Key just south of the Bay of St. Louis is being expanded to include the remainder of the dismantled I-10 bridge over the Jordan River. The first 1200 feet of the key laid down in 2002 was the rubble from the East bound bridge. Now the reef is being doubled in size with the addition of the concrete from the West bound bridge.

L&A Contractors is moving the material on a barge from I-10 to the site of the Key. The Key is having 300 feet added on the north end and the remaining 900 feet is being added to the South end. The project is approximately three-quarters complete at this time.

The semi-submerged concrete will continue to foul and allow organisms like oysters and barnacles to grow on its surface, providing a feeding area for fish, blue and stone crabs. The result will be an increase in bio-diversity and give recreational fishermen with smaller boats a chance to fish on an artificial reef. In addition to being an easily accessible fishing spot, the lee side of the structure can also provide some relief for boaters who become caught in storms that can pop up unexpectedly.

The Square Handkerchief Key project involved cooperation from many agencies and bodies. The Mississippi Departments' of Transportation, Marine Resources, and Environmental Quality; the Secretary of State, Army Corps of Engineers, Hancock and Harrison Counties, L&A Contractors, and the Mississippi Gulf Fishing Banks, all played important roles in the permitting, funding, and construction necessary to complete this project.

This second half of the project was funded by the Wallop-Breaux Aquatic Resources Trust Fund. This fund was established by congress to help in the areas of boater safety and sports fishing. It authorized motorboat fuel taxes, and excise taxes and import duties on fishing equipment and recreational boats, to be transferred to the fund. This is a unique program that allows those who fish and boat to directly receive the benefit of the taxes they pay on items purchased for these activities.

The public enthusiasm for the Square Handkerchief Key has been overwhelming. Whereas before we had an entire bridge that was going to sit useless in a landfill, we will now have a 2,400-foot long key. Before, this material was helping South Mississippians move from place to place, now it will serve as an easily accessible fishing venue.

It was a pleasure to work with everyone in the planning and completion of the key. We must consider these opportunities as they arise. This shallow reef will enhance our local fisheries by allowing this concrete to continue to work for South Mississippi.

## **U.S. Fish and Wildlife Service Estuarine Restoration in Alabama**

**Larry E. Goldman – U.S. Fish and Wildlife Service  
Field Supervisor – Daphne, Alabama Field Office**

**Locations:** Marsh projects have been carried out at Weeks Bay, Mobile-Tensaw Delta, and on the western shore of Mobile Bay near Brookley Field; dune projects have been at Bon Secour NWR, Fort Morgan State Park, Gulf State Park and county road R-O-W on Fort Morgan

**Funding:** Fish and Wildlife Service provided all funding; in kind contributions came from partners

**Project Contact:** Randy Roach, Daphne, Alabama Field Office 251-441-5872

**Partners:** Camp Beckwith, Fish River Christmas Trees, Baldwin County Commission, FEMA, University of South Alabama, Alabama Department of Conservation and Natural Resources-- State Lands Division (SLD), Fort Morgan State Park, Gulf State Park

**Habitat Restored:** Shoreline emergent marsh; Gulf-fronting primary-secondary dunes

**Acreage restored:** Marsh: about 10 acres; Dunes: about 2 miles

**Project Summary:** Marsh restoration included wave protection (Christmas tree fences and other means) and planting marsh plants; dune restoration involved installation of sand fencing, sifting and placing reconditioned sand, and planting dune plants.

**Rationale for Project:** Shoreline emergent marsh is vital for fish, shellfish and wildlife resources; dune habitat is important for the endangered Alabama beach mouse

**Authorizations:** Property owners, Corps of Engineers, ADEM, SHPO, FEMA

**Outreach/education:** Students have provided labor for many projects. Powerpoint presentations have been shown to many groups. FWS-DFO website

**Follow-up monitoring-evaluation:** Ongoing, once per year.

**Challenges:** Getting partners, logistics, permits, hurricanes, managing labor

## **Funding Opportunities at the National Fish and Wildlife Foundation**

### **Chris Rigby - National Fish and Wildlife Foundation**

Chris Rigby, Assistant Director of the Foundation's southern regional office, which is located in Atlanta, will give an overview of the Foundation's grant making as it relates to the Gulf coast. He will describe the Foundation's 20 year grant making history, reviewing the number and type of grants the Foundation has given, explain match requirements and the application process. In addition to reviewing the Foundation's marching grant program, he will highlight several partnerships that are particularly relevant to the region. These include the Shell Marine Habitat Program, Southern Company Power of Flight program, and the North Gulf Coast Initiative the Foundation is launching in partnership with NOAA.

## **U. S. Army Corps of Engineers Habitat Restoration Programs**

**Susan Ivester Rees, Ph.D. and Jennifer L. Jacobson**  
**U. S. Army Corps of Engineers**

Congress has provided nationwide continuing authorizations to the Corps of Engineers to plan, design, and construct aquatic habitat restoration projects throughout the United States. These Continuing Authorities do not require yearly authorization and funds are appropriated nationwide each year. In all instances there is a requirement for a local sponsor who is required to provide a share of the costs of the project, lands, easements, and rights of way, and future maintenance. Currently we work under three authorities:

Section 1135 of the Water Resources Development Act of 1986 provides for ecosystem restoration through modification to Corps structures or operation of Corps structures or implementation of restoration features when the construction of a Corps project has contributed to degradation of the quality of the environment.

Section 204 of the Water Resources Development Act of 1992 provides for protection, restoration, and creation of aquatic and wetland habitats in connection with construction and maintenance dredging of an authorized project.

Section 206 of the Water Resources Development Act of 1996 provides for the restoration and protection of aquatic ecosystems if the project will improve the environment and is in the public interest.

We will discuss the procedures followed in the development of projects under each of these authorities and provide examples of ongoing or completed activities.

## **Mississippi's Basin Management Approach - "An Evolving Process"**

**Steve Goff – Coastal Streams Basin Coordinator  
Mississippi Department of Environmental Quality**

### **Major Points:**

- BMA Purpose
- Five Phases Update
- Lessons Learned
- New Terminology
- Q & A

**Summary:** MDEQ's Basin Management Approach to protect and/or restore Mississippi's Water Resources continues to be a collaborative effort using resource agencies and local stakeholders to provide input to and development of watershed implementation plans. Lessons learned during the first five year cycle have generated a more efficient and effective process to identify and address prioritized restoration/protection projects.

## **Coastal Alabama Clean Water Partnership**

**Jody A. Scanlan – Auburn University Marine Extension and Research Center  
and Mississippi-Alabama Sea Grant Extension**

The Coastal Alabama Clean Water Partnership, facilitated by Alabama Sea Grant Extension, is a public-private partnership dedicated to improving water quality in Coastal Alabama, and is part of the overall Alabama Clean Water Partnership. The Partnership is funded through the Clean Water Act Section 319.

Goals of the CACWP include protection and restoration of water quality, stakeholder education, and facilitation of on-the-ground demonstration projects. The CACWP has sponsored a series of streambank restoration workshops to build local capacity in Rosgen techniques. Also, each year, the Partnership solicits project proposals from watershed groups and municipalities for demonstration and education projects, in an effort to assist these groups in finding funding for these projects.

## **Creation of a Natural Beach Landscape Along the Manmade Beach in Biloxi, Mississippi**

**Pete Melby, Tom Cathcart and Richard Harkess  
Center for Sustainable Design - Mississippi State University. and  
Biloxi Bay Chamber of Commerce**

Would you like to see what the coastal edge might have looked like in the 1800's? The attractive natural beach landscape across from Miramar Road Park in Biloxi is evolving into just that kind of native landscape, and is providing beach goers with a different experience from the sterile environs of the regularly maintained beach on either side

The 3 acre site is composed of over 50 species of native plants, many which have established themselves naturally and are native only to beach landscapes. Dr. Tom Cathcart with the Center for Sustainable Design (CSD) says the plants are unique to the area because they are able to withstand the harsh conditions of the white sandy beach including the intense heat, bright sun, salt spray and long periods with no rain. The 3 acre experiment began in 1995 as a joint project between the Biloxi Bay Chamber of Commerce, the CSD at Mississippi State, the Harrison County Sand Beach Department, and the Department of Marine Resources. A long range objective identified by Mississippi State Landscape Architecture Students for the Biloxi Tourism Design Plan in 1991 was to get rid of the 200 large concrete pipes that cross the beach and find another way to carry runoff from the mainland to the Mississippi Sound.

Besides aesthetics and improving the beach experience, the effect the native plantings are having on sand movement has been evaluated. Sand Beach Department Director Bobby Weaver noted that crews were not having to sweep sand from the highways behind the natural beach site, nor were they having to strip sand from those medians each year. In a 4 month long study it was found there was 500 times more sand blowing across the beach on the regularly maintained beach than on the natural beach! When CSD researchers Cathcart and Melby concluded sand movement on the natural beach was being controlled by plant roots, they talked with no till farming researchers at Mississippi State and were told to compare sand compaction differences between the two sites. It was found that a compacted layer of sand 6 inches beneath the sand on the regularly maintained beach was being created by beach cleaning equipment. That compacted layer was not found on the natural beach. Beach cleaning equipment was fluffing the sand at a depth of 6 inches and compacting the sand below that level, thereby creating the compacted level and rain falling on the beach moved through the fluffed level and when it met the compacted layer, it washed the fluffed sand into the Mississippi Sound. Rain on the natural beach site, which receives no heavy equipment maintenance, soaked deeply into the sand and there was no surface runoff into the Mississippi Sound.

There is also no blowing of sand on the naturally maintained site due to a combination of roots on the natural beach holding on to the sand and the fact that the sand has been allowed to settle and interlock due to no disturbance by beach cleaning and sand grading machinery. Professor Melby added, "These findings could affect the monumental beach renourishment effort that occurs about every 8-10 years due to beach erosion."

The beach is a dynamic, ever changing landscape controlled by natural cycles and seasonal weather events. Revered local artist Joe Moran is remembered to have said to just leave the beach alone and it would stabilize itself and become an attractive part of Biloxi. The CSD and the Biloxi Bay Chamber of Commerce are doing just that with the natural beach landscape. Come visit the site and step back onto an 1800's Biloxi beachfront.

## Mississippi Sound Reef Restoration Project

Nicole Vickey – The Nature Conservancy of Alabama  
Cynthia Ramseur – The Nature Conservancy



**Location:** Biloxi Bay, near Spoil Island

**Date:** May or September 2005

**Funding:**

- **Primary source(s) and total amount:** National Partnership between the NOAA Community-based Restoration Program and The Nature Conservancy, \$35,600
- **Match source(s) and total amount:** The Nature Conservancy, privately-raised funds, \$24,955.20 and volunteer in-kind services, \$900; Mississippi Department of Marine Resources, in-kind monitoring services, \$21,600.

**Project Contact:** Nicole Vickey, The Nature Conservancy of Alabama  
[nvickey@tnc.org](mailto:nvickey@tnc.org)

**Project partners:** Mississippi Department of Marine Resources (primary partner)  
The Mobile Bay National Estuary Program  
J.L. Scott Marine Education Center

**Type of habitat restored:** Reef.

**Acreage restored:** 5 acres

**Project summary:** The Nature Conservancy, in partnership with the Mississippi Department of Marine Resources, seeks to expand an existing reef habitat restoration demonstration project by conducting restoration activities on five acres in Biloxi Bay. In addition, The Nature Conservancy hopes to identify an additional 30 acres of potentially restorable sites in eastern Mississippi Sound.

**Rationale for project:** As the result of The Nature Conservancy's conservation planning process, reef habitat was identified as a target for conservation and restoration in eastern Mississippi Sound.

**Permits obtained:** Mississippi Department of Marine Resources is obtaining needed permits.

**Outreach and education:**

Volunteers will be an important component of the 5 acre restoration, conducting hook and line surveys to document fish colonization of the restored reef habitat.

TNC plans to publish the results of the planning phase of this project, including the map of viable restoration sites, on the Mobile Bay National Estuary Program website. TNC will outreach to other interested conservation organizations and interest groups to let them know that this map is available. We hope that making this map publicly available will encourage other organizations to join this landscape-scale restoration effort.

The Nature Conservancy also hopes to use this study to educate the residents of coastal Alabama and Mississippi about the benefits of reef habitat to commercial and recreation fisheries, shoreline stabilization and water quality. To this end, we plan to work in partnership with the Mobile Bay NEP's oyster gardening program, providing field trips to our restoration sites and engaging students and volunteers in the restoration efforts. We will also work with the J.L. Scott Marine Education Center to include information about this restoration effort in their upcoming oyster-focused exhibit. We will also work with the education coordinator at the Grand Bay National Estuarine Research Reserve to incorporate information about this effort in their public outreach program.

TNC will actively seek quarterly opportunities to present this project to various civic and community organizations.

**Follow-up monitoring and evaluation:** The Nature Conservancy and Mississippi Department of Marine Resources will monitor the success of this project by evaluating the following structural and functional objectives:

**Structural Objective:** *Construct 5 acre platform of cultch material*

Parameter: *Area of cultch placement in acres*

Technique for Measurement: *Side scan sonar will be used to do pre and post site evaluations.*

Baseline: *Essentially 0 acres of cultch as determined by side scan sonar in 2003.*

*There was some shell there but very patchy.*

Reference: *Area – 5 acres*

Target: *5.0 acres*

Timing: *Preliminary scan 2004; Post-construction scan will occur within one month of cultch material deployment; Plan to do a ~ 5 year post-construction scan*

**Functional Objective:** *Successful spat settlement, growth and survival on cultch of mature oysters*

Parameter: *# spat (less than 1 inch), seed (1-3 inches), adult oysters (3+ inches)/m<sup>2</sup>*

Technique for Measurement: *1 minute hand-dredges – area of sample will be estimated by multiplying area of dredge opening by speed of vessel and time of dredge (e.g. 0.5m opening x 25m/minute x 1 minute)*

Baseline: *Essentially 0/m<sup>2</sup>*

Reference: *Hand-dredge samples will be collected from other nearby reefs. Average # spat, seed and adult oysters will serve as reference for a given time period.*

Target: *Some percentage of spat and seed comparable to the reference within 2 years (i.e. 20% of the reference spat set, 10% of the reference seed within 2 years)*

Timing: *Biannual for several years*

**Challenges encountered and lessons learned:** The Nature Conservancy is new to reef restoration activities, and is hopeful that this partnership with Mississippi Department of Marine Resources will teach us many needed lessons on how to successfully restore reef habitat so that we may extend our efforts into new locations across the eastern portion of Mississippi Sound.

## **Northern Gulf of Mexico Eco-regional Planning The Nature Conservancy**

**Rafael Calderon – The Nature Conservancy**

The Nature Conservancy undertook a first iteration of an ecoregional plan for the northern Gulf of Mexico that identifies key habitats at risk including oyster reefs, seagrass beds, salt marshes, and mangroves and provides a first attempt at identifying the most appropriate places for their conservation. During this process identification of a prioritization process to determine where to establish site-based projects throughout the Gulf that would aid in restoring these key habitats. This process was done building partnerships with key US government agencies like the EPA Gulf of Mexico Program, NOAA's Community-based restoration program, and the Army Corps of Engineers, as well as by developing strong ties with Mexican and US management agencies to look at resource planning and management at larger scales. This process has allowed for development of a Gulf of Mexico program within TNC linked and led by science to achieve larger scale conservation in the Gulf. Among the projects/activities that this effort has spawned are a Seagrass Conservation program, Oyster reef restoration projects, coordination and planning with the Upper and Lower Mississippi initiatives and more.

## **Operation Green Shores Project, Pensacola, FL**

### **Sava Varazo – Restoration Consultant**

Project GreenShores is a community-supported oyster, saltmarsh and seagrass habitat restoration project developed by the Florida Department of Environmental Protection, ERSO, Inc. and local partners to replace estuarine habitat destroyed decades ago. Located along Bayfront Parkway in Pensacola, Florida, it is highly visible to the public. Originally planned as a small shoreline habitat demonstration project, GreenShores attracted the attention of many partners and volunteers and grew to a substantial restoration project. Site I, completed in the fall of 2003, provides 15 acres of restored habitat. Site II, an additional 25 acres, is in the planning and fundraising stages.

The primary objective of Project GreenShores is to create a highly visible, accessible, habitat-rich, educational shoreline restoration project to serve as a restoration model for other disturbed estuarine shorelines. Project GreenShores was constructed by installing over 20,000 tons of limestone rock and clean broken concrete in mounds to create a protective reef approximately 2,000 feet long by about 75 feet wide, resulting in an approximately 3.4-acre oyster reef habitat. Approximately 16 tons of live oysters were moved from the shoreline to the rock mounds, which resulted in large numbers of new oyster spat and barnacles on the rocks. Approximately 35,000 cubic yards of clean sand was pumped between the rock and shoreline to create five individual intertidal areas to approximate the original water depths. About 35,000 *Spartina alterniflora*, smooth cordgrass plants, were planted on the intertidal areas. *Ruppia maritima*, widgeon grass, is being planted between these areas to create a 12-acre saltmarsh and seagrass habitat. An unexpected benefit has been an increase in the numbers and diversity of birds, and the project was recently designated as part of the Great Florida Birding Trail.

## **Development of a Regional Estuarine Habitat Restoration Plan for the Five Coastal Counties in Alabama and Mississippi**

**LaDon Swann – Mississippi-Alabama Sea Grant Consortium and Auburn University Department of Fisheries and Allied Aquacultures**

There are substantial gaps in estuarine habitat restoration planning in every region of the coastal United States (Restore America's Estuaries, 2002). There is a paucity of regional comprehensive estuarine habitat restoration planning in every region of the United States, including the north central Gulf of Mexico. The lack of regional site-specific planning is compounded by population growth resulting in a rapid urbanization along the margins of waterways and upland areas where there is oftentimes minimal land use planning. High rainfall (60 in/yr) combined with land disturbance leads to erosion and sedimentation in public waters. The ever increasing use of impervious surfaces following land disturbance contribute to a variety of nonpoint source pollutants reaching estuaries. Sediment and pollutants combine to reduce the quantity and quality of habitat necessary for the sustainability of NOAA trust resources. Other related threats include bulkheading, wetland fillings, and the cumulative effects of a variety of activities on estuarine habitats.

To offset the loss of essential habitat, state management agencies routinely create fish reefs and plant clutch material for oyster settings. During the last two years several non-profits, municipalities, and state agencies have also benefited from restoration grants to restore or create estuarine habitat. However, a strategic assessment to serve as a guide for future habitat restoration projects has not yet been completed for estuarine habitats in Alabama and Mississippi. Development of such a plan would serve as a “roadmap” to estuarine habitat restoration projects by setting restoration goals and identifying priority sites. There is a need for science and technology to be a fundamental part of the identification and prioritization of restoration sites in the two states. Without such a plan in place, groups involved in estuarine habitat restoration will be challenged by a scattered, fragmented or even a “shotgun” approach to restoration projects. In many existing restoration projects, the selection criteria are determined, as much by politics as science. While politics, especially on the funding side, is important, there needs to be a better balance between the two, with science being the ultimate factor in undertaking restoration projects.

Auburn University Department of Fisheries and Allied Aquacultures and the Mississippi-Alabama Sea Grant Consortium (MASGC) propose to develop a consensus-based regional estuarine habitat restoration plan for the five coastal counties in Alabama and Mississippi. These counties include Jackson, Harrison, and Hancock Counties in Mississippi (4<sup>th</sup> Congressional District) and Mobile and Baldwin Counties in Alabama (1<sup>st</sup> Congressional District). Potential collaborators in this process will include the Mobile Bay National Estuary Program, the Dauphin Island Sea Lab, Mississippi Department of Marine Resources, Alabama Department of Conservation and Natural Resources (Coastal Programs and Division of Marine Resources), The Nature Conservancy in each state, the Army Corps of Engineers, both states' Coastal Conservation Associations, the Gulf Fishing Bank, the Alabama Seafood Association, the

Organized Seafood Association of Alabama, the Alabama Coastal Foundation, and many other constituent groups.

The plan will provide restoration goals and identify priority sites in the U.S. Geological Service, Hydrologic Unit Codes: 03140107 (Perdido Bay), 03160205 (Mobile Bay), and 03170009 (Mississippi Coastal). Each of these areas encompasses a rich cultural heritage of commercial, a rapidly expanding recreational fishery, traditional coastal communities, newly created waterfront communities, a host of water related recreational opportunities, and significant port operations.

## Suggested Readings

- Restore America's Estuaries. (2002). National Strategy to Restore Coastal and Estuarine Habitat. Available at: <http://www.estuaries.org/downloads.php>
- The Nature Conservancy. (2000). Identification of Priority Sites for Conservation in the Northern Gulf of Mexico: An Ecoregional Plan. Available at: [http://www.epa.gov/gmpo/habitat/NGoM\\_Final\\_allfigs.PDF](http://www.epa.gov/gmpo/habitat/NGoM_Final_allfigs.PDF)
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## Funding Opportunities

- NOAA Restoration Center: <http://www.nmfs.noaa.gov/habitat/restoration/>
- Fish America Foundation: <http://www.fishamerica.org>
- Gulf of Mexico Foundation: <http://gulfmex.org>
- National Fish and Wildlife Foundation: <http://www.nfwf.org/index.htm>
- Mississippi-Alabama Sea Grant Consortium: <http://www.masgc.org>
- EPA Gulf of Mexico Program (habitat): <http://www.epa.gov/gmpo/habitat.html>