THE MISSISSIPPI GULF COAST RESTORATION PLAN

A Path Toward Sustainable Ecosystem Restoration

AUGUST 31, 2015

MISSISSIPPI DEPARTMENT of ENVIRONMENTAL QUALITY
NATIONAL FISH and WILDLIFE FOUNDATION
The Plan

OVERALL GOAL:

“Create a plan that would result in a **coordinated**, **systematic**, and **transparent** process for **sustainable** ecological restoration in Mississippi, that will direct funds associated with the GEBF, and be applicable to informing ecological restoration funding associated with the RESTORE Act.”
The Plan

**PRIMARY GOALS:**

• To meaningfully engage individuals and organizational stakeholders (e.g., government, academia, non-government) in a transparent and inclusive Plan development process;

• To develop the Mississippi Comprehensive Ecosystem Restoration Tool (MCERT), a science-based tool for identifying and examining ecological resources and threats for improved restoration planning and project sustainability; and

• To establish program objectives and a decision-making process for projects based on the above goals to promote the long-term vitality and sustainability of all of Mississippi’s coastal habitats and resources.
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Chapter 1: Introduction and Public Engagement
Individual CBO and NGO Meetings

Community Conversations

Resource Summits

Themes:
• Water Resources Restoration and Enhancement
• Gulf Environment Conservation and Restoration
• Sustainable Ecological Restoration

• Restoration should not be limited to public lands
• Oyster reef habitat was ranked the most important marine resource, followed by shrimp, seagrass habitat, and recreational finfish
• Sewer/wastewater and nutrient loading from the urban environment was ranked as the top threat to water quality
Overall Restoration Vision

- Restore and enhance ecological function and connectivity of habitats
- Restore and stabilize the populations of important species at sustainable levels
- Restore and enhance the ecological and hydrological integrity of our water resources
Chapter 2: Landscape Change

TERRESTRIAL ENVIRONMENT

ALTERATIONS IN LAND COVER
Land cover change was analyzed using data from NOAA’s Coastal Change Analysis Program (C-CAP). This program offers a standardized database of land cover and land change information for the coastal regions of the U.S. The data provide spatial inventories of coastal intertidal areas, wetlands, and adjacent uplands with the goal of monitoring these habitats by updating the land cover maps every five years. Data were aggregated by five HUC-8 watersheds that are included in the restoration plan study area (Figure 4). Land cover change values show different trends depending on watershed characteristics including conversions in land use, habitat loss, and fragmentation. For example, the Lower Pearl watershed shows substantially more forest loss from 1996 – 2010 than any other watershed (Figure 5).

FRAGMENTATION AND CORE AREAS
Core habitat (forest not degraded by edge effects) is a key feature that has a large influence on ecosystem functioning and is related to the level of fragmentation. Fragmentation occurs when large, contiguous habitats are divided into smaller isolated patches. This process is typically caused by human activities, such as road and utility corridor construction, agricultural land conversion, and urbanization, all of which may have large impacts on ecological processes. Forest fragmentation in coastal Mississippi is considerable, and the amount of core areas has declined in every watershed over the last 15 years and most dramatically in the Lower Pearl (Figure 6). For more information, see Chapter 3 or the full MCEET report http://www.mceetms.com/NWF_Plan/NWF_Plan_Task_2-4_Appendix.pdf.

THIS LOSS COULD HAVE BEEN CAUSED BY DRASTIC FOREST LOSS FROM HURRICANE KATRINA AND/OR SYSTEMATIC, SHORT-TERM COMMERCIAL FOREST HARVESTING: Forest loss and fragmentation represented the highest losses in every watershed, followed by woody wetlands and agriculture losses. The large increase in scrub/shrub habitat are likely (1) remnants of Hurricane Katrina that are regenerating or (2) forestry practices in which clear-cuts have occurred and the area have been planted, representing young pine monocultures. These scrub shrub areas are young forest and represent only a temporary change in land cover, but not a change in land use.

Figure 4. Land Use/Land Cover in the Study Area and by the Mississippi Comprehensive Ecosystem Restoration Tool.

Figure 5. Net change in land cover across watersheds in coastal Mississippi from 1996 – 2010.
Chapter 3: MCERT Models

- **Landscape Conservation**
  - Habitat Fragmentation Analysis
  - Landscape Connectivity

- **Water Resources**
  - Nutrient and Sediment Loadings
  - Flow

- **Watershed Characterization**
  - Aggregated Environmental Resource Data
  - Aggregated Impact/Stressor Data

- **Marine Restoration Planning**
  - Aggregated Environmental Resource Data
  - Aggregated Impact/Stressor Data

- **Subwatershed Planning Units**
  - Environmental Resource Score
  - Impact/Stressor Score

- **Marine Planning Units**
  - Environmental Resource Score
  - Impact/Stressor Score

**Restoration Effort Index**
Chapter 3: MCERT Models

**Environmental Resource (ER) Value Metrics**

**Environmental:**
- Hubs
- Corridors
- Threatened and Endangered Species
- Estuarine Wetlands
- Other Wetlands (Poluwanine)
- Wildlife Management Areas
- National Wildlife Refuges
- National Forests
- Mississippi Coastal Preserves
- Wilderness Areas
- Camp Shelby Managed Area
- NGO Land
- Conservation Easements
- Department of Defense Land

**Human Welfare:**
- Public Waterways
- Source Water Protection Areas
- Water Quality Standards for Recreation (Streams)
- Water Quality Standards for Recreation (Lakes)
- Water Quality Standards for Public Water Supply (Streams)
- Water Quality Standards for Public Water Supply (Lakes)
- Recreational Locations
- State, National, and Local Parks

**Impact/Stressor (I/S) Metrics**

**Environmental:**
- Non-Riparian Zone
- Subwatershed Nitrogen Yield
- Subwatershed Phosphorus Yield
- Subwatershed Sediment Yield
- Cumulative Nitrogen Input
- Cumulative Phosphorus Input
- Cumulative Sediment Input
- Impervious Surface
- Dam Storage Ratio
- Livestock Index

**Human Welfare:**
- Landscape Development Intensity
- Groundwater Permits
- Surface Water Permits
- Erosion Potential Index – National Hydrography Dataset (NHD) Subwatersheds
- Nutrient Potential Index – NHD Subwatersheds
- Beach Closures
- National Pollutant Discharge Elimination System (NPDES) Locations
- Section 303(d) of the Clean Water Act Impaired Water Bodies

*Table 3. Subwatershed characterization data inputs.*
Chapter 4: The Plan

Made up of two key components:

MCERT

The DSS

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The DSS is an analytical framework informed by science inputs (MCERT), which guides appropriate decisions on restoration actions. The DSS accounts for scientific gaps and identifies root causes of stresses that compromise sustainability. It provides a logical framework to determine project feasibility and location prioritization so that decision makers can make informed, science-based decisions for enhancing, protecting, or restoring the ecological integrity (Figure 22). There are three levels of screening at which decisions points will be addressed:

1. PROGRAM/OBJECTIVE LEVEL
   - decisions on programmatic inputs into DSS

2. RESTORATION ACTION LEVEL
   - decisions on existence of ecological resources and impacts/stressors, scientific gaps, and the need to address fundamental root causes before restoration action implementation

3. PROJECT LEVEL
   - decisions whether project meets specific criteria and proper locations for implementation

MCERT data outputs are used to support decision points at all levels of the DSS. Furthermore, data gathered from scientific gap studies and restoration-assessment data will be used to implement adaptive management through feedback into MCERT for further refined support in decision making.

This DSS process will help produce groups of projects within programs that result in coordinated science-based restoration at scales that are meaningful to meaningfully change the condition of our coastal lands, water, and marine resources and habitats.
MCERT - Overview

Restoration Effort Index - Theory

“Environmental Resources”

“Environmental Stressors”
Restoration Effort Outcome

Marine Planning Units

- ER1, IS4 (Very Low)
- ER1, IS3 (Very Low)
- ER2, IS4 (Very Low)
- ER1, IS2 (Low)
- ER2, IS3 (Low)
- ER3, IS4 (Low)
- ER1, IS1 (Moderate)
- ER2, IS2 (Moderate)
- ER3, IS2 (Moderate)
- ER2, IS1 (High)
- ER3, IS2 (High)
- ER3, IS1 (Very High)

Cautionary
Sensitivity Analysis

![Sensitivity Analysis Graph]

The graph illustrates the sensitivity of weighted values to different percent changes in planning unit zone categories. The categories include WQ Nitrogen, Estuarine Emergent Wetlands, Commercial Oysters, and SAV. The graph shows the impact on values when reducing weight by 25%, 50%, and 75% across various percent changes in planning unit zone categories.
Foundationally built on ensuring sound scientific and sustainable projects
Ensuring Success with Science

Ensuring Sustainability by being Foundational

The DSS
Project Lists vs. DSS

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DSS vs. Random List of Projects

- **Expectation:** Sets a unfair expectation that a project will be funded eventually
- **Limitless List:** List could be continuously expanded and increased as new projects materialize
- **Transparency:** Difficult to justify why a project got selected over another
- **Ensuring Sustainability:** Projects are not built whereby they drive at the sustainability of the project

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DSS vs. Prioritized List of Projects

- **Lack of science to prioritize**: There are no plans currently that have a prioritization of projects to be funded.
- **Inflexible to change**: If they have been prioritized then there was a justification to that prioritization.

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Meeting NFWF’s Standards

- NFWF invested in the Planning Process for a reason
- The DSS is an approach that will help provide the NFWF Board the opportunity to know that projects are being situated in the State of Mississippi in such a way to:
  1. Maximize the success of any project
  2. No matter the starting point – be that a given area (i.e., Hancock County Marshes), a given project in a given area (i.e., Oyster reef rebuilding in Back bay of Biloxi), or an overarching theme to fund a certain type of restoration action (i.e., land acquisition) – that the most sustainable route forward will be prioritized.

Principal Tenets
Advantage #1: Prioritized Decision Making

“Principal Tenet: Thinking Long Term”
EXAMPLE 1

**Programmatic Input: Acquisition of land adjacent to salt marsh for buffer.**

In this example, the input is actually a restoration action. This action type can be found in many different conservation plans. It is specifically a priority in the Grand Bay NERR Management Plan and for DMR Coastal Preserves Program. Data have and continue to be collected on this concept.

**Does the Programmatic Input Address a Program Objective? Yes**

- Program: Land Resources
- Objective: Conserve Priority Habitats

**What is the Restoration Action of Interest for the Associated Program Objective?**

Restoration Action - Conservation of buffers to facilitate the natural migration of coastal marsh habitat inland in response to sea-level rise

**Are There Adequate Scientific Data Available to Ensure Success of the Implemented Project? Yes**

Some data are available on this concept and there are clear locations in Mississippi which are facing high erosion rates with no buffer.

**Based on the Restoration Effort Index (REI), Do Any Foundational Root Causes Need to Be Addressed for Candidate Restoration Locations Before Implementation? No**

- In case of land acquisition, there are no foundational root causes to be addressed.
- By scoping out the data associated with the REI (MCERT), identify a few candidate locations for such a project (MAP). The ecological research show locations that still contain large stands of healthy salt marsh and the impact/stressor data show those areas that are highly erosive. “Low” and “very low” index scores are desirable because of less impediments/stressors to migration.
- Candidate locations include: Hancock County, St. Louis Bay, Graveline Bay, Grand Bay

**Project Site-Specific Criteria/Conditions (MCERT Location Prioritization)**

- Adjacent to marsh
- Willing to sell
- Adjacent to other protected land
- Hub/corridor size
- Low development pressure
Advantage #2: Ability to coordinate restoration with RESTORE and NRDA

One Trustee

NRDA  |  RESTORE  |  NFWF

Grand Bay Example

“Principal Tenet: Leverage”
Advantage #3: Use of “learning by doing” to inform decision making and expenditures

Current Oyster Proposal – Project Component: Benthic Habitat Mapping of Oyster Reefs

Provide information on areas of missing reef

Confident cultch deployment estimate and location

Next project framed out based on information

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EXAMPLE 2

PROGRAMMATIC INPUT:
OYSTER HABITAT RESTORATION IN
PASCAGOUA RIVER MOUTH

Restoration of historic oyster habitat in Mississippi
estuaries has been an important priority for many
strategic partners (TNC, DMR) and is cited in numerous
planning documents and as a project type in the MS
project portal. This area historically had most oyster
habitat removed in the first half of the century and once
supported productive oyster reefs.

DOES THE PROGRAMMATIC INPUT
ADDRESS A PROGRAM OBJECTIVE? YES

- Program: Coastal and marine living resources
- Objective: Protect and restore marine habitats

WHAT IS THE RESTORATION ACTION OF
INTEREST FOR THE ASSOCIATED PROGRAM?

Restoration Action: Restore and/or create non-
commercial oyster reef habitat

ARE THERE ADEQUATE SCIENTIFIC DATA
AVAILABLE TO ENSURE SUCCESS OF THE
IMPLEMENTED PROJECT? NO

Benthic habitat mapping is needed to better understand
the best locations for oyster habitat restoration. In this
scenario, a benthic habitat project would need to be
conducted first. Once completed we can continue to the
next step of the DSS.

BASED ON THE RESTORATION EFFORT
(INDEX (REI), DO ANY FOUNDATIONAL,
ROOT CAUSES NEED TO BE ADDRESSED
FOR CANDIDATE RESTORATION LOCATIONS
BEFORE IMPLEMENTATION? YES

- By scaling the data associated with the REI (MCERT),
the impact data indicate a sedimentation issue for
the area. This issue would first need to be explored
and addressed (MAP). The ecological data show
locations where oyster reefs historically existed and
other current features that could benefit oyster reefs.
- In this scenario, assume the WQ project to reduce
sedimentation was addressed (see Example 3)
appropriately and move to project development.

PROJECT SITE-SPECIFIC CRITERIA/CONDITIONS
(MCERT LOCATION PRIORITIZATION)

- Salinity: Bathymetry
- Historic reefs
- Potential conflicts with user groups

MCERT Restoration Effort Index (REI)

Planning Units in areas with “low” and
“very low” index scores

Suitable locations vetted through project
site-specific criteria using MCERT
Advantage #4: Flexible to unexpected environmental circumstances and conservation opportunities

Example 1

Example 2

110,000 acre acquisition

VS.

Hurricane and other natural disasters
Being flexible to respond to change
Transparency of Plan

- Online MCERT viewer with option to provide feedback
- Translated Plan into Vietnamese
- Online version of Plan
- Technical Q&A document to highlight changes from V1 to V2
NFWF Webinar
The Mississippi Department of Environmental Quality
March 1, 2016 | 10:00 am CST

Questions?

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The webinar will be posted on
www.restore.ms