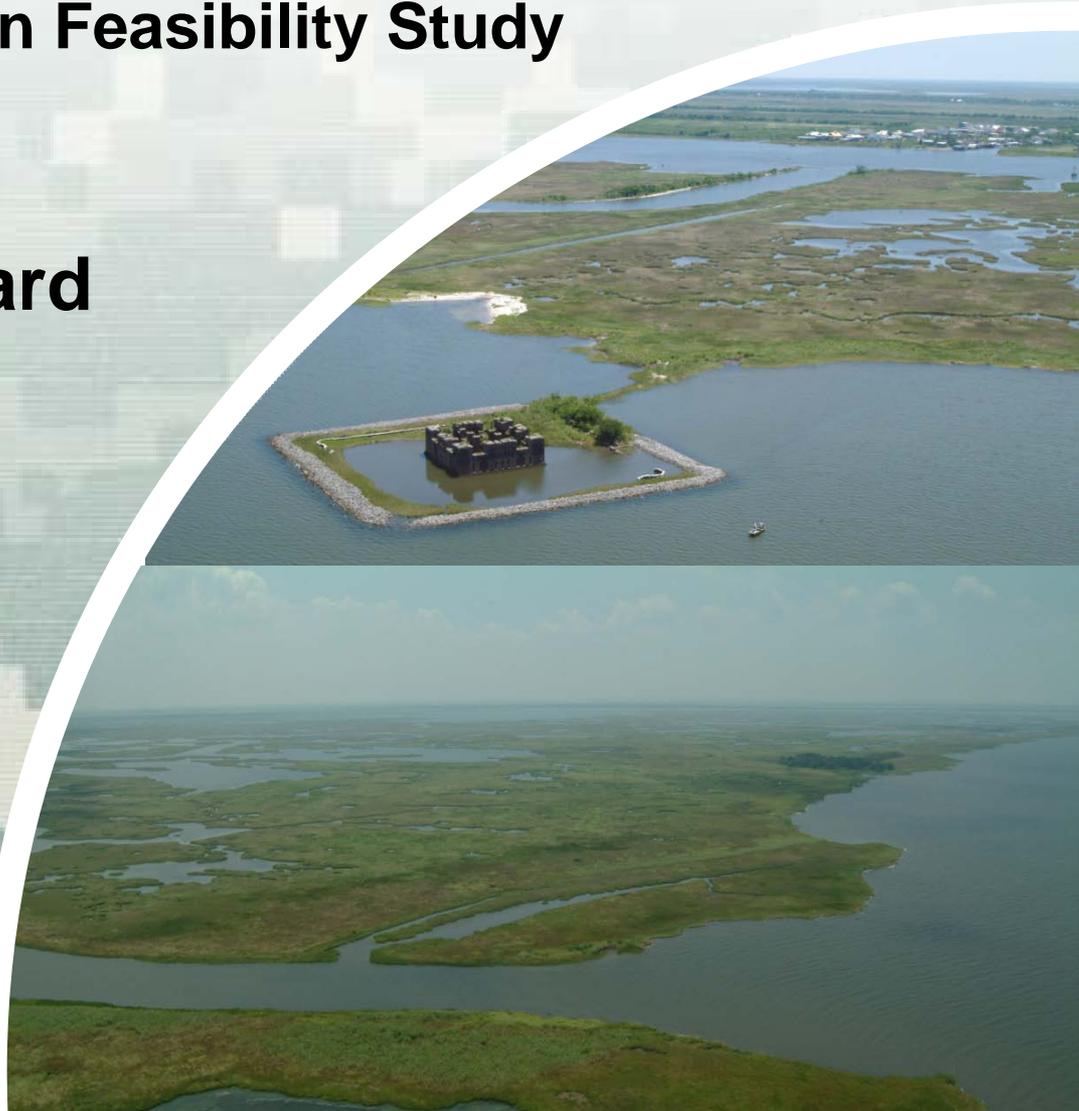


Mississippi River Gulf Outlet, LA

Ecosystem Restoration Plan Feasibility Study
(WRDA 2007 Section 7013)

Civil Works Review Board

14 June 2012



US Army Corps of Engineers
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Bayou Bienvenue Circa early 1900s



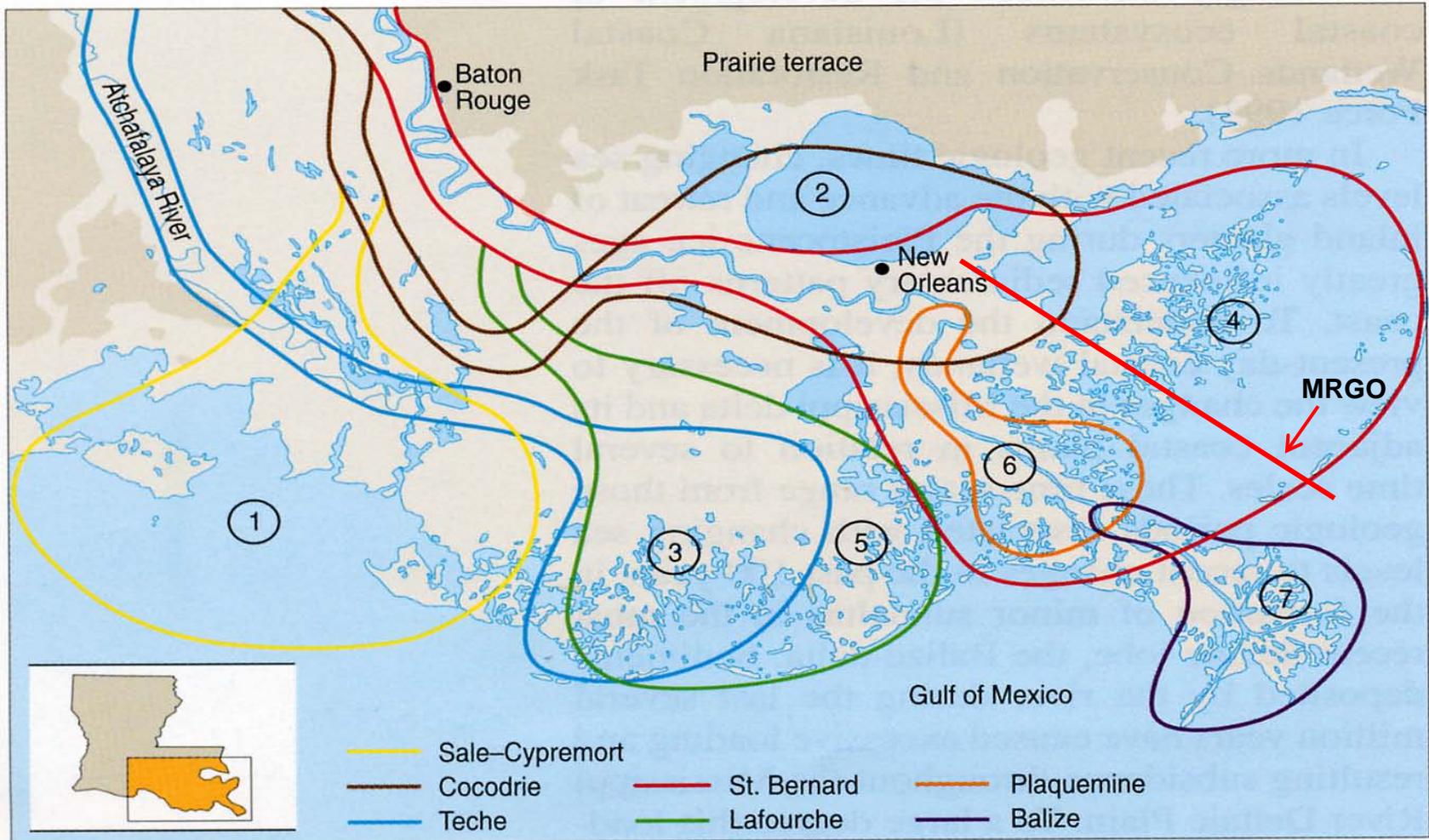
Project Timeline

- **Studies dating back to the 1940's**
- **1956: Congressional Authorization**
- **1958: Construction Start**
- **1963: First Ship Transit**
- **1968: Construction Complete**
- 1988: MRGO Bankline Recon Study
- 1998: Coast 2050 Plan
- 1999: Navigation Reevaluation Study Authorized
- 2004: Louisiana Coastal Area (LCA) Report (Includes MRGO bank stabilization and other eco-features)
- 2005: Hurricane Katrina
- 2006: \$75M MRGO O&M Appropriation
- 2007: Water Resources Development Act (WRDA)
- 2008: Deauthorization
- 2009: Closure Project Complete

Bienvenue Triangle 2006

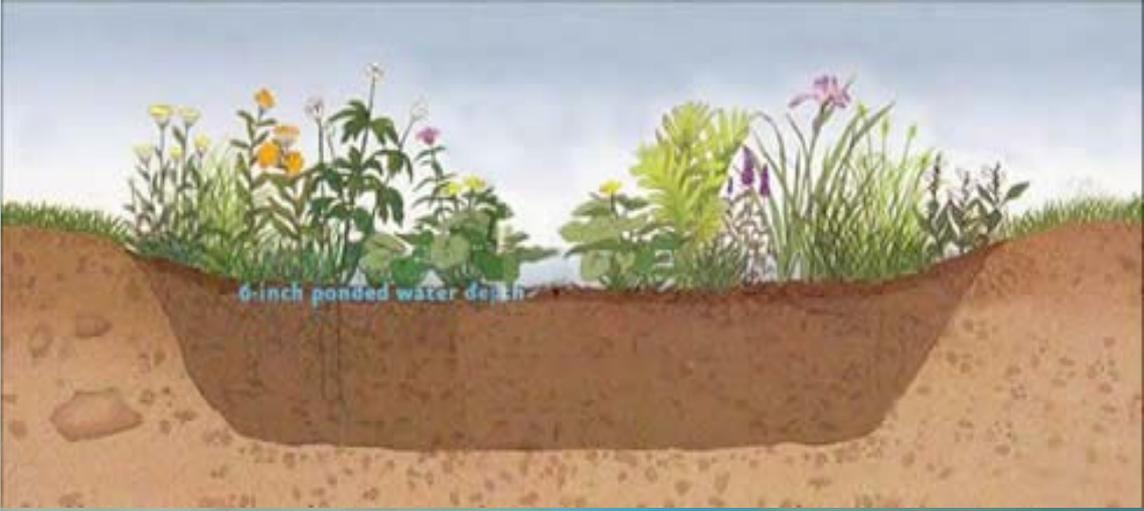


Mississippi River Delta Lobe Progression













Bottom Line Up Front

- Request approval to release report for state and agency review.
- Federally Identified Plan restores 57,000 acres.
- A non-Federal sponsor has not been identified.



ASA (CW) Memorandum

09 November 2010

- Complete the report and NEPA process.
 - ▶ Document a Federally Identified Plan.
 - ▶ Explain whether a non-Federal cost share partner has been identified.



Study Authority

WRDA 2007 Section 7013

INCLUSIONS — At a minimum, the report ... shall include —

- ▶ a plan to **physically modify the Mississippi River-Gulf Outlet** and restore the areas affected by the navigation channel;
- ▶ a plan to **restore natural features** of the ecosystem that will reduce or **prevent damage from storm surge**;
- ▶ a plan to prevent the **intrusion of saltwater** into the waterway;
- ▶ efforts to **integrate** the recommendations of the report with the [LCA] ...and the [LACPR] analysis and design ...; and
- ▶ **consideration of** —
 - use of **native vegetation**; and
 - **diversions of fresh water** to restore the Lake Borgne ecosystem.



Study Authority

- WRDA 2007 Section 7012 (b) states that the activities described in Section 7013 will be carried out consistent with the cost-share requirements in PL 109-234 (4th Supplemental).
- PL 109-234: “...develop a comprehensive plan, at full Federal expense, to deauthorize deep draft navigation on the Mississippi River-Gulf Outlet, Louisiana...”
- Study is 100% Federally funded.



Study Area



3.86 million acres (6,023 miles²) of land and open water

Lake Borgne ecosystem and areas potentially affected by the channel



Project Timeline

- Studies dating back to the 1940's
- 1956: Congressional Authorization
- 1958: Construction Start
- 1963: First Ship Transit
- 1968: Construction Complete
- 1988: MRGO Bankline Recon Study
- 1998: Coast 2050 Plan
- 1999: Navigation Reevaluation Study Authorized
- 2004: Louisiana Coastal Area (LCA) Report (Includes MRGO bank stabilization and other eco-features)
- 2005: Hurricane Katrina
- 2006: \$75M MRGO O&M Appropriation
- 2007: Water Resources Development Act (WRDA)
- 2008: Deauthorization
- 2009: Closure Project Complete

Study Intent

- Develop comprehensive ecosystem restoration plan for Lake Borgne ecosystem & areas affected by MRGO.
- Include measures to restore natural areas to reduce or prevent storm surge damage.
- Produce recommendations in support of future construction.
- Address WRDA 2007 Sec. 7013 through supplement to MRGO Deep Draft De-authorization Chief's Report.



Study Area Problems

- Land loss
- Bank/shoreline erosion
- Habitat change and loss
- Modification of natural hydrology
- Saltwater intrusion
- Ridge habitat degradation and destruction
- Herbivory
- Invasive species
- Decreased freshwater, sediment, and nutrient inputs
- Retreating and eroding barrier islands
- Loss of threatened and endangered species and migratory bird habitat
- Increasing susceptibility of coastal communities to storm surge



Determining Affects of MRGO

- ***Habitat Impacts of the Construction of the MRGO*** (USACE 1999) estimated acres affected by the channel considering all land loss factors (such as storms and sea level rise).
- **Additional losses between 1990 and 2008 were calculated by U.S. Geological Survey for the MRGO Ecosystem Restoration study.**
- **This analysis was used to develop the study objectives.**

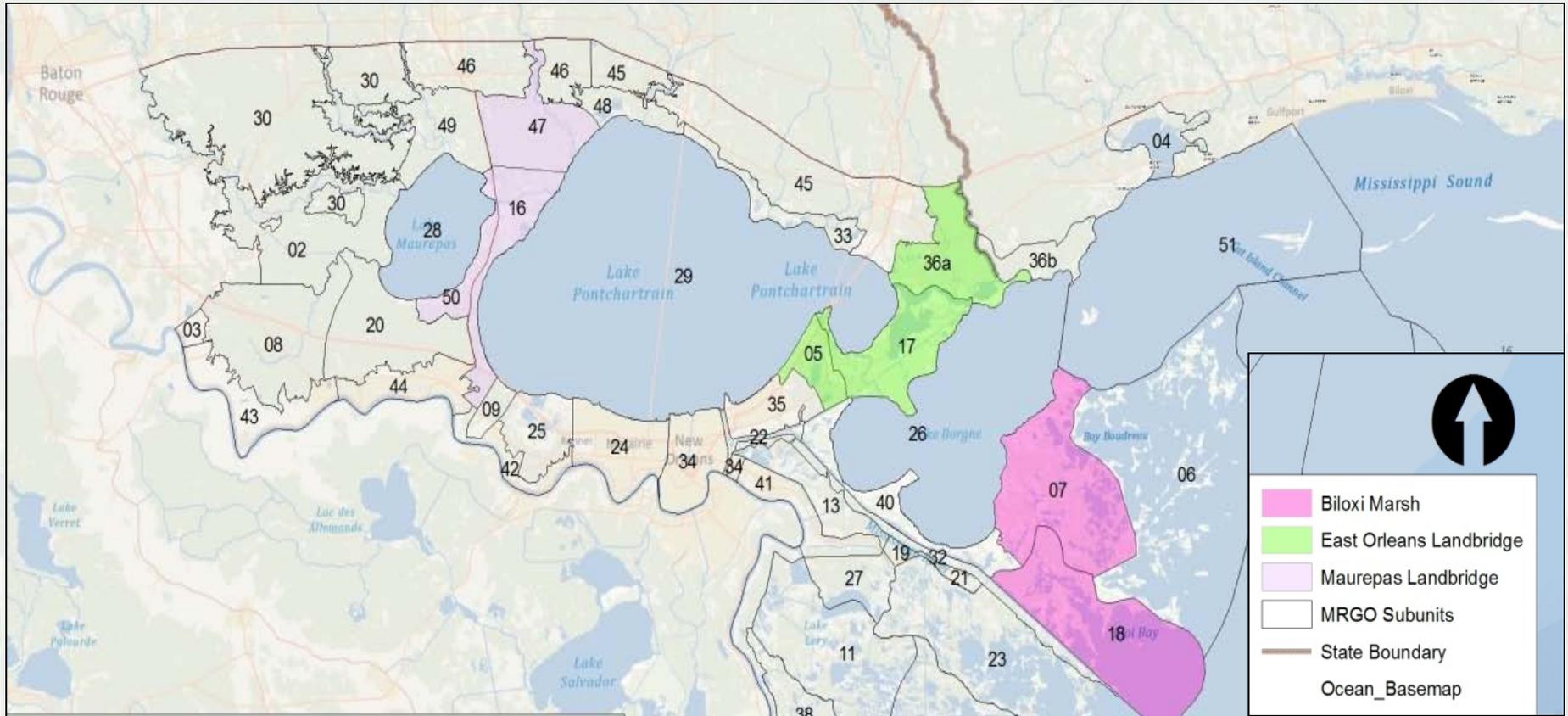


Study Objectives

1. Restore historic salinity conditions measured by monthly targets in the Biloxi Marsh.
2. Restore habitats affected by the MRGO:
 - Cypress swamp by at least 9,500 acres.
 - Fresh/intermediate by at least 6,800 acres.
 - Brackish marsh by at least 18,100 acres.
 - Vegetated wetlands in areas adjacent to the channel lost to increased tides and salinity by at least 3,900 acres.
 - Coastal ridge habitat along Bayou La Loutre.
 - Vegetated wetlands on critical landscape features that provide hurricane and storm damage risk reduction.
3. Increase awareness and understanding of the significance of resources in the study area through increased recreational opportunities and utilization.

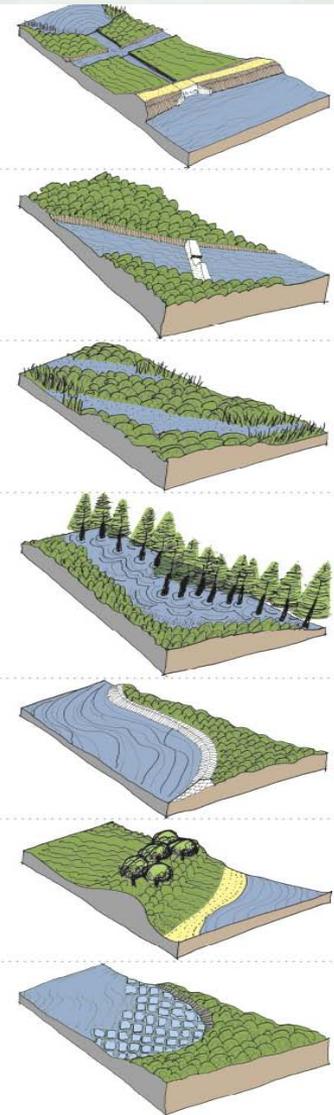


Critical Landscape Features



Measures Considered

- **Mississippi River Diversion**
- **Hydrologic Restoration**
- **Marsh Restoration**
- **Cypress Swamp Restoration**
- **Shoreline Protection**
- **Ridge Restoration**
- **Oyster Reef Restoration**
- **Barrier Island Restoration**



Relative Sea Level Rise

- Project developed in accordance with EC 1165-2-212.
- RSLR incorporated in engineering models.
- Acres estimated for historic, intermediate, and high RSLR.
- OMRR&R maintains benefits under historic and intermediate RSLR.
- High RSLR rate would result in catastrophic damage to study features and habitats throughout the estuary.
- Monitor RSLR in study, design, and implementation.



Risk and Uncertainty

- **Extreme Weather Events**
 - ▶ Long term erosion rates incorporate storm effects.
 - ▶ Climate change.

- **Cost and Benefits Analysis**
 - ▶ Complex and dynamic ecosystem.
 - ▶ Used simplifying assumptions.
 - ▶ Timing and availability of funds.



Lessons Learned from Past Projects

- Applied technological advances in coastal restoration science since 2005.
- Used refined ERDC models.
- Incorporated improved techniques for beneficial use and shoreline protection.

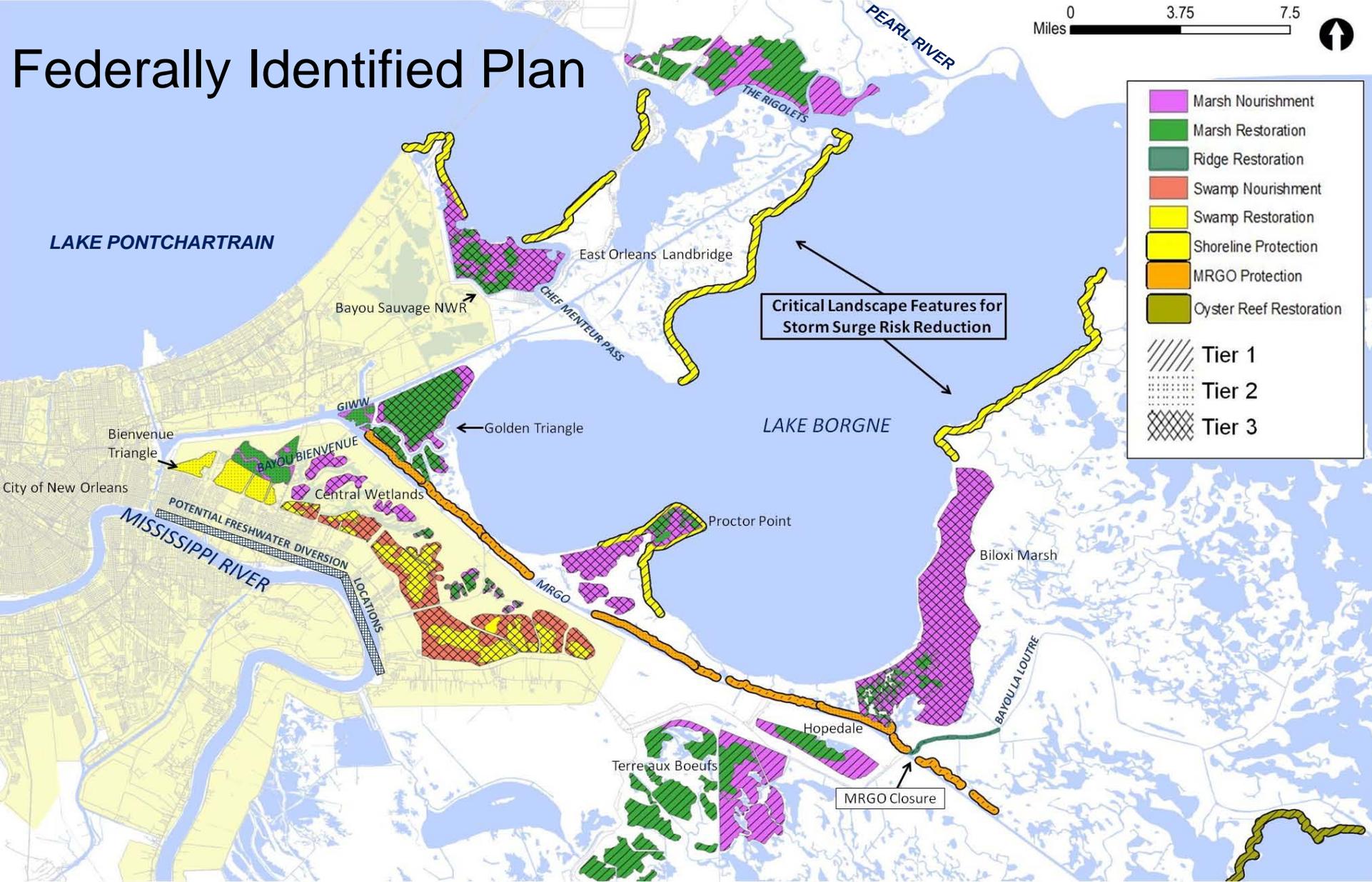


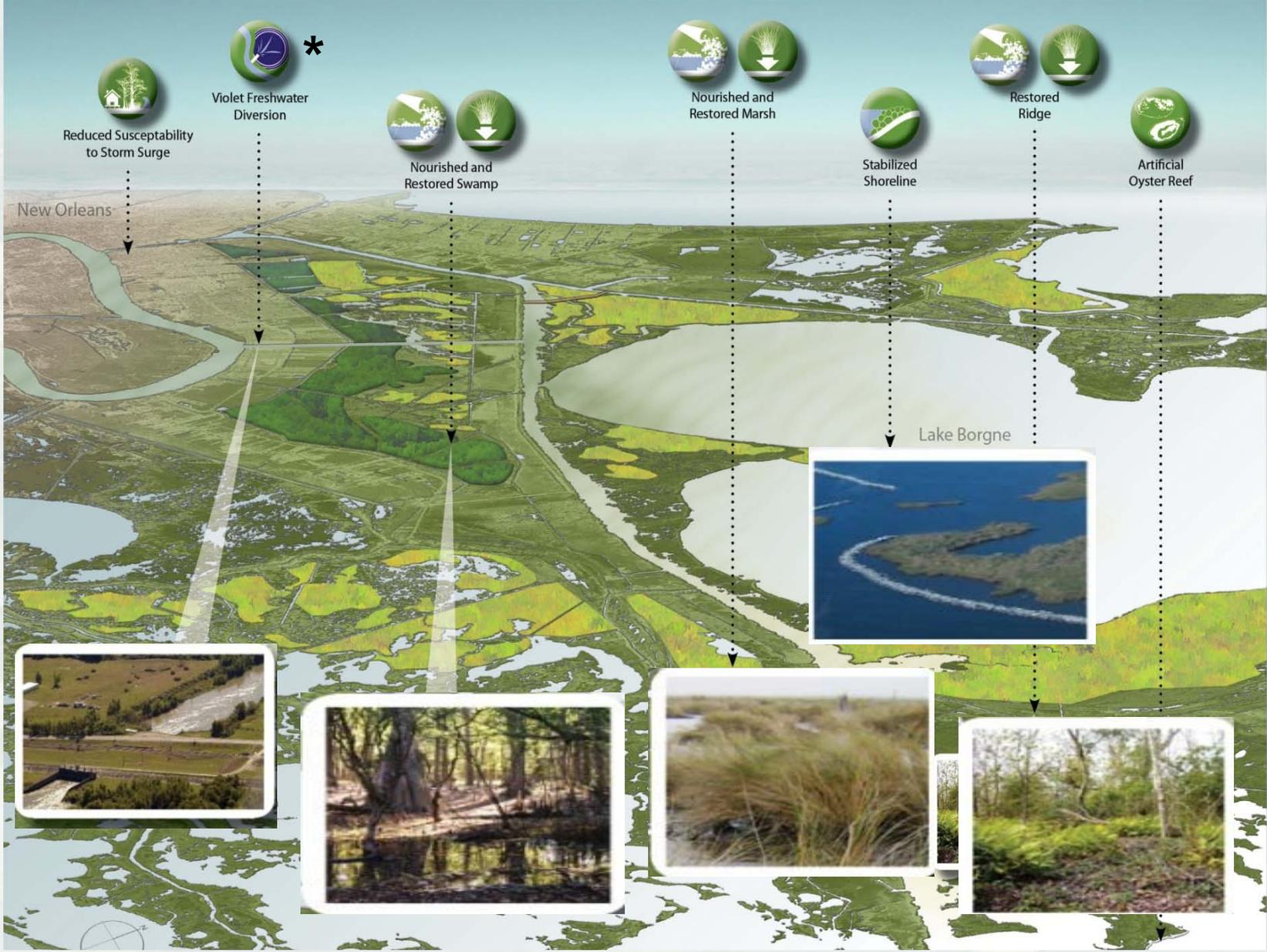
Evaluation Array of Alternatives

- **200+ site-specific management measures evaluated and screened.**
- **62 measures carried forward for further analysis.**
- **Habitat benefits calculated for measures.**
- **Cost Effectiveness/Incremental Cost Analysis used IWR-PLAN.**
- **Software generated 6,721 plan combinations**
 - **285 cost effective plans**
 - **19 best buy plans**



Federally Identified Plan





* Violet Freshwater Diversion recommended for further study under WRDA 2007 Section 3083



Average Annual Costs

Mississippi River Gulf Outlet Ecosystem Restoration Project - All Tiers (Oct 2011 Price Level, 50-Year Period of Analysis, 4.0% Discount Rate)	
Investment Costs	
Total Project Construction Costs	\$2,884,000,000
Interest During Construction	\$16,960,000
Total Investment Cost	\$2,900,960,000
Average Annual Costs	
Interest and Amortization of Initial Investment	\$113,200,000
OMRR&R	\$6,011,000
Total Average Annual Costs	\$119,211,000



Average Annual Costs by Tier

Mississippi River Gulf Outlet Ecosystem Restoration Project - Tier 1 (October 2011 Price Level, 50-Year Period of Analysis, 4.0 Percent Discount Rate)	
Investment Costs	
Total Project Construction Costs	\$ 1,308,000,000
Interest During Construction	\$8,774,000
Total Investment Cost	\$1,316,774,000
Average Annual Costs	
Interest and Amortization of Initial Investment	\$51,450,000
OMRR&R	\$3,141,000
Total Average Annual Costs	\$54,591,000



Average Annual Costs by Tier

Mississippi River Gulf Outlet Ecosystem Restoration Project - Tier 2	
(October 2011 Price Level, 50-Year Period of Analysis, 4.0 Percent Discount Rate)	
Investment Costs	
Total Project Costruction Costs	\$390,200,000
Interest During Construction	\$32,700
Total Investment Cost	\$390,232,700
Average Annual Costs	
Interest and Amoritization of Initial Investment	\$15,280,000
OMRR&R	\$251,700
Total Average Annual Costs	\$15,531,700



Average Annual Costs by Tier

Mississippi River Gulf Outlet Ecosystem Restoration Project - Tier 3	
(October 2011 Price Level, 50-Year Period of Analysis, 4.0 Percent Discount Rate)	
Investment Costs	
Total Project Costruction Costs	\$1,186,000,000
Interest During Construction	\$8,150,000
Total Investment Cost	\$1,194,150,000
Average Annual Costs	
Interest and Amortization of Initial Investment	\$46,450,000
OMRR&R	\$2,618,000
Total Average Annual Costs	\$49,068,000



Stakeholders

- Interagency Planning Team
- Community groups, NGOs, parishes, and stakeholders were regularly updated and involved in planning:
 - ▶ Meetings
 - ▶ Workshops Discussion Panels
 - ▶ Forums



Public Involvement

- NEPA public scoping meetings in November 2008.
- 250+ small group meetings.
- Quarterly meetings with NGOs.
- Public meetings on the draft report in 2011.
 - Approximately 500 citizens participated in three public meetings.
 - Six hours of verbal comments received.
 - 25,000+ email comments.
 - Hundreds of comment letters received by mail.



Technical Reviews

Agency Technical Review

- All ATR comments resolved.
- Certification completed 14 March 2012
- Review managed by ECO-PCX, Jacksonville District lead effort

Independent External Peer Review

- All IEPR comments resolved.
- Certification completed 15 September 2011
- Review by Louisiana Water Resources Council, as detailed in Sec 7009 of WRDA 2007.



Environmental Compliance

- Formal consultation with NOAA on threatened and endangered species is complete.
- The Biological Opinion (BO) states, “*that the project, as proposed, may affect, but is not likely to adversely affect sea turtles and Gulf Sturgeon.*” The BO also states, “*that the project is likely to adversely affect Gulf Sturgeon critical habitat, but is not likely to destroy or adversely modify it.*”
- USFWS reports that the MRGO impacted the Breton Island Refuge. USACE evaluation found no quantifiable impacts and screened the measure during preliminary evaluations. Further study of alternative barrier island restoration techniques should be conducted to protect and restore this significant coastal habitat.
- Report is ready for State and Agency Review.



Schedule

Civil Works Review Board	June 2012
State and Agency Review	July 2012
Public Review of Final EIS	July 2012
Chief's Report	September 2012



Recommendation

**Civil Works Review Board approves
release of the MRGO Ecosystem
Restoration Plan Feasibility Study and
Environmental Impact Statement for
State and Agency Review.**



State of Louisiana Support



Agency Perspective

- National Marine Fisheries Service
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service



Presentation to the

CIVIL WORKS REVIEW BOARD

Mississippi River Gulf Outlet, LA
Ecosystem Restoration Plan Feasibility Study
(WRDA 2007 Section 7013)

by

MG John W. Peabody

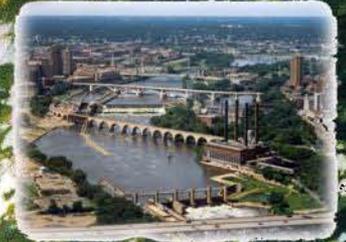
Commander

Mississippi Valley Division

June 14, 2012



US Army Corps of Engineers
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Mississippi River Gulf Outlet (MRGO) Navigation Channel



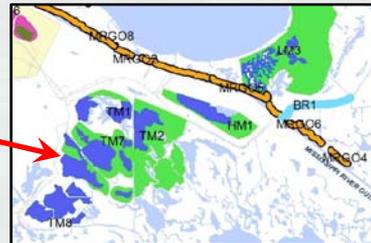
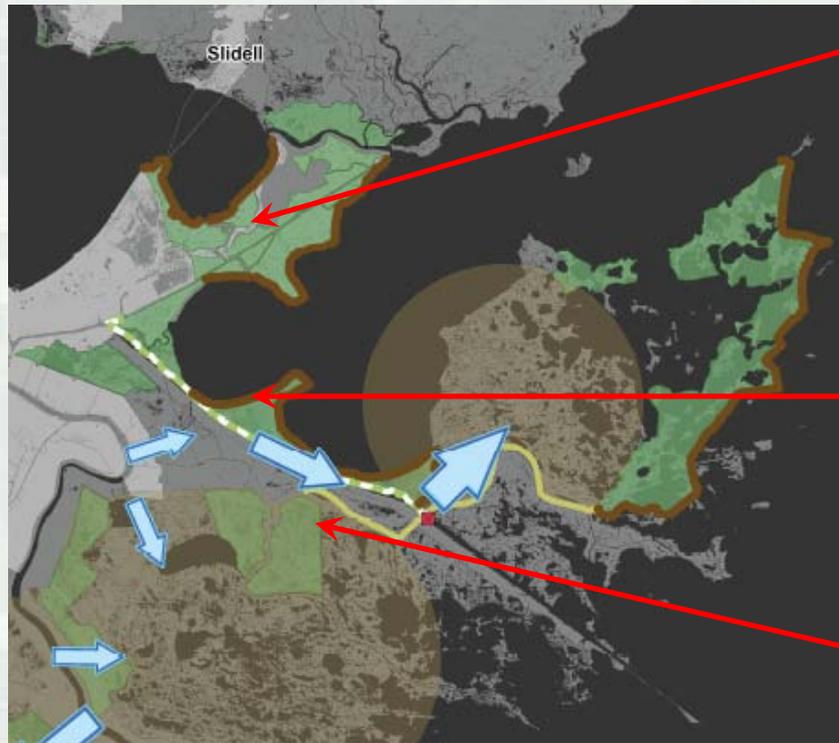
Channel Timeline

- 1956: Authorization
- 1958: Construction Start
- 1963: First Ship Transit
- 1965: Hurricane Betsy
- 1968: Construction Complete
- 1970: NEPA enacted
- 1978: Peak Tonnage
- 1999: Channel Reevaluation Study
- 2004: LCA (includes MRGO bank stabilization features)
- 2005: Hurricane Katrina
- 2005: \$75M O&M Appropriation
- 2006 Deauthorization study authority
- 2008 Deauthorization Rpt Complete
- 2009 Closure Project Complete

Channel Facts

- Support by Congressional delegation, Governor, New Orleans Port, City of New Orleans and shipping interests
- Shortcut to New Orleans from Gulf of Mexico
- 75.4-mile canal; dimensions 500 ft wide (bottom) x 36 ft deep
- Channel dredging converted wetlands to open water
- Dredge disposal converted wetland habitat to spoil banks
- Waves from ship wakes ranged from 4-6 ft in height
- Bank erosion 15-65 ft per year

State Master Plan and MRGO Plan Comparison



Common Features

- East Orleans Landbridge Marsh Restoration and Shoreline Protection
- Central Wetlands Restoration
- South Lake Borgne Marsh Restoration and Shoreline Protection
- MRGO Bank Protection
- Bayou La Loutre Ridge Restoration
- Terre aux Boeufs Marsh Restoration
- Violet Freshwater Diversion

Additional Master Plan Features

- East Orleans Landbridge Marsh Restoration
- Shows West of Shell Beach Shoreline Protection (under construction, USACE)
- Additional MRGO Closure
- Bayou La Loutre Ridge Restoration
- Outer Biloxi Marsh Restoration and Shoreline Protection

Additional MRGO Plan Features

- Central Wetlands Marsh and Swamp Restoration
- Inner Biloxi Marsh Restoration and Shoreline Protection
- Hopedale and Terre aux Boeufs Marsh Restoration



Key Challenges

- Tiering of restoration measures
- Distinction between OMRR&R and monitoring and adaptive management
- Uncertainty of relative sea level rise
- Balancing desires of many different stakeholders



MVD Command Endorsement

- Concur with MVN Commander's findings and recommendations for MRGO Ecosystem Restoration Plan.
- Report complies with all applicable policies and laws in place at this time.
- Report identified a Federally Identified Plan in accord with ASA(CW) guidance.
- Anticipate a favorable response to the draft Chief's Report; however, USFWS believes a barrier island component should have been included.
- Plan lacks a non-Federal sponsor willing to cost share in implementation of the plan.



Certification of Legal and Policy Compliance

- Legal certification dated May 25, 2012.
- Technical and policy compliance:
 - ▶ ATR performed by staff from SAD and NWD.
 - ▶ All ATR comments resolved and certification dated March 14, 2012.



MVD Review Plan

- Development of a Review Plan for design & implementation of the project in conformance with EC 1165-2-209 (Appendix B) requirements.
- Anticipate review of design and implementation documents will be limited to DQC and ATR
- Type II IEPR will not be required since there are no life safety issues
- RMO for the Review Plan will be MVD



MVD Quality Assurance Activities

- MVD reviewed ATR/IEPR comments/responses to ensure appropriate resolution.
- Active participation by vertical team.
- Worked with MVN to resolve HQ review comments.
- MVD concurs that project is technically sound and policy compliant.
- Conforms with WRDA 2007 guidance dated April 28, 2009.
- Conforms with ASA(CW)'s guidance dated November 9, 2009.



MVD Recommendations

- Approve Final Report.
- Release report for State and Agency Review.
- Complete Chief's Report NLT September 2012.



Agency Technical Review



- ATR managed by Eco-PCX
- ATR lead: James M. Baker, Planning Division, Jacksonville District
- 3 reviews:
 - FSM Package– Feb 2009
 - AFB/Draft Report – May 2010
 - Final Report – Mar 2012
- 443 comments from 12 reviewers (not including cost cert review) – All Resolved

Agency Technical Review



○ Prominent review concerns:

- PDT seemed unsure as to how broadly to interpret the project authority (FSM)
- Insufficient specificity as to both the project itself and the stage of the planning process (FSM)
- Recon, rather than feasibility level of detail to define and lay out management measures and to compute related quantities (AFB)
- Insufficient specificity within the main report, as to how TSP was selected (AFB)
- Recommended that Navigation Servitude be raised at the HQ level and considered during the authorization of this project (Final Report)
- Recommended vertical team explore other mineral rights options before a lands request is made to a sponsor (Final Report)
- Noted that the Violet Diversion design was not completed but recommended to be done separately (Final Report)
- Summary: Final report presents a clear, understandable, methodical plan formulation story and appears to fully respond to vertical team guidance (Final Report)

IEPR – MRGO

▶ The IEPR was conducted in 2011

- The IEPR was completed following the Louisiana Water Resources Council (LWRC) Charter and is in compliance with WRDA 2007, Section 7009
 - Completed by LWRC standing IEPR Panel Members
 - Two additional IEPR Panel Members were recruited to address specific technical aspects of the MRGO project

MRGO IEPR Panel Members	LWRC IEPR Panel	Additional Experts
Civil Works Planning – <i>Kenneth L. Casavant, Ph.D.</i>	✓	
Environmental/Coastal Ecology – <i>Kay Crouch</i>	✓	
Civil/Construction Engineering – <i>Ralph Ellis, Ph.D., P.E.</i>	✓	
Economics – <i>Darrell Kelsoe</i>	✓	
Hydrology/Hydraulic Engineering – <i>Michelle Orr, P.E.</i>	✓	
Fisheries Biology – <i>Kenneth Rose, Ph.D.</i>		✓
Coastal Geomorphology – <i>Chris Houser, Ph.D.</i>		✓

IEPR – MRGO Report/Results

▶ Final IEPR Report submitted on June 3, 2011

Results:

- 19 Final Panel Comments
 - 6 high significance
 - 13 medium significance

▶ Post-Final Panel Comments/Response results documented on September 15, 2011

Results:

- PDT Responses to Final Panel Comments
 - 16 concurs, 3 non-concurs
- Panel's Response to the PDT Responses
 - 19 concurs, 0 non-concurs

IEPR – MRGO Report/Results

▶ Notable Panel Findings from the Final Report

- Adequacy and acceptability of Cost and Schedule Risk Analysis (CSRA) could not be determined
- Monitoring and Adaptive Management Plan (MAMP) is missing key elements and is not funded sufficiently to assess project performance and address important uncertainties
- Specific location and magnitude of the proposed freshwater diversion is not supported by the technical analysis and information presented
- Cumulative effects analysis does not consider related planned projects and other foreseeable potential actions in the study area that could be affected by or affect the MRGO project
- Absence of a non-Federal sponsor poses a significant risk to the implementation of the MRGO project
- UNO hydrology and hydraulics model may not accurately describe variations in spatial and temporal salinities

IEPR – MRGO Conclusion

The Panel agreed with all PDT
Responses to all Final Panel Comments



Break



HQUSACE POLICY REVIEW CONCERNS

Civil Works Review Board

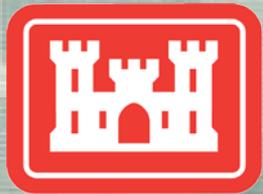
Mississippi River Gulf Outlet Ecosystem Restoration Project

Wes Coleman

Office of Water Project Review

Planning and Policy Division

Washington, DC – 14 June 2012



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US Army Corps of Engineers
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HQUSACE Team Reviews:

- Review of Draft Report completed March 2011.
- Review of draft Final Feasibility Report completed June 2012.



Significant Policy Comments

- No Non-Federal Sponsor Identified. No non-Federal sponsor has been identified for sharing the cost of project implementation.
- Dependence of Certain Project Features on Violet Diversion. A number of the proposed project features are dependent on salinity effects from Violet Diversion.
- Adaptive Management vs. OMRR&R. The adaptive management plan included actions and costs that should be included as part of OMRR&R plan.
- Impact of Sea Level Rise on the Federally Identified Plan (FIP). Ensuring sustainability of project objectives is impractical under a high relative sea level rise scenario.



No Non-Federal Sponsor Identified

CONCERN: No non-Federal sponsor has been identified for sharing the cost of project implementation.

REASON: The MRGO study was authorized at full Federal expense by Section 7013(a)(3) of WRDA 2007 and chapter 3 of title II of the Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006. Project construction will require 35 percent non-Federal cost sharing under Section 103(c)(7) of WRDA 1986. Feasibility studies are carried out in accordance with Chapter 2 of ER 1105-2-100, which normally requires a study to be terminated absent a cost-sharing sponsor.

RESOLUTION: ASA(CW) memorandum dated 9 November 2010 directed completion of the MRGO study and NEPA process.

RESOLUTION IMPACT: The feasibility study has been completed in accordance with ASA(CW) guidance. No sponsor has been identified for project implementation.



Dependence of Certain Project Features on Violet Diversion

CONCERN: Several proposed restoration features in the FIP are dependent upon Violet Diversion to enable restoration to proceed or to sustain the constructed features in the long term.

REASON: Delivery of freshwater to reduce salinities is required for establishment of cypress swamp and fresh marsh, and ongoing delivery of freshwater, sediments and nutrients is important for the long-term sustainability of the restored habitats.

RESOLUTION: Project features of the FIP were tiered based on their dependence on Violet Diversion. Project features not dependent on Violet Diversion (Tier 1) will be eligible for construction upon approval; Projects that may not be dependent on Violet Diversion (Tier 2) would be eligible upon confirmation of future salinity monitoring results; Project features dependent on Violet Diversion (Tier 3) would be eligible after Violet Diversion is operational.

RESOLUTION IMPACT: Concern Resolved.



Adaptive Management vs. OMRR&R

CONCERN: The \$474 million adaptive management plan submitted as part of final report included actions and costs that would be more appropriate in the OMRR&R plan.

REASON: The adaptive management plan included actions (e.g., marsh renourishment) that were not strongly related to uncertainties in construction parameters such as the elevations of restored marsh units, or project performance measures such as vegetative cover, but rather appeared to be a means of reacting to habitat changes caused by long-term relative sea level rise and other factors.

RESOLUTION: Revisions to the final report reduced the adaptive management plan costs to \$190 million by transferring some of the proposed activities and costs to the OMRR&R plan.

RESOLUTION IMPACT: Concern Resolved.



Impact of Sea Level Rise on the FIP

Concern: Ensuring sustainability of project objectives is impractical under a high relative sea level rise scenario.

Reason: In accordance with Section 7013 of WRDA 2007, the project objectives were established based on restoration of the areas affected by the navigation channel. Existing sea level guidance assumes adaptive management measures can be incorporated into the plan formulation to address risk and uncertainty. However, the FIP measures become impractical at high sea level rise and habitat switching occurs. The habitat switch impacts the in-kind restoration of the areas affected by the navigation channel.

Resolution: The risk and uncertainty in project features and the response will be identified and described in the Adaptive Management Plan.

Resolution Impact: Concern Resolved.



HQUSACE POLICY REVIEW TEAM RECOMMENDATION

**Release the report and EIS for S&A
Review**



Board Discussion



Presentation to the

CIVIL WORKS REVIEW BOARD

*Mississippi River Gulf Outlet (MRGO)
Ecosystem Restoration Supplemental Report and
Environmental Impact Statement*

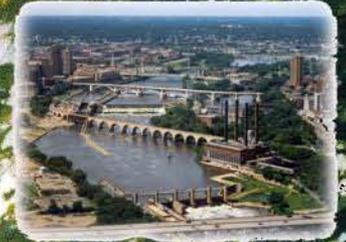
LESSONS LEARNED

by
MG John W. Peabody
Commander
Mississippi Valley Division

June 14, 2012



US Army Corps of Engineers
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MVD Lessons Learned

- Separation of OMRR&R and Adaptive Management Costs proved challenging given uncertainty of RSLR
- Tiering of recommendations required due to varying levels of design and dependencies between features
- Uncertainty relative to future RSLR may affect investment decisions should implementation be undertaken
- Active Vertical Team involvement was essential for issue resolution
- Planning modernization (3x3x3)



MRGO Ecosystem Restoration Plan

Lessons Learned

- Clearly define what constitutes feasibility level of design for a project of this scale, and when in the process this needs to be achieved (AFB, Draft Report, Final), is needed (particularly in the context of 3x3x3).
- Public comment volume can significantly impact study cost and schedule. An automated method of submitting and tracking public comments needs to be developed for projects with high public interest.

