Restoration of Grand Batture Island

RESTORE Council Proposal Document

General Information

Title:
Restoration of Grand Batture Island

Project Abstract:
Mississippi and Alabama, through the Mississippi Department of Environmental Quality (MDEQ) and the Alabama Department of Conservation and Natural Resources (ADCNR), is requesting $55M in Council-Selected Restoration Component funding for the proposed Restoration of the Grand Batture Island project in Mississippi and Alabama. This would include planning funds as FPL Category 1, as well as an implementation component as an FPL Category 2 priority for funding. This project will support the restoration and protection of natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast Region by creating, restoring, and enhancing coastal habitats through the restoration of Grand Batture Island in Jackson County, Mississippi and Mobile County, Alabama. The project includes, but is not limited to, project management, planning, engineering and design (E&D), monitoring, and construction of habitats to restore the former barrier headland in a cross-border project sponsored by Alabama and Mississippi. The remnants of Grand Batture Island are characterized by natural sandy beaches, dunes, and back barrier marsh. In the past, the island played a crucial role by protecting extensive intertidal marshes and supporting thriving oyster and Submerged Aquatic Vegetation (SAV) beds within Point aux Chenes Bay, Middle Bay, and Grand Bay in Mississippi and Alabama. Restoration actions would reduce erosion rates, protect essential coastal marsh and create crucial habitat for many species including shorebirds and the diamondback terrapin.

FPL Category: Cat1: Planning/ Cat2: Implementation

Activity Type: Project

Program: N/A

Co-sponsoring Agency(ies):
AL

Is this a construction project?:
Yes

RESTORE Act Priority Criteria:
 (I) Projects that are projected to make the greatest contribution to restoring and protecting the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast region, without regard to geographic location within the Gulf Coast region.
 (II) Large-scale projects and programs that are projected to substantially contribute to restoring and protecting the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast ecosystem.
 (III) Projects contained in existing Gulf Coast State comprehensive plans for the restoration and protection of natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast region.
 (IV) Projects that restore long-term resilience of the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands most impacted by the Deepwater Horizon oil spill.

Priority Criteria Justification:
 Between 1848 and 2012, the seaward facing edge of Grand Batture Island has been reduced to 1/5 the length of the former island (Figure 2). The degradation of Grand Batture Island has resulted in increased shoreline exposure on the mainland shore, increasing wave energy to the shoreline and extirpating back-island habitats. Due to these increasing impacts, the Grand Bay National Estuarine Research Reserve has identified large-scale barrier restoration as an action in the 2023-2027 Management Plan (GNDNERR, 2023). The management plan includes work to understand how mitigative actions (e.g., shoreline protection, barrier island nourishment, infrastructure revision, etc.) might influence the outcome for marshes. Management actions are currently being assessed in detailed workshops with researchers and stakeholder partners as part of this management plan. The project also aligns with the primary objective in the Mississippi Gulf Coast Restoration Plan (MDEQ, 2017) to restore priority habitats in coastal Mississippi. Additionally, this is a priority habitat restoration project for the State of Alabama. There has been a significant amount of work implemented to date to benefit the Grand Bay ecosystem as a whole. Mississippi and Alabama have collectively invested $25 million for land acquisition and habitat restoration in the area, which have allowed for the linking of existing protected areas to facilitate a holistic approach to long-term management and stewardship for the Grand Bay ecosystem. The restoration of the Grand Batture headlands will help protect these investments for both states and create a substantial amount of habitat to benefit species that have been impacted by severe habitat loss. For example, shoreline habitats that are important nesting areas for the diamondback terrapin are eroding at high rates. This loss of nesting habitat leads to a decrease in local populations of the diamondback terrapin.

Project Duration (in years): 10

Goals

Primary Comprehensive Plan Goal:
 Restore and Conserve Habitat

Primary Comprehensive Plan Objective:
 Restore , Enhance, and Protect Habitats

Secondary Comprehensive Plan Objectives:
Protect and Restore Living Coastal and Marine Resources
Restore and Enhance Natural Processes and Shorelines

Secondary Comprehensive Plan Goals:
 N/A

PF Restoration Technique(s):
 Create, restore, and enhance coastal wetlands, islands, shorelines and headlands: Protect natural shorelines
 Create, restore, and enhance coastal wetlands, islands, shorelines and headlands: Sediment placement

Location

Location:
 The project location is in southeast Jackson County, MS and southwest Mobile County, AL. The project would occur, in part, within the administrative boundaries of the Grand Bay National Estuarine Research Reserve and include both the State of Mississippi and the State of Alabama.

HUC8 Watershed(s):
 South Atlantic-Gulf Region(Pascagoula) - Pascagoula(Mississippi Coastal)

State(s):
 Alabama
 Mississippi

County/Parish(es):
 AL - Mobile
 MS - Jackson

Congressional District(s):
 AL - 1
 MS - 4

Narratives

Introduction and Overview:
Description of the Proposed Activity; Goals and Objectives
The Restoration of Grand Batture Island project will support the restoration and protection of natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast Region by creating, restoring, and enhancing coastal habitats through the restoration of Grand Batture Island in Jackson County, MS and Mobile County, AL. This project will support the planning, engineering and design (E&D), and construction of habitats to restore the former barrier habitat in a cross-border project sponsored by the states of Alabama and Mississippi.

The project addresses the Gulf Coast Ecosystem Restoration Council Comprehensive Plan Goal #1: Restore and Conserve Habitat. The project would restore and create habitat within coastal waters of Mississippi and Alabama, including priority bays and estuaries, and within the Mississippi Sound. The activity of the project, restoring and creating coastal island and marsh habitats, is consistent with RESTORE Council's primary objective of Restore, Enhance, and Protect Habitats. The Comprehensive Plan goal and objective would be directly addressed through restoration of the former barrier headland by means of habitat creation to mitigate high erosion rates in the Grand Bay marsh system. Additionally, the project would provide protection of seagrass and oyster resources in the area and increase habitat availability for numerous species including, but not limited to, shorebirds, wading birds, and the diamondback terrapin.

Alignment with FPL Planning Framework:
This project aligns with the FPL Planning Framework priority approaches and techniques by addressing the approach "Create, restore and enhance coastal wetlands, islands, shorelines, and headlands," and the techniques "Sediment Placement" and "Protect Natural Shorelines." Additionally, the proposed project builds off previous investments from the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund (NFWF-GEBF), RESTORE Comprehensive Plan Component (Initial FPL) and Spill Impact Component (MSEP), and Natural Resource Damage Assessment (NRDA) restoration projects.

Commitments in 2022 Comprehensive Plan Update:
The following describes how this project addresses the commitments set forth in the 2022 Comprehensive Plan Update:

• Regional ecosystem-based approach to restoration: MDEQ and ADCNR are dedicated to restoring lost coastal wetland and island habitat through various funding streams. Mississippi currently has seven habitat creation projects implemented and planned (~850 acres); Alabama has eight of these projects implemented and planned (~700 acres). These combined projects total nearly 1,550 acres to benefit the overall Mississippi Sound Ecosystem. Restoration at Grand Batture Island would continue this effort and focus on an important ecological area in the Eastern Sound that has yet to be restored

• Leveraging resources and partnerships: The states of Mississippi and Alabama have coordinated to implement this cross-border project. Garnering support and engaging through coordination with project partners, including the Mississippi Department of Marine Resources (MDMR) and the Grand Bay National Estuarine Research Reserve, has been critical to the formulation of the project concept. Partner engagement would continue through project implementation and is a key component of project success. Additionally, the NFWF GEBF has expressed interest in leveraging funds for the implementation component of the project.

• Engagement, Inclusion, and Transparency: The state of Mississippi's prioritization of this project is based on multiple public and stakeholder engagement activities; including the Annual Mississippi Restoration Summit and the Mississippi Coastal Restoration Plan (NFWF-GEBF). Throughout Mississippi's restoration public engagement and planning efforts, stakeholders have consistently identified the restoration and protection of marsh and critical habitats as a top priority. The state of Alabama's prioritization of this project is based on stakeholder input obtained through Alabama's restoration summits in 2018 and 2022, as well as FPL 1-funded planning activities carried out by the Mobile Bay National Estuarine Program watershed planning project and Alabama's Grand Bay modeling project. (see Public Engagement, Outreach, and Education section).

• Science-based decision-making: The proposed project is supported by an initial effort to model various restoration scenarios for Grand Batture Island funded by the NFWF-GEBF. A project team from the United States Geological Survey (USGS) and the University of Southern Mississippi (USM) will assess potential changes in hydrodynamics, salinity, sediment transport under different restoration scenarios and how these changes may impact seagrass habitat suitability. The team will evaluate the coastal processes driving salinity and sediment transport through time, benchmark the response to those processes, and determine the likely impact of potential restoration scenarios. Once these dynamics are better understood, MDEQ and ADCNR, along with project partners, would choose the most favorable restoration scenario to accomplish the goal to restore habitats.

• Delivering results and measuring impacts: The proposed project would adhere to site-specific milestones and monitoring success criteria. These would be documented in observational data management plans.

General Description of Environmental Benefits:
Barrier headlands like Grand Batture Island serve as invaluable natural buffers, shielding the mainland from the devastating impacts of storm surges and coastal erosion. These barrier features serve as the first line of defense against oceanic waves and storm surge generated flooding (Johnson et al., 2020). In the past, Grand Batture Island protected extensive intertidal marshes, oyster reefs, and SAV beds within Point aux Chenes Bay, Middle Bay, and Grand Bay in Mississippi and Alabama. The coastal wetlands in the Grand Bay system are vital nurseries for numerous species of marine life. Additionally, this area provides crucial habitat for hundreds of birds, including migratory species that utilize the headlands as essential nesting, stopover, and wintering habitat.

Large-scale habitat creation would significantly benefit these species that have been impacted by severe habitat loss. The proposed project would provide habitat protection for one of the largest expanses of coastal wildlands in Mississippi and Alabama. There has been a significant amount of work implemented to date to benefit the Grand Bay ecosystem as a whole. Mississippi and Alabama have collectively invested $25 million for land acquisition and habitat restoration, which has allowed for the linking of existing protected areas to facilitate a holistic approach to long-term management and stewardship for the Grand Bay ecosystem. Investment into habitat protection measures is critical for this area to maintain large-scale ecosystem functioning. Restoration of the Grand Batture headland would ensure protection from erosion for many years to come.

Environmental Stressors being addressed:
The remnants of the Grand Batture headland, situated on the south side of the Grand Bay National Estuarine Research Reserve, is characterized by natural sandy beaches, dunes, and back-barrier marsh. In 1850, the US Coast Survey mapped approximately 450 acres of barrier headland spanning a length of approximately 5 miles (Meyer-Arendt and Kramer, 1991). However, by the 1950s, it had dwindled to shoals. Since 1850, the rate of shoreline erosion has averaged up to 15 feet per year, and presently, the remaining headland is retreating even faster (Terrano, 2018). Restoration actions would reduce erosion rates, protect essential coastal marsh, and create habitat for many species including shorebirds and the diamondback terrapin (Heaton et al, 2022). The restoration of Grand Batture Island would not only reinstate the original barrier headland but also mitigate erosion along adjacent bayshores and curtail the degradation of marshes owing to reduced wave action.

Total Cost: $55,000,000

Timeline: 10 years

Proposed Methods :
This project would support the following activities: 1) Project Management and Oversight; 2) Planning, including permitting and engineering and design; 3) Construction of appropriate habitats to reestablish the former Grand Batture Island including, but not limited to, beach/dune and back barrier marsh habitats; and 4) Monitoring.

Project Management and Oversight:
Program management and oversight will cover all activities associated with the project. MDEQ and ADCNR personnel and its contractors will provide administrative programmatic functions and/or support during the life of the grant. MDEQ and ADCNR, with contractual support, will also manage the data associated with this project in accordance with the procedures outlined in the Observational Data Plan.

Permitting and E&D:
Engineering, design, and permitting for the project would utilize and apply standard engineering

practices for similar projects, including certified and stamped plans. Engineering and design services will provide the design for the headland restoration and protection measures, such as living shorelines.

The appropriate state/federal agencies will be engaged for permitting requirements habitat creation and source material placement. Project design would take into consideration best management practices. Additional activities may include bathymetry and survey data collection, geotechnical investigations, and other needs associated with site design.

Construction Implementation:
Federal, state, and local groups undertake dredging activities constantly in the Gulf environment for navigation maintenance, infrastructure, and/or hydrological connectivity. Synergistically linking sediment management to the science of habitat creation helps to address coastal habitat loss through sustainable resource management (GCERTF, 2011; CH2M Hill, 2011a, b; ERG, 2014). In developing the scope of work for implementation, MDEQ and ADCNR will consider previous planning efforts and techniques/lessons learned from similar projects in the northern Gulf of America (e.g., Curole and Hartman, 2016; Taylor and Dartez, 2019). Construction implementation will be based on final plans and specifications developed during engineering, design, and permitting. Construction implementation may include all potential activities associated with habitat construction and development of appropriate habitat types to support flora and fauna native to the area. Construction implementation may include, but is not limited to, materials sourcing (e.g., dedicated material sourcing from borrow sites, Beneficial Use of dredge materials, etc.), transport of materials, pumping costs to sites, marsh/beach/dune construction and grading, and protection measures such as living shorelines. Engineering and design and construction services will be procured consistent with applicable procurement standards.

Monitoring:
See monitoring section.

Environmental Benefits:
Marsh-edge erosion from waves reduces the areal extent of a salt marsh, converting marsh to open-water embayments. This process is one of the main drivers for marsh loss worldwide (Nowacki and Ganju, 2021). Wetland loss in the form of shoreline erosion is a significant management concern in the Grand Bay wetland system. Shorelines in some areas are eroding more than six meters per year (Terrano et al., 2019; Schmid, 2000; Otvos, 1990). With relative sea level rise of 0.41 centimeters per year, the erosion rates are higher than would be expected based on wetland retreat from sea level rise alone (Smith et al., 2021a). Currently, a prevalent sand shoal remains where Grand Batture Island once existed. The degradation of Grand Batture Island has resulted in increased connectivity with the Mississippi Sound (Passeri et al., 2023), altered salinity and sediment type, and reduced protection from large water waves. The environmental benefits to the proposed project are directly related to the primary environmental stressor that is prevalent in the area, which is coastal habitat erosion. The issue is two-fold. First, loss of the barrier spit has led to increased erosion of salt marsh located to the north of

former headland. Second, the degradation of headland habitats, including natural sand beaches and back-barrier marsh has impacted species that use natural sand beach habitats for nesting and foraging such as the diamondback terrapin and solitary and colonial nesting birds, among others.

 The reduction of erosive forces at the Grand Bay marsh is critical for habitat sustainability over time. Salt marsh wetlands are being transformed to shallow open water habitat due to wave-driven marsh erosion as barrier islands and headlands degrade and sea levels rise along the northern Gulf of America coast (Douglass et al., 2012). These eroding areas are ecologically productive and many of the commercial and non-commercial finfish and shellfish species of the Gulf spend a critical portion of their lifespan in these salt marshes. Salt marshes are keystone habitats within the coastal environment as they provide the base for a host of ecosystem services and benefits (Purcell et al, 2020). These ecosystem services include: serving as natural buffers to protect shorelines from eroding; storm surge protection (Gittman et al., 2014); fisheries production, water quality enhancement through sediment and nutrient reduction, faunal support, carbon sequestration (Battaglia et al. 2012), and providing habitat for a multitude of trophic levels within the ecosystem (Barbier et al., 2011; Mendelssohn et al., 2012). The creation of habitat and the protection of existing marsh in Mississippi's coastal system would continue to support and increase these ecosystem services in Mississippi and Alabama.

 Sustainable restoration and creation of coastal habitats is key when confronting threats from sea-level rise and tropical storms. The creation of multiple habitat types driven by topographic variation (Kim et al., 2010), distance to tidal streams, and other factors ensures habitat viability and resilience into the future. Integrated habitats from low marsh to uplands also provide benefit to multiple species with each vegetation zone comprised of distinctive macrophyte assemblages and the species that use them (Moffet et al., 2010).

 New Round Island in Mississippi is a recent example of the environmental benefits that can be received from utilizing sediment materials to create a large-scale, multi-habitat site in the Mississippi Sound system. MDEQ, in collaboration with the Port of Pascagoula, MDMR, NFWF, and the US Army Corps of Engineers (USACE), benefited from a federal dredging opportunity to construct approximately 220 acres of coastal habitat (marsh and sand beach) near the existing Round Island in the Mississippi Sound. The configuration of the island provides bird habitat, shoreline protection, and storm surge buffering to the cities of Pascagoula and Gautier; and with its topographical range has the capability to support numerous habitat types from low marsh to vegetated dunes. Since its creation in 2016, thousands of shorebirds and pelicans have used the habitat for nesting, loafing, and foraging (Gamblin et al., 2023). New Round Island also provides ample opportunity to apply restoration approaches and techniques to refine habitats specific to species or groups of species (e.g., shorebird nesting habitat).

 In addition to habitat use by birds, these habitat types in the Grand Bay ecosystem are used by the Diamondback terrapins for nesting. In recent years, nest surveys conducted by the Grand Bay National Estuarine Research Reserve found the lowest numbers of nest detections since surveys began in 1994. Terrapins are known to exhibit nest site fidelity, and it is likely that the

lower numbers of nests and adult terrapins seen at Grand Batture Island over time is related to the shoreline retreat and loss of nesting habitat observed in the area. Additionally, erosion of the remaining headland has led to a shift of marsh vegetation habitat type, from high marsh species in sandy sediment, which is used by terrapins for nesting, to low marsh species in silty sediment (Heaton et al., 2022). Restoration of beach/dune and high marsh habitats at the Grand Batture headland would provide a significant amount of nesting habitat for terrapins in the Grand Bay system.

Metrics:

Metric Title: PRM011 : Restoration planning/design/permitting - # E&D plans developed

Target: 1

Narrative: The number of E&D plans developed for implementation.

Metric Title: PRM013 : Restoration planning/design/permitting - # environmental compliance documents completed

Target: 1

Narrative: The number of permits/compliance documents completed

Metric Title: HR013 : Wetland restoration - Acres restored

Target: 100

Narrative: The number of acres of coastal nearshore habitat created.

Risk and Uncertainties:
The threat of tropical storms is a project risk for all coastal restoration projects. In the case of marsh or beach/dune restoration, project components would be designed to buffer storm damage to habitats but could be compromised requiring infrastructure repairs after a storm. Additional project risks include constructed sediment compaction and subsidence occurring to a greater degree than anticipated. Based on the geology of the sediments, engineers would build the habitats to a higher elevation with the anticipation of compaction and settling. Through the Monitoring and Adaptive Management Plan (see Monitoring and Adaptive Management section), adaptive management strategies and corrective actions would be identified to address project risks associated with structural integrity. Further, engineering assessments will explore cost-effective wave attenuation features that balance structural protection with ecological

integrity. Also, with large-scale restoration, there could be a risk of changing broader ecosystem dynamics as they currently exist. Scientific evaluations to assess the impacts of restoration efforts on estuarine hydrodynamics and water quality would take place before project implementation to better understand potential changes to ecosystems, including seagrass habitat and influence design considerations.

 Sea level rise (SLR) is a project risk for all coastal habitat projects. At Grand Bay, the area is experiencing a relative sea level rise of 0.41 centimeters per year (Smith et al., 2021a). An increase in water levels can cause increased exposure to wave driven erosion and the submergence of habitats over time. For the Grand Bay ecosystem, the level of current lateral erosion to marsh habitats is outpacing water level increases over time. Due to this, it is imperative to provide protection to existing resources and reduce amplification of further erosion from sea level rise. However, mitigation measures to reduce shoreline erosion could also reduce suspended sediments in tidal floodwaters and therefore sediment delivery into the marsh platform, impacting elevation gain which is an important component for marsh systems to adapt to rising sea level (Smith et al., 2021b). A better understanding of hydrodynamic and sediment transport pathways under different restoration scenarios is needed to inform potential impacts from restoration and provide insight into how large-scale restoration can alter the physical estuarine processes under present-day conditions as well as future SLR (Passeri et al., 2023). ACDNR previously funded research to assess potential impacts of large-scale restoration at Grand Batture Island on the Alabama side of the system. Findings from this research, published in Passeri et al. (2023), indicate that restoration efforts on Grand Batture Island could alter sediment deposition patterns, stabilizing the island and indirectly benefiting the surrounding coastal marshes by reducing wave energy and preventing further erosion. Jenkins et al. (2023) also highlighted that restoring these interior structures could help mitigate saltwater intrusion, thereby stabilizing habitats for species such as seagrass and oysters, which are sensitive to salinity fluctuations. MDEQ currently has a proposal under review to leverage this research for a cross-border project that will include restoration scenarios for both Mississippi and Alabama. Information from the study would help inform restoration and the design of a full headland structure.

Monitoring and Adaptive Management:
 Monitoring activities would occur after implementation of the project. The core components could include dimension (elevation and spatial extent) of the created habitat, plant survivorship/mortality for vegetative plantings, erosion monitoring of marsh habitat that is being protected by the headland, SAV monitoring, and biological response (e.g., wildlife use such as birds and terrapins). Monitoring would follow established monitoring guidance and be documented in a Monitoring and Adaptive Management Plan. Additionally, this plan would be developed as part of the proposed project to address project uncertainties, adaptive management strategies, and corrective actions as needed. The project's observational data plan would document the timing of monitoring activities, frequency of data collection, and the duration of the monitoring component. To the extent applicable, monitoring activities would leverage ongoing work at the Grand Bay National Estuarine Research Reserve.

Data Management:
 MDEQ will store project information on a server that utilizes the Amazon Web Services cloud-based server environment. In addition to the network and server administration provided by Amazon Web Services, MDEQ manages the server, operating system, software and services. Project information is backed up in three locations and a backup will be provided to ADCNR for use by the State of Alabama. The data is included in server snapshots performed by and stored at Amazon Web Services. Duplicate datasets are also located on a secure, cloud-based system. This system includes separate cloud backup and storage on two separate network attached storage arrays located in Gulfport and Jackson, MS. Finally, copies of the data are stored on an internal server. All electronic data and metadata are available upon request.

Collaboration:
 The states of Mississippi and Alabama have collaborated to implement this cross-border project. Garnering support and engaging through coordination with project partners, including the Mississippi Department of Marine Resource and the Grand Bay National Estuarine Research Reserve, has been critical to the formulation of the project concept. Partner engagement would continue through project implementation and is a key component of project success.

Public Engagement, Outreach, and Education:
 The State of Mississippi's prioritization of the project is based on multiple public and stakeholder engagement activities. Throughout Mississippi's restoration public engagement and planning efforts, stakeholders have consistently identified the restoration and protection of coastal wetlands and critical habitats as a top priority. The following are examples of public engagement, outreach and education activities which were considered in the selection of this proposal:

 Annual Mississippi Restoration Summit: MDEQ has hosted the Mississippi Restoration Summit annually for four consecutive years. The public is invited to learn about restoration projects and programs and to provide input on current and future priorities for restoration. The priority of marsh restoration and protection through the beneficial use of dredge material has been highlighted each year. Based on the input received at the annual summits, investing in coastal habitat restoration and protection continues to be a top priority of stakeholders.

 Mississippi Coastal Restoration Plan (NFWF-GEBF): In 2014, MDEQ undertook a multi-year planning effort to develop a comprehensive plan to support NFWF-GEBF restoration program activities in Mississippi. Development of the Mississippi Coastal Restoration Plan included extensive engagement with the public, NGO's/subject matter experts, and state and federal agencies. MDEQ's community engagement activities included community conversation and resource summits held in each of the three coastal counties. The community conversation meetings had more than 200 participants, representing 125 organizations, across the three coastal county locations. The priority of habitat conservation and restoration, including utilization

of beneficial use of sediments, was a top common value voiced across all three coastal counties.

RESTORE Act Mississippi State Expenditure Plan: Since 2016, MDEQ has solicited stakeholder input to support planning and development of the Mississippi State Expenditure Plan (MSEP). Engagement with a wide range of stakeholders, including private citizens, non-governmental organizations, business owners, elected officials, and other community leaders, has informed the priorities for restoration. During MSEP planning and development in 2023, MDEQ received input from stakeholders that projects which support the beneficial use of sediments be prioritized.

The state of Alabama's prioritization of this project is based on stakeholder input obtained through Alabama's restoration summits in 2018 and 2022, as well as FPL 1-funded planning activities carried out by the Mobile Bay National Estuarine Program watershed planning project and Alabama's Grand Bay modeling project.

Alabama Restoration Summits: ADCNR and the State of Alabama held restoration summits in 2018 and 2022. Habitat creation and restoration and beneficial use of sediments were priorities identified by the coastal stakeholders at the summits.

Conservation Advisory Board: Alabama's Conservation Advisory Board (CAB) assists in formulating policies for the Department of Conservation. During meetings held in March 2024 and May 2024, the CAB discussed habitat restoration in Alabama and affirmed the use of beneficial use for habitat conservation and restoration as an agency priority.

Planning Efforts: Additionally, the Mobile Bay National Estuarine Program (MBNEP) is currently holding public meetings and Steering Committee meetings to develop and publish a watershed management plan for Grand Bay. Watersheds have no state boundaries and the MBNEP, through FPL 1 funding, is developing the Alabama portion of the Grand Bay watershed management plan. The Environmental Protection Agency (EPA) is funding the development of the watershed management plan on the Mississippi side of Grand Bay. Stakeholder input and public outreach is a critical part of the planning process to engage the community and gather information about watershed issues. Although early in the process, the public is already involved and, before the plan is published, public opinion of the plan will be elicited through public meetings and a comment period, leading to a plan that the community influenced.

Leveraging:

Funds: $1,048,258.00

Type: Leveraging

Status: Proposed

Source Type: Not For Profit

Description: This project will evaluate different restoration scenarios for Grand Batture Island and assess potential changes in hydrodynamics, salinity, sediment transport and how these changes may impact seagrass habitat suitability. The United States Geological Survey (USGS) St Petersburg Coastal and Marine Science Center (SPCMSC) modeling team will use numerical models to evaluate the coastal processes driving salinity and sediment transport through time, benchmark the response to those processes, and determine the likely impact of potential restoration scenarios.

Funds: $364,964.00

Type: Leveraging

Status: Received

Source Type: Other Federal

Description: In June 2023, USGS, as a subrecipient to ADCNR, completed hydrodynamic, salinity, and sediment transport modeling under different restoration scenarios for the AL portion of Grand Batture Island. Modeling exercise was first step in exploring restoration actions to increase estuarine resilience including reconstructing the degraded interior headlands.

Environmental Compliance:
 Environmental compliance documentation will be updated. Environmental compliance checklists and required environmental compliance information will be provided as a part of the planning component of this project.

Bibliography (All references listed below that were published prior to 2025 may reference the Gulf of Mexico. This nomenclature has been retained to maintain the integrity of the referenced material. The Council recognizes the name change Gulf of America):

 Barbier E.B., Hacker, S.D., Kennedy, C., Koch, E.W., Stier, A.C., Silliman, B.R. (2011). The value of estuarine and coastal ecosystem services. Ecological Monographs 81(2), 169-193.

 Battaglia, L. L., Woodrey, M. S., Peterson, M. S., Dillon, K. S., & Visser, J. M. (2012). Wetlands of the northern Gulf Coast. Wetland habitats of North America: ecology and conservation concerns, 75-88.

 CH2M Hill (2011a). Final master plan for the beneficial use of dredged material for coastal Mississippi. Prepared for the Gulf of Mexico Alliance/Habitat Conservation and Restoration Team in cooperation with Mississippi Department of Marine Resources. Funding provided by the Gulf of Mexico Foundation, through cooperative agreement with the National Oceanic and Atmospheric Administration Coastal Services Center. http://msrestoreteam.com/docs/final%20MS%20Master%20Plan%20with%20appendices_1020

11-print%20version_with%20appendices.pdf Last accessed: 4.8.2020

CH2M Hill (2011b). Final project management plan for selected beneficial use projects along coastal Mississippi. Prepared for the Gulf of America Alliance/Habitat Conservation and Restoration Team in cooperation with Mississippi Department of Marine Resources. Funding provided by the Gulf of Mexico Foundation, through cooperative agreement with the National Oceanic and Atmospheric Administration Coastal Services Center. http://msrestoreteam.com/docs/Final%20MS%20PMP%20for%20BU%20102011.pdf Last accessed: 4.8.2020

Curole, G. P. and B. J. Hartman. (2016). Operations, Maintenance, and Monitoring Report for West Belle Pass Headland Restoration (TE-23), Coastal Protection and Restoration Authority of Louisiana, Thibodaux, Louisiana. 42 pp. and Appendices.

Douglass, S. L., Ferraro, C., Dixon, C. R., Oliver, L., & Pitts, L. (2012, December). A Gulf of Mexico marsh restoration and protection project. In 33rd International Conference on Coastal Engineering (p. 76).

ERG. 2014. Economic, environmental, and social benefits of regional ocean partnerships. Final report, NOAA Coastal Services Center, Charleston, SC. Prepared by Eastern Research Group, Inc., Lexington, MA. pp. 49

Gamblin, A. E., Darrah, A. J., Woodrey, M. S., & Iglay, R. B. (2023). Coastal bird community response to dredge-spoil tidal marsh restoration at New Round Island, Mississippi, USA. Restoration Ecology, 31(4), e13775.

GCERTF. (2011). Gulf of Mexico regional ecosystem restoration strategy. Gulf Coast Ecosystem Restoration Task Force, pp.128

Gittman, R.K., Popowich, A.M., Bruno, J.F., Peterson, C.H. (2014). Marshes with and without sills protect estuarine shorelines from erosion better than bulkheads during a Category 1 hurricane. Ocean & Coastal Management, 102, 94-102.

GNDNERR. (2023). Grand Bay National Estuarine Research Reserve 2023-2027 Management Plan. https://grandbaynerr.org/wp-content/uploads/2023/05/2023-2027GBNERRMgmtPlan_FINAL_05 192023-compiled-updated.pdf

Heaton, A. J., Archer, M. J., Mohrman, C., & Pitchford, J. L. (2022). Loss of Mississippi Diamondback terrapin (Malaclemys terrapin pileata) Nesting Habitat in the Northern Gulf of Mexico. Chelonian Conservation and Biology: Celebrating 25 Years as the World's Turtle and Tortoise Journal, 21(2), 272-276.

Jenkins III, R. L., Passeri, D. L., Smith, C. G., Thompson, D. M., & Smith, K. E. (2023).

Modeling the effects of interior headland restoration on estuarine sediment transport processes in a marine-dominant estuary. Frontiers in Marine Science, 10, 1217830.

 Johnson, C. L., Chen, Q., & Ozdemir, C. E. (2020). Lidar time-series analysis of a rapidly transgressing low-lying mainland barrier (Caminada Headlands, Louisiana, USA). Geomorphology, 352, 106979.

 Kim, D., Cairns, D.M., Bartholdy, J. (2010). Environmental controls on multiscale spatial patterns of salt marsh vegetation. Physical Geography, 31(1), 58-78.

 MDEQ. (2017). The Mississippi Gulf Coast Restoration Plan. A path forward toward sustainable ecosystem restoration. Available online: http://msrestoreteam.com/NFWFPlan2018/.

 Mendelssohn, I.A., Andersen, G.L., Baltz, D.M., Caffey, R.H., Carman, K.R., Fleeger, J.W., Joye, S.B., Lin, Q., Maltby, E., Overton, E.B., Rozas, L.P. (2012). Oil impacts on coastal wetlands: implications for the Mississippi River delta ecosystem after the Deepwater Horizon oil spill. Bioscience 62 (6), 562-574

 Meyer-Arendt, K. J., & Kramer, K. A. (1991). Deterioration and restoration of the Grand Batture Islands, Mississippi. Mississippi Geology, 11, 1-5.

 Moffett, K.B., Robinson, D.A., Gorelick, S.M. (2010). Relationship of salt marsh vegetation zonation to spatial patterns in soil moisture, salinity, and topography. Ecosystems, 13(8), 1287-1302.

 Nowacki, D. J., & Ganju, N. K. (2021). Sediment dynamics of a divergent bay–marsh complex. Estuaries and Coasts, 44(5), 1216-1230.

 Otvos, E. G. (1990). Mississippi and adjacent coastal sectors; geological and environmental perspectives. Long Term Implications of Sea Level Change for the Mississippi and Alabama Coastlines, 57.

 Passeri, D. L., Jenkins III, R. L., Poisson, A., Bilskie, M. V., & Bacopoulos, P. (2023). Modeling the effects of large-scale interior headland restoration on tidal hydrodynamics and salinity transport in an open coast, marine-dominant estuary. Frontiers in Marine Science, 10, 1193462.

 Purcell, A.D., Khanal, P.N., Straka, T.J., Willis, D.B. (2020). Valuing ecosystem services of coastal marshes and wetlands.Clemson (SC): Clemson Cooperative Extension, Land-Grant Press by Clemson Extension; LGP 1032.https://doi.org/10.34068/report4

 Schmid, K. (2000). Shoreline erosion analysis of Grand Bay marsh. Mississippi Department of Environmental Quality (Jackson, MS). http://geology.deq.ms.gov/Coastal/NOAA_DATA/Publications/Publications/Jackson/Shoreline%20Erosion%20Analysis%20of%20Grand%20Bay%20Marsh.pdf

Smith, K. E., Terrano, J. F., Pitchford, J. L., & Archer, M. J. (2021a). Coastal wetland shoreline change monitoring: A comparison of shorelines from high-resolution WorldView Satellite imagery, aerial Imagery, and field surveys. Remote Sensing, 13(15), 3030.

Smith, K. E., Terrano, J. F., Khan, N. S., Smith, C. G., & Pitchford, J. L. (2021b). Lateral shoreline erosion and shore-proximal sediment deposition on a coastal marsh from seasonal, storm and decadal measurements. Geomorphology, 389, 107829.

Taylor, A., & Dartez, S. (2019). A Synergistic approach to restoring the Caminada Headland. Dredging Summit and Expo Proceedings.

Terrano, Joseph. (2018). An evaluation of marsh shoreline erosion and sediment deposition in the Grand Bay National Estuarine Research Reserve, Mississippi, USA. University of South Florida.

Terrano, J.F., Smith, K.E.L., Pitchford, J., McIlwain, J., and Archer, M. (2019). Shoreline change analysis for the Grand Bay National Estuarine Research Reserve, Mississippi Alabama—1848 to 2017 (ver. 2.0, February 2019): U.S. Geological Survey data release, https://doi.org/10.5066/P9JMA8WK.

Budget

Project Budget Narrative:
 A total of $55,000,000 is being requested to fund activities associated with the project. The funds will be used for project management, planning, implementation, and monitoring associated with the project. An estimated 25% will be used for FPL Category 1 activities such as project planning, project administration (e.g., administrative programmatic functions, coordination, and sub-recipient / contractual support for project implementation), engineering and design, permitting, monitoring, and data management activities. An estimated 75% will be for FPL Category 2 implementation (i.e., construction) activities associated with the project.

Total FPL Project/Program Budget Request:
 $ 55,000,000.00

Estimated Percent Monitoring and Adaptive Management: 6 %

Estimated Percent Planning: 10 %

Estimated Percent Implementation: 75 %

Estimated Percent Project Management: 8 %

Estimated Percent Data Management: 1 %

Estimated Percent Contingency: N/A

Is the Project Scalable?:
Yes

*If yes, provide a short description regarding scalability.:*
 The extent of the restoration footprint will be determined by several factors including subsurface geology, potential impacts to existing habitats, modeling outputs, and partner input. The project footprint could represent historical shoreline boundaries (e.g., 1853,1917) or a variation of those depending on the factors mentioned previously.

Environmental

Environmental Requirement	Has the Requirement Been Addressed?	Compliance Notes (e.g.,title and date of document, permit number, weblink etc.)
National Environmental Policy Act	Yes	In Category 1, this proposed activity involves only planning actions. These planning actions are covered by the Council's NEPA Categorical Exclusion for planning, research or design activities (Section 4(d)(3) of the Council's NEPA Procedures). Additional NEPA compliance will be required for Category 2 efforts.
Endangered Species Act	N/A	Note not provided.
National Historic Preservation Act	N/A	Note not provided.
Magnuson-Stevens Act	N/A	Note not provided.
Fish and Wildlife Conservation Act	N/A	Note not provided.

Coastal Zone Management Act	N/A	Note not provided.
Coastal Barrier Resources Act	N/A	Note not provided.
Farmland Protection Policy Act	N/A	Note not provided.
Clean Water Act (Section 404)	N/A	Note not provided.
River and Harbors Act (Section 10)	N/A	Note not provided.
Marine Protection, Research and Sanctuaries Act	N/A	Note not provided.
Marine Mammal Protection Act	N/A	Note not provided.
National Marine Sanctuaries Act	N/A	Note not provided.
Migratory Bird Treaty Act	N/A	Note not provided.
Bald and Golden Eagle Protection Act	N/A	Note not provided.
Clean Air Act	N/A	Note not provided.
Other Applicable Environmental Compliance Laws or Regulations	N/A	Note not provided.

Maps, Charts, Figures
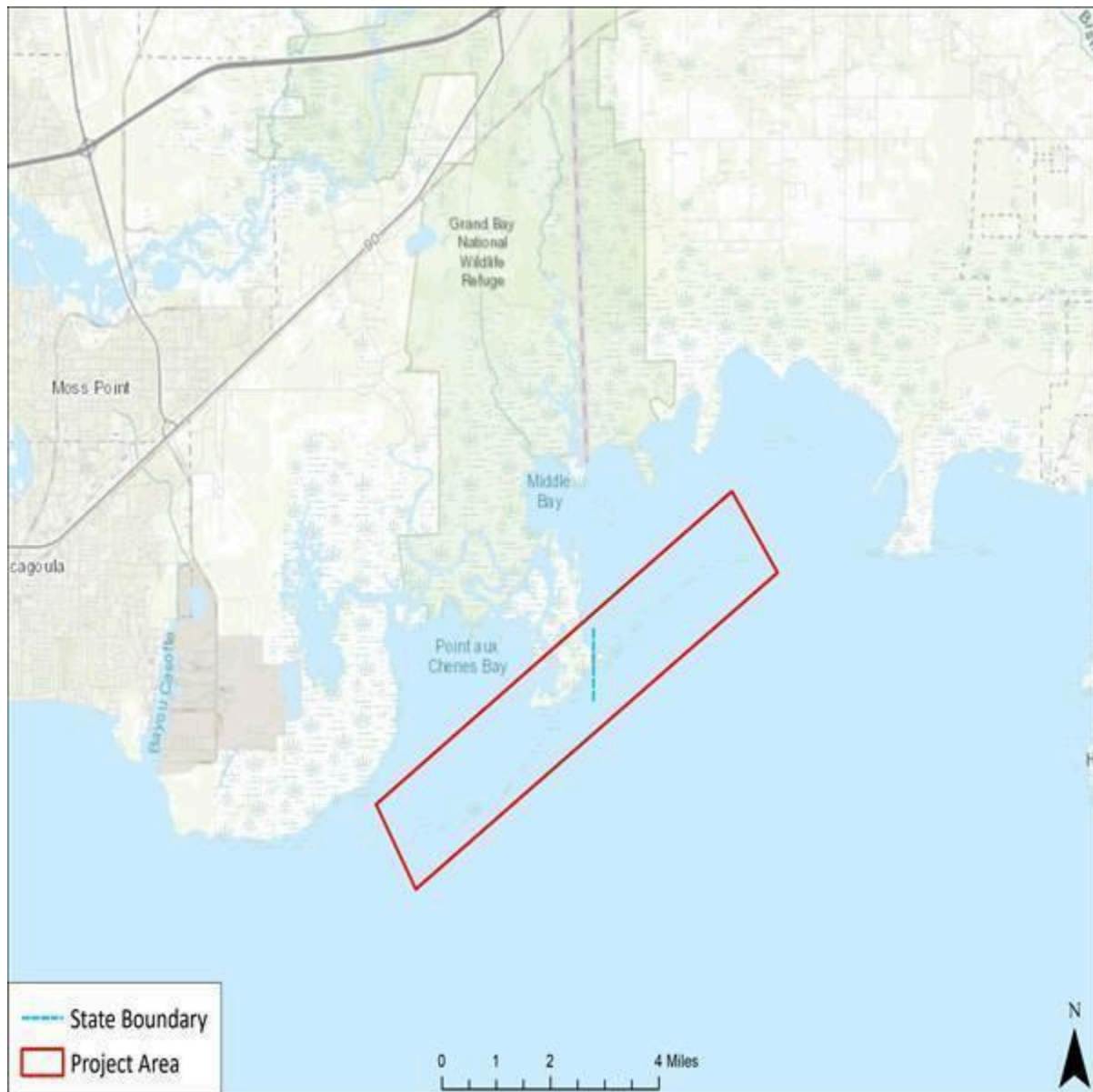
Caption : Project Area

Caption : Grand Batture Island - 1850 Shoreline

Other Uploads

GIS Data_2:
RESTORE_GIS_Template.gdb.zip
Caption : N/A
Link to Download
http://www.restorethegulf.gov/apps/piper/web/Uploads/Download/proposal/4093/79

Council Staff Review: Restoration of Grand Batture Island

FPL Internal Staff Review

Project/Program	Restoration of Grand Batture Island		
Primary Reviewer	Heather Young	Sponsor	Mississippi
EC Reviewer	John Ettinger	Co-Sponsor	Alabama

1. Is/Are the selected Priority Criteria supported by information in the proposal?	Yes
Notes	

2. Does the proposal meet the RESTORE Act geographic eligibility requirement?	Yes
Notes	

3. Are the Comprehensive Plan primary goal and primary objective supported by information in the proposal?	Yes
Notes	

4. Planning Framework: If the proposal is designed to align with the Planning Framework, does the proposal support the selected priority approaches, priority techniques, and/or geographic area?	Yes
Notes	

5. Does the proposal align with the applicable RESTORE Council definition of project or program?	Yes
Notes	

6. Does the budget narrative adequately describe the costs associated with the proposed activity?	Yes

Notes	$55M (25% Planning, & Monitoring, 75% construction implementation) MAM 6 %, Planning: 10 %, Project Management: 8 %, Data Management: 1 %, Implementation: 75 %, Contingency 0% Note: Restore Council staff worked with the state to resolve these comments.

7. Have three external BAS reviews been completed and has the proposal sponsor provided their response?	Yes
Notes	

8. Have appropriate metrics been proposed to support all primary and secondary goals?	Yes
Notes	

9. Environmental compliance: If FPL Category 1 has been selected for the implementation component of the project or program, does the proposal include environmental compliance documentation that fully supports the selection of Category 1?	N/A
Notes	Implementation funding is in FPL Category 2.

Summary of Best Available Science Review: Restoration of Grand Batture Island

The Grant Batture Island Restoration proposal received generally positive evaluations across in-state, out-of-state, and out-of-Gulf reviews, though several areas were identified as needing additional information. Reviewers agreed that the proposal was grounded in best available science, referencing appropriate literature and leveraging peer-reviewed and public sources, although some cited works were not publicly accessible or directly applicable to the site. The project goals—restoring habitat, protecting marshland, and supporting wildlife—were clearly stated, but more detail on methods, risk mitigation, and metrics was requested. Reviewers noted a lack of specificity regarding construction methods, monitoring strategies, sediment data, and adaptive management plans. While some risks, such as sea level rise and erosion, were discussed, contingency planning for events like hurricanes or sediment transport changes was insufficient. Experience from past restoration projects was cited, but lessons learned from failures were underexplored. Despite these gaps, reviewers supported funding the project, citing strong cross-state collaboration between Mississippi and Alabama, alignment with RESTORE Act goals, and the opportunity to build upon existing monitoring infrastructure. The project is seen as a crucial next step in regional ecosystem protection, though success will depend on more detailed planning and integration of modeling and protective measures.

Summary of Mississippi's Response to BAS Comments: Restoration of Grand Batture Island

The state's response to BAS comments outlines several key points related to project planning and management. Construction methods and alternatives will be addressed in the engineering and design phase, with a Monitoring and Adaptive Management Plan to be developed. This plan will include strategies for monitoring uncertainties, adaptive management, and corrective actions. The proposal also details plans to include monitoring for structural integrity, shoreline position, and sediment dynamics, with opportunities for collaboration with partners on monitoring efforts like SAV, bird, and erosion monitoring. The proposal has been updated to include additional information on erosion risk, protection measures such as living shorelines, and findings from studies like Passeri et al. (2023) and Jenkins et al. (2023). Regarding Round Island, the state clarifies that while erosion has occurred, there has also been accumulation in some areas, and the site's expansion will include protective measures. The state also refrains from commenting on other restoration projects in different states, as it is unclear whether corrective actions were taken by those project sponsors. The response reaffirms that a Monitoring and Adaptive Management Plan will be part of the proposed project.

Best Available Science Review Forms: Restoration of Grand Batture Island

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Restoration of Grand Batture Island	
Location (If Applicable): The project location is in southeast Jackson County, MS and southwest MobileCounty, AL. The project would occur, in part, within the administrative boundaries of the Grand BayNational Estuarine Research Reserve and include both the State of Mississippi and the State ofAlabama.	
Council Member Bureau or Agency: Mississippi Department of Environmental Quality	
Type of Funding Requested: Planning / Implementation	

Reviewed by: In State
Date of Review: 10/28/2024

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Need more information
Comments:	

The following resources have been provided within the "Proposed Methods/Construction Implementation" section:
GCERTF, 2011; CH2M Hill, 2011a, b; ERG, 2014; Curole and Hartman, 2016; Taylor and Dartez, 2019.

ERG 2014 is neither peer-reviewed nor publicly available.

GCERTF 2011 does not specifically list any construction implementation methods.
CH2M Hill 2011a and 2011b do not discuss any activities at Grand Battures.

Proposal provides the Caminada Headland and West Belle Pass Headland Restoration projects as examples but the proposal does not specify which of the other described methods would apply to Grant Battures restoration. For example, will there be analysis performed using GENCADE or GENESIS on alternative implementations? Also the proposed project details are not provided such as length, width, slope, volume, sediment type, size, borrow area, etc. Also the need for constructing a containment structure (dike) is not discussed to provide protection to the fill sites during construction. Also, considering the high erosion rates (USGS ref. Terrano et al, 2019), the restored island may be eroded again over time because it is subject to the highest erosion rates in the study area, and the proposal do not include any plan to combine the nourishment (dredge/fill) proposal with a combination of shoreline protection measures (for example, submerged breakwaters or other protective measures).

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes
Comments:	
The information supporting the proposal directly pertains to the Gulf Coast region.	

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Yes
Comments:	
Yes, the literature sources used to support the proposal are accurately and completely cited and represented in a fair and unbiased manner. All references are cited!	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Need more information
Comments:	
For risks, the proposal lists some risks but do not evaluate or present any contingency plans regarding achieving objectives. For example, there are no reconfiguration plans if a hurricane affects the project site during construction/implementation. The risk of construction delays and the associated erosion and shoreline changes is not mentioned (i.e. a background erosion estimation/evaluation is not proposed).	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	
The provided list of references are appropriate for the proposal. Most of the references are from recent years and provide examples of best available science from journals, reports, webpages, etc.	

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Need more information
Comments:	

Environmental Benefits section of the proposal provides reasonable justification that the outcomes of the proposed projects may be similar to other successful past applications. Risks and Uncertainties section also list recent modeling studies for the project site which are critical for the proposed project. However, the construction implementation section lacks references especially from the study area, i.e. Mississippi Sound. Some recent examples are Ship Island restoration and Round Island restoration projects in Western and Central Mississippi Sound and Little Bay Project in Alabama.

Besides, the construction implementation section does not provide a detailed view to the proposed project activities. For example, for the Round Island restoration project multiple containment cells were used as a combination of dikes and sand berms. Ship Island project was a beach nourishment project and Little Bay project included a nearshore breakwater complex with wave attenuation devices. The proposal lacks a list of design options, a declaration of the preferred design method and a discussion of alternatives.

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Need more information
Comments:	

Although the applicant extensively discusses SLR as a risk, other critical risks, such as the breaching of the restored site during a storm, or limited lifetime of the project because of regular sediment drift are not considered in detail in the Risks and Uncertainties section. For example, for the Round Island project, because there was no direct protection from wave action (i.e. no hard structures protecting the restoration area), most of the initially placed material was lost after a certain time and frequent re-nourishment was recommended for continuous environmental benefits. This will be true for any site, such that based on the sediment supply availability and the dominant wave and current-driven sediment transport patterns; any nourished restored site might experience similar erosion and the lifetime of the project might be limited. Also in the Little Bay project, wave attenuation devices were found to provide minimal attenuation and had to be optimized to enhance flow and water quality for aquatic species.

There are two studies mentioned (Passeri 2023 and Jenkins 2023) focusing on the east side of the island for the impact of proposed restoration scenarios on hydrodynamics, water quality and morphology and sediment transport. Also, they conclude that "Additional modeling that takes into account the feedback processes of marsh erosion, resuspension, and deposition would be required to determine if shoreline change rates could be impacted by restoration scenarios." Therefore, at this stage it is unclear whether the restoration of the island will guarantee positive impact on the marsh restoration efforts because it is said while it will provide protection from waves and reduce marsh shoreline erosion, it will also reduce the sediment supply to the marsh and these are not discussed in detail in the proposal.

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Need more information
Comments:	
The proposal states that "Mississippi currently has seven habitat creation projects implemented and planned (~850 acres); Alabama has eight of these projects implemented and planned (~700 acres). These combined projects total nearly 1,550 acres to benefit the overall Mississippi Sound Ecosystem." and also "Mississippi and Alabama have collectively invested $25 million for land acquisition and habitat restoration". Although no further information is provided on the type of projects and the similarity of those projects to the one being proposed.	

Question B	
Does the project/program have clearly defined goals and objectives?	Yes
Comments:	
The proposed project aims to: - restore Grand Battures Island - provide natural protection to the marshland by the restoration of Grand Battures Island - create habitat by reducing erosion rates in Grant Bay marshland - provide protection to aquatic species - increase habitat for birds and diamondback terrapin	

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Need more information
Comments:	
Monitoring is listed as a proposed activity under methods and is described in a separate section. However, cost-effectiveness is not discussed and the listed activities are not detailed enough raising questions such as: Will there be small boat surveys? Will there be on-land field surveys on the marsh? Will there be water quality surveys? What is the proposed frequency of all measurements? Annual? Seasonal? Monthly? Will there be bathymetric surveys before and after the restoration of Grand Battures? Will there be surveys on breeding non-breeding bird nests? Will there be instruments/sensors deployed for continuous measurements? What will be the during construction and post-construction	

monitoring for the marshland? Will aerial surveys be conducted to monitor shoreline change? Will there be LiDAR surveys (either terrestrial or aerial)? There may be other questions regarding the proposed monitoring activities.

Construction and Implementation is the main method proposed to restore the Grand Battues Island/Headland and it is clear that the goal is to use dredged material for the proposed restoration project. However, the applicant is not clear which method will be selected. It is mentioned that the methods will be based on finals plans and specifications developed during engineering, design and permitting. Even if the West Belle Pass Headland restoration and Caminada Headland restoration projects are listed as previous studies to be considered, no method is listed as proposed or listed to be used as a list of possible methods to select from.

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	Yes
Comments:	
Yes, the proposal extensively discusses the environmental benefits of the proposed Grand Battures Restoration project via the creation of habitat and protection of marshland. The applicants also discuss the benefits in reference to the stressors including salt marsh erosion, headland habitat degradation. They provide the recent Round Island Project as an example of environmental benefits.	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Need more information
Comments:	
PRM011, PRM013 and HR013 are listed as metrics but details are provided except 100 acres of wetland will be restored (i.e. coastal habitat created). So, although a metric is included for habitat creation and wetland restoration. There seems to be no metric included for the success of nesting increase for birds or diamondback terrapin or any metrics included as fast as the success of protection for aquatic species such as oysters and seagrass.	

Question F

Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	Yes

Comments:

The proposal extensively discusses vulnerability to Sea Level Rise, i.e. climate risk. The applicants refer to multiple studies (Passeri et al., 2023 and Jenkins et al., 2023) already conducted by funding from one of the partners (ADCNR). Both are modeling studies focusing on the impact of the proposed restoration (combined with other restoration activities) on both hydrodynamics, water quality and morphodynamics while considering SLR scenarios. One thing to note is both studies focus on the eastern side of the proposed project site while it is also very important to also study and analyze the potential impacts on the western side (Pascagoula side) because the implementation will potentially modify the sediment transport dynamics in the downdrift western side. These are is critical habitat for the threatened Gulf Sturgeon, therefore it is crucial to under the potential long-term impacts of the proposed implementation on the water quality and hydrodynamics of the entire study area.

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	Need more information

Comments:

The proposal discusses the storm threats and the possibility of repairs; unanticipated compaction and subsidence; also potential chances to ecosystems. However, there is no specific mitigation plan to address short-term risks. The proposal does not consider any socio-economic impacts. For example, the positive impacts of marshland restoration on coastal communities is not discussed, or the influence of enhanced protection for oyster provided by the restored island on oyster fishermen is not discussed, among others. Also recent studies (Jenkins et al., 2023) indicated that the proposed project might lead to sediment supply issues for the marshland but the proposal does not discuss this risk/uncertainty.

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Need more information

Comments:

The proposal refer to several recent studies such as Passeri et al. and Jenkins et al. (2023) studying the impacts of the restoration of Grand Battues Island, however they do not provide sufficient information from their findings.

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	Need more information
Comments:	
Proposal refers to past headland restoration efforts and also to another successful study in Mississippi: Round Island restoration. However, the failures during those projects and the potential similar risks for the proposed project are not discussed in detail. For example, there were construction failures during the initial West Belle Pass Headland Restoration project which had adverse impacts such as volume deficits, marsh tracks, and elevated spoil embankments and a significantly reduced wetland acreage below the goal. There were data collection difficulties during the Caminada Headland restoration project. The Little Bay project was a living shoreline success and this was not discussed in the proposal at all. The successes and environmental benefits of the Round Island project were discussed. However, the short term (and also long term benefits) to certain bird species was not discussed. Also the fact that the sand berm solution was subject to erosion and went back to pre-implementation levels was not discussed. This is important because it highlights the need for a combination of a soft solution (nourishment, filling with dredged material) with a green solution (e.g., a living shoreline) adding a level of protection for the project.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is the appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Need more information
Comments:	
The proposal discusses a monitoring plan and also includes a data management plan. However, the monitoring plan is not detailed and therefore there is no direct linkage between their support of project metrics and measures of success. Also, adaptive management is not articulated in the proposal.	

Please summarize any additional information needed below:

The restoration of Grand Battures Island could be a critical project and will help preserve and protect the ecosystem as well as marshland in Mississippi Sound. The proposal very well articulates the environmental and ecosystem benefits of the proposed project. The study site experienced the largest shoreline retreat in the study area and this means even after the sand fill and nourishment with dredged material for the restoration of the island, it will remain subject to high erosion rates. For this reason, it would be beneficial for the applicants to combine the sandfill approach with a coastal protection method. This could be porous energy buffer, wave attenuation devices, living shorelines, or other alternatives such as frequent re-nourishment activities planned.

Here are some additional comments/suggestions:

The proposal does not discuss the possibility of using a modeling system to predict the impact of Grand Battures restoration on marsh accretion. There are models available to study marsh dynamics, marsh edge erosion, marsh lateral erosion, marsh vertical growth and vertical accretion due to biomass production, submerged aquatic vegetation growth. It would be crucial to utilize such models as well as morphological/shoreline change models in conjunction with the sediment transport models, hydrodynamics models, wave models to analyze the impact of the proposed restoration effort before construction begins. (For example, see Kalra et al. 2021, Front. Mar . Sci. Vol. 8 https://doi.org/10.3389/fmars.2021.740921)

The proposal did not provide technical details (even if they may change during planning and implementation) such as fill material, sediment type, sediment size, protection material, riprap, fill slope, fill height, fill width/thickness, fill length, etc.

The proposal does not discuss baseline bathy=topo surveys, baseline habitat surveys, monthly monitoring surveys, hydrodynamic (wave/currents affecting sediment transport) measurements and also types of surveys to determine volumetric changes and accretion calculations to assess project metrics.

Proposal Title: Restoration of Grand Batture Island
Location (If Applicable): The project location is in southeast Jackson County, MS and southwest MobileCounty, AL. The project would occur, in part, within the administrative boundaries of the Grand BayNational Estuarine Research Reserve and include both the State of Mississippi and the State ofAlabama.
Council Member Bureau or Agency: Mississippi Department of Environmental Quality
Type of Funding Requested: Planning / Implementation

Reviewed by: In Gulf
Date of Review: 10/25/2024

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Yes
Comments:	
This is a barrier island/beach construction and monitoring project. The proposal has referenced many pertinent studies and work that shows support for their goals/objectives.	

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes

Comments:
Methods are supported with adequate documentation. This construction project is for a specific geographic location that spans both Mississippi and Alabama coastal habitats.

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Yes
Comments:	
Accurately and well-represented literature citations are documented in a fair and unbiased manner.	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Yes
Comments:	
There are risks and uncertainties discussed in the proposal, but the near and long term benefits of the project are considered to be essential and will never be obsolete. There is no indication that the project will not function as planned. Protecting interior wetland habitat while providing a barrier headland/beach for wildlife usage is fundamental to good stewardship at a practical level even with the ever-present erosional and potential ephemeral nature of such habitats.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	
Throughout the project proposal the applicant provides ample peer-reviewed and publicly available data references that support their goals/objectives.	

Question B

Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Yes
Comments:	
The proposal is based on peer-reviewed as well as comprehensive agency reports that provide data information and proper statistical approaches. There is ample evidence in the literature that this project is of high quality.	

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Yes
Comments:	
I was very pleased to see that the proposal highlighted the uncertainties that accompany all such barrier beach/headland construction projects.	

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Yes
Comments:	
The sponsors and project partners have all the necessary experience through other sponsored coastal projects similar to the one being proposed.	

Question B	
Does the project/program have clearly defined goals and objectives?	Yes
Comments:	
The proposal has a very broad-stroke goal and objective statement and I would have expected more habitat-specific and biota-specific information to be included. However, when reading the entire proposal, the authors provide much of that information in their following narrative sections.	

Question C

Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	
The authors cite past projects that have specific science-based methodologies that will be similarly used in this project. They also state that methodologies will be established according to accepted management protocols.	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	Yes
Comments:	
The proposal gives a good account of potential environmental stressors and associated risk of project success. They appear to have a firm understanding of those stressors. The potential benefits are also discussed in the proposal and in my opinion outweigh the risks.	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Yes
Comments:	
Comments already provided above satisfy this question. Aligns with RESTORE Act requirements.	

Question F	
Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	
The proposal gives a good account of potential environmental stressors and associated risk of project success. They appear to have a firm understanding of those stressors. The potential benefits are also discussed in the proposal and in my opinion outweigh the risks.	

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include	Yes

the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	
Comments:	
Comments already provided above satisfy this question. Aligns with RESTORE Act requirements.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Yes
Comments:	
The proposal cites numerous scientific studies that support the above questions, and does an adequate job of discussing them.	

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	Yes
Comments:	
This is captured in the narrative with scientific citations. Aligns with RESTORE Act requirements.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is the appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Yes
Comments:	
Comments already provided above satisfy this question. Aligns with RESTORE Act requirements.	

Please summarize any additional information needed below:

I would recommend this project for funding. I base this recommendation on the following:
*The proposal is submitted by MDEQ, but there is a partnership with the Alabama ADCNR. This creates a strong proposal with the cooperation of both states since the project footprint borders both, and ultimately benefits both with the protection of Grand Bay National Wildlife Refuge.
*Monitoring in the nearby GBNRR is extensive and on-going, e.g.. the Sentinel Monitoring Program. Opportunity to develop a monitoring plan for the project with an infrastructure of already available supporting staff and expertise. An opportunity to better understand barrier beach habitat changes over time. This project can potentially become a sentinel for how storms, currents, etc. change habitats and how the biota adapt with those habitat changes.
*This construction of barrier headlands will support the protection of interior marsh habitats that have been previously funded from NFWF, NRDA, and the RESTORE Act. This is a very logical next-step project.
*Such a large-scale project will require extensive planning before final development of proper monitoring strategies. They state this in the document with the need for incremental procedures, and realistically propose a 10-year plan timeline.
*MDEQ, ADCNR, and GBNERR have experience in construction and monitoring of such a proposed project, which ensures proper oversight and fulfillment of project goal/objective.
*I was very pleased to see in the proposal that the work proposed will be used to leverage future research opportunities for cross-state projects that will include restoration scenarios for both Mississippi and Alabama.
*Outreach to the public by MDEQ, ADCNR, and others have indicated that habitat preservation and enhancement are high priorities. This project definitely encompasses the wishes of the public. Additionally, MDEQ hosts an annual Restoration Summit.
*Understanding the hydrodynamics of sediment transport to/from the proposed barrier headland project is essential. The USGS had been funded to model this for the Alabama part of the headland and MDEQ has a pending project with a Not For Profit to do the same for the Mississippi part of the headland.

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Restoration of Grand Batture Island	
Location (If Applicable): The project location is in southeast Jackson County, MS and southwest MobileCounty, AL. The project would occur, in part, within the administrative boundaries of the Grand BayNational Estuarine Research Reserve and include both the State of Mississippi and the State ofAlabama.	
Council Member Bureau or Agency: Mississippi Department of Environmental Quality	
Type of Funding Requested: Planning / Implementation	

Reviewed by: Out of Gulf	
Date of Review: 10/21/2024	

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Yes
Comments:	

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes
Comments:	
N/A as the project benefits directly to the Gulf Coast.	

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Yes
Comments:	
Literature is well used in describing benefits, project designs and risks.	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Yes
Comments:	
The proposal does an excellent job of identifying these risks to the project utilizing recent literature.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Yes
Comments:	

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Yes
Comments:	

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Yes
Comments:	
The proposal does detail the adjacent work that has been ongoing in AL and MS, as well experience in permitting, engineering and construction.	

Question B	
Does the project/program have clearly defined goals and objectives?	Yes
Comments:	
At this stage, yes the goals are clearly defined and assume they will get more detailed during the E&D process.	

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those	Yes

benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	
Comments:	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Yes
Comments:	

Question F	
Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	
Yes, the proposal does discuss this, as well as has a modeling team from USGS and USM that will be conducting scenario modeling to reduce risks during the planning and E&D stage.	

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	
The proposal does identify short-term risks. At this stage, there are plans to conduct scenario modeling to reduce risks, as well as a parallel project to better understand hydrodynamic and sediment transport pathways under different restoration scenarios and future environmental conditions that will inform the future details of the design of the project.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Yes

Comments:

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	Need more information
Comments:	
The proposal doesn't explicitly discuss past efforts, but does note a few literature resources around sediment resource management and techniques/lessons learned from similar projects.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is the appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Yes
Comments:	
The proposal does identify key monitoring and data management needs for the projects and makes a commitment to that, however the details (such as performance criteria) are lacking most likely due to the stage of the project in development.	

Please summarize any additional information needed below:
Overall, the project is justified by the best available science and the proposal has explicit reliance on peer-reviewed and other public literature. Where details are lacking, it simply seems to be due to the stage of the project in early development and more information will become available during the permitting, E&D and environmental compliance stages of the project.