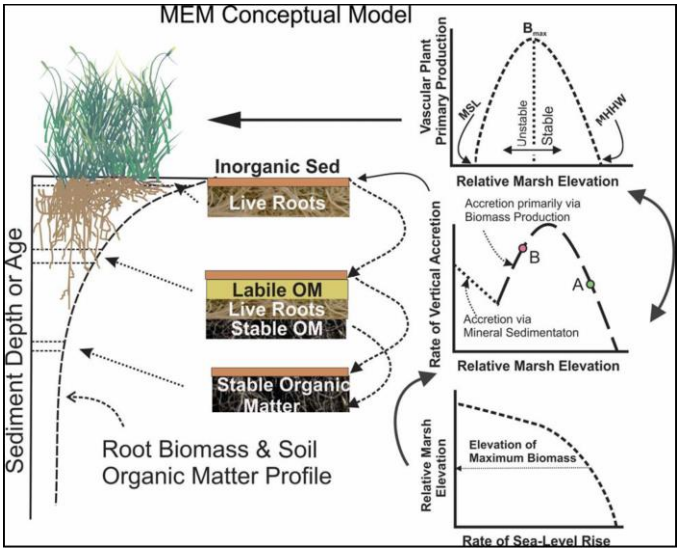
US Army Corps of Engineers®
Engineer Research and Development Center

National Regional Sediment Management Program
ERDC EL/CHL:

Improved BU wetland planning: RSM scenario planning with the Marsh Equilibrium Model (MEM)

Description

This project will utilize the Marsh Equilibrium Model to demonstrate how the model can be used to better plan and operationalize wetland BUDM and to demonstrate how to more fully utilize wetland placement as part of a RSM strategy.



Conceptual model of the Marsh Equilibrium Model (MEM; Morris and Renken 2019).

Issue/Challenge To Address

The majority of coastlines along the eastern, Gulf, and western coasts of the U.S. have a net sediment deficit, which could impact the ability of coastal ecosystems such as wetlands to adapt to natural and anthropogenic stressors. Sea level rise and coastal development threaten coastal wetland sustainability requiring RSM practices be implemented as part of wetland management.

Effective beneficial use of dredged material (BUDM) in wetland environments as part of the RSM approach requires the alignment of disparate activities: dredging and wetland restoration. While there are many complexities involved with effective BUDM, aligning the requirements and timing of dredging and placement activities are significant operational impediments that can prevent use of wetland BUDM. Approaches and tools are needed to adequately plan and implement wetland BUDM as part of RSM strategy.

This project will provide instruction in linking individual wetland BUDM projects together as part of a network of BUDM options that can integrated into a regional RSM approach rather than treating BUDM projects as one-off deviations from typical practice. The use of modeling tools can be used to determine how to effectively and efficiently supplement sediment to wetlands, combatting long-term degradation of wetland systems caused by sea level rise and sediment starvation.

Successes Lessons Learned

Lessons learned will be compiled throughout the duration of this study.

Projected Benefits Cost Savings Value Added

Developing and documenting planning frameworks will ease the burden on district staff when initiating BU projects and encourage a uniform procedure nationwide in such projects. An established timeline for BU projects will allow planners to align their work with anticipated and scheduled dredging needs and funding programs. These long-term values will improve

National Regional Sediment Management Program ERDC EL/CHL:

Improved BU wetland planning: RSM scenario planning with the Marsh Equilibrium Model (MEM)

efficiency and communication between ERDC, USACE districts, and other project partners in BUDM projects.

Cost savings from BUDM are realized in the conservation of CDF fill volume and reduction of transportation costs at placement sites that may be closer to the dredge location than CDFs or ocean placement sites. Habitat value is added at placement sites where sea level rise, erosion, and other stressors may threaten ecological integrity.

The use of MEM can address some regulatory concerns as the model is designed to predict future vegetation biomass and can be used to optimize placement elevations so preferred wetland vegetation communities can establish. MEM can also be used to demonstrate potential sediment volumes placed and marsh life-cycle outcomes versus a no-action scenario, which can help Districts communicate how the benefits and risks of BUDM versus no-action compare.

Expected Products

- MEM scenario analysis tool (Batch tool)
- Planning framework
- Technical Report/Note outline approach and documenting Case Study
- Conference presentation (target: ASBPA)

Stakeholders/Users

The role of the stakeholders will include collaborative application of the tools, feedback on the model and output issues, and incorporation of end-user technical expertise into case study documentation and application guidance. Depending on the case study sites selected, District and local partners will be added to the RSM team.

Leveraging Opportunities

This effort leverages several other CW R&D past and continuing efforts originating with the development of a version of MEM (version 8.6) that included the ability to simulate thin-layer placement (Piercy, DOER 2015). The optimization of restoration and dredging priorities at a regional scale in San Francisco Bay Estuary will determine which planned bayland restoration projects are most efficiently supported through SPN maintenance dredging (Piercy, Gailani, Boyd; DOER 2019). Other applications designed to determine sediment placement capacity for wetland BUDM include in NAP as part of the Seven Mile Island Innovation Laboratory (Chasten, NAP) and in SAM at the Blakeley Island CDFs (Godsey, Piercy, Boyd; RSM 2020).

Points of Contact

Candice Piercy, CEERD-EEW, Research Environmental Engineer; Candice.D.Piercy@erdc.dren.mil
Brandon Boyd, CEERD-HZT, Research Oceanographer; Brandon.M.Boyd@erdc.dren.mil
Kyle Runion, CEERD ORISE Scholar; kyle.d.runion@erdc.dren.mil
Emily Russ, CEERD-EEW, Research Biologist; Emily.R.Russ@usace.army.mil

Participating Partners

District RSMers, depending on case study site selected.