



Improving Coastal Resiliency Along America's Shorelines: One Wetland at a Time

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World Dredging Congress (WODCON XXI)
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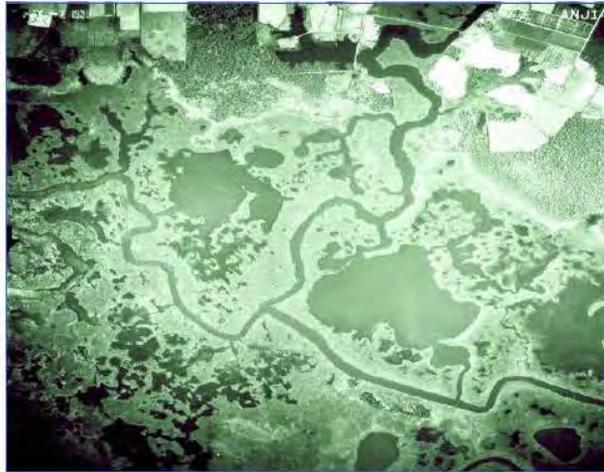


Marsh Loss Processes

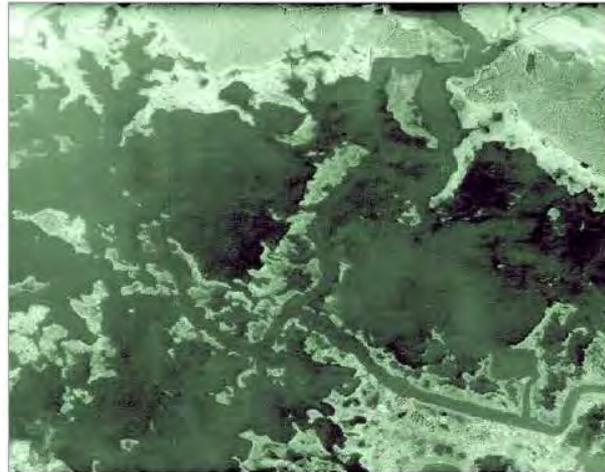


Approx. 25% - 50% of the world's coastal wetlands have been lost due to human encroachment in the last 100 years!

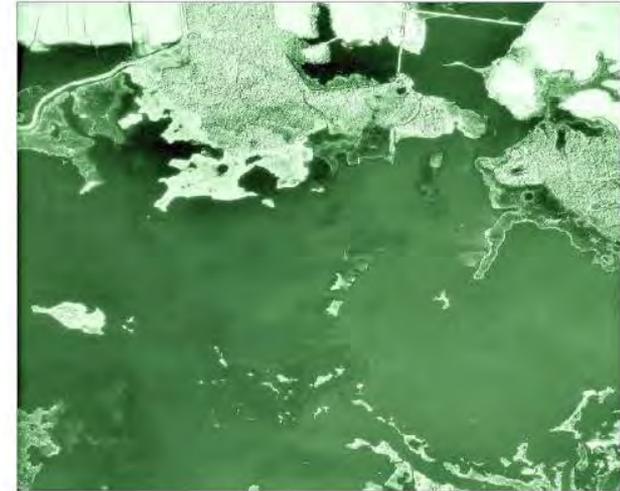
Clear Evidence of Historic Loss (Blackwater Refuge, Chesapeake Bay)



1938



1974



1989

Curson et al., 2016.

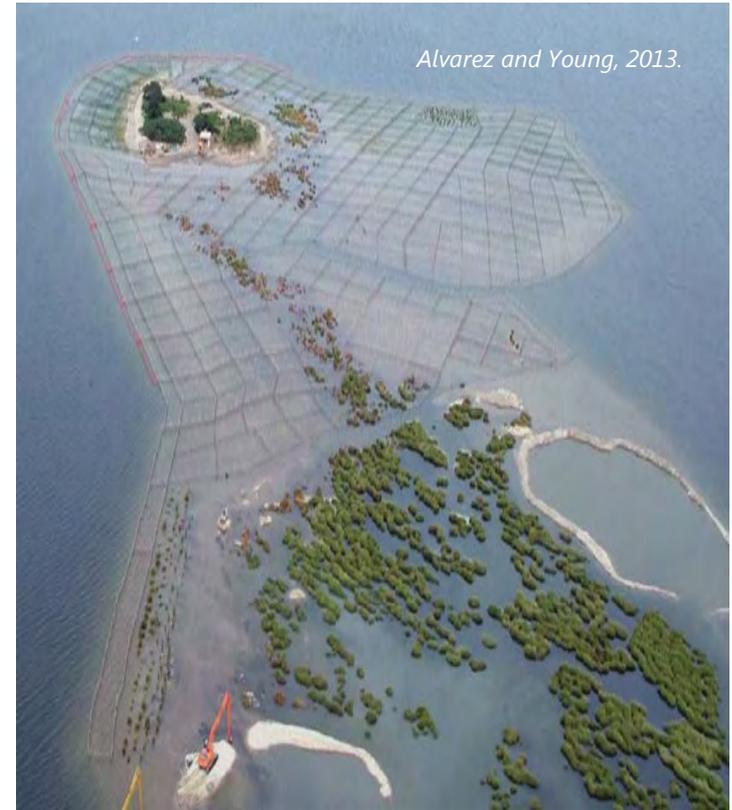
Post-Sandy Observations



Coastal damage was lower in protected natural marshes

Coastal Resiliency: Where Are We Headed?

- Long term loss expected to continue
- Coastal processes identified and studied
- Pilot demonstrations successful
- Dredged material - a resource for restoration
 - Balance of sustainable use versus over placement
- Regulatory hurdles still exist
- Long-term monitoring and adaptive management are key for success



Managing for Coastal Resiliency

- Improve overall resiliency
 - Enhance sediment supply (thin placement)
 - Manage water balance (alleviate water logging)
 - Improve drainage
- Adaptive management
 - Facilitate marsh migration by removing dead trees and upland barriers
 - Consider change in crops (salt tolerant species?)
 - Control invasive species
 - Conserve lands in potential migration pathways



Benefits of Wetlands Restoration

- Improved resiliency
- Improved water quality and circulation
- Diversity (plants and animal use)
- Long-term improvement (aesthetics)
- Enhanced recreational use (hiking, fishing, kayaking)



Restoration Case Studies

- 1978: St. Simons Sound, GA
- 1988: Bon Secour, AL
- 1992: Lake Landing Canal, NC
- 1999: Venice Marsh, LA
- 2006: Masonboro Island, NC
- 2013: Delaware Bay, DE
- 2014/15: Avalon/Fortescue, NJ
- 2015/16: Black Water Marsh, MD
- 2011-2050: Jamaica Bay, NY
- 2017-2025: Mississippi Marshes, MS



All wetlands recovered vigorously within one to two growing seasons following placement

Spray Placement in Coastal Louisiana

- One of the first thin-layer placement pilot projects
- In Terrebonne Parish
- Varying thickness (10 to 15 cm)
- After 14 months, still some smothering of vegetation
- Full re-colonization in two seasons



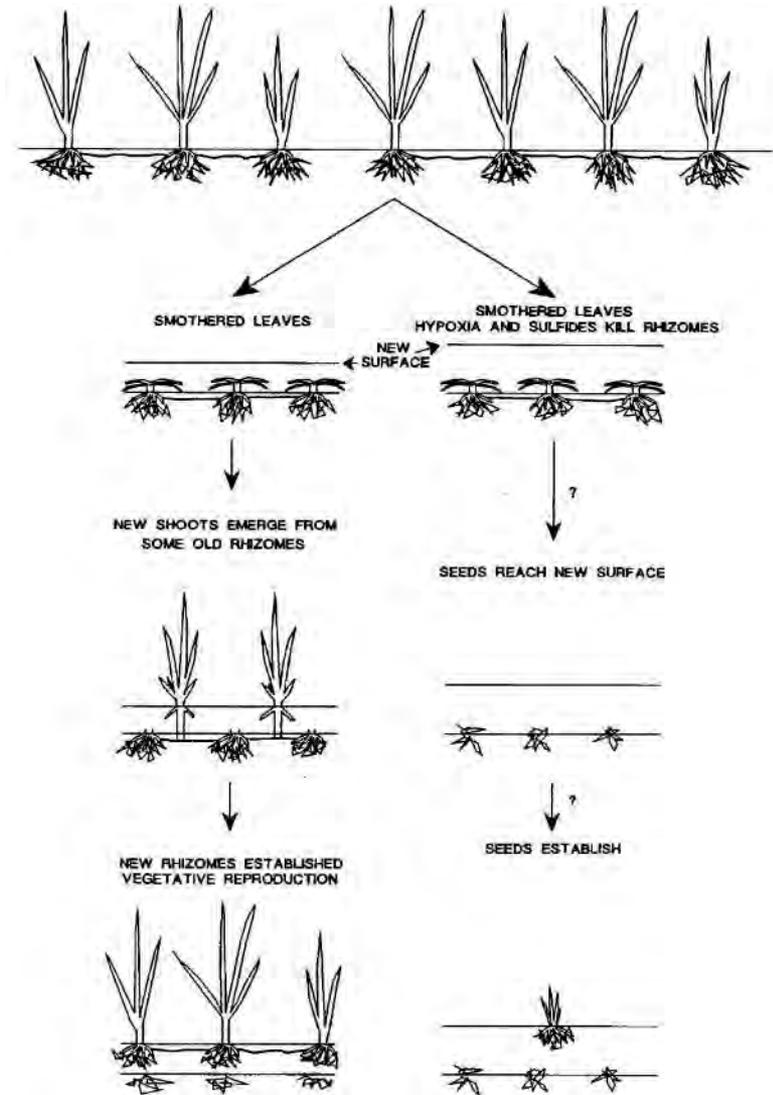


Environmental Effects of Dredging Technical Notes



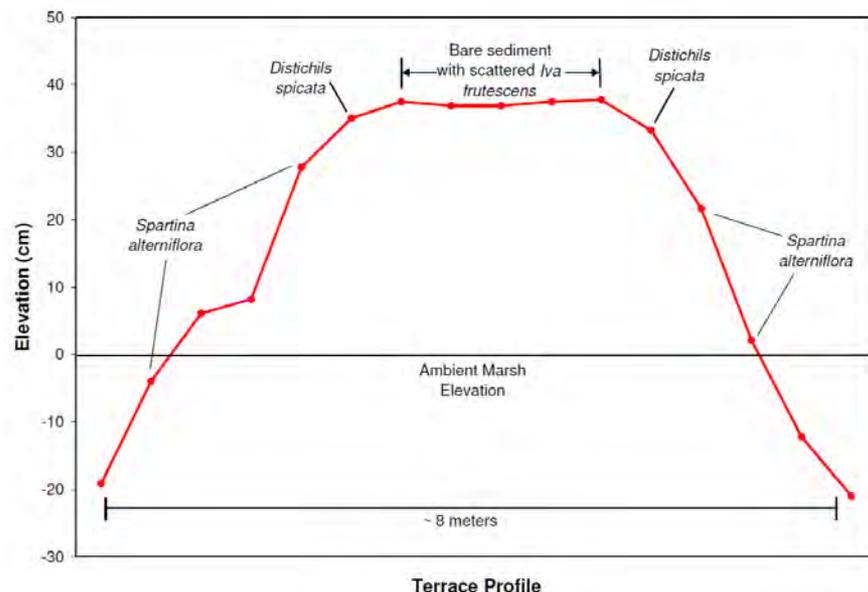
Managing Dredged Material Via Thin-Layer Disposal in Coastal Marshes

- Bulking noted: 2 to 4 times in situ
- Shrinkage: 10% to 40% in first 10 days
- New shoots penetrate for 8- to 23-cm thick placement



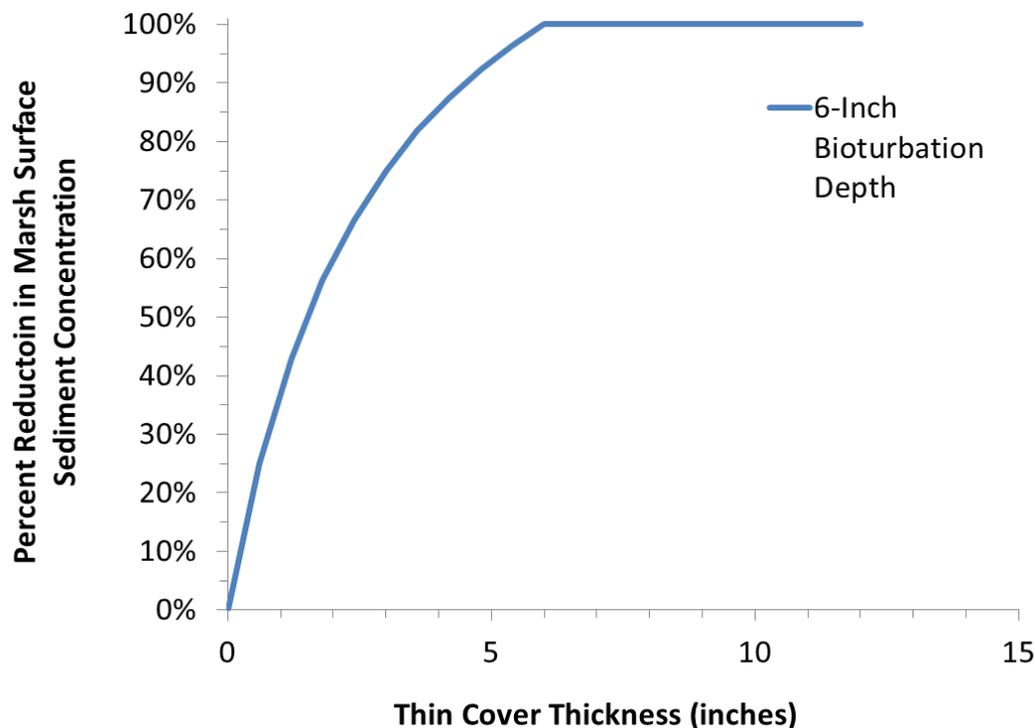
Marsh Recovery Evaluation

- Marsh recovery is a function of tidal range
 - Placed material thickness has to be within this tolerance
- USACE/ERDC studied wetlands in several states
 - NC, SC, GA, NJ, and NY
 - Results indicate that if placement layer thickness is less than 1 to 2 feet, marsh vegetation recovers
 - Recovery is more vigorous and healthy for thinner layers



Contaminant Isolation Considerations

- Thin layer is an effective barrier
- Root mats inhibit bioturbation
 - The zone is generally 3-6 inches



Strategic Wetlands Assessment Process

- Determine location-specific factors affecting wetlands
- Determine resiliency needs
- Identify marsh habitat of highest utilization to marsh/shore birds
- Map out marsh migration corridors
- Identify potential barriers to marsh migration
- Facilitate future marsh migration
- Help communities adapt



Planning and Design Considerations

- Project goals & timeframe
- Habitat criteria
- Logistical analysis
- Preliminary site screening
- Baseline data collection
- Site layout/placement design
- Alternative analysis
- Final site selection
- Engineering design



Material Placement Considerations

- Evaluate material type
- Dredging, transport, and placement
 - *“One cubic yard dredged is not one cubic yard placed”*
- Bulking and shrinkage
- Consolidation modeling
- 3-dimensional modeling



Construction Considerations



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Planting Considerations



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Vegetative Monitoring



What questions
and functions
captured?



Additional
questions and
functions?



Update and
add methods

Lessons Learned?



- Thin placement accelerates restoration
- Include habitat diversity as part of design
- Stakeholder engagement and “buy-in” is critical
- Evaluate circulation pre- and post-project
- Marsh edge erosion control can be key
 - Living shorelines versus engineered systems?
- Incorporate adaptive management, as part of long-term monitoring
- Allow natural processes to facilitate the long-term recovery

If You Restore, They Will Come!



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Questions?

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