



# PLANNING & CONSTRUCTION TOOLS, MONITORING PROTOCOLS AND LESSONS LEARNED FROM THREE DECADES OF COASTAL RESTORATION PROJECTS



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# Coastal Wetlands – Where are we headed?

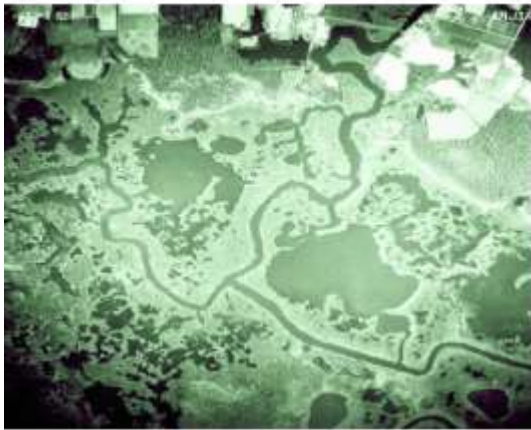
- Approx. 25% - 50% of the world's coastal wetlands have been lost in the last 100 years!
- Future Considerations:
  - Dredged material use as a resource
  - Balance of sustainable use versus over placement
  - Long term monitoring and adaptive management are key for success



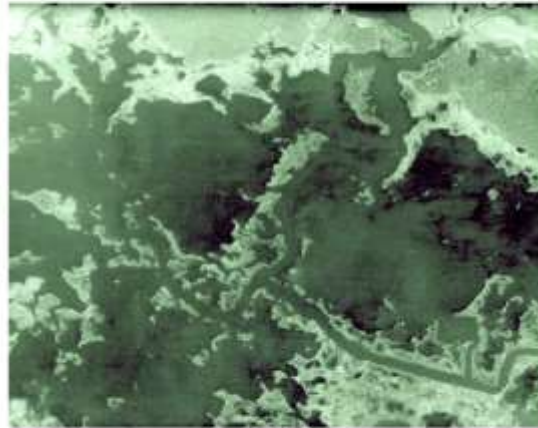
# Case Study: Blackwater Refuge, Maryland



Clear evidence of historic change...



1938



1974



1989

Curson et al, 2016

# Managing Wetlands for Coastal Resiliency

- Wetlands enhance coastal resiliency by acting as buffers
- Tools for wetland restoration
  - Control edge erosion
  - Enhance sediment supply (thin or bulk placement)
  - Manage water balance (alleviate water logging)
  - Improve drainage
- Adaptive management is key for success!
  - Renourish as needed, if feasible
  - Control invasive species
  - Facilitate marsh migration
    - Remove dead trees and upland barriers
    - Conserve lands in potential migration pathways



# Thin Layer 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*

# Case Study - Spray Placement, 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



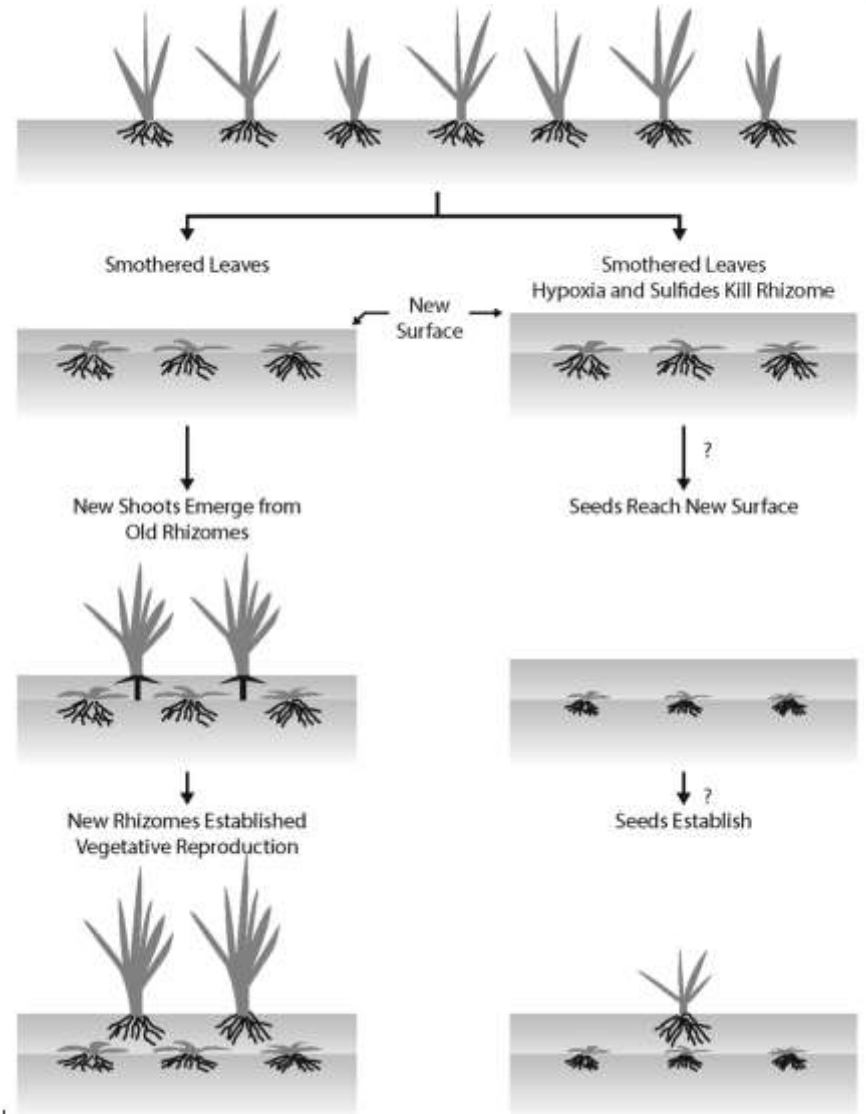


# Environmental Effects of Dredging Technical Notes



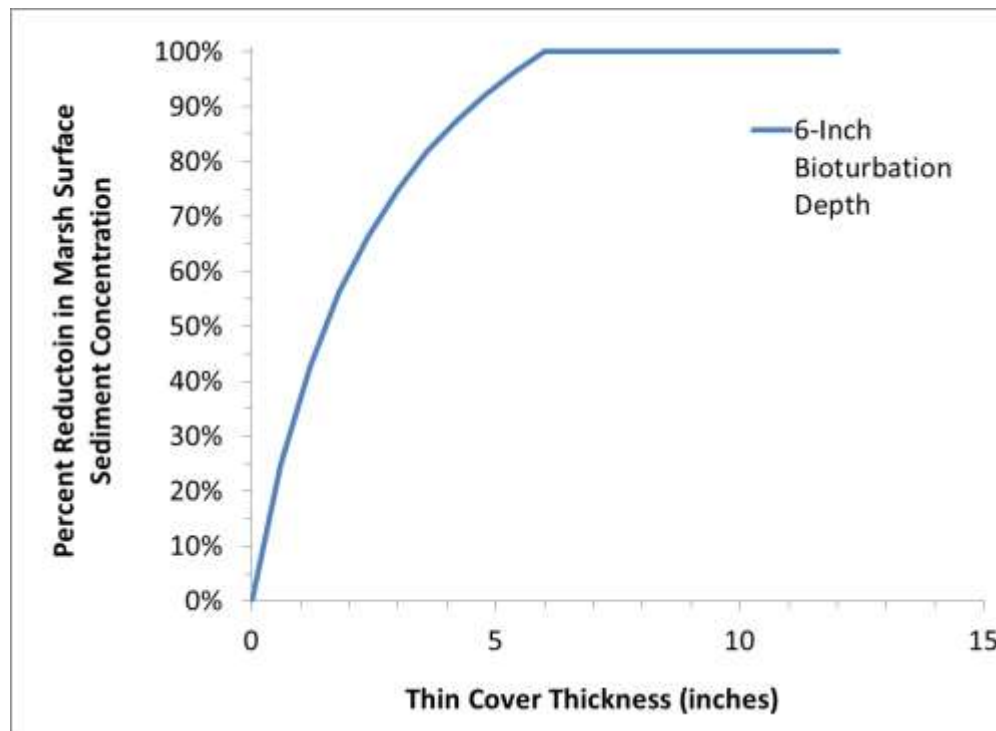
## Managing Dredged Material Via Thin-Layer Disposal in Coastal Marshes

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



# Contaminant Isolation – Considerations

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





# Planning and Design Considerations

- Define project goals and timeframe
- Habitat criteria selection
- Identify sites
- Review logistics
- Preliminary site screening
- Baseline data collection
- Site layout and placement design
- Alternative analysis
- Final site selection



Alvarez and Young, 2013

# Planning Case Study



# Construction Considerations



# Material Placement & Planting Considerations

- Fine-grained silts and clays
  - “One cubic yard dredged is not one cubic yard placed”
- Bulking and shrinkage – testing
  - Consolidation modeling (PSDDF)
  - 3-dimensional modeling



# Case Study: Poplar Island, Maryland



# Example Monitoring Template

Monitoring Year	Baseline Monitoring		Long-term Monitoring						
	1	2	1	2	3	4	5	6	7
Sediment Quality	X		X		X		X		X
Wetland Vegetation	X	X	X	X	X	X	X	X	X
Water Quality	X	X	X		X		X		X
Benthic Community	X	X	X		X		X		X
Wetlands Use by Fish	X	X	X		X		X		X
Wetlands Use by Wildlife	X	X	X		X		X		X
Bird Utilization	X	X	X		X		X		X
Submerged Aquatic Vegetation	X	X	X	X	X	X	X	X	X



# 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!

## Questions?

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