High Hopes: Boosting Marsh Elevation & Understanding through Thin Layer Sediment Placement

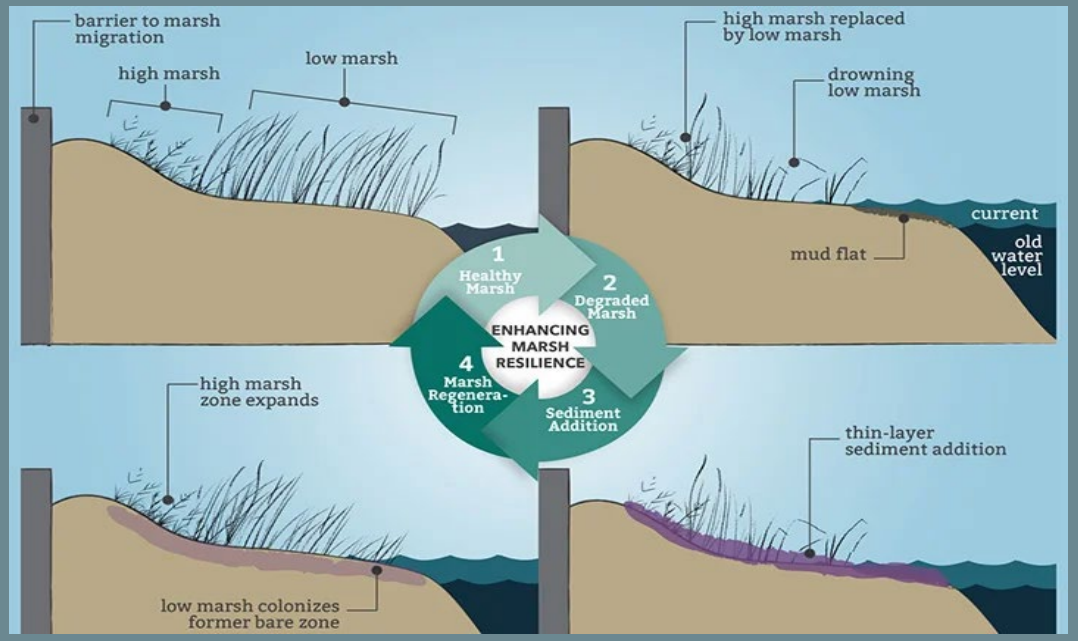


Bri Benvenuti | Lauren Lenderman, P.E., Ducks Unlimited
Karl Stromayer, Rachel Carson National Wildlife Refuge
Kate O'Brien, U. S. Fish and Wildlife Service
Dr. Adrienne Kovach | Talia Kuras | Dr. Gregg Moore| Marjorie Mednikova, University of New Hampshire

SEA-LEVEL RISE & ELEVATION DYNAMICS

- Altered hydrology → reduced sediment delivery → suppressed mineral accretion
- Once marshes cross hydroperiod threshold, collapse accelerates
- Elevation capital – the buffer between marsh surface and submergence thresholds – is shrinking
- Costs rise exponentially when marsh drowning is advanced.





PROJECT OVERVIEW

- Regulatory Engagement
- Hydrology Restoration (runnels)
- Berm Removal
- Thin Layer Sediment Placement / Beneficial Use of Dredged Material
- Monitoring & Adaptive Management

First beneficial use of dredge material project in northern New England

Designed to test feasibility, ecological outcomes, and regulatory pathways

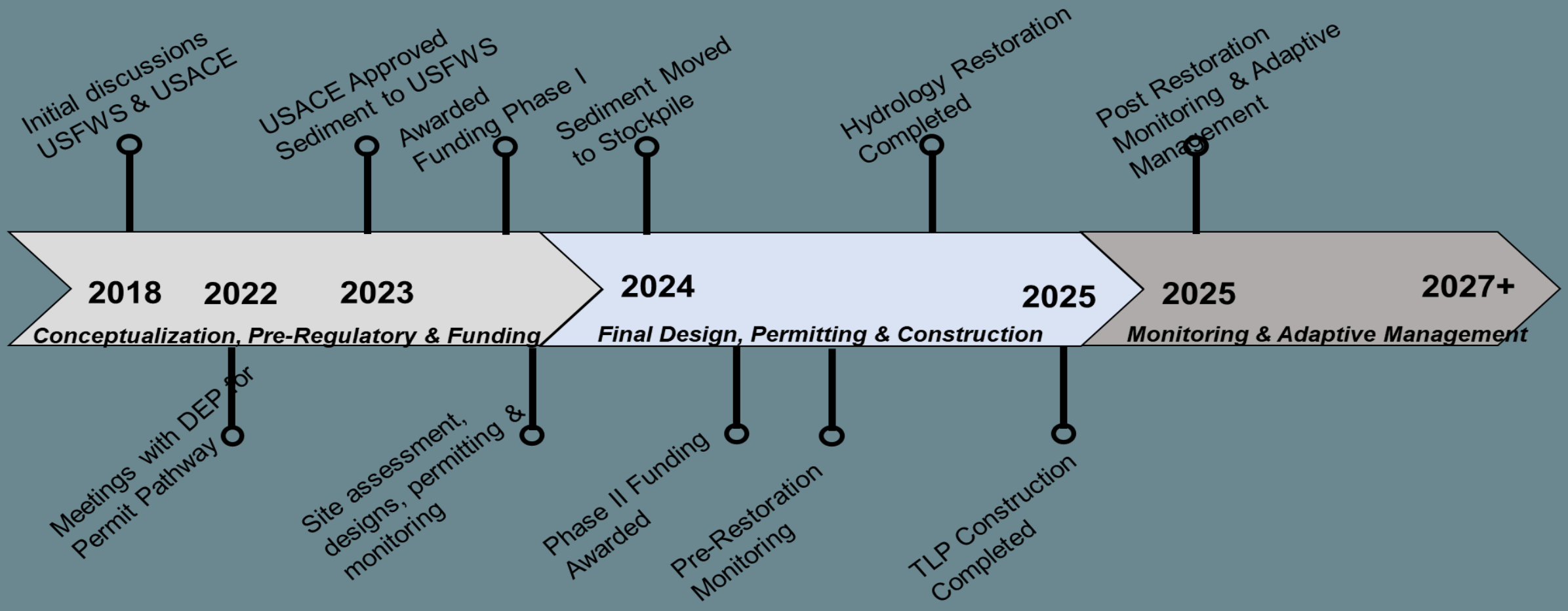








PROJECT TIMELINE







March 2025

Placement Location

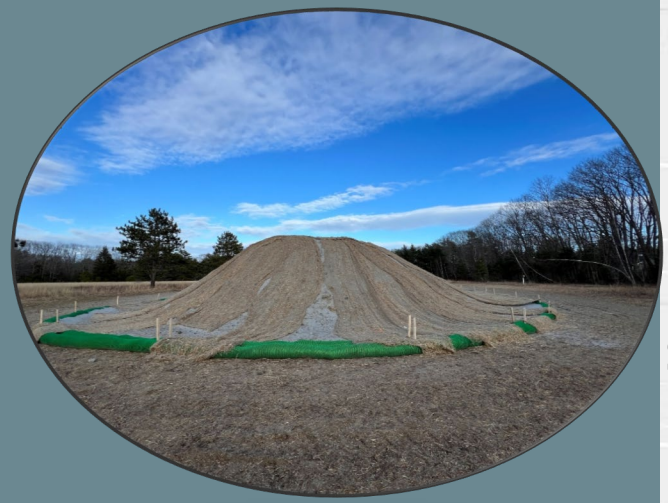
Sediment Pickup



USACE Dredge



January 2024



Stockpile Location

0 0.38 0.75 1.5 Miles

STOCKPILE & SCREENING







January 2024 – February 2025

CONSTRUCTION
(PHASE I: 2024)

Hydrology Restoration
- 627 LF of Runnels
- 6 CY of Ditch Clearing
- 9 Microtopography Placements







March 2025



Sept 2025





BERM REMOVAL









February 2025

SEDIMENT PLACEMENT







February - March 2025

SEDIMENT PLACEMENT





February - March 2025

SEDIMENT PLACEMENT







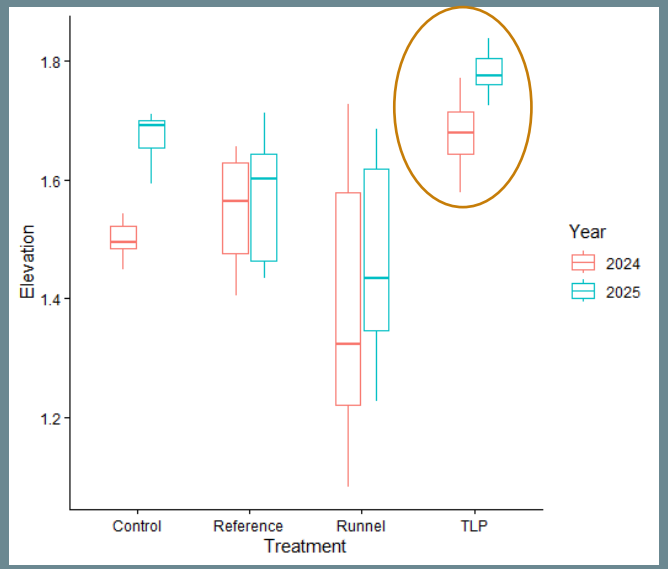
February - March 2025

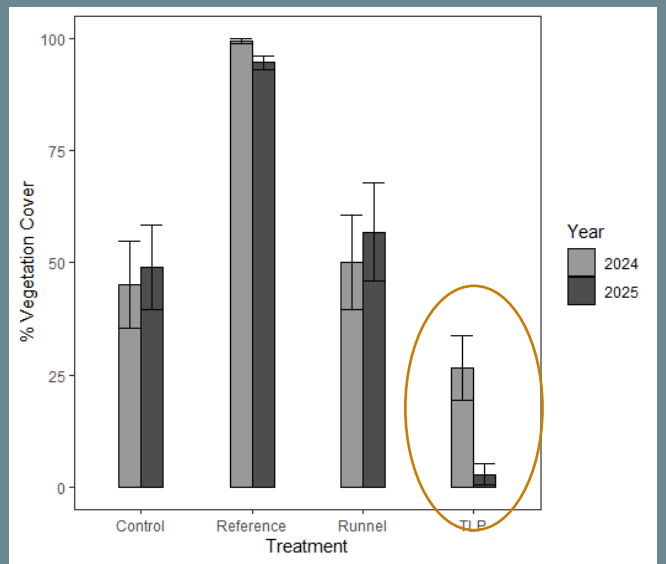
ECOLOGICAL RESPONSE

- Increased elevation capital
- Visual reduction in water level extent/depth (data forthcoming)
- Decrease in vegetation but some natural recruitment
- Weather challenges



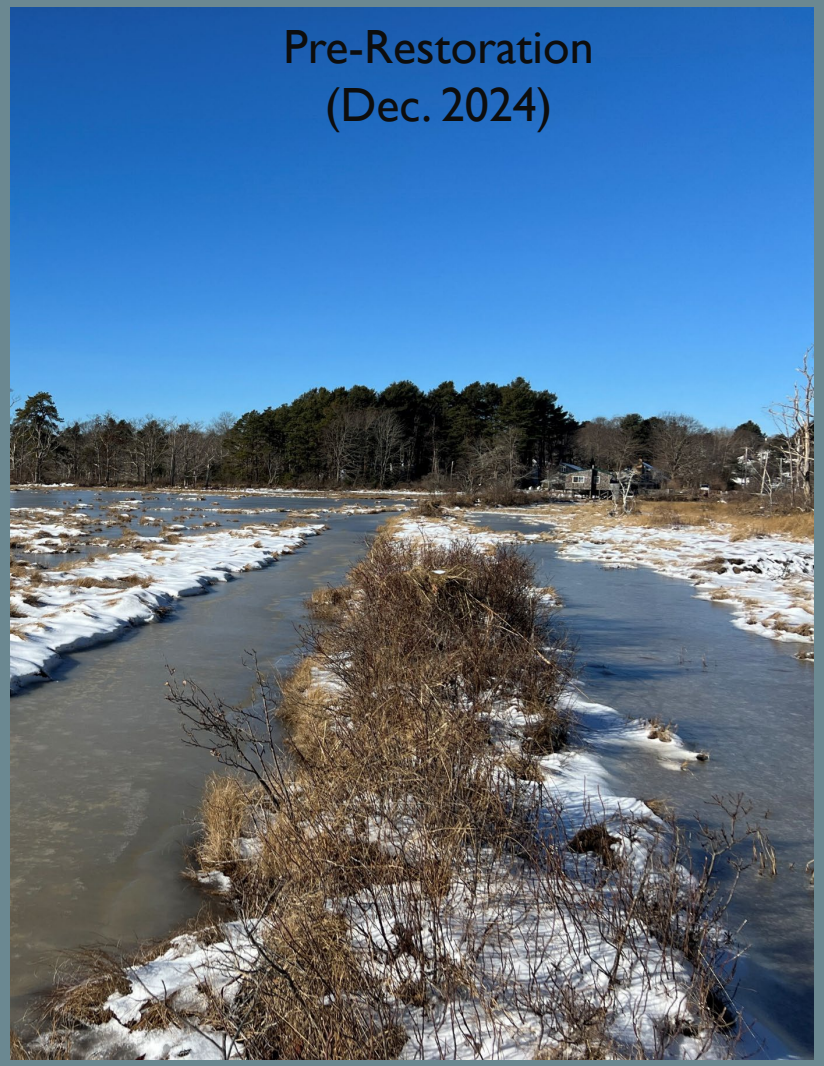






ECOLOGICAL RESPONSE: BERM REMOVAL

Pre-Restoration
(Dec. 2024)



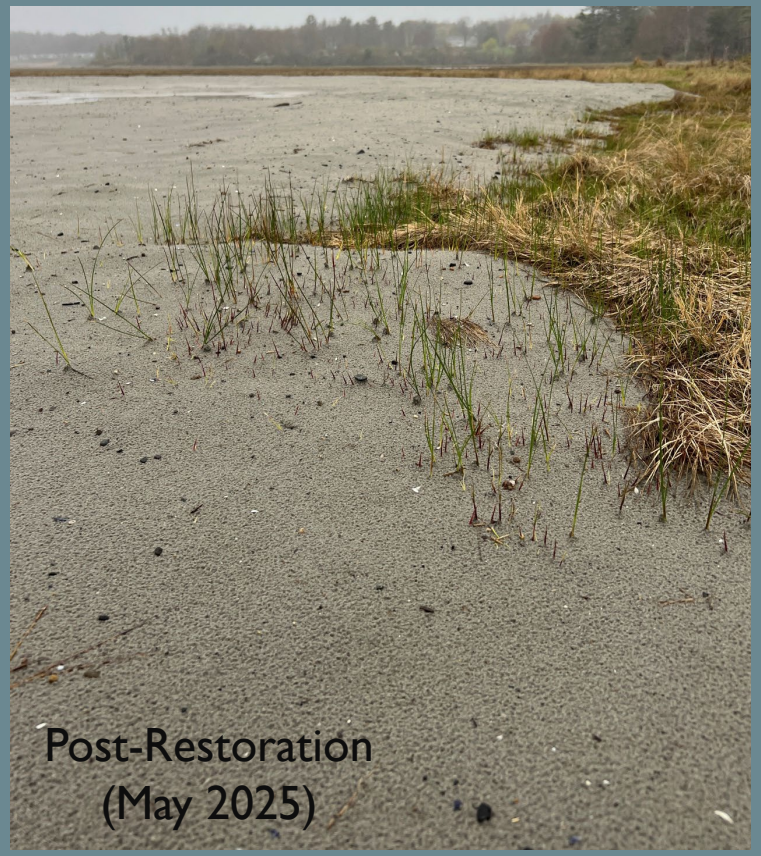
Post-Restoration
(March 2025)



Post-Restoration
(Sept. 2025)



ECOLOGICAL RESPONSE: SEDIMENT PLACEMENT









ECOLOGICAL RESPONSE: SEDIMENT PLACEMENT







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University of New Hampshire

DEPARTMENT OF ENVIRONMENTAL PROTECTION
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PROJECT ROLLERCOASTER

- USACE continued dredge planning = lost opportunities & changing costs
- Able to show how the technique can work in marshes further from dredges
- State and Federal permitting process not clear and evolving
- DEP was flexible on how they could permit the project in their existing frameworks
- Funding (and permits) came together to get the project implemented



FACILITATING SUCCESS



Create working & trust-based relationships for ecologically beneficial projects



Understand the individual personalities of regulatory folks and how each operates best



Learn together: listen to questions & concerns, know their sensitivities and constraints



What are the barriers and what can your team do to overcome it?



Identify your regulatory advocate for new ideas



This project is funded by Greenfield Penobscot Estuary Project Trust LLC, Trustee of the Penobscot Estuary Beneficial Environmental Projects Trust and two Private Foundations

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DREDGED MATERIAL SOURCE

- Material sourced from USACE's 10-year navigation dredge
- Total dredged volume ~150k cy, ~1,000 cy allocated for the TLP
- Sediment testing confirmed clean, compatible sand suitable for marsh application
- Screened prior to placement

Table 1. Grain Size Results from Wells Harbor FNP Samples

Sample ID	%Gravel		%Sand			%Fines
	Coarse	Fine	Coarse	Medium	Fine	
A	0.1		0.1	2.1	97.6	0.1
B	0.2		0.1	2.6	96.9	0.2
C	9.8	4.4	4.0	22.9	58.7	0.0
D	0.0		0.0	1.0	98.9	0.1
E	0.1		0.1	3.6	94.4	1.7
F	0.0		0.0	0.7	98.7	0.6
G	0.0		0.0	0.8	98.8	0.5
H	0.1		0.3	12.9	86.2	0.4
I	0.0		0.0	14.5	84.7	0.8
J	0.0		0.1	3.4	87.6	8.9
SB1	0.0		0.1	1.0	98.8	0.1
SB2	0.0		0.1	0.6	99.2	0.1
SB3	1.5		0.9	13.4	84.0	0.2
SB4	0.0		0.0	0.6	99.0	0.4



