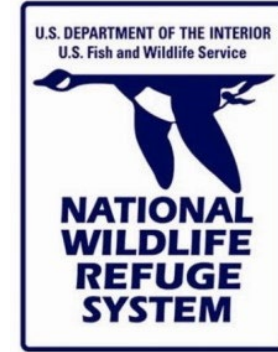


The Future of Nature-based Shoreline Stabilization: A Geologic and U.S. Fish and Wildlife Perspective

BARTHOLOMEW WILSON , P.G. PH.D,
COASTAL DELAWARE NWR COMPLEX
USFWS



What is goal of stabilization?

What are we trying to protect and why?

Bring order to a dynamic setting of shoreline interface.

Interaction of our ecological goals with a protection factor.

Just because we can, should we.....

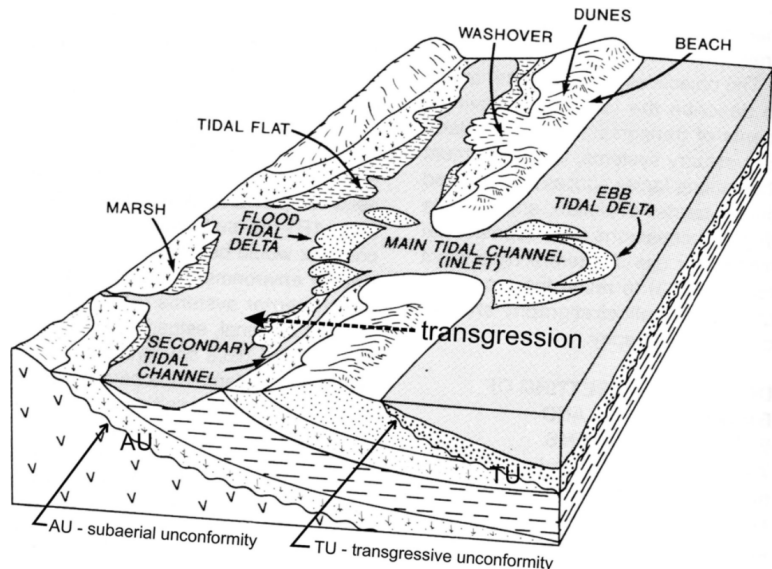
- Is our problem-solving ability clouding our decision making?
- Can we not let go of the past and how we interpret it on the coast?

Coastal Tunnel Vision

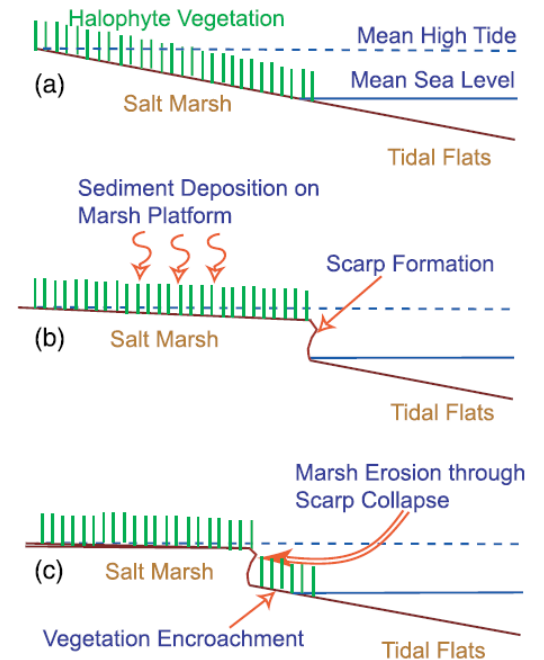
Have we become too focused on the edge and lost sight of the system?

We are trying to overcome climate change, but still are failing at times to understand our level of involvement in coastal disequilibrium.

Redistribution of sediment – is it a function of it not going where it is needed?



Forbes et al 2014

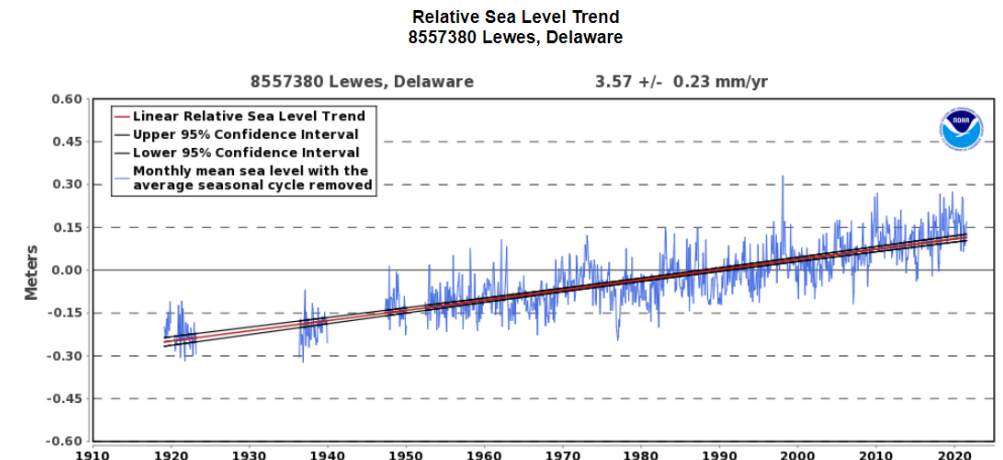
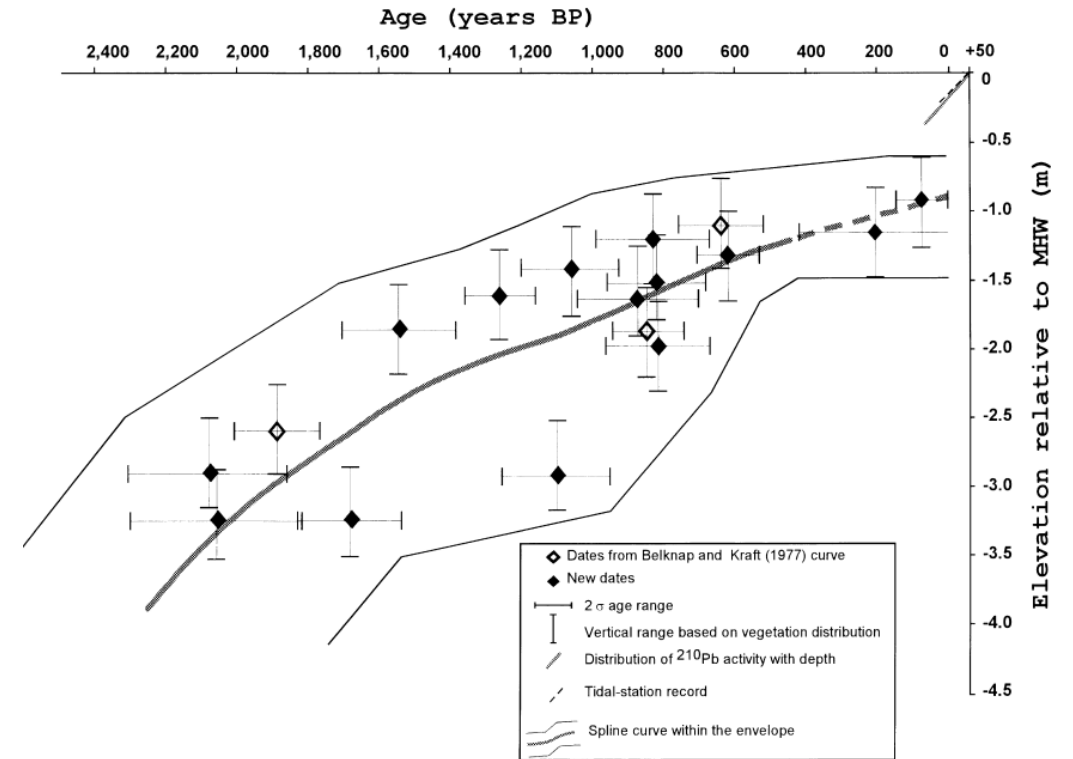
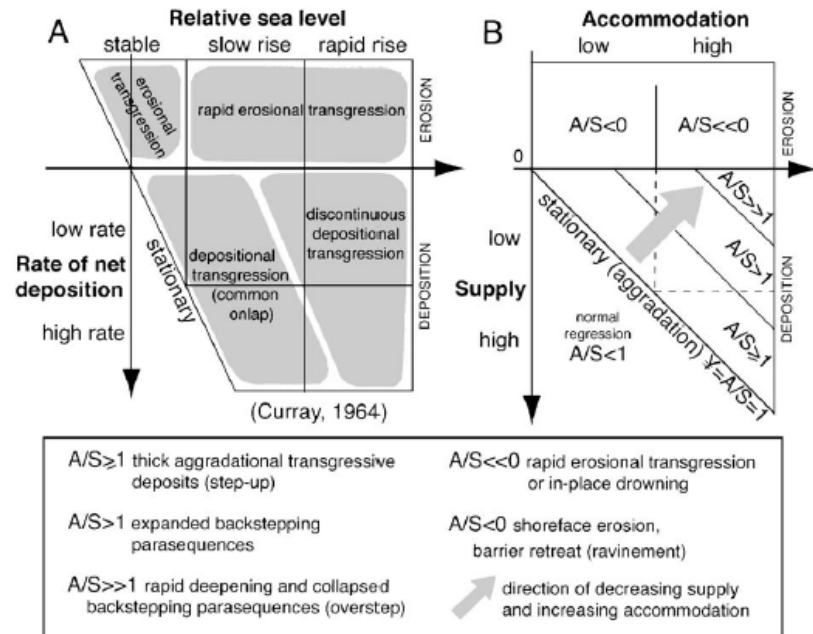


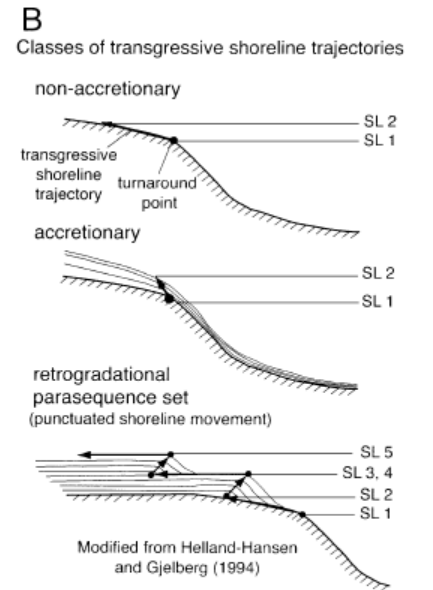
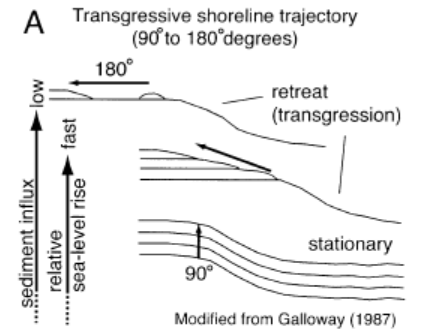
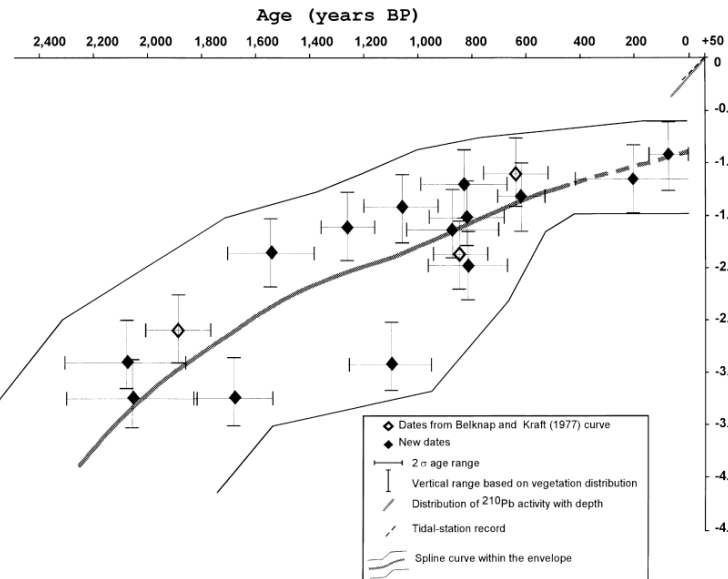
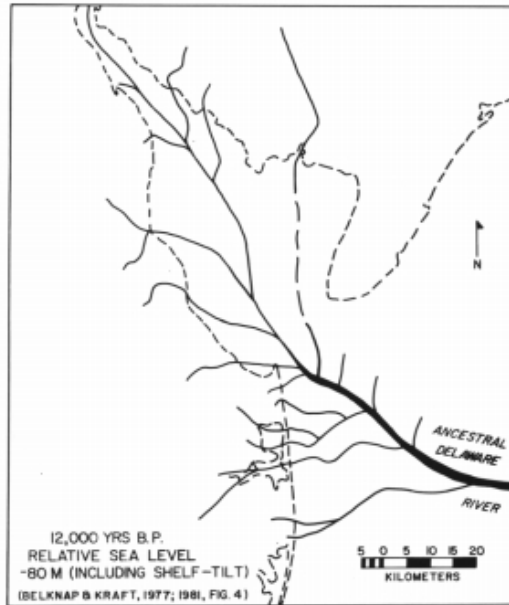
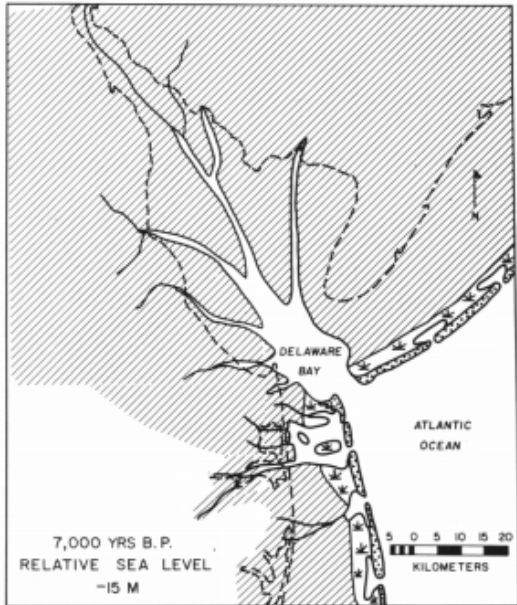
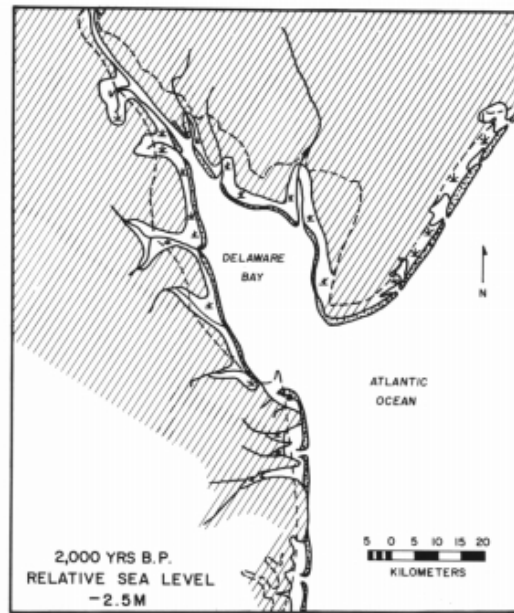
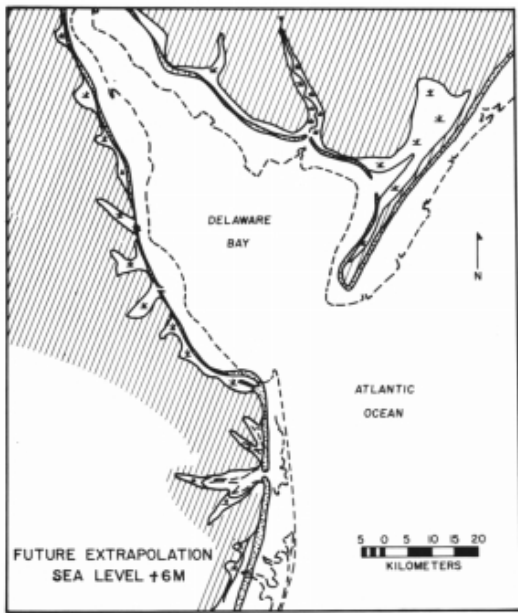
Fagherazzi et al 2020

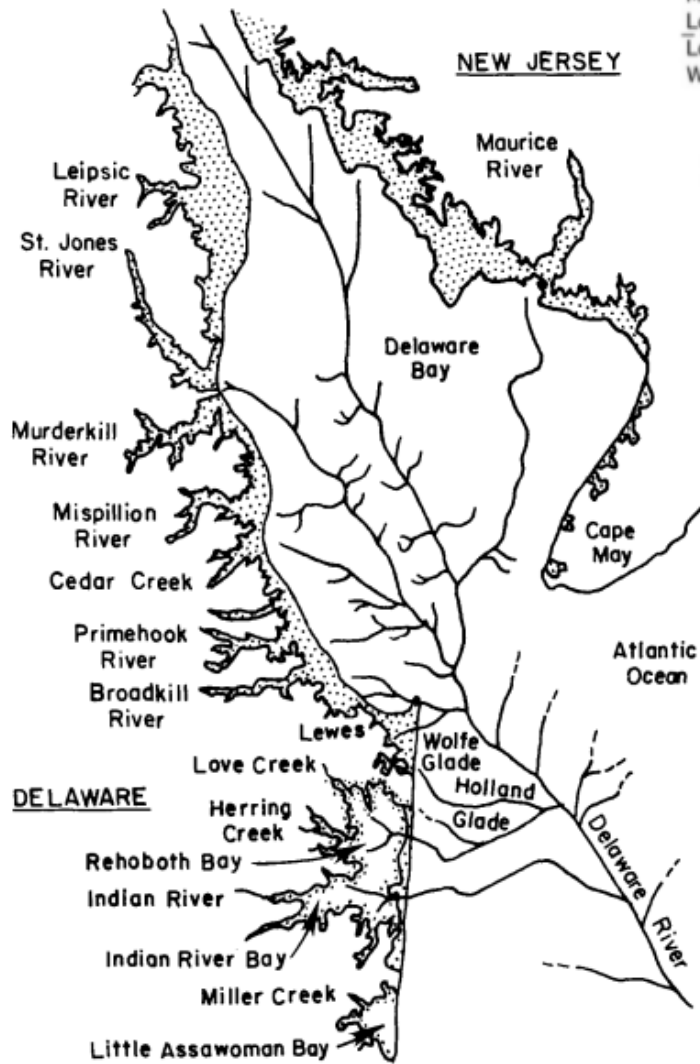
Geologic Context

Shoreline position is a function of the physical forces
Natural Equilibrium

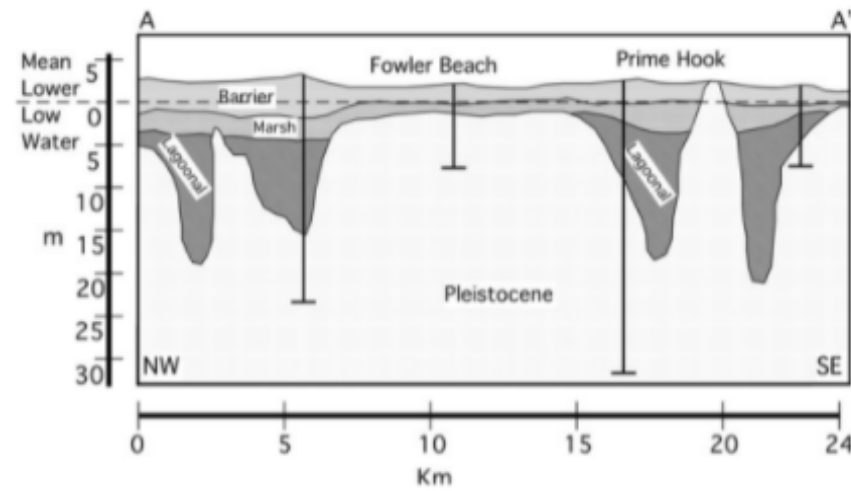
Changing of our base level conditions





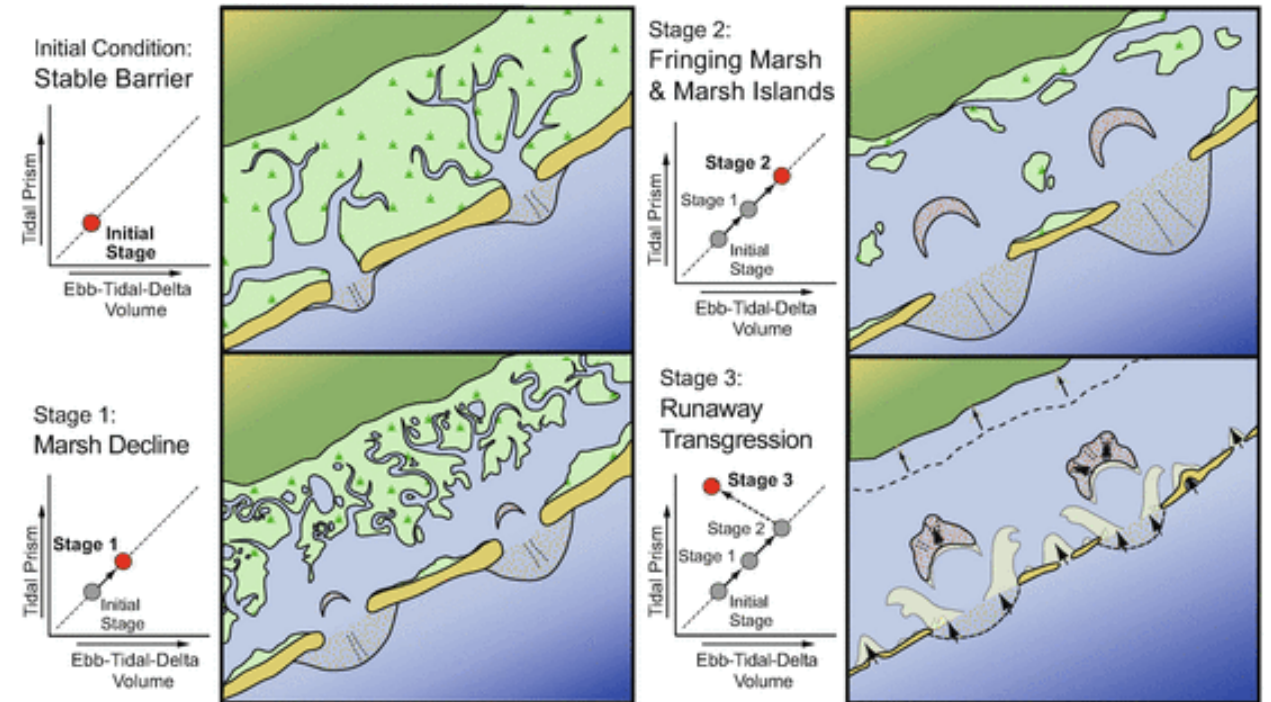


Fletcher et al. 1990



Runaway Barrier Island Transgression Concept: Global Case Studies

Fitzgerald et al. 2018



Unintended Consequences

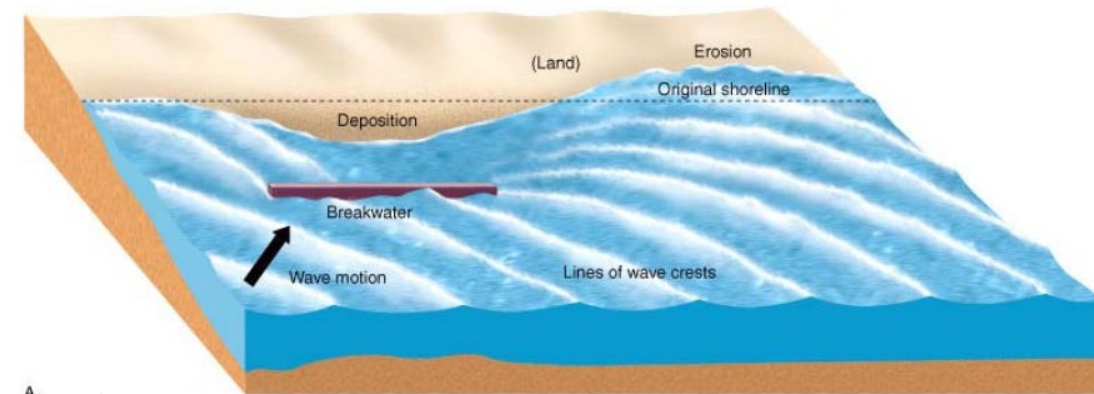
Reflection/Refraction

Rock Structures

- Speed Bump in time (not dynamic, in that it will not evolve)
 - Fixed in time and space
 - Overtopping Effect
- Invasive Species Vectors
- Impingement

Sediment Placement/ Dredging

- Most sediment placement projects use sediments finer than natural grain size
 - Erodes 2 to 3 time quicker than natural beach
- Ugly history of mining our natural wave breaks and transformers
 - H&H models may not be inclusive of system



Pitfalls of Shoreline Stabilization: Selected Case Studies

edited by J. Andrew G. Cooper, Orrin H. Pilke

Mankind Against the Sea

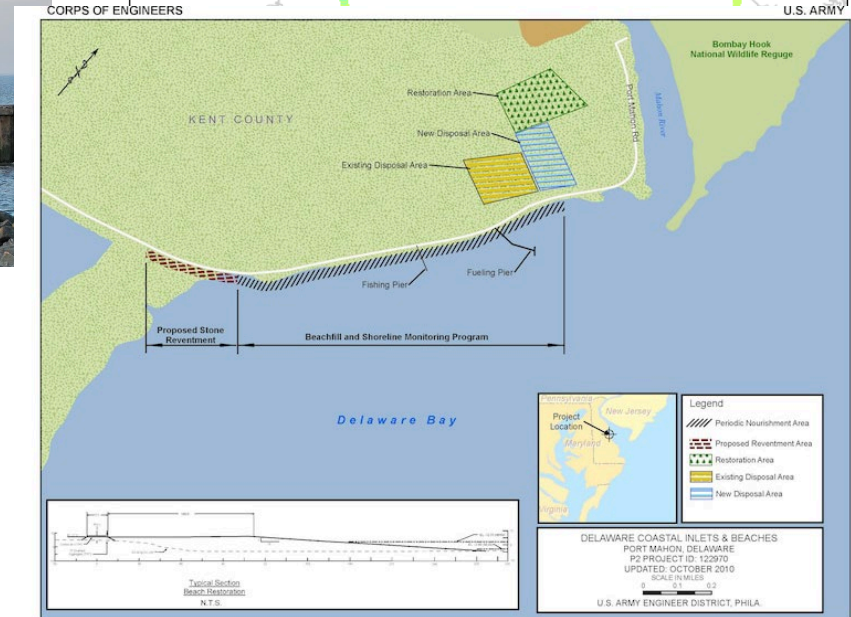
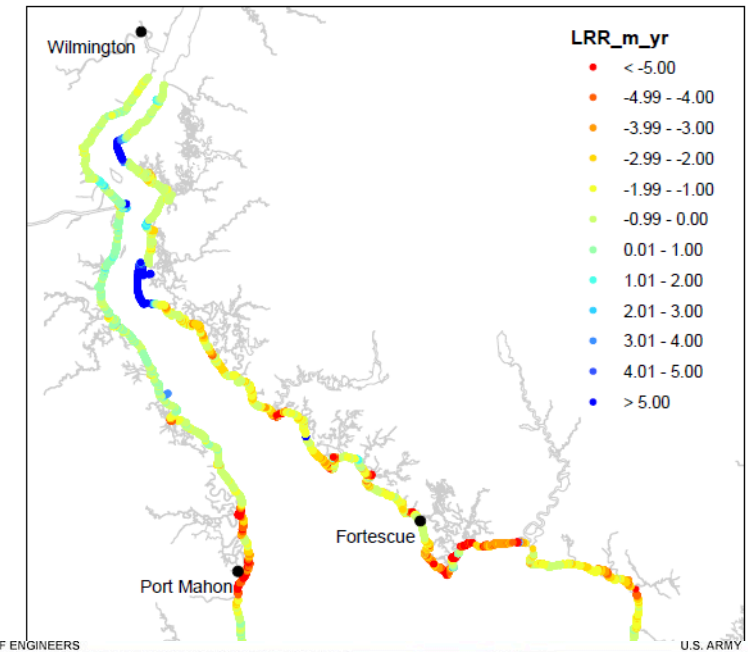
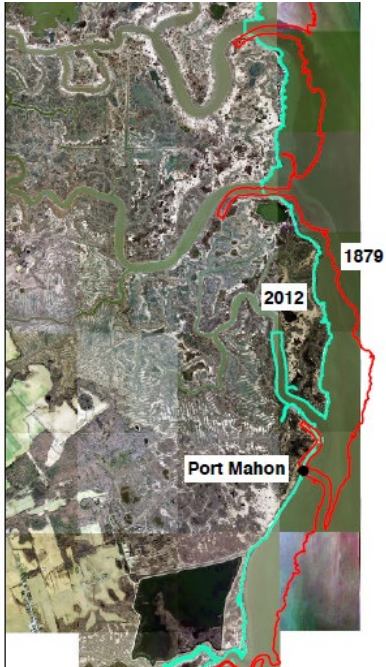


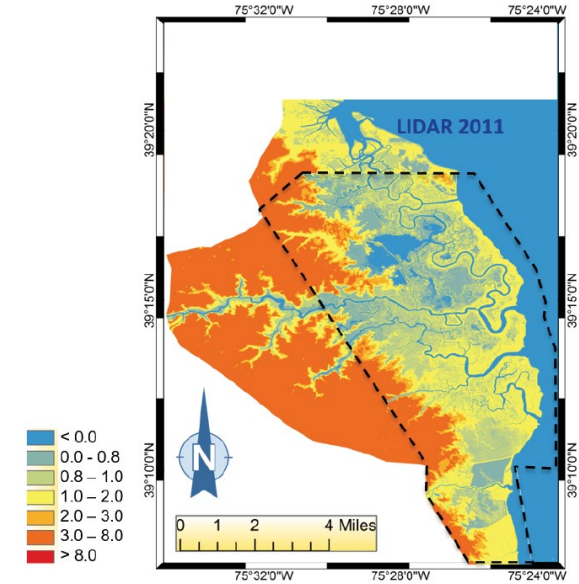
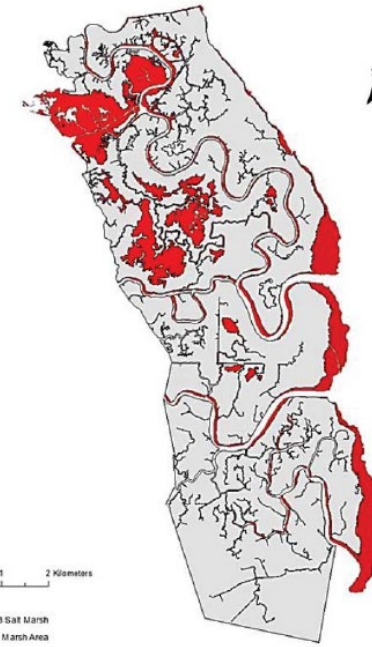
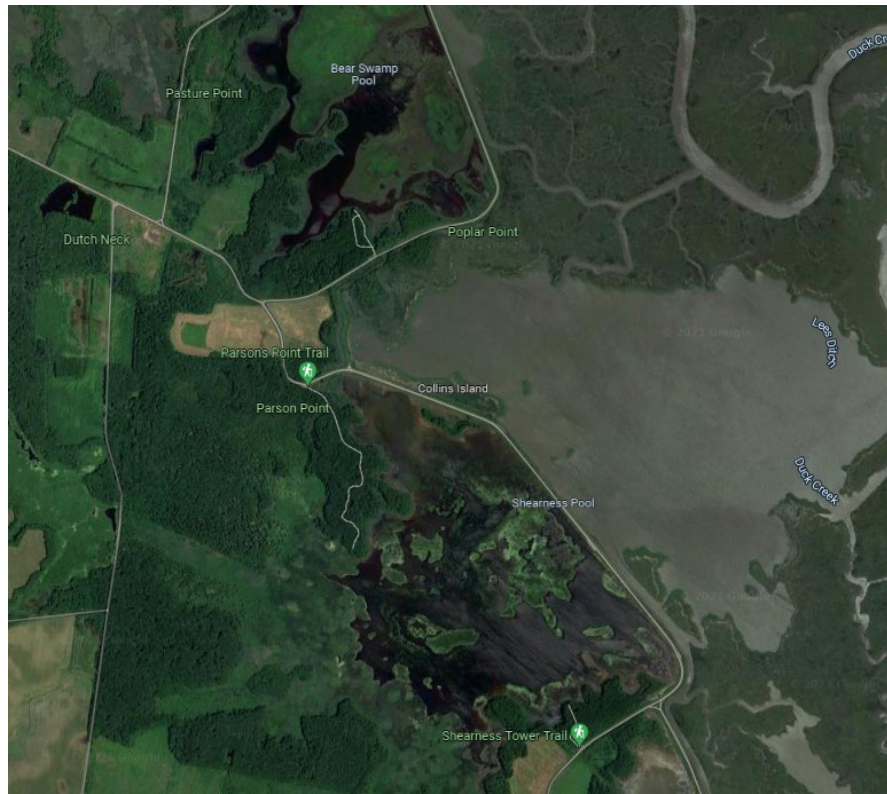
Let me tell you a story.....

Port Mahon, De

Why do we see the need to place beaches where they may not occur naturally?

Pocket Beach may be more sustainable and still create ecological niche necessary.





Bombay Hook NWR – Sheariness Flats

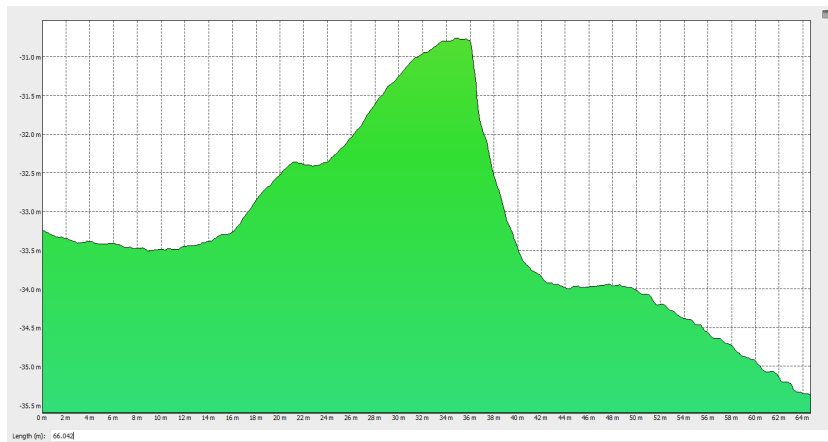
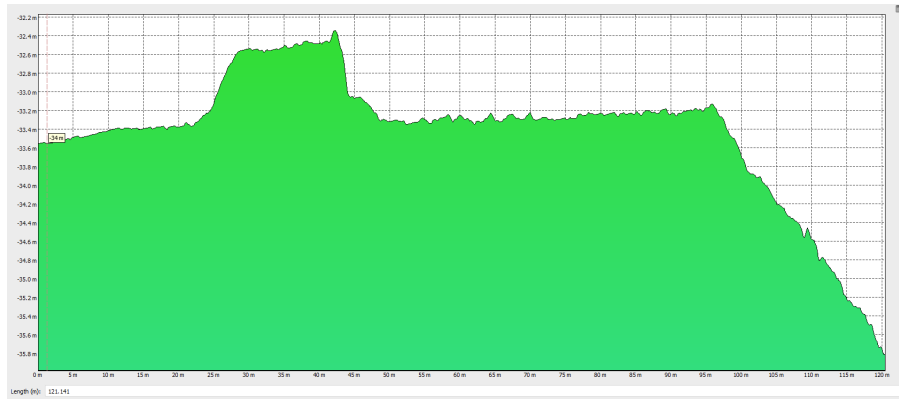
Disconnection of wave attenuation from shoreline

Sediments Supply is not the issue

- Sediment delivery and trapping
- Juxtaposition of dike and altered internal hydrology (Ditching and channel creation)



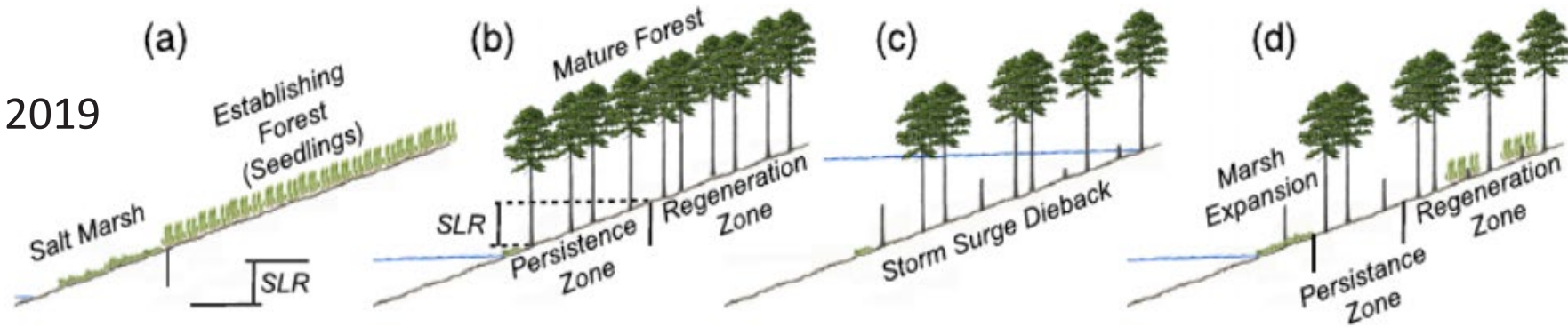
Prime Hook NWR vs Broadkill Beach Shoreline Study



Facilitated Transgression

Ecological Ratchet Model of Marsh Transgression in an Forest

Fagherazzi et al., 2019



Facilitated Barrier Rollover

Ecosystem Based Restoration



Focus for USFWS restoration moving forward

- Moving away from species specific restoration
 - High prevalence of failure or unintended consequences (especially hydrology)

This translated to both marsh and shoreline restoration

Coordinating with NOAA and USFWS



Subtidal Restoration (...again think accommodation space and wave transformation)

- Mud Motors
- Keeping Sediments in the systems



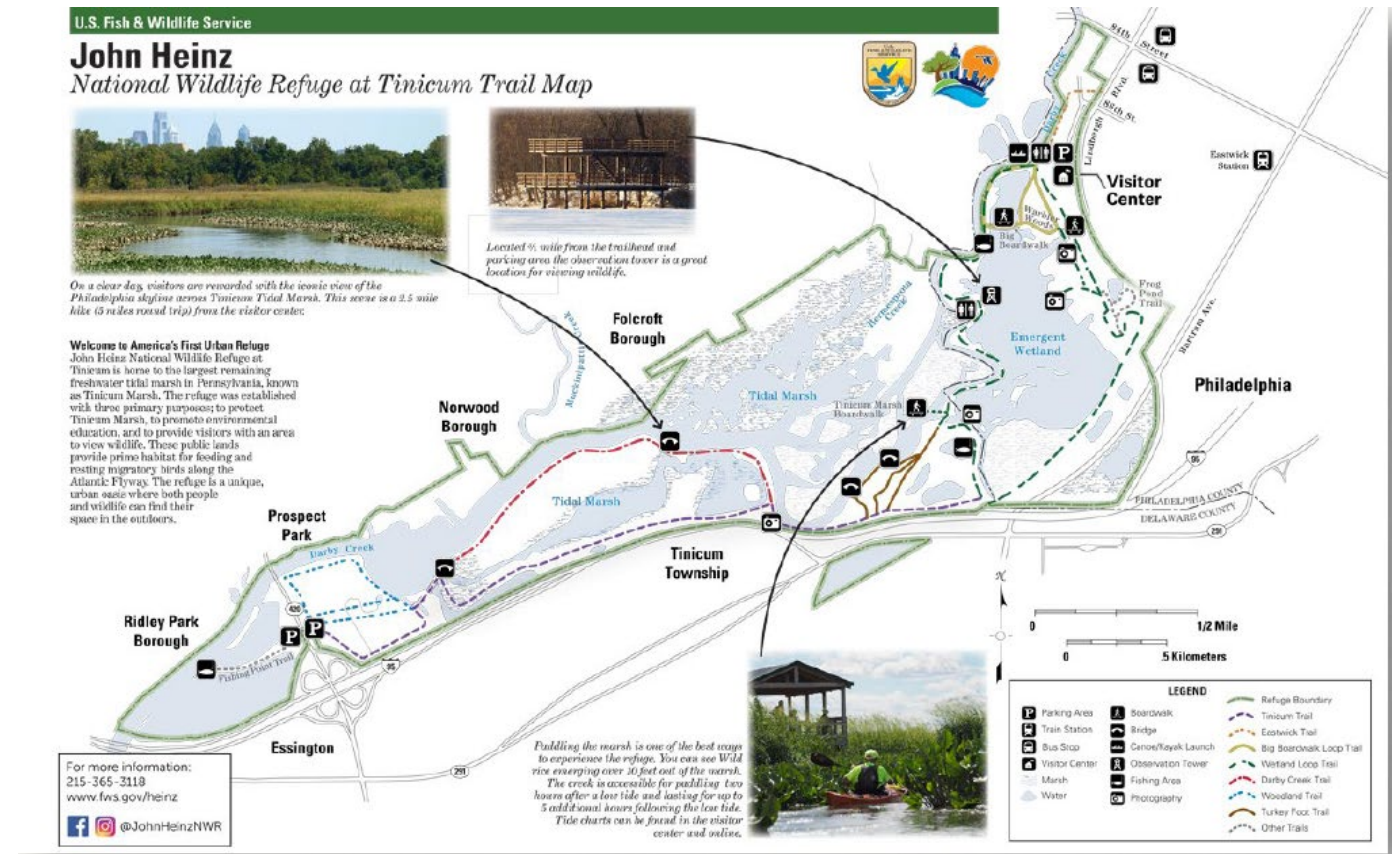
Urban Interface



Impingement of nature-based solutions in the Urban Interface

Shrinking space within the tidal prism

Underserved and Environment Justice Communities on the frontlines



Managed Re-alignment or Strategic Retreat

Two Mile Beach
(Cape May NWR)

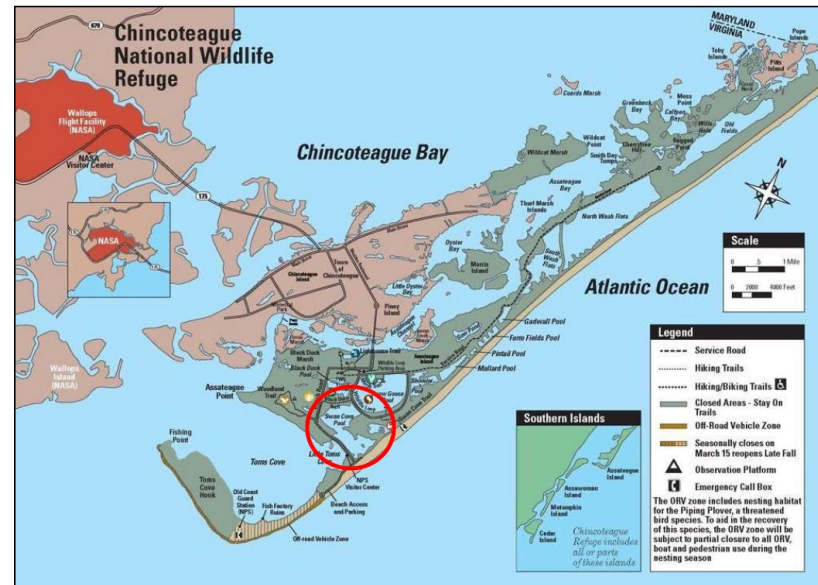


East Pool
(E.B. Forsythe NWR)



Green Creek
(Cape May NWR)

Swan Cove
(Chincoteague NWR)



Questions

