Small-Scale Features = Large-Scale Implications
Milford Neck, DE

Restore America's Estuaries

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Overview

- Site information
- Project Goals and Objectives
- Tools
  - Field data collection
  - Numerical modeling
- Lessons Learned
- NFWF Hurricane Sandy Resiliency Program

Courtesy DE Wild Lands, Andrew Martin
Milford Neck Conservation Area

Delaware Bay

Atlantic Ocean
10,000 acres
- Diverse habitat
- Shared ownership
- Multiple uses
- 500 acres of marsh converted to open water
- Barrier island erosion
- Natural and anthropogenic changes
Diverse Wetland Habitat
Open Water
Upland Forest
Complex System

Courtesy DE Wild Lands
Goals & Objectives

- Minimal Engineering
- Enhance Habitat & Improve Resiliency
  - Reduce open water
  - Restore wetlands
  - Protect upland forest & farm
Tools – Field Data Collection

- North Marsh
- East Marsh
- Upper Lagoon
- Lower Lagoon
- Upland Forest
- Greco’s Canal
- Daiber Creek
- South Creek & Inlet
- Crooked Gut
- Farmed Land

Pressure sensor

1 km

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Data: NOAA, U.S. Navy, NGA, GEBCO
Tools – Methods
Looking Downstream

Distance between sensors: 300m

Old boardwalk

Mosquito ditching

Courtesy DE Wild Lands
Deployment 2 Data:

- Distance between sensors: 300m

Locations:
- HS10
- HS10a
- HS3a
- HS3

Looking Upstream

Courtesy DE Wild Lands
Deployment 2 Data:

North Marsh
East Marsh
Upper Lagoon
Lower Lagoon
South Creek & Inlet
Daiber Creek
Greco’s Canal
Crooked Gut
Greco’s Canal
Farmed Land
Upland Forest
Tidal Dampening
- CMS Flow
- Simulate Existing System
  - Spring and neap tidal cycle
  - Coastal storm surge
  - Rainfall event
  - Sea level rise
- Evaluate Alternatives
Tools – Modeling Alternatives
Sample Alternative

- Remove boardwalk, lower marsh elevation
Remove Boardwalk Plus
Improve Channels
Low Tide: Improved Drainage

Existing Bathymetry

Modified Bathymetry
Drainage Comparison: Four Days After a Rainfall Event:

Existing Bathymetry

Modified Bathymetry

0.75m

0 m

-0.75m
Lessons Learned(ing)

- Invest in field measurements!
  - Proper reconnaissance
  - Existing data – ground-truth LiDAR
  - Local stakeholder knowledge
  - Seasonality
  - Believe your data

- Allow observations to define the engineering alternatives – don’t pre-define!

- Small-scale features = large scale implications

- Next key step - Importance of sediments
Special Thanks:

- The Nature Conservancy (nature.org)
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- Field support teams