ENGINEERING WITH NATURE TO SUPPORT SYSTEM RESILIENCE: *EXAMPLES OF INNOVATIVE CHANNEL DREDGING AND PLACEMENT IN COASTAL NEW JERSEY*

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A "PERSISTENT" APPROACH
NJ Past, Present & Future

• **Navigation and Nature**: District took action to restore navigation after Sandy, but also looked for opportunities to assist with shoreline & ecosystem recovery and build coastal system resilience with *clean* dredged sediment

• **Technical Expertise**: Use *Regional Sediment Management (RSM)* and *Engineering with Nature (EWN)* concepts to develop short-term (post-Sandy) and long-term dredging strategies

•**Team Approach**: Actions were aided by support from USACE North Atlantic Division and other districts including Galveston, Mobile & Baltimore, ERDC, NJDEP and other partners

Within State of NJ…Progression from fear and risk aversion to being proactive and driven with willingness to accept risk

New Jersey Intracoastal Waterway (NJIWW) Channel Dredging with Innovative Placement

The NJIWW is a 117 mile long federal channel that runs through the NJ Back Bays from Manasquan to Cape May

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MORDECAI ISLAND RESTORATION
BEACH HAVEN, NJ
CASE STUDY

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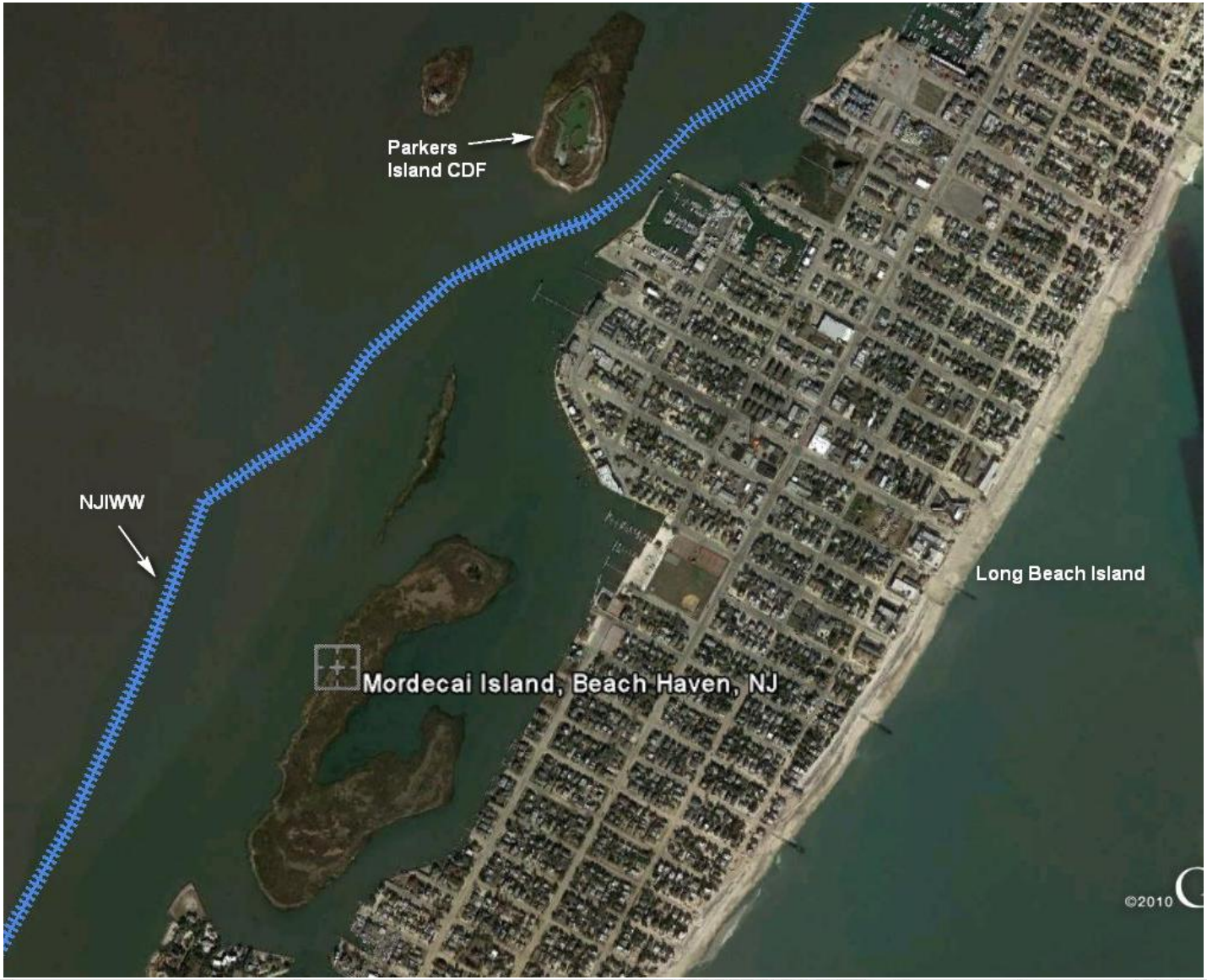
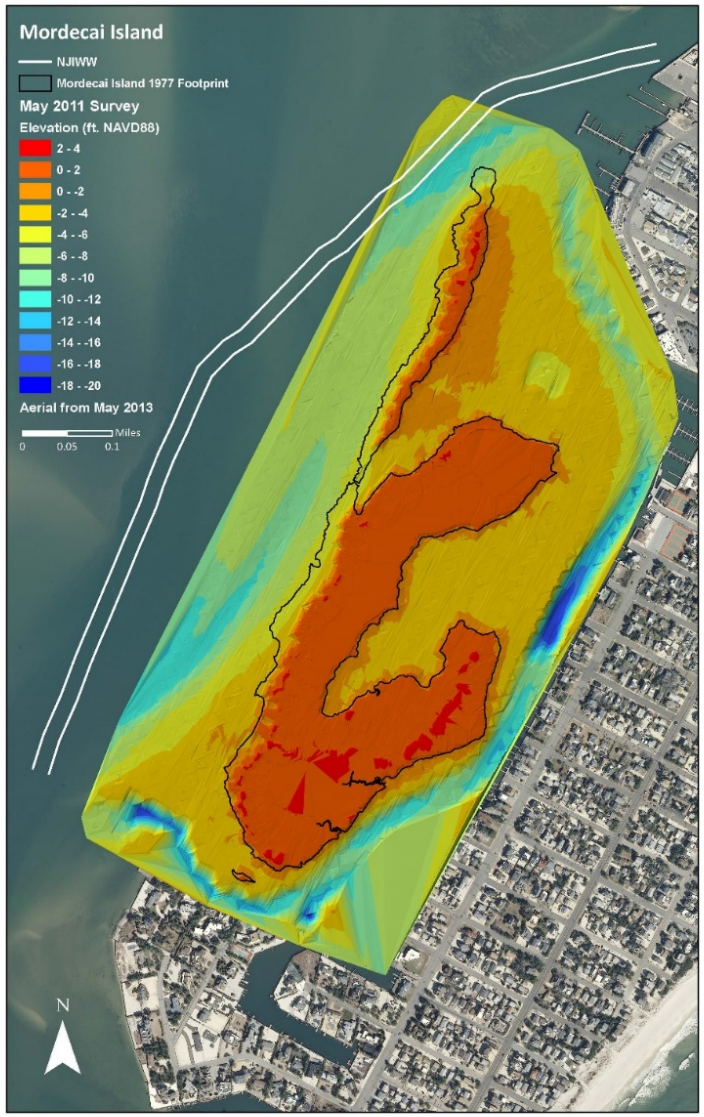
ACCELERATING PROGRESS WITH AN RSM/EWN SYSTEMS APPROACH: MORDECAI ISLAND NJ



MORDECAI ISLAND PLANNING STUDY: ECOSYSTEM RESTORATION CONTINUING AUTHORITIES PROGRAM (CAP)



Continued erosion of Mordecai Island threatens a diversity of natural wildlife habitats including open marsh, salt ponds, exposed mud flats, shrub-dominated areas and shallow water eelgrass beds.

Previous work and partnerships were and are incredibly valuable!! Included NMFS & USFWS, Bureau of Coastal Engineering, Mordecai Land Trust, NOAA

POST-CONSTRUCTION MORDECAI ISLAND

Mordecai Island August 2017

AVIAN MONITORING AND ADAPTIVE MANAGEMENT: THINKING THROUGH THE PROJECT OBJECTIVES

Raised Habitat in Dec 2017

Build it and they will come….

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MORDECAI ISLAND CONSTRUCTION: DECEMBER 2017

ps

MORDECAI ISLAND: CONTINUING TO MONITOR & PARTNER

NOAA NCCOS, USACE, ReClam the Bay, Mordecai Land Trust, Rutgers University

DREDGING MUSEUM EXHIBIT IN THE NETHERLANDS

NJIWW Channel Dredging And Placement Demonstration Projects:
Ring Island And Avalon NJ

Land Owned By New Jersey Division Of Fish & Wildlife (NJDFW)

Constructed With Emergency Supplemental Operation & Maintenance Funds

And

A National Fish And Wildlife Foundation Grant TO NJDFW, The Nature Conservancy And Green Trust Alliance

Contractor: Barnegat Bay Dredging Co.

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

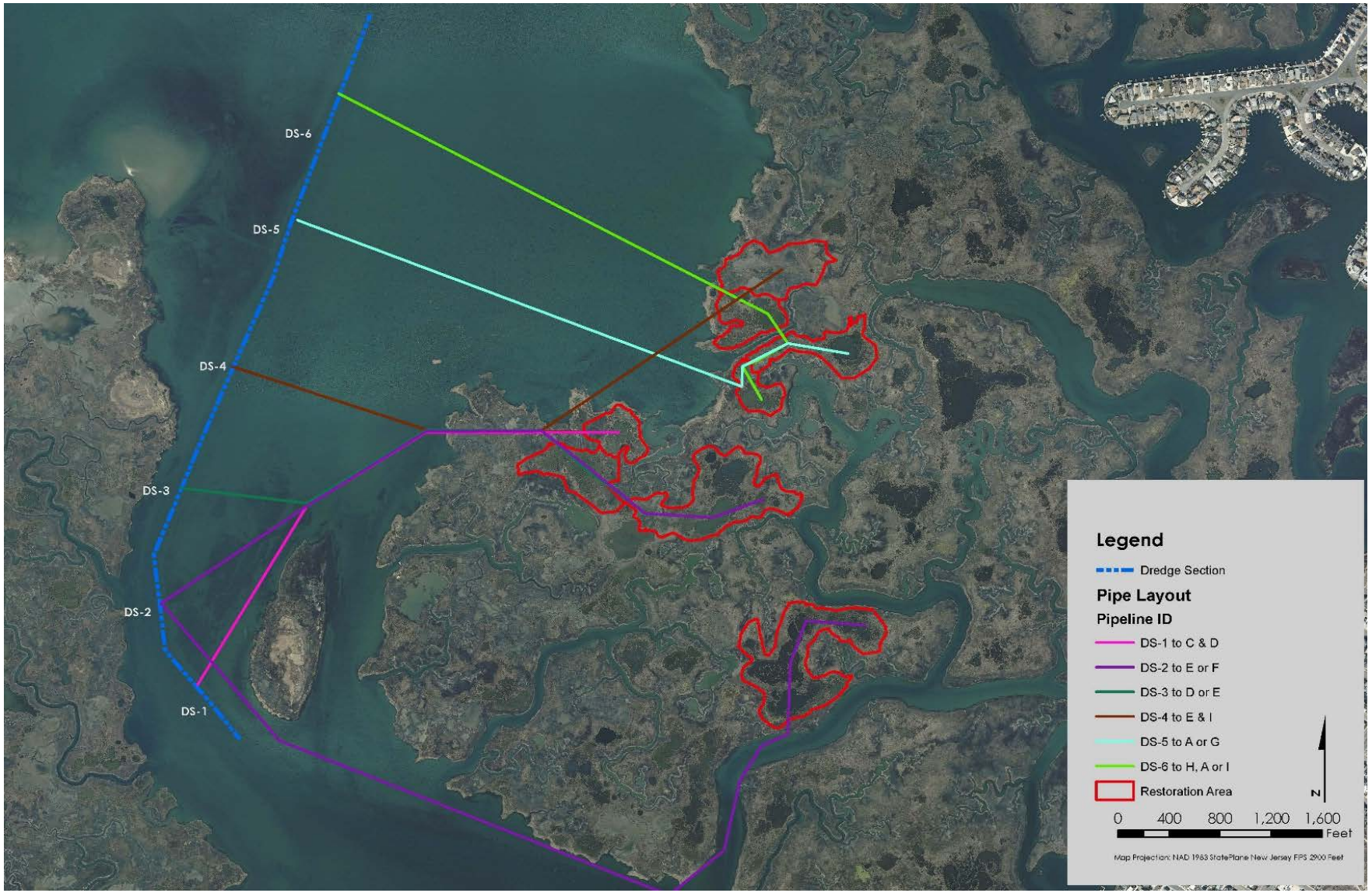
GreenVest One Step Ahead.

Princeton Hydro

Wetlands Institute

The Nature Conservancy
Protecting nature. Preserving life.

NJIWW Dredging & Avalon Thin Layer Placement



Constructed Dec 2014 to Feb 2016

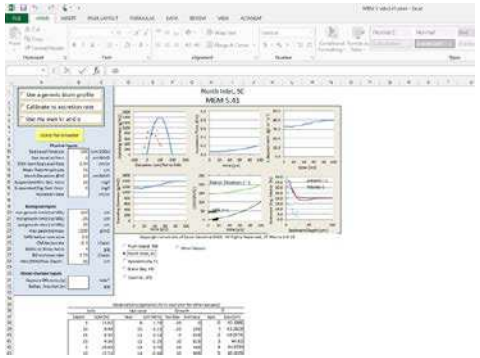
NJIWW Avalon Pilot Project:
Dredging "The Football Field" And Thin-layer Placement

- Larger project continued from Nov 15 to Feb 2016 (45,000 cy & 35 acres)
- USACE funded dredging, NFWF grant funded placement design, construction oversight
- Costs and lessons learned under development
- Monitoring to continue for several years, NFWF Grant Team & ERDC

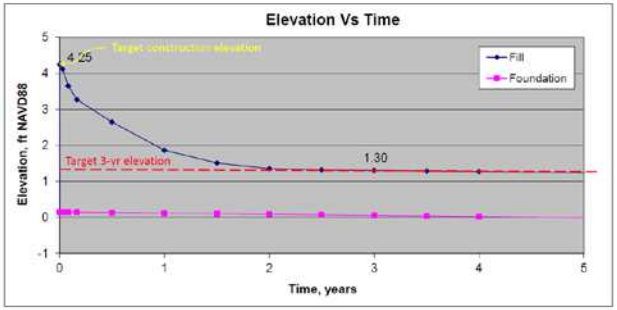
Guidance for Designing and Constructing of TLP Projects

Objectives:

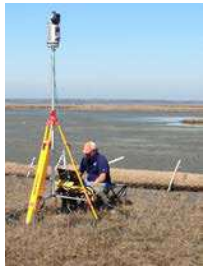
- Distill knowledge & information from past current, and developing TLP projects, and evolving pertinent R&D activities
- Synthesize into guidance document designed for use by both USACE and stakeholders to optimize engineering and construction of TLP projects.

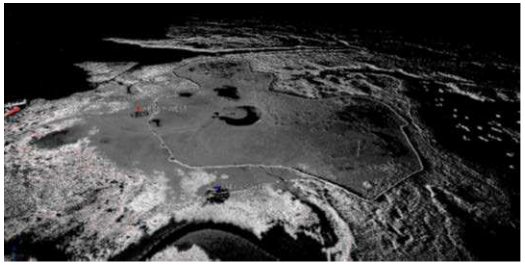


Marsh Equilibrium Model (MEM)



PSDDF - Primary Consolidation, Secondary Compression, And Desiccation Of Dredged Fill





Ring Island, NJ: Black Skimmer Habitat And Thin-layer Placement with NJIWW Sand

- Constructed August 2014
- Placed on land owned by NJDFW instead of Confined Disposal Facility
- Habitat creation
  - Shorebird usage
  - Also used by horseshoe crabs & terrapins
- Small thin layer placement demo with >96% sand, 500 cubic yards
- Raised elevation of habitat in March 2018, Adaptive Management!!

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ERDC

GreenVest
One Step Ahead.

pH Princeton Hydro

The Nature Conservancy
Protecting nature. Preserving life.

Wetlands Institute

UPCOMING ACTIONS AND FUTURE OPPORTUNITIES

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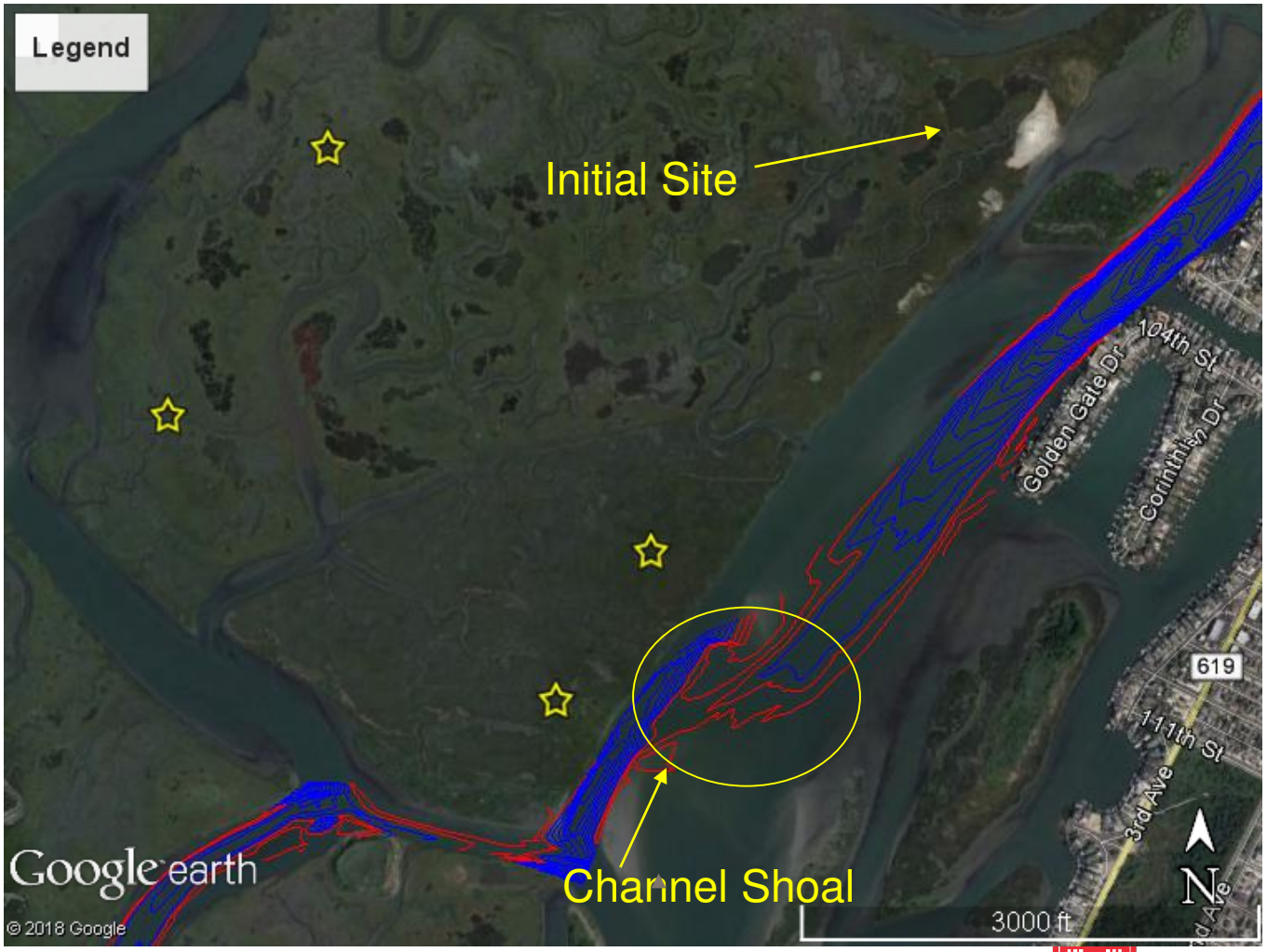
ADAPTIVE MANAGEMENT AND SYSTEMS APPROACH
FROM NNBF PILOTS TO SOLUTIONS



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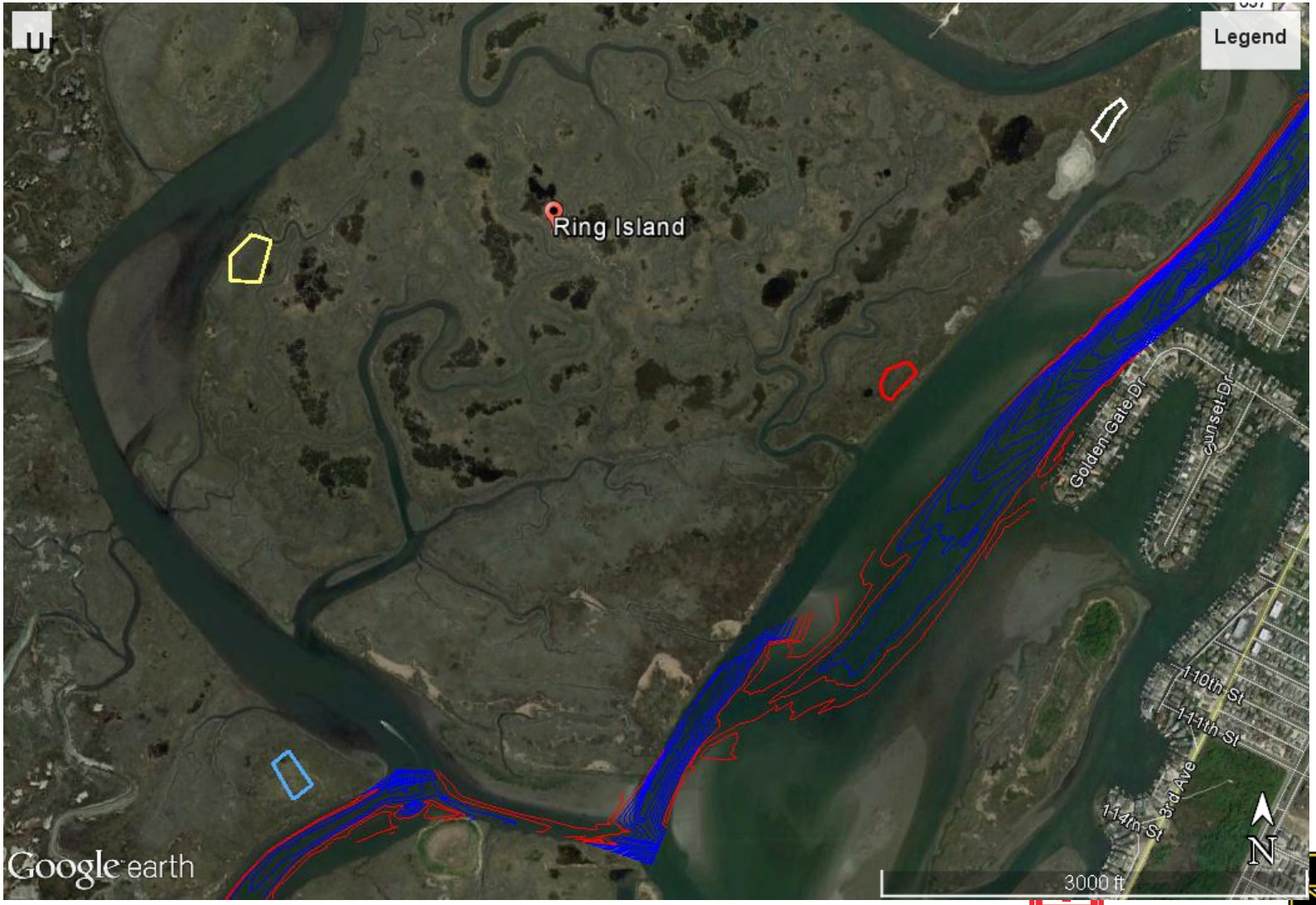
FROM NNBF PILOTS TO SOLUTIONS



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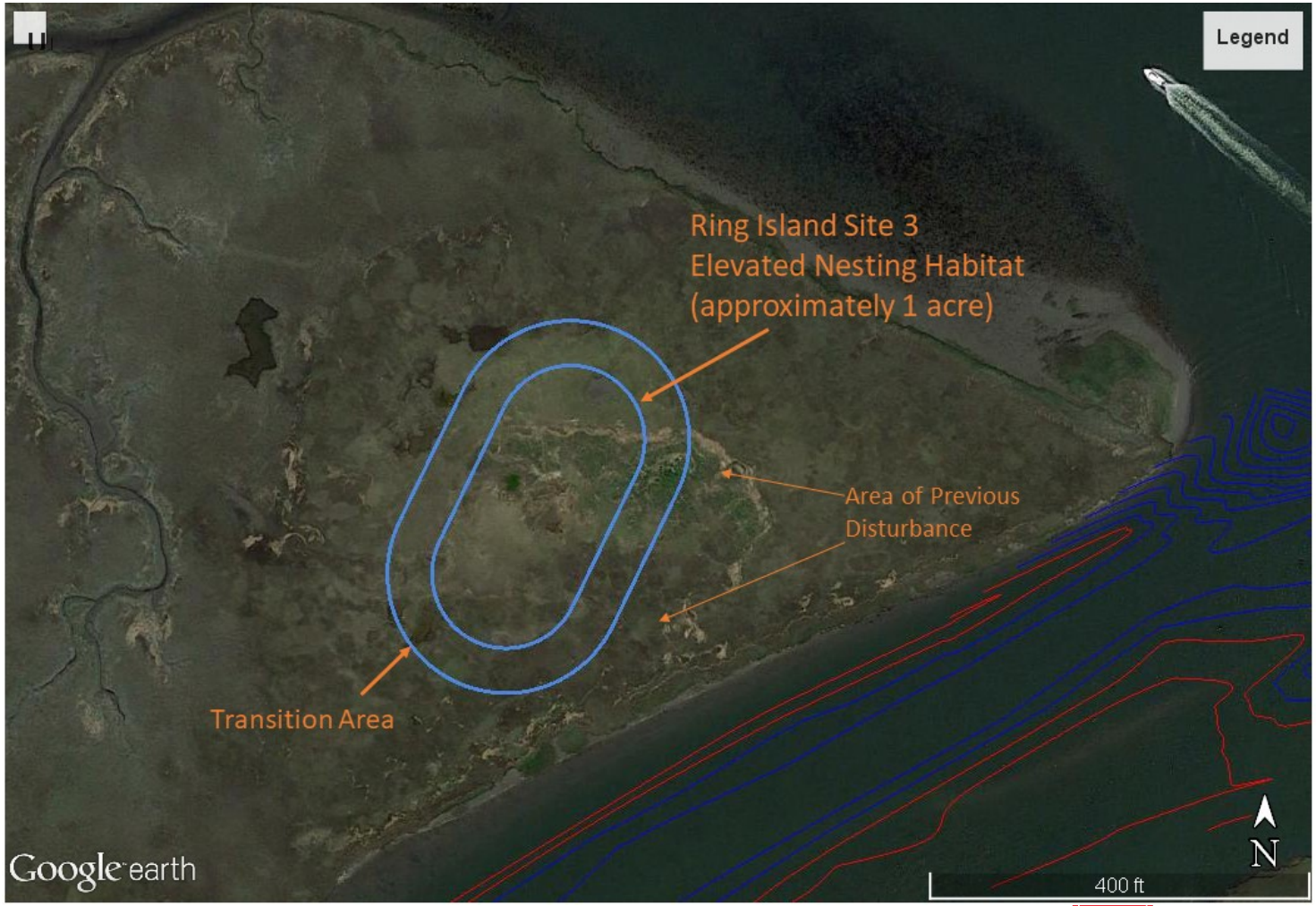
ADAPTIVE MANAGEMENT AND SYSTEMS APPROACH
RING ISLAND SITE 3, ANTICIPATED DEC 2018



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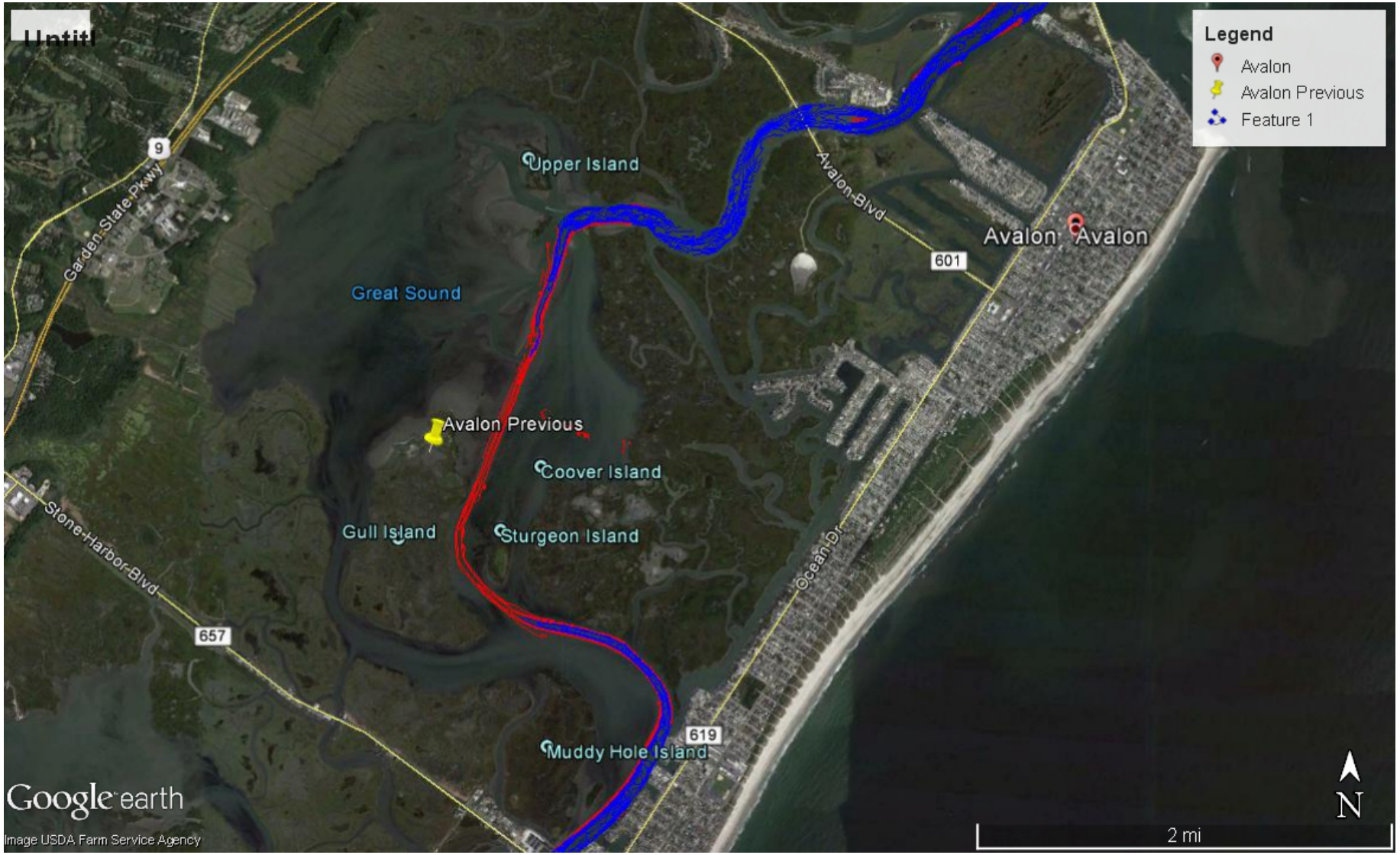
SEVEN MILE ISLAND "LIVING LABORATORY" APPROACH

PROVIDING ECOLOGICAL UPLIFT AND ENHANCED RESILIENCE FOR ECOSYSTEMS AND COASTAL COMMUNITIES



NJIWW Critical Shoals (Markers 386 to 397) Placement Strategy

Possible placement areas for NJIWW
Markers 386 to 397 west of Avalon/Stone Harbor

Notes
1. Volumes ~75K CY, mixed sediments
2. Need clarification on current shellfish areas

Date: 4/24/2013

SEVEN MILE ISLAND "LIVING LABORATORY" FOR COASTAL RESILIENCE

- Scientific Advisory Committee/Living Lab Working Group: *Helps with managing risk and brings stakeholders & agencies together*
- Develop project objectives/components/techniques that have role in addressing future system resilience, such as,
  - fine grained sediment transport & strategic placement
  - sea level rise & future trajectories of marsh
  - edge erosion
  - success of previous sites
- Implement Short and Long-term Actions & Strategies
  - Collect pre-project data and establish baseline to add to data set (start now)
  - Do not over-engineer, use nature as the lead and mimic processes
  - Construct (Fall 2019)
  - Implement a monitoring program
  - Adaptive management and lessons learned

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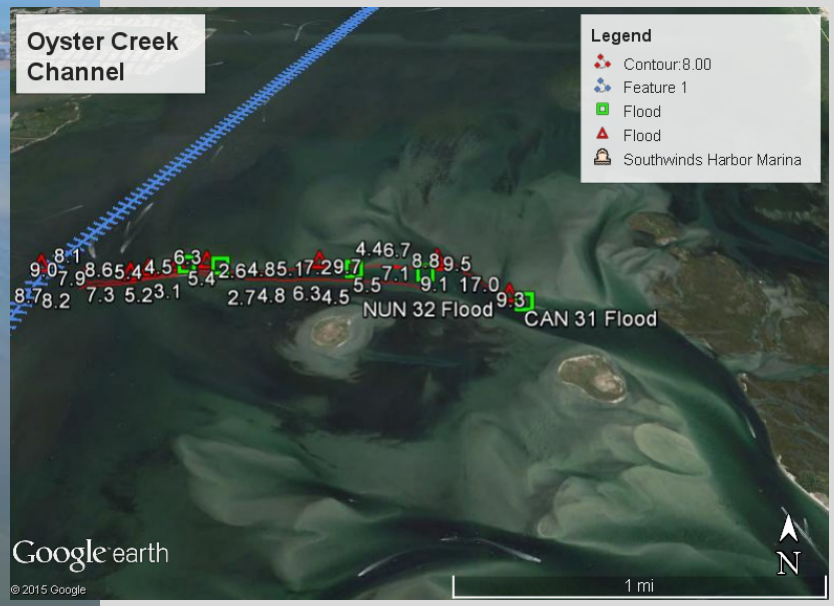
EWN Opportunities: Barnegat Inlet, NJ

BARNEGAT INLET AND BAY, NJ
ISLAND BUILDING AND OPPORTUNITIES



Future Opportunities

- Island Creation in coastal NJ and DE

- Strategic Placement for Marsh Restoration and Coastal Resilience
  - Thin layer
  - Edge restoration
  - Using natural processes

- Using the EWN Strategic Plan and RSM Strategies: Working together to inform science-based decisions and projects, opportunities and challenges

- Engineering with Nature Proving Ground Projects that are cost effective and science based

Sharing Lessons Learned across USACE

San Francisco District Navigation *Synchronization* Meeting

March 2018

Adaptive Management Puts Controls on Known Risk,
LTC Rayfield, San Fran District
September 2018

ENGINEERING WITH NATURE
PLANTING WORKSHOP IN DELAWARE
APRIL 2018
USACE, CENTER FOR INLAND BAYS, DNREC