

Engineering With Nature



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RSM-EWN Meeting

21 July 2014

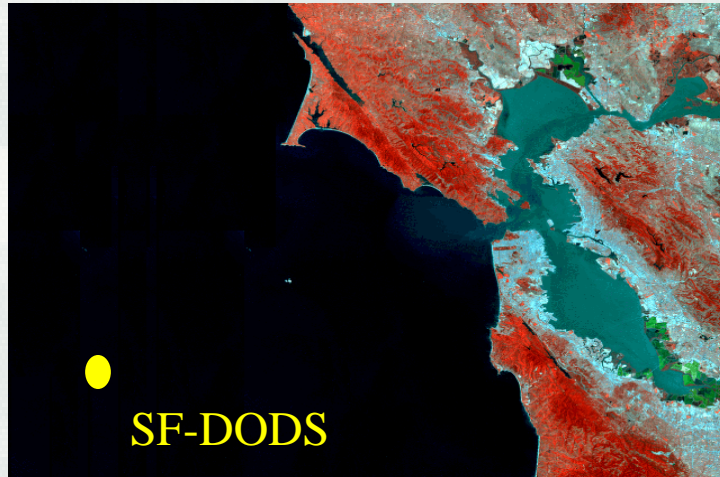
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**US Army Corps of Engineers
BUILDING STRONG®**

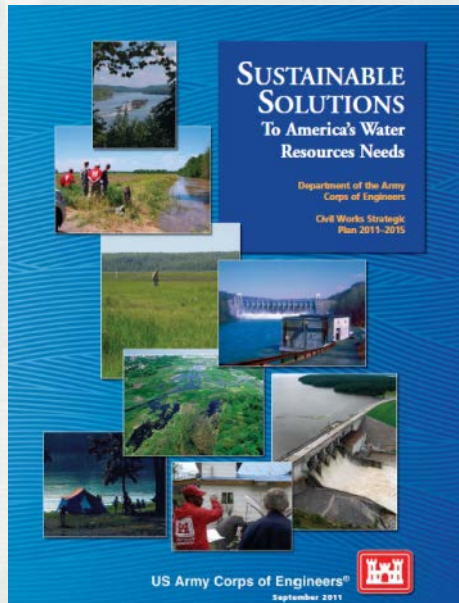


Moving Beyond the *Status Quo*



Needs:

- Efficient, cost effective engineering and operational practices
- More collaboration and cooperation, less unproductive conflict.
 - ▶ Ports, commercial interests, regulators, NGOs, and others
- Sustainable projects. Triple-win outcomes integrating social, environmental and economic objectives.



Sustainable Solutions Vision: “Contribute to the strength of the Nation through innovative and environmentally sustainable solutions to the Nation’s water resources challenges.”

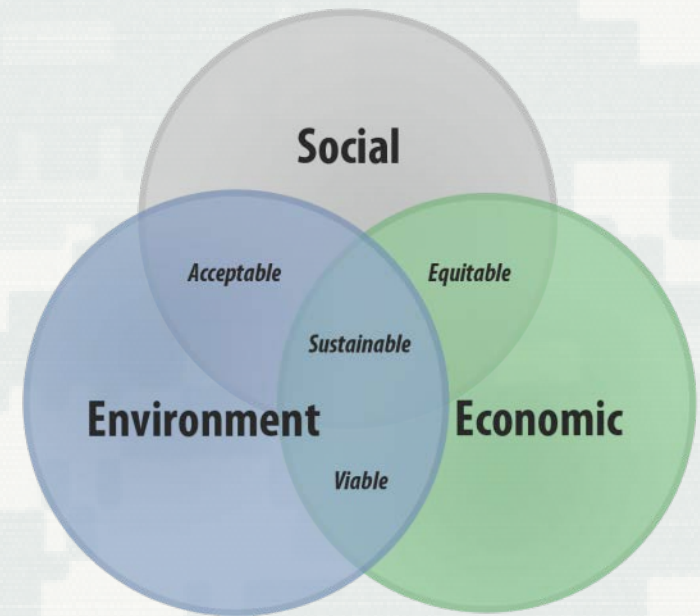


Engineering With Nature...

...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.

Key Ingredients

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners



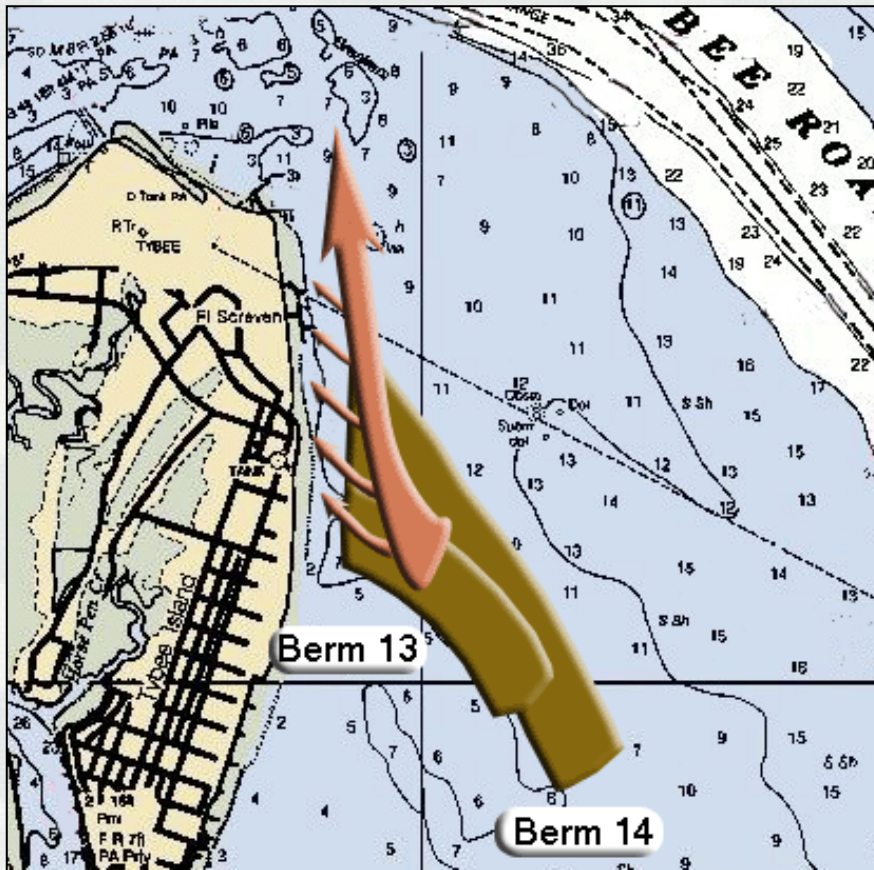
EWN Status

- *Engineering With Nature* initiative started within USACE Civil Works program in 2010. Over that period we have:
 - ▶ Engaged > 300 ind. across USACE Districts (23), Divisions, HQ; other agencies, NGOs, academia, private sector, international collaborators
 - Workshops (15), dialogue sessions, project development teams, etc.
 - ▶ Developed a strategic plan
 - ▶ Focused research projects on EWN
 - ▶ Initiated field demonstration projects
 - ▶ Begun implementing our communication plan
 - ▶ Awards
 - 2013 Chief of Engineers Environmental Award in Natural Resources Conservation
 - 2014 USACE Sustainability Award-Green Innovation

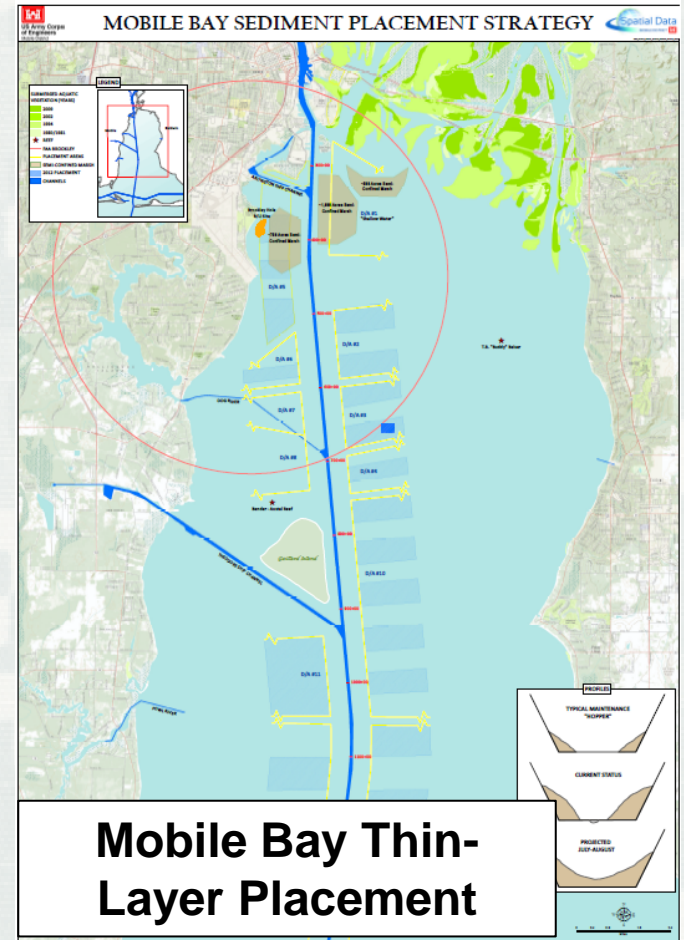


Example EWN Solutions

Strategic Sediment Placement

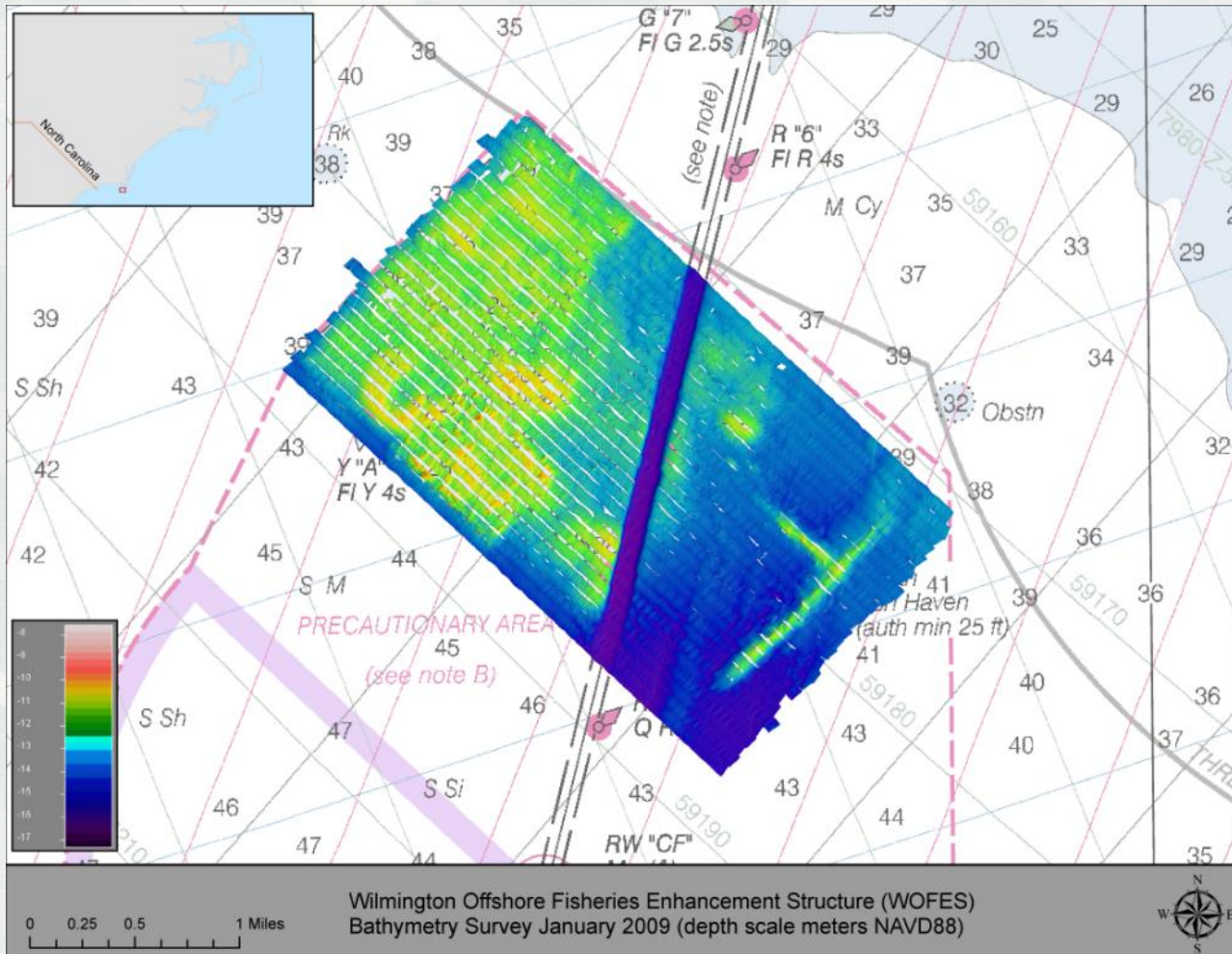


**North Tybee Island
Savannah, Georgia**



Mobile Bay Thin-Layer Placement

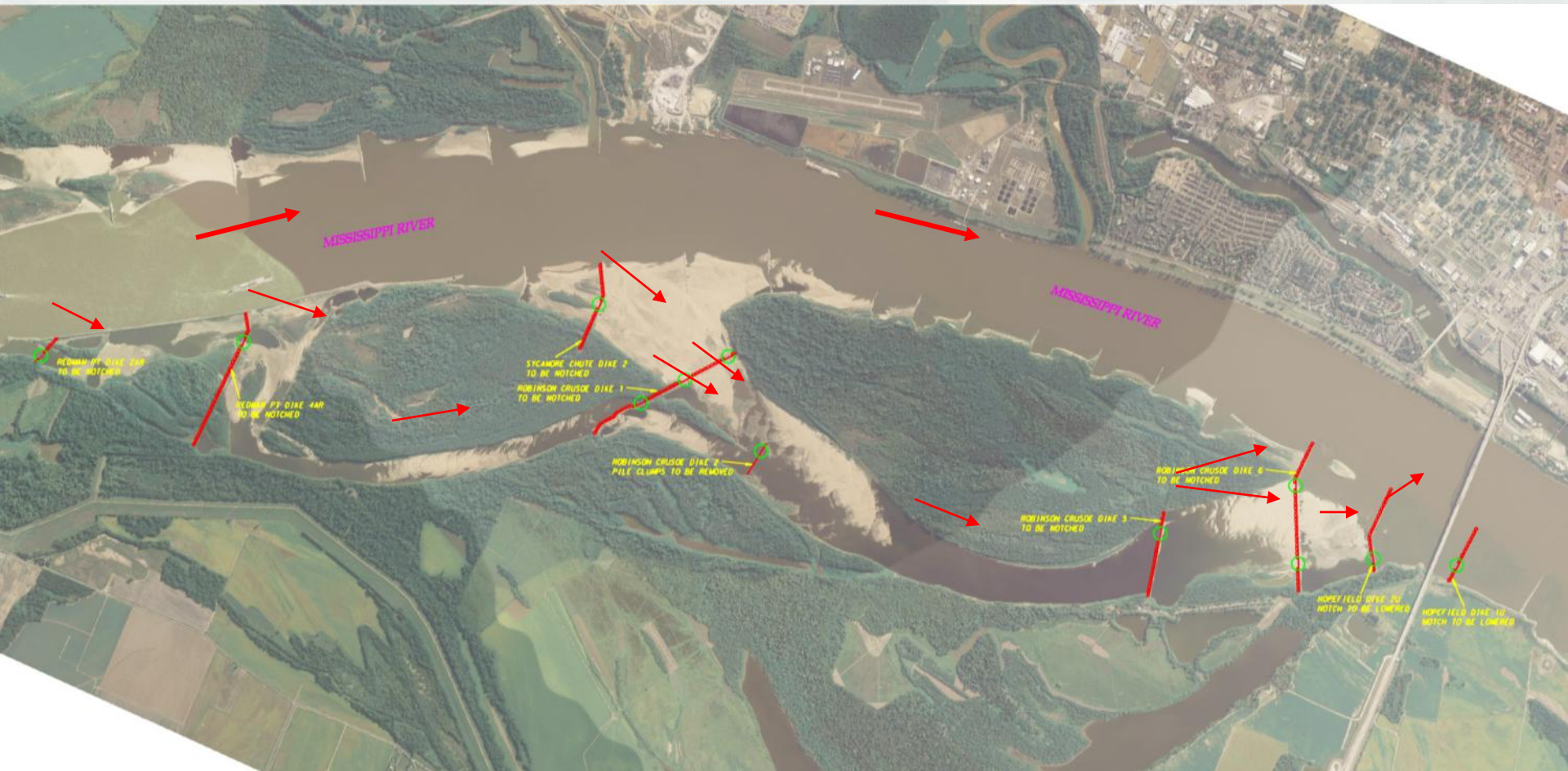
Example EWN Solutions



Wilmington Offshore Fisheries Enhancement Structure



Example EWN Solutions



Loosahatchie Bar
Aquatic Habitat Rehabilitation

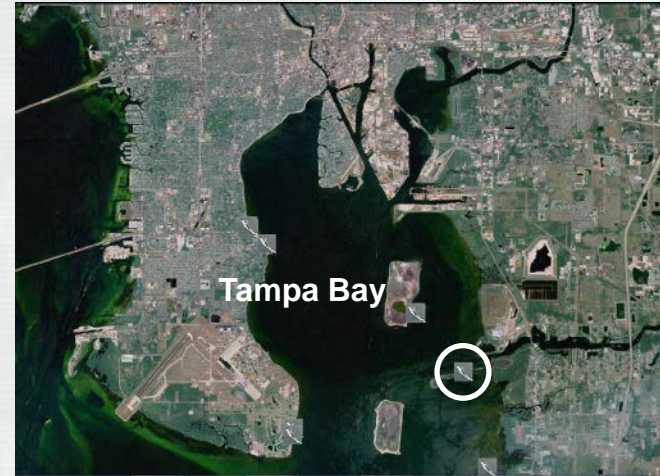


Alafia Banks Bird Sanctuary, FL

- 8000 lb reef module breakwaters (930 ft)
- Shore protection for Audubon bird sanctuary islands
- Help restore oyster populations
- Provide habitat

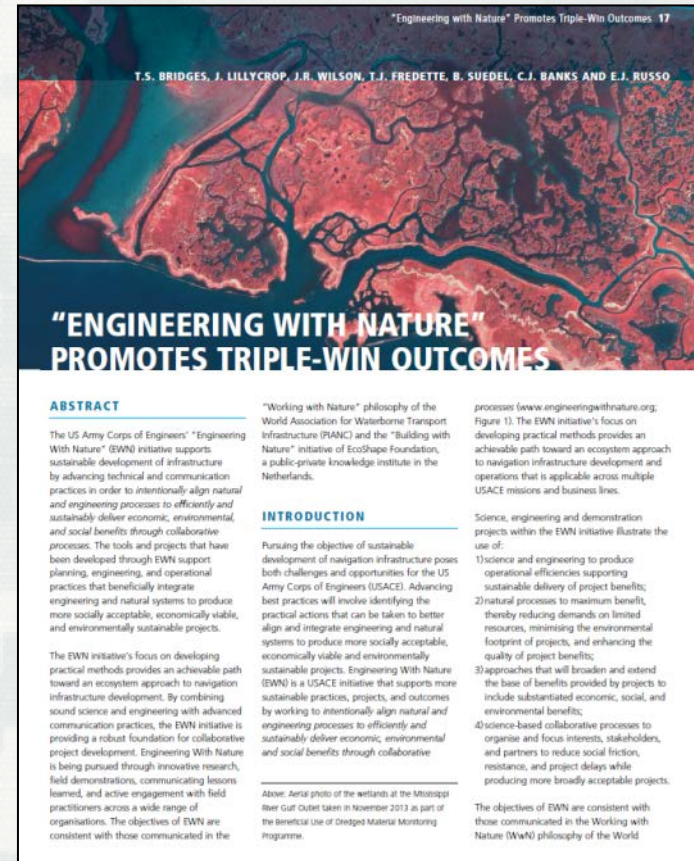


Example: www.reefball.org



Update

- EWN Demonstration Projects
- NACCS Natural and Nature-Based Features
- Workshops/Conferences
- Forsythe National Wildlife Refuge
- District Collaboration
 - ▶ Philadelphia Operations
 - ▶ Galveston EWN Proving Ground
- USFWS Collaboration on ESA and EWN
- Engagement
 - ▶ NWF, EDF, TNC, NFWF



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2013 EWN Action Demonstration Projects

- Sediment Retention Engineering to Facilitate Wetland Development (San Francisco Bay, CA)
- Realizing a Triple Win in the Desert: Systems-level Engineering With Nature on the Rio Grande (Albuquerque, NM)
- Atchafalaya River Island and Wetlands Creation Through Strategic Sediment Placement (Morgan City, LA)
- Portfolio Framework to Quantify Beneficial Use of Dredged Material (New Orleans and New England)
- Engineering Tern Habitat into the Ashtabula Breakwater (Ashtabula, OH)
- Living Shoreline Creation Through Beneficial Use of Dredged Material (Duluth, MN)
- A Sustainable Design Manual for Engineering With Nature Using Native Plant Communities



2014 EWN Action Demonstration Projects

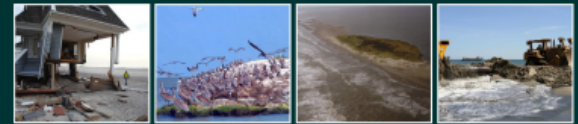
- Landscape Evolution of the Oil Spill Mitigation Sand Berm in the Chandeleur Islands, Louisiana
- Guidelines for Planning, Design, Placement and Maintenance of Large Wood in Rivers: Restoring Process and Function (Collaboration with BoR)
- The Use and Value of Levee Setbacks in Support of Flood Risk Management, Navigation and Environmental Services (a strategy document)
- Strategic Placement of Sediment for Engineering and Environmental Benefit (an initial guide to opportunities and practices)



Systems: Coastal Risk Reduction and Resilience

*“The USACE planning approach supports an **integrated approach** to reducing coastal risks and increasing human and ecosystem community resilience through a combination of **natural, nature-based, non-structural and structural measures**. This approach considers the engineering attributes of the component features and the dependencies and interactions among these features over both the short- and long-term. It also considers the **full range of environmental and social benefits** produced by the component features.”*

Coastal Risk Reduction and Resilience: Using the Full Array of Measures



US Army Corps of Engineers
Directorate of Civil Works



US Army Corps of Engineers
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September 2013
CWTS 2013-3

Natural and Nature-Based Infrastructure at a Glance

GENERAL COASTAL RISK REDUCTION PERFORMANCE FACTORS:
STORM INTENSITY, TRACK, AND FORWARD SPEED, AND SURROUNDING LOCAL BATHYMETRY AND TOPOGRAPHY



Dunes and Beaches

Benefits/Processes

- Break offshore waves
- Attenuate wave energy
- Slow inland water transfer

Performance Factors

- Berm height and width
- Beach Slope
- Sediment grain size and supply
- Dune height, crest, width
- Presence of vegetation



Vegetated Features:

Salt Marshes, Wetlands, Submerged Aquatic Vegetation (SAV)

Benefits/Processes

- Break offshore waves
- Attenuate wave energy
- Slow inland water transfer
- Increase infiltration

Performance Factors

- Marsh, wetland, or SAV elevation and continuity
- Vegetation type and density



Oyster and Coral Reefs

Benefits/Processes

- Break offshore waves
- Attenuate wave energy
- Slow inland water transfer

Performance Factors

- Reef width, elevation and roughness



Barrier Islands

Benefits/Processes

- Wave attenuation and/or dissipation
- Sediment stabilization

Performance Factors

- Island elevation, length, and width
- Land cover
- Breach susceptibility
- Proximity to mainland shore



Maritime Forests/Shrub Communities

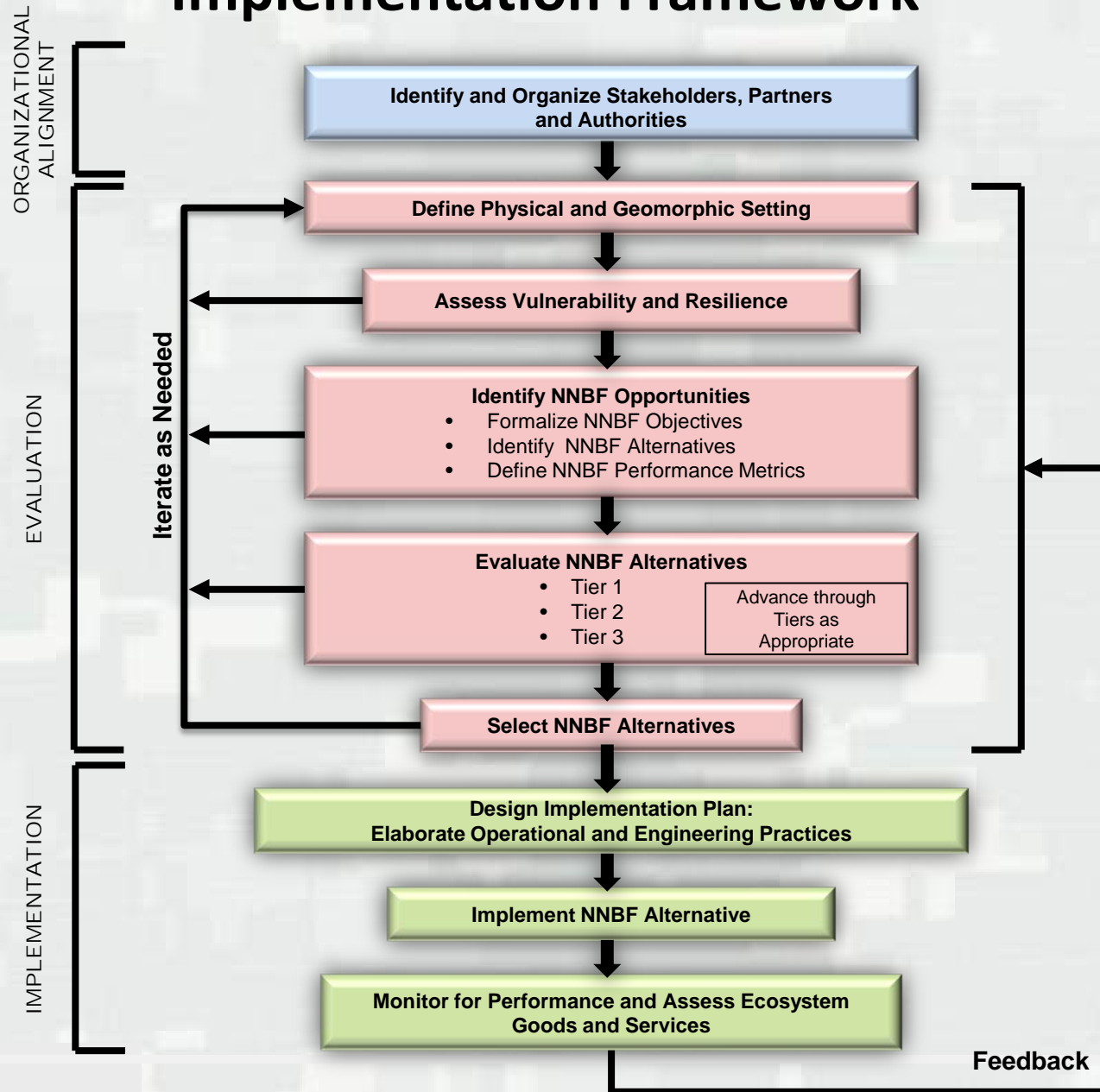
Benefits/Processes

- Wave attenuation and/or dissipation
- Shoreline erosion stabilization
- Soil retention

Performance Factors

- Vegetation height and density
- Forest dimension
- Sediment composition
- Platform elevation

Natural and Nature-Based Features Evaluation and Implementation Framework



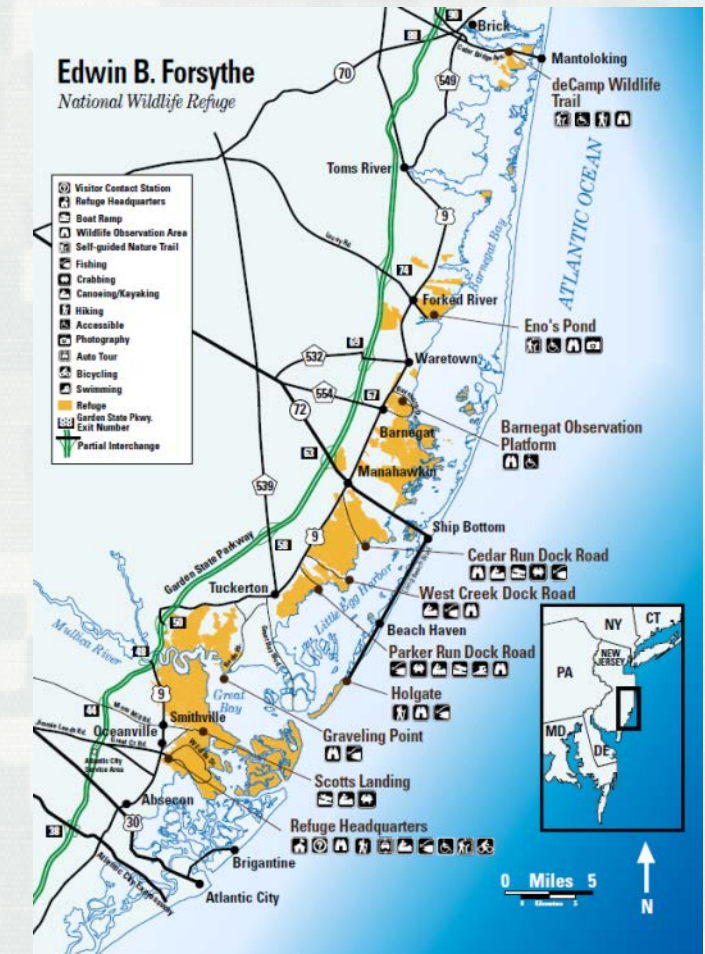
2013/2014 EWN-Sponsored Workshops

- Regional Sediment Management and Engineering With Nature Inland Working Meeting; 29 April – 1 May 2014; Omaha, NE
- Coastal Resilience: The Environment, Infrastructure and Human Systems; 21-23 May 2014; New Orleans, LA (partnered with USEPA and USDOE)
- Working with Nature in Navigating the New Millennium; 1 June 2014, San Francisco, CA (in association with the 33rd PIANC World Congress)
- Flood Risk Management and Engineering With Nature Collaborative Meeting; 10-11 June 2014; Vicksburg, MS



Forsythe National Wildlife Refuge

- Forsythe NWR:
>40,000 acres of wetlands and other habitat
- Objective: Enhance resilience through engineering and restoration
- Means: Apply EWN principles and practices



District Collaboration

- Collaborating with NAP-Operations on using dredged material to increase the resilience of coastal NJ
- SWG to serve as a “proving ground” for district-wide integration of EWN principles and practices



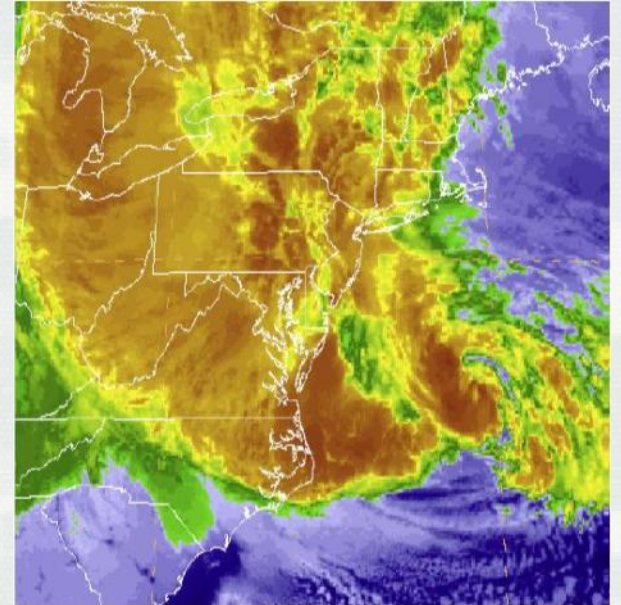
Collaboration with USFWS on EWN and Endangered Species Act

- USACE spends \$300M per year on ESA compliance
- Combining ESA 7(a)(1) authority with EWN presents opportunity to reduce time and cost, while increasing benefits for species conservation



Engagement with NGOs

- National Wildlife Federation
 - ▶ Use of EWN for conservation and NNBF
- Environmental Defense Fund
 - ▶ Coastal resilience investment
- The Nature Conservancy
 - ▶ Science for Nature and People (SNAP)- Integrating Natural Defenses into Coastal Disaster Risk Reduction
- National Fish and Wildlife Foundation
 - ▶ “Building Ecological Solutions to Coastal Community Hazards”
 - Collaboration with NJDEP, NWF, USACE, Sustainable Jersey, NJ Sea Grant Consortium





**Piper Jane Duchesne, born 14 July 2014
(6 lbs 14 oz, 19.5 inches)**

Expanding Opportunities

- Increasing communication about opportunities and successes
 - ▶ Across business lines within the Corps
 - ▶ Among partners and stakeholders
- Establishing basis for more fully sustainable practice
- Consistent, timely generation of written products in order to document achievements and capitalize on momentum

