

# Engineering With Nature



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

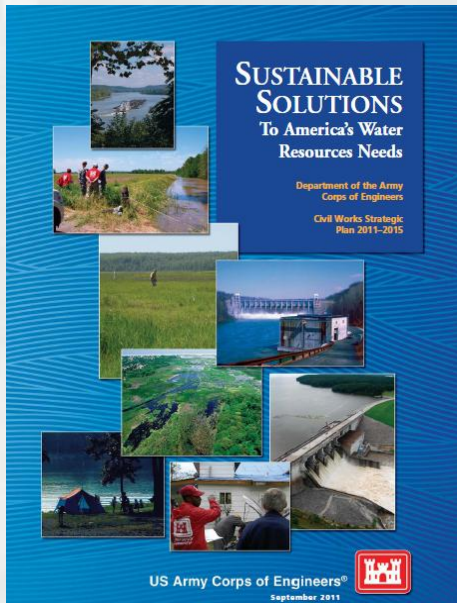


# Moving Beyond the *Status Quo*



## 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."



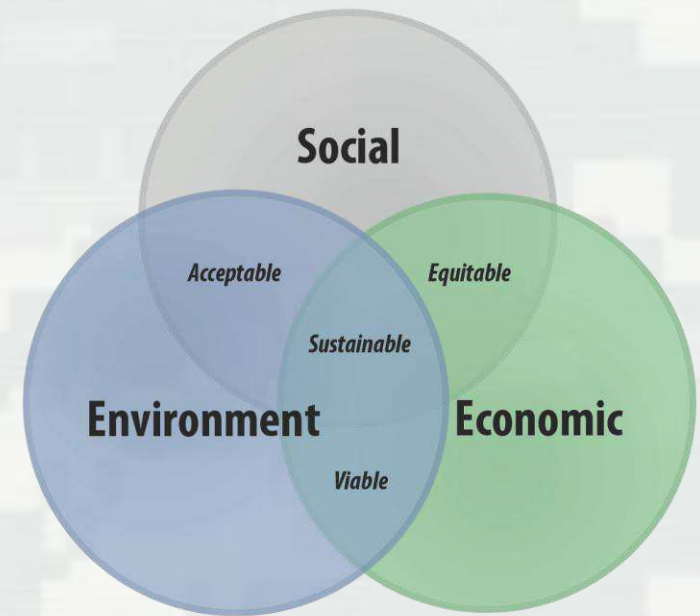


# Engineering With Nature...

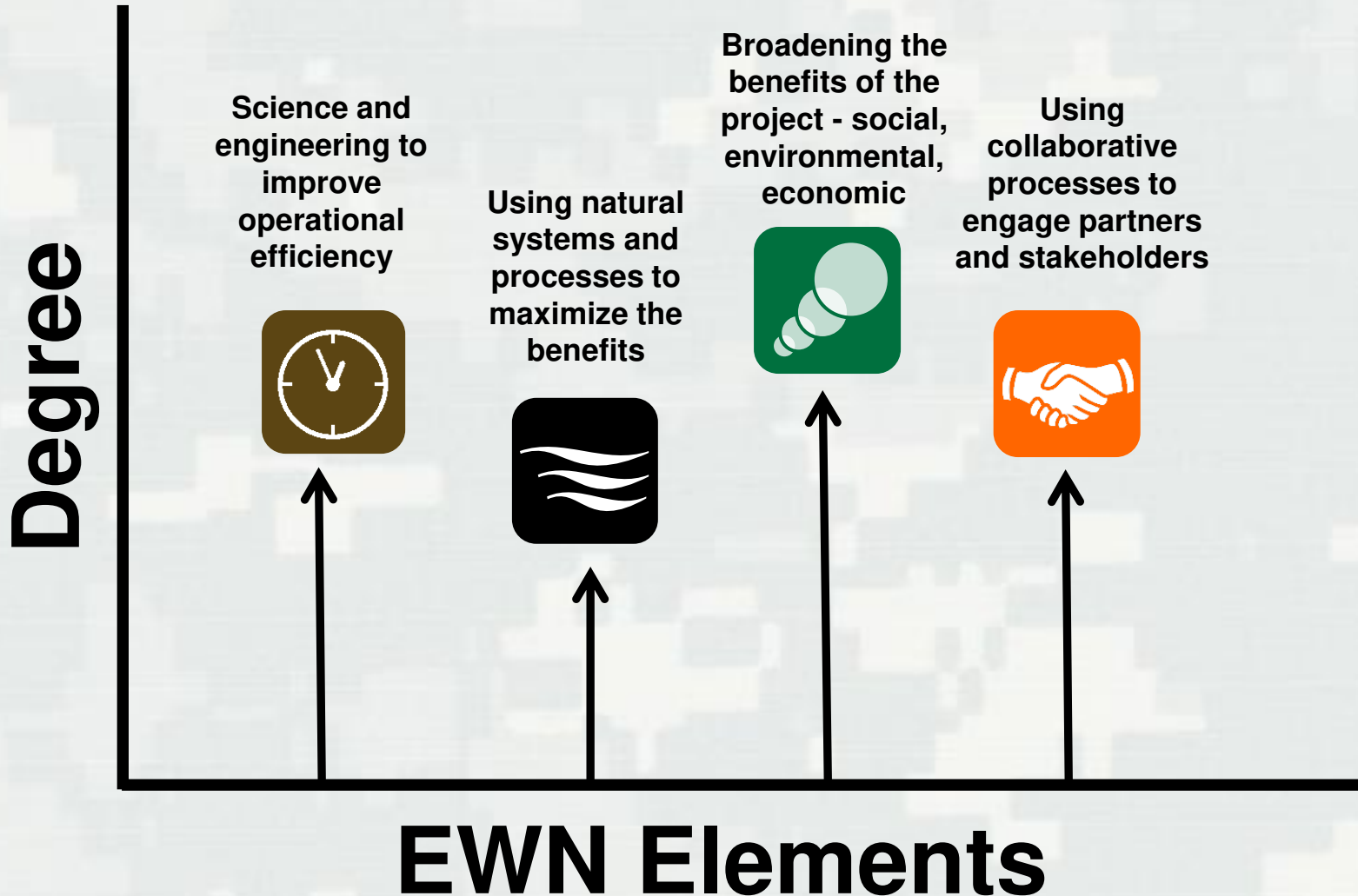
***...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.***

## 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



# *Engineering With Nature* Elements

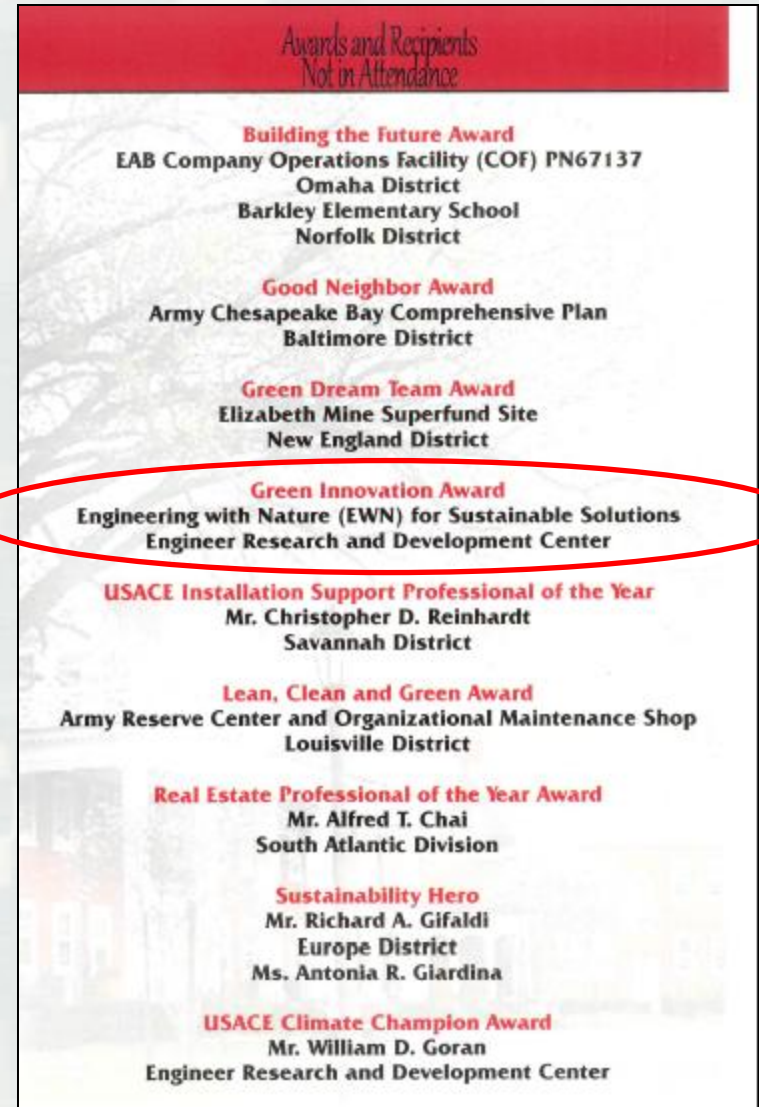
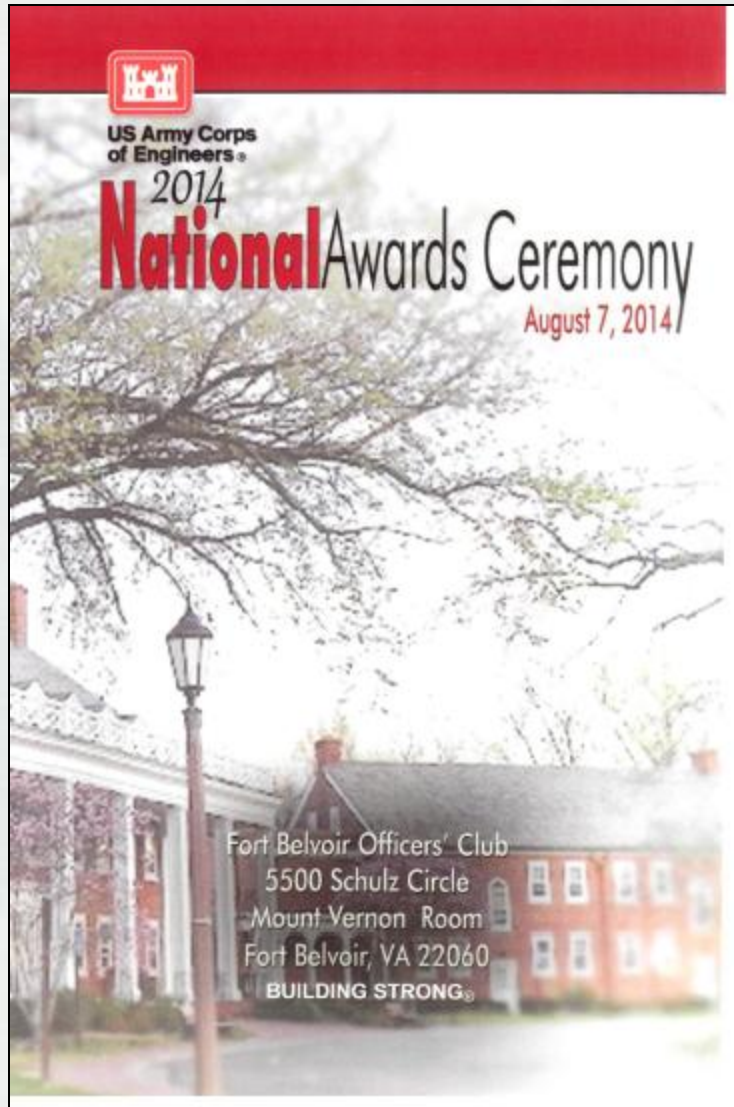


# EWN Status

- *Engineering With Nature* initiative started within USACE Civil Works program in 2010. Over that period we have:
  - ▶ Engaged across USACE Districts (23), Divisions, HQ; other agencies, NGOs, academia, private sector, international collaborators
    - Workshops (>20), dialogue sessions, project development teams, etc.
  - ▶ Implementing strategic plan
  - ▶ Focused research projects on EWN
  - ▶ Field demonstration projects
  - ▶ Communication plan
  - ▶ Awards
    - 2013 Chief of Engineers Environmental Award in Natural Resources Conservation
    - 2014 USACE National Award-Green Innovation



# 2014 Green Innovation Award for Engineering With Nature





# Considering EWN Opportunities

- **Key Factors, the 4 Ps**

- ▶ **Processes**

- Physics, geology, biology...
    - Foundation of “coastal engineering Jujitsu”

- ▶ **Programmatic context**

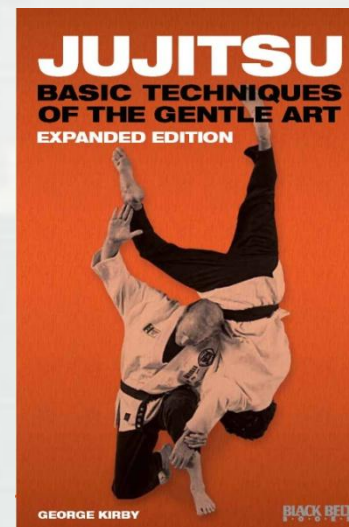
- Planning, engineering, constructing, operating, or regulating

- ▶ **Project scale**

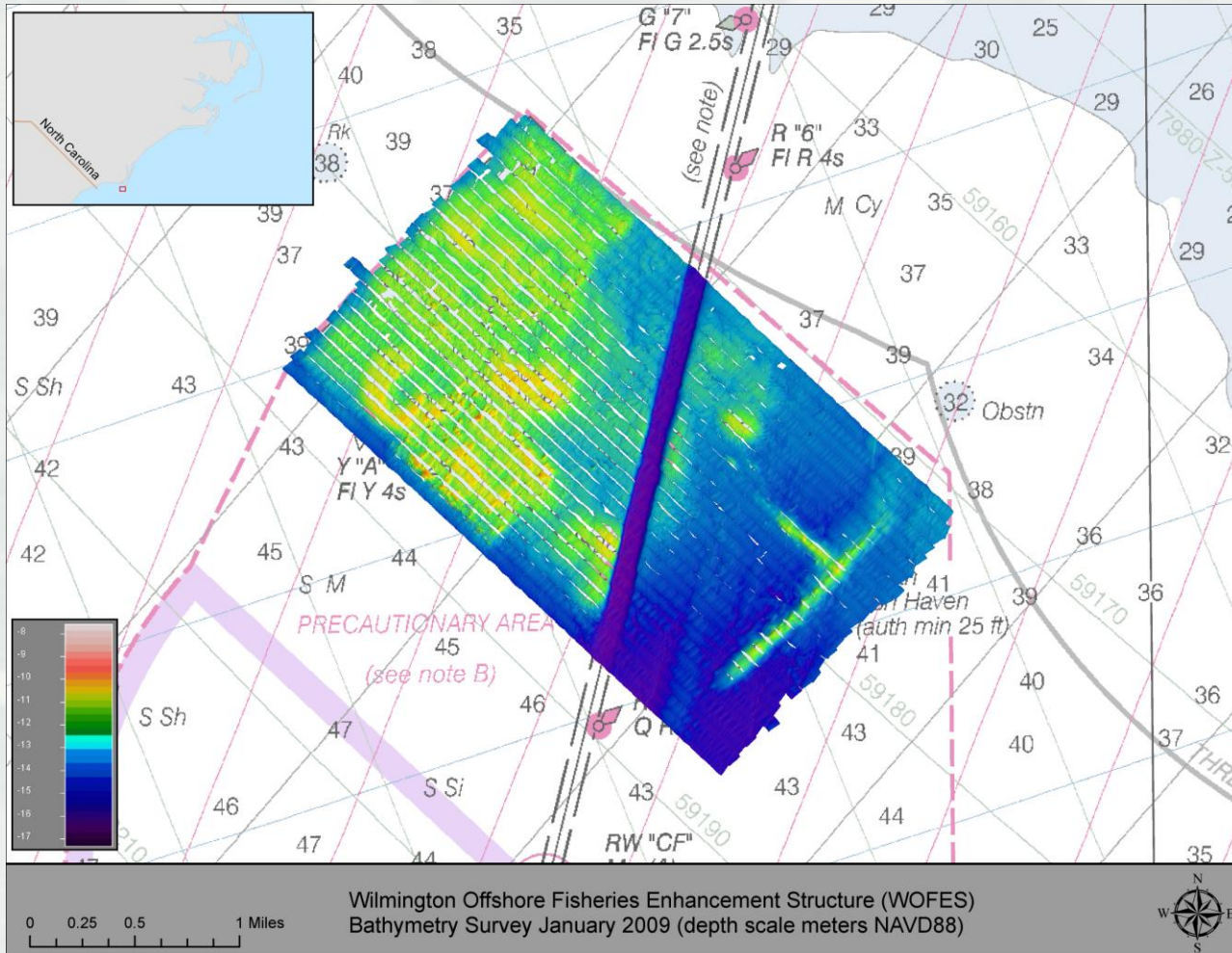
- Individual property owner to an entire coastal system

- ▶ **Performance**

- Configuring the system
    - Quantifying the benefits



# Example EWN Solutions



## Wilmington Offshore Fisheries Enhancement Structure

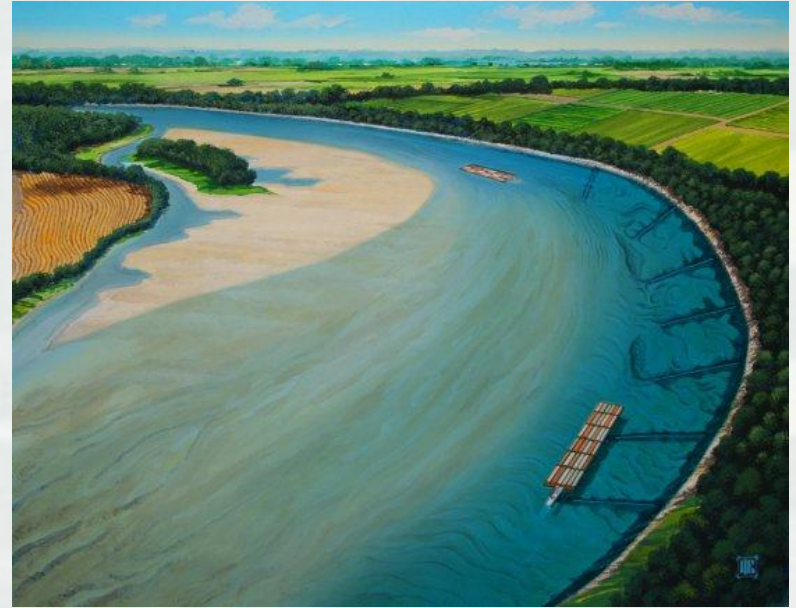




# Example EWN Solutions

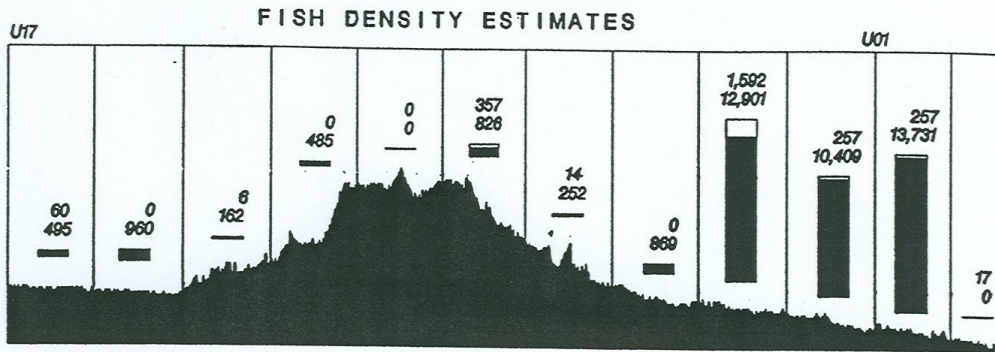
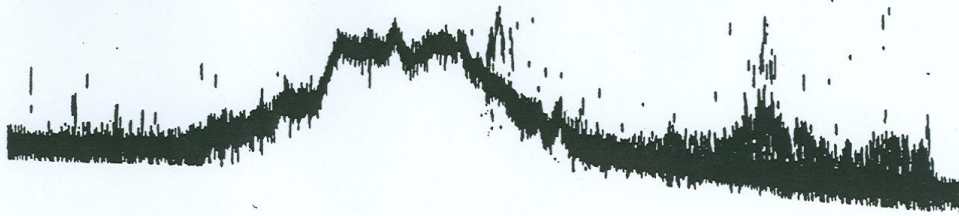


**Upper Mississippi River Training  
Structures: Chevrons**



**River Bendway Weirs**

# Example EWN Solutions

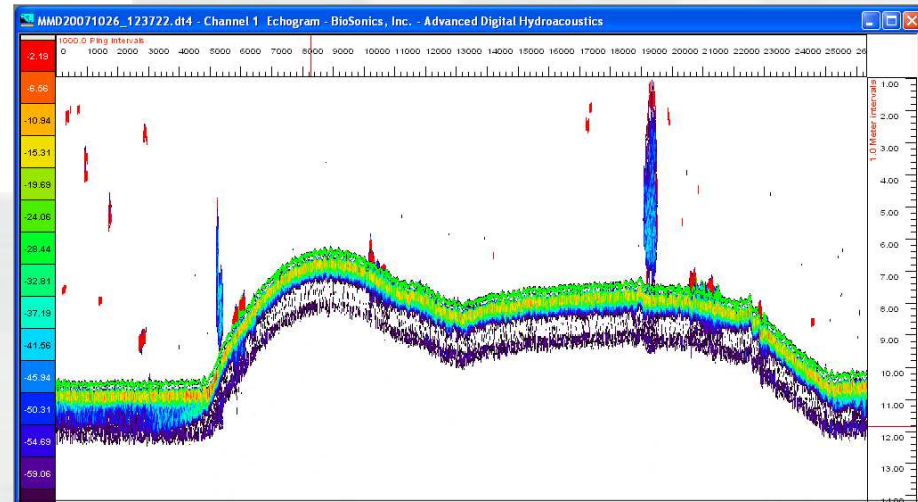


## LEGEND

xxxx Density Of Mid-column Fish  
yyyy Density Of Bottom Fish  
Histogram Of Fish Density  
in fish per hectare

Hydroacoustics and trawling data used to document fisheries benefits provided by topographic relief created with dredged material

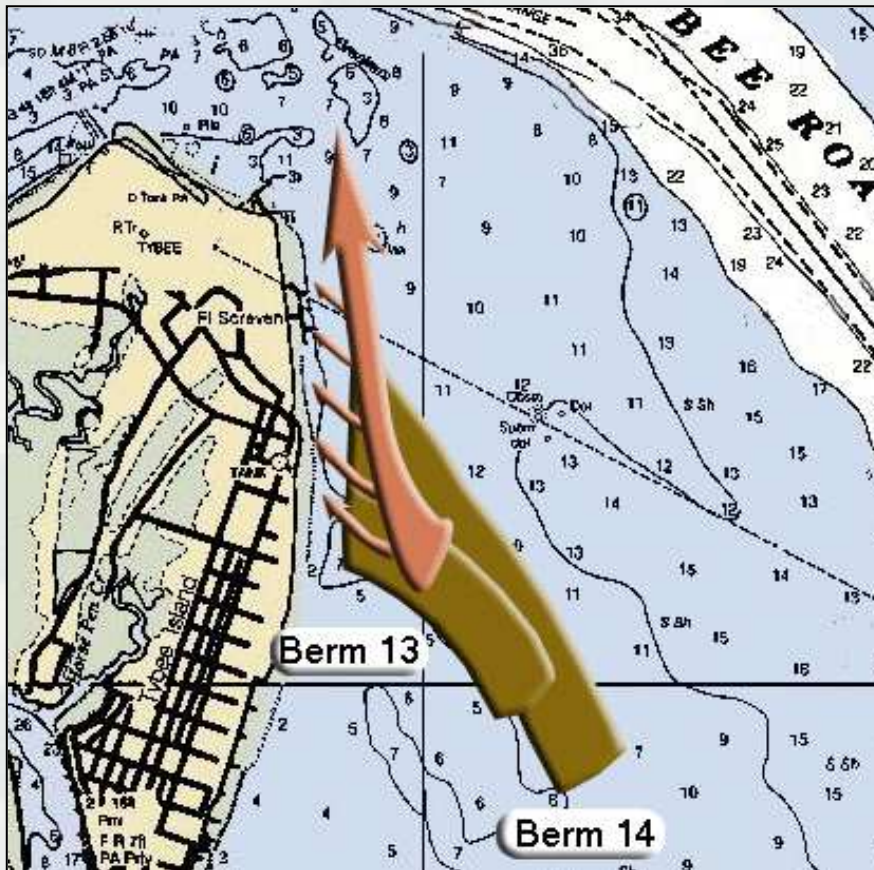
## Mobile Offshore Dredged Material Mound



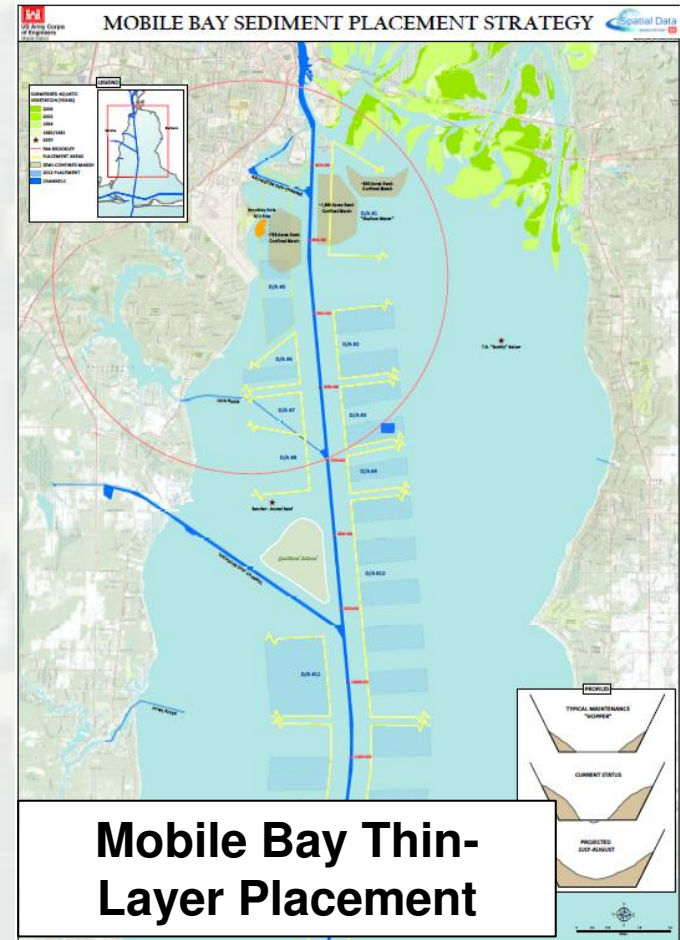


# Example EWN Solutions

## *Strategic Sediment Placement*



**North Tybee Island  
Savannah, Georgia**





# Example EWN Solutions

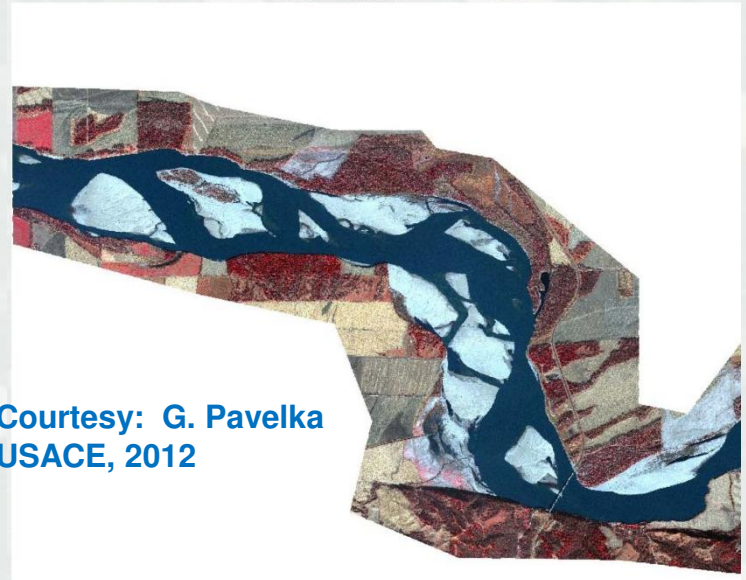
## *Upper Missouri River Sandbar Habitat*

- \$25 Million to construct 650 acres of sandbar
- 16,000 acres created by the flood of 2011

July 2009

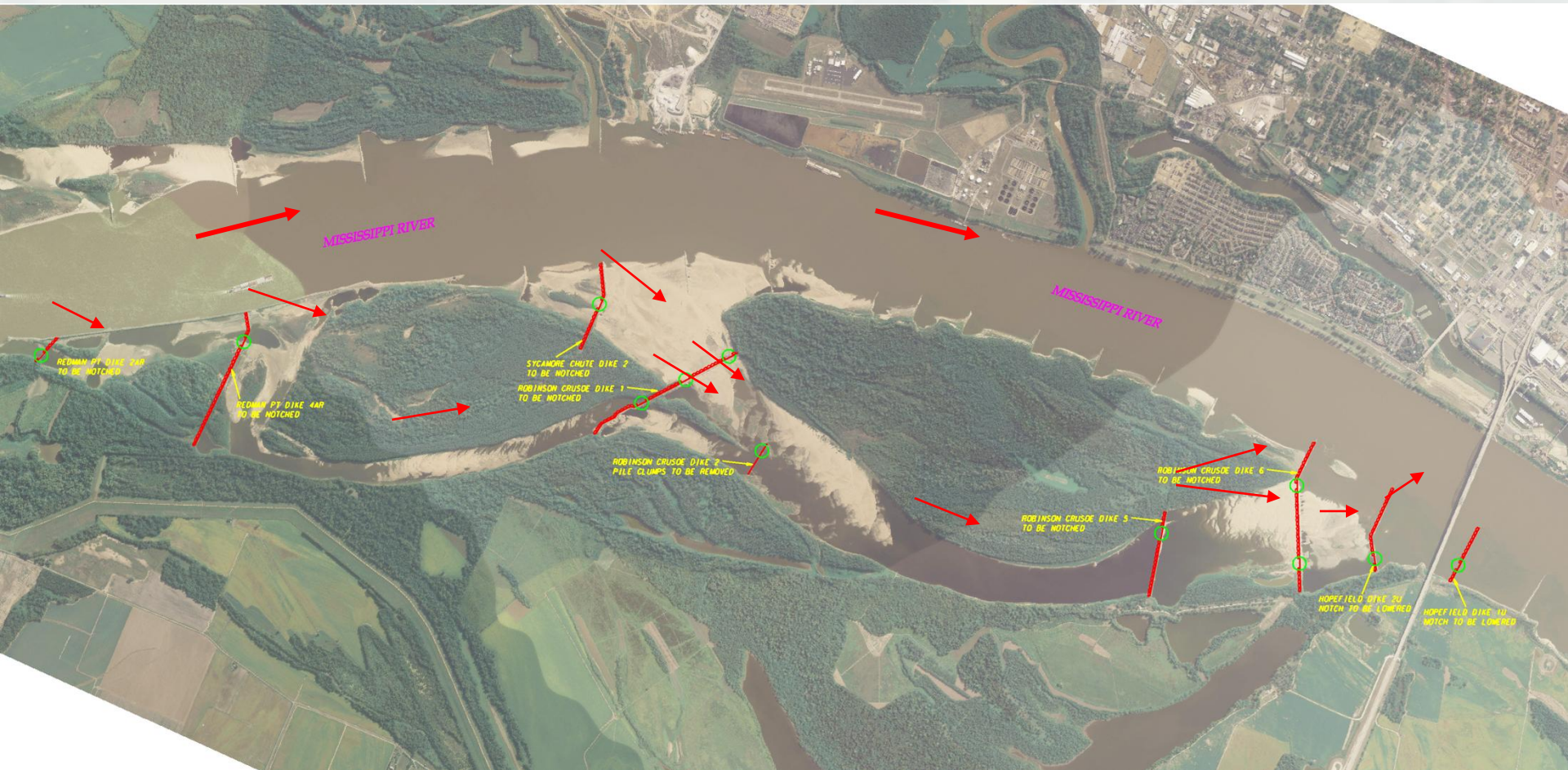


November 2011



Courtesy: G. Pavelka  
USACE, 2012

# Example EWN Solutions

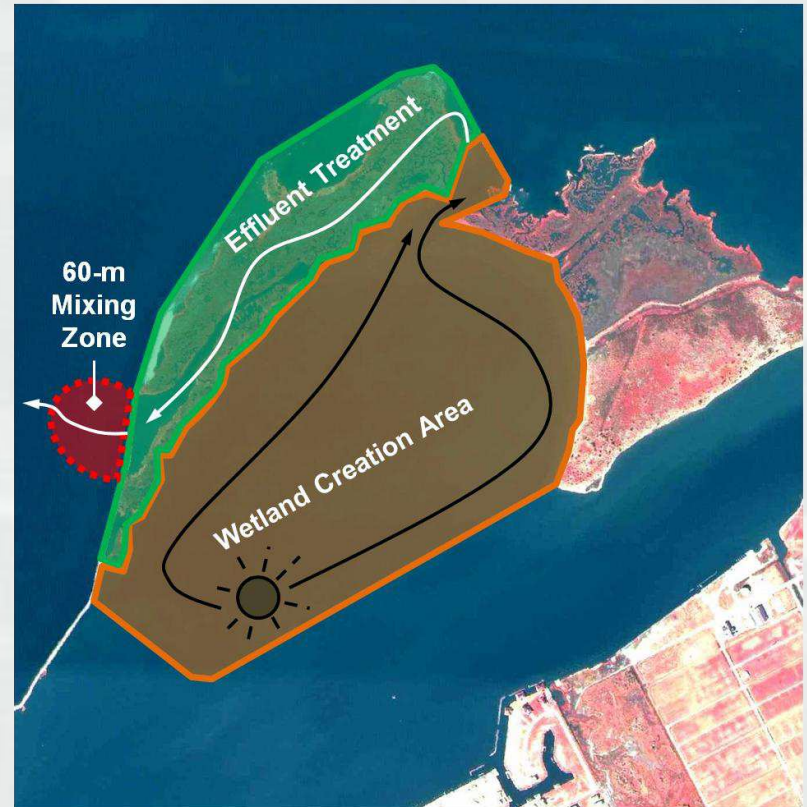


Loosahatchie Bar  
Aquatic Habitat Rehabilitation





# Example EWN Solutions



Bayou Rigaud, Louisiana



# 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



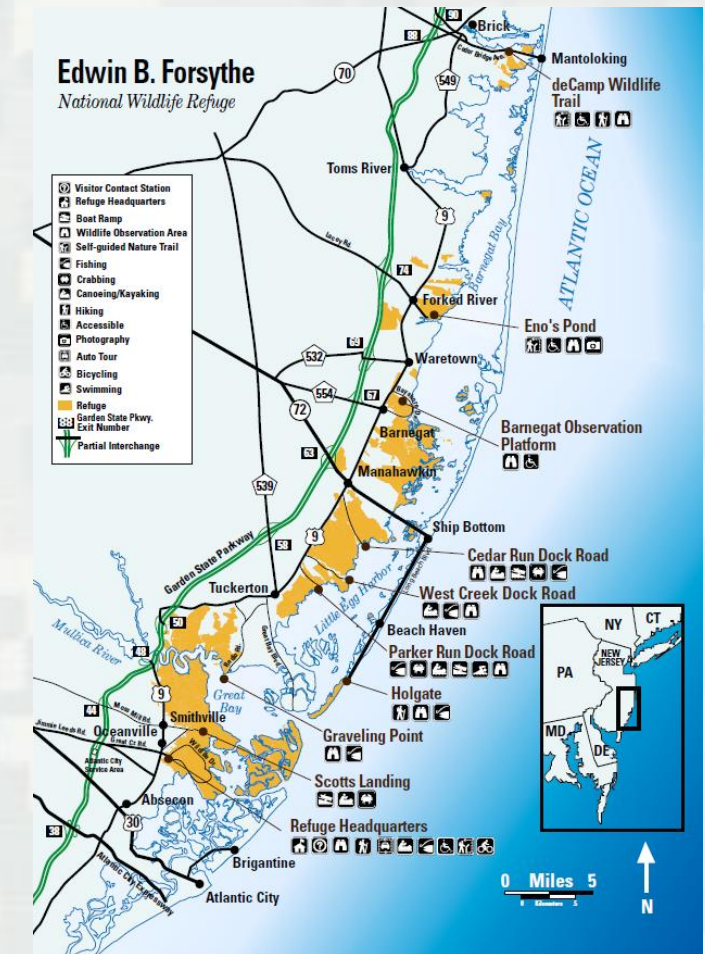
# 2014 EWN Action Demonstration Projects

- 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)



# 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





# 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



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# Expanding EWN Opportunities

- Increasing communication about opportunities and successes
  - ▶ Across business / mission areas
  - ▶ Among partners and stakeholders
- Establishing basis for more fully sustainable practice
- Balancing consideration of the environmental risks associated with infrastructure, with the environmental benefits that can be produced



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