

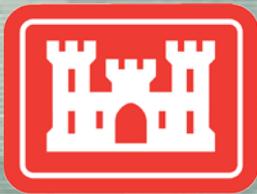
# Engineering With Nature



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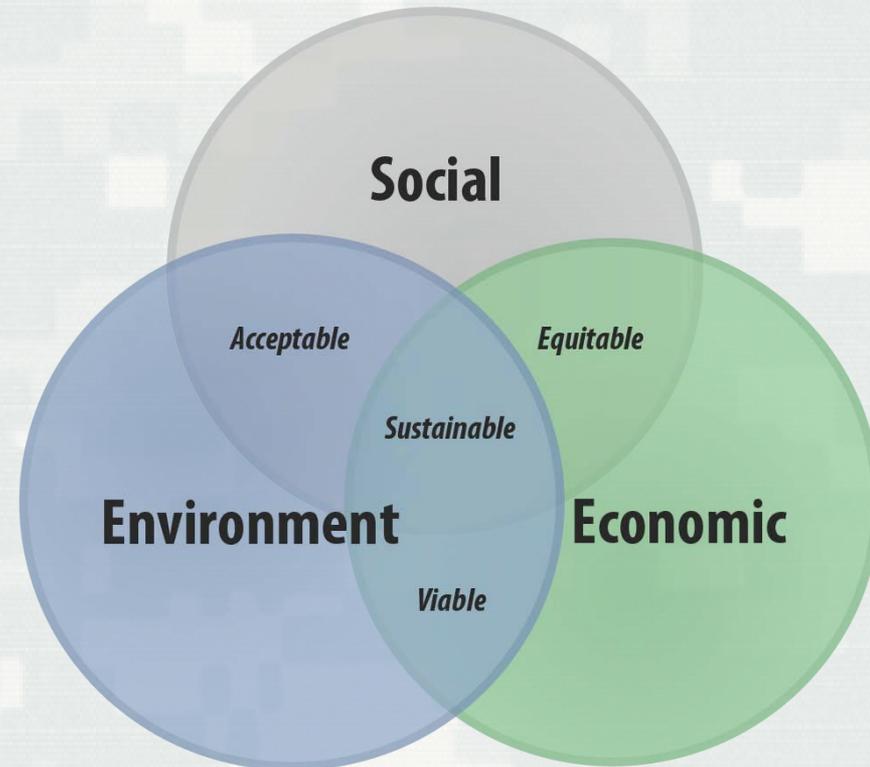
**US Army Corps of Engineers  
BUILDING STRONG®**

# The Challenge:

## The *Status Quo* is Not An Option

### The need:

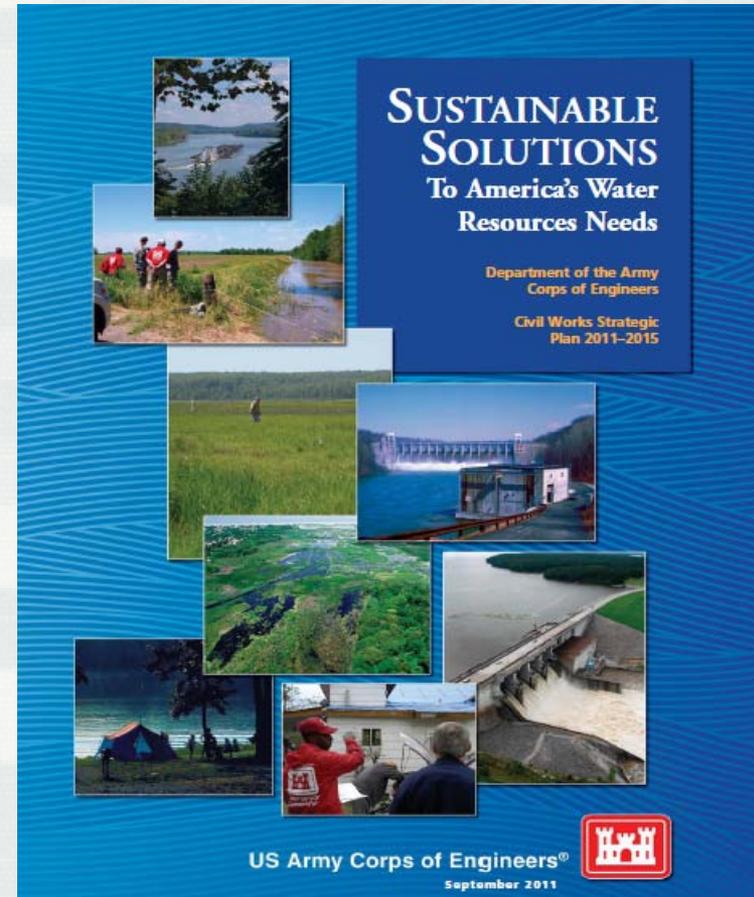
- Efficient, cost effective engineering and operational practices
- More collaboration and cooperation with our partners and stakeholders.
  - ▶ Ports, commercial interests, regulators, NGOs, and others
- Sustainable projects. Triple-win outcomes integrating social, environmental and economic objectives.



# The USACE Civil Works Strategic Plan

## *Sustainable Solutions to America's Water Resources Needs*

- Vision: “Contribute to the strength of the Nation through innovative and environmentally sustainable solutions to the Nation’s water resources challenges.”
- The goals established by this strategy are to:
  - ▶ Assist in providing for safe and resilient communities and infrastructure.
  - ▶ Help facilitate commercial navigation in an environmentally and economically sustainable fashion.
  - ▶ Restore degraded aquatic ecosystems and prevent future environmental losses.
  - ▶ Implement effective, reliable, and adaptive life-cycle performance management of infrastructure.
  - ▶ Build and sustain a high quality, highly dedicated workforce.



# Definition

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



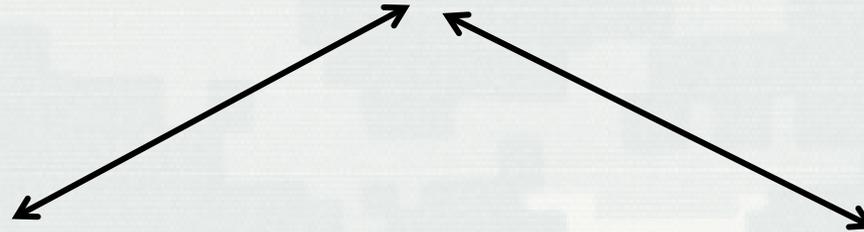
# Background

- *Engineering With Nature* initiative was established by the USACE Navigation program in 2010. Over that period we have:
  - ▶ Conducted 7 workshops that have defined the scope and technical approach
    - Participants have included HQ, Districts, other agencies, NGOs, academics, private sector, international collaborators
  - ▶ Developed a strategic plan for the initiative
  - ▶ Initiated research to support the intent of EWN
  - ▶ Numerous briefings and discussions in a variety of fora





***Working  
with Nature***



***Building  
with Nature***

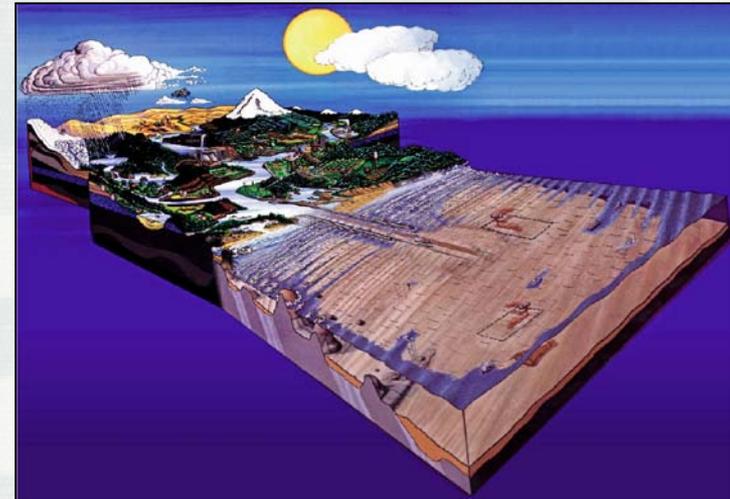


***Engineering  
With Nature***



# EWN, A Natural Extension of RSM

- EWN- An *ecosystem approach* to infrastructure development and operations
  - ▶ Applied across missions and business lines
  - ▶ Expanding environmental benefits and services provided by infrastructure



# The Essential Ingredients of EWN

- Use science and engineering to produce operational efficiencies
  - ▶ Support sustainable delivery of project benefits.
- Use natural process to maximum benefit
  - ▶ To reduce demands on limited resources, minimize the environmental footprint of the project, and to enhance the quality of benefits produced
- Broaden and extend the benefits provided by projects
  - ▶ To include substantiated economic, social, and environmental benefits
- Use science-based collaborative processes to organize and focus interests, stakeholders, and partners
  - ▶ To reduce social friction, resistance, and project delays while producing more broadly acceptable projects



# Example EWN Opportunities

- Cost-efficient engineering practices
  - ▶ E.g., for enhancing the habitat value of infrastructure
- Use engineering to focus natural processes that achieve operational and environmental objectives
  - ▶ E.g., to minimize navigation channel infilling and to transport and focus sediments for positive benefits
- Strategic placement of sediments for beneficial use of dredged material
  - ▶ E.g., make use of hydrodynamics and natural transport processes to build near-shore habitats
- Optimizing the use of natural systems, such as wetlands and other features
  - ▶ E.g., to reduce the effects of storm processes and sea level rise on shorelines and coasts
- Science-based communications processes
  - ▶ To significantly improve stakeholder engagement, collaboration and communication



# Example EWN Solutions



**Upper Mississippi River Training Structures: Chevrons**



**River Bendway Weirs**

# Example EWN Solutions

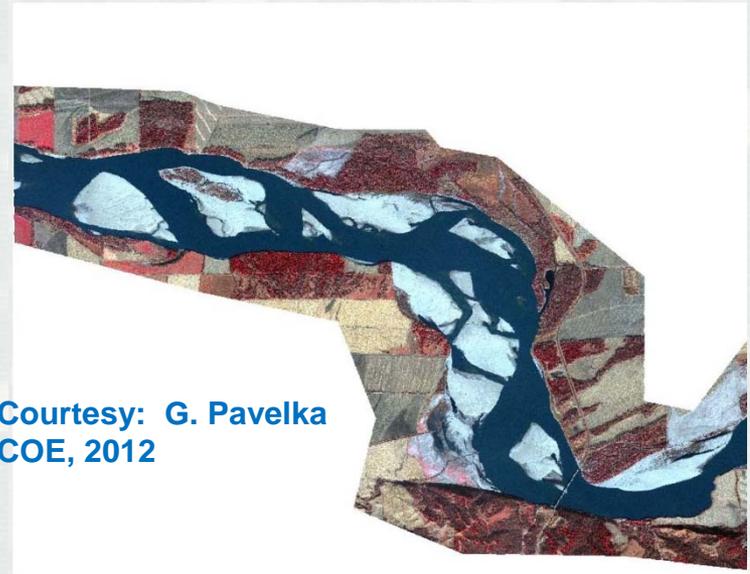
## *Upper Missouri River Sandbar Habitat*

- \$25 Million to construct 650 acres of sandbar
- Buried under 16,000 acres, 2011 flood

July 2009

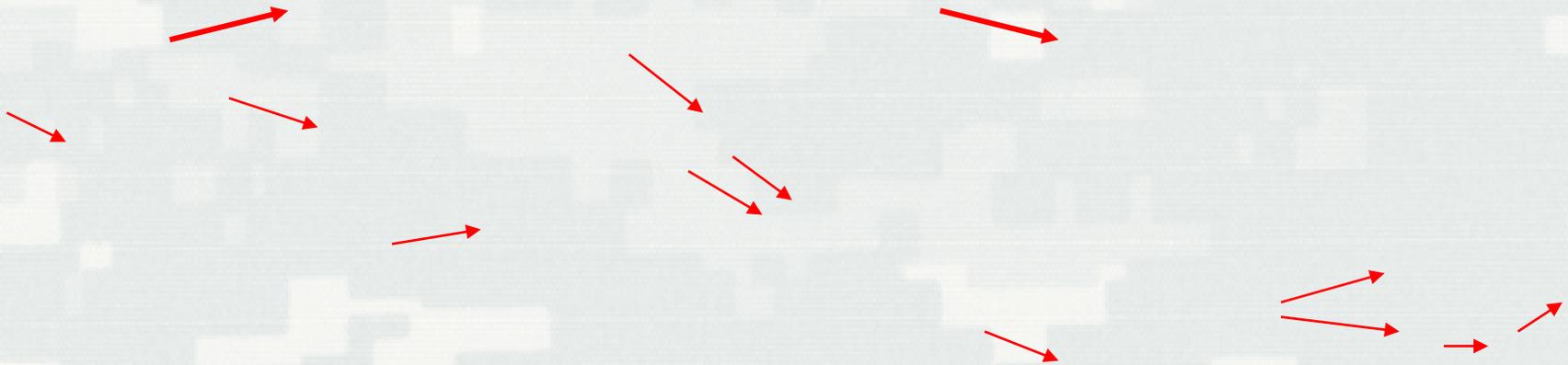


November 2011



Courtesy: G. Pavelka  
COE, 2012

# Example EWN Solutions

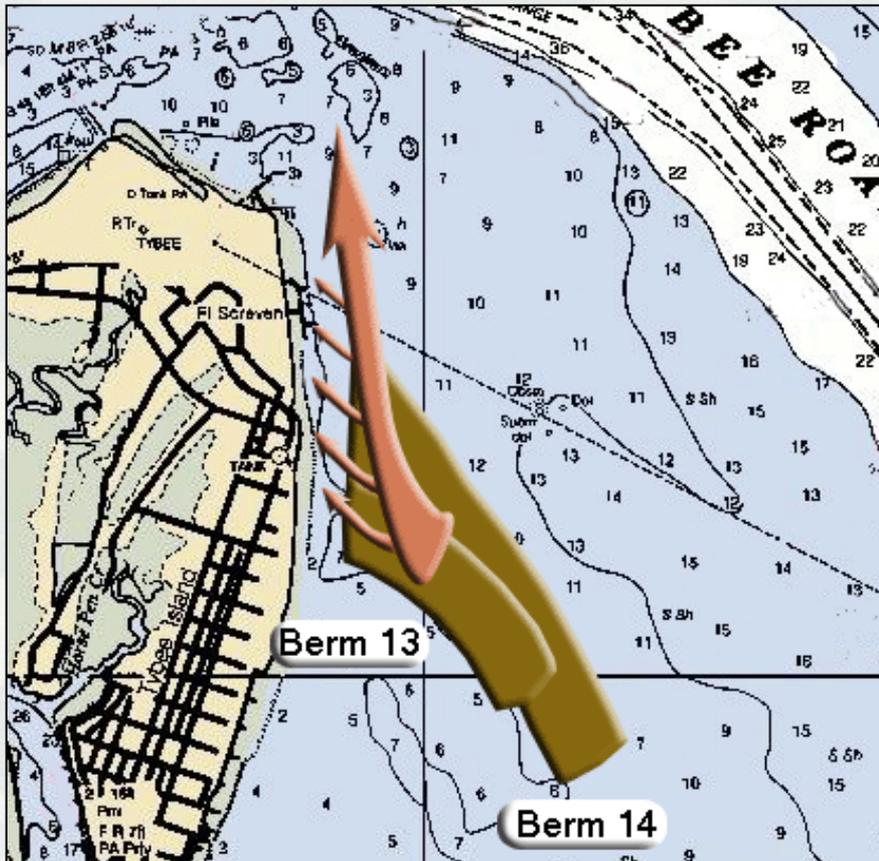


Loosahatchie Bar  
Aquatic Habitat Rehabilitation

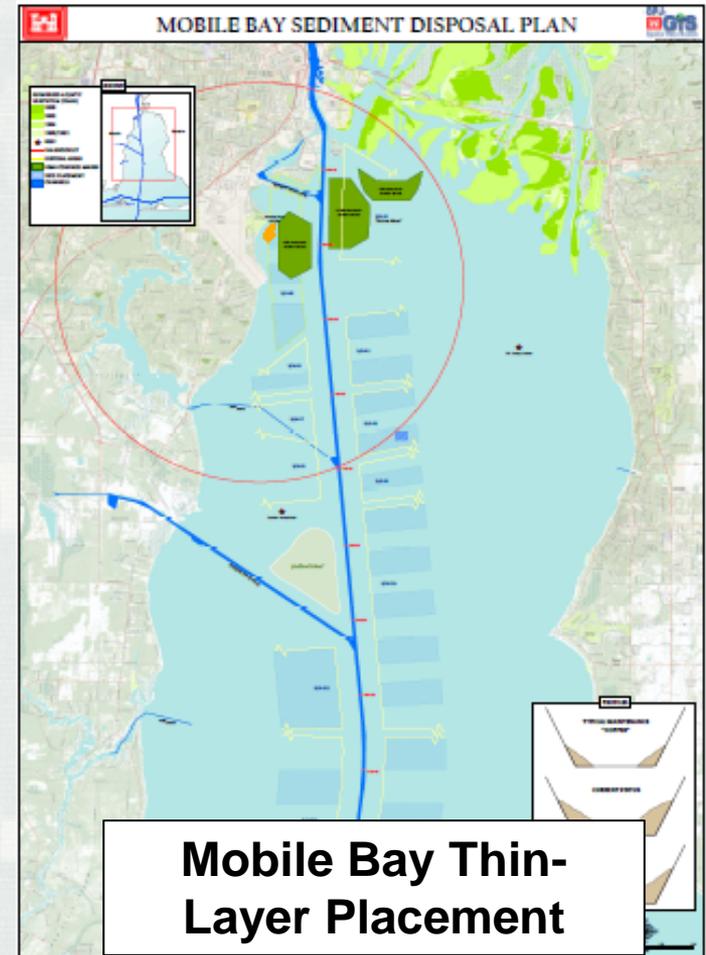


# Example EWN Solutions

## *Strategic Sediment Placement*

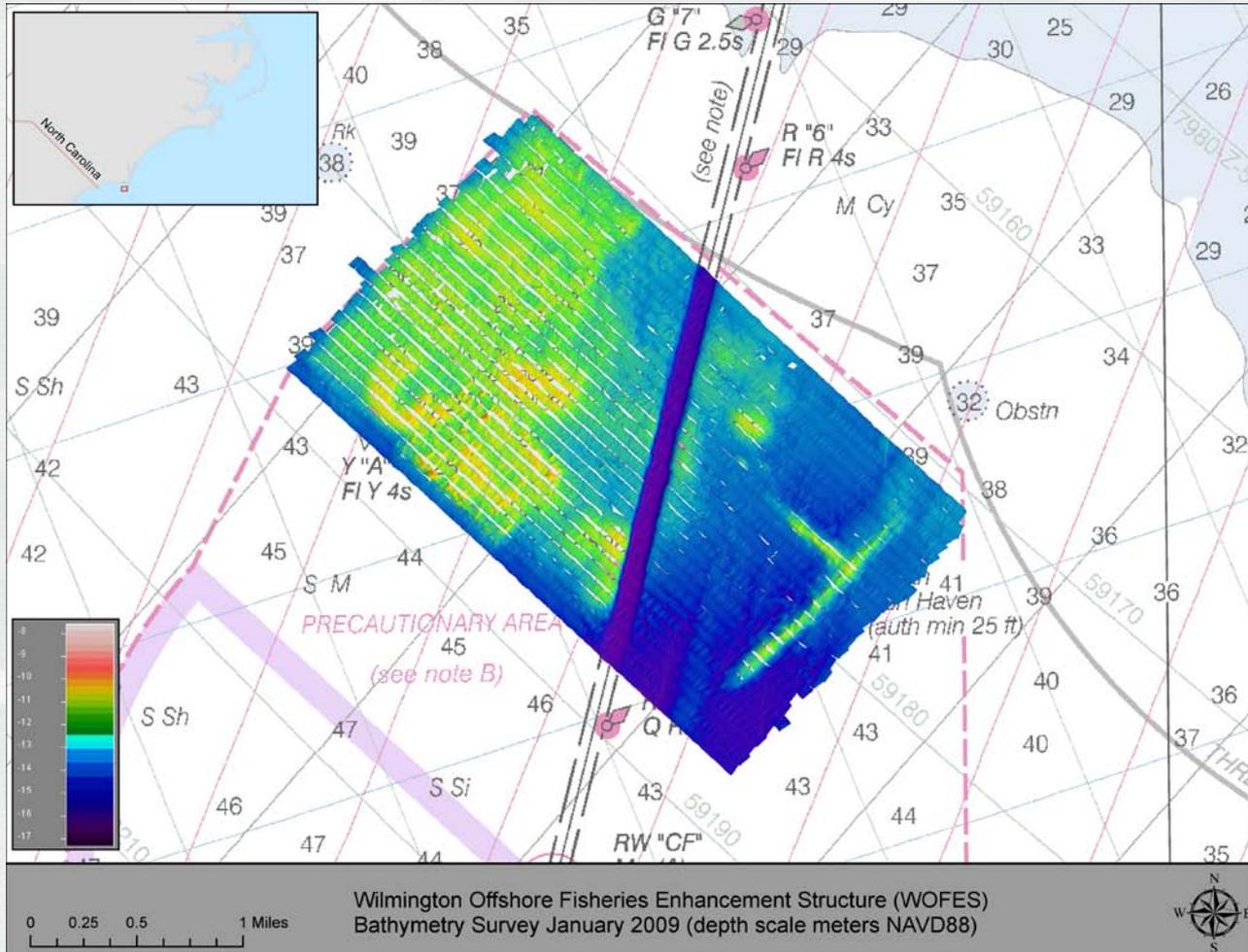


**North Tybee Island  
Savannah, Georgia**



**Mobile Bay Thin-Layer  
Placement**

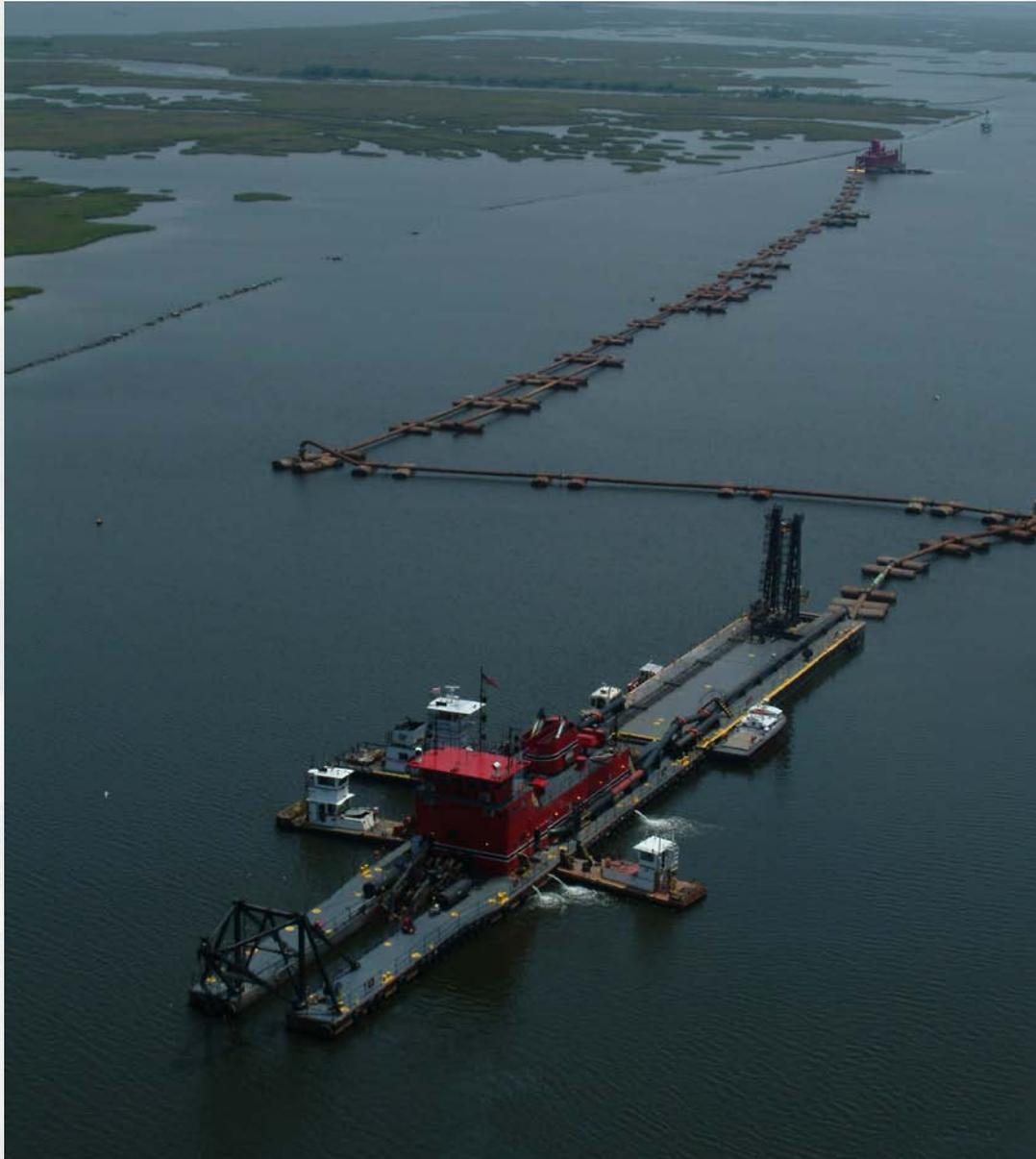
# Example EWN Solutions



## Wilmington Offshore Fisheries Enhancement Structure



# Example EWN Solutions



**Long-distance  
pumping of  
dredged material  
for wetlands  
creation in coastal  
Louisiana, USA**

- *How to marry LDC with natural transport processes to expand opportunities?*

# Engineering With Nature: *The Progression*

## Inputs and Outputs *'Degree of'*

System Resilience

Efficiency

Benefits Related to the Project

### Outcomes

### Inputs

Communications and Technology Transfer

Technical Understanding

Innovation and Creativity

Diversity of Skills and Expertise

Stakeholder Engagement



Business  
as Usual

Understanding  
Natural  
Processes

Aligning  
Processes

Expanding  
Benefits

Enabling  
Self-Sustaining  
Benefits

STAGES



# Engineering With Nature

- Smart, efficient engineering practice
- Expand the range of benefits provided through water-based infrastructure
  - ▶ Emphasis on environmental outcomes
- Progress achieved through productive, collaborative project dynamics

