

# The USACE Engineering With Nature Program



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US Army Corps  
of Engineers.

**ERDC**

Engineer Research and  
Development Center

# Dredging Operations Environmental Research (DOER)

**Mission:** To support sound environmental management and operational practice by advancing science, engineering and technology applied to navigation dredging operations



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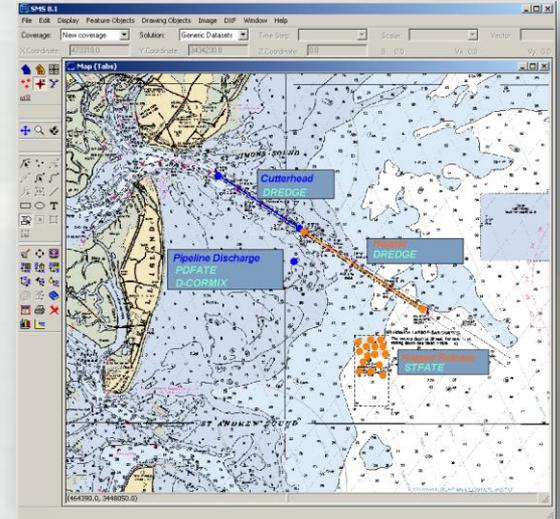
# DOER Programmatic

- Continuing program in O&M
  - ▶ Operating for >15 years
- Organized around Focus Area themes
  - ▶ Sediment and Dredging Processes
  - ▶ Dredged Material Management
  - ▶ Environmental Resource Management
  - ▶ Risk Management
- Finite-term research projects, e.g. 1-3 years in length
  - ▶ About 40 projects active in a given year
- Proactive R&D to shape debate and practice



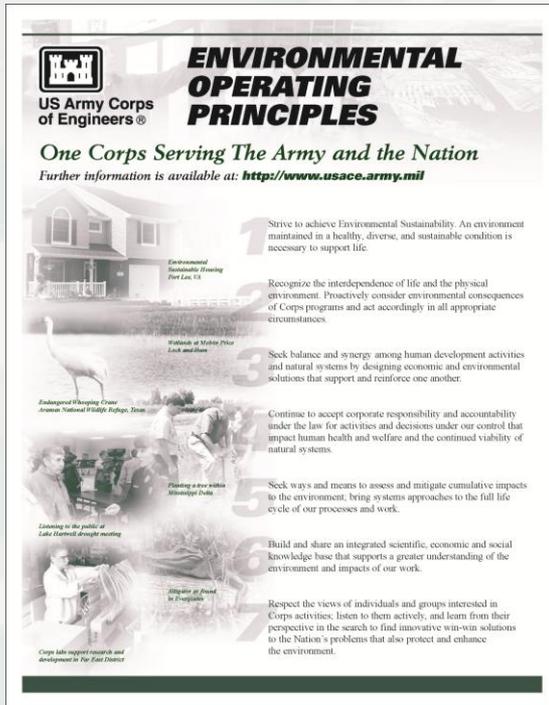
# DOER's Strategic Focus

- Increase understanding of key, fundamental processes
- Enhanced modeling capability to support engineering design and operations
- Science that reduces environmental testing burden
- Economical solutions for T&E species and Environmental Windows
- Engineering With Nature for sustainable practice



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# Advancing USACE Practice



Vision: "Contribute to the strength of the Nation through innovative and environmentally sustainable solutions to the Nation's water resources challenges."

## Sustainable Solutions

To America's Water Resource Needs

Civil Works Strategic Plan 2014-2018



## Goals:

- More efficient, cost effective engineering and operational practices.
- More collaboration and cooperation, less unproductive conflict.
- Sustainable projects. Triple-win outcomes integrating social, environmental and economic objectives.

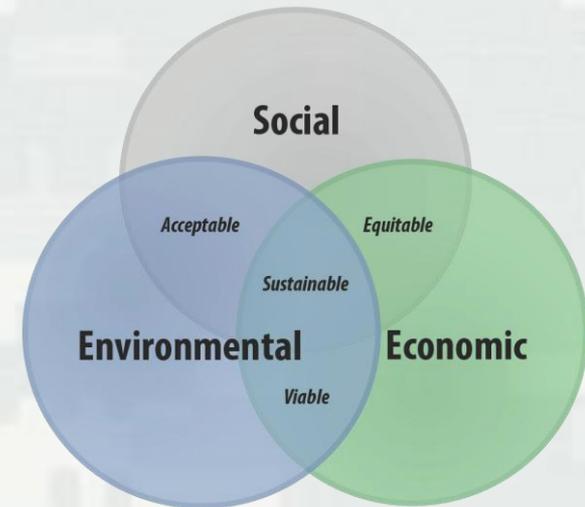


# Engineering With Nature...

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

## Key Elements:

- 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 across USACE Districts (23), Divisions, HQ; other agencies, NGOs, academia, private sector, international collaborators
    - Workshops (>20), dialogue sessions, project development teams, etc.
    - USACE Business Lines engaged: Navigation, Ecosystem Restoration, Flood Risk Management, Water Operations
  - ▶ 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

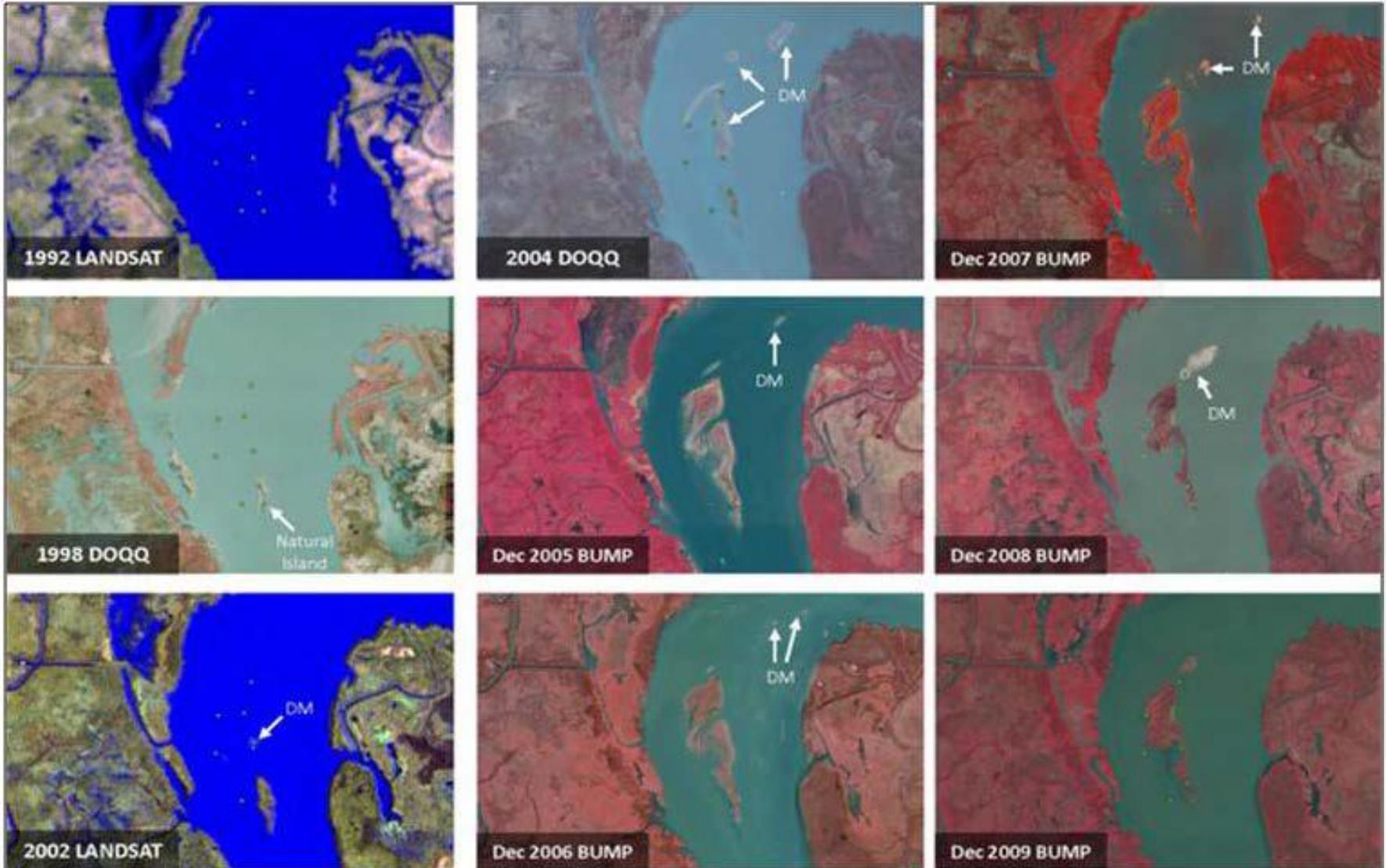


# EWN Action Projects

1. Sediment Retention Engineering to Facilitate Wetland Development (San Francisco Bay, CA)
2. Realizing a Triple Win in the Desert: Systems-level Engineering With Nature on the Rio Grande (Albuquerque, NM)
3. Atchafalaya River Island and Wetlands Creation Through Strategic Sediment Placement (Morgan City, LA)
4. Portfolio Framework to Quantify Beneficial Use of Dredged Material (New Orleans and New England)
5. Engineering Tern Habitat into the Ashtabula Breakwater (Ashtabula, OH)
6. Living Shoreline Creation Through Beneficial Use of Dredged Material (Duluth, MN)
7. A Sustainable Design Manual for Engineering With Nature Using Native Plant Communities
8. Landscape Evolution of the Oil Spill Mitigation Sand Berm in the Chandeleur Islands, Louisiana
9. Guidelines for Planning, Design, Placement and Maintenance of Large Woods in Rivers: Restoring Process and Function
10. The Use and Value of Levee Setbacks in Support of Flood Risk Management, Navigation and Environmental Services: A Strategy Document
11. Strategic Placement of Sediment for Engineering and Environmental Benefit: An Initial Guide to Opportunities and Practices



# Atchafalaya River, Horseshoe Bend





**Native American lotus**

**A diverse assemblage of native plant and animal life has colonized the island.**



**Juvenile Tricolored heron**

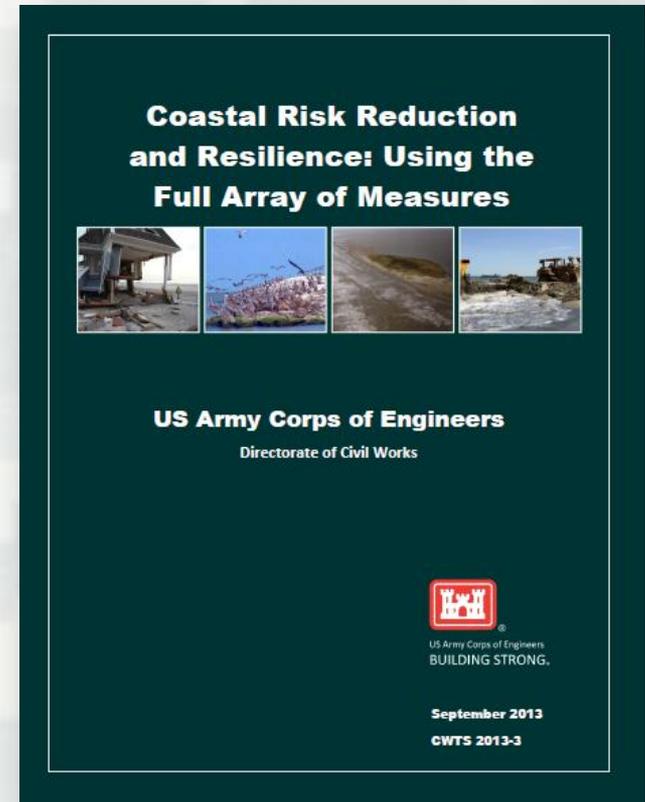


**Juvenile Snowy egret**



# 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.”*

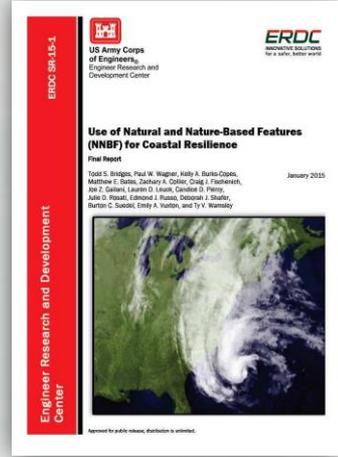
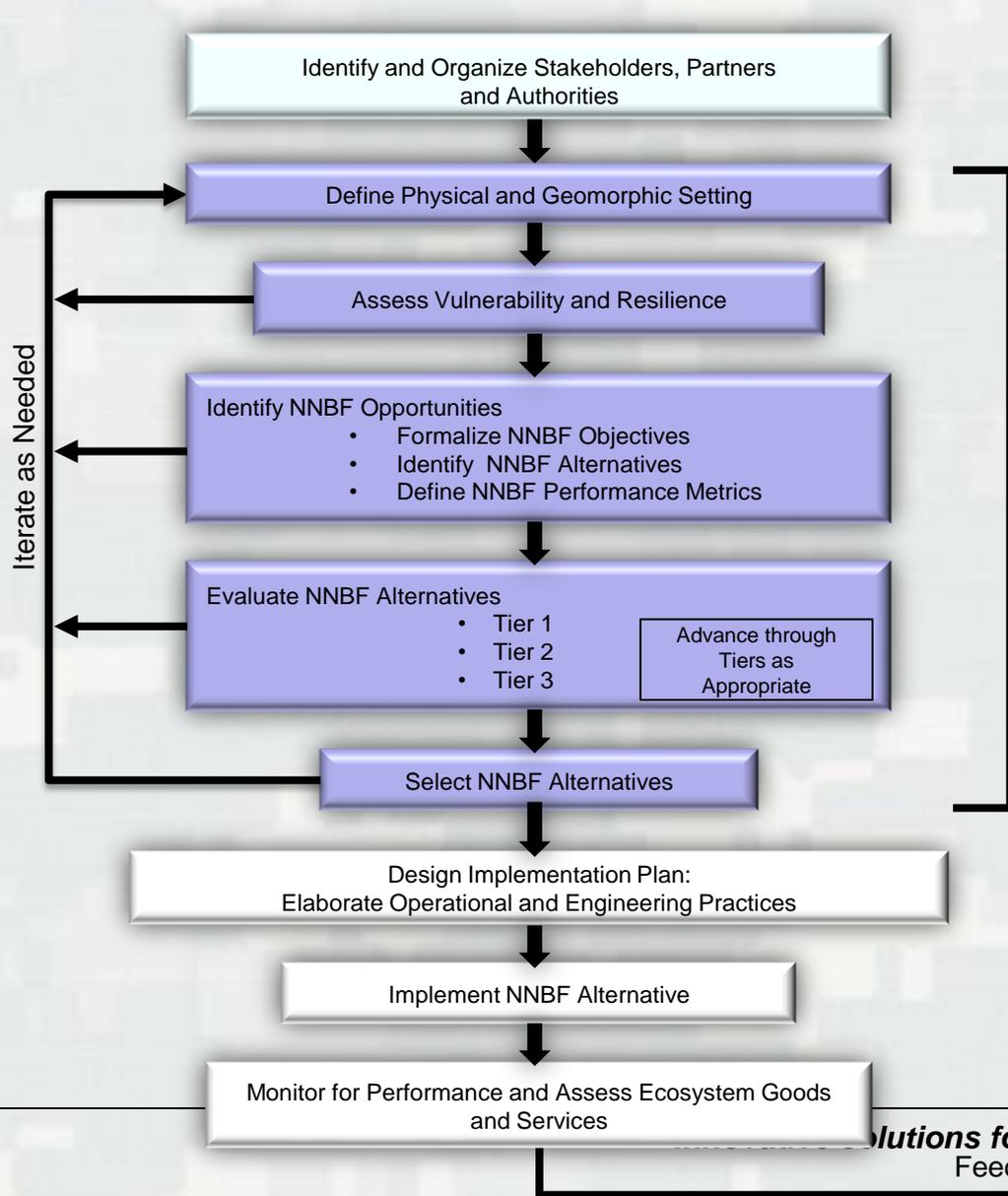


# Natural and Nature-Based Features Evaluation and Implementation Framework

ORGANIZATIONAL ALIGNMENT

EVALUATION

IMPLEMENTATION



BUILDING STRONG®

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*Solutions for a safer, better world*  
Feedback

# Collaboration with USFWS on EWN and Endangered Species Act

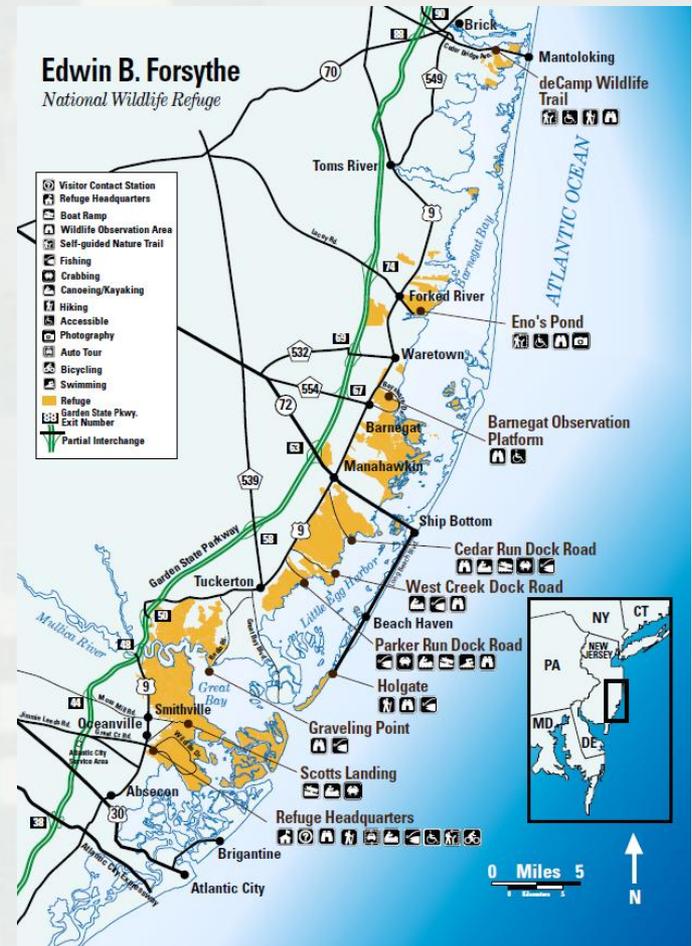
- USACE spends \$300M per year on ESA compliance
- Combining ESA 7(a)(1) authority with EWN presents opportunity to reduce time and cost, while increasing benefits for species conservation



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# 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



# 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



# USACE Galveston and Buffalo Districts: EWN “Proving Grounds”



- October and December 2014
- ~70 participants
- SWG, SWD, LRB ERDC, IWR and HQ
- Identified opportunities to implement EWN within current and future projects



# Publications and Recognition

**A Design Manual:  
Engineering  
With Nature  
Using  
Native Plant  
Communities**

Author: Dr. Pamela U.S. Army  
Sponsored by Engineers U.S. Army

**wetland science & practice**  
Published by the Society of Wetland Scientists  
Vol. 32, No. 1 March 2015

**"ENGINEERING WITH NATURE" PROMOTES TRIPLE-WIN OUTCOMES**

Y.S. BRIDGES, J. LILLYCROP, J.R. WILSON, T.J. FREDETTE, B. SUDELL, C.J.

**ABSTRACT**

The US Army Corps of Engineers "Engineering With Nature" (EWN) initiative supports sustainable development of infrastructure by advancing technical and communication practices in order to intentionally align natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes. The tools and projects that have been developed through EWN support planning, engineering, and operational practices that beneficially integrate engineering and natural systems to produce more socially acceptable, economically viable, and environmentally sustainable projects.

**INTRODUCTION**

Pursuing the objective of sustainable development of navigation infrastructure poses both challenges and opportunities for the US Army Corps of Engineers (USACE). Advancing best practices will involve identifying the practical actions that can be taken to better align and integrate engineering and natural systems to produce more socially acceptable, economically viable, and environmentally sustainable projects.

The EWN initiative's focus on developing practical methods provides an achievable path toward an ecosystem approach to navigation infrastructure development. By combining sound science and engineering with advanced communication practices, the EWN initiative is providing a robust foundation for collaborative project development. Engineering With Nature is being pursued through innovative research, field demonstrations, communicating lessons learned, and active engagement with field practitioners across a wide range of organizations. The objectives of EWN are consistent with those communicated in the

**Technical Articles**

Dedicated to the USA, Host Country of PIANC's AGA 2014 and the 33<sup>rd</sup> PIANC World Congress

**ERDC environmental research supports USACE civil**

By Dr. Beth Fleming, Director, Environmental Laboratory, U.S. Army Engineer Research and Development Center

As the U.S. Army Engineer Research and Development Center (ERDC) Environmental Laboratory (EL) is responsible for the placement of approximately 220 million cubic yards of dredged material in an annual cost of more than \$7.5 billion, EL is introducing an LCA approach into the dredged material management process as a way to understand and consistently compare alternatives by quantifying economic, human health, and resource consumption.

ERDC scientists, experts in environmental research and risk and decision analysis in close with the Army and Department of Defense. We are committed to sharing the application of these capabilities in a relevant way and demystifying the environmental impact, risk, benefits and sustainability of new technologies and materials in all of our work initiatives. These such initiatives are the focus of this column. Environmental Life Cycle Assessment - an early initiative that will provide a comprehensive view of the environmental impacts from the development, production, use and disposal of Army materials and products. Focus on resilience, and project del... producing more broadly as...

The objectives of EWN are consistent with those communicated in the

**wetland science & practice**

**Wetland Port**

2011 Issue VI

**USACE Promotes Environmental Sustainability**

**PIANC and I**

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**The BUZZ** A Quarterly Newsletter

The BUZZ is a forum for Silver Jackets honor awardees, opportunities and resources.

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For more information, contact the Environmental Laboratory (EL) at the U.S. Army Engineer Research and Development Center (ERDC) at Fort Belvoir, IL. Email: [el@erdc.usace.army.mil](mailto:el@erdc.usace.army.mil)

SOCIETY OF AMERICAN MILITARY ENGINEERS - JANUARY-FEBRUARY 2014 - VOL. 106 - NUMBER 007

**TME**  
The Military Engineer

Maj. Gen John Peabody on the Future of Civil Works Page 44

The Restoration of Fort Ord Page 63

How the Air Force

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**Building Bridges**

**CORPS' MISSION AT HOME AND ABROAD**

July 2015

**The BUZZ** A Quarterly Newsletter

Yamin Seda-Sanabria Appointed Acting Deputy Chief USACE Office of Homeland Security

Ms. Seda-Sanabria holds a bachelor's degree and master's degree in Civil Engineering from the University of Puerto Rico at Mayaguez. She earned a Master of Science degree in Engineering Mechanics from Mississippi State University in 1996. She received the American Society of Civil Engineers' Young Governmental Service Award in 2002 in recognition of her public and professional service achievements. In 2002, she received the Women of Color Government and Defense Award for Technical Innovation in recognition for her efforts leading to the development and implementation of innovative technologies for rapid load capacity assessment of bridges. She has authored more than 30 publications, including peer-reviewed journal and conference papers, invited articles, and technical reports. She is a member of various professional engineering organizations, including the American Society of Civil Engineers, the Association of State Dam Safety Officers, the U.S. Society on Dams, and the Sigma Xi Research Society.

By the needs and requirements of the warfighter and the nation, the USACE is providing innovative solutions for a better world.

**ENVIROPOINT**

**CORPS VS. NATURE**  
Climate change creates

**PRIME POWER**  
Profile of the 249th

**TEAM STEM**  
Outreach from

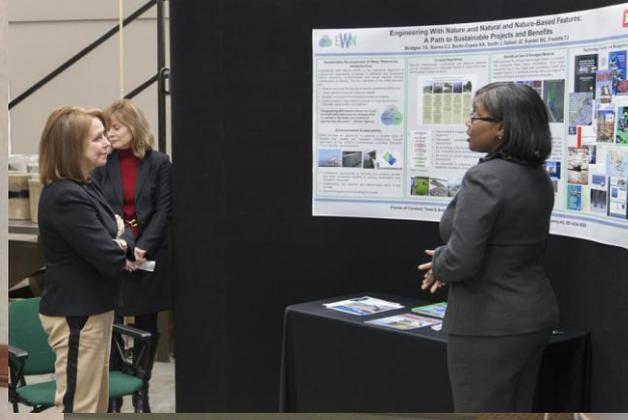
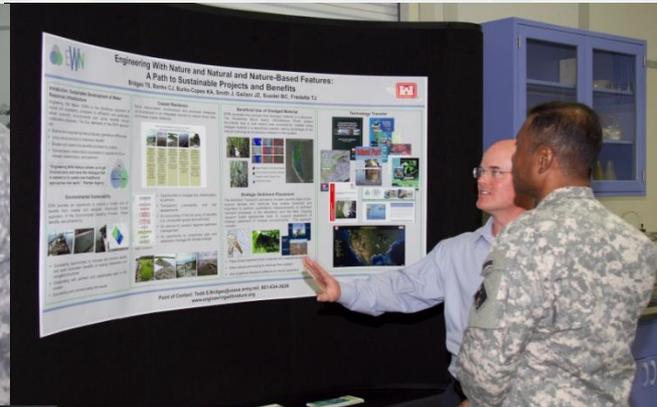
**GREAT GETAWAYS**  
recreation areas

# 2014/2015 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)
- Flood Risk Management and Engineering With Nature Collaborative Meeting; 10-11 June 2014; Vicksburg, MS
- Advancing Cost-Efficient and Effective ESA Compliance & Mission Sustainability through Engineering With Nature and ESA Section 7(a)(1) Conservation Plans: Opportunity Assessment Working Meeting; 3-4 September 2014; Atlanta, GA (partnered with USFWS Southeast Region)
- EWN in Water Operations; 31 March – 1 April 2015; Vicksburg, MS

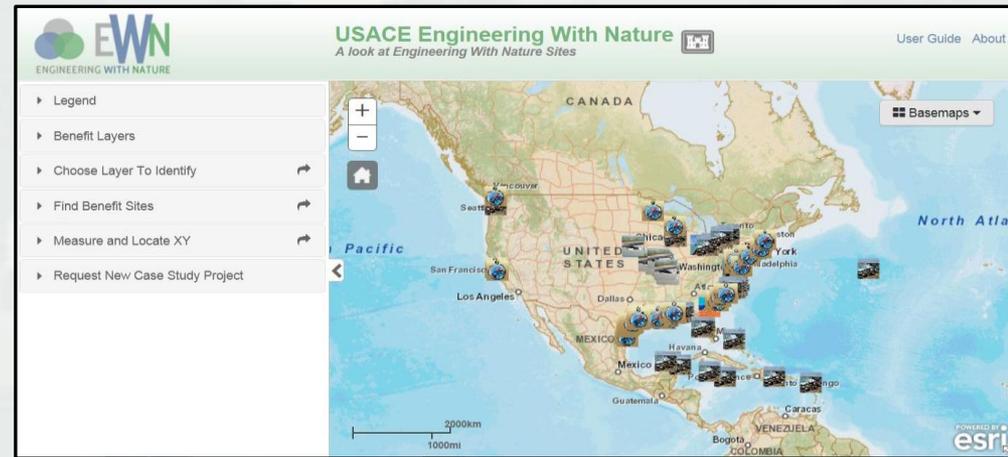


# Past Engagements



# EWN Project Mapping Tool (EWN ProMap)

- Online GIS database of projects illustrating EWN principles and practices
  - ▶ Illustrating the key elements of EWN
- Currently contains ~175 projects
  - ▶ Name
  - ▶ Manager/Owner
  - ▶ Description
  - ▶ Infrastructure association e.g., jetty, breakwater, channel
  - ▶ Benefits e.g., fish habitat, bird habitat, recreation
  - ▶ Links, reports, photos
- Designed to facilitate communication about opportunities, lessons learned, and good practices
- Projects examples can be added through a process of self-nomination and independent evaluation



<http://gis2.sam.usace.army.mil/applications/opj/v013/>

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## WHAT IS ENGINEERING WITH NATURE?

The U.S. Army Corps of Engineers (USACE) Engineering With Nature (EWN) Program enables more sustainable delivery of economic, social, and environmental benefits associated with water resources infrastructure. EWN directly supports USACE's "Sustainable Solutions to America's Water Resources Needs: Civil Works Strategic Plan 2011 - 2015" and contributes to the achievement of its Civil Works Mission and Goals. EWN is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes.

### UPCOMING EVENTS

- 11-15 May** Coastal Sediments 2015  
San Diego, California
- 22-25 June** Western Dredging Association and Texas A&M Dredging Summit and Expo  
Houton, Texas
- 19-22 October** Dredging 2015 Conference  
Savannah, Georgia

### WHAT'S NEW

- [Natural and Nature-Based Features Report Newly Released](#)
- [EWN and Buffalo District Collaborative Meeting December 2014](#)
- [EWN and Galveston District Collaborative Meeting October 2014](#)
- [Regional Sediment Management \(RSM\) and Engineering With Nature \(EWN\) Working Meeting July 2014](#)
- [More What's New](#)

### EWN NEWS



- [Natural and Nature-Based Features Report Newly Released!](#)
- [More EWN News](#)



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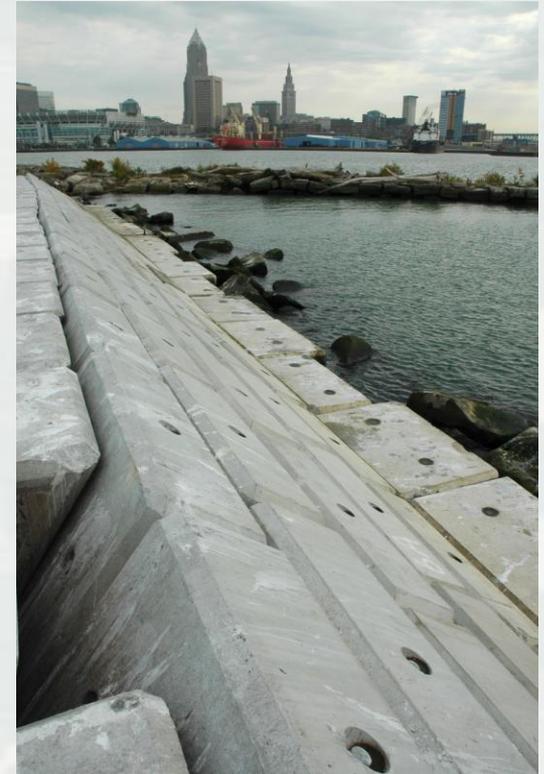


[www.EngineeringWithNature.org](http://www.EngineeringWithNature.org)  
<http://el.erd.c.usace.army.mil/ewn>

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# Creating Value for the Nation

- Value arguments resonate
  - ▶ Must take assertive control of the dialogue
- Correcting the hyper-focus on risk is achieved by giving more attention to compensating benefits
  - ▶ ...Not by giving more attention to risk
- There are potentially valuable allies in “unlikely” places
- Our projects produce multiple benefit streams, but you have to claim them!



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# Direct Technical Support



- A response can...
  - ▶ be initiated by submitting a request through the DOTS Tracking System <http://el.erd.c.usace.army.mil/dots>
  - ▶ consist of up to 2 weeks of scientist or engineer time & travel expenses.
  - ▶ range from a phone call “one stop”, to a technology demo, to a site visit.
  - ▶ result in products such as a technical documents or reviews.
  - ▶ Technical response statistics
    - FY14 - 54
    - FY15 - 39

