

# Engineering With Nature



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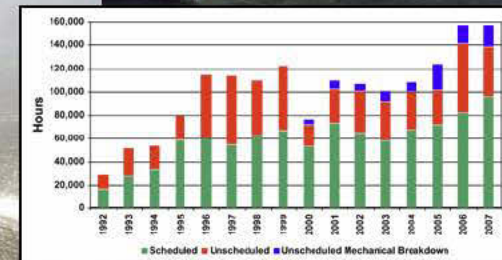
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Engineer Research and Development  
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October 24<sup>th</sup>, 2012



US Army Corps of Engineers  
**BUILDING STRONG**





Engineering With Nature (EWN) is a U.S. Army Corps of Engineers (USACE) initiative to intentionally align natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.



# Some Responsibilities of USACE

- 200 million cubic yards (mcy) of material dredged every year by USACE
  - 50 mcy gets placed in ocean sites
  - Other material placed in upland sites, beaches, as well as used for wetland and marsh creation
- Creates and maintains coastal protection structures





# Civil Works in USACE

- Navigation
- Flood and Coastal Storm Damage Reduction
- Environment
- Hydropower
- Regulatory
- Recreation
- Emergency Management
- Water Supply
- Support for Others



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- Use science and engineering to produce operational efficiencies.



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- Use science and engineering to produce operational efficiencies.
- Use natural processes to maximum benefit.
- Broaden and extend the base of benefits provided by projects.
- Use science-based collaborative processes to organize and focus interests, stakeholders, and partners.





# **Examples of** ***Engineering With*** ***Nature***

# ***Upper Missouri River Sandbar Habitat***

- \$25 Million to construct 650 acres of sandbar
- In 2011 flood, these 650 acres were buried under 16,000 acres of sandbars

July 2009

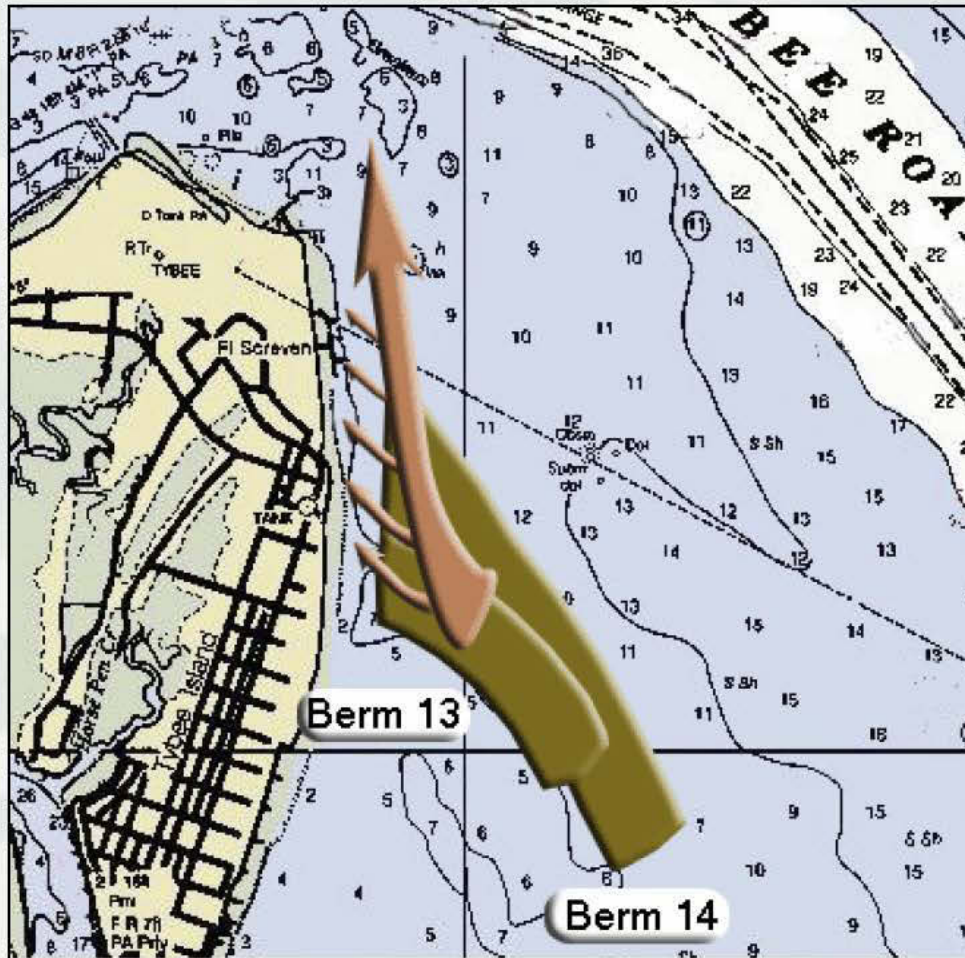


November 2011

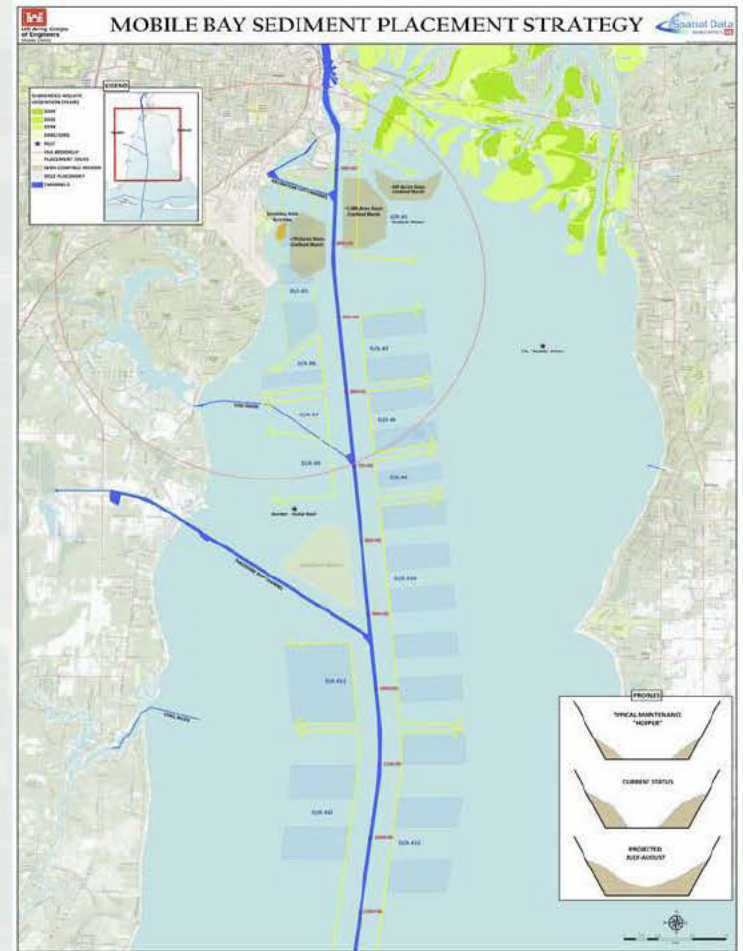




## Strategic Sediment Placement

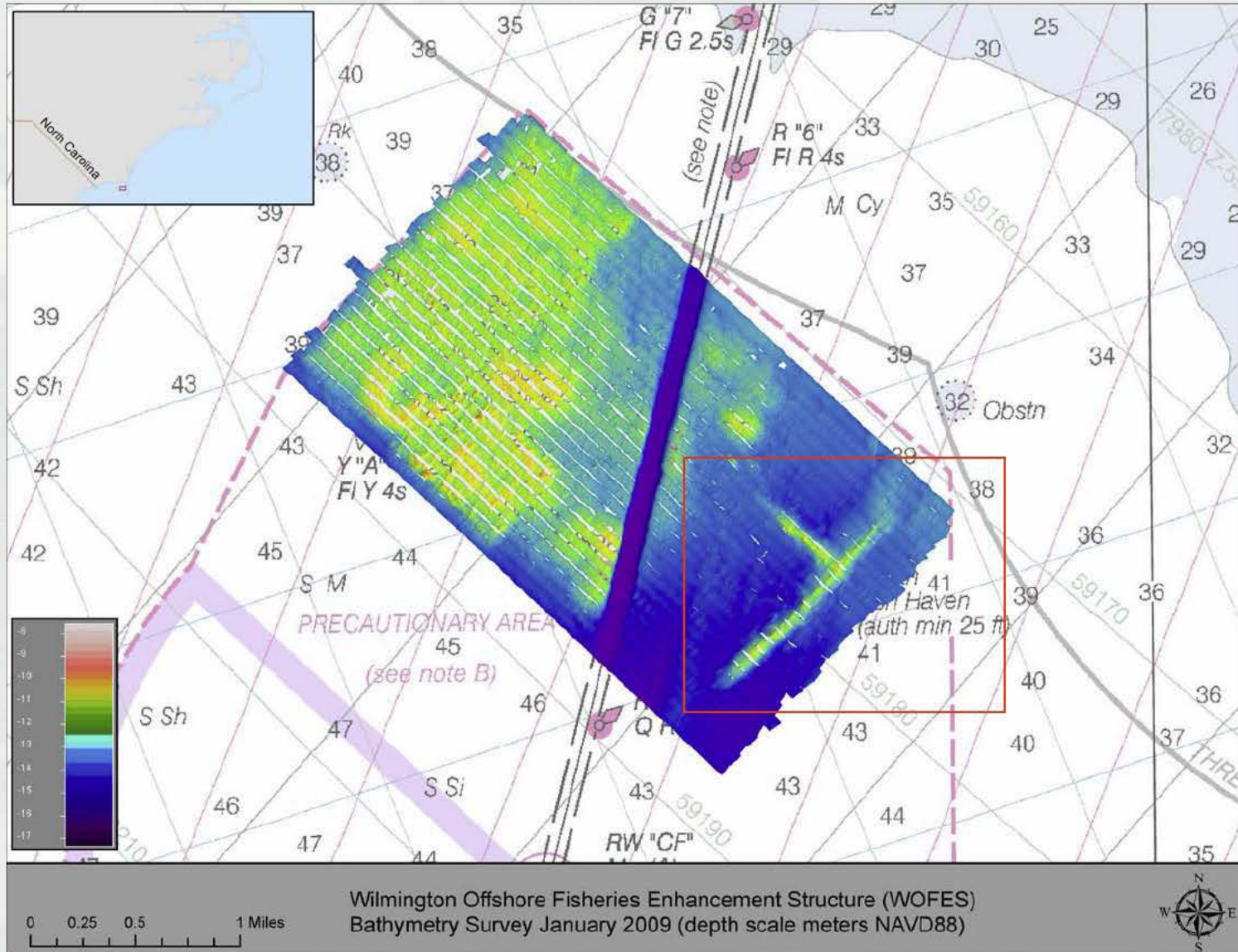


# North Tybee Island Savannah, Georgia



## Mobile Bay Thin-Layer Placement

# Wilmington Offshore Fisheries Enhancement Structure





# ***Poplar Island, MD***



**1996 Aerial Photo**

# ***Poplar Island, MD***



**2008 Aerial Photo**



# ***Deer Island Restoration Plan Overview***



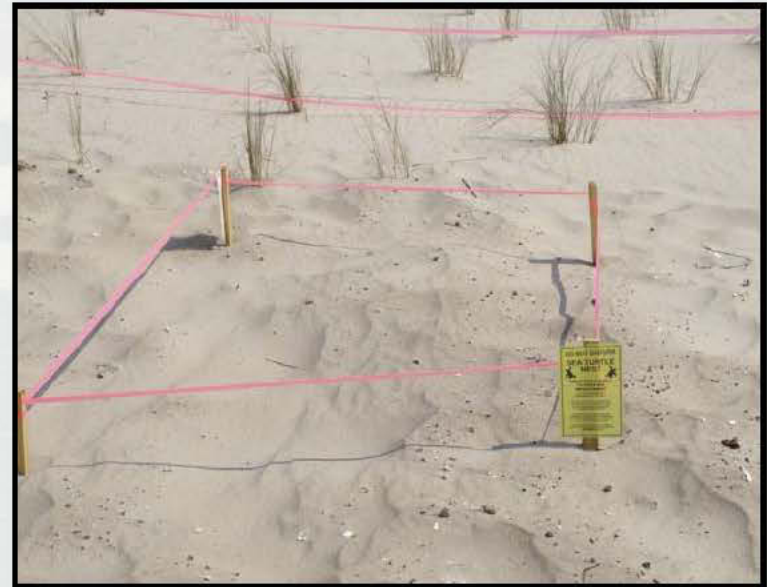
# ***Deer Island Restoration Plan Overview***



20 Nov 10



# ***Deer Island Restoration Plan Overview***



# ***Deer Island Restoration Plan Overview***





# ***Notable Galveston District Beneficial Use Projects***



**Houston Navigation Channel –  
marsh restoration at Atkinson Island**



**Texas City Channel – 1,000  
acres of marsh in Lower  
Galveston Bay**



**Sabine-Neches Waterway–  
Bessie Heights Marsh**



**GIWW– Aransas National Wildlife  
Refuge – 1,600 acres of marsh**



**Brazos Island Harbor – 3,000 feet of  
beach nourishment at South Padre  
Island**



**Port Mansfield Channel – 3 acres  
beach nourishment**



**Chocolate Bayou – marsh creation**



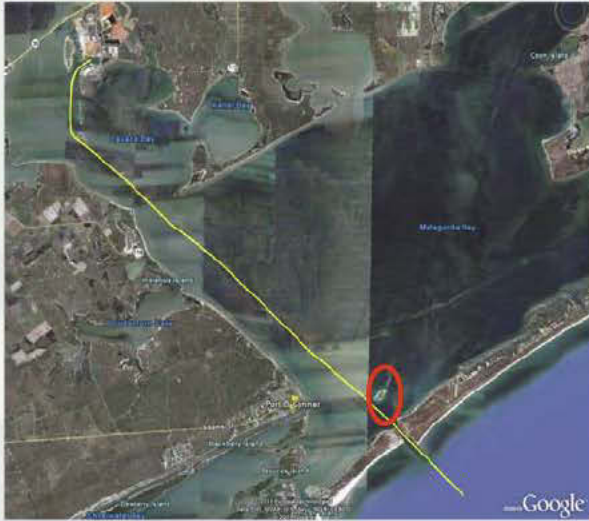
**Houston Ship Channel – Evia Island –  
6 acre bird nesting habitat**



**Houston Ship Channel– Bolivar  
Marsh creation/channelization**



# ***Chester and Evia Island Bird Sanctuaries***



# ***Texas City Channel***



727.520.8181  
[www.aerophoto.com](http://www.aerophoto.com)

**Texas City Channel**

Image # 110524 6037  
Date 05.24.11

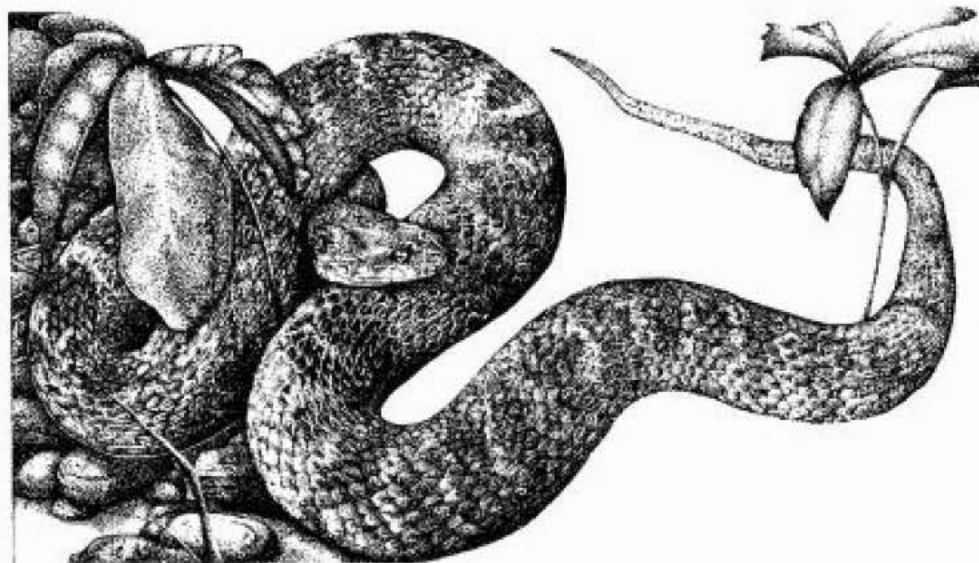
**Marsh Creation from Dredged Material**



U.S. Fish & Wildlife Service

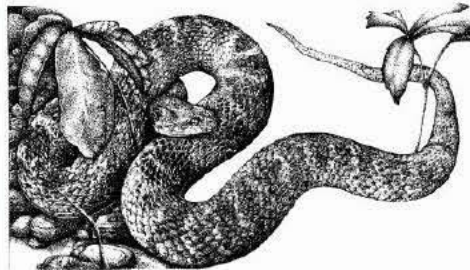
# Lake Erie Watersnake Recovery Plan

*(Nerodia sipedon insularum)*



September 2003

Lake Erie Watersnake  
Recovery Plan  
(*Nerodia sipedon insularum*)



September 2003

The ODNR, in consultation with the Ohio Environmental Protection Agency (OEPA) and USFWS, published Coastal Guidance Sheet No.9, entitled, "Shore Structures and the Lake Erie Watersnake" (Appendix C). This document briefly describes the life history and habitat of the snake, and types of shoreline projects that can be designed to benefit the Lake Erie Watersnake. Since the snake was listed under the ESA, the most common type of projects that the USFWS reviews on the islands are private docks. The conservation of Lake Erie Watersnakes can be aided by incorporating rock-oriented designs into shoreline developments and associated erosion control structures. Research indicates that Lake Erie Watersnakes will use rock-filled timber or steel crib docks for summer basking and resting habitat, while sheet steel docks provide no habitat for the snake. In addition, erosion protection such as riprap provides some summer habitat for the snake, while sheet steel or poured concrete erosion protection does not provide habitat for the snake. The guidance sheet provides recommendations to use "snake-friendly" designs to benefit both the landowner and the snake. Such measures have already been adopted by many construction projects on the U.S. islands. By designing these projects in snake-friendly





# Public Notice

Applicant:  
Predevelopment, Ltd.

Date:  
Published: December 8, 2005  
Expires: January 6, 2006

U.S. Army Corps  
of Engineers

In Reply Refer To:

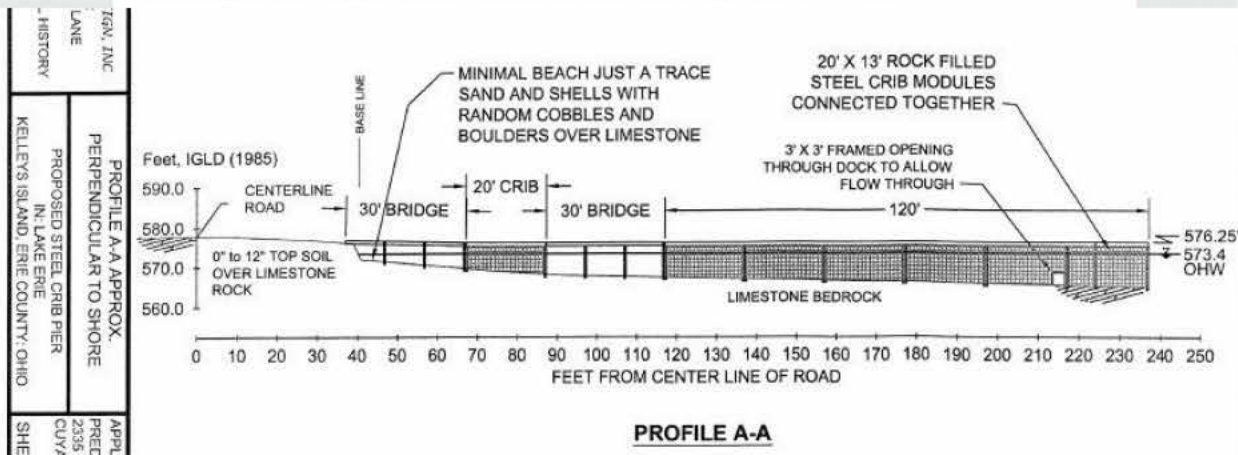
Buffalo District CELRB-TD-R RE: 2003-01621(1) Section: OH 10 and 404

Application for Permit under Authority of  
Section 10 of the Rivers and Harbors Act of 1899 and  
Section 404 of the Clean Water Act (33 U.S.C. 1344).

Predevelopment, Ltd., 2235 Second Street, Suite A, Cuyahoga Falls, Ohio, 44221, has requested a Department of the Army permit to construct a private rock-filled steel crib dock/pier and one stone jetty and install three floating docks in Lake Erie, located on the northwest side of Monagan Road, Kelleys Island, Erie County, Ohio.

The project consists of the following:

1. The construction of a "J" shaped rock filled steel crib dock/pier, with a 10-foot wide by 200 foot long leg containing two 30-foot long bridges, one at the shore attachment and one waterward of a 20-foot crib dock/pier section. Perpendicular to and west of the north end of this dock will be a 10-foot wide by 186-foot long steel crib dock/pier section. Perpendicular to the west end of this dock and running south will be a 10-foot wide by 40-foot long steel crib dock/pier section. This project was designed to provide habitat for the Lake Erie watersnake (*Nerodia sipedon insularum*) and to maintain water flow along the shoreline.
2. The installation of three 6-foot wide by 24-foot long floating docks on the south side of the 186-foot long dock/pier.



# Current Activities

- Field workshops to enlist practical experiences and to stimulate new solutions
- Development of a GIS database of projects demonstrating EWN attributes
  - ▶ Sharing experiences, lessons and practices
- Communications
  - ▶ Engagement with multiple technical communities
  - ▶ Structured dialogue sessions within USACE and with external stakeholders and partners to identify opportunities and gaps
- Identification and pursuit research to advance EWN
- Strategic plan development and communication plan implementation