





# EWN in Action: Application of Vegetation and Natural Materials

Tosin Sekoni, Ph.D., Research Ecologist Brian Durham, Biologist

ASBPA Conference, October 31-November 2, 2018











US Army Corps of Engineers

#### Primer



Revetments along Bubblegum Beach, Rehoboth Beach, Sussex County, DE.

US Army Corps of Engineers • Engineer Research and Development Center

UNCLASSIFIED

Problem

- Limited guidance on the use of native plant species in DMPAs and USACE projects.
- Minimal application of native plant communities in USACE projects.



US Army Corps of Engineers • Engineer Research and Development Center



Oyster reef community along the Delaware Bay shoreline in Rehoboth Beach, DE.

- Capability Statement
  - This project is capable of adding ecological resilience to infrastructures while achieving engineering objectives.
- Value Statement
  - Providing resilient and cost effective solutions, that serve ecological and engineering functions to the nation.

US Army Corps of Engineers • Engineer Research and Development Center



#### **Galveston District Project Site**





US Army Corps of Engineers • Engineer Research and Development Center





UNCLASSIFIED

#### **Galveston District EWN Demo Workshop**

UNCLASSIFIED



#### • Objective

- Provide <u>guidance</u> on plant community and ecosystem development.
- <u>Demonstrate</u> the use of vegetation and natural features to support engineering objectives.
- Provide EWN <u>information</u> to USACE engineers and scientists with emphasis on <u>vegetation and NNBF</u>.

#### **Conceptual and Actual Designs**

#### BENEFICIAL USE SITE 4A CROSS SECTION PROFILE



US Army Corps of Engineers • Engineer Research and Development Center

		A1. Ilex va A2. Erythi A3. Morel A4. Lyciuu B1. Sparti B1. Sparti B2. Distch B3. Schoe A4. Lyciuu	SPECIE omitoria (Ya ina herbaci la cerifera ( m carolinan SPECIES na patens (S PECIES B al na patens (S illis piscata noplectus i m carolinan	<u>SA</u> upon Holly) ea (Coral Bea Nax Myrtle) <i>um</i> (Caronlina <u>SB</u> saltMeadow C (Saltgrass) <i>naritimus</i> (sa <i>um</i> (Caronlina	n) desert-thorn) ordgrass) ordgrass) Itmarsh Bulrush) desert-thorn)				ZC	DNE 2	Interior DMPA	Cho
A1 A1 A3 A3	A1 A1 A3 A2	A2 A2 A4	A2	B1 B1 B1 A4 A4 A4 A4	A4 A4	A4 A4	<ul> <li>B2</li> <li>B</li></ul>	<ul> <li>B2</li> <li>B</li></ul>	<ul> <li>B2</li> <li>B</li></ul>			86



# Galveston District EWN Demo Workshop



US Army Corps of Engineers • Engineer Research and Development Center

#### Pre-site planting

#### Day 01 planting

UNCLASSIFIED

#### Day 365 planting



US Army Corps of Engineers • Engineer Research and Development Center

#### **Philadelphia District Project Site**



US Army Corps of Engineers • Engineer Research and Development Center





US Army Corps of Engineers • Engineer Research and Development Center

# Philadelphia District EWN Demo Workshop



Severe escarpment on beach front



Beach front after grading













US Army Corps of Engineers • Engineer Research and Development Center

#### **Philadelphia District Workshop**



**Classroom Portion** 



Workshop Participants Planting

US Army Corps of Engineers • Engineer Research and Development Center







US Army Corps of Engineers • Engineer Research and Development Center

## **Philadelphia District**

UNCLASSIFIED



US Army Corps of Engineers • Engineer Research and Development Center

=

(a

## **Website**



October 2018 Baltimore District strives to restore Chesapeake Bay island, marshes (PDF) October 2018 Engineering With Nature, An Atlas will be released October 2018 (PDF) September 19-21, 2018 Fifth, In-person Technical Meeting of International Working Group Developing Guidelines for Use of Natural and Nature-Based Features (internal link) September 20, 2018

Experts from around the world joined at the University of California Santa Cruz for the NNBF Symposium. (internal link)

#### What is Engineering With Nature?

The Nature Conservancy's reef balls, Coffee Island, Portersville Bay, AL

 $\equiv$ 

@

The U.S. Army Corps of Engineers (USACE) Engineering With Nature (EWN) Initiative enables more sustainable delivery of economic, social, and environmental benefits associated with water resources infrastructure. EWN is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes. EWN is a cross-cutting program of activities resulting from collaborations among multiple Civil Works Research, Development and Technology programs and non-USACE partners.







#### Incorporating Vegetation into Engineering Projects

The use of vegetation, plant communities, and ecosystems are important in engineering projects. Plants are keystone species which acclimate, adapt, thrive, and mitigate environmental effects especially in the face of climate change and sea level rise. They are resilient and self-propagating, providing additional reinforcement and stability resulting in cost savings, ecosystem creation, wave attenuation, sediment accretion, and other ecological, economic, and engineering benefits.



https://ewn.el.erdc.dren.mil/developmentofvegetation.html



\$

rticipants plant vegetation during an EWN workshop in Rehoboth Beach, DE. Photo by Barbara Conlin.

op participants plant vegetation during an EWN worksho in Rehoboth Beach, DE, Photo by Barbara Conlin,

Our goal is to assist practitioners (managers, engineers, scientists, architects, builders, land owners, etc.) incorporate desirable native vegetation into engineering projects, through customized design at various stages throughout the lifespan of a project. We apply functional designs into engineering project from planning, design, operation, maintenance, and post-operational phases. In addition we utilize real life projects to demonstrate the use of natural features in engineering and construction projects across many ecosystems (wetlands, dunes, beaches, uplands, riparian, etc.).

**Application in Dredge Material Placement Areas** 

#### www.engineeringwithnature.org

US Army Corps of Engineers • Engineer Research and Development Center

# Conclusion

**UNCLASSIFIED** 

• Workshops are tools to Educate



US Fish and Wildlife Service (Delaware Bay Estuary Program) staff planting <u>Panicum amarum</u> to stabilize dunes as part of EWN demo workshop in Rehoboth Beach, Sussex County, DE.



Source: Living Shorelines in New England: State of the Practice, 2017 Report



Galveston District landscape architect planting <u>Spartina</u> <u>alterniflora</u> on placement area dike during EWN demo workshop in BUS 4A, Brazoria County, TX.

US Army Corps of Engineers • Engineer Research and Development Center

# **Eco-Genesis Team**

UNCLASSIFIED

- Project Team and Roles
  - Tosin Sekoni, Research Ecologist, Lead
  - Brian Durham, Landscape Architecture Skillset
  - Jacob Berkowitz, Soil Scientist
  - Kevin Philley, Botanist
  - Matthew Balazik, Coastal Ecologist
  - Susan Bailey, Engineer
  - Darrell Evans, Biologist





Workshop participants plant <u>Spartina alterniflora</u> at Bubblegum Beach, DE.

- Collaboration with other organizations
  - Feds: NOAA, USDA, and USFWS.
  - USACE Districts: SWG, NAP, and LRB.
  - State: TXGLO, TPWD, and DENREC.
  - Academia/Others: TAMU, USC, and POHA.

US Army Corps of Engineers • Engineer Research and Development Center