Engineering With Nature®

EWN in Action: Application of Vegetation and Natural Materials

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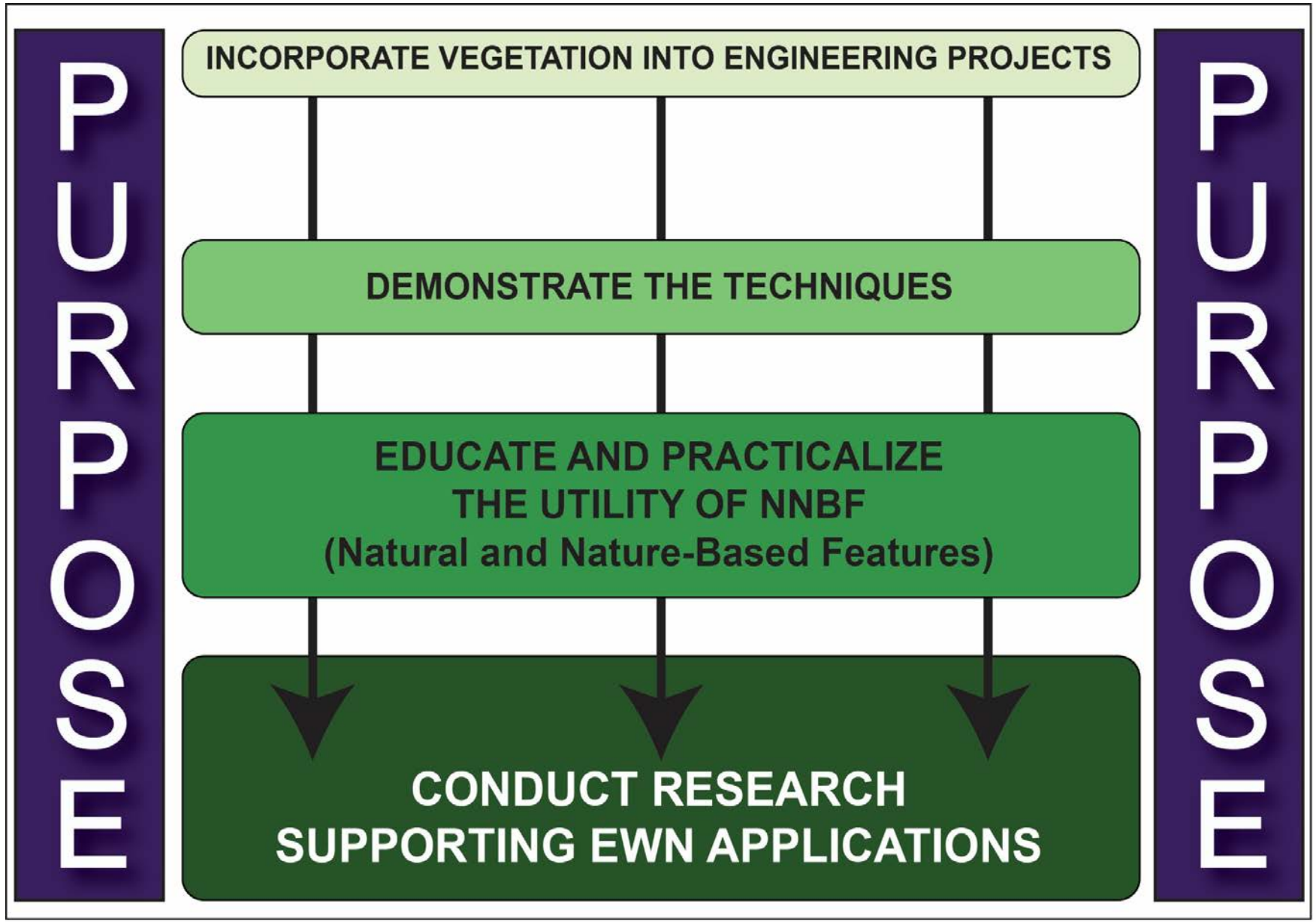
Brian Durham, Biologist

ASBPA Conference, October 31-November 2, 2018

Primer

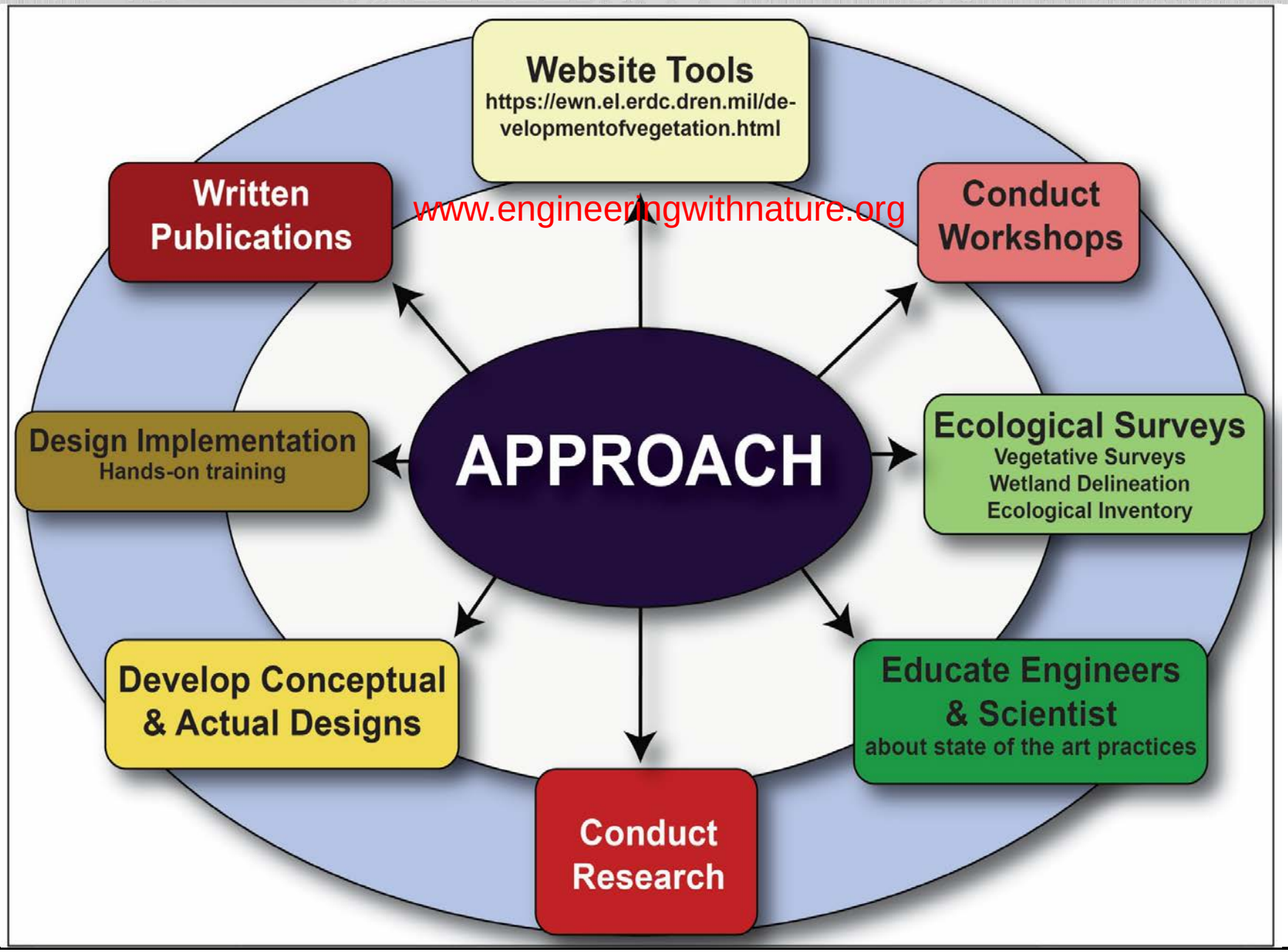
Revetments along Bubblegum Beach, Rehoboth Beach, Sussex County, DE.

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


PURPOSE
INCORPORATE VEGETATION INTO ENGINEERING PROJECTS
DEMONSTRATE THE TECHNIQUES
EDUCATE AND PRACTICALIZE
THE UTILITY OF NNBF
(Natural and Nature-Based Features)
CONDUCT RESEARCH
SUPPORTING EWN APPLICATIONS
PURPOSE

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.


Website Tools
https://ewn.el.erdc.dren.mil/de-
velopmentofvegetation.html
Written Publications
www.engineeringwithnature.org
Conduct Workshops
Design Implementation
Hands-on training
APPROACH
Ecological Surveys
Vegetative Surveys
Wetland Delineation
Ecological Inventory
Develop Conceptual & Actual Designs
Educate Engineers & Scientist
about state of the art practices
Conduct Research

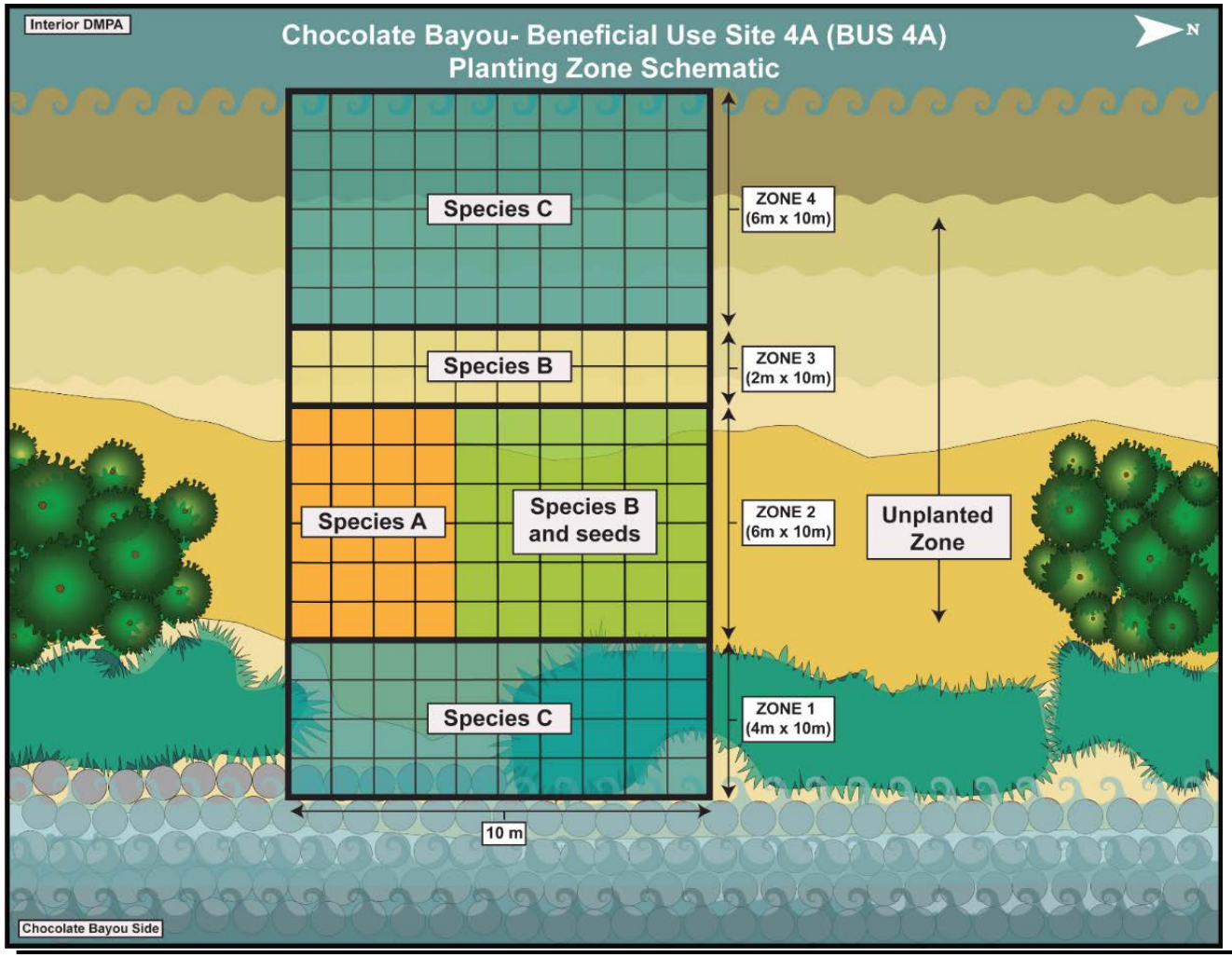
Galveston District Project Site

Lat. 29.203878 Long. 95.175255

Galveston District EWN Demo Workshop

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

Conceptual and Actual Designs

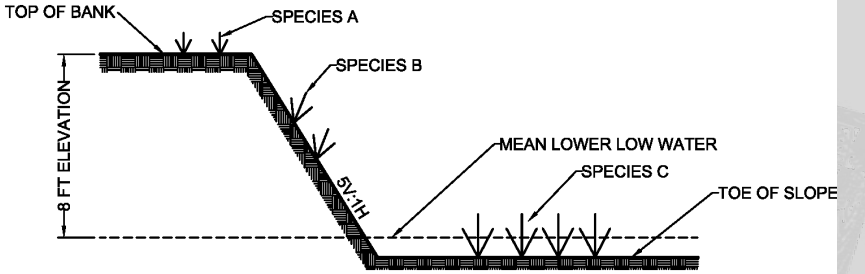


BENEFICIAL USE SITE 4A
CROSS SECTION PROFILE

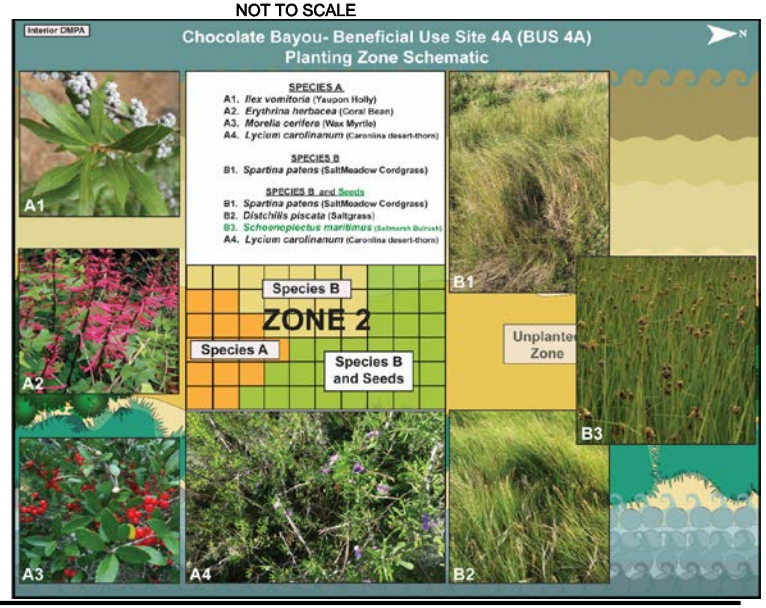
SPECIES A
FORESTICA ACUMINATE
ERYTHRINA HERBACEA
MORELLA CERIFERA
ILEX VOMITORIA

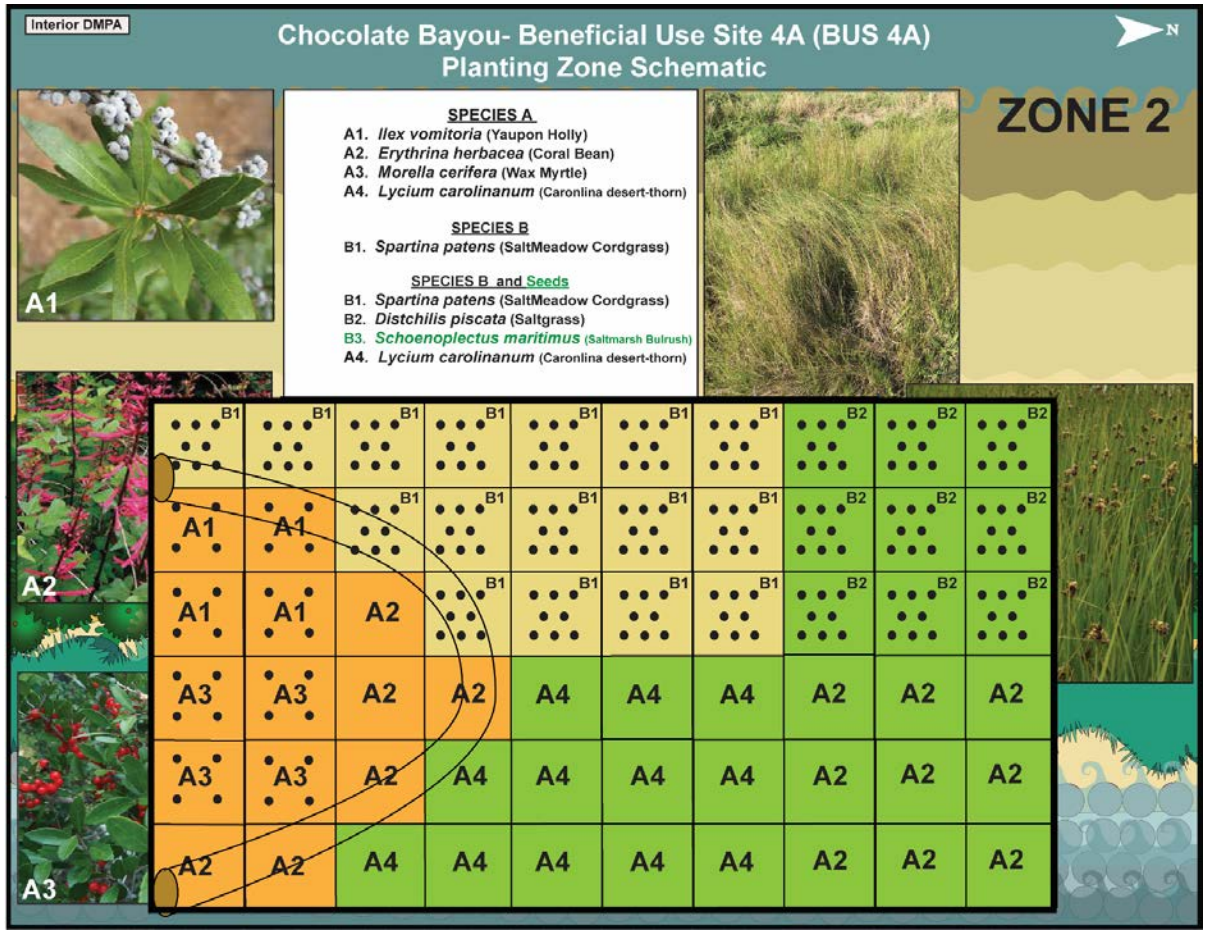
SPECIES B
SPARTINA PATHENS
SCHOENOPLECTUS MARITIMUS
DISTICHILIS PISCATA
LYCIUM CAROLINIANUM

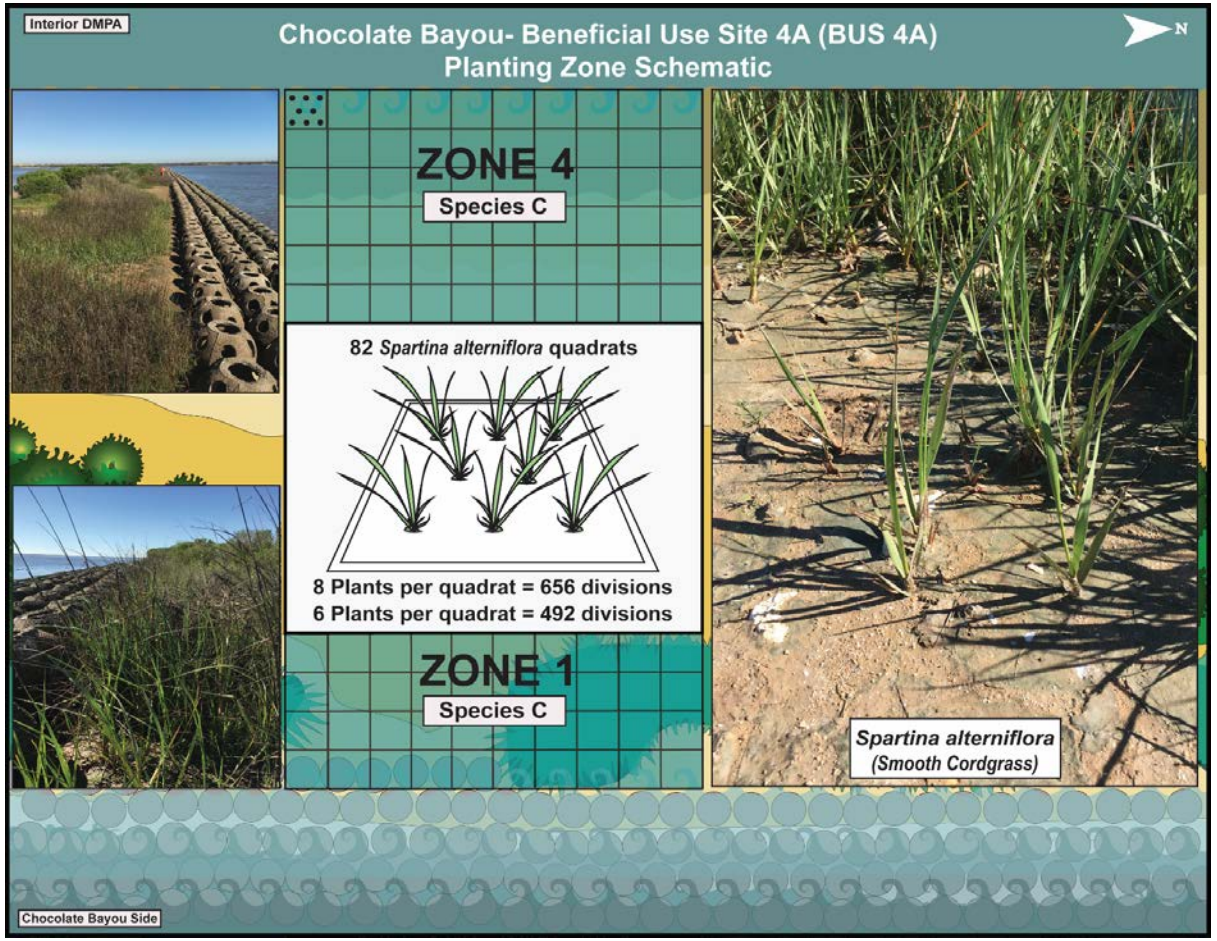
SPECIES C
SPARTINA ALTERNIFLORA
PASPALUM VIRGINIATUM
SPOROBOLUS VIRGINIANUS
IVA FRUTESCENS
BORICHIA FRUTESCENS



GALVESTON BAY
NOT TO SCALE




Interior DMPA
Chocolate Bayou- Beneficial Use Site 4A (BUS 4A)
Planting Zone Schematic
N
ZONE 2
SPECIES A
A1. Ilex vomitoria (Yaupon Holly)
A2. Erythrina herbacea (Coral Bean)
A3. Morella cerifera (Wax Myrtle)
A4. Lycium carolinanum (Caronlina desert-thorn)
SPECIES B
B1. Spartina patens (SaltMeadow Cordgrass)
SPECIES B and Seeds
B1. Spartina patens (SaltMeadow Cordgrass)
B2. Distchilis piscata (Saltgrass)
B3. Schoenoplectus maritimus (Saltmarsh Bulrush)
A4. Lycium carolinanum (Caronlina desert-thorn)
A1
A2
A3


Interior DMPA
Chocolate Bayou- Beneficial Use Site 4A (BUS 4A)
Planting Zone Schematic
N
ZONE 4
Species C
82 Spartina alterniflora quadrats
8 Plants per quadrat = 656 divisions
6 Plants per quadrat = 492 divisions
ZONE 1
Species C
Spartina alterniflora
(Smooth Cordgrass)
Chocolate Bayou Side

Galveston District EWN Demo Workshop

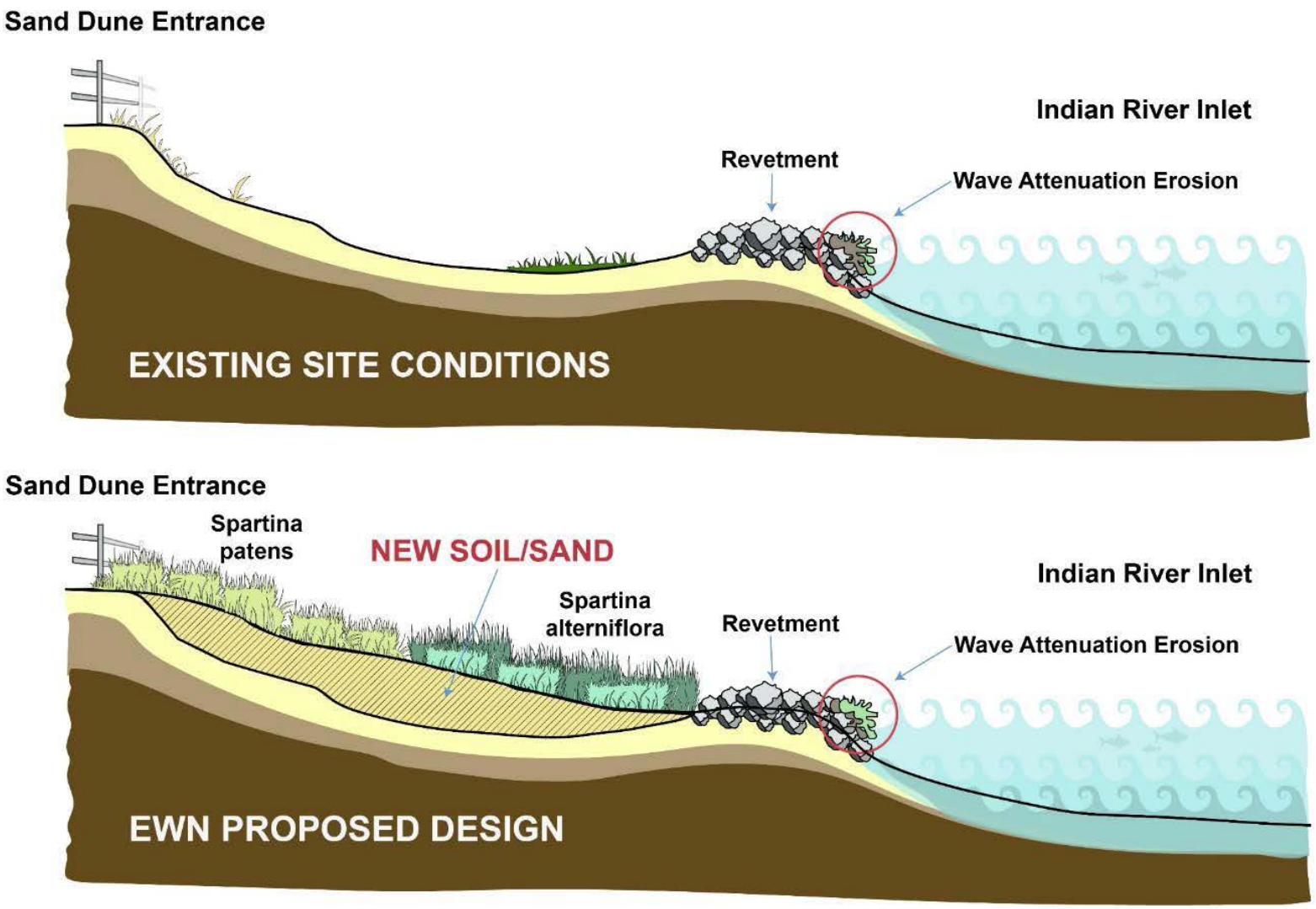
Pre-site planting

Day 01 planting

Day 365 planting

Philadelphia District Project Site

Bubble Gum Beach


Sand Dune Entrance
Indian River Inlet
Revetment
Wave Attenuation Erosion
EXISTING SITE CONDITIONS
Sand Dune Entrance
Spartina patens
NEW SOIL/SAND
Spartina alterniflora
Indian River Inlet
Revetment
Wave Attenuation Erosion
EWN PROPOSED DESIGN

NOT TO SCALE

Philadelphia District EWN Demo Workshop

Severe escarpment on beach front

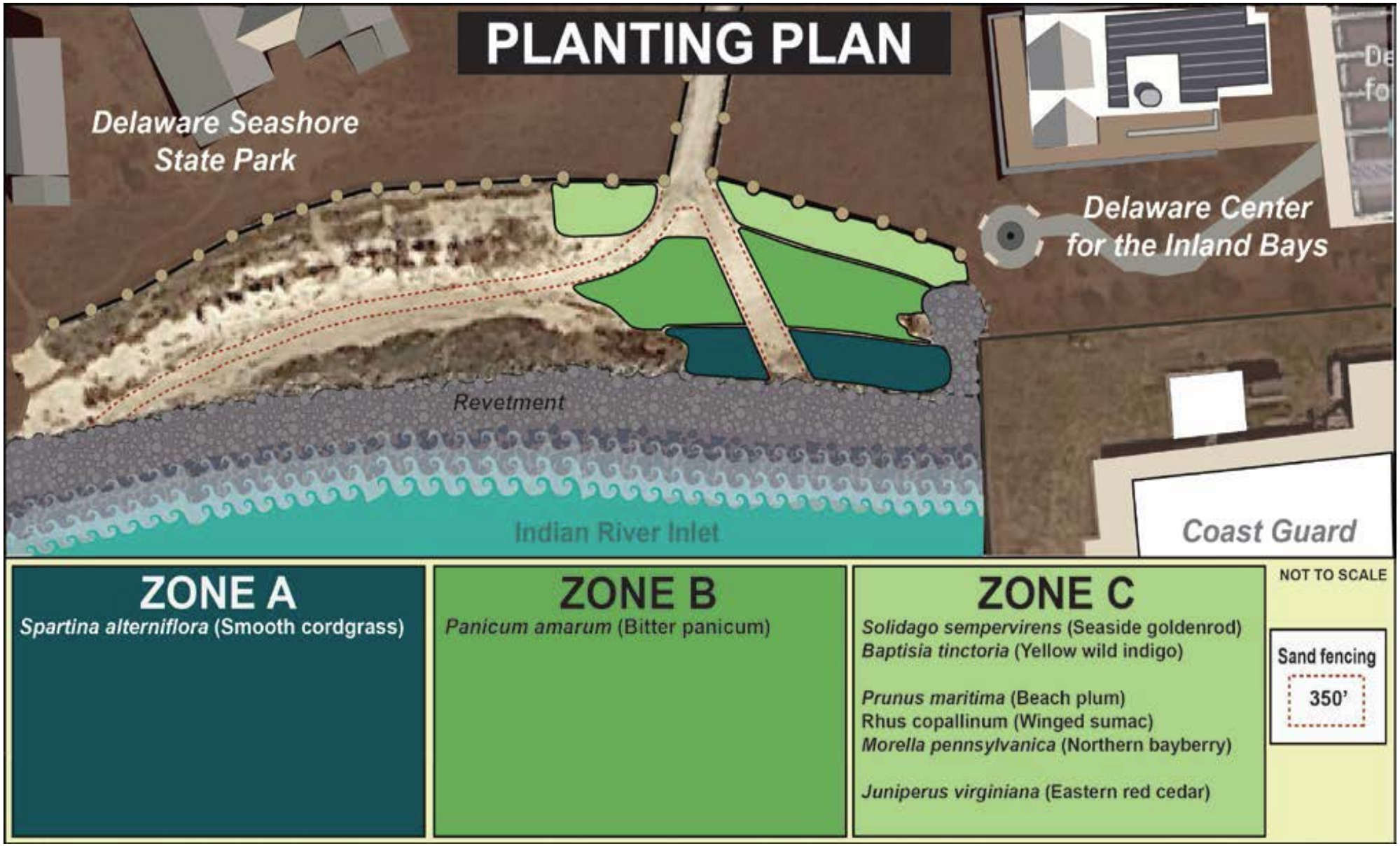
Beach front after grading

Philadelphia District Workshop

Classroom Portion

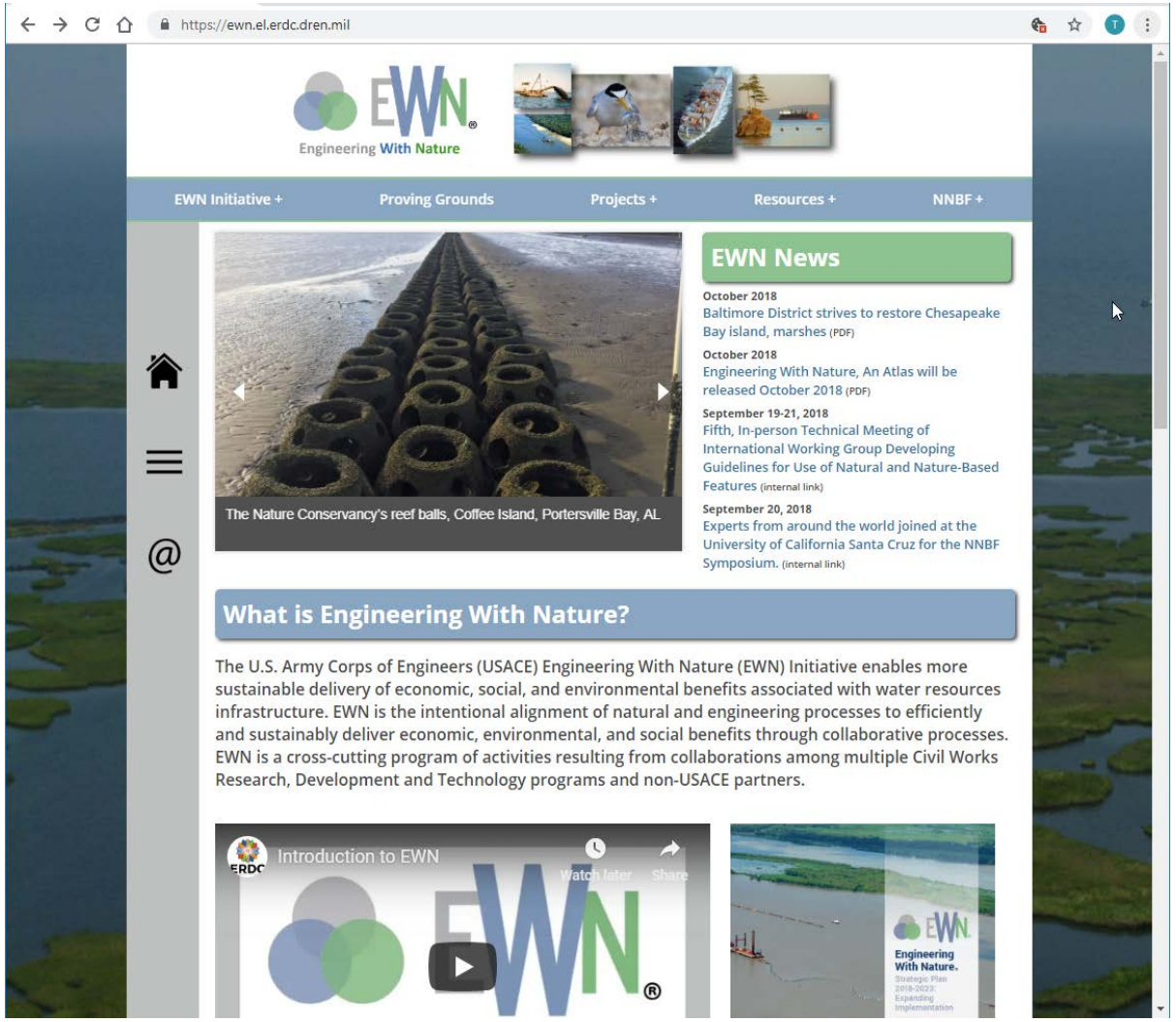
Workshop Participants Planting

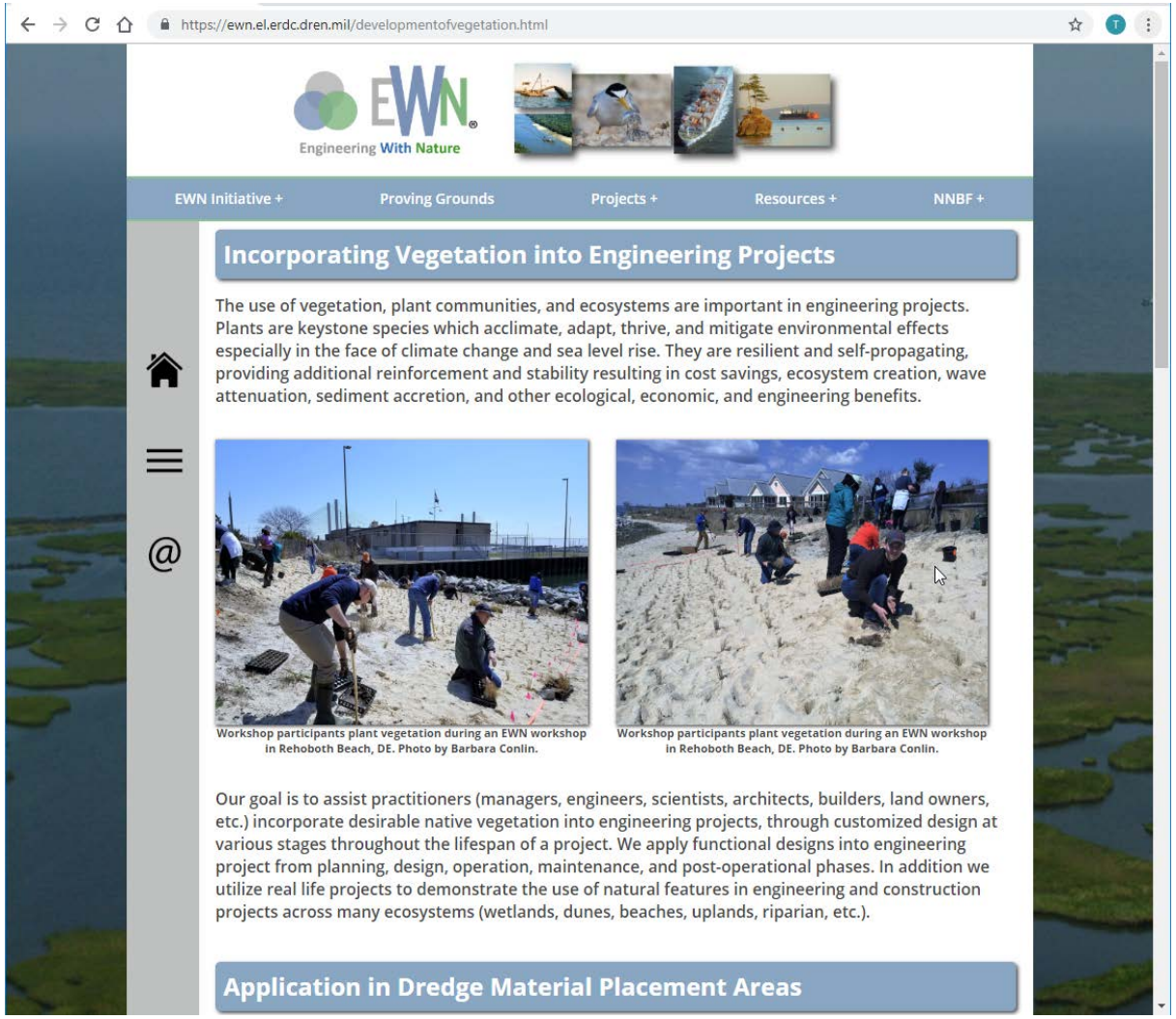
Delaware Seashore State Park
Planting Zones
Legend
C
B
A
Google earth
N
50 ft


PLANTING PLAN
Delaware Seashore State Park
Delaware Center for the Inland Bays
Revetment
Indian River Inlet
Coast Guard
ZONE A
Spartina alterniflora (Smooth cordgrass)
ZONE B
Panicum amarum (Bitter panicum)
ZONE C
Solidago sempervirens (Seaside goldenrod)
Baptisia tinctoria (Yellow wild indigo)
Prunus maritima (Beach plum)
Rhus copallinum (Winged sumac)
Morella pennsylvanica (Northern bayberry)
Juniperus virginiana (Eastern red cedar)
NOT TO SCALE
Sand fencing
350'

Philadelphia District

Website





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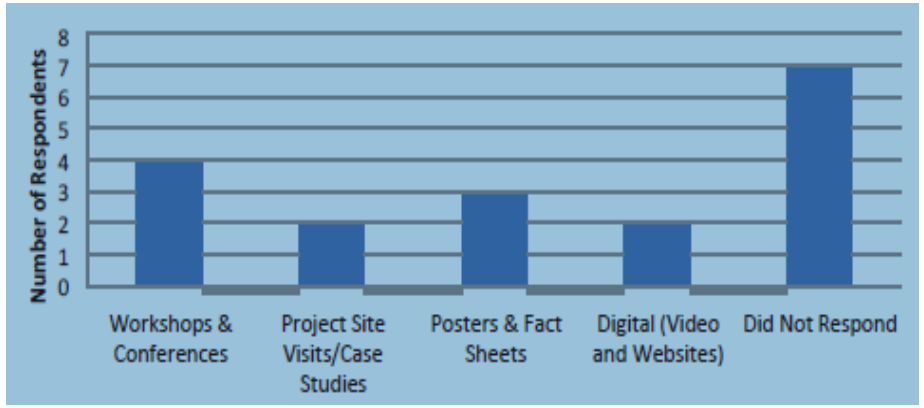
Conclusion

- Workshops are tools to Educate

US Fish and Wildlife Service (Delaware Bay Estuary Program) staff planting *Panicum amarum* 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 *Spartina alterniflora* on placement area dike during EWN demo workshop in BUS 4A, Brazoria County, TX.

Eco-Genesis Team

- 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 *Spartina alterniflora* 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.

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