50 Year Master Plan
Recap Phase 1 Performance
Challenges
- Design Changes on the “Fly”
- To Trawl or not to Trawl
- To Plant or not to Plant
- To Bid or not to Bid
- Sediment Availability
Coming Soon
Q&A
Bogue Banks Master Beach Nourishment Plan

- 50 Year Master Plan - Long Term, Sustainable Management of Beaches
Bogue Banks Master Beach Nourishment Plan - Engineering

- **Level of Protection** – Modeled to Determine Volume Required to Maintain Protection Against 25-yr Storm Event
  - Developed Nourishment Triggers for Each Reach Based On Volume from the Peak of the Dune out to -12 ft NAVD88
  - Ranged from 211 cy/ft to 266 cy/ft Along Bogue Banks

![Diagram showing various beach zones and their elevations](image-url)
Summary of Findings – Profile Volume

Average Profile Volume by Reach Above -12ft NAVD88

Oceanfront Average Minimum Profile Volume to Outer Bar = 233 cy/ft
Bogue Banks Master Beach Nourishment Plan - Engineering

- **Volume Need** – Determined by Statistical Analysis of Historical Volume Changes (Annual Monitoring Program)
  - Background Erosion – 22.6 Mcy
  - Storm Erosion – 27.2 Mcy
  - Sea Level Change – 1.8 Mcy
  \[ 51.6 \text{ Mcy} \]

**NOTE:** Hurricane Florence Measured Loses Above -12 ft NAVD88 Were in Excess of 3,500,000 cy.
Bogue Banks Master Beach Nourishment Plan - Engineering

- Geotechnical Investigation (Alpine & Coastal Tech):
  - Current ODMDS – 6.7 Mcy
  - Old ODMDS – 14.2 Mcy
  - Area Y – 1.5 Mcy
  - Bogue Inlet – 5.1 Mcy
  - Morehead City Harbor – 20.0 Mcy
  - Upland Sources/AIWW – 2.7 Mcy

50.2 Mcy
Bogue Banks Master Beach Nourishment Plan - Permitting

- **USACE 50-Year Permit**
  - Operate Under FWS Statewide Programmatic Biological Opinion
- **USACE Project Specific Permit** (To Be Updated for Each Individual Nourishment Event Upon Event Notification)
- **NCDCM CAMA Major Permit** (To Be Updated for Each Individual Nourishment Event Upon Event Notification)
- **NC DWQ 401 Certification** (Must Apply for New Permit for Each Event)
- **BOEM Lease Authorization** (3 Years for 2,000,000cy)
- **50-Year NMFS Biological Opinion**
Phase 1 Procurement Details

- **Timeline**
  - Hurricane Florence September 14, 2018
  - Revise Plan & Permits for Phase 1 Project
  - Initial Bid November 20th 2018 (Only one bid received)
  - Readvertised to Bid December 4th 2018 (Only one bid GLDD)

- **Bid Detail**
  - Mob & Demob $5,900,000.00
  - Beach Fill 975,000 @ $14.00 $13,650,000.00
  - Standby $330,000.00/ Day

- **Required Completion**
  - Beach Fill April 30th 2019
  - Dune Grass Planting August 31, 2019
Phase 1 Placement Locations

Post-Florence Project
Phase I Project
2018-2019
Emerald Isle East
Transects 34-48
624,945 cu

Post-Florence
Phase I Project
2018-2019
Indian Beach/Salter Path
Transects 49-52, 55-58
350,702 cu
Phase 1 Beach Template Design Detail

- **Distance Varies**
  - **Level Dune Width Varies**
  - From 20' to 50'
- **Dune Crest Elevation Varies**
  - From EL +12.0 to EL +14.0 NAVD88
- **Level Berm Width Varies**
  - From 50' to 85'
- **Dune Toe Elevation Varies**
  - From EL +6.0 to EL +7.0 NAVD88
- **Berm Crest Elevation Varies**
  - From EL +6.0 to EL +7.0 NAVD88
- **Beach Renourishment Fill from ODMDs**
- **Approx Exist. Grade**
- **Seaward Fill Limit, Elevation Varies**

**Beach Nourishment Typical Section — Reaches 1, 2-4, 7, 9, 10**

*Not to Scale*
Phase 1 – Design Detail

(A) 9/10/18

(B) 9/10/18

Reference

Diagram:

- Landward Fill Limit
- Dune Crest +12.0'
- Dune Toe +6.0'
- Level Berm (width varies)
- Berm Crest +6.0'
- Mean High Water +1.5'
- 1 V: 20 H Slope
- Construction Line
- Beachfill
- Existing Beach Profile

Legend:

- 1 V: 5 H
- Level Berm (width varies)

Note: Mirrored photo originally looking west, and taken obliquely to the nourishment fill cross-section.
Phase 1 Construction Timeline

- **Construction**

- **Beach Fill Quantity = 965,000 CY**
  - Liberty Island Beach Fill Placement March 8\textsuperscript{th} thru April 25
  - Ellis Island Beach Fill Placement April 7\textsuperscript{th} thru April 18

- **Dune Grass Planting =178,000 SY or 400,000 plants**
  - Dune Grass Planting April 23\textsuperscript{rd} thru August 13\textsuperscript{th}

- **Relocation Trawling 1 Vessel Per Dredge**
  - Trigger was one take or water temp. of > 57\textdegree
  - Relocation Trawling occurred on all Days
Phase 1 Contractor Equipment Performance

Liberty Island
6,540 yd³

Days on Project: 49
Number of Loads: 179
Total Cubic Yards Hauled: 849,893
Total Cubic Yards Paid: 724,608
Average Loads per Day: 3.65
Average Size of Load: 4,750
Haul to Pay 1.17
Pay CY / Day 14,818
Revenue per Day $207,500
Time Efficiency 77.5% (Weather, Mechanical, Fouled Pumpout Line -2x)
Post Florence Nourishment Project Phase 1

Ellis Island
14,800 yd³

Days on Project: 12
Number of Loads: 25
Total Cubic Yards Hauled: 262,745
Total Cubic Yards Paid: 221,030
Average Loads per Day 2.08
Average Size of Load 10,510
Haul to Pay 1.14
Pay CY / Day 18,389 (One Arm Operating During Project – Port Gimble)
Revenue per Day $257,500
Time Efficiency 89.5% (Delays mainly trawler weather days)
April 11 Largest Production Day - Placed 53,000 CY
Changing Template on the “Fly”

- Dynamic Nature of the Foreshore Beach
- Design Process
- Annual Monitoring
- Construction Survey
- Pre-Fill Survey
- Change of Template
Grading the Fill
Changing Template on the “Fly”

- Owner Budget
  - Take full advantage of budget (large mob $5.9M)
  - Hit target Quantity (Not go over budget)
- Allows Engineer to best utilize the material
  - Changes can go both directions
- Need Flexibility with the Contractor
- GLDD did great job dealing with changes (timing)
  - Some changes less than 24 hours
- Benefited by have GPS controlled dozers
  - No need for grade stakes
Checking Grade
**To Trawl or not to Trawl**

- Project Specific Biological Opinion for 50-year project
- Required trawling after 1 take or water temp reach 57°C
- B.O. Incidental Take Statement was based strictly on historical data

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<th>Species</th>
<th>Lethal Take</th>
<th>Non-lethal Take</th>
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<tbody>
<tr>
<td>Green sea turtle (NA and SA DPSs combined)</td>
<td>6 total (3 observed; all hopper dredging)</td>
<td>0</td>
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<tr>
<td>Kemp’s ridley sea turtle</td>
<td>8 total (4 observed; all hopper dredging)</td>
<td>0</td>
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<tr>
<td>Loggerhead sea turtle (NWA DPS)</td>
<td>46 total (24 observed; 23 hopper dredging, 1 relocation trawl)</td>
<td>30 (all relocation trawling)</td>
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<tr>
<td>Atlantic sturgeon (All 5 DPSs combined)</td>
<td>22 total (11 observed; all hopper dredging)</td>
<td>847 (all relocation trawling)</td>
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- The take limits were for the 50-year project limits were proportionally reduced to amount of hopper dredging work
To Trawl or not to Trawl

- Owner Decision making on Trawling
- 1<sup>st</sup> Non-lethal Take
- 1 “Lethal” take of Kemps Ridley
- Rehabilitated at Karen Beasley Sea Turtle Center

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<td>11</td>
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Note: Also 1 Non-lethal take of a leatherback
To Plant or not to Plant

- NC Statewide Programmatic Biological Opinion
- Doesn’t specifically address dune grass planting however, no “heavy equipment” allowed on the beach from May 1 thru Nov 15
- Sub Contractors original method included hand planting with a tractor pulled water sled
- The native NC beach grass planned to be used could only begin after the last frost (Early March)
- Hand Planting Production up to 3,000 plants per day
- Coastal Transplants had to be innovative to speed up process
  - Utilized a modified Nursery Tree Planter to plant flat areas
3,000 vs 10,000 Plants per day
Completed Dune Grass Area
To Bid or not to Bid

- Timing, Timing, Timing
  - Current Market Demands (During Environmental Window)
  - USACE Supplemental
  - New Work Deepening Projects
  - Availability of Equipment (right equipment)

- NC Legislation
  - NC General Statue 143-132. Minimum number of bids for public contracts
  - Must Receive 3 bids if not re-advertise then open
  - 2 of last three project only had 1 bidder and in all three had less than 3 with the same number of bidders bidding upon rebid.
Sediment Availability

- Old ODMDS originally had approximately 14M CY of material, first three years of the Bogue Projects will utilize approx. 6.4M CY
- COASTAL RESOURCE COMMISION 15A NCAC 07H .0312
  TECHNICAL STANDARDS FOR BEACH FILL PROJECTS
  - Limits on Fines (5% above native beach)
  - Need Different standards for Hydraulic vs Hopper Dredge
  - Native Beach +/- 0.7% (Allowable 6%) Average within borrow area 4.8% from weekly tests of material placed on beach 1.9% approximately 60% loss in fines.
- Deeper Areas
- Higher Oversize Content
  - New Technology
- Performance Based Contracts
Coming Soon 2019-2020

- 1,955,000 CY GLDD Contractor $28,161,050.00
Coming Soon 2020-2021

- 2,250,000 CY  Expected Bid Date 1st Qtr 2020
Q&A

Drone Video on YouTube:
https://youtu.be/icptLDObh34
Post Hurricane Dorian Drone Survey of Bogue Banks