

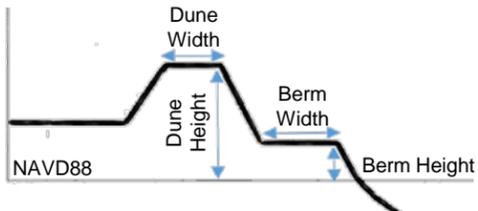
STUDY AREA



Bogue Banks is a 25-mile long barrier island on the southeastern coast of NC. The island is situated at the southern boundary of North Carolina's 'Crystal Coast', a significant visitor destination which attracts people from every state in the nation.

The shoreline along Bogue Banks consists of a two-part system:

- Berm - the flat region of the beach between the dune and the water line.
- Dune - an elevated section of the beach profile that serves to protect structures from increased water levels during storm events.



Hurricane Floyd (CAT 2)



1999

Hurricane Ophelia (CAT 1)



2005

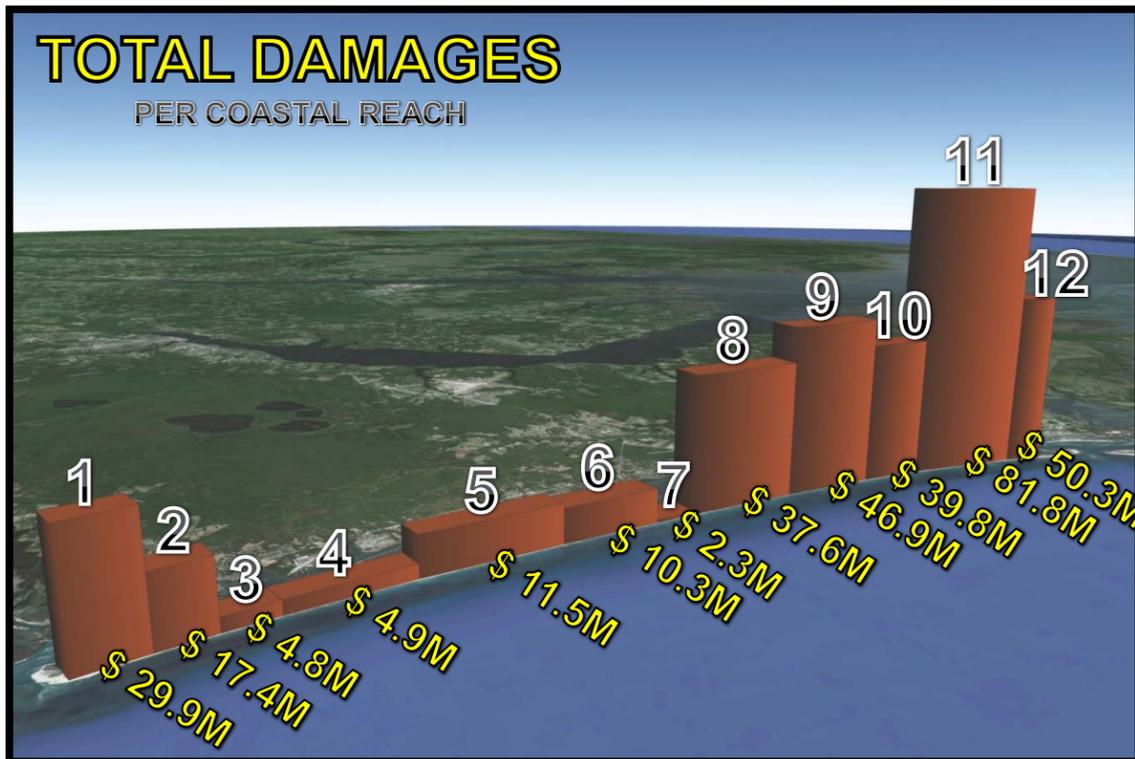
EXISTING CONDITIONS – SHORELINE PROFILE

PROBLEMS:

- Long-term beachfront erosion
- Storm-induced damages to structures and contents
- Loss of beachfront recreational areas
- Loss of sea turtle and shorebird habitat

OPPORTUNITIES:

- Reduce storm damage risks
- Enhance recreation
- Improve long-term sea turtle nesting and shorebird habitat



OBJECTIVE:

Over a 50-year period of analysis, reduce the risk of coastal storm damages (as measured by increases in NED benefits), to approximately 22.7 miles of shoreline at Bogue Banks while minimizing or avoiding impacts to natural resources.

CONSTRAINTS:

- Limited land availability for relocation of structures.
- Avoidance or minimization of impacts to threatened and endangered sea turtle and shorebird nesting habitat.

TROPICAL STORM IRENE - DAMAGE COMPARISONS



Clamdigger, Pine Knoll Shores - looking west



Ocean Oaks, Emerald Isle - looking west

## ECONOMIC INVESTMENT & RETURNS

### Economic Investment\*

Initial Construction:	\$37.3M
16 Nourishments:	\$229.5M
Annual O&M:	\$0.075M
Project First Cost:	\$266.9M

Average Annual Cost: \$6.1M

\* Oct 2014 price levels

Benefit/Cost Ratio: 2.45

### Economic Returns (average annual)

Storm Damage Reduction:	\$11.7M
Recreation:	\$3.1M
Total Benefits:	\$14.8M

Net Benefits: \$8.7M

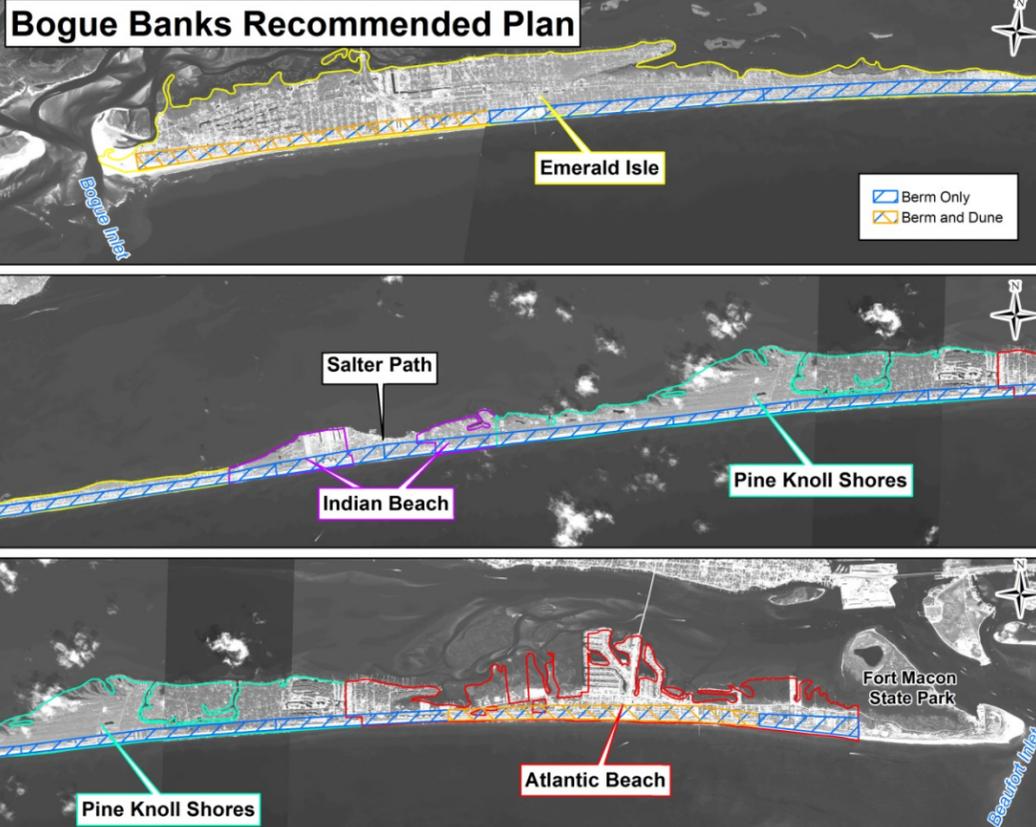
Federal Interest:  
Return of \$2.45 for every \$1 invested

## NED PLAN COSTS & ECONOMICS

Initial Construction Cost	\$37,327,000
Renourishment Cost (per, 16 total)	\$14,341,000
AA Cost	\$6,065,000
AA Benefits (CSDR only)	\$11,688,082
AA Benefits (Recreation)	\$3,148,607
AA Total Benefits	\$14,836,688
AA Total Net Benefits	\$8,771,688
BCR at 3.5%	2.45 : 1
BCR at 7%	1.98 : 1

Oct 2014 price level

## RECOMMENDED PLAN



The Recommended Plan consists of a combination dune- and berm plan, with construction of a 50-foot wide berm along the entire 22.7 mile length of the project, and dune construction along 5.9 miles. Berm height varies between 5.5 and 7 feet, and dune height varies between 15 and 20 feet. The renourishment interval is 3 years. Initial construction will require 2.45 MCY of material, and each renourishment cycle will require 1.06 MCY of material. The total project sediment volume requirement, including 16 renourishment cycles, is 19.6 MCY. Estimated compatible sediment volumes available in three tested offshore borrow areas total 41.8 MCY, more than adequate to fulfill the requirements of the project.

3.6% of NC sea turtle nests are located on Bogue Banks.



Average of 38 nests per year on Bogue Banks.

BEACH RENOURISHMENT	
Initial construction	2,451,000 yd <sup>3</sup>
Average (3yr cycle)	1,069,000 yd <sup>3</sup>
Enhanced Habitat	138 acres

BORROW NEED VS. AVAILABILITY		
Area	Available Volume (MCY)	50 yr Volume Needed (MCY)
Y	4.6	3.6
U	8.9	6.1
Q2	28.3	9.9
Total	41.8	19.6



### Gap analysis (Based on June 2014 Access Points)

- Project Length (proposed) = 22.7 miles
- Gap Total (sum of gaps) = 3.25 miles
- Length of Beach in Compliance = 19.45 miles

FULL ACCESS PARTICIPATION	FEDERAL	NON-FEDERAL
Initial Construction	\$24,263,000 (65%)	\$13,064,000 (35%)
Renourishment	\$114,725,000 (50%)	\$114,725,000 (50%)

CURRENT ACCESS PARTICIPATION	FEDERAL	NON-FEDERAL
Initial Construction	\$20,789,222 (56%)	\$16,537,778 (44%)
Renourishment	\$98,296,380 (43%)	\$131,153,620 (57%)

## PARKING AND ACCESS

Town	Total Parking Spaces Needed for Peak Demand	Current Parking Spaces	Additional Parking Spaces Needed
Emerald Isle	662	529	133
Salter Path/Indian Beach	96	141	0
Pine Knoll Shores	210	180	30
Atlantic Beach	1,100	1,011	89
Total	2,068	1,861	252

Parking and access is currently not sufficient to meet requirements for full federal participation. Sponsor is aware of additional needs and has indicated they can/will provide if project is authorized and funded.

**109 current access points, 122 needed to meet minimum distribution requirements.**

## SPONSOR SUPPORT

- Has the financial resources and commitment
- Understands the magnitude of the investment
- Enforces land use control and flood damage prevention ordinances
- Is prepared for storm events
- Enforces strict building codes adopted by the state for construction in flood zones and high wind areas
- Understands and will accept operation and maintenance requirements

**Carteret County supports the Recommended Plan because it provides safeguards to homes and businesses, roads, infrastructure, public utilities, tax base, habitat for sea turtles, recreational areas, and because it supports the national and local economy.**