SHOULD NORTH CAROLINA & HOLDEN BEACH RETROFIT THEIR BARRIER ISLAND INLETS?

ONSLOW BAY COLOR TOPOGRAPHY MAP (LiDAR DATA)
BARRIER ISLAND TYPES:
ONSLOW & LONG BAYS

1. Sand-Rich, Complex Barrier Islands
2. Sand-Poor, Simple Barrier Islands
3. Headland
   3A. Sub-Aerial Headland
   3B. Sub-Marine Headland

BARRIER ISLAND TYPES:
ONSLOW & LONG BAYS
IN RISING SEA LEVELS THE ISLANDS MIGRATE LANDWARD OVER THE MARSH LIKE A TANK TREAD LEAVING MARSH PEAT CROPPING OUT ON THE SHOREFACE

BACK-BARRIER SALT MARSHES FORM ON OVERWASH FANS & INLET FLOOD-TIDE DELTAS
INLETS--OUTLETS

CRITICAL ISLAND BUILDING PROCESSES THAT DEPOSIT BACK-BARRIER SHOALS, INCREASE ISLAND WIDTH, & FORM MARSH HABITAT.
US ACE 4.6 KM LONG & 9.1 M HIGH DAM BUILT IN 1881-1887 TO BLOCK CAPE FEAR RIVER DISCHARGE ON NE SIDE OF CAPE FEAR
CAPE FEAR RIVER
INLET DREDGED CHANNEL

BATHYMETRIC CONTOURS IN M BELOW MEAN SEA LEVEL

J. McNINCH, USACE 2004
OAK ISLAND HEADLAND

Blevins/Star News
1-21-2015
NORTH TOPSAIL & ONSLOW BEACH ROCK HEADLAND SCARPS
(CROWSON, 1980)

NEW RIVER SUB-MARINE HEADLAND
(RIGGS, CLEARY, & SNYDER, 1995)
ONSLOW BAY & LONG BAY
HARDBOTTOMS
THERE IS A GOOD REASON WHY SIMPLE BARRIER ISLANDS ARE SAND-POOR: THEY LACK A MAJOR SOURCE OF NEW SAND!
SHOULD WE ENGINEER OUR DYNAMIC COASTAL SYSTEM TO KEEP UP WITH ONGOING RISE IN SEA LEVEL?
127 MILES OF BEACH COMMUNITIES RENOURISH (Ave. = 2 yrs Survival)
9 HARDENED STRUCTURES OCCUR ON NC BEACHES & INLETS
2015 LAW ALLOWS 6 TERMINAL GROINS TO BE BUILT AT INLETS
2015 RULE ALLOWS SAND-BAG WALLS & DIKES EVERYWHERE!
HUNDREDS OF HOUSES ARE SAND-BAGGED &/OR IN THE SURF ZONE!

~ 25 MILES OF COASTAL HIGHWAY ARE COLLAPSING & ~100 MILES ARE THREATENED BY FLOODING!
DIRECTION OF SEDIMENT TRANSPORT

- 45 FOOT DEEP SHIPPING CHANNEL

OFFSHORE DISPOSAL OF DREDGED SEDIMENT

TERMINAL GROIN BUILT IN EARLY 1960s

SEDIMENT SHUNTED OFFSHORE BY INLET DYNAMICS, JETTY, & DREDGING
DOWNSTREAM SHORELINE RECESSION AT ATLANTIC BEACH

BEAUFORT INLET TERMINAL GROIN AT FORT MACON
IF TERMINAL GROINS WORKED, THERE SHOULD BE NO NEED FOR BEACH NOURISHMENT AT FORT MACON & ATLANTIC BEACH!

1978-2004 FORT MACON & ATLANTIC BEACH (E 6 mi) NOURISHED WITH 13,143,000 yds³ OF SAND

A. FORT MACON: 2.9 mill yds³

B. ATLANTIC BEACH: 10.2 mill yds³
OREGON INLET MIGRATED SOUTH AT RATES OF:

1849-1980 = 77 ft/yr or 1.9 mi
1980-1988 = 265 ft/yr or 0.4 mi
1988-1989 = 1,100 ft or 0.2 mi

INCREASED RATES OF MIGRATION ARE DUE TO INCREASED INLET DREDGING & OFFSHORE DUMPING

TERMINAL GROIN WAS BUILT IN 1989-1991 TO SECURE ‘FASTEN’ THE BRIDGE TO THE ISLAND
TERMIAL GROIN PERMIT TO HARDEN OREGON INLET REQUIRED NOURISHMENT OF DOWN-STREAM PEA ISLAND BEACHES WITH SAND FROM ANNUAL INLET DREDGING

~12.7 MILLION yds³ OF INLET SAND WERE PUMPED & PLACED ON MILES 1--3 OF PEA ISLAND IN 36 OPERATIONS BETWEEN 1988-2009

HOWEVER, PEA ISLAND’S OCEAN SHORELINE CONTINUES TO ERODE AT RATES UP TO 13 ft/yr & HWY MAINTENANCE COSTS ARE >$93,000,000!
Groins Built in 1934-1935

The consequence of terminal groins is the erosion & rapid landward movement of downdrift island segments.

Ocean City, MD
Assateague, VA

Net direction of sediment drift

OCEAN CITY, MD
ASSATEAGUE, VA
BRIGHTON BEACH HOTEL, CONEY ISLAND, NY (1888)

WE MUST ADAPT TO THE MOBILE BARRIER ISLANDS & MOVE WITH THEM!

“DARE TO DREAM THE IMPOSSIBLE DREAM” IN MIRLO BEACH, RODANTHE (1-2010)

D. BOWERS 11-2009

SCIENTIFIC AMERICAN, APRIL 14, 1888