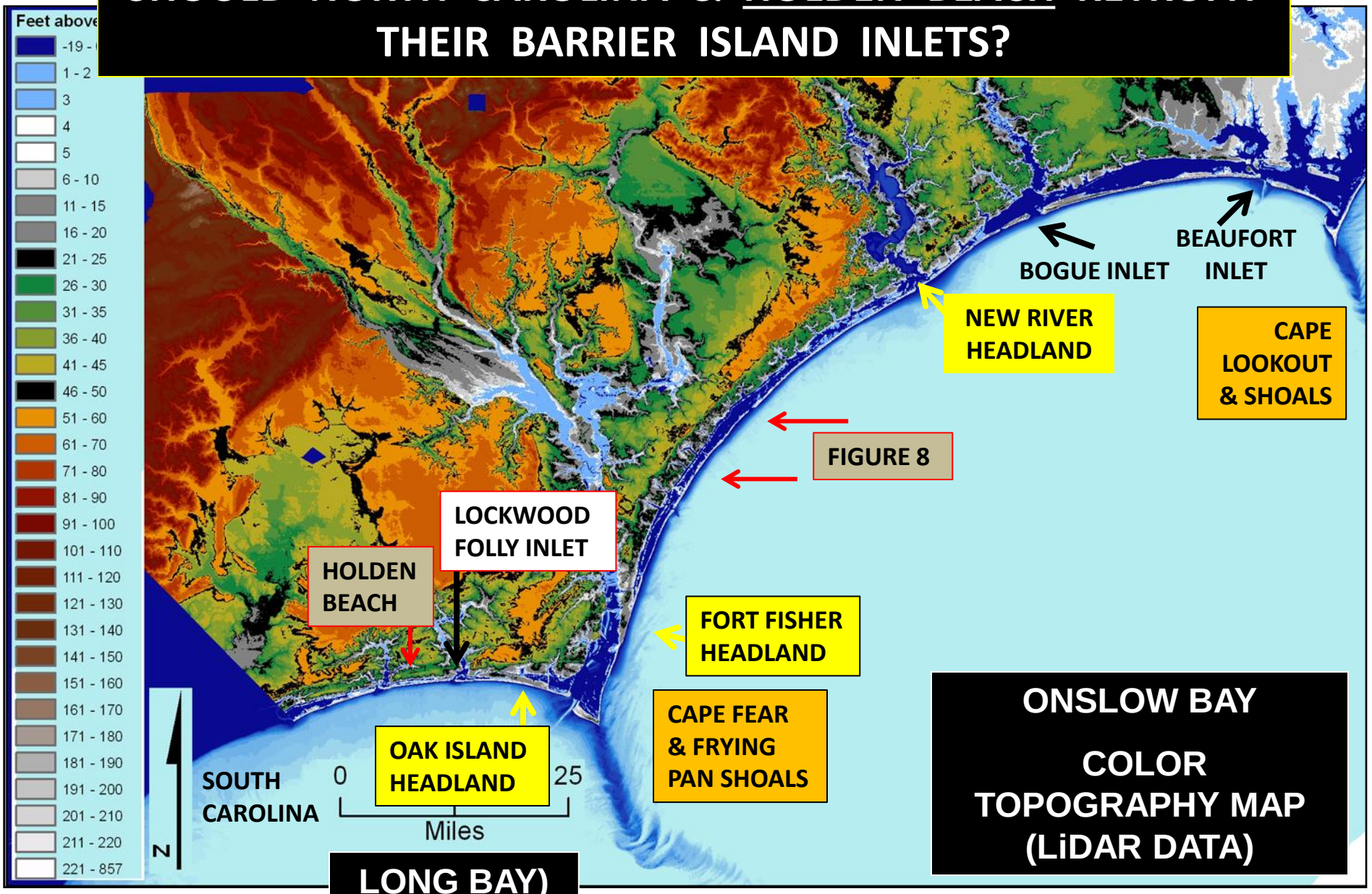
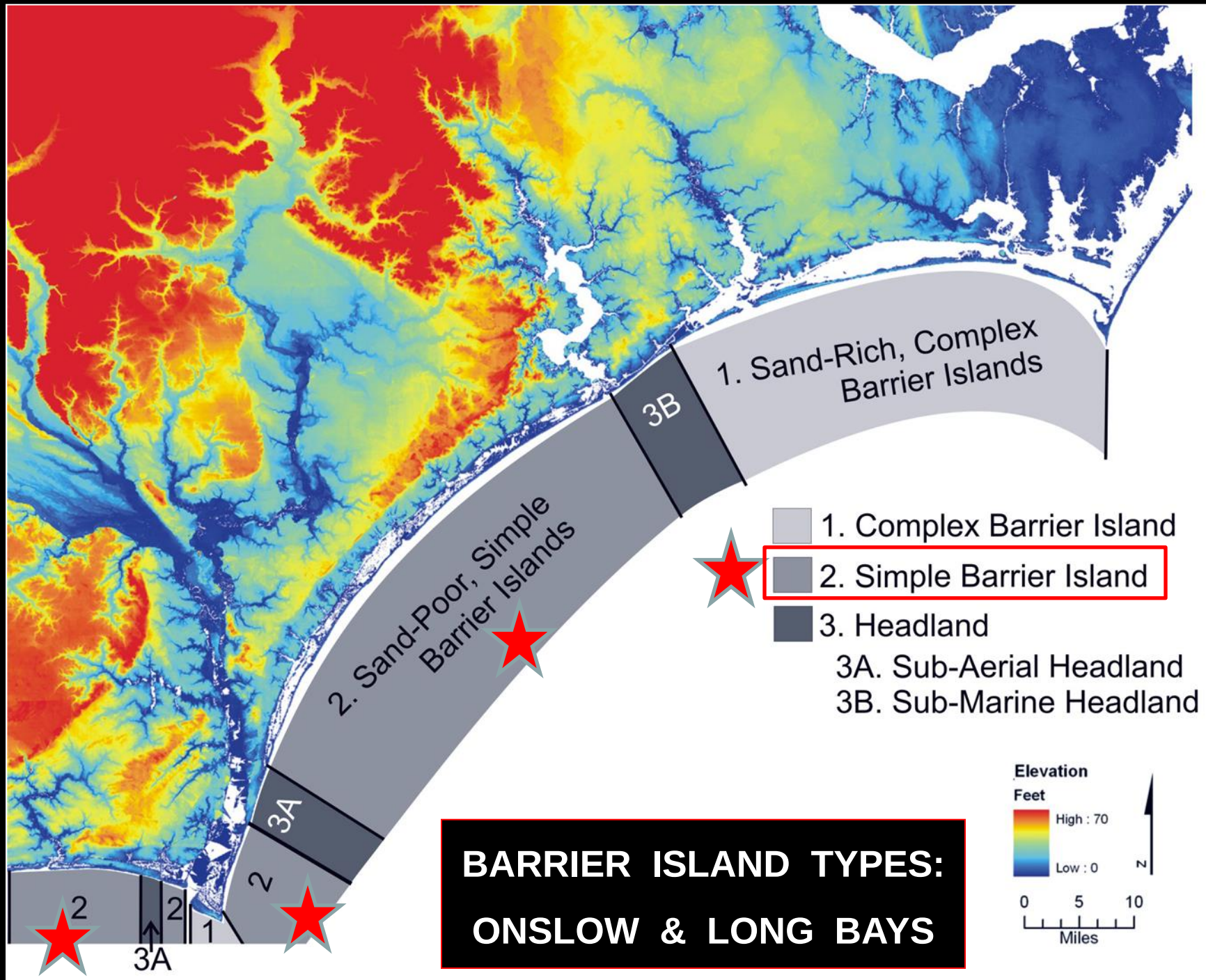
SHOULD NORTH CAROLINA & HOLDEN BEACH RETROFIT THEIR BARRIER ISLAND INLETS?

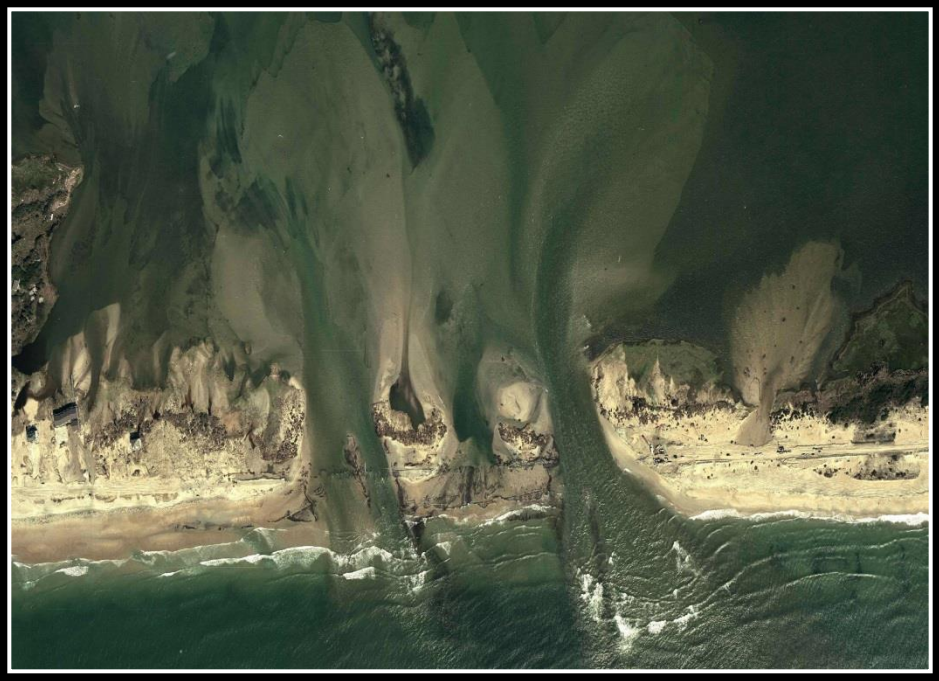



1. Sand-Rich, Complex Barrier Islands
3B
2. Sand-Poor, Simple Barrier Islands
3A
2
2
1
3A
1. Complex Barrier Island
2. Simple Barrier Island
3. Headland
3A. Sub-Aerial Headland
3B. Sub-Marine Headland
Elevation
Feet
High : 70
Low : 0
N
0 5 10
Miles
BARRIER ISLAND TYPES:
ONSLOW & LONG BAYS

SAND-POOR, SIMPLE BARRIER ISLANDS

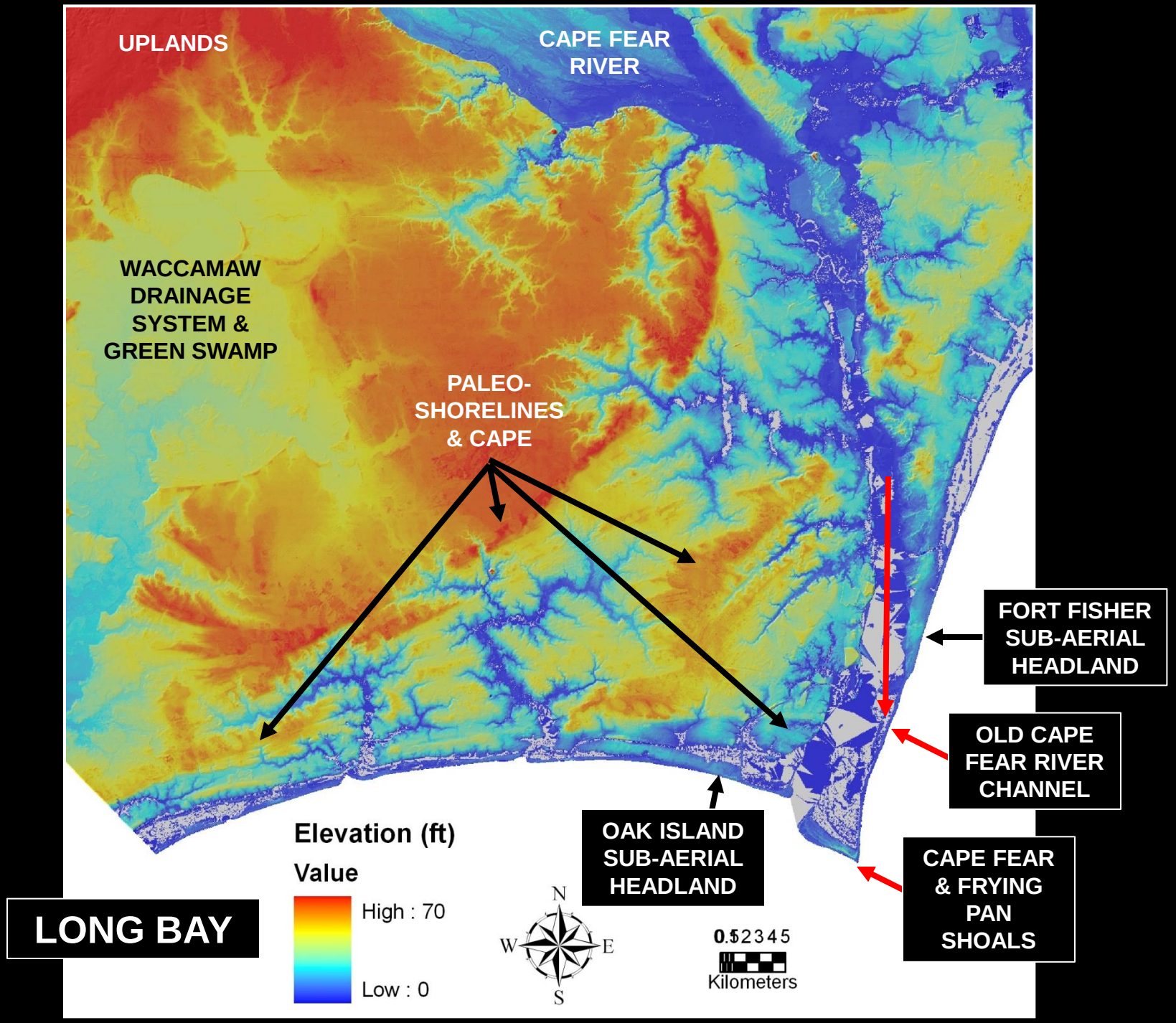
IN RISING SEA LEVELS THE ISLANDS MIGRATE LANDWARD OVER THE MARSH LIKE A TANK TREAD LEAVING MARSH PEAT CROPPING OUT ON THE SHOREFACE

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

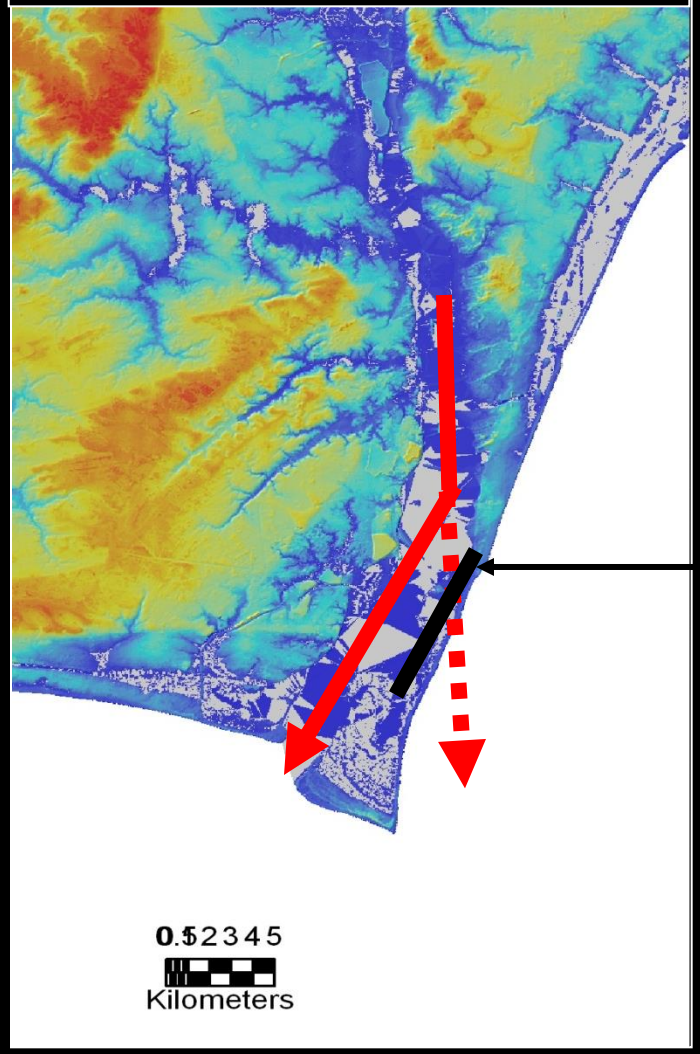


INLETS--OUTLETS

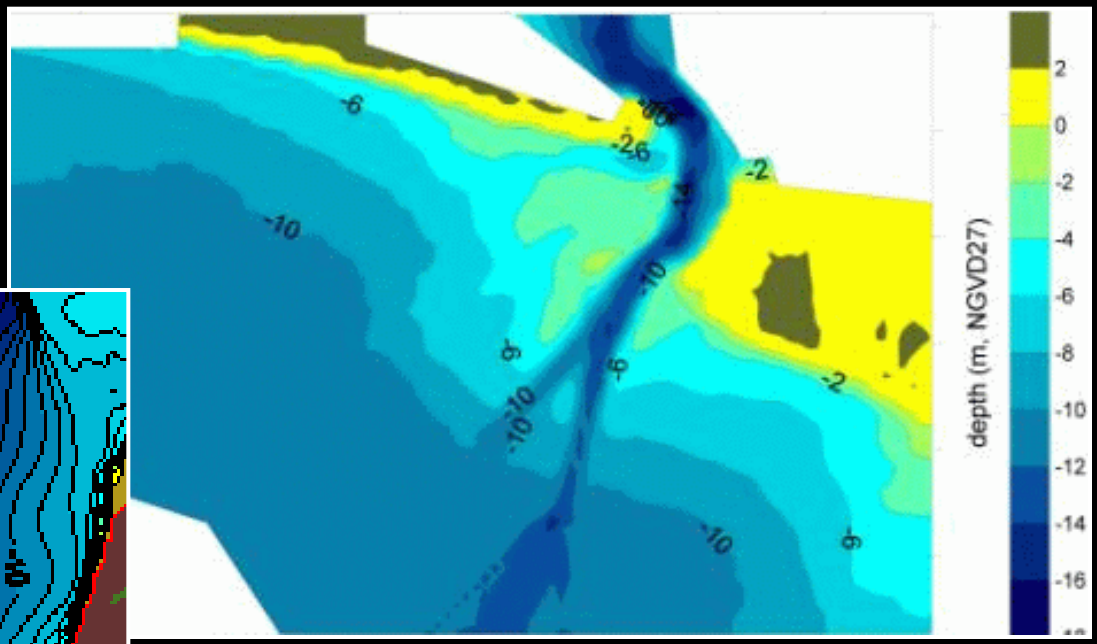
CRITICAL ISLAND BUILDING PROCESSES THAT DEPOSIT BACK-BARRIER SHOALS, INCREASE ISLAND WIDTH, & FORM MARSH HABITAT.

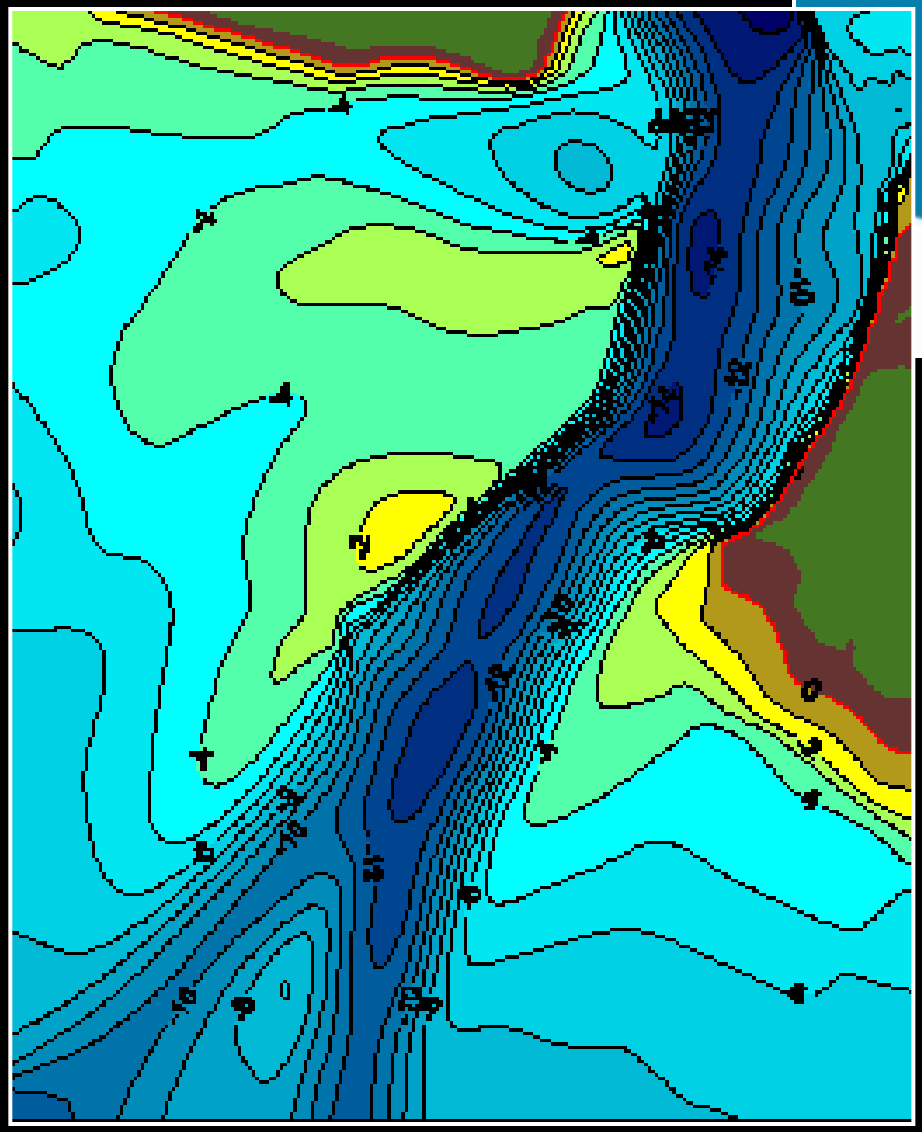

UPLANDS
CAPE FEAR RIVER
WACCAMAW DRAINAGE SYSTEM & GREEN SWAMP
PALEO-SHORELINES & CAPE
FORT FISHER SUB-AERIAL HEADLAND
OLD CAPE FEAR RIVER CHANNEL
OAK ISLAND SUB-AERIAL HEADLAND
CAPE FEAR & FRYING PAN SHOALS
LONG BAY
Elevation (ft)
Value
High : 70
Low : 0
N
W
E
S
0 0.5 1 2 3 4 5
Kilometers

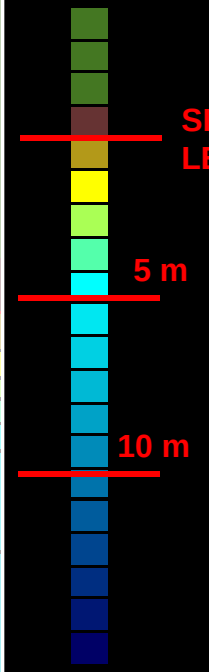
US ACE 4.6 KM LONG & 9.1 M HIGH DAM BUILT IN 1881-1887 TO BLOCK CAPE FEAR RIVER DISCHARGE ON NE SIDE OF CAPE FEAR



CAPE FEAR RIVER INLET DREDGED CHANNEL







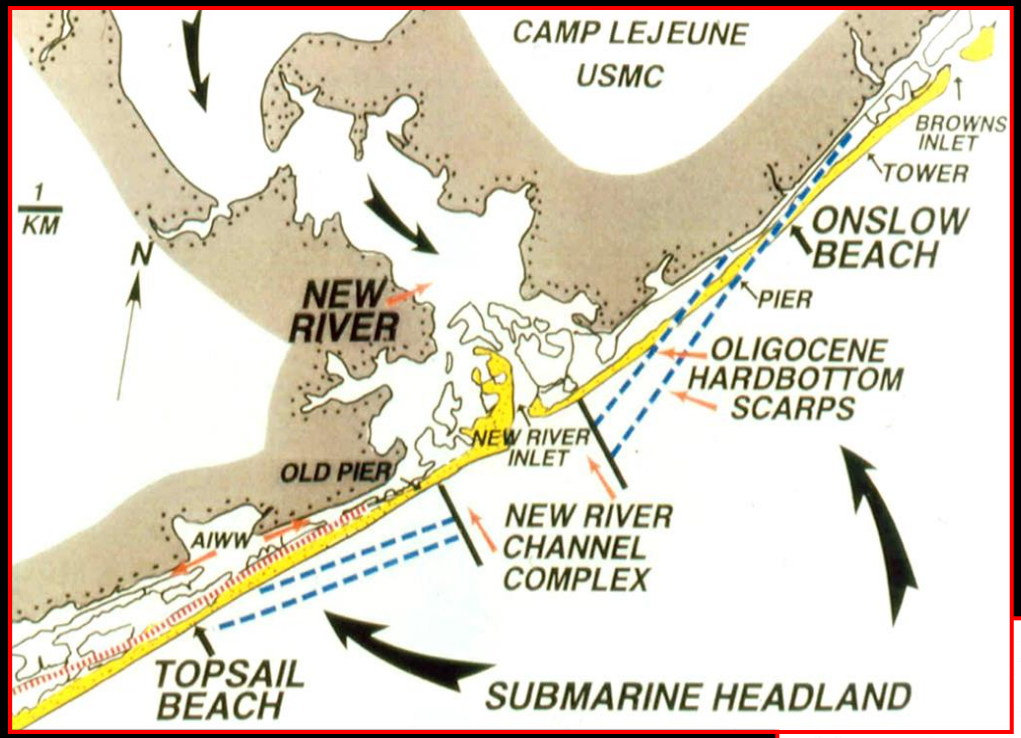
BATHYMETRIC CONTOURS IN M BELOW MEAN SEA LEVEL

J. McNINCH, USACE 2004

HOLDEN BEACH, LONG BEACH, & CAPE FEAR
2016

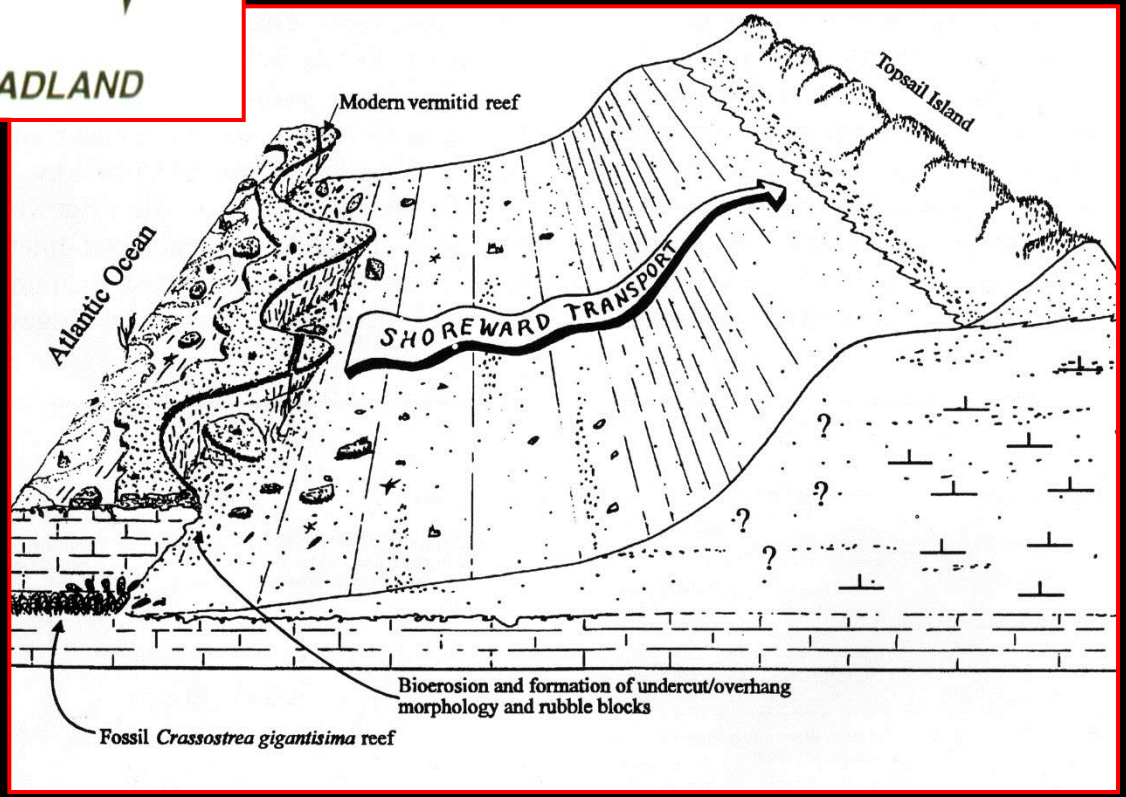
OAK ISLAND HEADLAND

Blevins/Star News 1-21-2015



NEW RIVER SUB-MARINE HEADLAND

(RIGGS, CLEARY, & SNYDER, 1995)



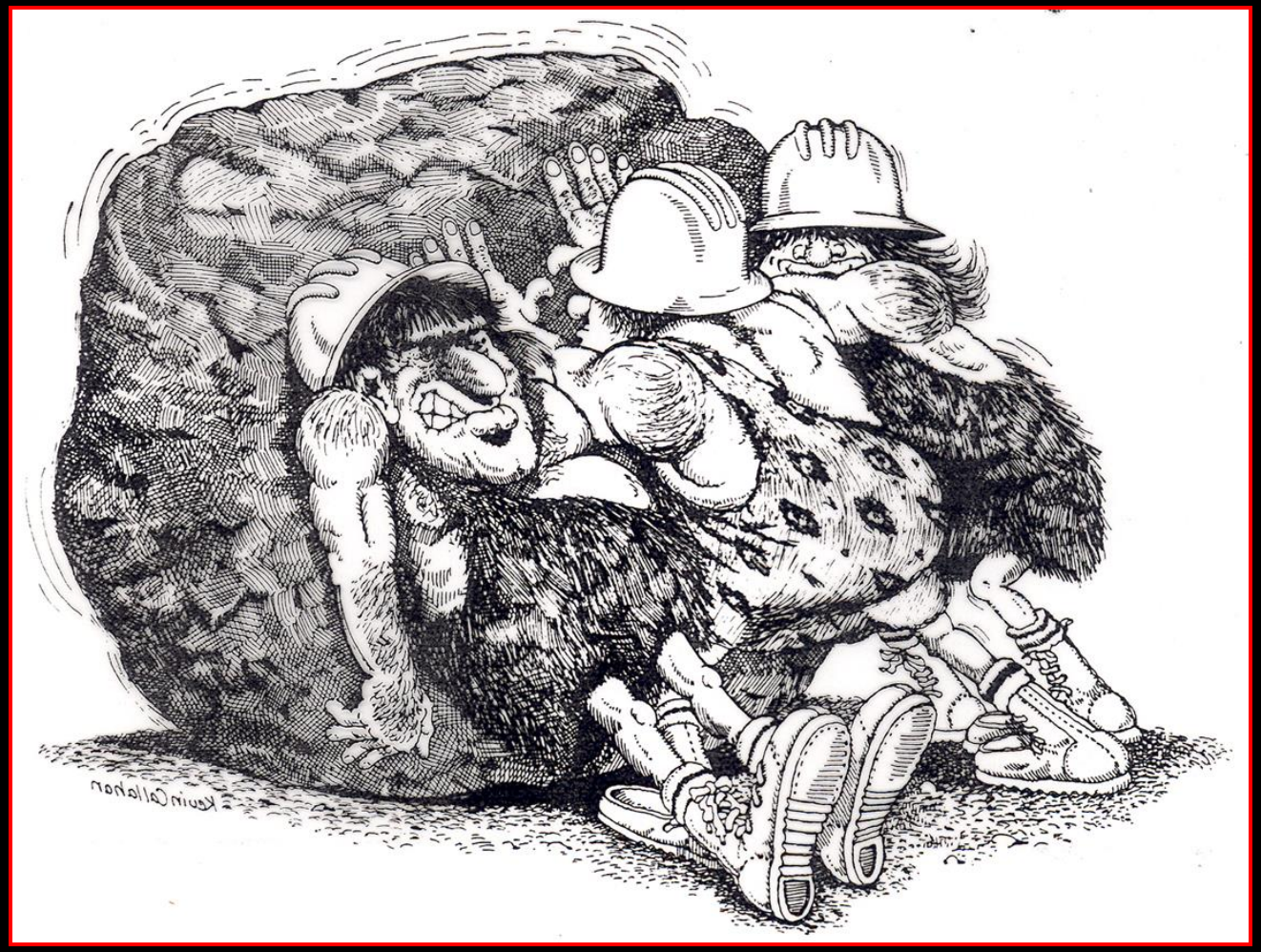
NORTH TOPSAIL & ONSLOW BEACH ROCK HEADLAND SCARPS

(CROWSON, 1980)

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!

NORTH CAROLINA'S ROCKY BEACH
NORTH TOPSAIL ISLAND (M. Giles 3-13-2015)



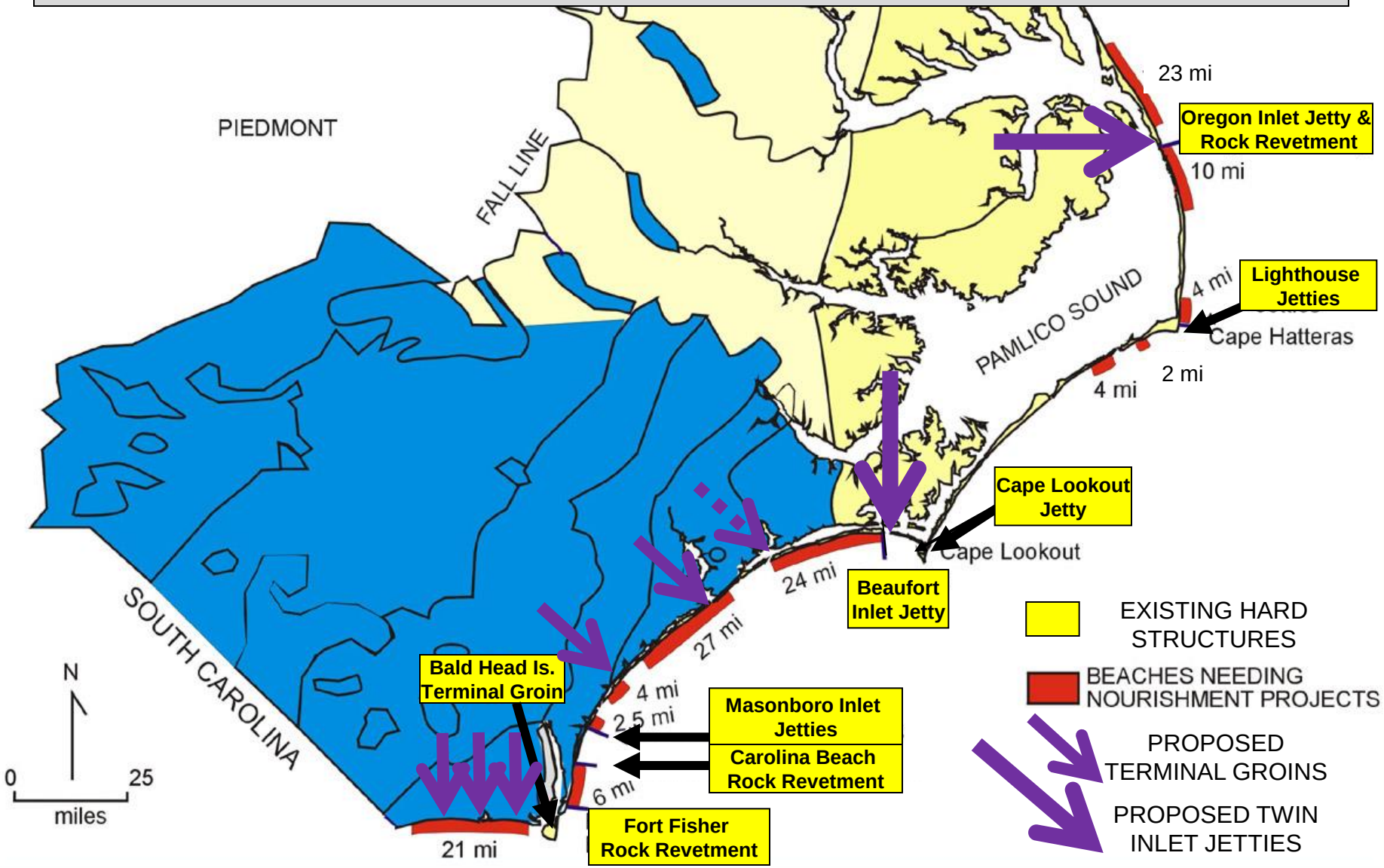
SHOULD WE ENGINEER OUR DYNAMIC COASTAL SYSTEM TO KEEP UP WITH ONGOING RISE IN SEA LEVEL?

127 MILES OF BEACH COMMUNITIES RENOURISH (Ave. = 2 yrs Survival)

9 HARDENED STRUCTURES OCCUR ON NC BEACHES & INLETS

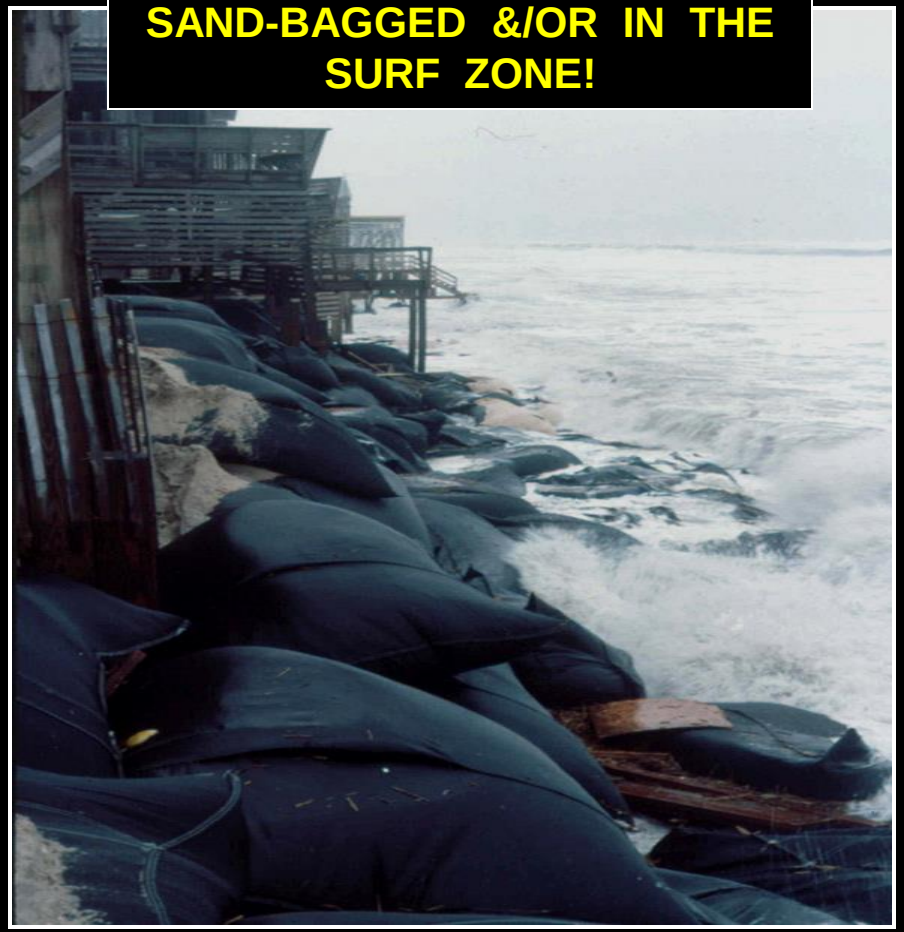
2015 LAW ALLOWS 6 TERMINAL GROINS TO BE BUILT AT INLETS

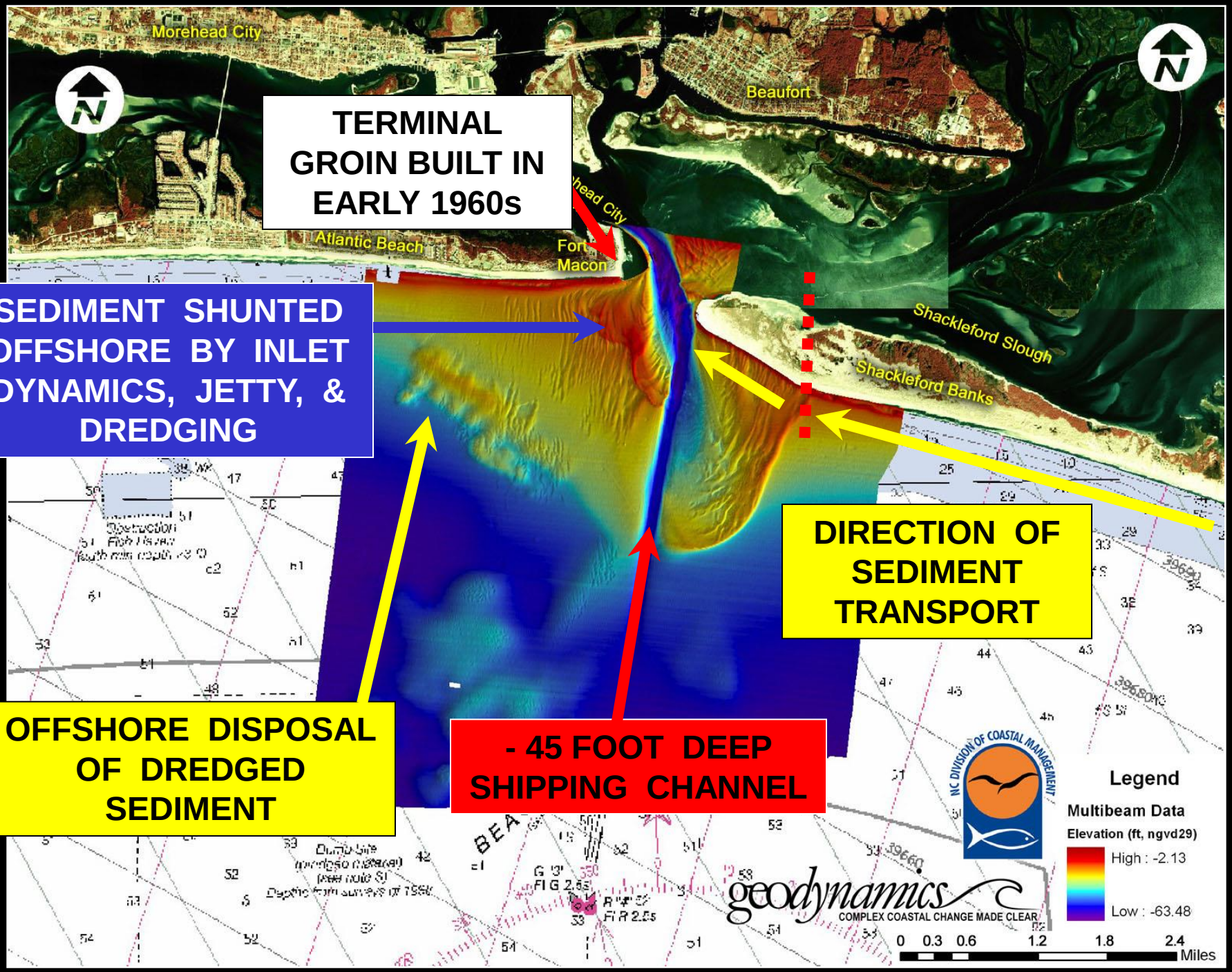
2015 RULE ALLOWS SAND-BAG WALLS & DIKES EVERYWHERE!



HUNDREDS OF HOUSES ARE SAND-BAGGED &/OR IN THE SURF ZONE!

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




Morehead City
Beaufort
TERMINAL GROIN BUILT IN EARLY 1960s
Atlantic Beach
Fort Macon
Shackleford Slough
Shackleford Banks
SEDIMENT SHUNTED OFFSHORE BY INLET DYNAMICS, JETTY, & DREDGING
DIRECTION OF SEDIMENT TRANSPORT
OFFSHORE DISPOSAL OF DREDGED SEDIMENT
- 45 FOOT DEEP SHIPPING CHANNEL
NC DIVISION OF COASTAL MANAGEMENT
Legend
Multibeam Data
Elevation (ft, ngvd29)
High : -2.13
Low : -63.48
geodynamics
COMPLEX COASTAL CHANGE MADE CLEAR
0 0.3 0.6 1.2 1.8 2.4
Miles

DOWNSTREAM SHORELINE RECESSION AT ATLANTIC BEACH

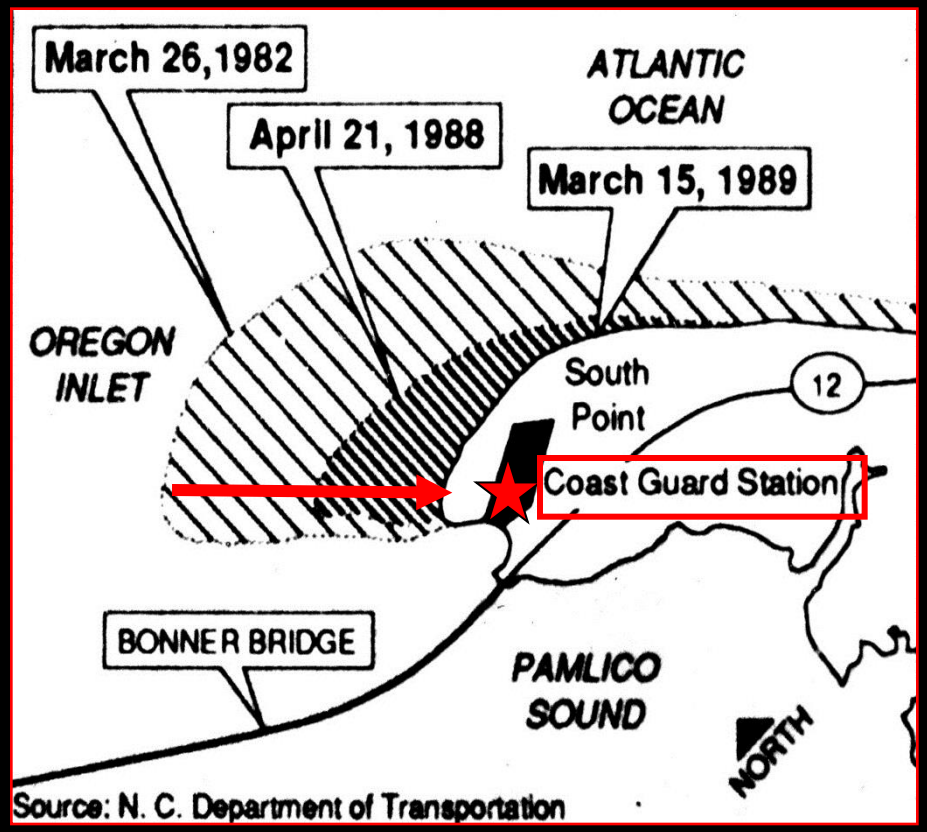
BEAUFORT INLET TERMINAL GROIN AT FORT MACON

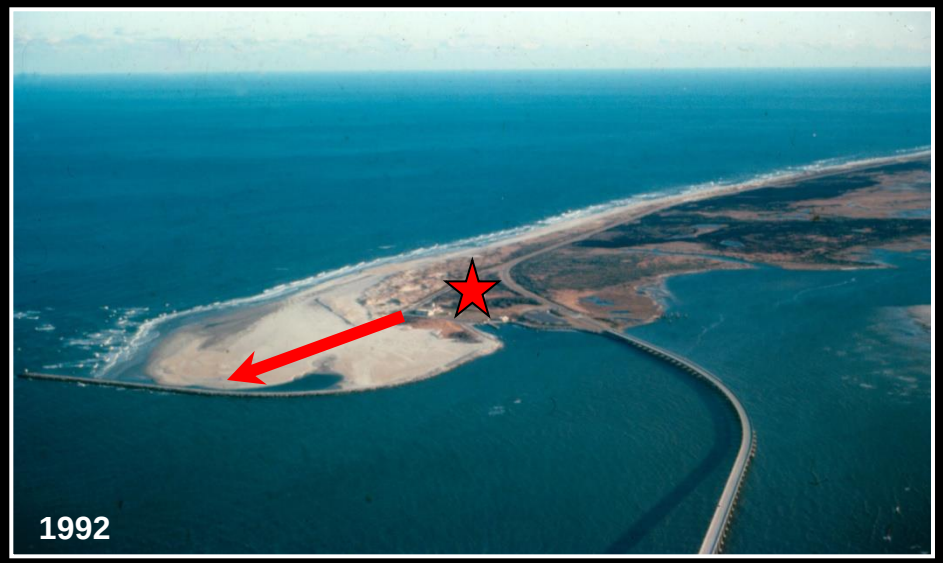
IF TERMINAL GROINS WORKED, THERE SHOULD BE NO NEED FOR BEACH NOURISHMENT AT FORT MACON & ATLANTIC BEACH!

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

TERMINAL GROIN PERMIT TO HARDEN OREGON INLET REQUIRED NOURISHMENT OF DOWN-STREAM PEA ISLAND BEACHES WITH SAND FROM ANNUAL INLET DREDGING

PIPELINE DREDGING 1992

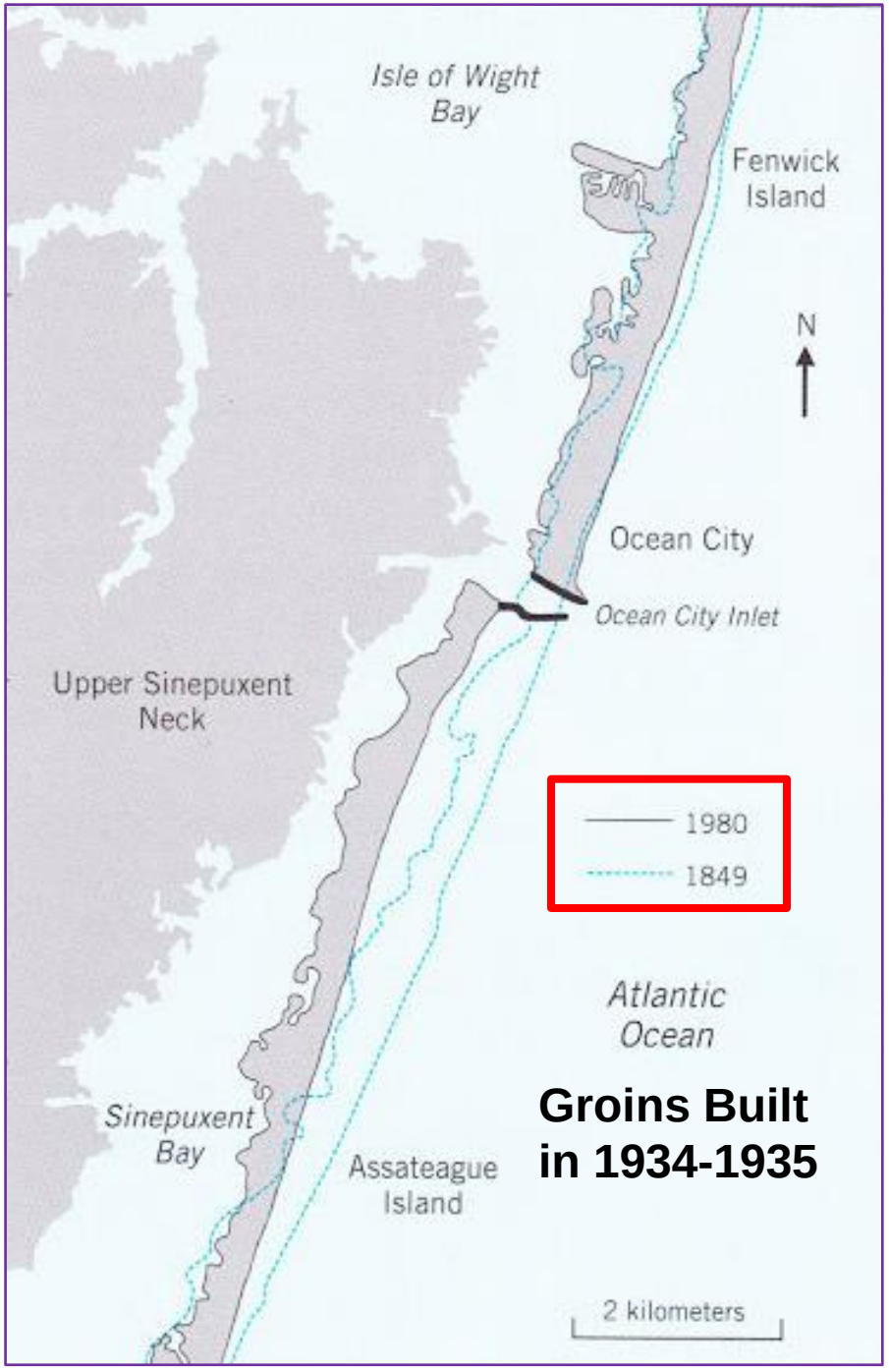
~12.7 MILLION yds^3 OF INLET SAND WERE PUMPED & PLACED ON MILES 1--3 OF PEA ISLAND IN 36 OPERATIONS BETWEEN 1988-2009

HOWEVER, PEA ISLAND'S OCEAN SHORELINE CONTINUES TO ERODE AT RATES UP TO 13 ft/yr & HWY MAINTENANCE COSTS ARE >$93,000,000!

PEA ISLAND
RODANTHE (12 miles)

“GOING—TO—SEA” NC
HWY 12

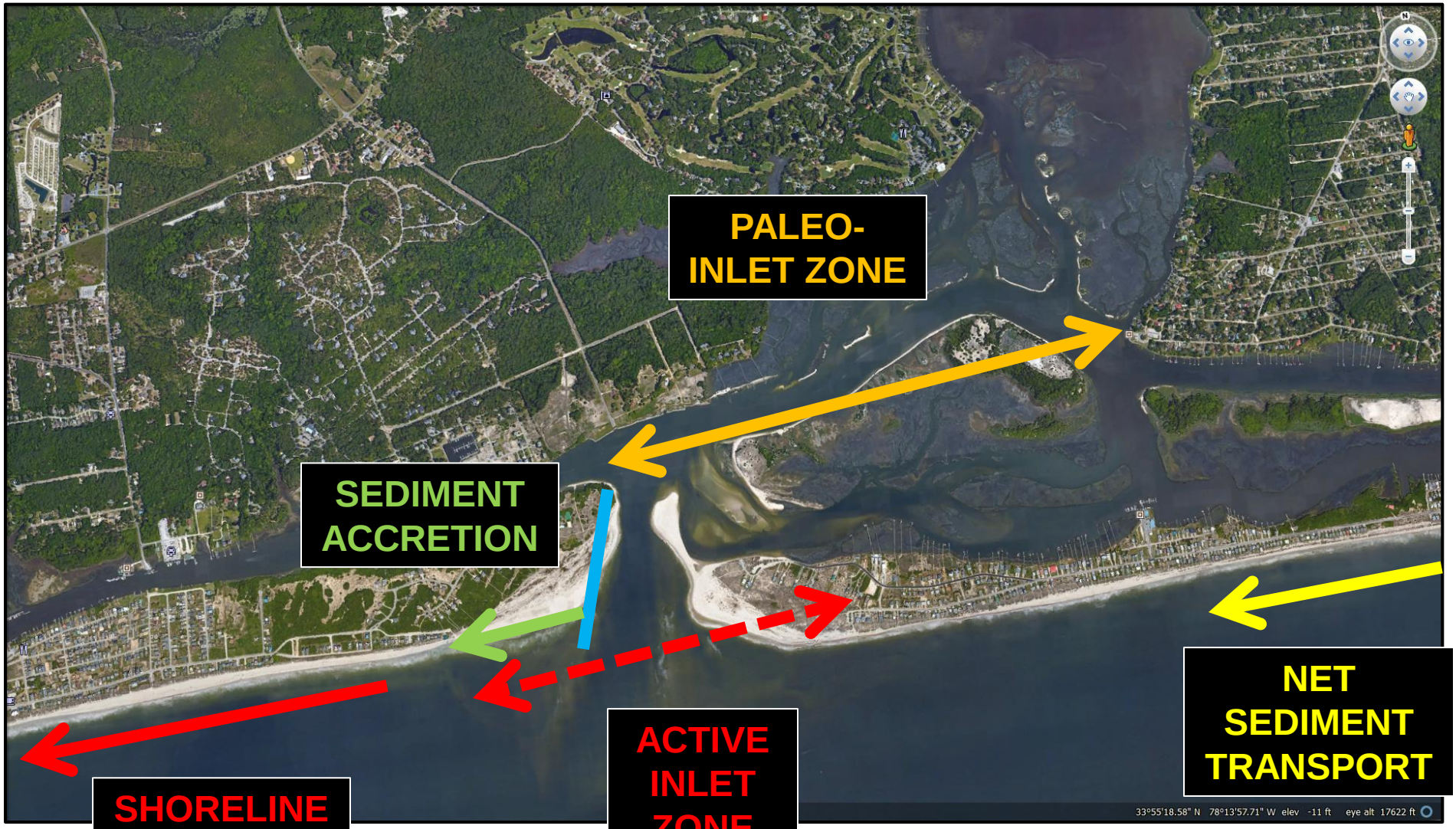
D. BOWERS 11-2009



Groins Built in 1934-1935

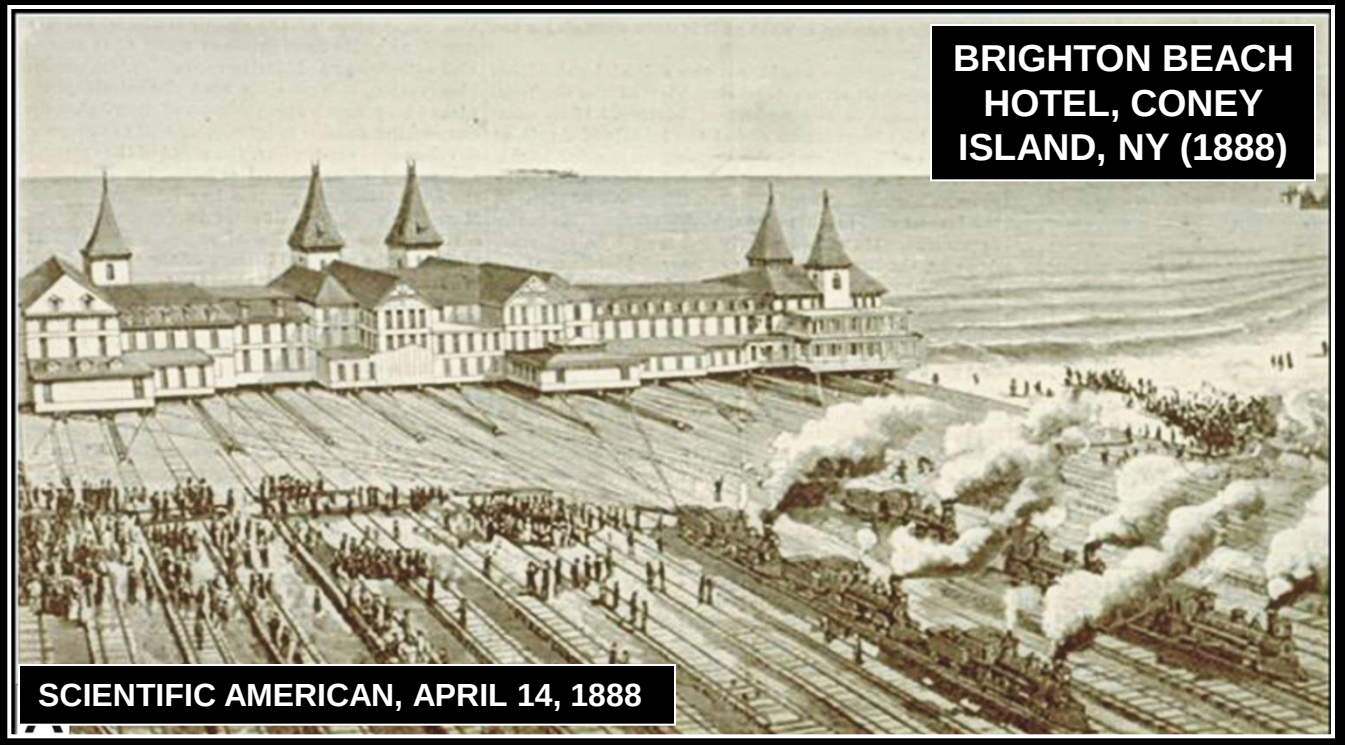
THE CONSEQUENCE OF TERMINAL GROINS IS THE EROSION & RAPID LANDWARD MOVEMENT OF DOWNDRIFT ISLAND SEGMENTS

LOCKWOOD FOLLY INLET: 2016



HOLDEN BEACH

LONG BEACH

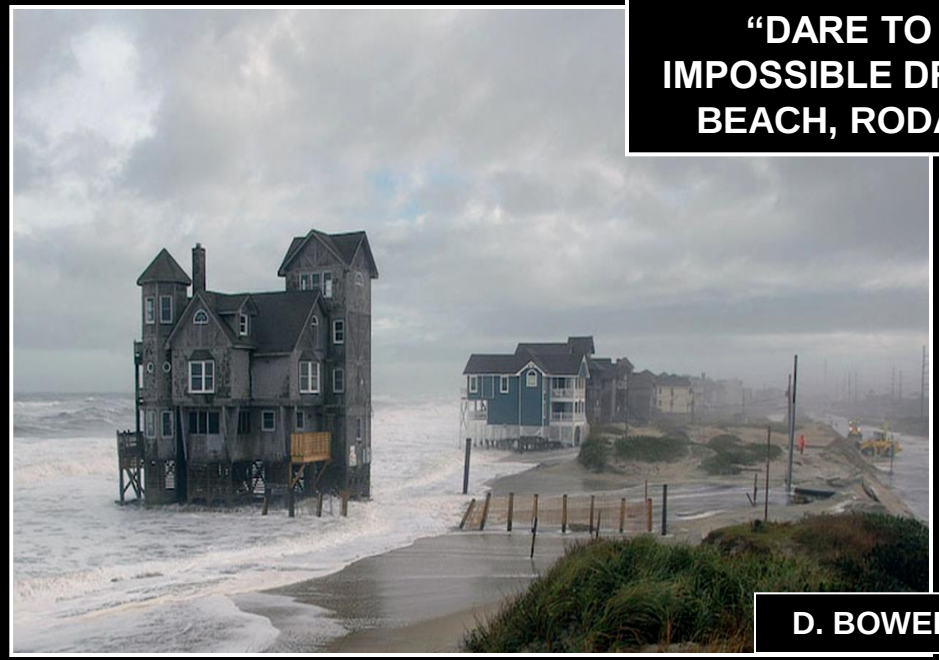


BRIGHTON BEACH HOTEL, CONEY ISLAND, NY (1888)

SCIENTIFIC AMERICAN, APRIL 14, 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