

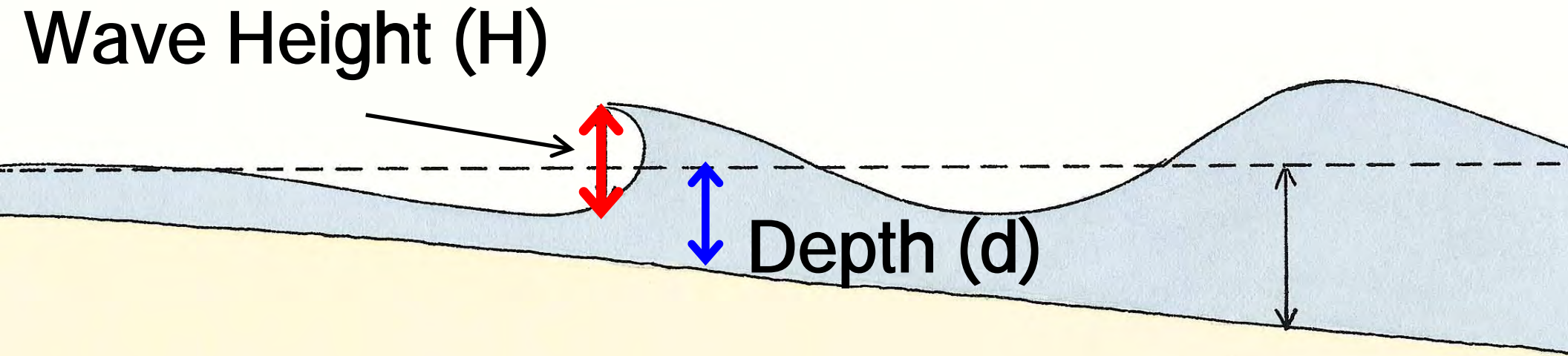
HOW THE BEACH WORKS

Spencer Rogers

North Carolina Sea Grant

UNC-Wilmington Center for Marine Science

NCSU Dept. of Civil Engineering



Wave Height (H)

Depth (d)

Wave breaks: Wave Height = Depth

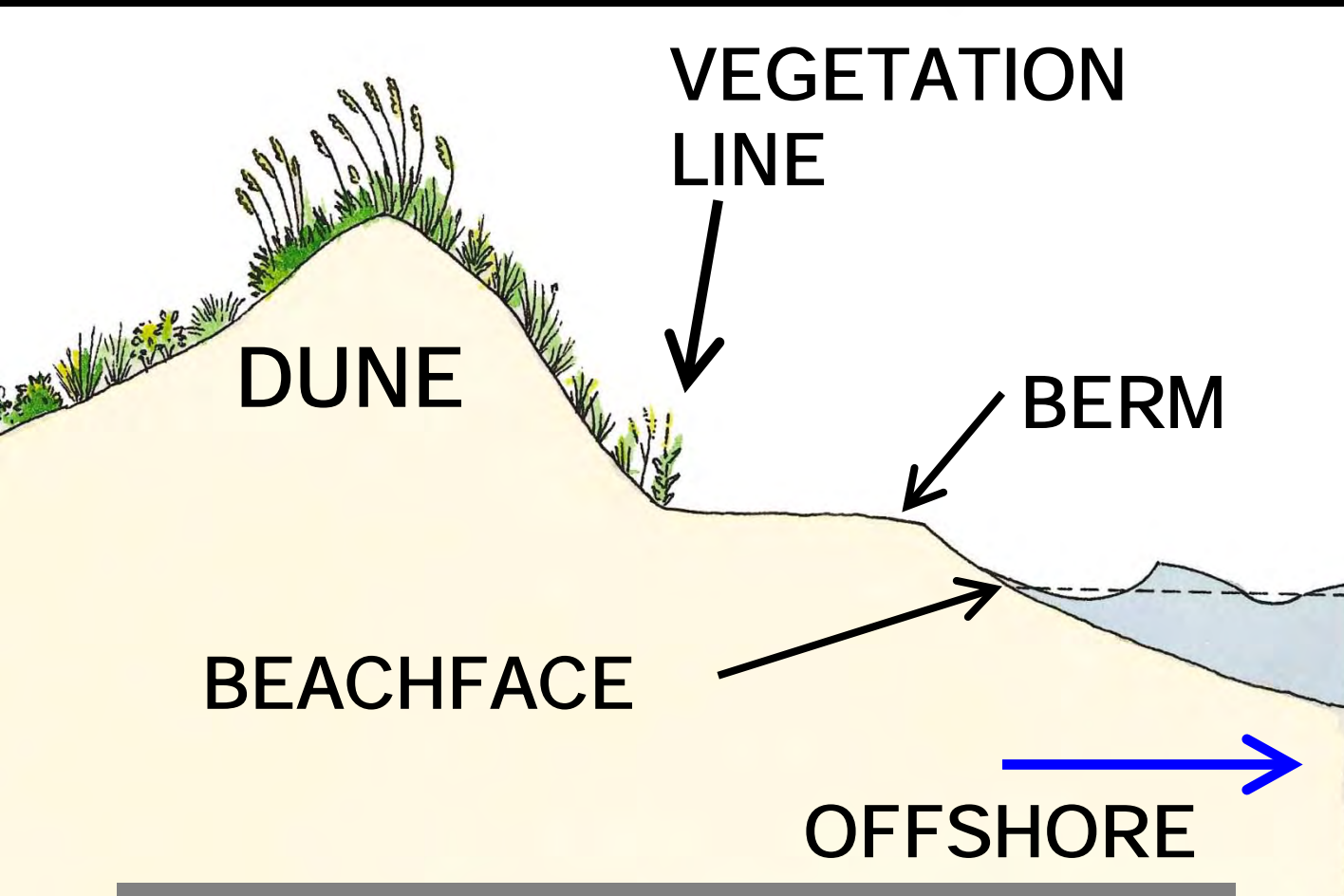
$$H = 78\% d$$



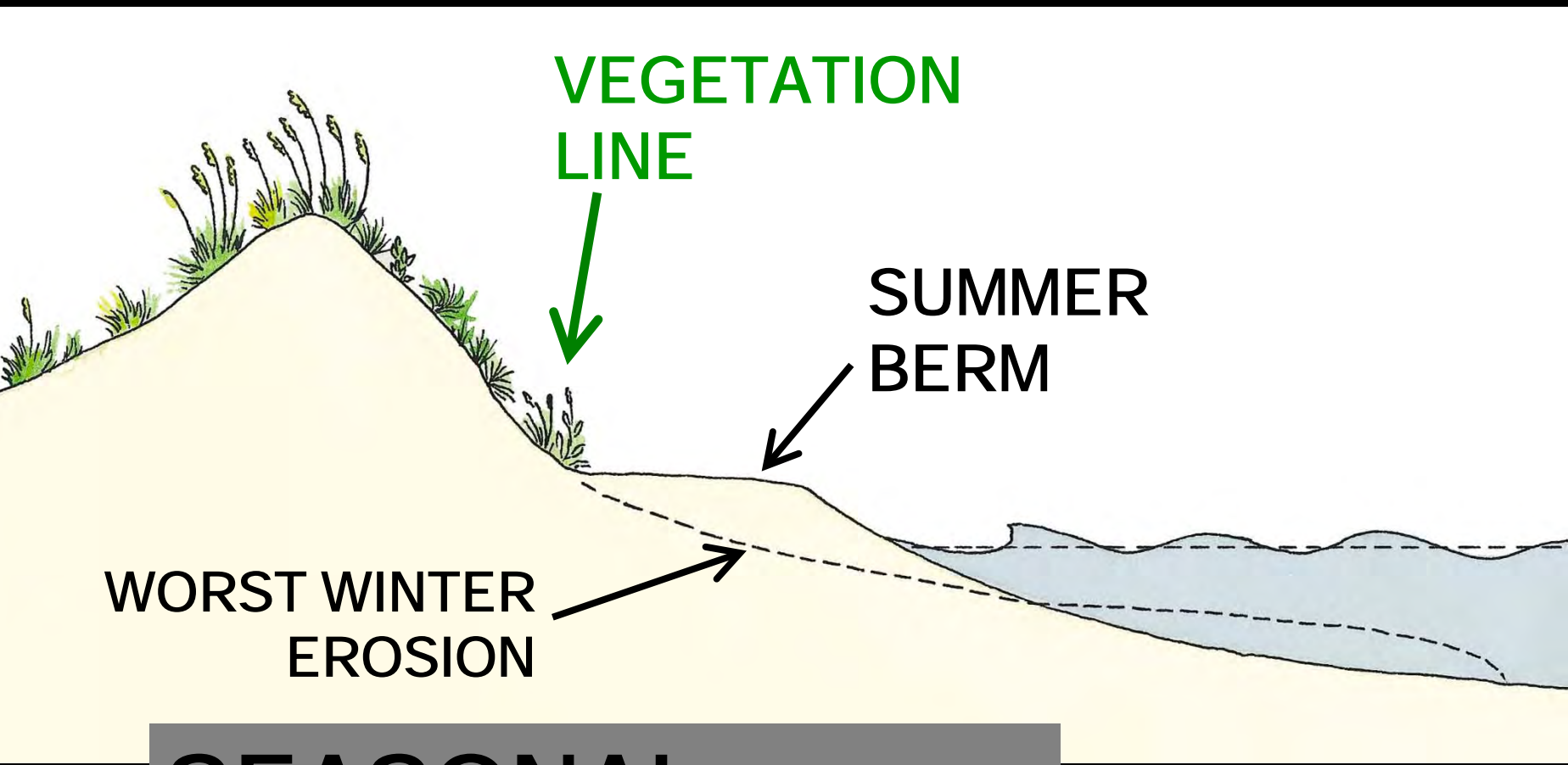
EROSION "TYPES"



- Seasonal
- Severe Storm
- Long-Term
- Inlet



DEFINITIONS



VEGETATION
LINE

SUMMER
BERM

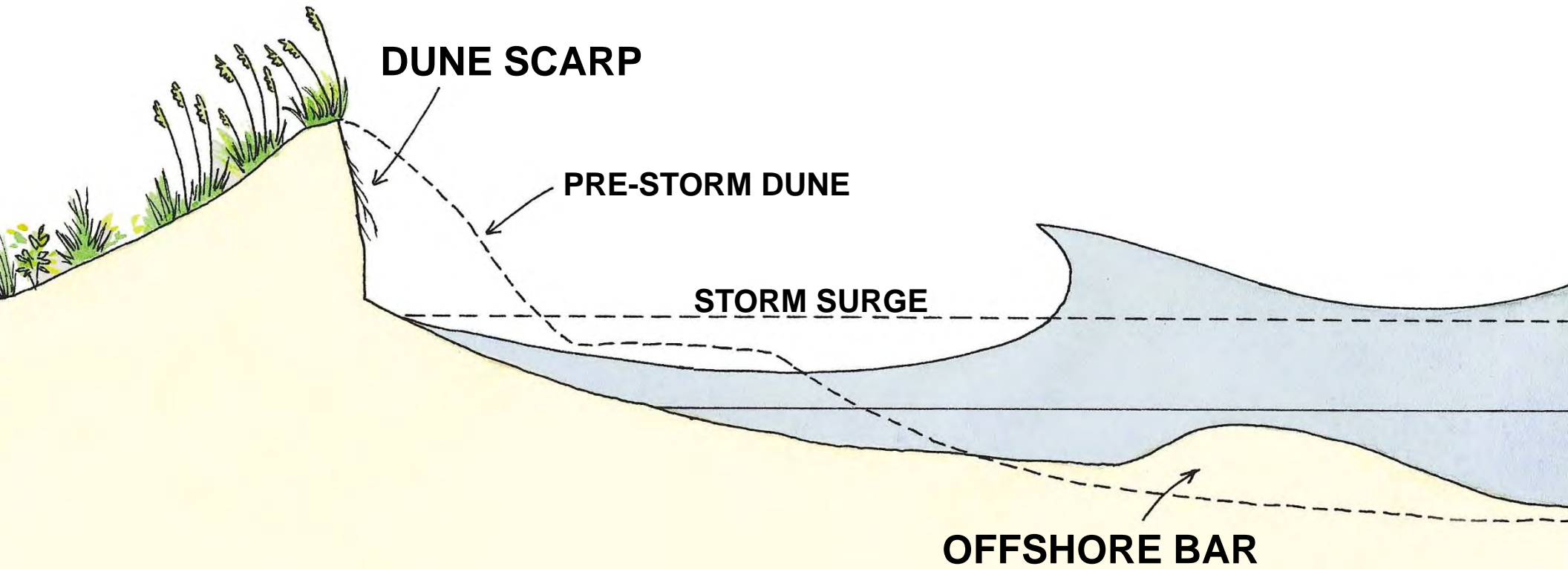
WORST WINTER
EROSION

SEASONAL
FLUCTUATIONS

Dune Myth #1

- **MYTH:** The roots of dune plants stop erosion
- **FACT:** The stems of dune plants protect from wind erosion





STORM-INDUCED



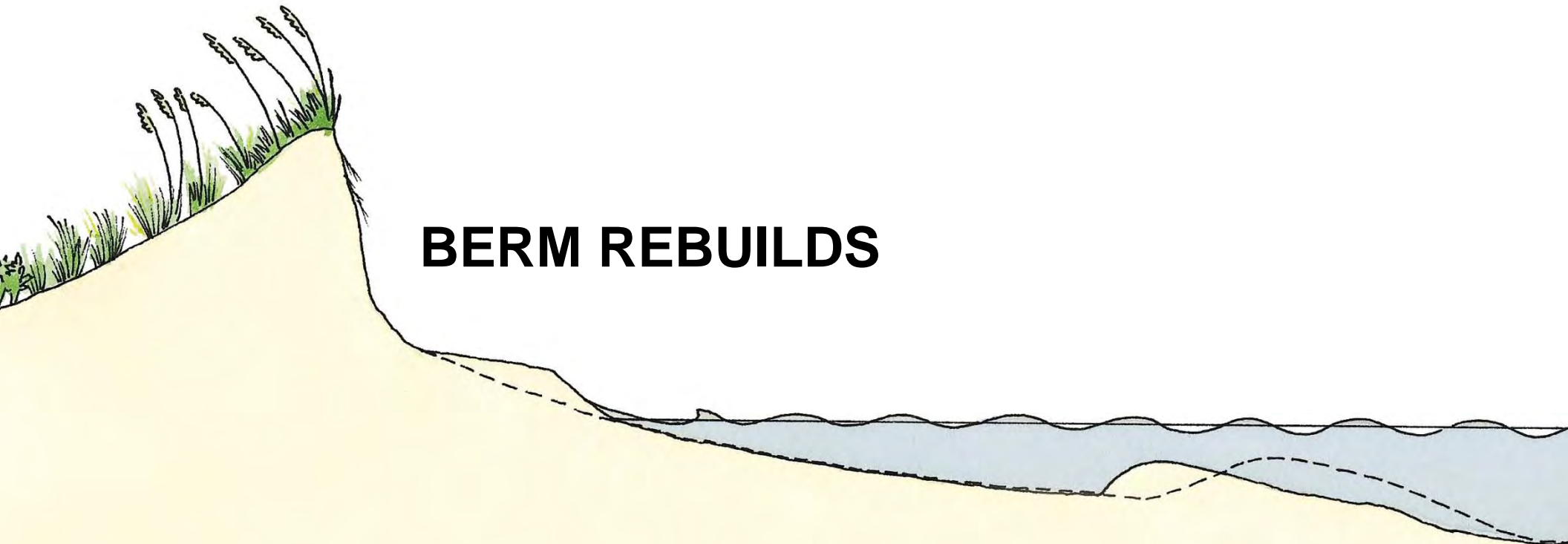






Dune Fact

Dunes provide erosion protection from infrequent but severe storms such as hurricanes



BERM REBUILDS

**POST-STORM
RECOVERY**

BAR MOVES LANDWARD



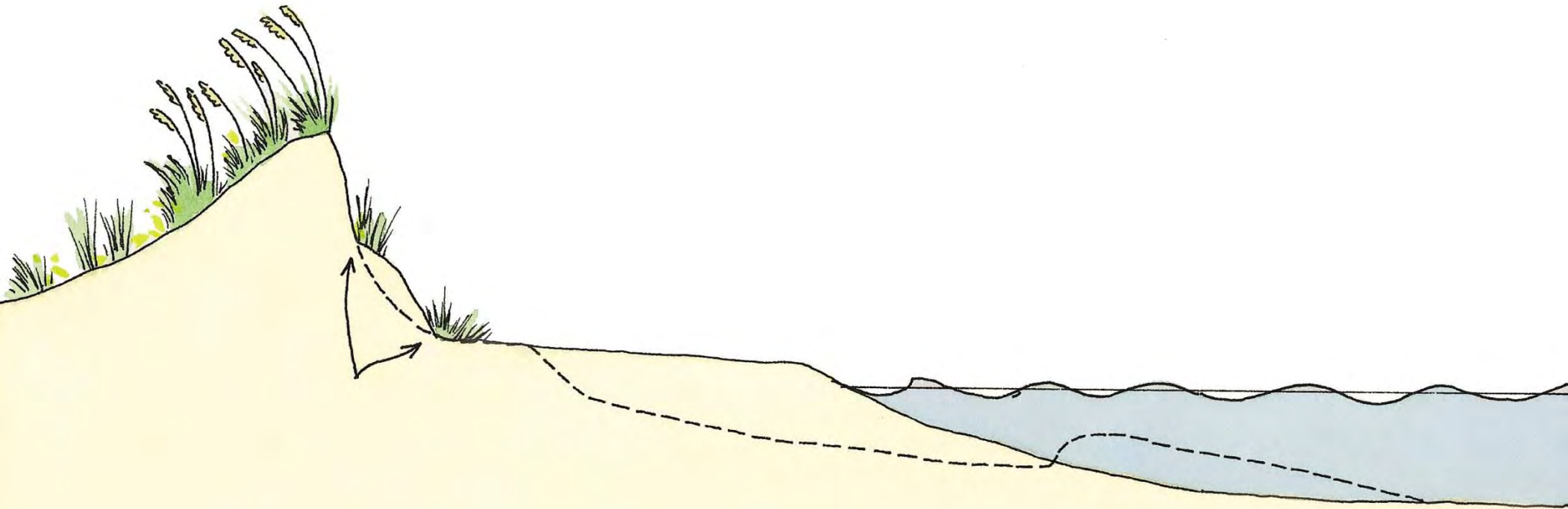
**STEEP EROSION
SCARP**



**SCARP DRIES &
COLLAPSES**



**SCARP DRIES &
COLLAPSES**

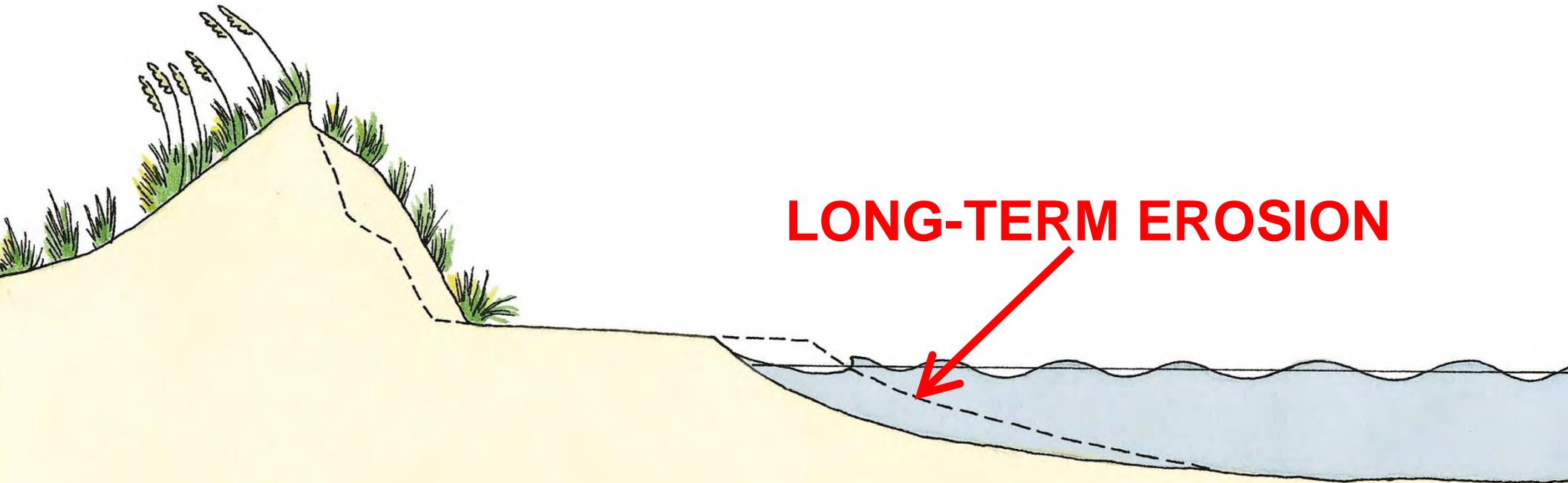


**INITIAL
REVEGETATION**









LONG-TERM EROSION

**DUNE
RECOVERY**

Dune Myth #2

- **MYTH:** Dunes provide protection from chronic erosion
- **FACT:** Dunes provide little or no protection from chronic erosion

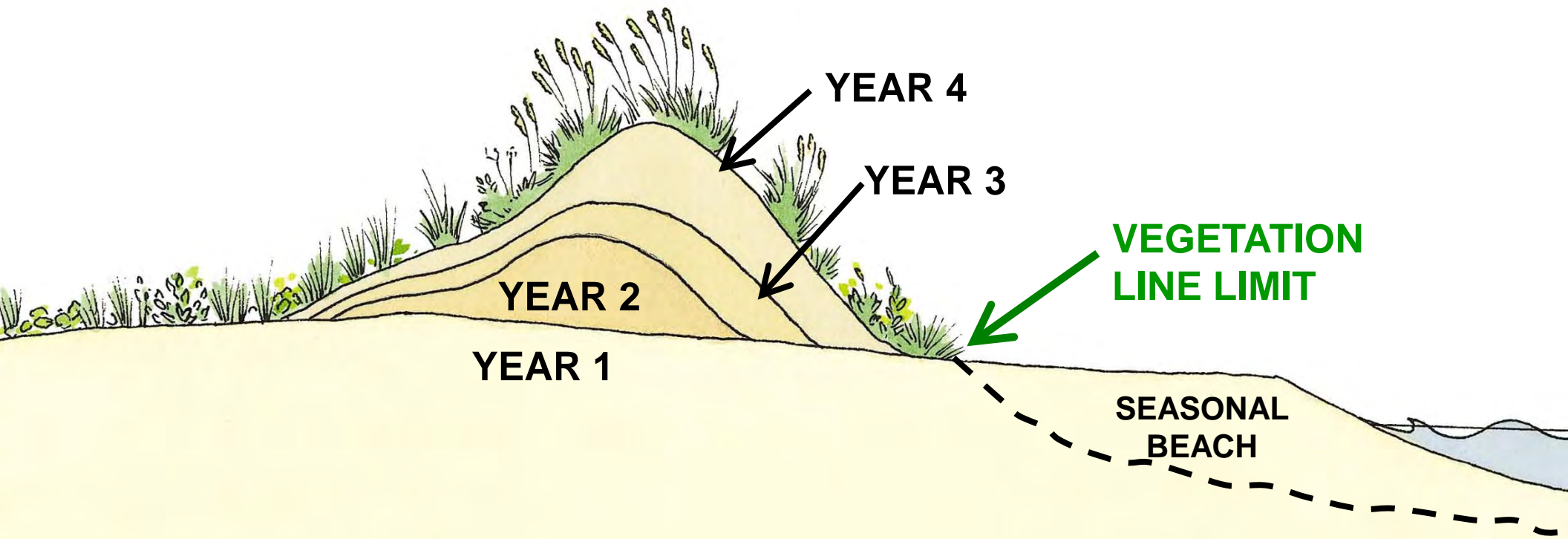






Dune Myth #3

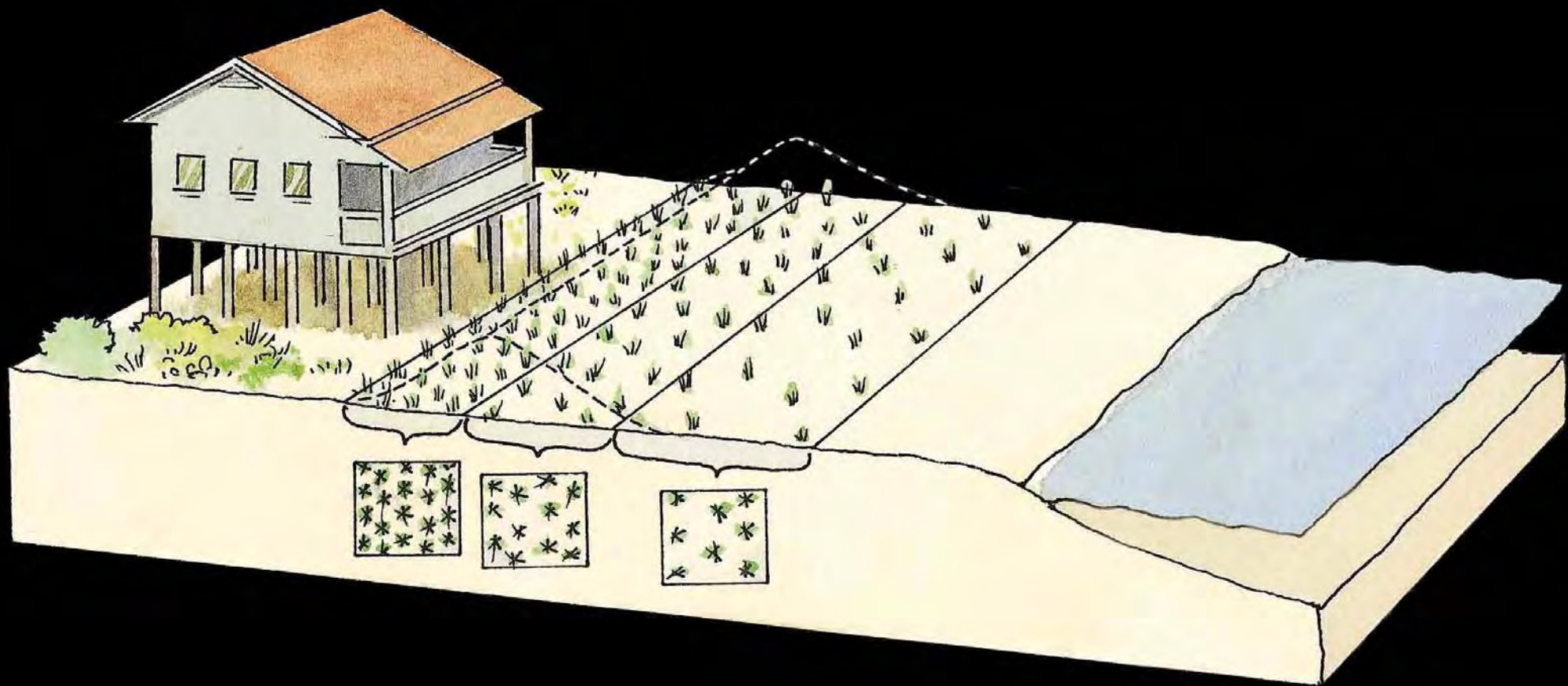
- **MYTH:** To build a big dune start close to the ocean
- **FACT:** Dunes build from landward to seaward
- **FACT:** To build a big dune start as far landward as possible



**DUNE GROWTH WITH
TIME**

Dune Fact

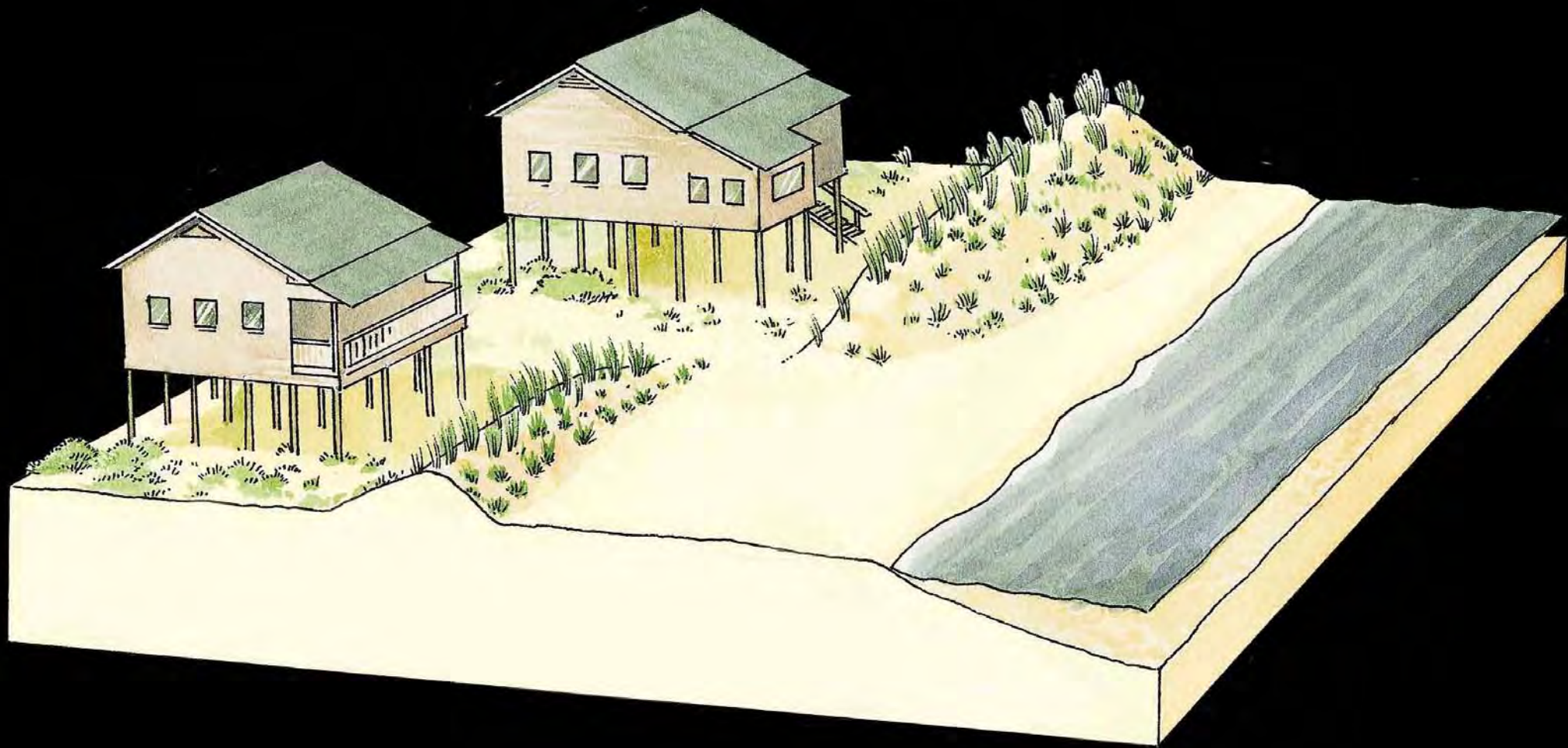
To build the best storm protection, start the dune as close to what you want to protect as feasible



Dune Myth #4

- **MYTH:** A big dune is always more protection than a small dune
- **FACT:** Location, location, location
- **FACT:** Smaller, more landward dunes can provide more protection for storm-induced and long-term erosion







SAND FENCES

- **Invest in plants rather than fence**
 - **Low maintenance**
 - **No debris**
- **Best use for pedestrian control**
- **Can trap sand too far seaward**
 - **Consider rope fences as low cost alternative**



BEACH SAFETY
RIP CURRENTS



WHAT IS A RIP CURRENT?
Rip currents are narrow channels of fast-moving water that flow from the beach back to the ocean. They are formed when waves break on a beach with a narrow channel or gap in the sandbars. The water that flows back to the ocean through the channel is called a rip current.



HOW TO AVOID A RIP CURRENT:
If you are caught in a rip current, do not panic. Do not try to swim directly across the current. Instead, swim parallel to the beach until you are out of the current. Then, swim back to the beach at an angle.



WHAT TO DO:
If you are caught in a rip current, do not panic. Do not try to swim directly across the current. Instead, swim parallel to the beach until you are out of the current. Then, swim back to the beach at an angle.

ADDITIONAL SAFETY TIPS:
Always wear your life jacket when boating. Do not drink alcohol before swimming. Always use proper beach etiquette.

Beach Safety
Beach Safety
Beach Safety

31

OUTER BANKS SHORELINE & BEACHFILL EXPECTATIONS

**SPENCER ROGERS
NC Sea Grant**

CENTER FOR MARINE SCIENCE

UNC-Wilmington

CIVIL ENGINEERING

NC State University

Top 10 things you need to know about your beach & beach nourishment

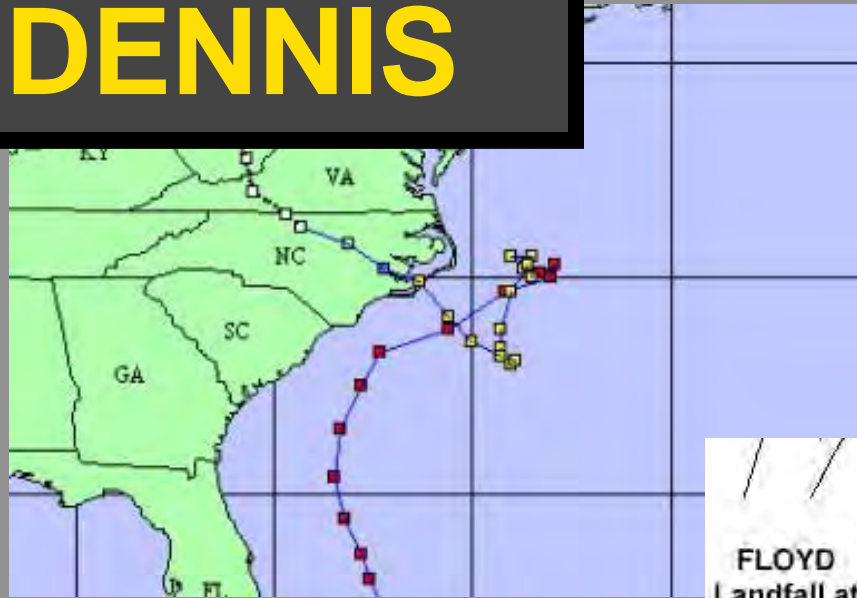
- 10. OBX has a long-term erosion problem**
- 9. OBX has a hurricane & NE'er problem**
- 8. Beachfill: treatment, not a cure**
- 7. Only effective on longer shorelines**
- 6. Effective for moderate erosion rates**

Top 10 things you need to know about your beach & beach nourishment

5. NOT cost-effective in high erosion rates
Beware erosion hotspots like Inlets
4. Small projects effective for long-term erosion
3. Larger projects provide hurricane protection (with dune)
2. Beach nourishment is expensive
1. Inaction may be more expensive

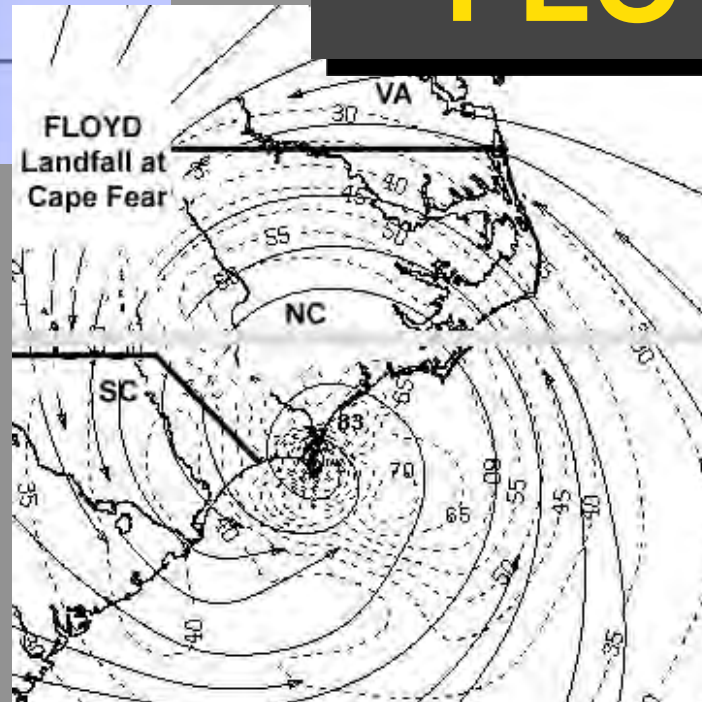
For the oceanfront owners & the town

DENNIS



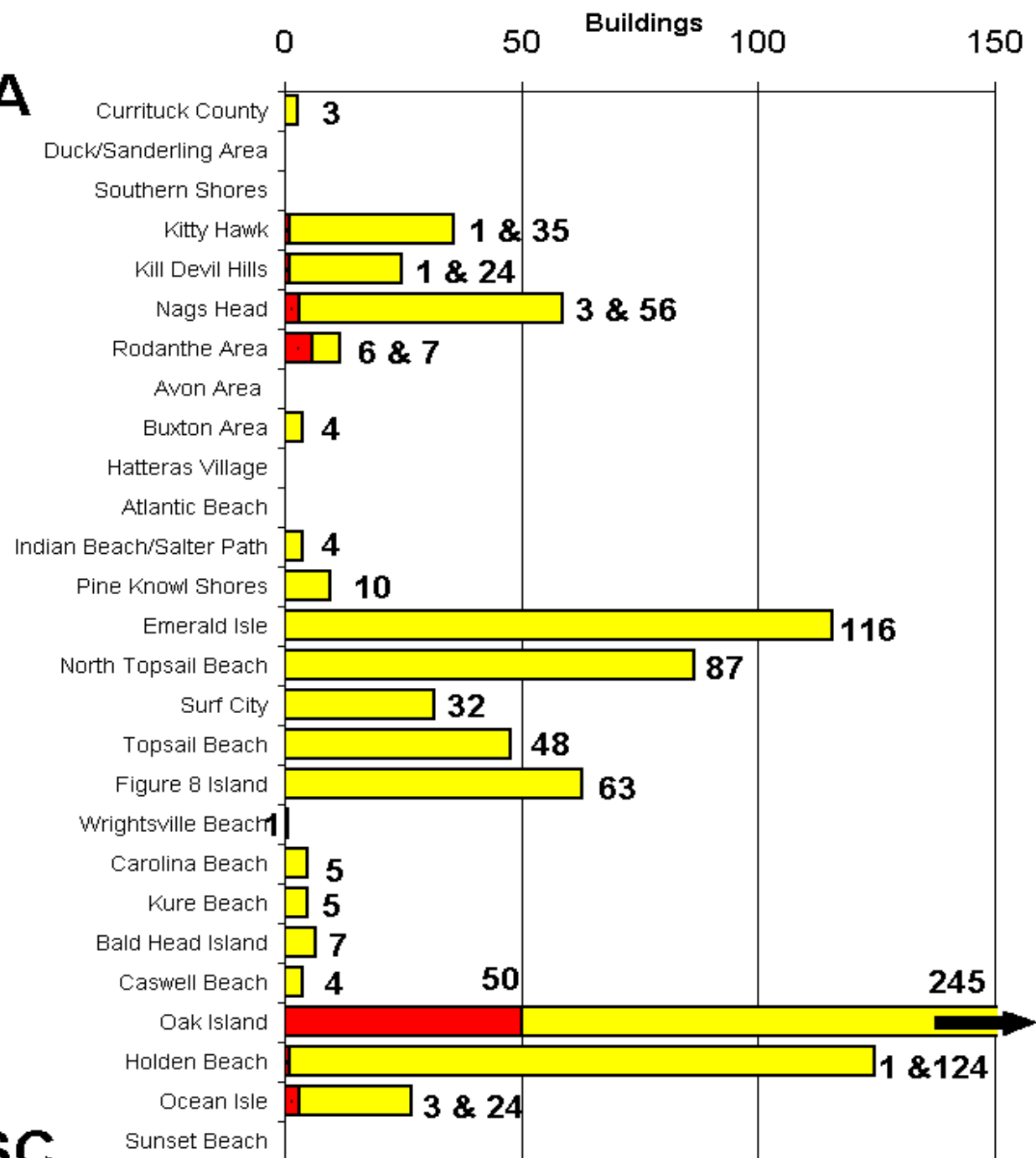
1999

FLOYD



**Buildings
DESTROYED
or
THREATENED
by
Erosion**

VA



SC

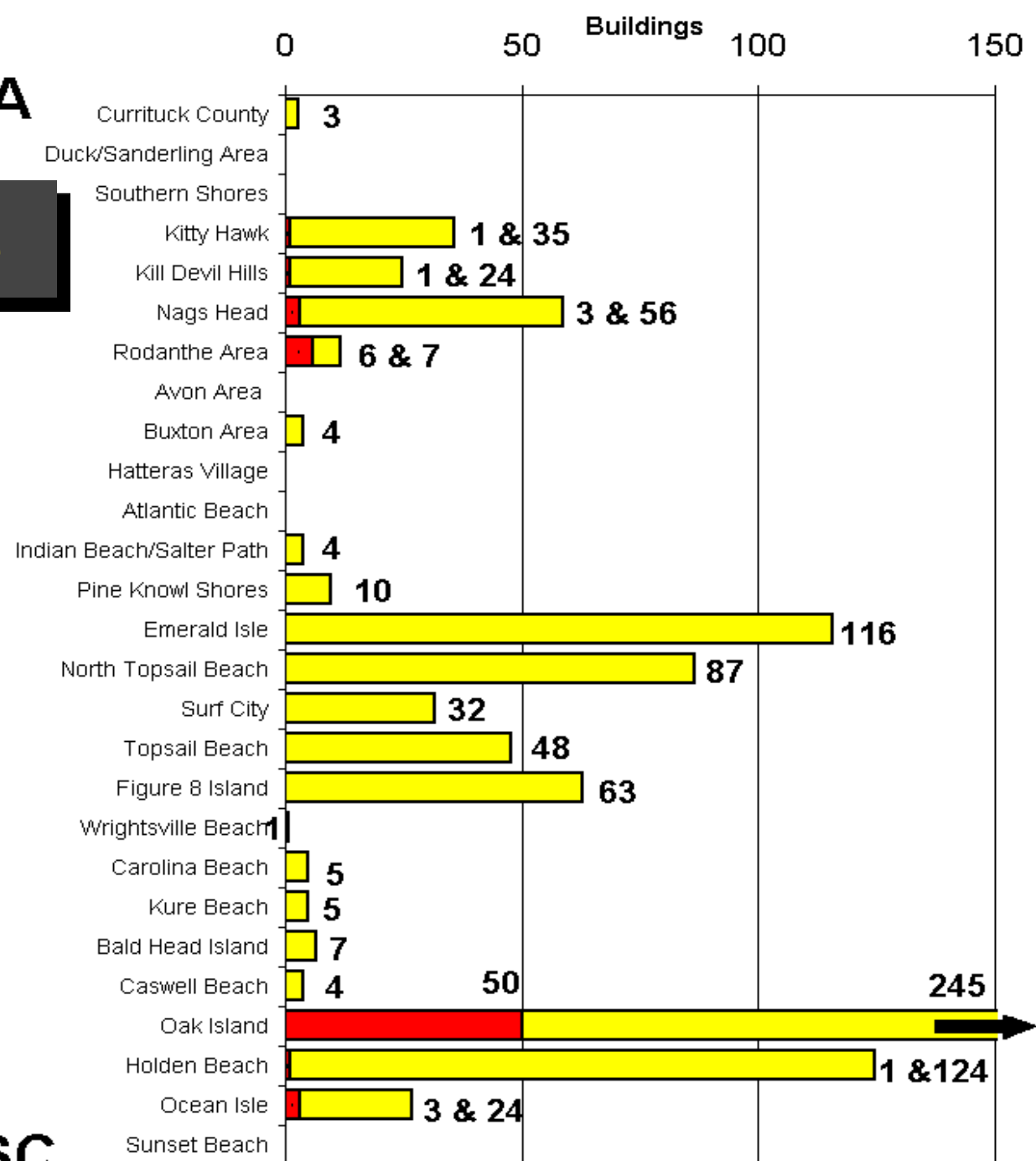


OBSERVATIONS

- Prior damage
- Erosion hot spots

VA

SC

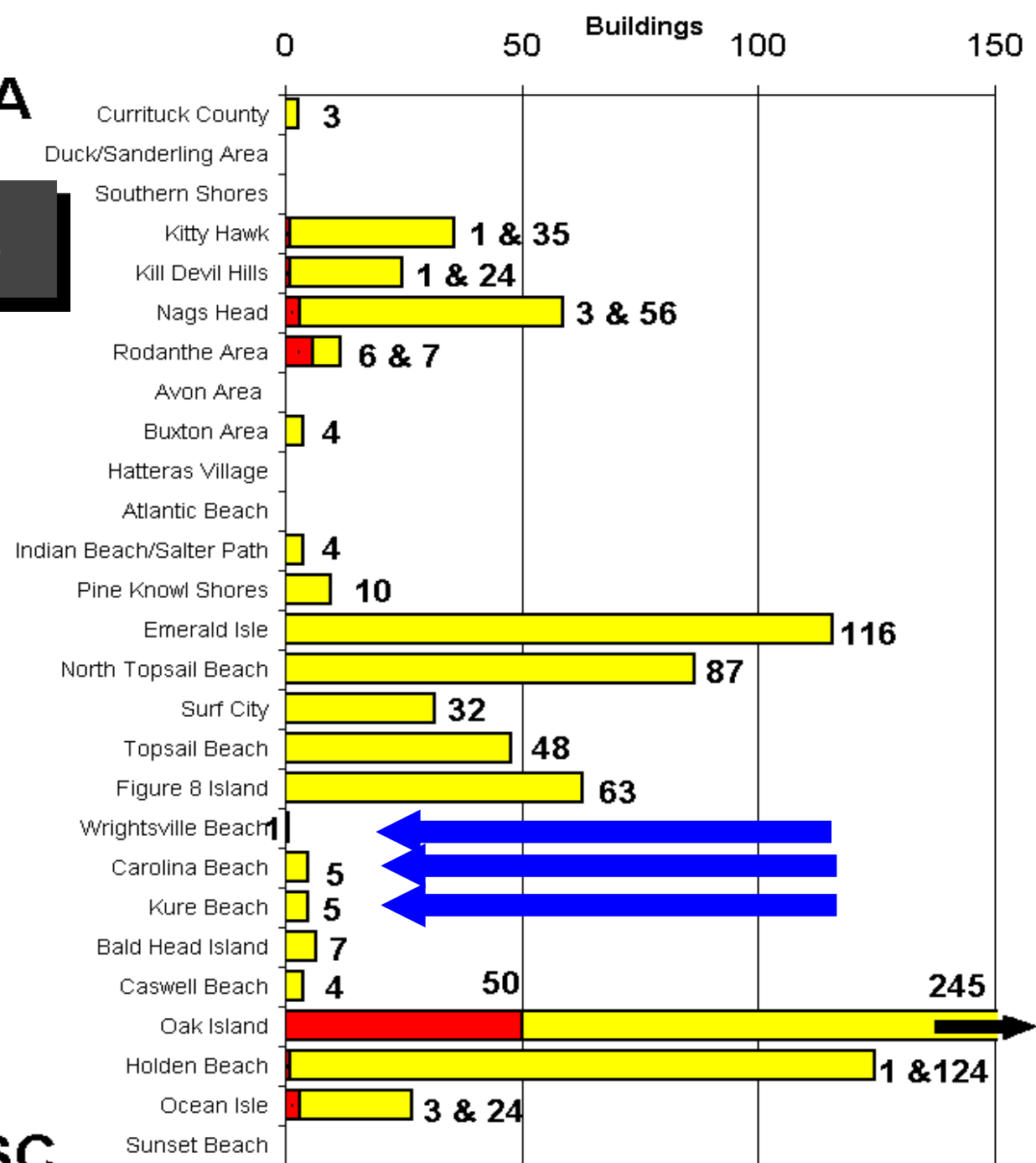


OBSERVATIONS

- Beach nourishment: Corps of Engineers Hurricane protection projects

VA

SC



THE SCORE:

OUTSIDE NOURISHMENT PROJECT DUNES

968

Threatened or Destroyed

INSIDE PROJECT DUNES

0



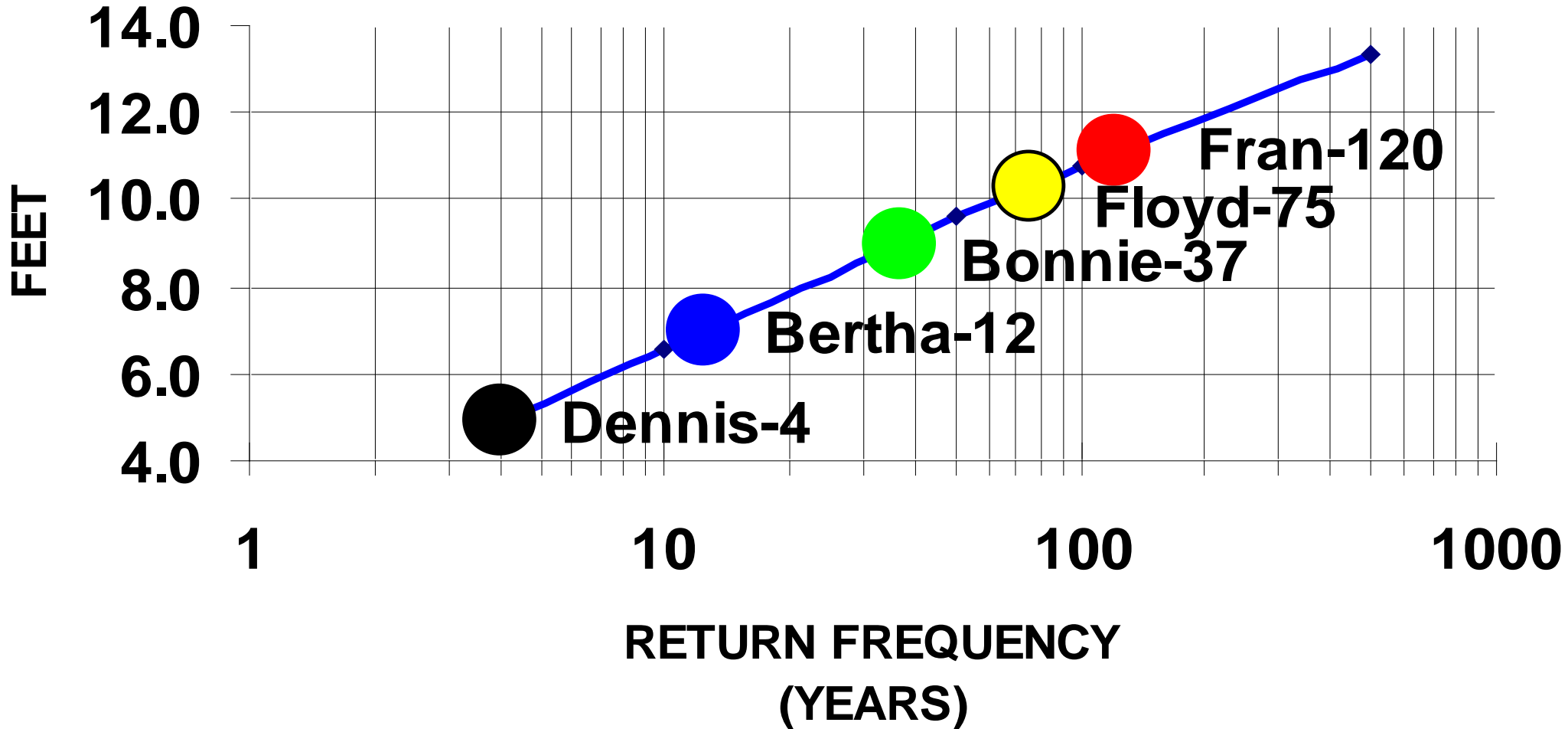
*Project Begins
Here and Moves
To Top of Picture*

**Wrightsville Beach
Renourishment**

*Masonboro Inlet
Borrow Site – Dredge
Is to the Left*

STORM SURGE ELEVATIONS

Behind Masonboro Island



WRIGHTSVILLE BEACH

CENTRAL AREA, POST-DENNIS & FLOYD





1979, NO MAINTENANCE



1980 RECONSTRUCTION



1995, PRE-HURRICANES



POST-BERTHA AND FRAN, 1996



POST-BONNIE, 1998



**POST-DENNIS & FLOYD
1999**



Summer 2003

2006





OBSERVATIONS

Smaller
nourishment
projects

- Long-term erosion protection
- Poor storm protection

VA

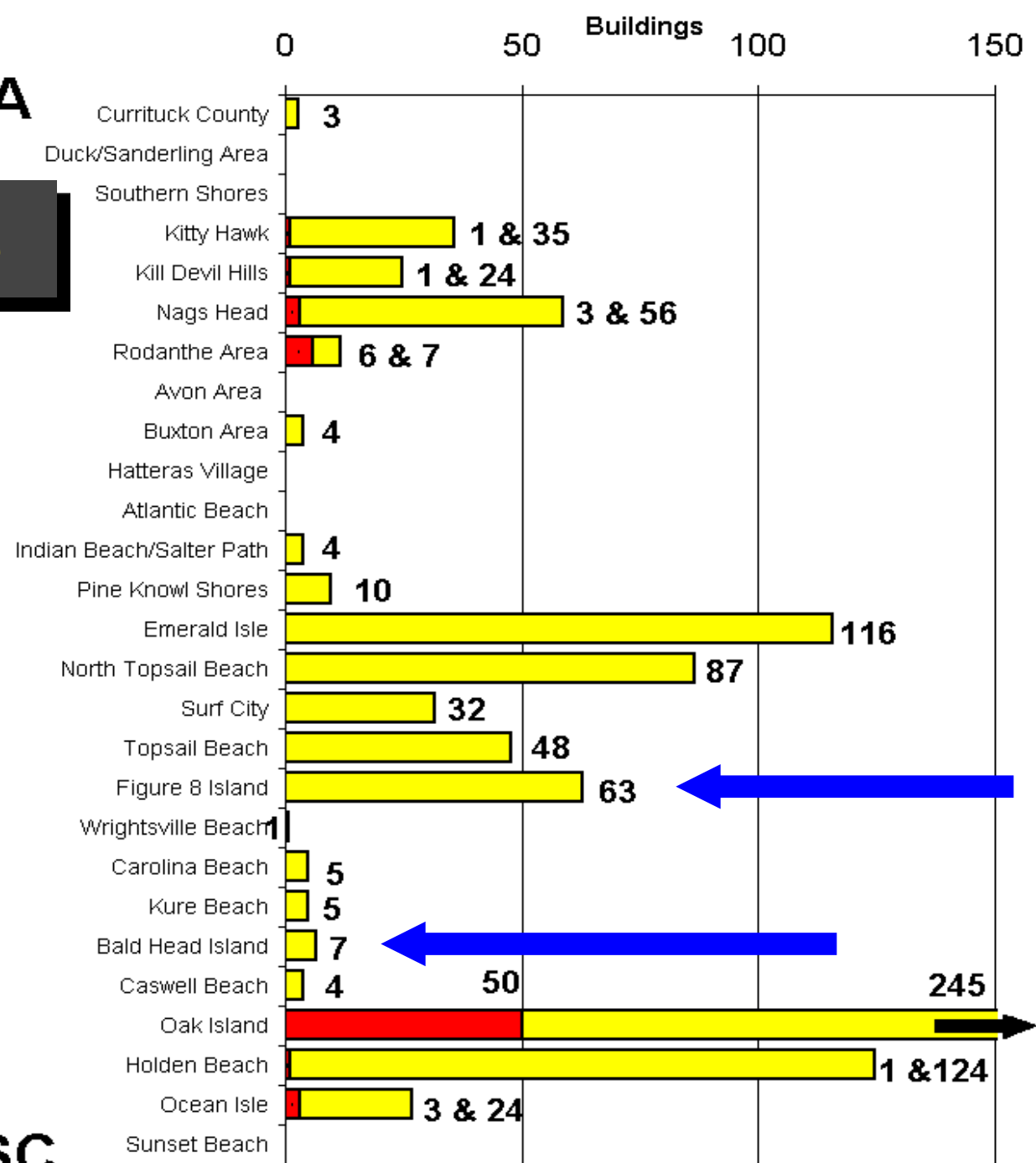




FIGURE 8 ISLAND

5th St

4th Ct

Ashville St

3rd Ct

Shallowe Blvd









QUESTIONS?

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