"Terminal Structures: Definitions, Processes and Examples"

Meeting of North Carolina Coastal Resources Commission

Morehead City, NC

February 11, 2009

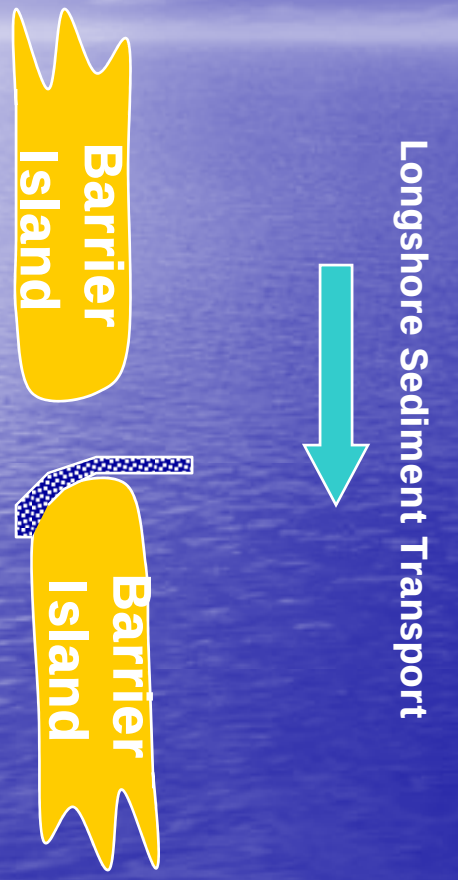
Outline

1. Distinguish Between Terminal Groins and Usual Groins and Between TG and Jetties
2. Describe Terminal Structures (Groins)
3. Discuss Processes Associated With Terminal Structures Adjacent to Inlets (Primarily on the Downdrift Side)
4. Examine a Number of Terminal Structures and Their Associated Responses

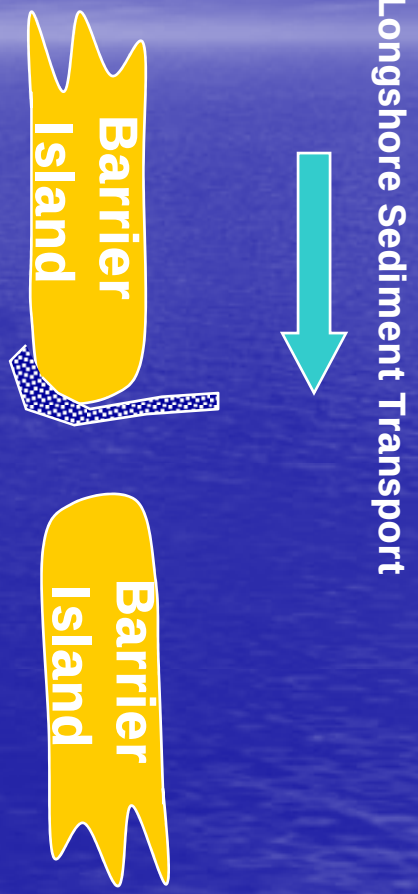
Bottom Line

1. Terminal Groins Are Not All That Complicated
2. They Have Functioned Effectively in Many Places Including North Carolina
3. I Know of No Installation Where They Have Caused Bad Effects

Terminal Structures (Groins)

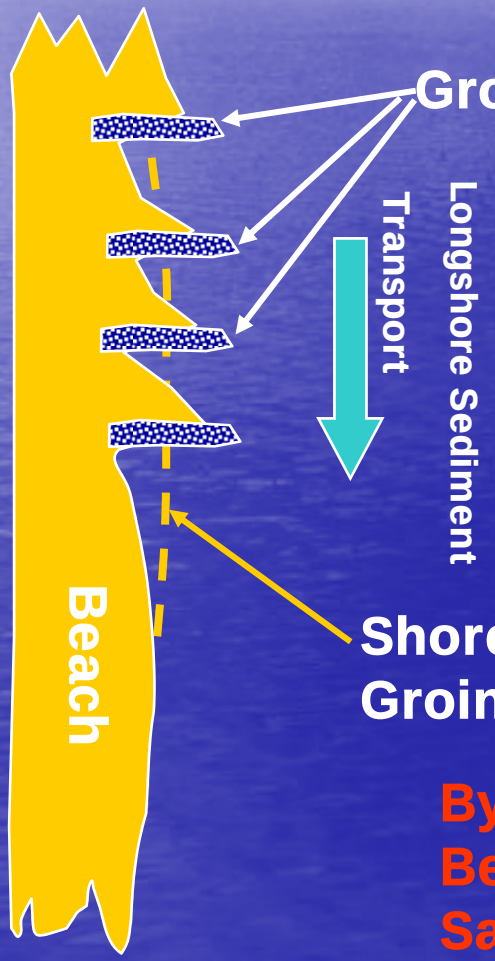


Terminal Groin on Downdrift Side of Inlet



Terminal Groin on Updrift Side of Inlet

Difference Between Terminal Groins and Usual Groins



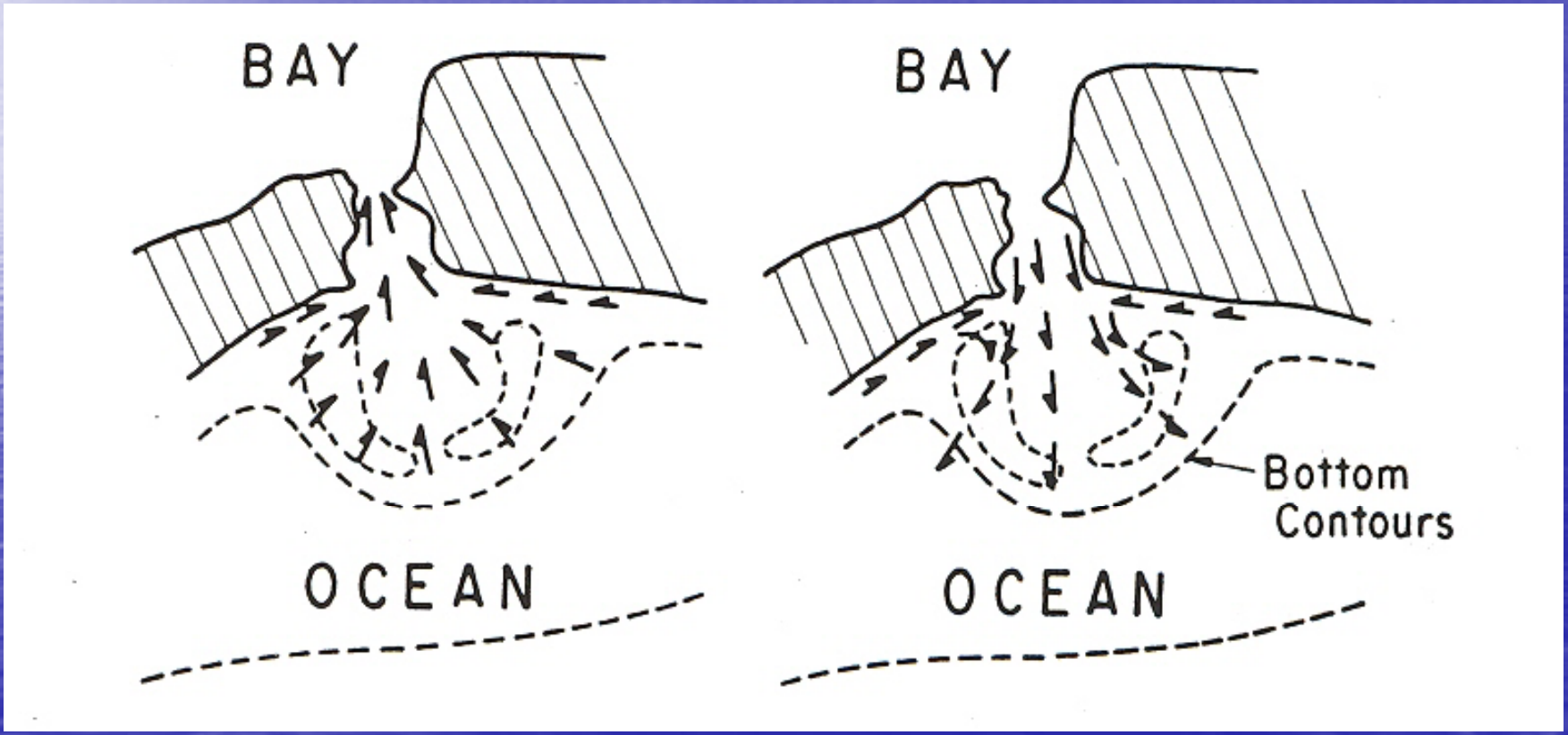
1. Usual Groins Are Designed to Trap Sand From the System
2. This Results in Downdrift Erosion!

By Contrast, TERMINAL GROINS, Being at the End of a System, Retain Sand in the System… *a Fundamental Difference!*

Illustration of a Field of Groins

Difference Between Terminal Groins and Jetties

Sand Flows in the Vicinity of Inlets (M. P. O'Brien, 1969)



Flood Tide

Ebb Tide

Terminal Structures on the Downdrift Sides of Inlets: Do They Work?

Let's Look at Some Actual Cases!

Basis For Much of This Presentation

Journal of Coastal Research	SI	18	195-210	Fort Lauderdale, Florida	Fall 1993

Terminal Structures at Ends of Littoral Systems

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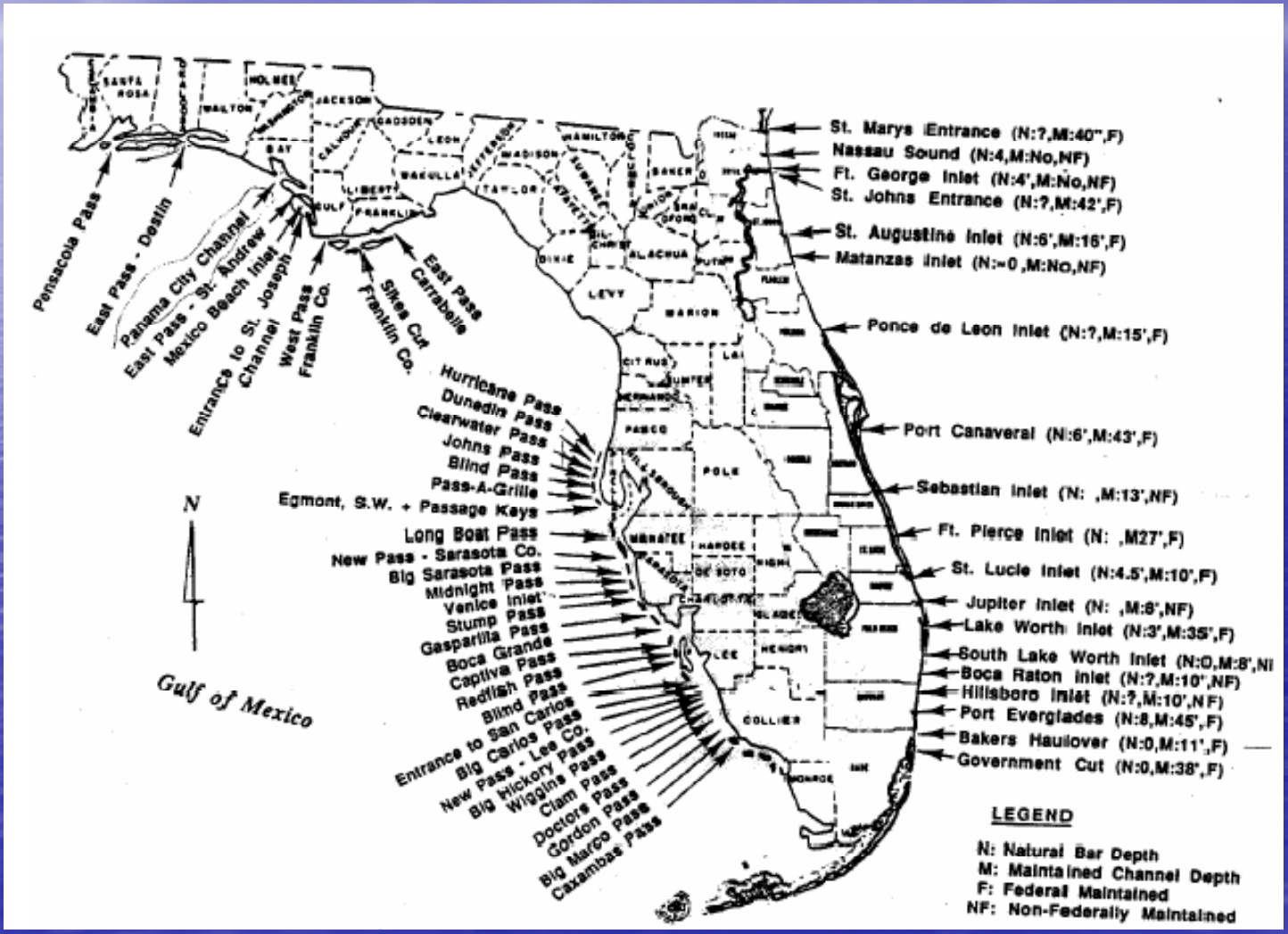
ABSTRACT

DEAN, R.G., 1993. Terminal structures at ends of littoral systems. *Journal of Coastal Research*, Special Issue No. 18, 195-210. Fort Lauderdale (Florida). ISSN 0749-0208.

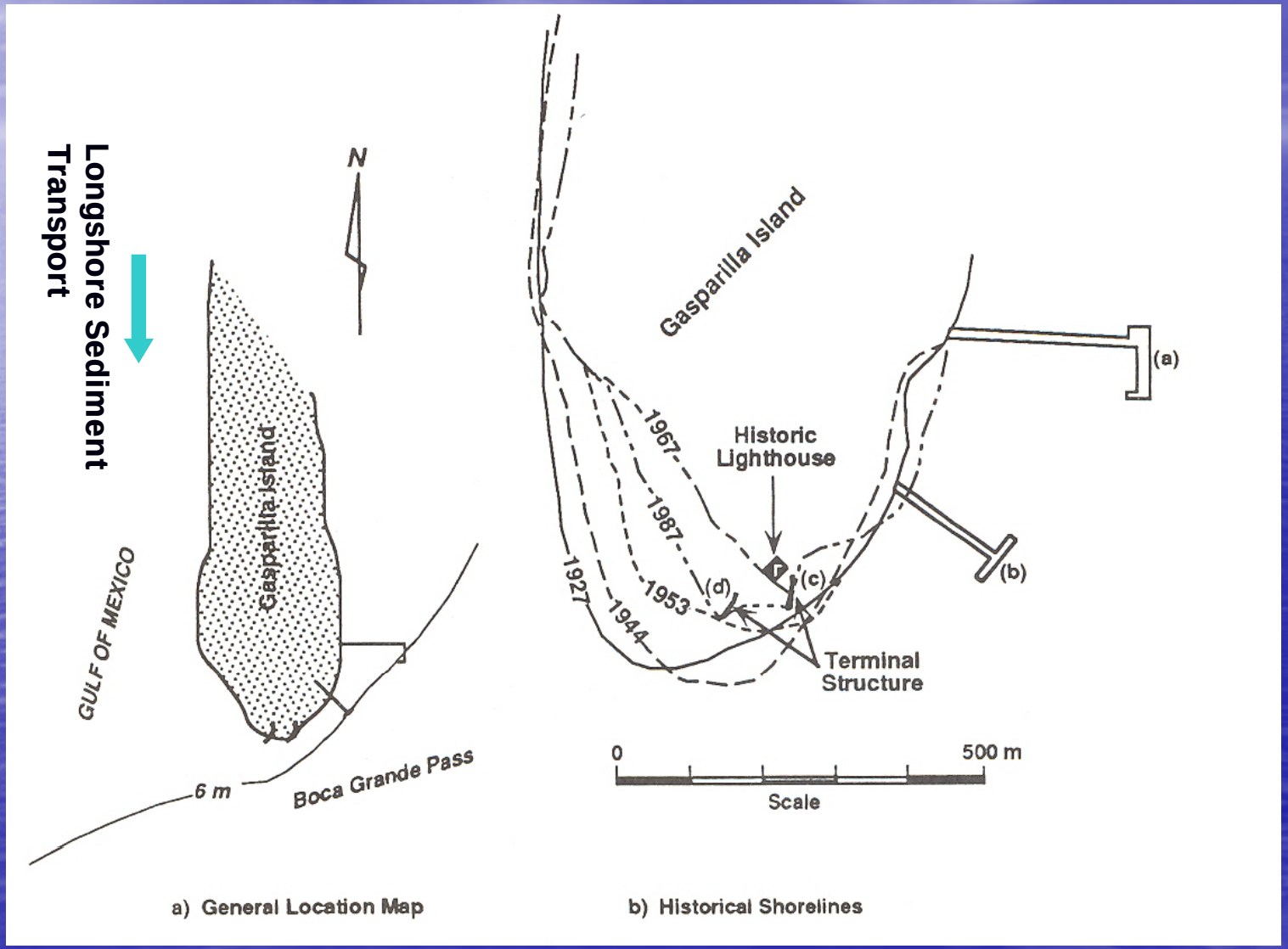
The interaction of deepened navigation channels with the adjacent shorelines is examined with the conclusion that the effect is to cause sediment transport from and draw down of the adjacent beaches, thereby contributing to two undesirable effects: (1) erosion on the adjacent shorelines, and (2) accelerated deposition in the deepened channel. A conceptual method is presented for representing the effect of a deepened channel on the sediment budgets of the adjacent shorelines including the effects of terminal structures (jetties). Through this analysis and examination of several entrances in Florida and elsewhere, it is shown that under the proper conditions, terminal structures can be effective in alleviating both of these undesirable effects.

ADDITIONAL INDEX WORDS: *Entrances, erosion, navigation channels, sediment deposition, shorelines.*

Florida's Inlets

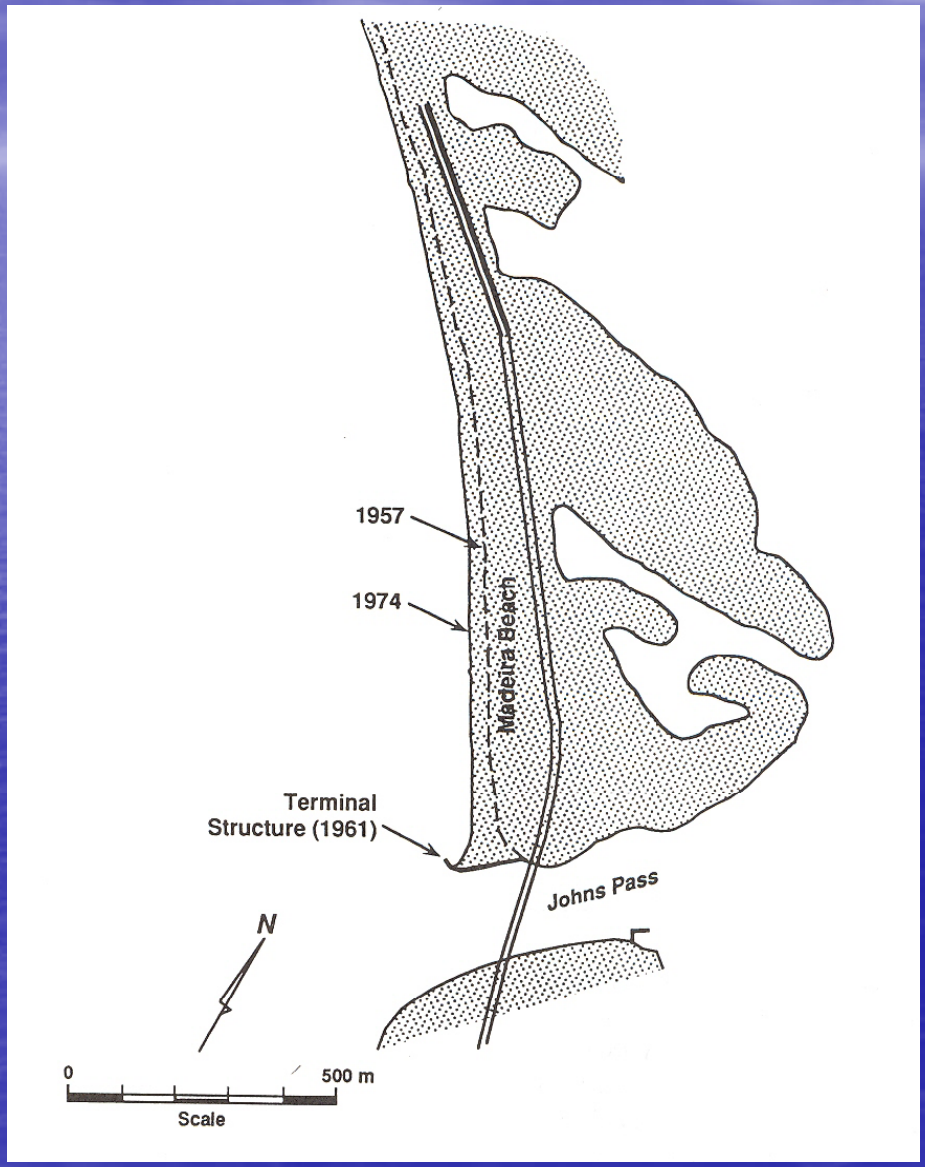


Gasparilla Island, FL



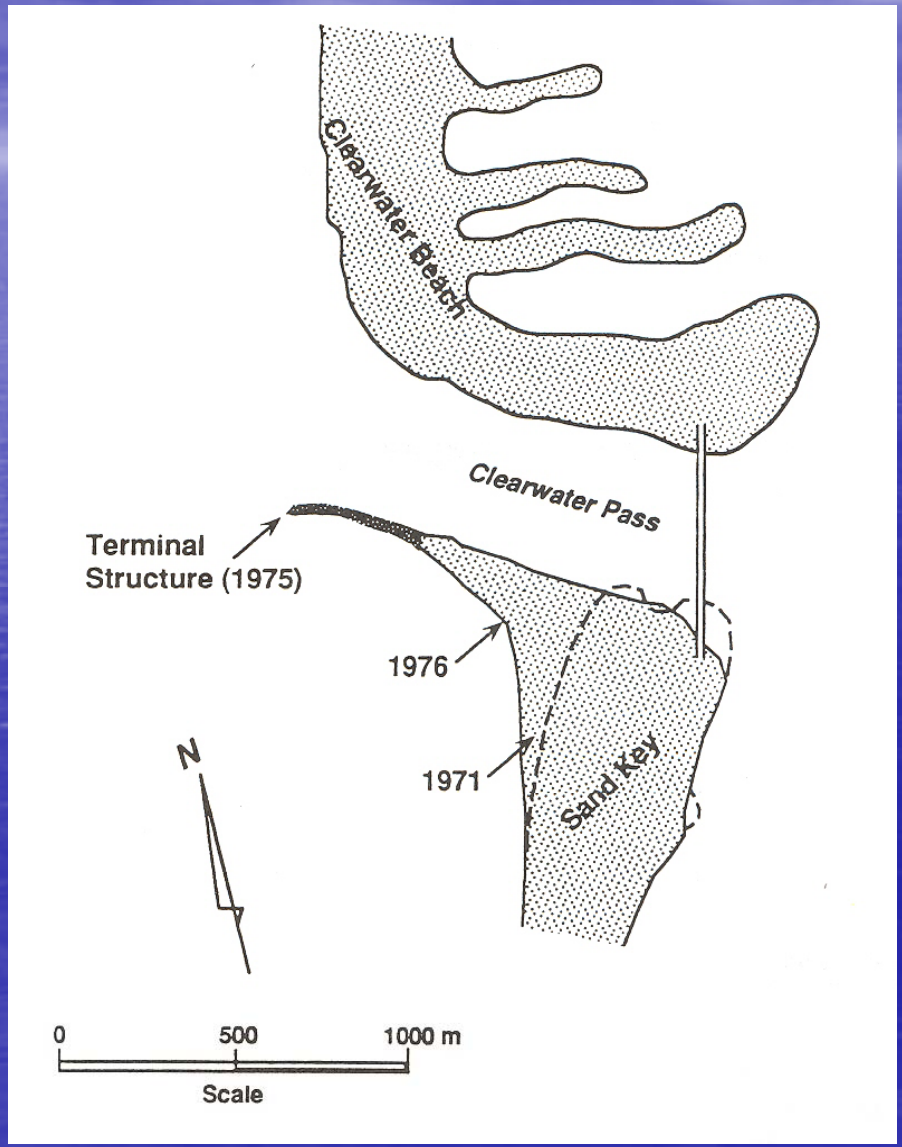
Gasparilla Island, FL

Johns Pass, FL

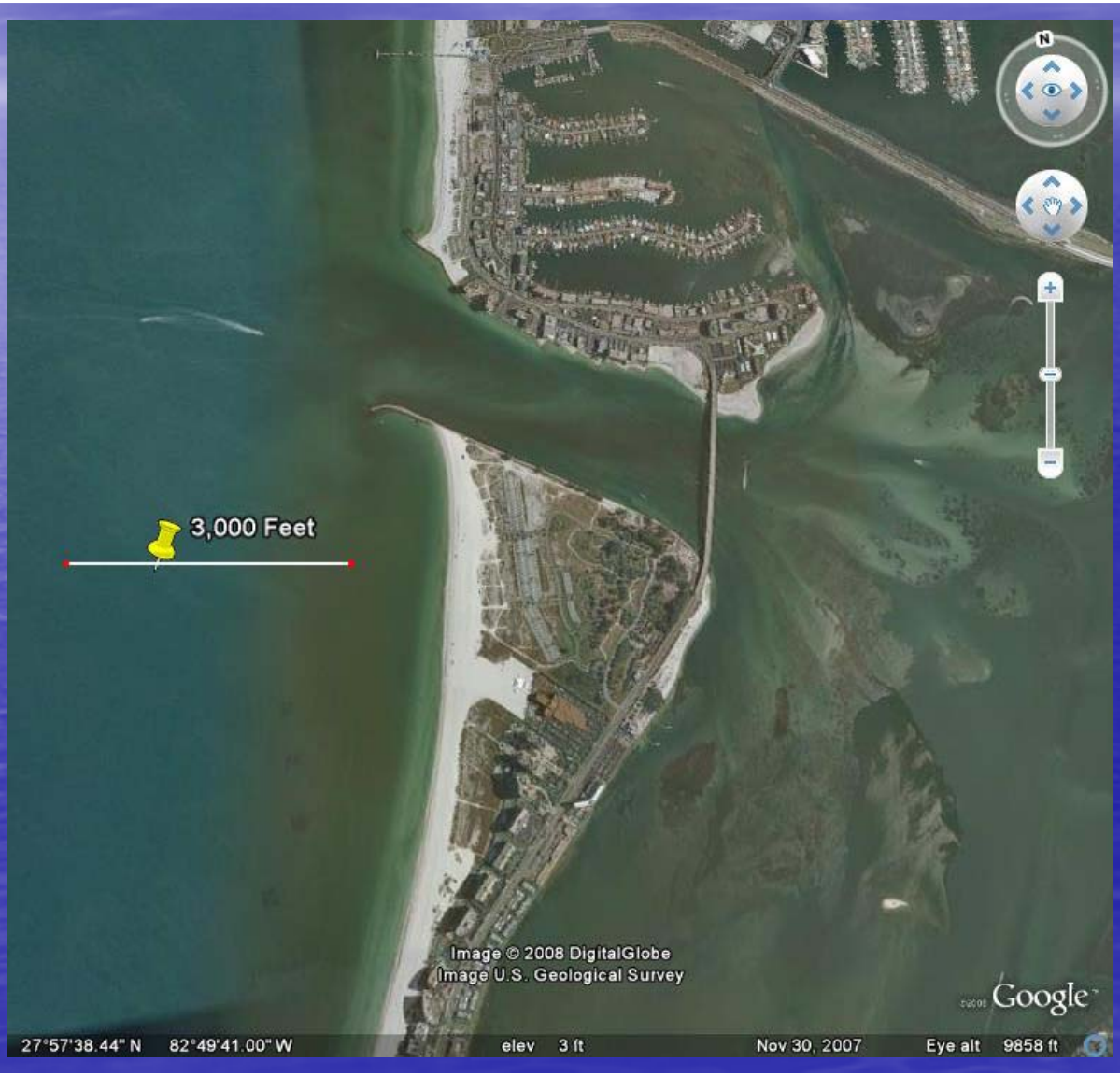


Johns Pass, FL

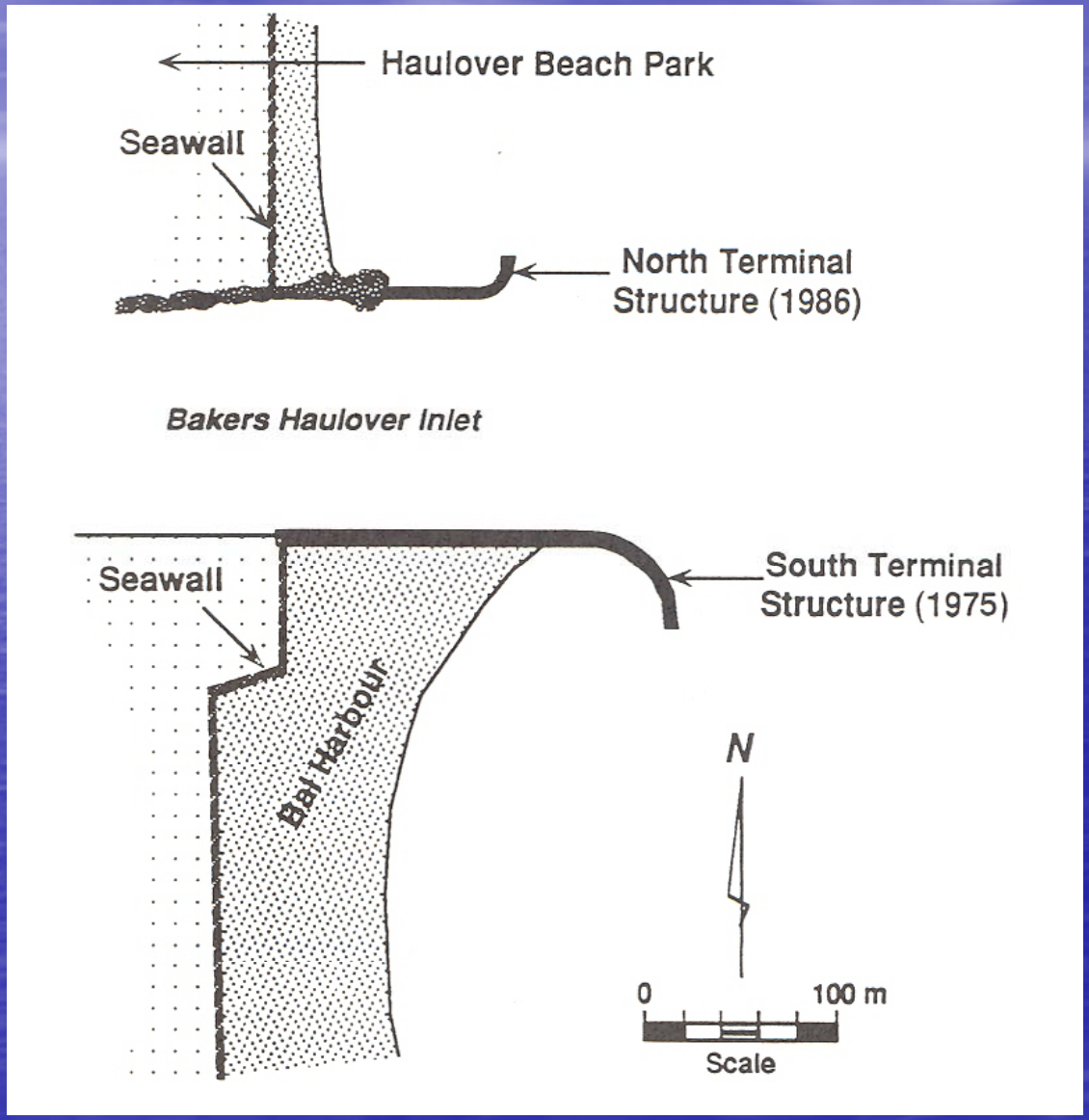
Clearwater Pass, FL



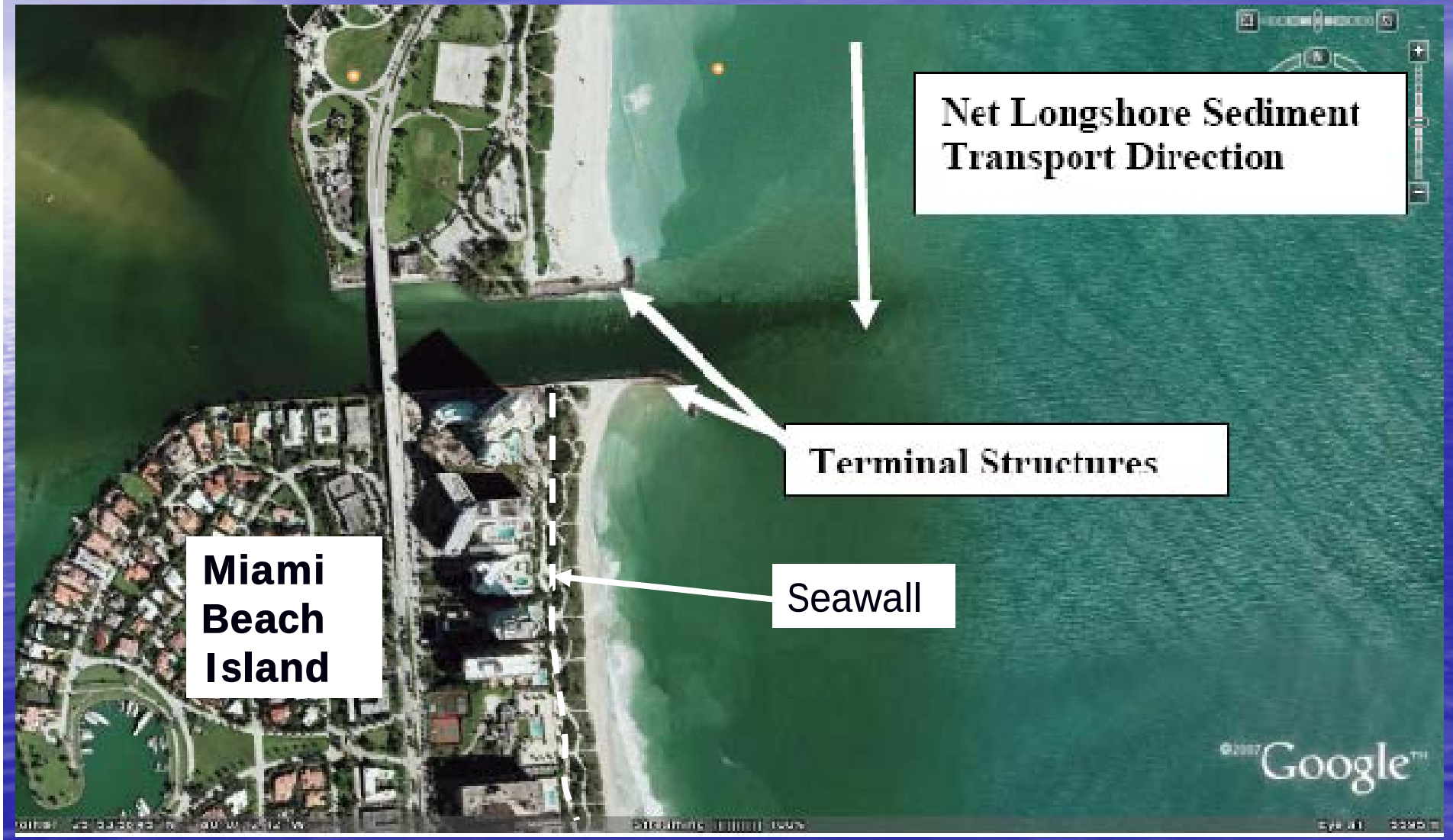
Clearwater Pass, FL



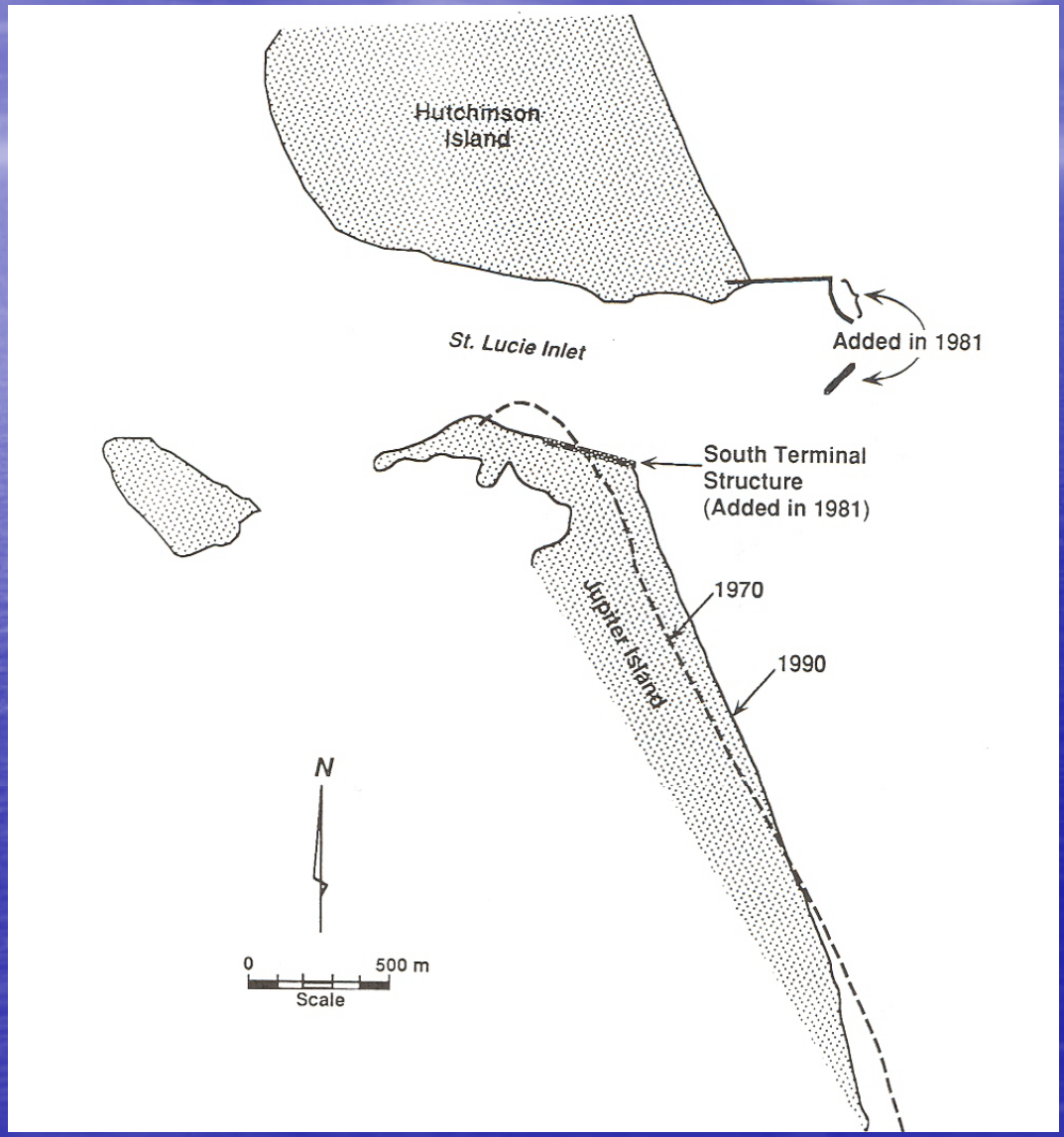
Bakers Haulover, FL



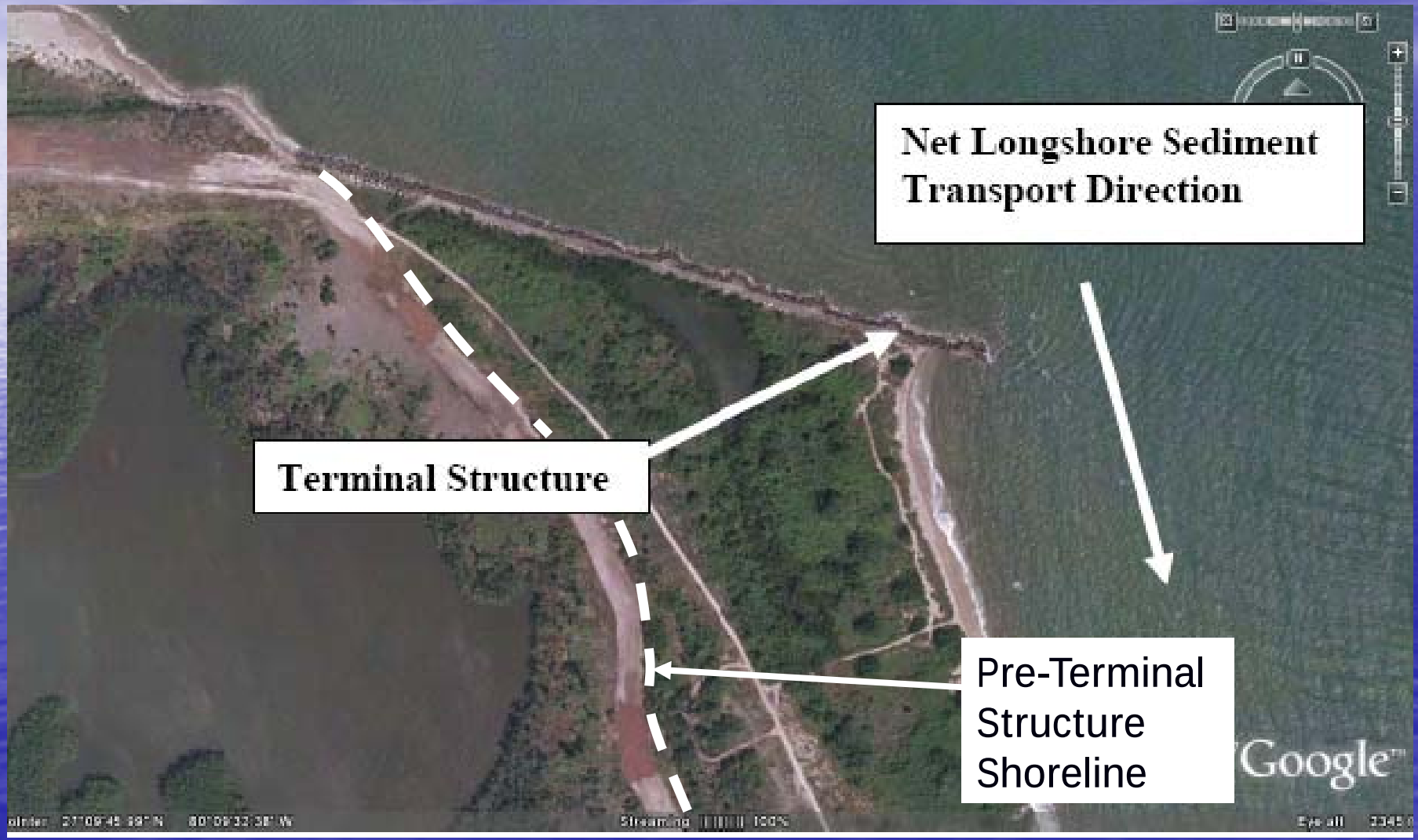
Bakers Haulover, FL



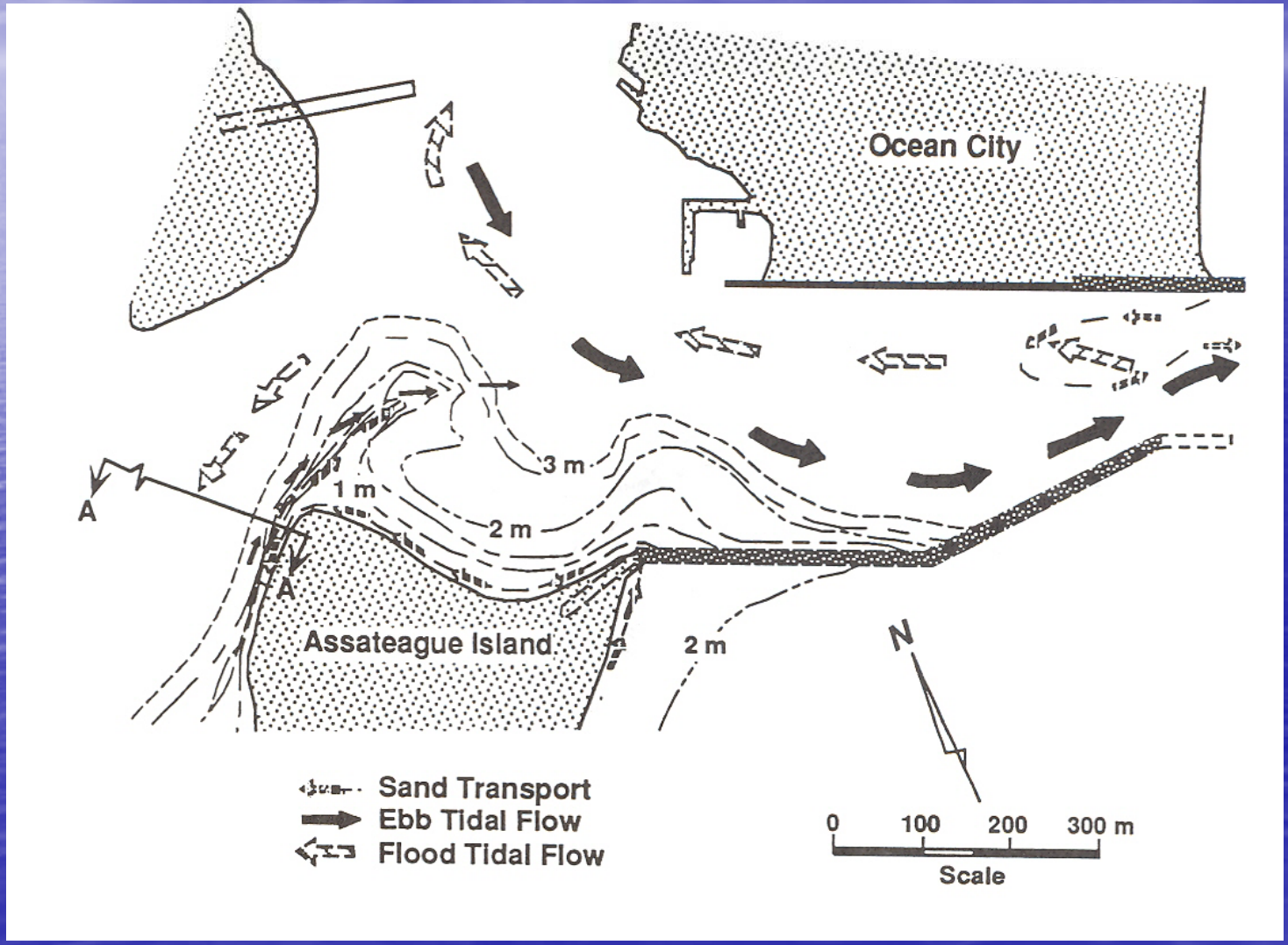
Jupiter Island, FL



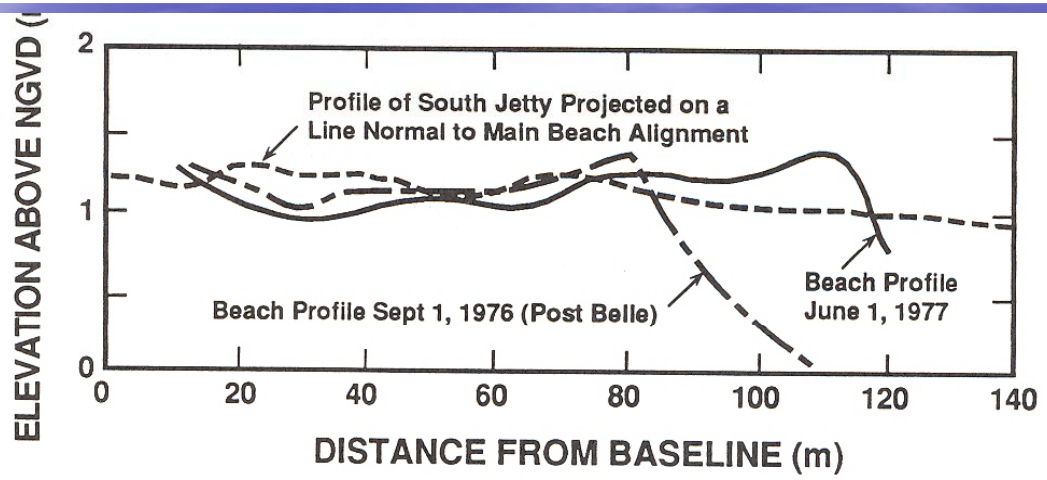
North End of Jupiter Island



Ocean City Inlet, FL

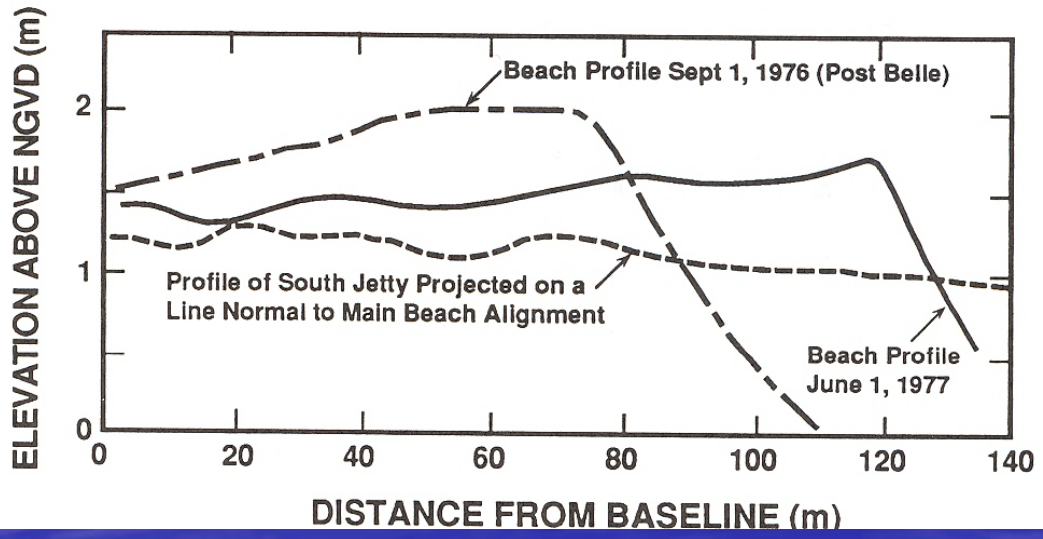


Beach Profiles on Assateague Island, MD



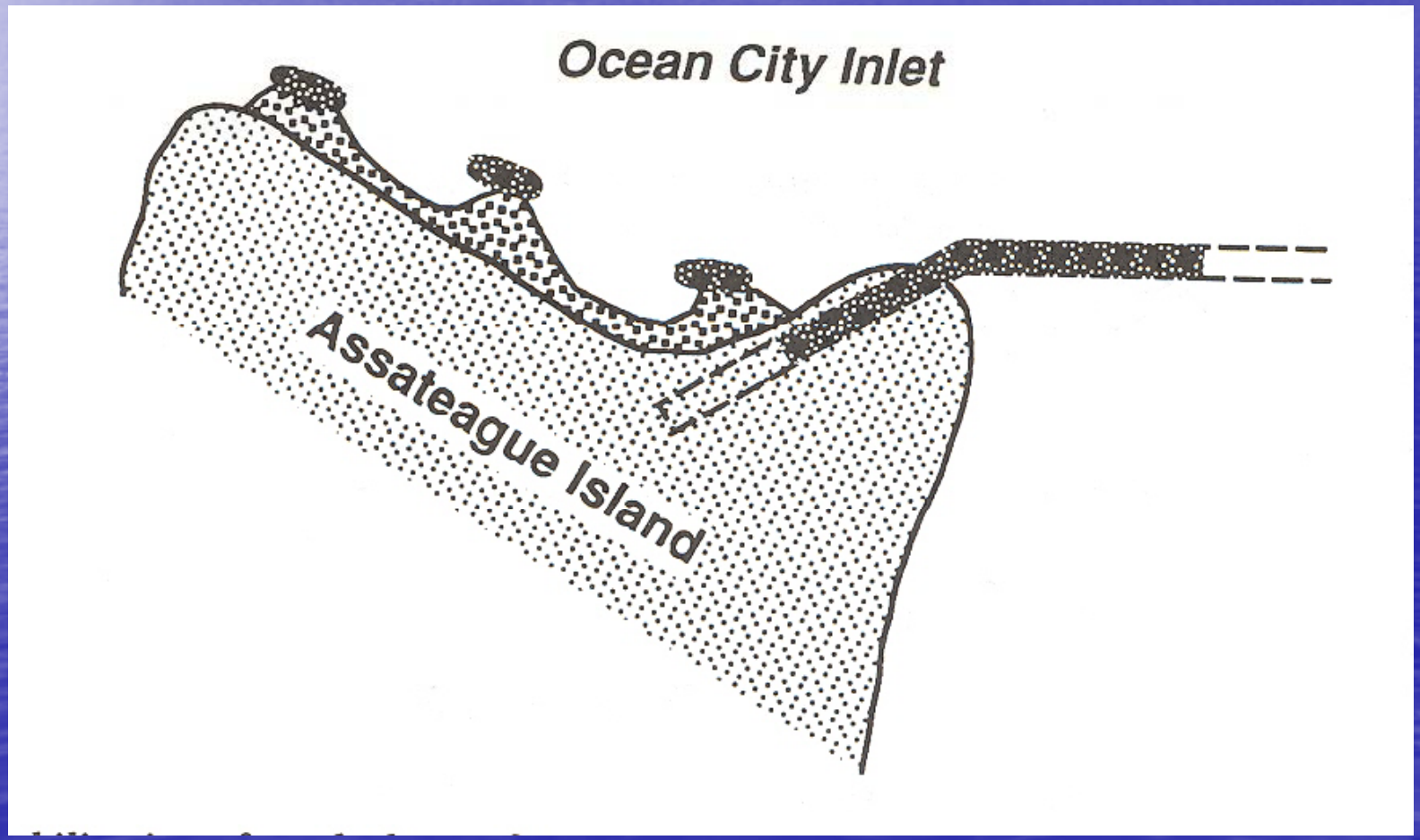
a) Beach Profiles Approximately 60 m South of South Jetty.

60 m South of South Jetty



800 m South of South Jetty

Recommended Detached Breakwaters Inside Ocean City Inlet

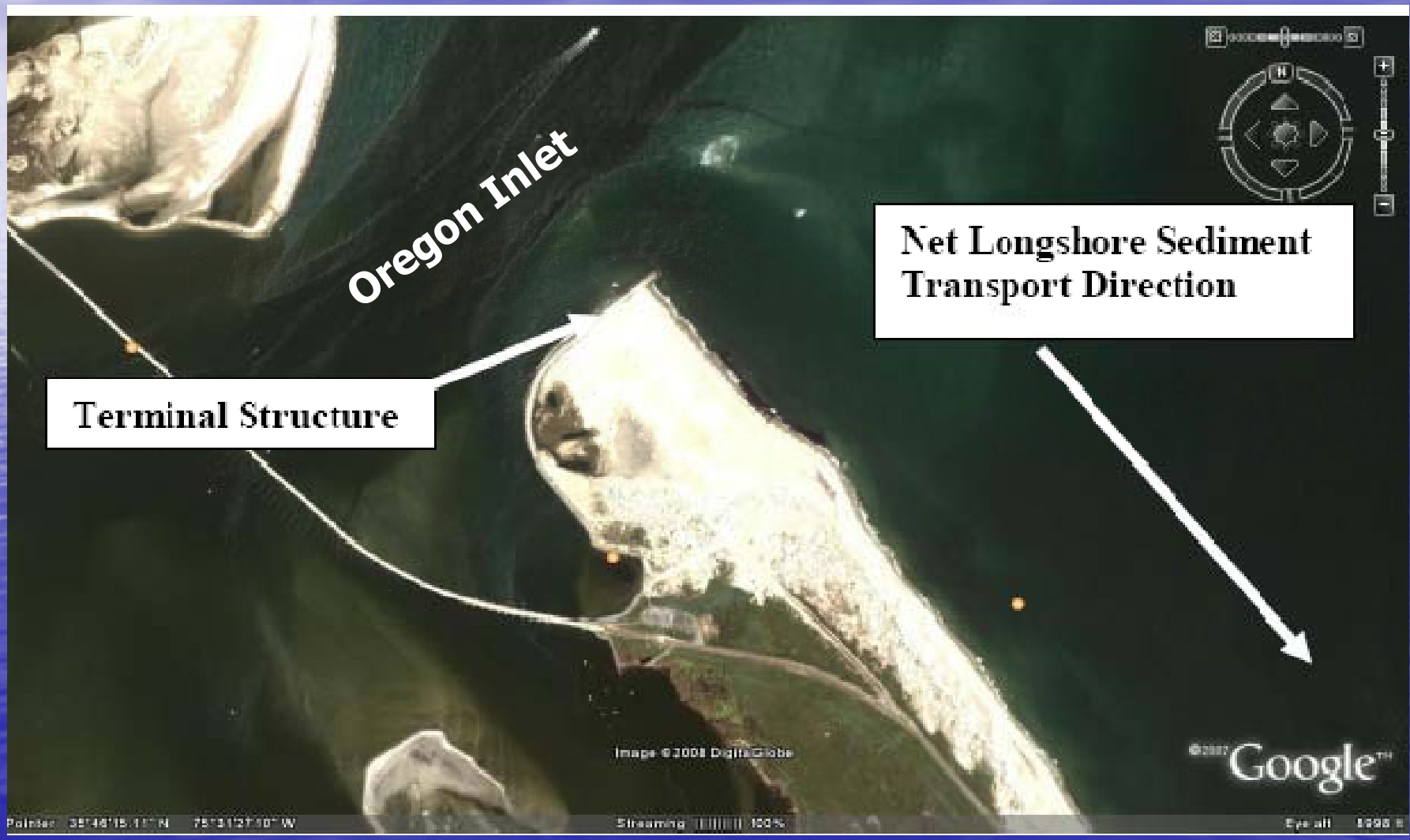


Ocean City Inlet, MD

North Carolina's Two Downdrift Terminal Structures

- Oregon Inlet
- Beaufort Inlet

Oregon Inlet, NC



From Professor Overton's December 2007 Report

5. SUMMARY AND CONCLUSIONS

As of December 12, 2007, the project erosion rates are much less than the historical rates in the first four miles of the study area. In the fifth and sixth mile, the rates are mostly below the historical rate and they do not significantly exceed the historical rate. In summary, the construction of the groin does not appear to have caused an adverse impact to the shoreline over the six-mile study area.

Fort Macon, NC

An Inventory Of Terminal Structures on the Downdrift Sides of Inlets

State	Number	State	Number
TX	2	VA	1
LA	2	MD	1
AL	1	DE	1
FL	6	NJ	1
GA	2	NY	1
SC	1	MA	1
NC	2	Total	22

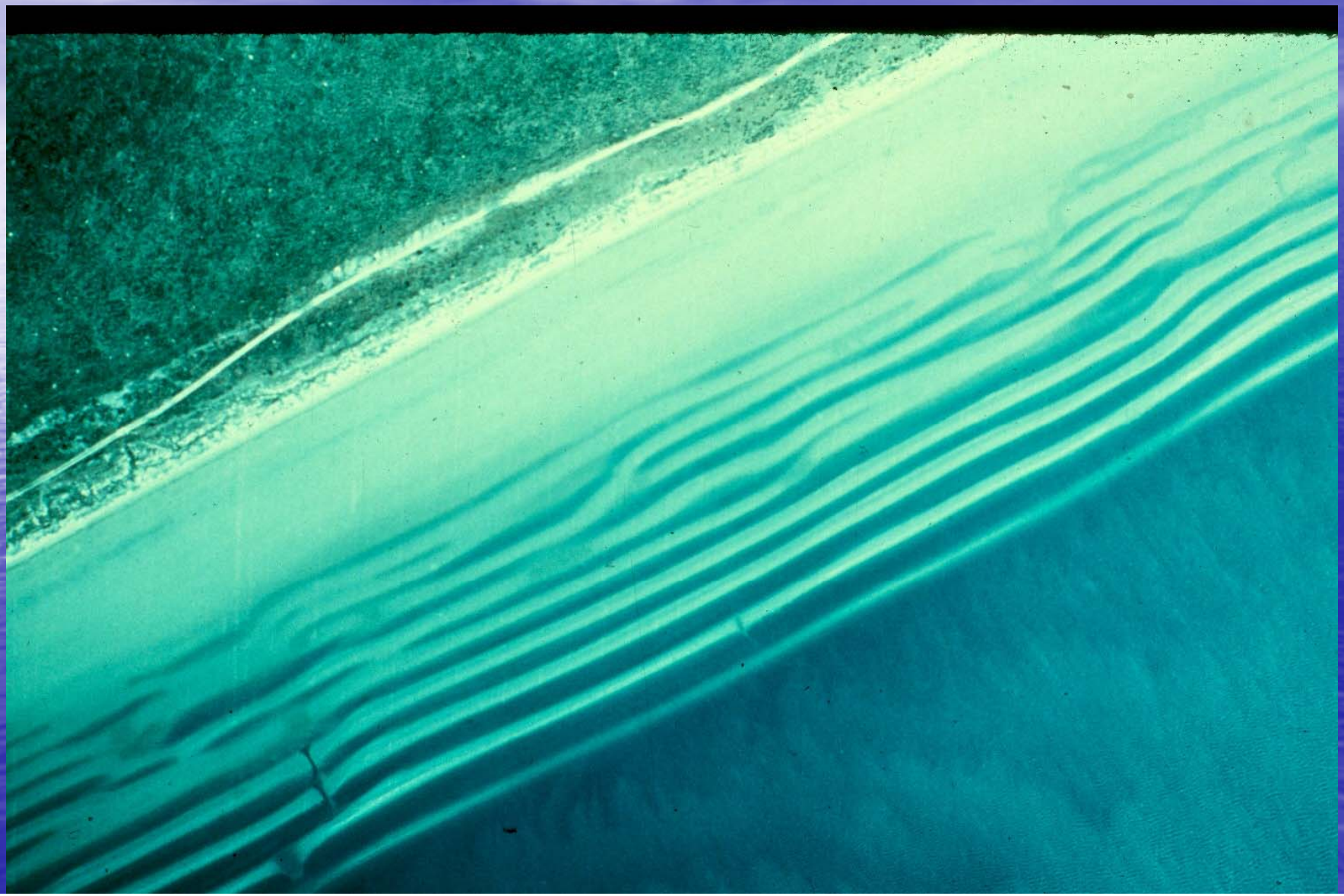
Summary

- We Have Seen That Terminal Groins Differ From Usual Groins and Jetties
- We Have Reviewed the Sand Transport Process in the Vicinity of Inlets – Generally Transport Toward the Inlet, Even on the Downdrift Side

Summary (Continued)

- We Have Reviewed a Number of Inlets With Downdrift Terminal Structures and Seen No Ill Effects
- North Carolina Has Two Inlets With Downdrift Terminal Structures That Have Been Proven to Function Effectively
- Coastal Policy Should be Foremost Based on Good Science

Thank You



Questions?