

Mother Nature is Not Responsible for Most Shoreline Erosion on the Florida Southeast Coast



Houston, *Shore and Beach* (2017)
Houston & Dean, *Journal of Coastal Research* (2016)

Fight Against Shoreline Erosion

- Common argument against beach nourishment:
 “You can’t fight Mother Nature”
- Is beach nourishment a fight with Mother Nature or with impacts of inlets modified for navigation?

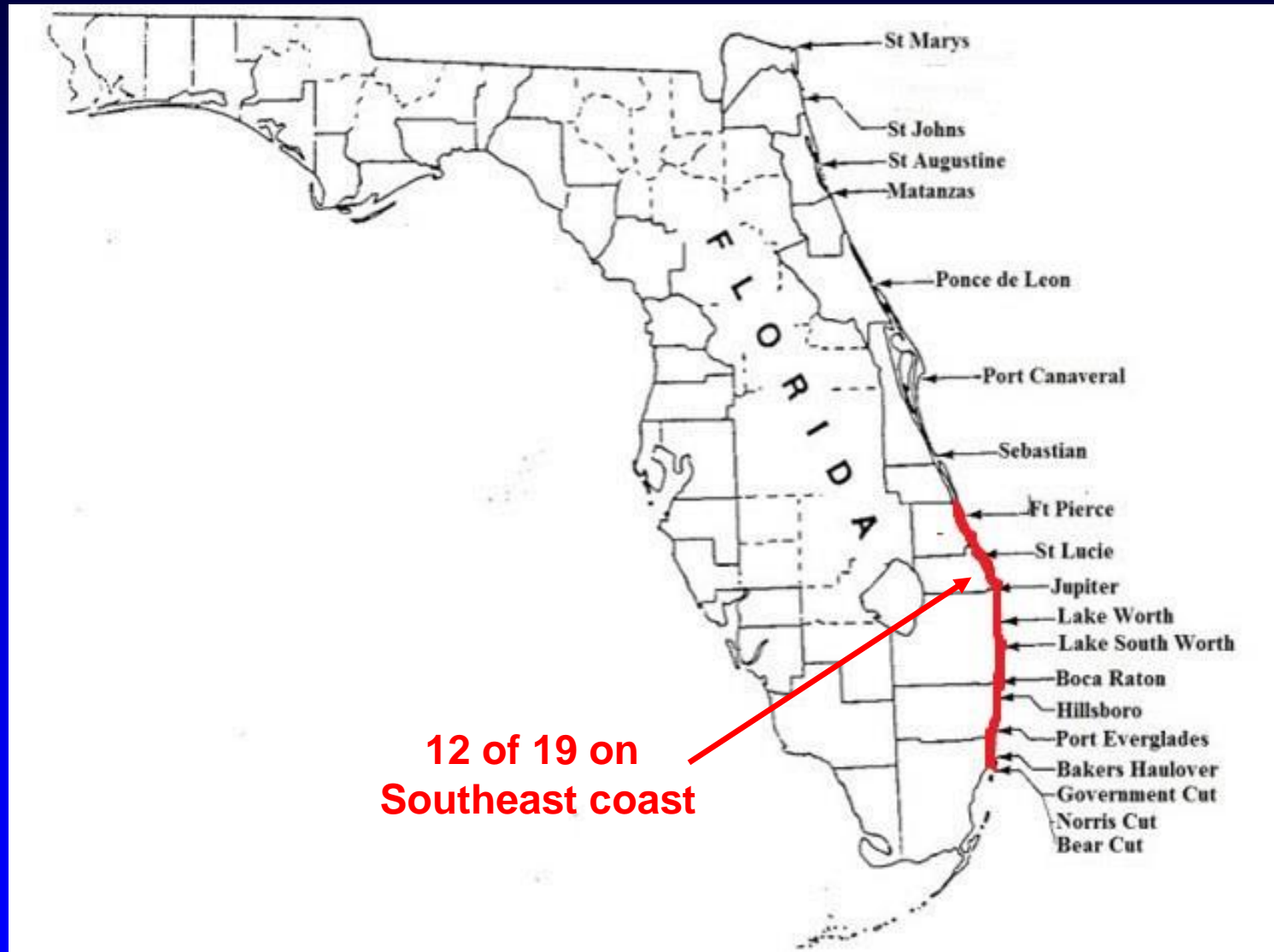


Inlet Modification

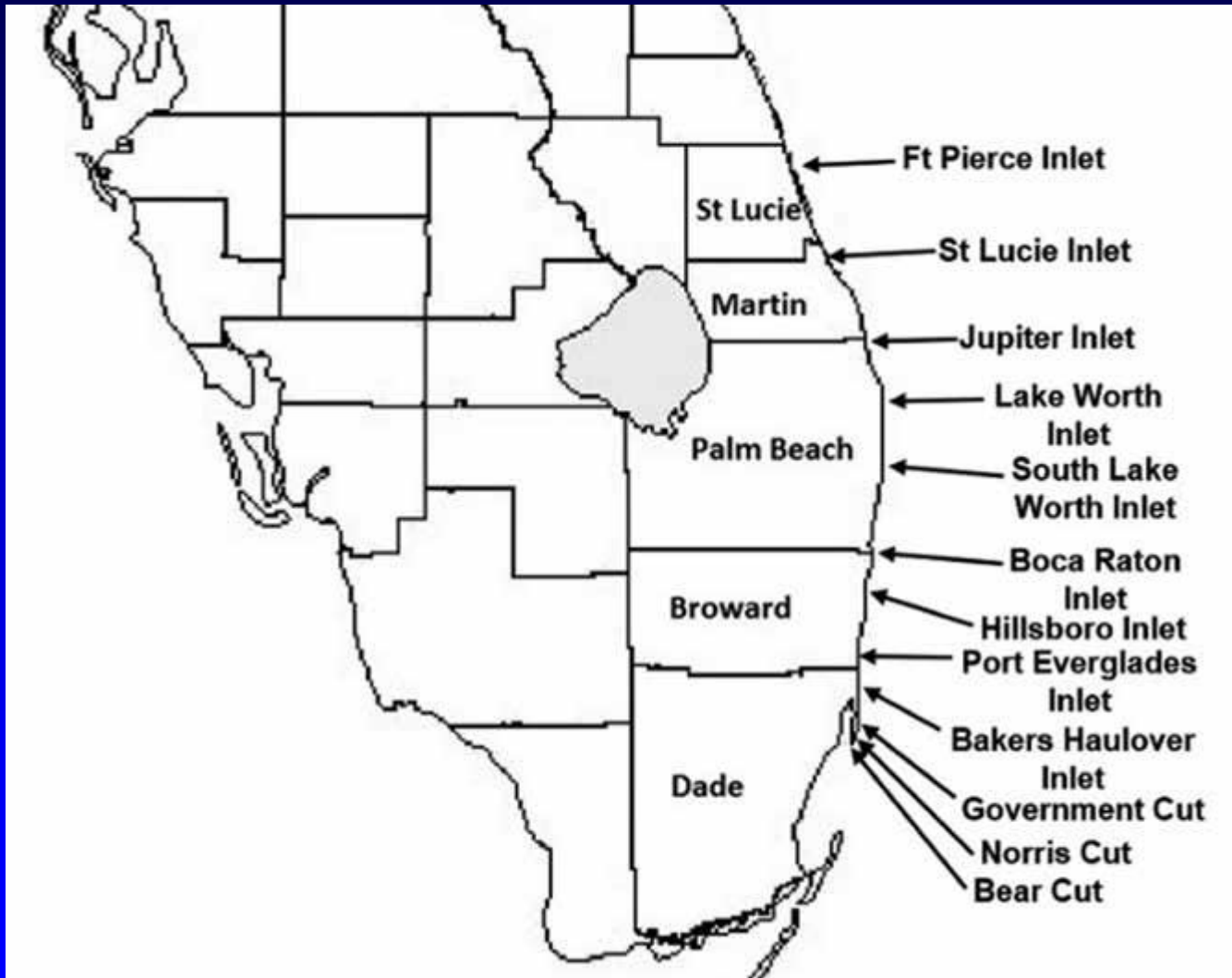
- Anything impeding sand flow or removing it from the littoral system
- Bob Dean often said that modified inlets produced 80 - 85% of the erosion on the Florida east coast
- These inlets actually caused 70% of east coast erosion (Houston and Dean, 2016)



19 Modified Inlets on East Coast



2/3rds of Southeast Inlets Are Not Natural, But Were Cut



Analyzed Historical Shoreline Change Data

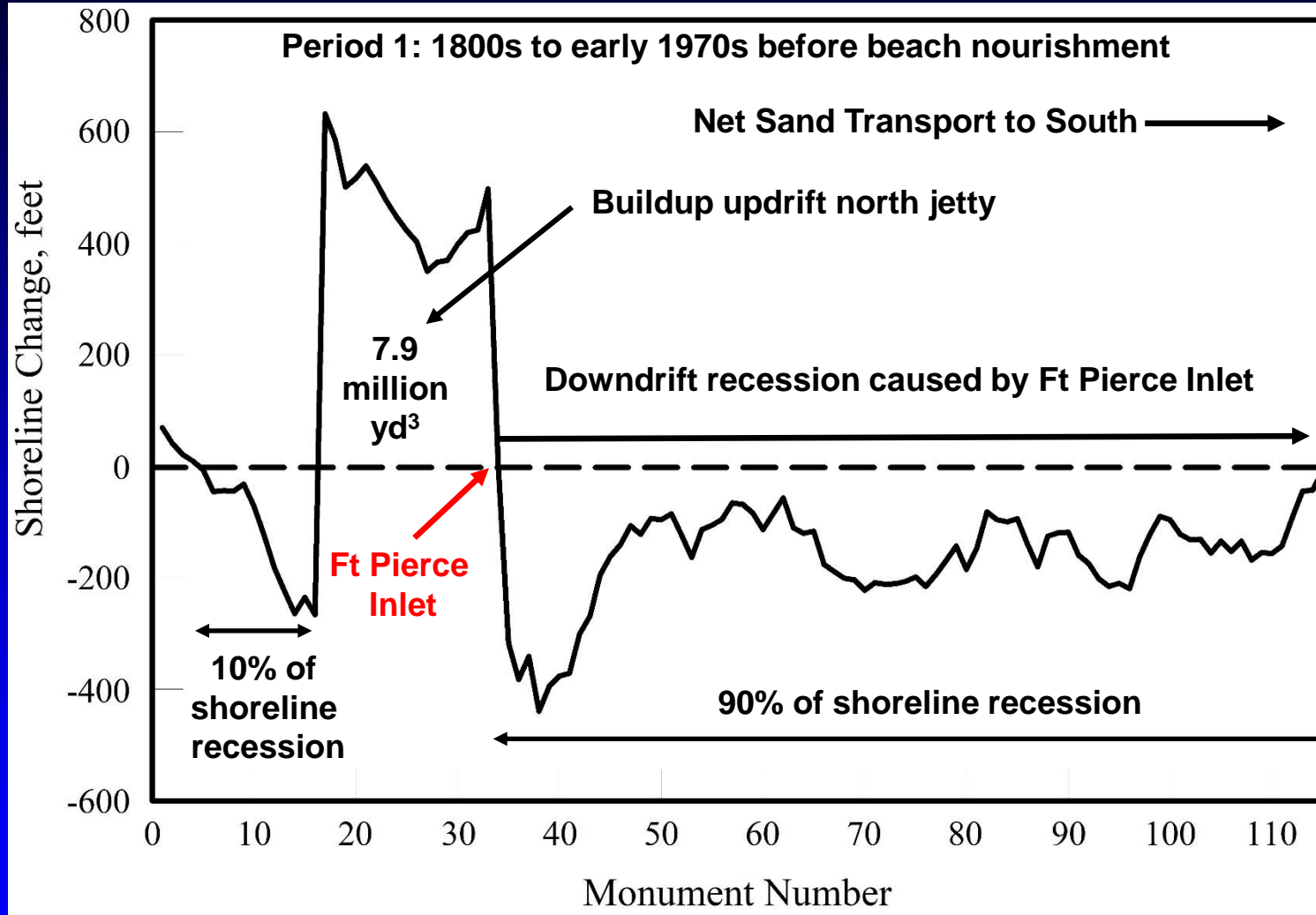
- Measured relative to 705 monuments along 130 miles of shoreline

County	Data Start
St Lucie	1883
Martin	1883
Palm Beach	1868
Broward	1884
Dade	1866



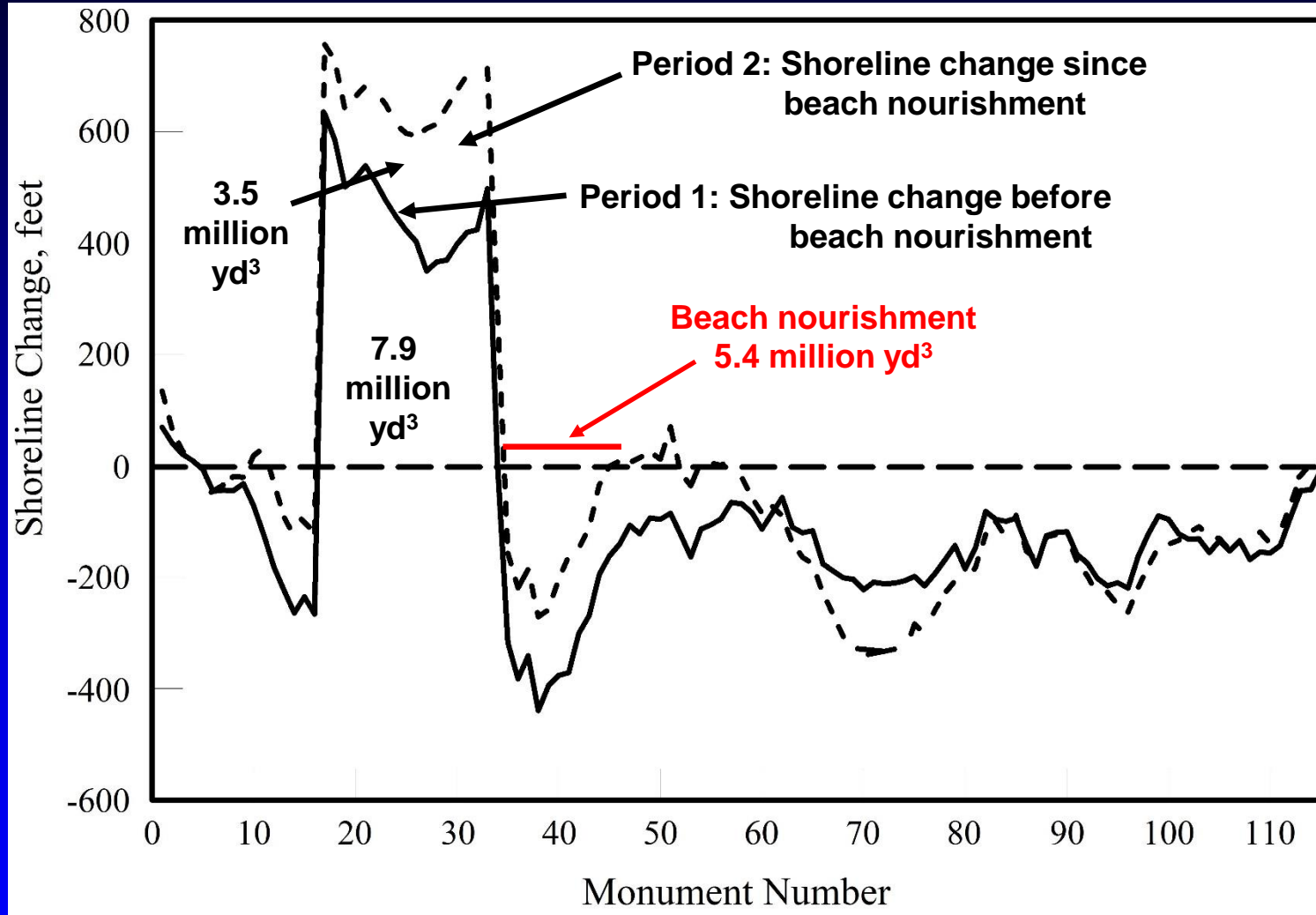
- Period 1: Before beach nourishment started masking erosion: 1800s to early 1970s
- Period 2: Since beach nourishment: Early 1970s to today

St Lucie County – Period 1



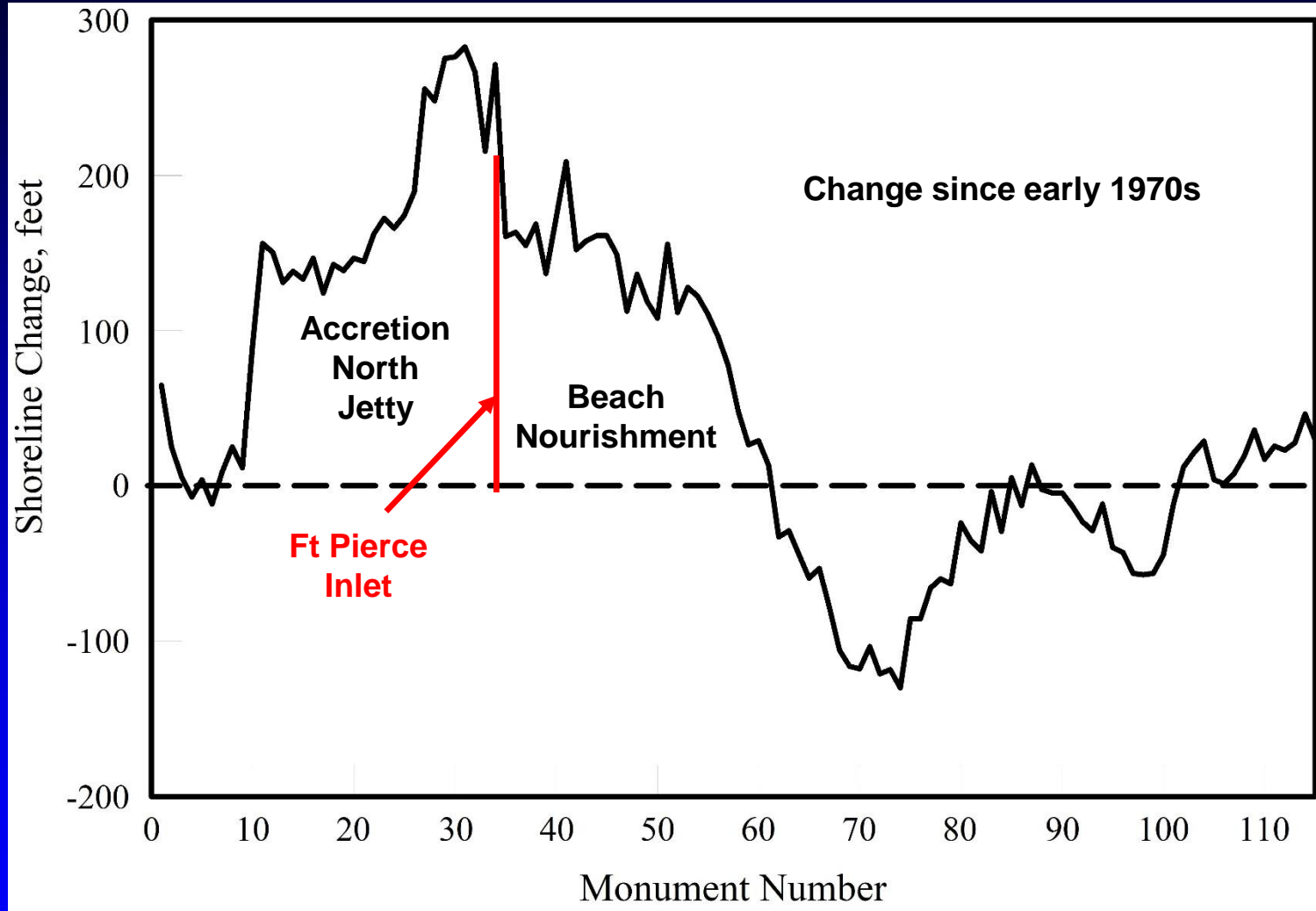
- 90% of shoreline recession caused by Ft Pierce Inlet

St Lucie County – Periods 1 and 2



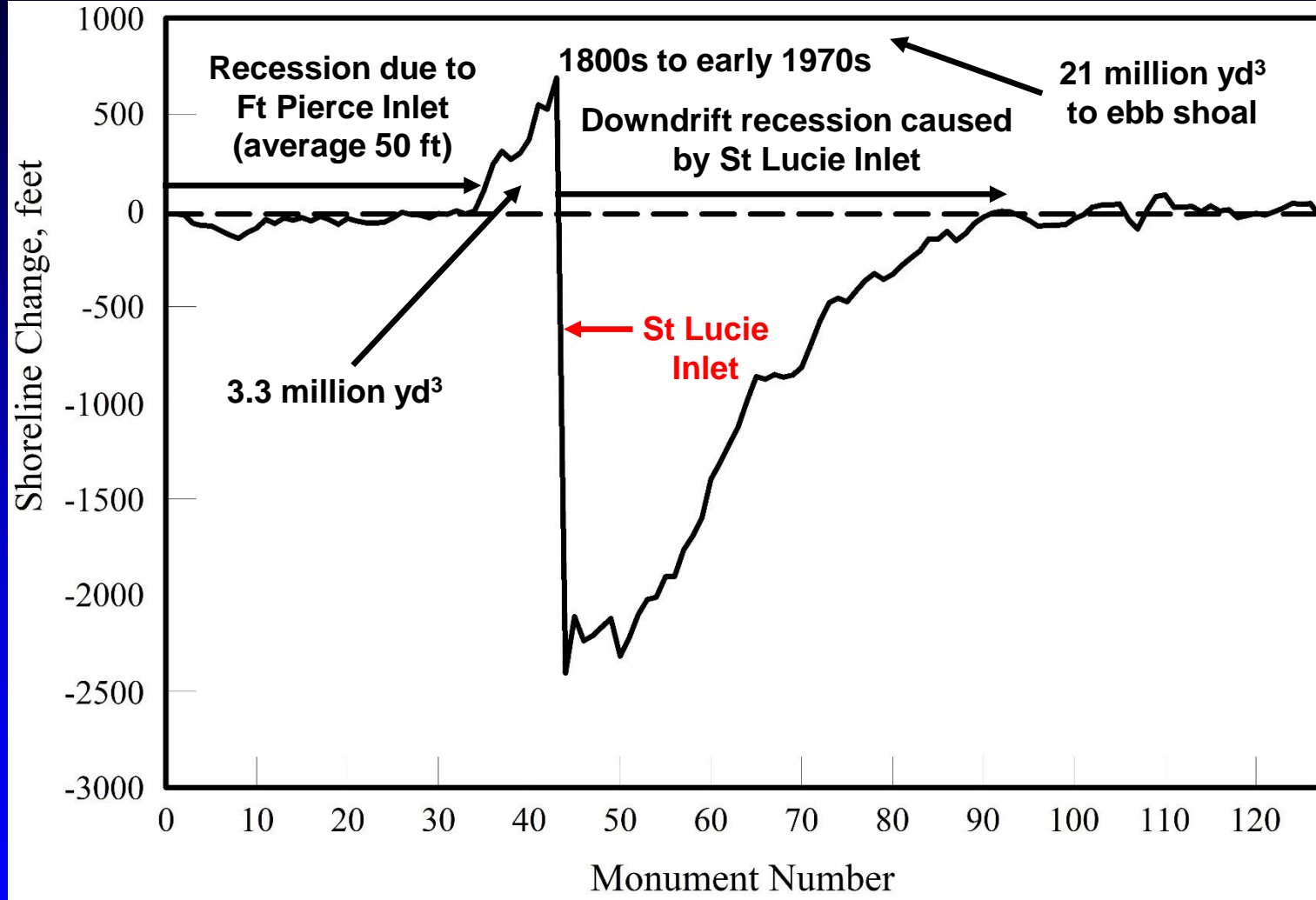
- 85% of recession remains today

St Lucie County – Period 2



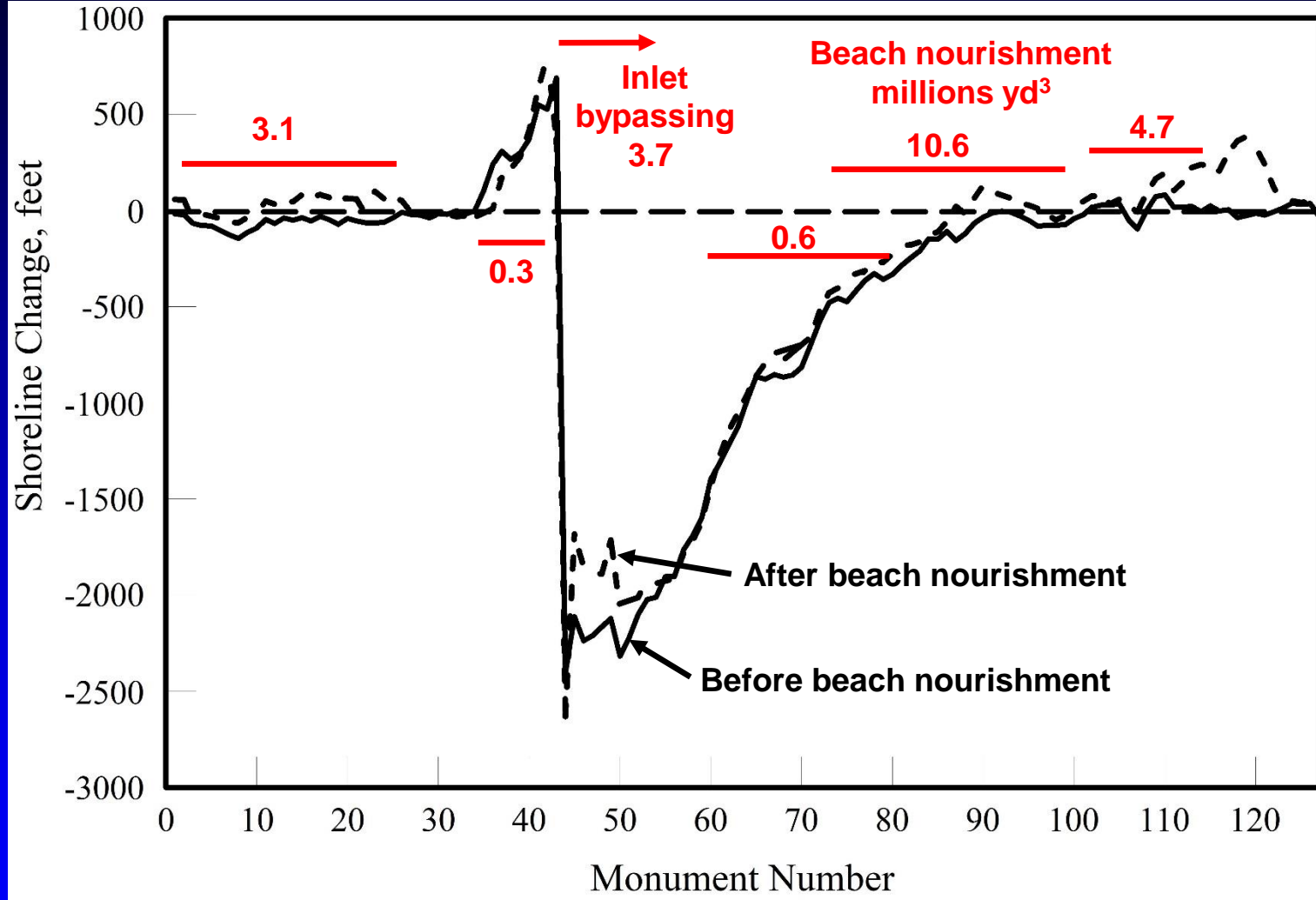
- Average shoreline advance of 56 ft since early 1970s

Martin County – Period 1



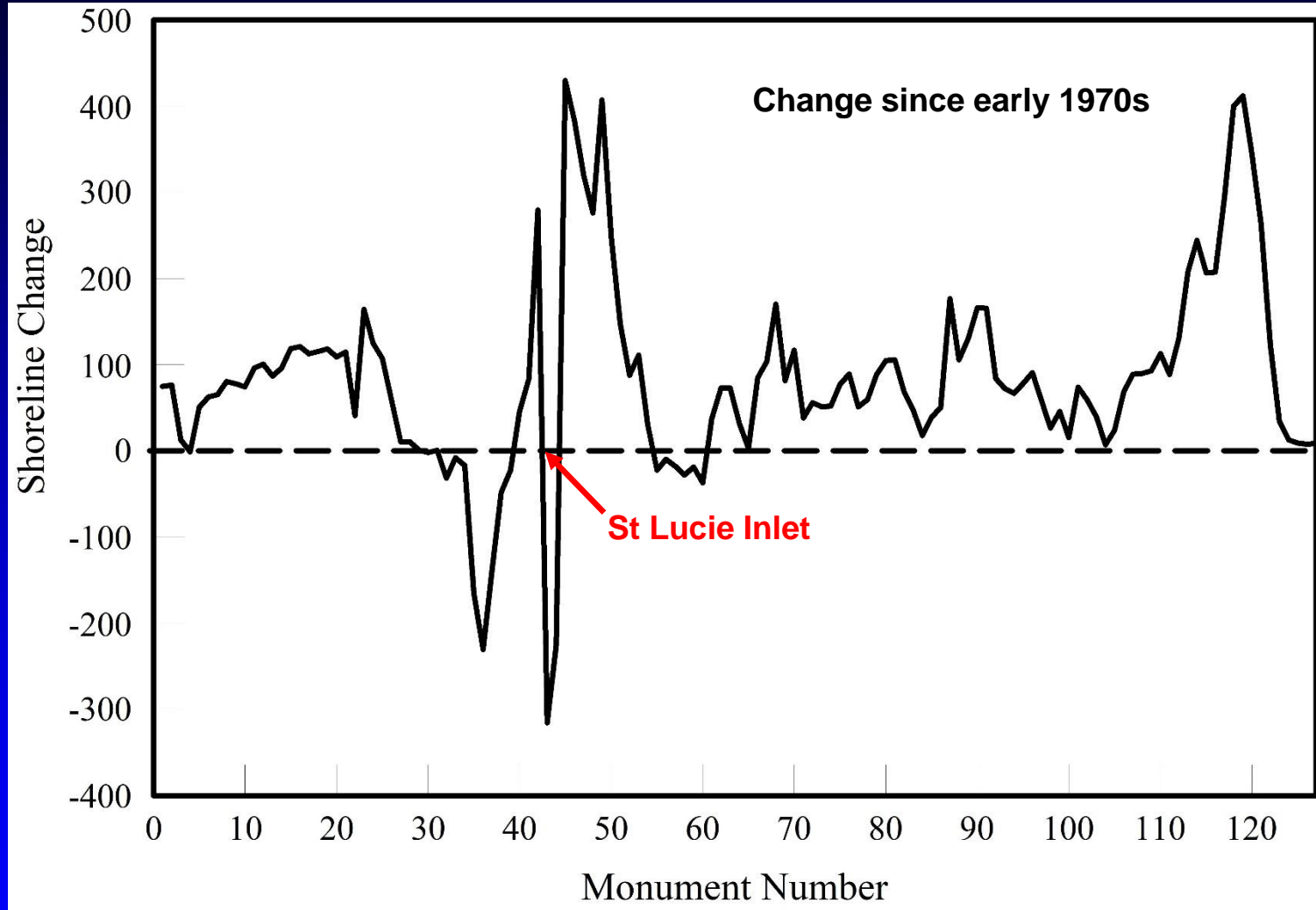
- 99% of shoreline recession caused by the two inlets

Martin County – Periods 1 and 2



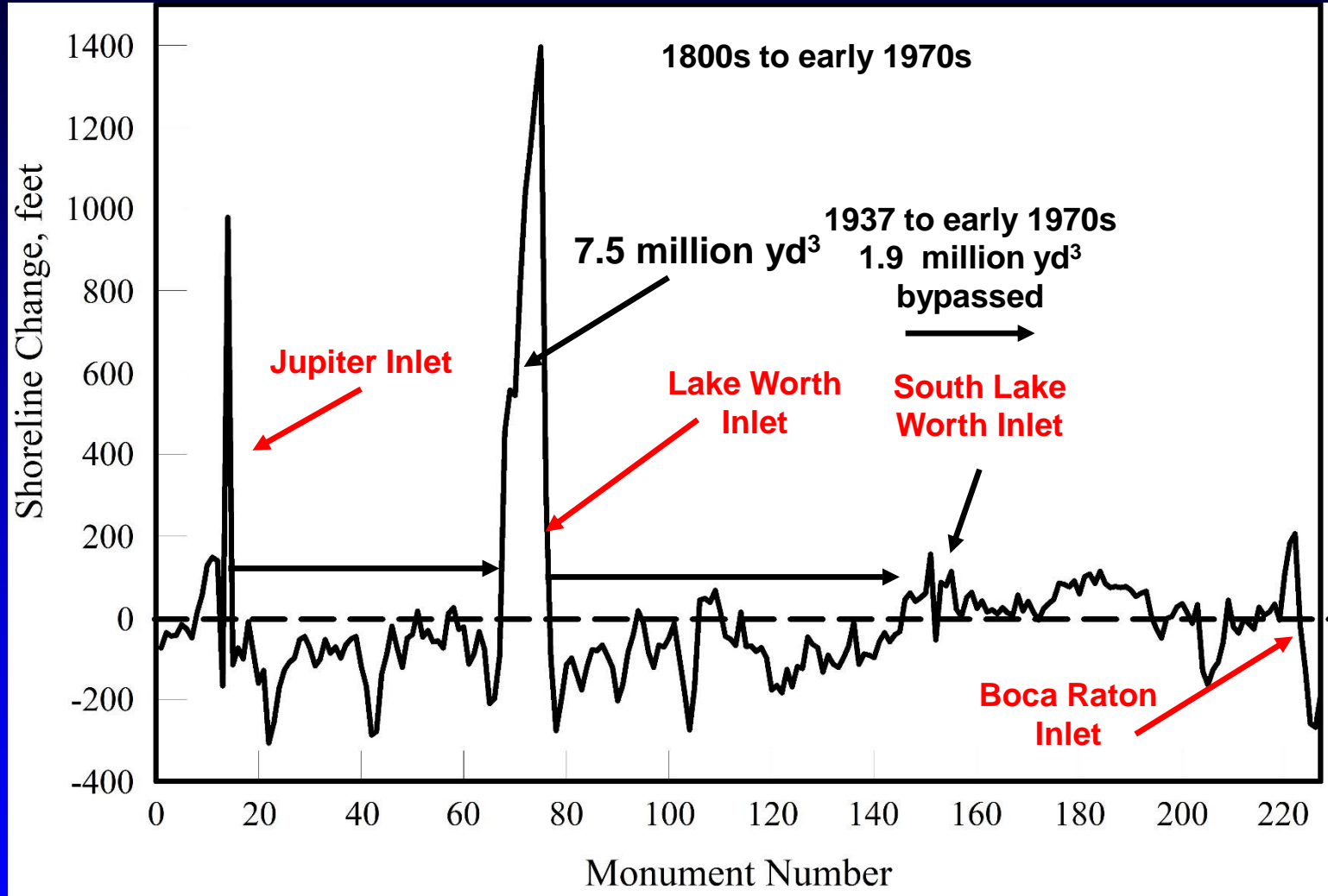
- 90% of shoreline recession remains

Martin County – Period 2



- Average shoreline advance of 82 ft since early 1970s

Palm Beach County – Period 1

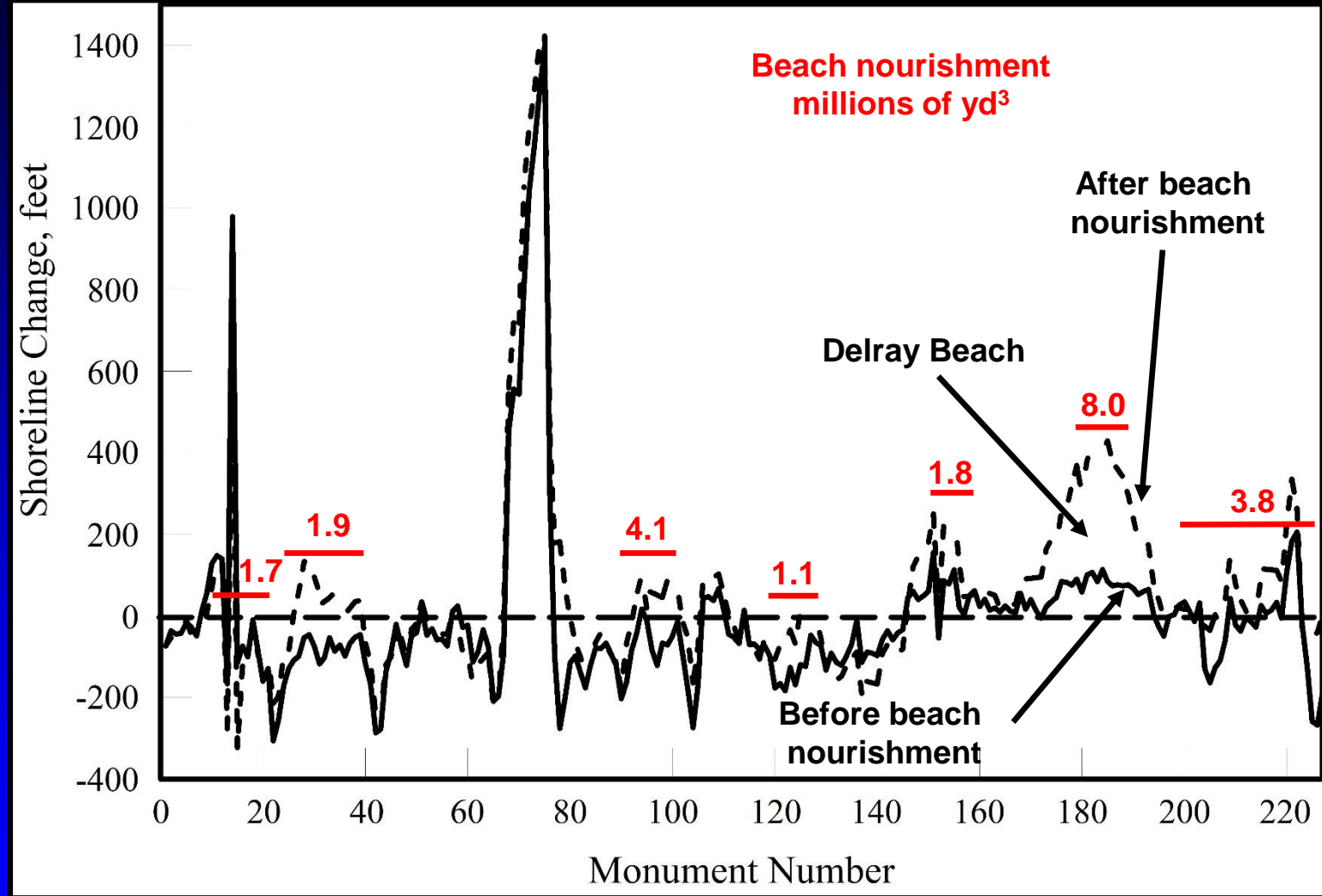


- 93% of shoreline recession caused by these inlets

Land Updrift from Lake Worth Inlet



Palm Beach County – Periods 1 and 2

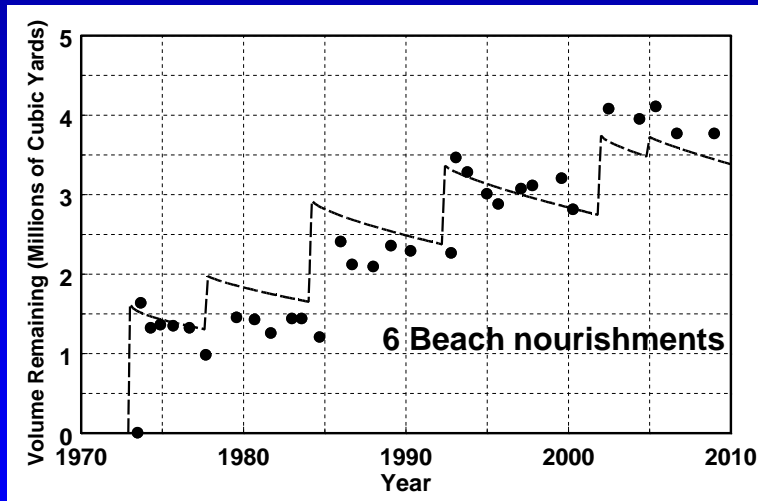


- 47% of shoreline recession remains today

Sins of the Past - Beach Encroachment

- Delray Beach dunes leveled in 1920s
- Beaches widened 80 ft from 1883 to late 1960s

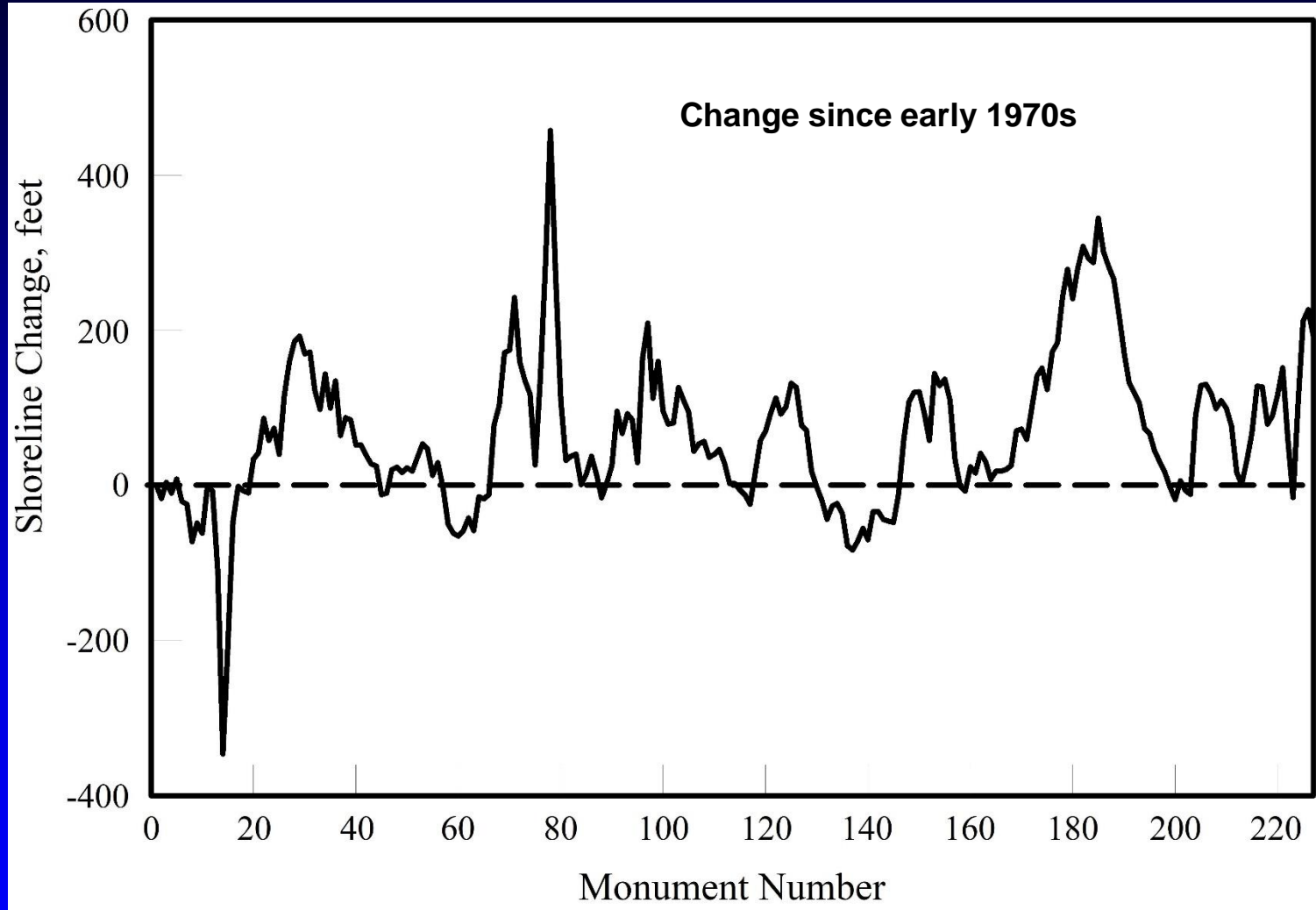
Situation in late 1960s



Delray Beach today

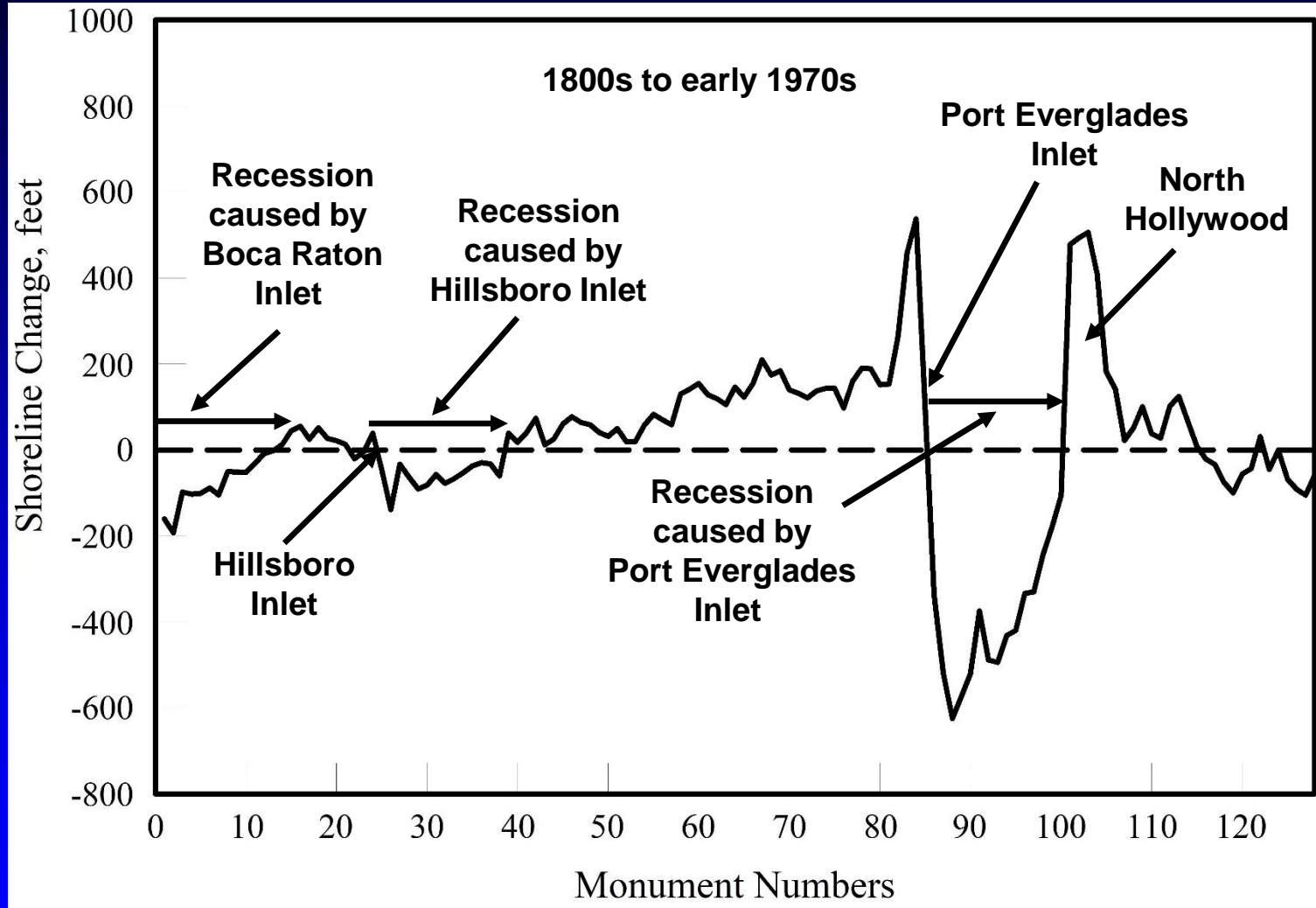
- Using beach nourishment, dunes were rebuilt and the shoreline advanced 250 ft

Palm Beach County – Period 2



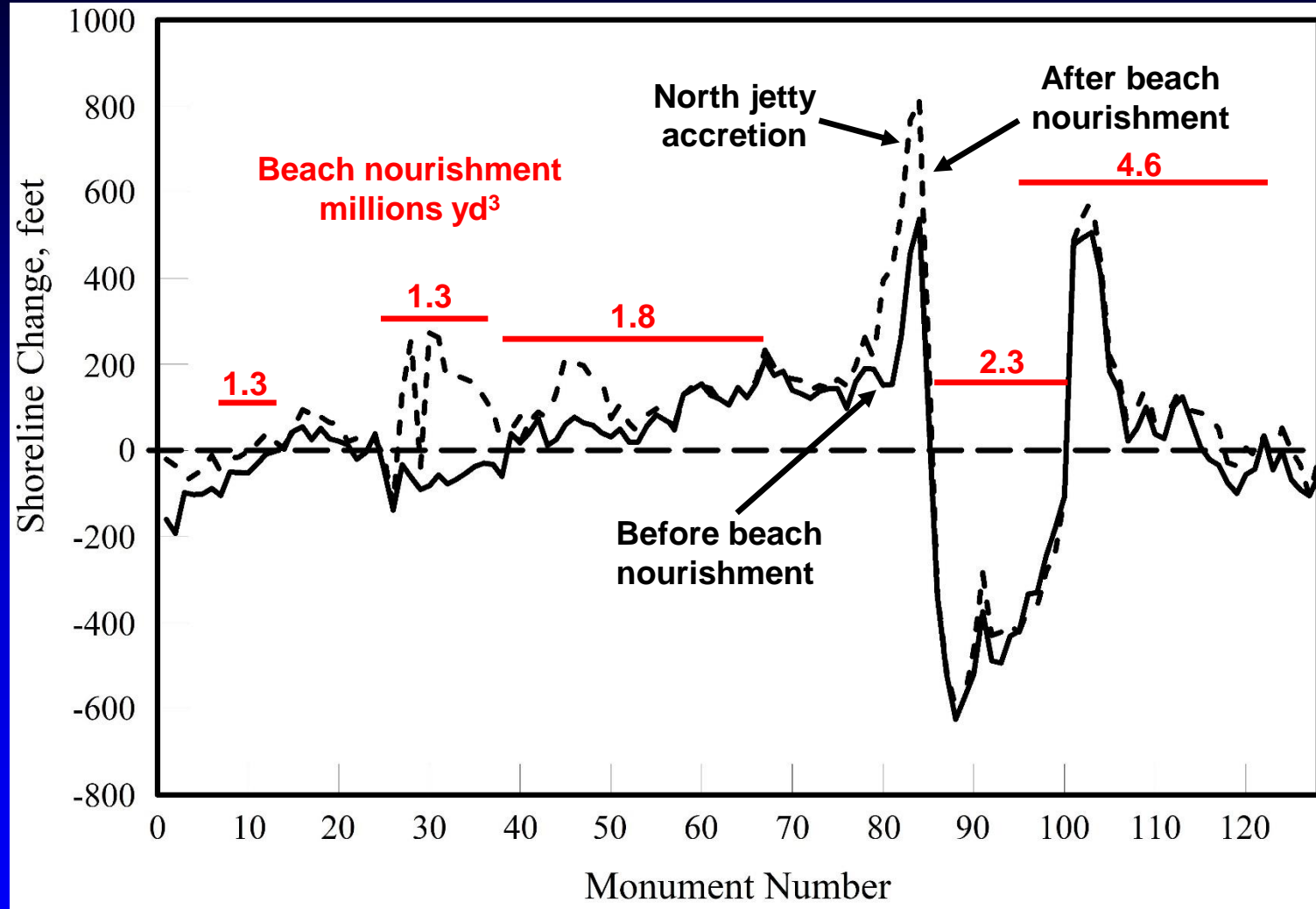
- Average shoreline advance 66 ft since early 1970s

Broward County – Period 1



- 90% of shoreline recession caused by the three inlets

Broward County – Periods 1 and 2



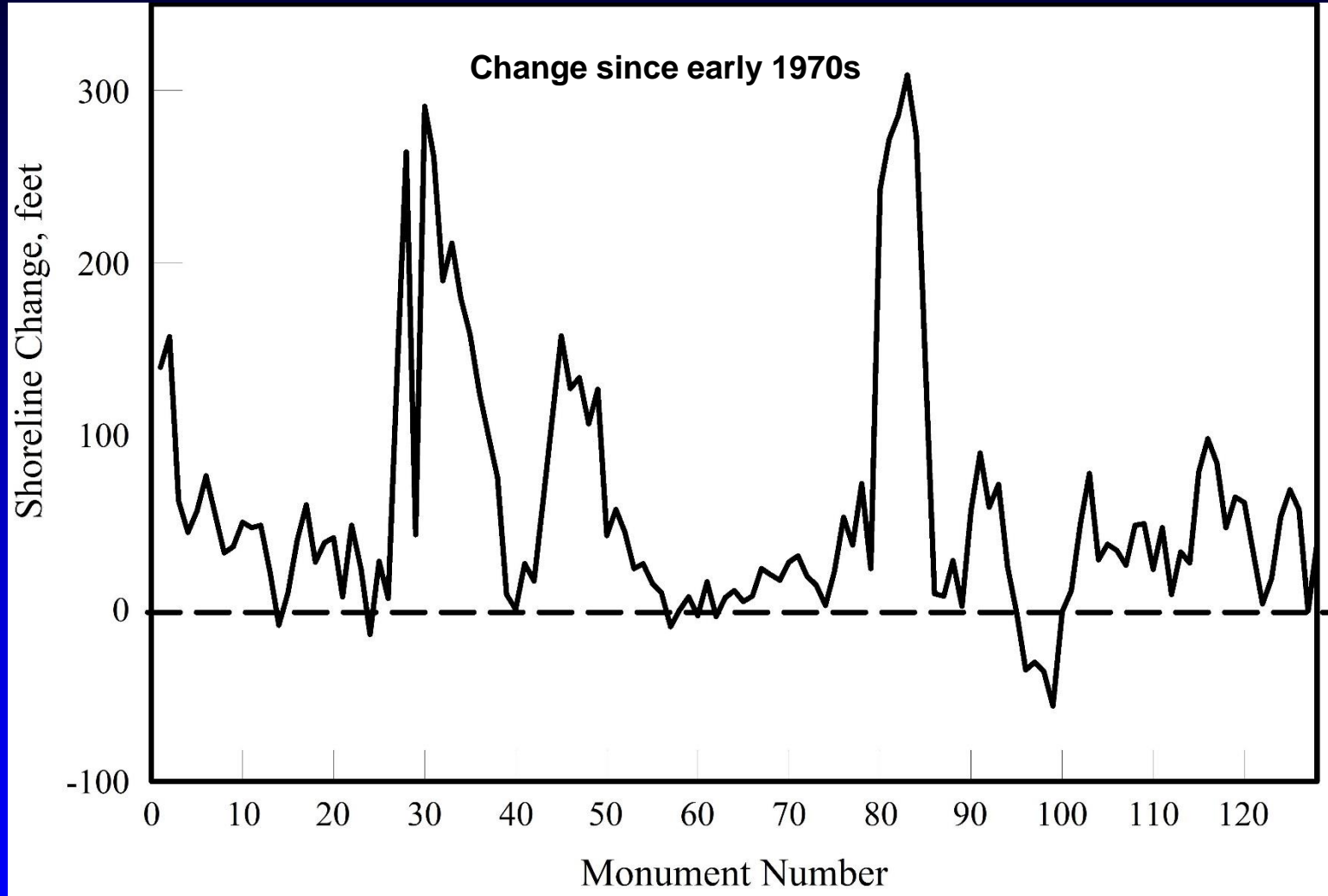
- 68% of shoreline recession remains

Beach North of Port Everglades

Mean High
Water
1883

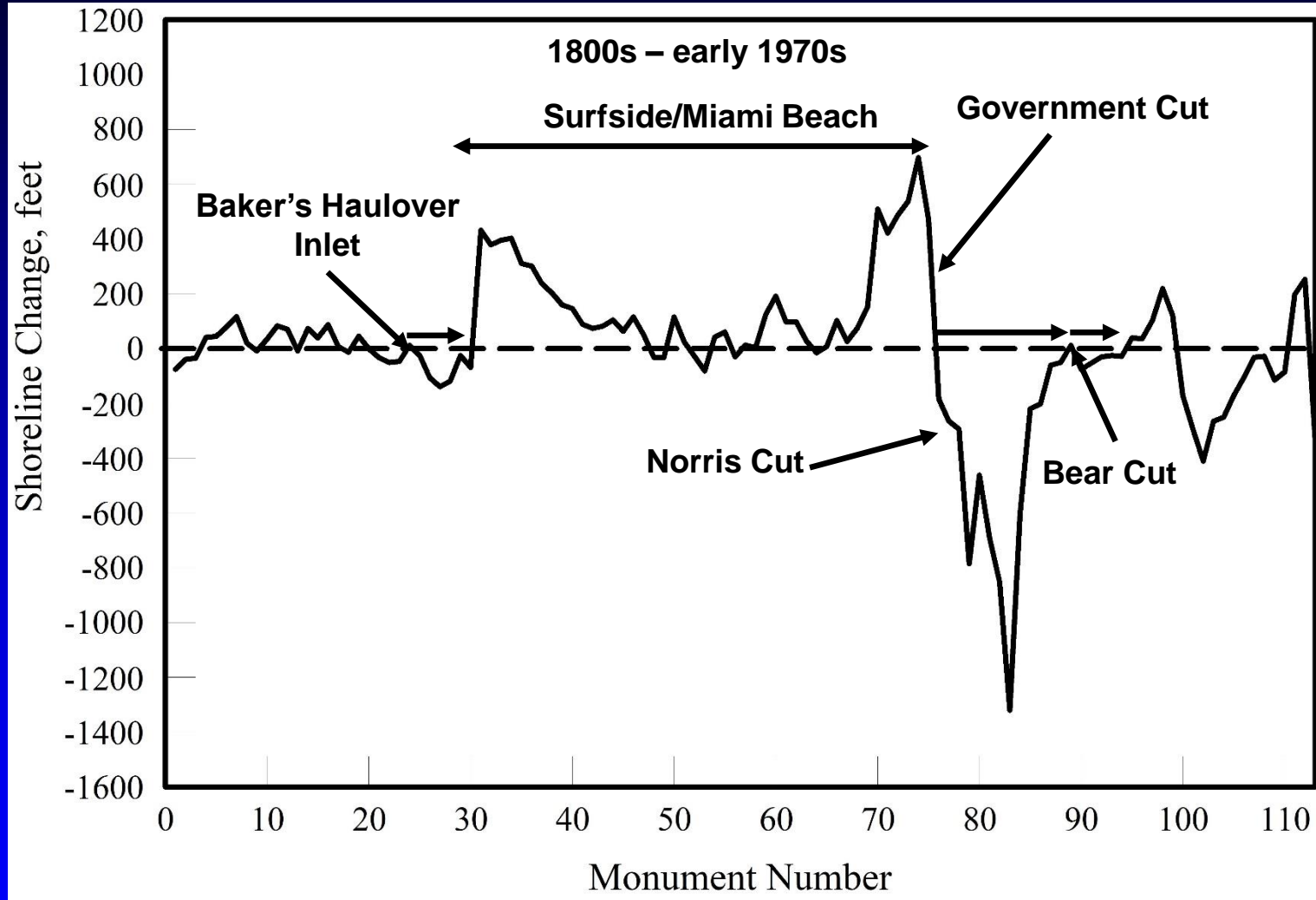


Broward County – Period 2



- Average shoreline advance 56 ft from early 1970s - today

Dade County – Period 1

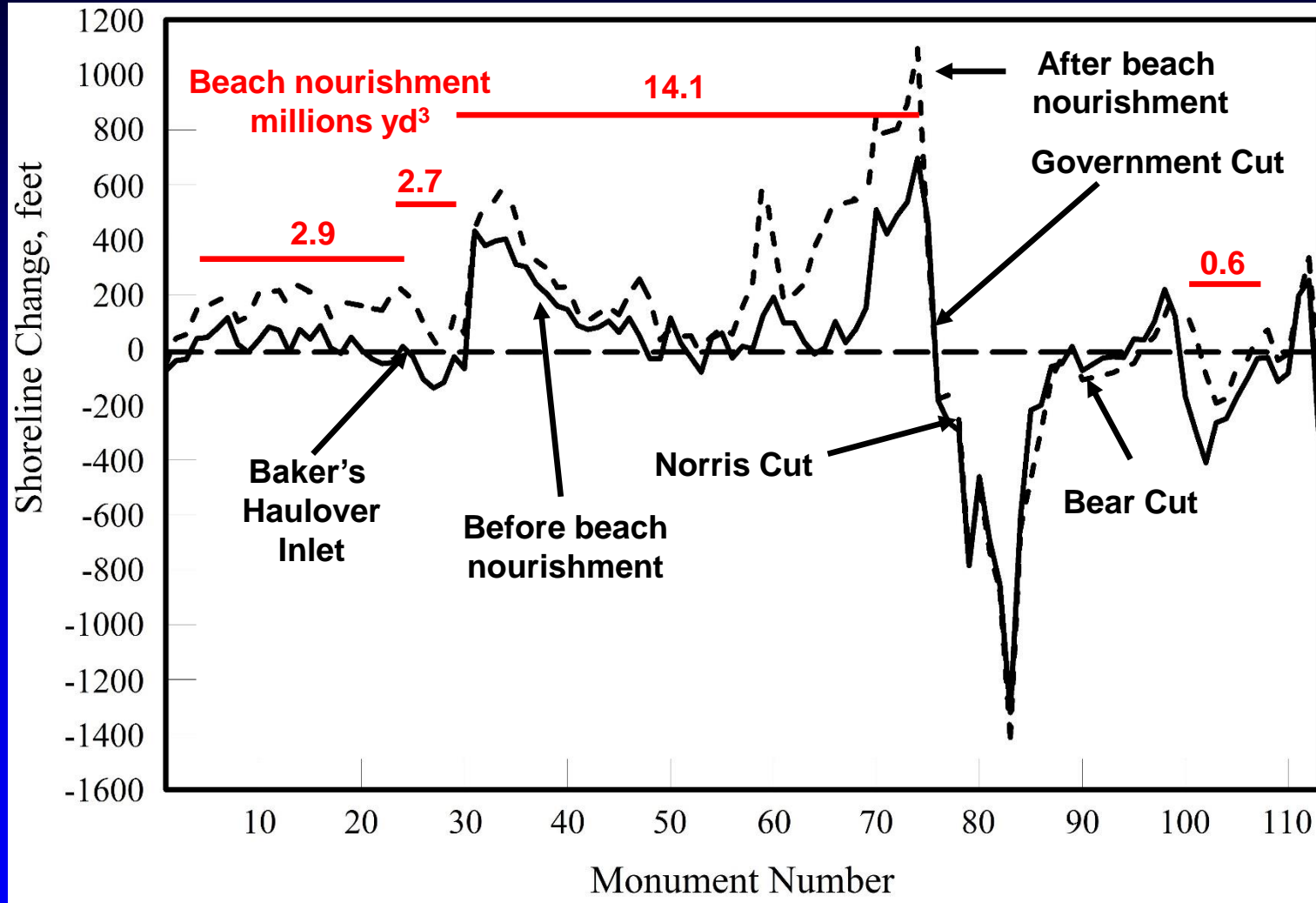


- 70% of recession caused by the four inlets

Sins of the Past – Surfside/Miami Beach



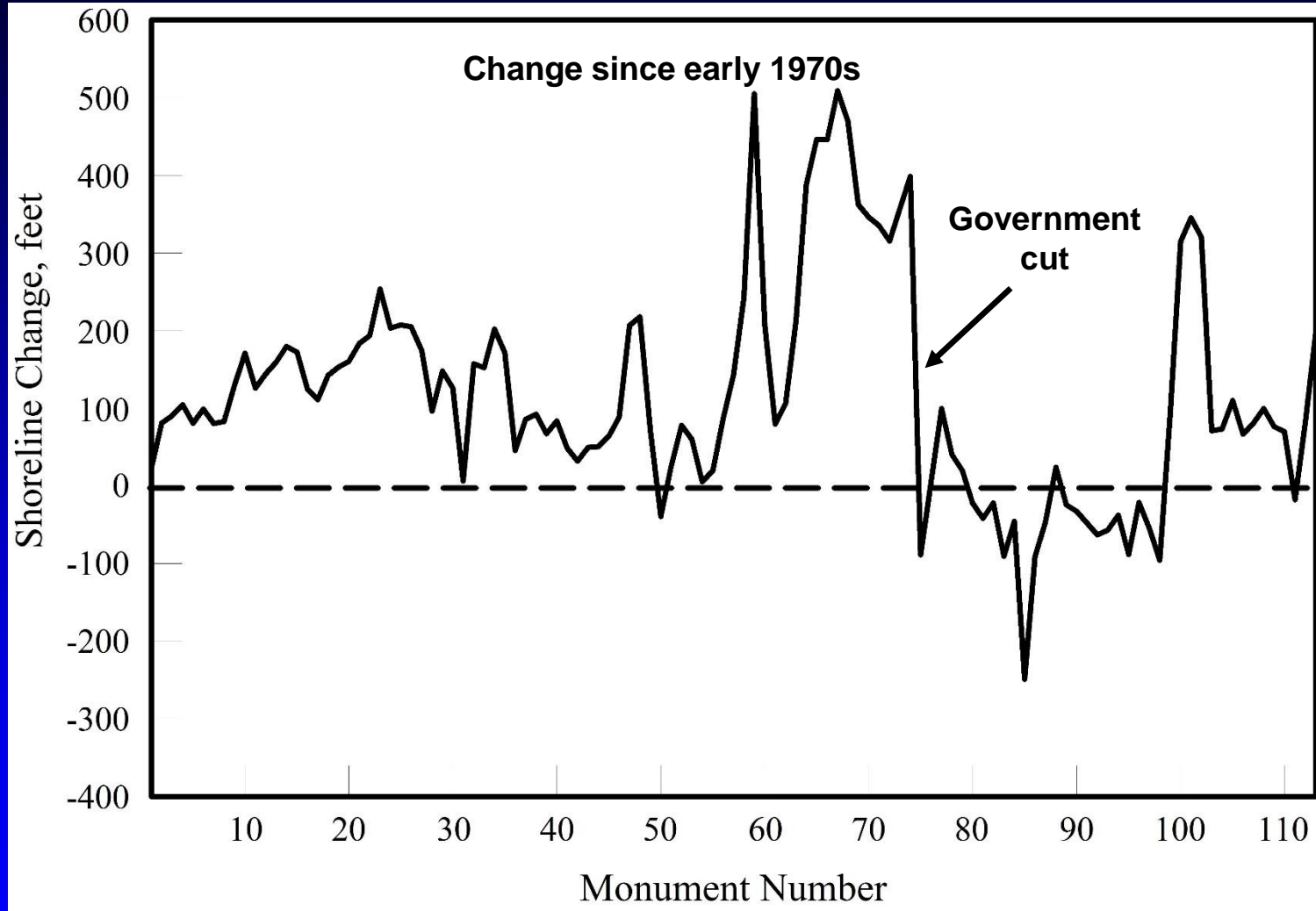
Dade County – Periods 1 and 2



- Almost 100% of recession remains

Dade County – Period 2

Government
Cut



- Average shoreline advance of 118 ft since early 1970s

5 County Sediment Budget 1800s to 1970s*

- Shoreline change contribution by modified inlets - 125 ft (ebb shoal growth/offshore disposal)
- Mother Nature contribution
 - Sea level rise - 50 ft
 - Longshore and long-term onshore + 100 ft
 -
 - 75 ft

*Houston and Dean (2016)

Navigation's Contribution
- 125 ft



Mother Nature's Contribution
+ 50 ft

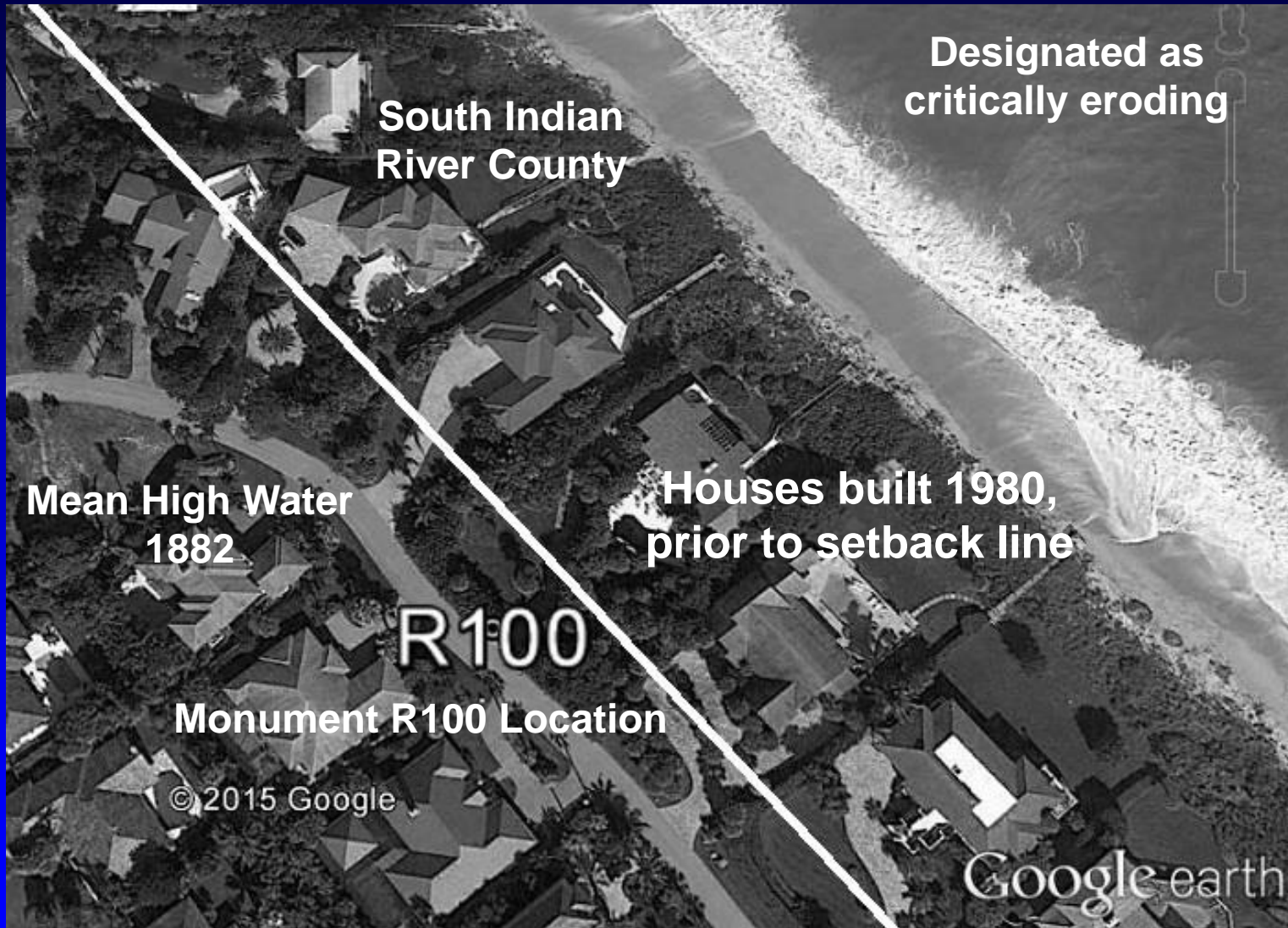
Mother Nature, 1800s to 1970s

- Is Mother Nature's + 50 ft net contribution unusual?
- No. Mother Nature contributed + 70 ft to the entire east coast*
- If inlets had not been modified, Mother Nature would have advanced these coasts



* Houston and Dean (2014)

Encroachment Has Masked Accretion



Beach Nourishment to the Rescue

- County beaches receded 75 ft on average from 1800s to 1970s
- Beach nourishment then advanced them 75 ft
- No NET change since the 1800s (although there has been both severe erosion and accretion)
- Interestingly, only half of beach nourishment was placed on beaches impacted by inlets



Inlet Management Plans

- Florida Statutes call for Inlet Management Plans to mitigate beach erosion
- FDEP Inlet Management Plans

Inlet	Bypass, yd ³
Ft Pierce	130,000
St Lucie	195,000
Jupiter	75,000
Lake Worth	202,000
South Lake Worth	88,000
Boca Raton	71,300
Hillsboro	120,000
Port Everglades	44,000
Baker's Haulover	26,400
Government Cut	No Plan



- Problem – No Enforcement Mechanism

Editorial

- Commercial shipping and the cruise and recreational boating industries benefit from modified inlets
- Beach communities largely fund beach nourishment to mitigate erosion caused by the inlets
- Navigation interests should pay costs to fully implement Inlet Management Plans



Conclusions

- Modified inlets are responsible for 93% of southeast shoreline erosion
- Humans, not Mother Nature, are largely responsible for the erosion
- Inlet Management Plans must be fully implemented to restore the balance necessary for sustainable shorelines



**“Reinstate the natural flow.
Sand went around inlets before the
channels were dredged and the jetties
were built”**

- Bob Dean

The End

