Overview of Morning Sessions
Sediment Budgets

1.	Sediment Budget Concepts and Methods	8:45-9:15
2.	Types of Sediment Budgets and Level of Analyses	9:15-9:40
3.	Sediment Budget Considerations for LA	9:40-10:00
		Break
4.	Sediment Budget Analysis System (SBAS)	10:20-10:40
5.	Hands-on SBAS	10:40-11:15

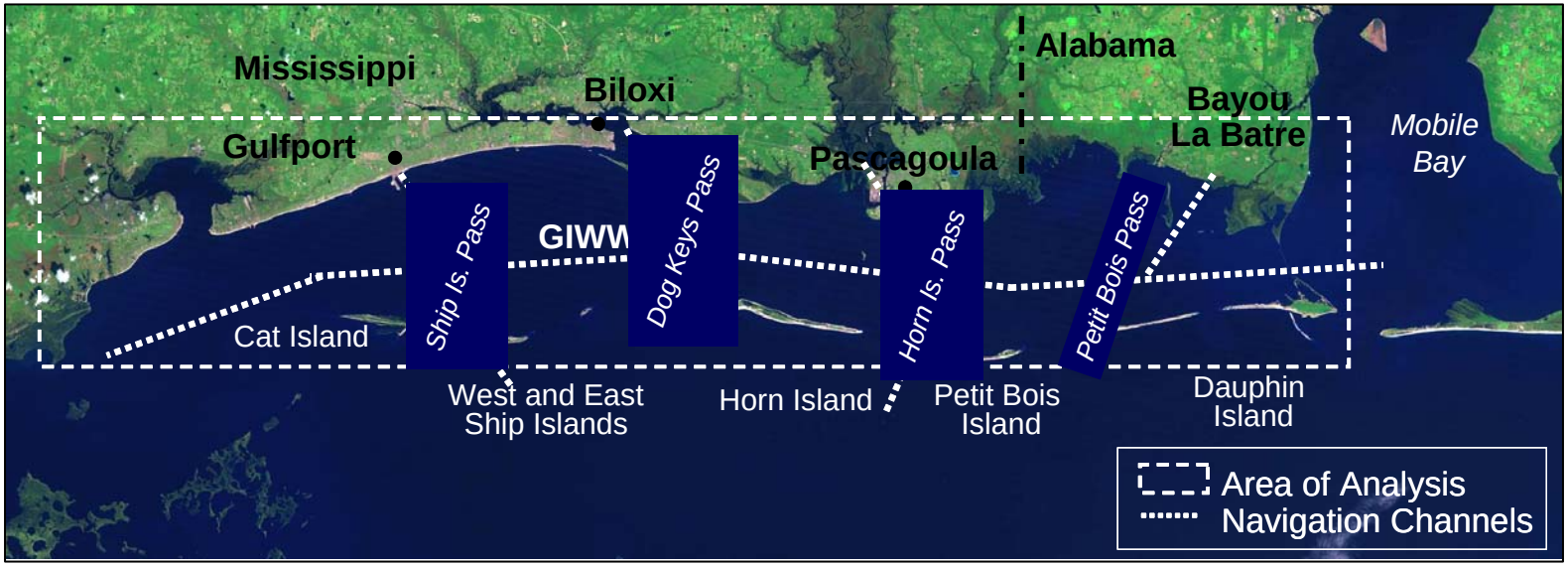
2. Levels of Budgets and Types of Analyses

How do I create a sediment budgets…

Conceptual

Interim

Operational?

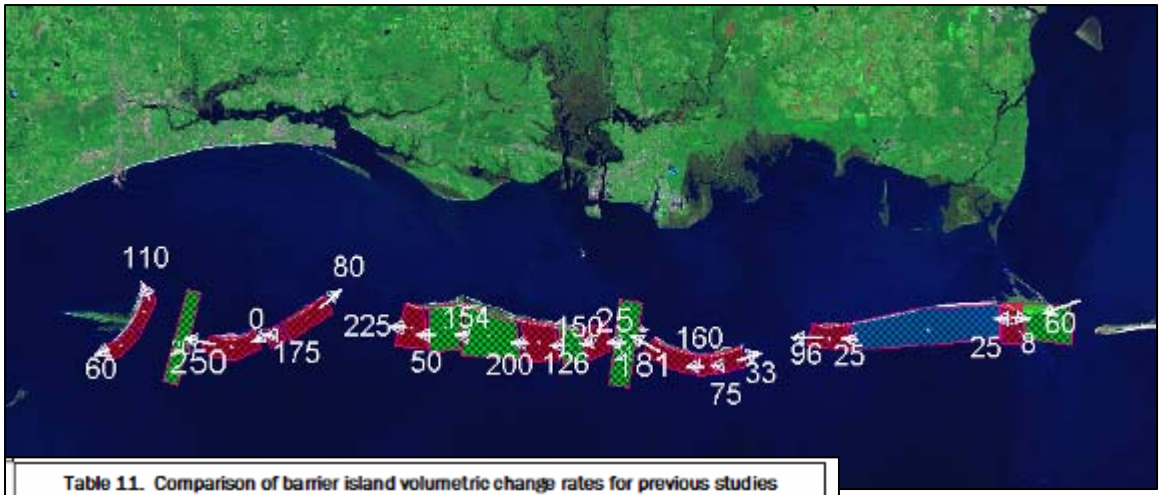


Conceptual Budget

- Developed relatively quickly
- Based on literature review, existing knowledge, or observable morphologic change, online databases
- Could be as simple as cells and direction of transport rates
- Used to develop a framework for more detailed budgets and identify gaps in knowledge (knowns and unknowns)
- Estimate level of confidence

a. Literature review (Cipriani and Stone)

Conceptual Budget



b. Literature review (Gravens)

c. Comparison of studies

Table 11. Comparison of barrier island volumetric change rates for previous studies

Barrier Island	Byrnes et al. (1991) (sq yd/yr)	Volumetric Change based on Byrnes et al. (1991) (thousand cu yd/year)*	Implied Volume Change from Cipriani and Stone (2001) (thousand cu yd/year)	Implied Volume Change from GENESIS modeling (thousand c yd/year)
Cat	-30,010	-160	n/a	-170
Ship - West	+19,360	+103	-32	-250
Ship - East	-50,330	-270	-14	-255
Horn	-20,330	-108	0	-200
Petit Bois	-23,700	-126	-52	-213
Dauphin	n/a	n/a	-5	-35

* Assuming an active depth of 16 ft = 5.3 yd.

Table 12. Comparison of shoaling rates implied from previous studies

Channel	Present-day Dredging of Bar Channel (thousand cu yd/year)	Implied Shoaling Rate from Cipriani and Stone (2001)	Implied Shoaling Rate from GENESIS modeling
Ship Island Pass	580	52	250
Dog Keys Pass	n/a	0	305
Horn Island Pass	515	52	156
Petit Bois Pass	n/a	0	128

Conceptual Budget

d. Dredging and placement information

Table A3. Dredging History for the Channel at Ship Island Pass: 1881 to 2003					
Date	Authority	Description	New Work (cy)	Maintenance (cy)	Source
March 3, 1881	River and Harbor Act	Examination of the outlet and harbor of Ship Island was conducted by Thomas L. Harrison, Assistant Engineer in the summer of 1881. "After careful examination of the various channels, I find nothing less than 23 to 24 feet over the bar, with 4 to 5 fathoms inside at mean low-water." "After consultation with the pilots and several prominent citizens of Biloxi, I do not think there is anything at this pass, at present, requiring improvement."			ARCE, 1882; p. 1321-1322
		Provided for an examination of Mississippi Sound outside the range of islands of the Mississippi coast, with a view of making an entrance for vessels. The main channel had a depth of 22 feet on the crest of the bar at mean low-water. The desired depth was 24 feet. A.N. Damrell (Major of Engi-			

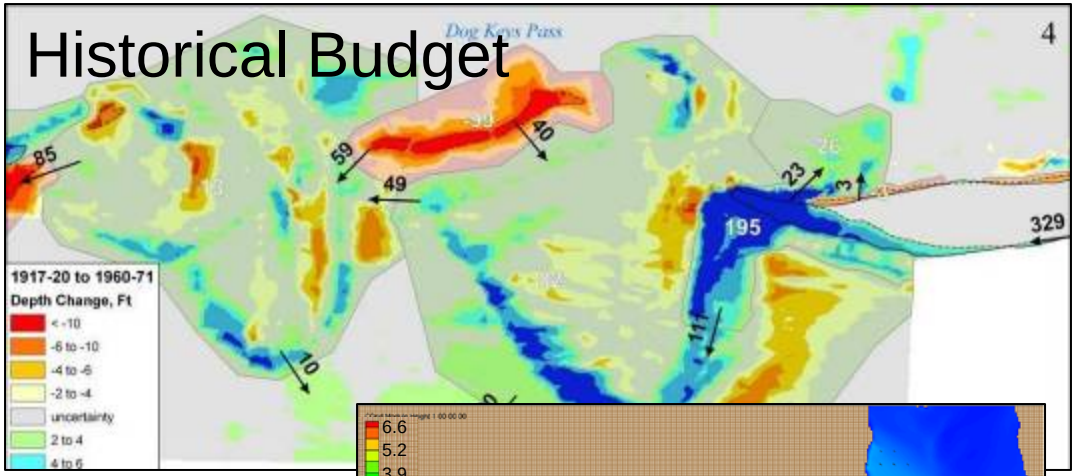
Conceptual Budget

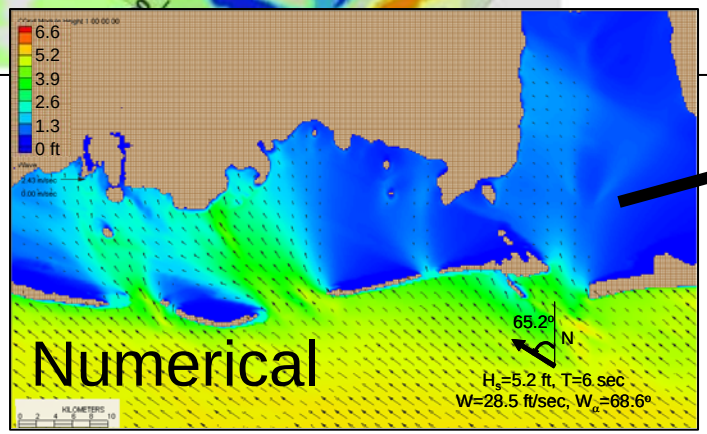
e. Best information put together in final conceptual budget. Represented all engineering works (channels, dredging, placement of dredged sediment)

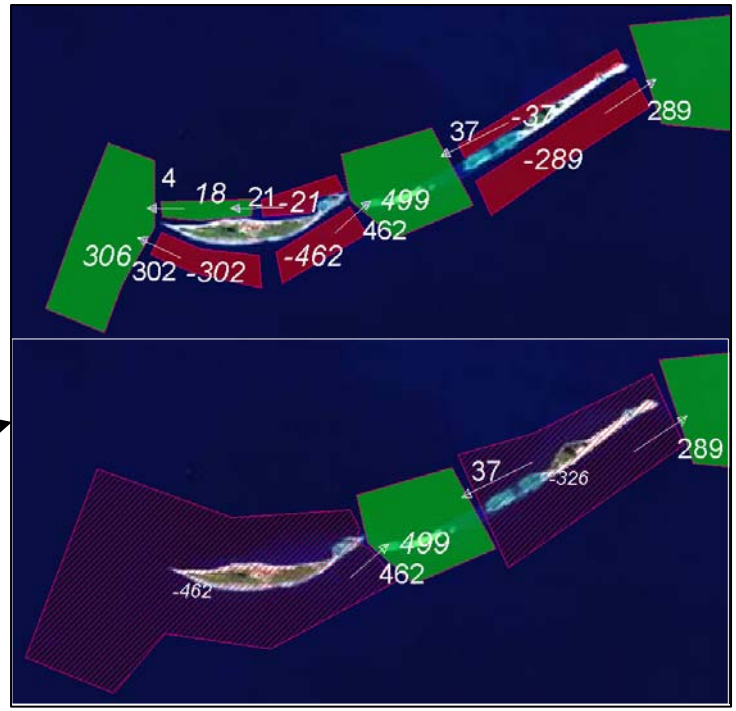
Final MsCIP Conceptual Budget

Interim Budgets

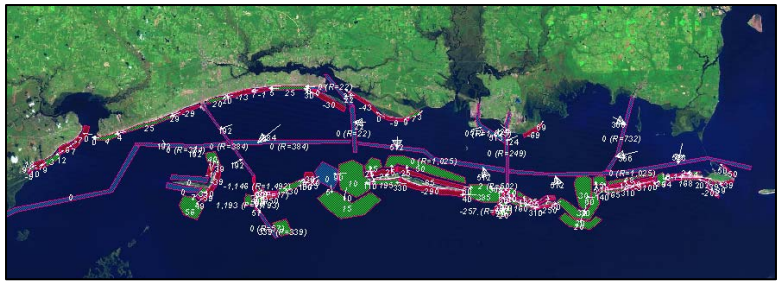
a. Historical (1917/20-1960/71)
b. Numerical (post-Katrina shoreline position; 1980-1999 WIS)







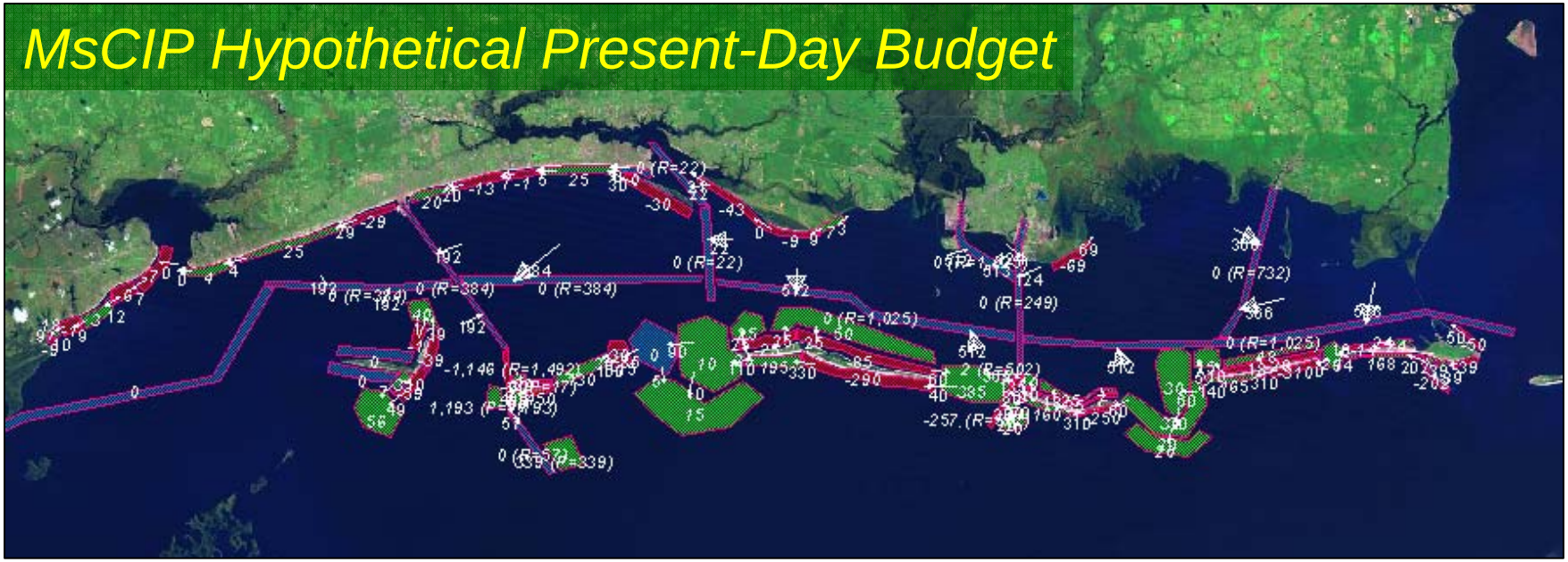
Operational Budget



- A final budget that is used in regional planning and initial design of site-specific projects

- May be a series of budgets representing typical and storm years
- Represents regional as well as project sources and sinks
- Developed with most available data sets, with some redundancy to develop confidence in estimates
- Can be updated with new knowledge and engineering activities
- Time ~ 1 mos+

Operational Budget

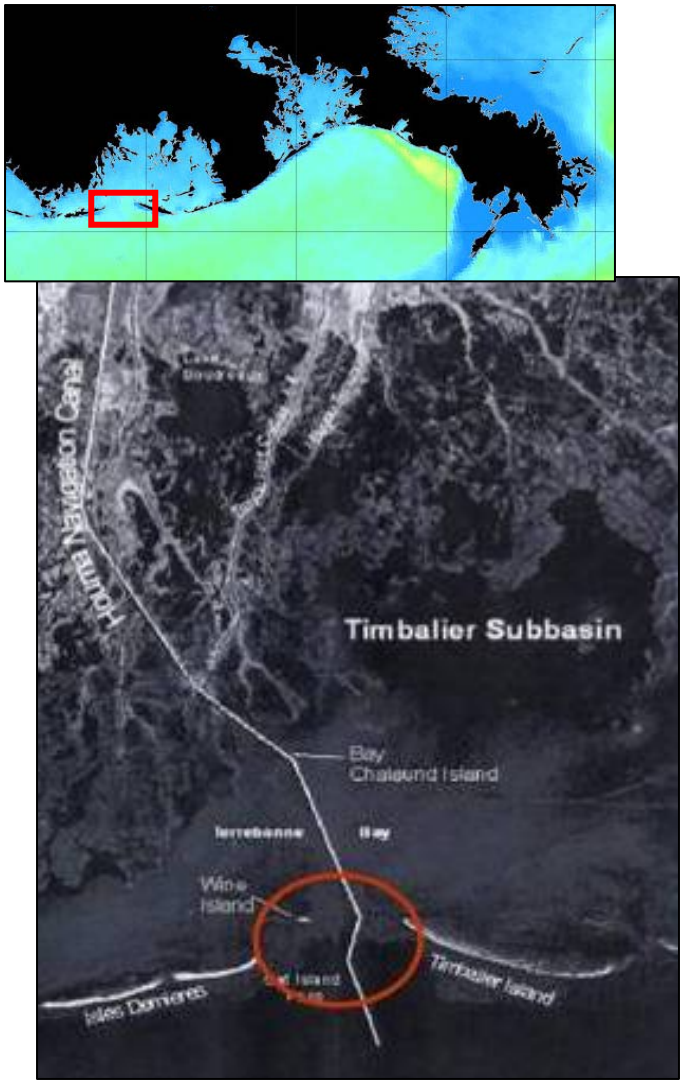


For MsCIP, we weighted historical budget most heavily, with numerical budget filling in unknown information (mainland)
→ For a truly MsCIP Operational Budget, need to update based on modern bathymetry and shoreline position data

Scoping-level study of Cat Island Pass, LA

How will deepening the Houma Navigation Channel change sediment transport patterns and shoaling magnitudes at CIP?

Examples: Conceptual and Interim Sediment Budgets for Cat Island Pass, LA

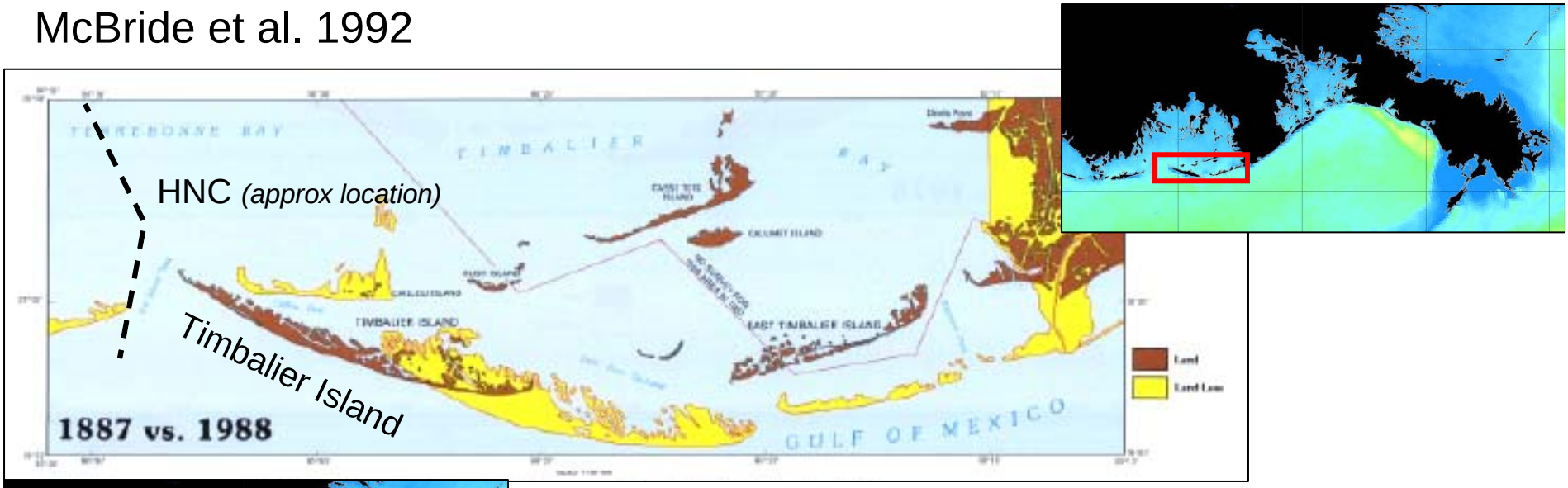


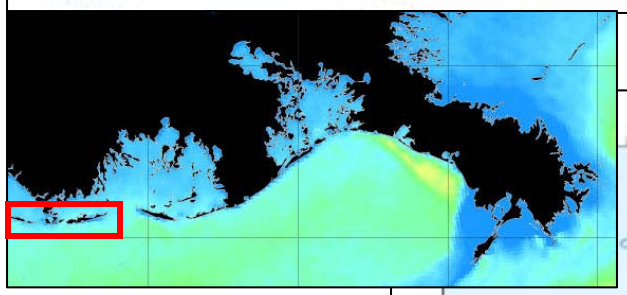
Questions:

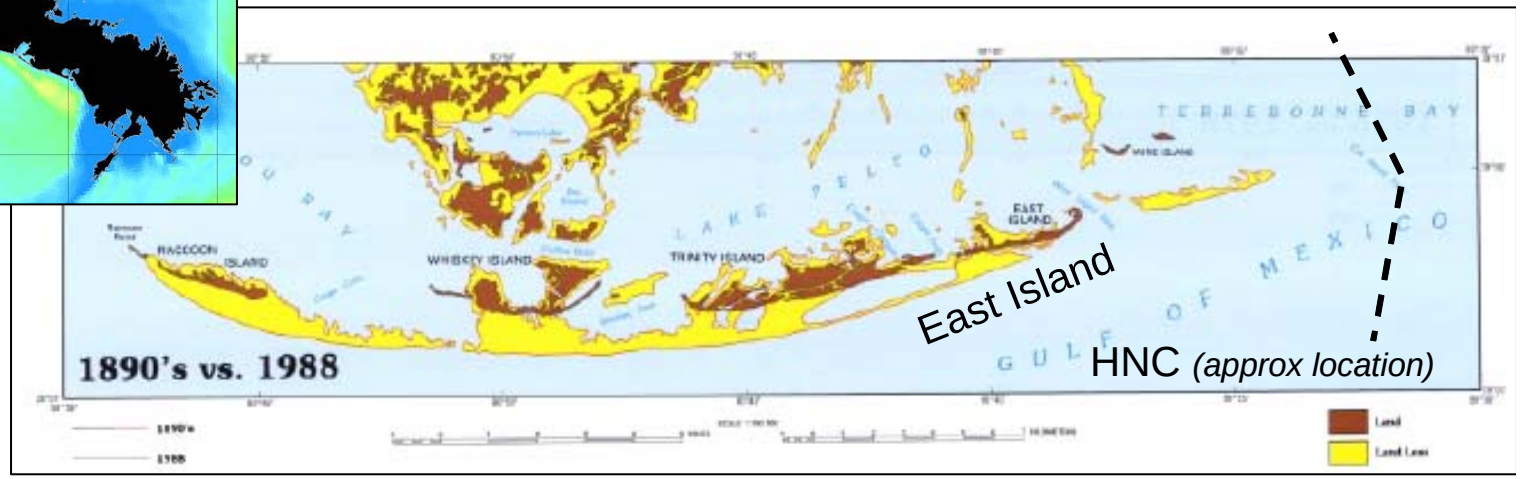
- What will happen to the sediment transport system when the navigation channel is deepened from 18 to 20 ft MLG?
- If there is an increase in shoaling, where will the sediment come from?
- Where should dredged sediment be placed?

Literature Review (1 of 3)

McBride et al. 1992

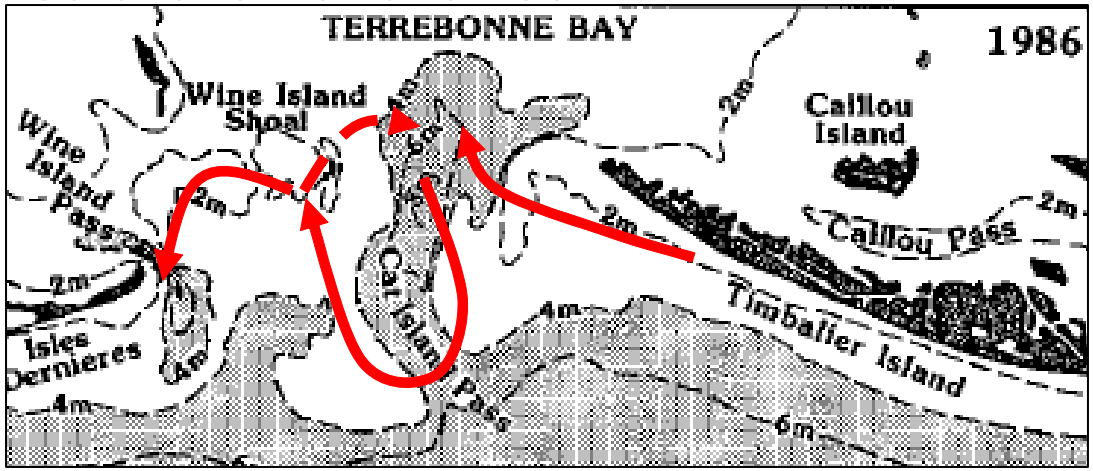




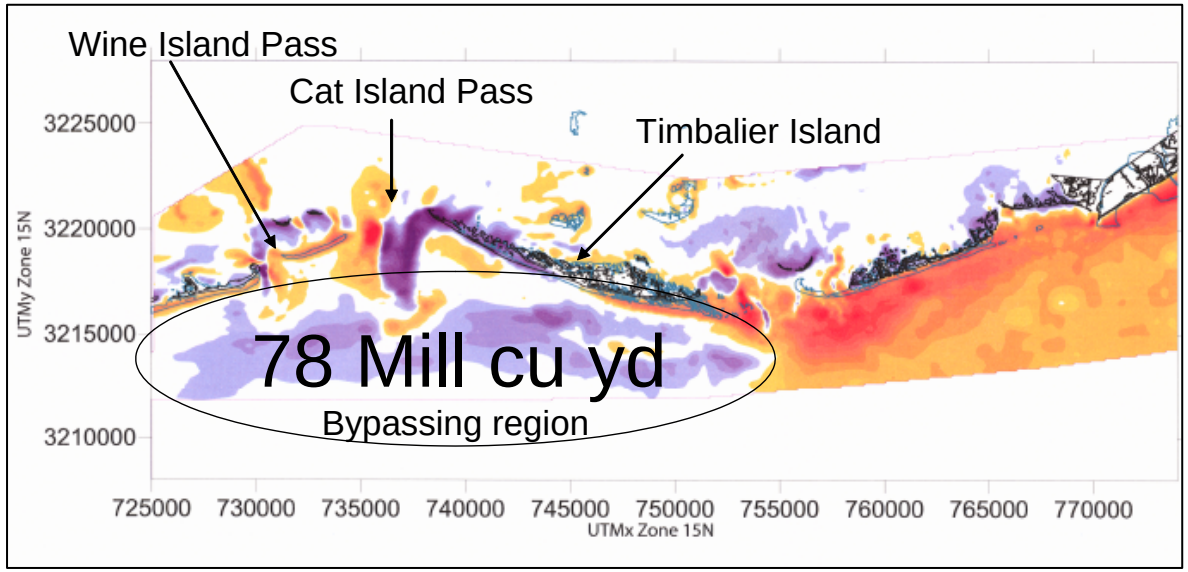


Literature Review (2 of 3)

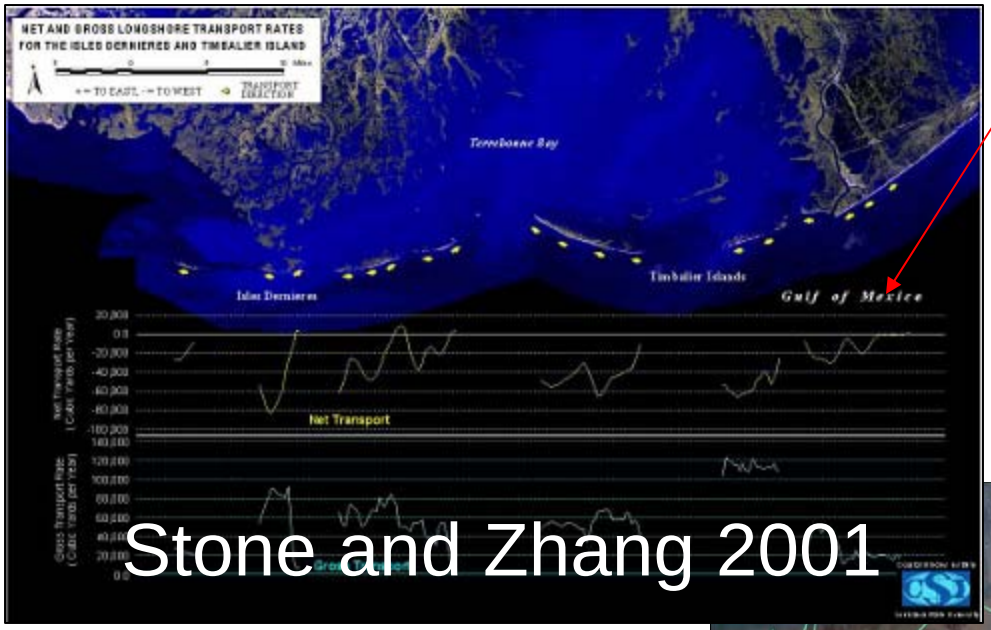
Suter and Penland 1987



Jaffee et al. 1997



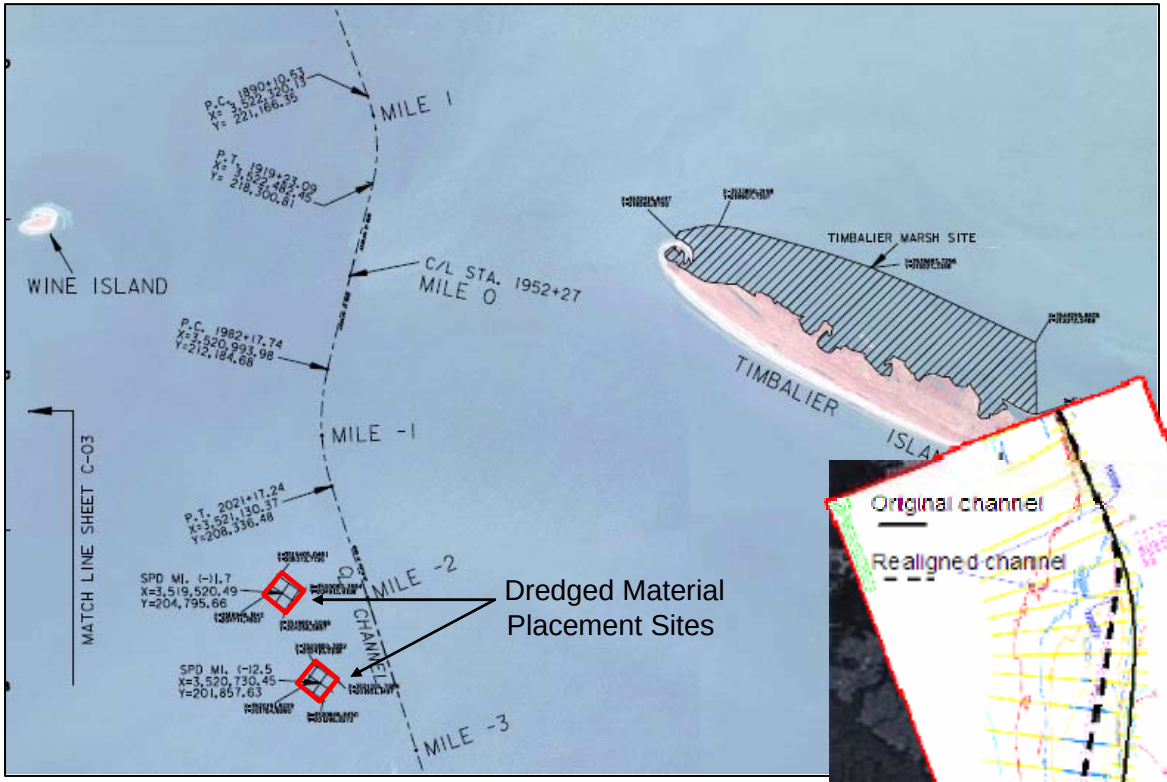
Literature Review (3 of 3)

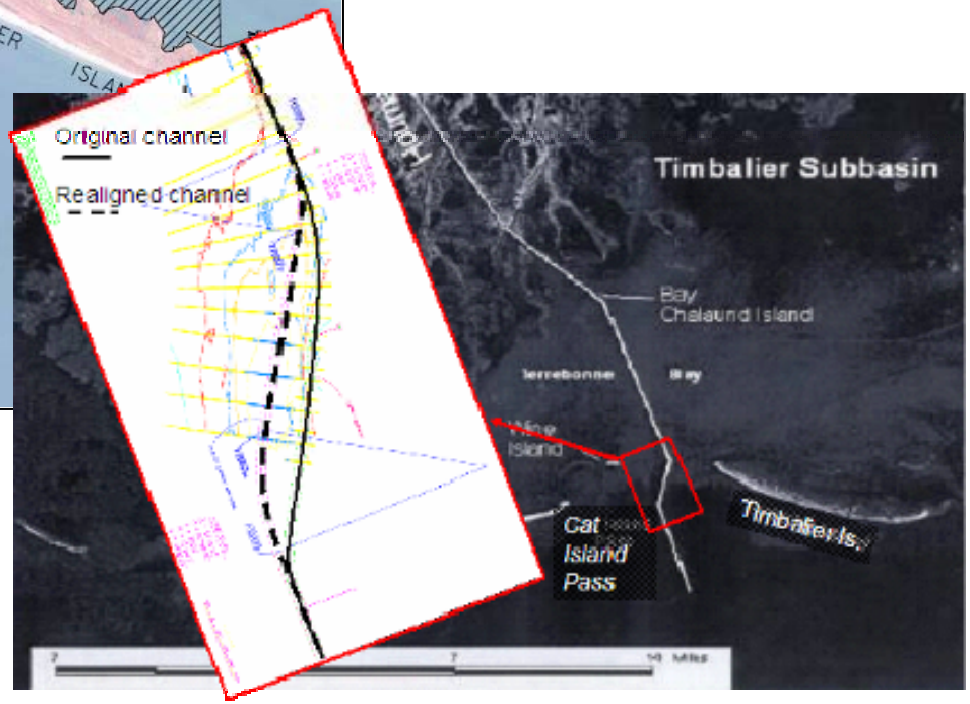


Stone and Zhang 2001

Numerical modeling of non-storm longshore transport rates

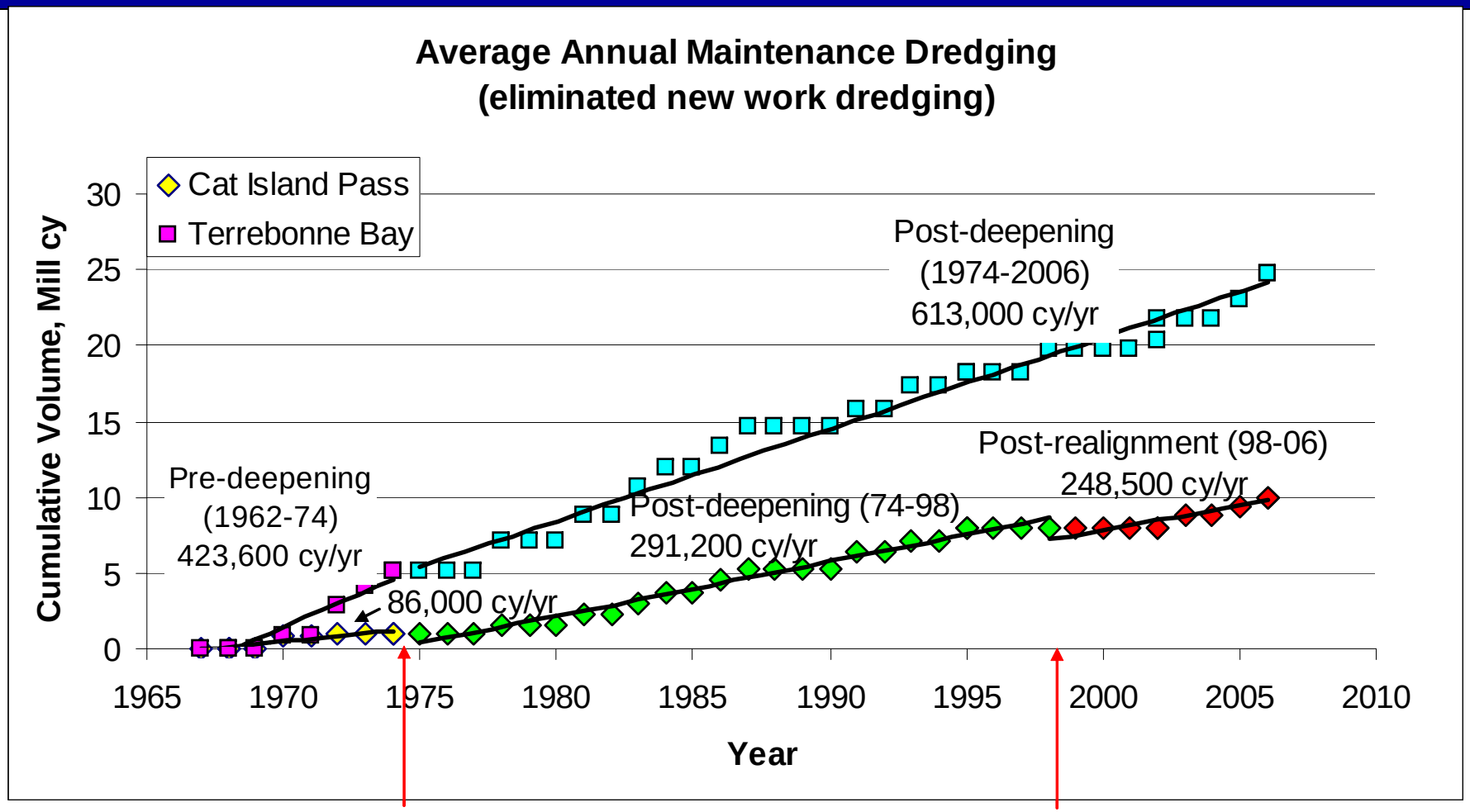
Navigation Channel History





Deepened in 1974;
Realigned in 1998

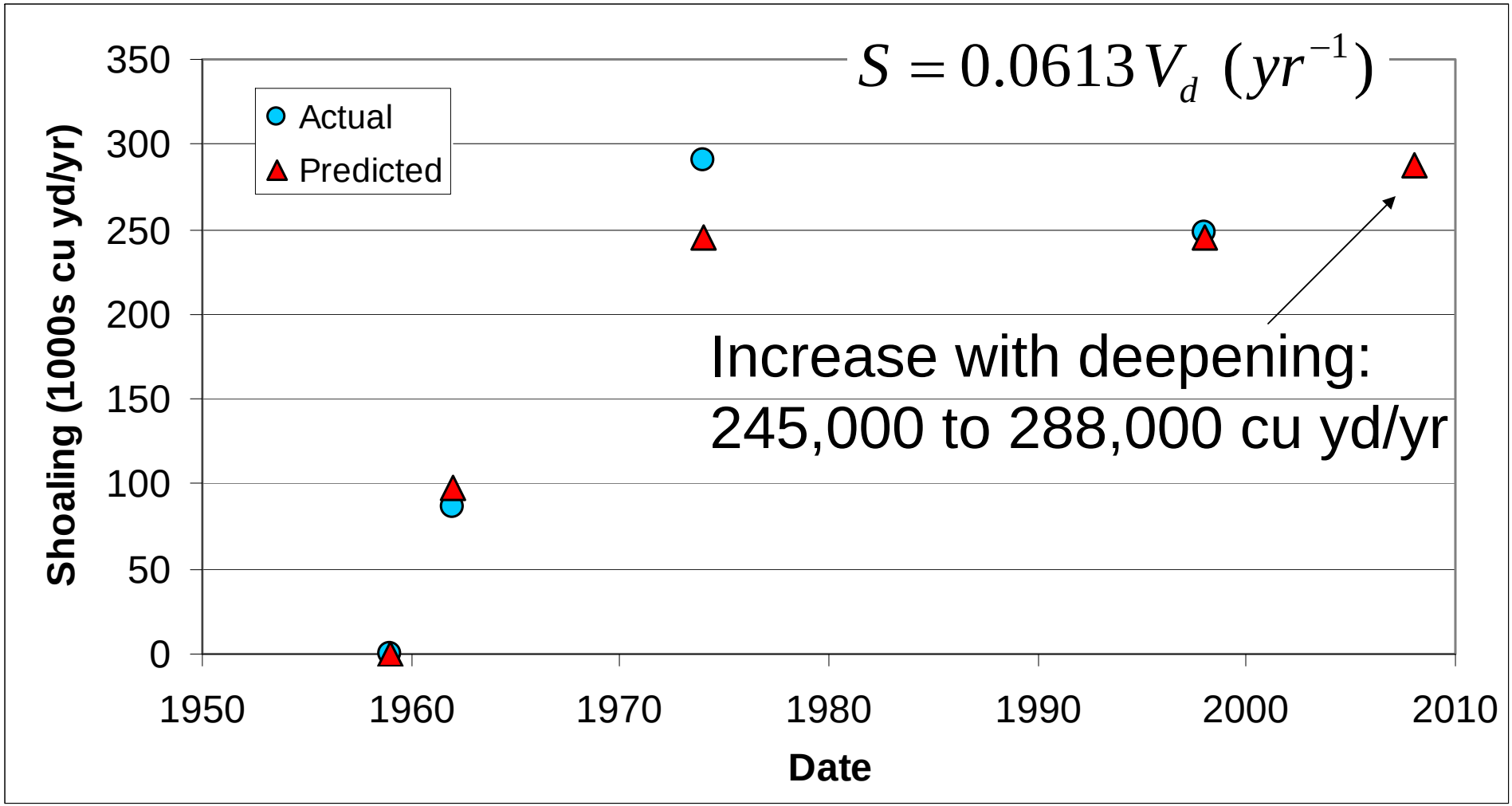
Historical Dredging Records



Channel deepening & widening 1974

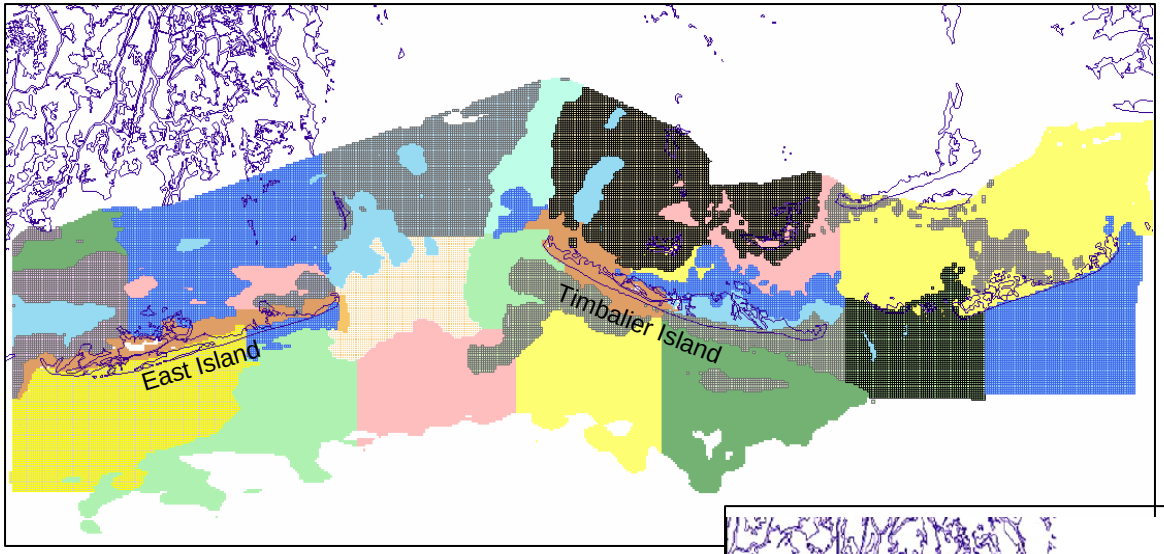
Channel realignment 1998

Calculation of Increased Shoaling at Cat Island Pass

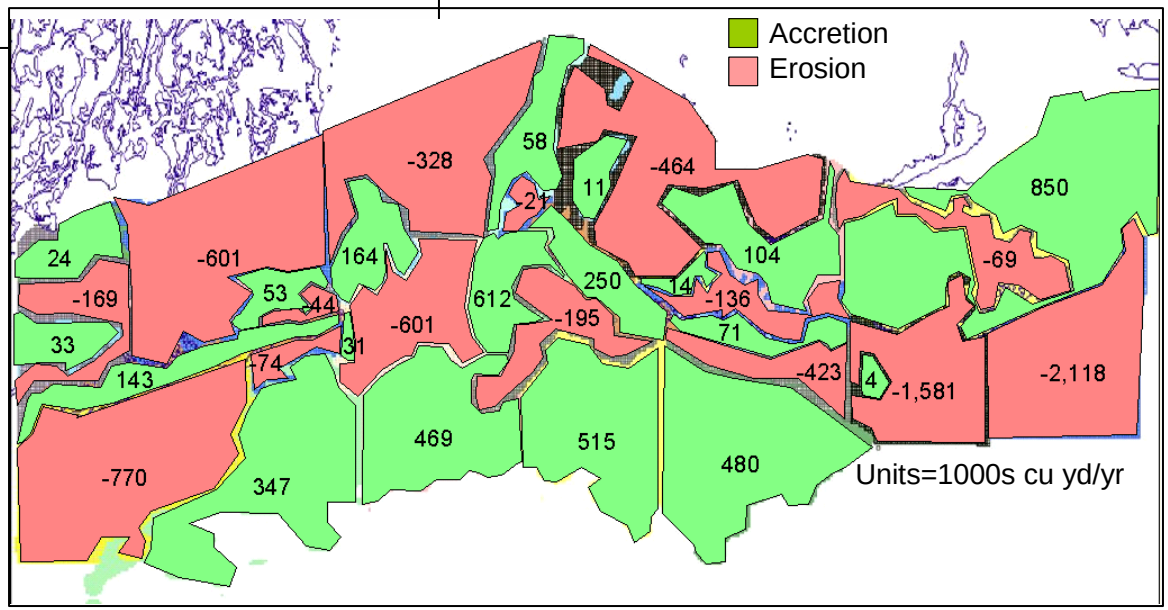


Conceptual Budget

Development of Interim Budget

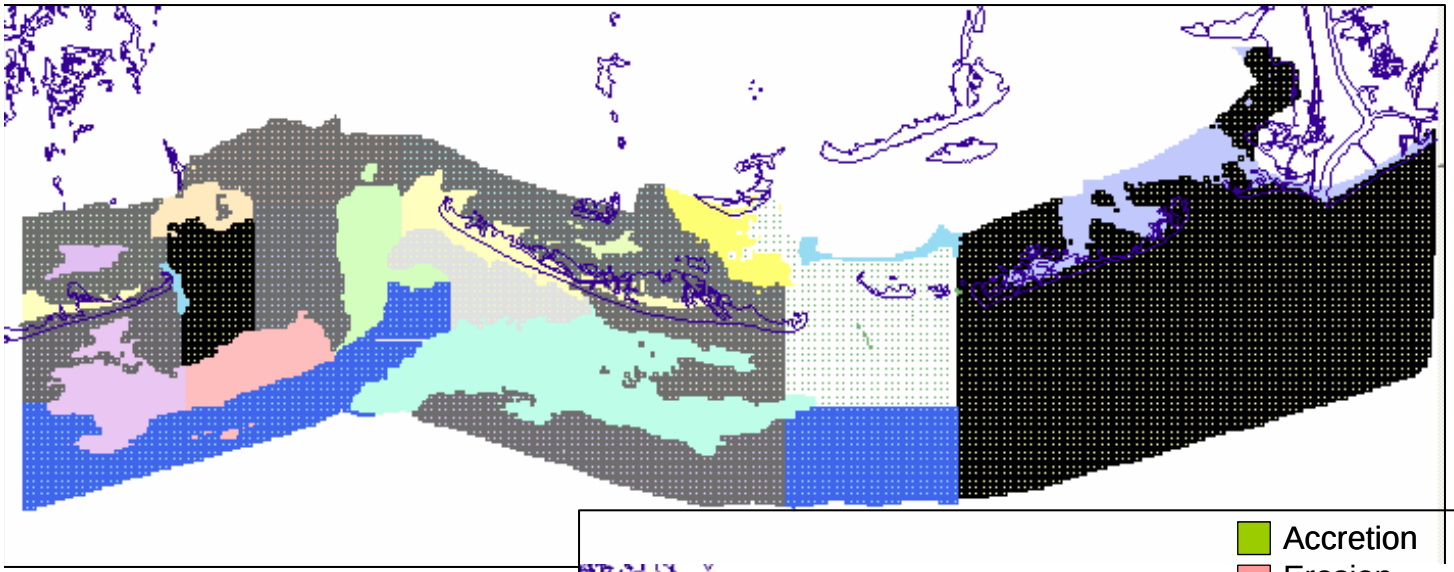


Volumetric Change: 1930s-1980s

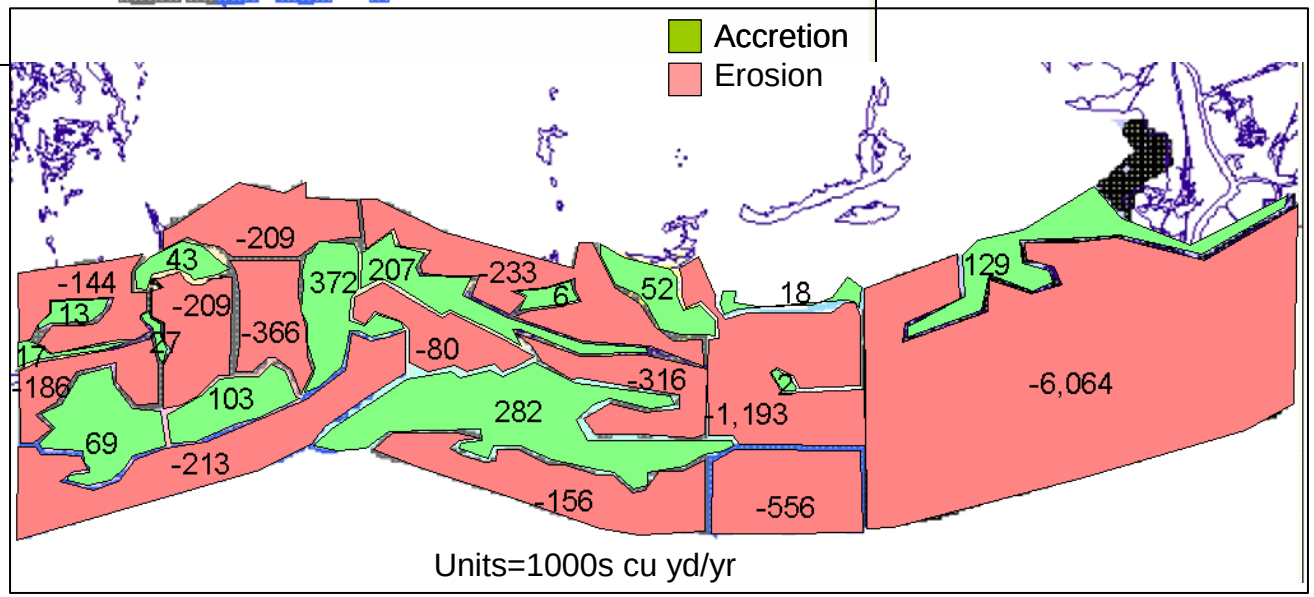


Data courtesy Darin Lee, LDNR and BICM Study, UNO

Development of Interim Budget

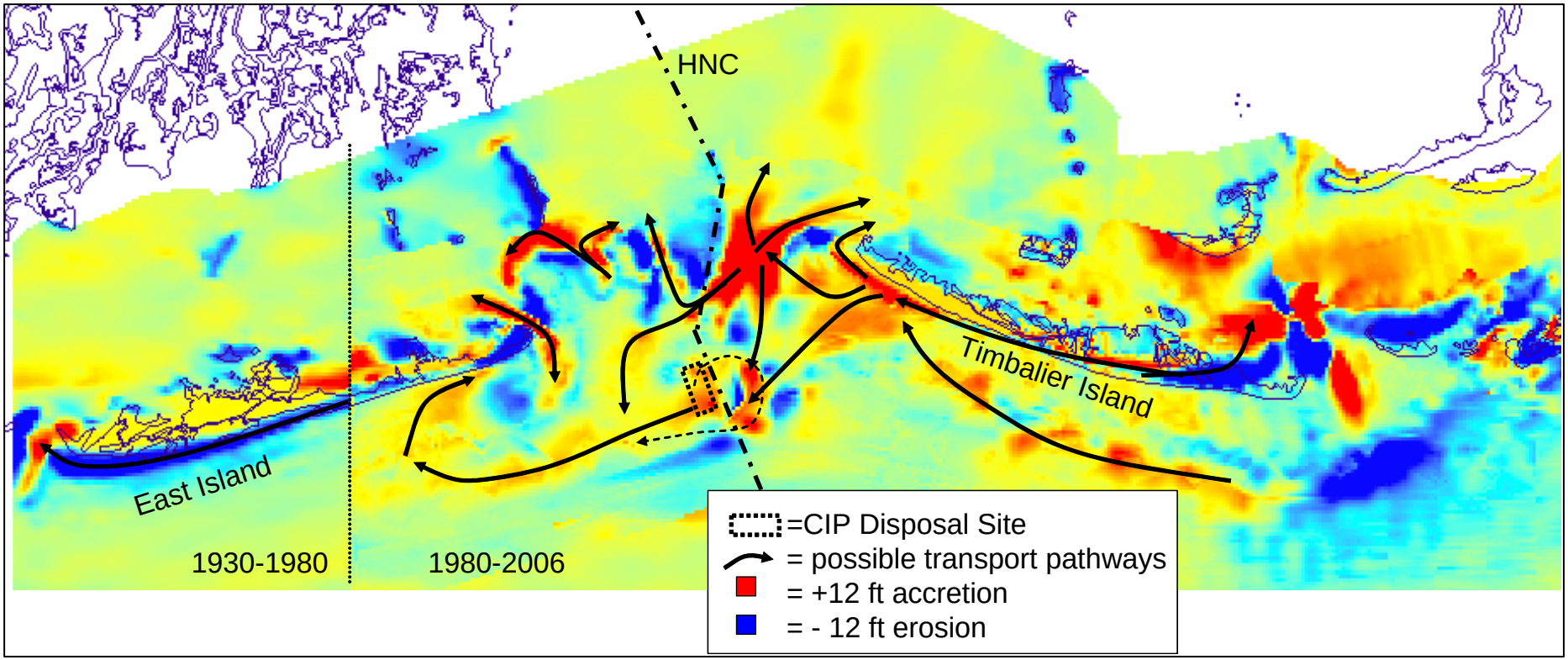


Volumetric Change: 1930s-2006

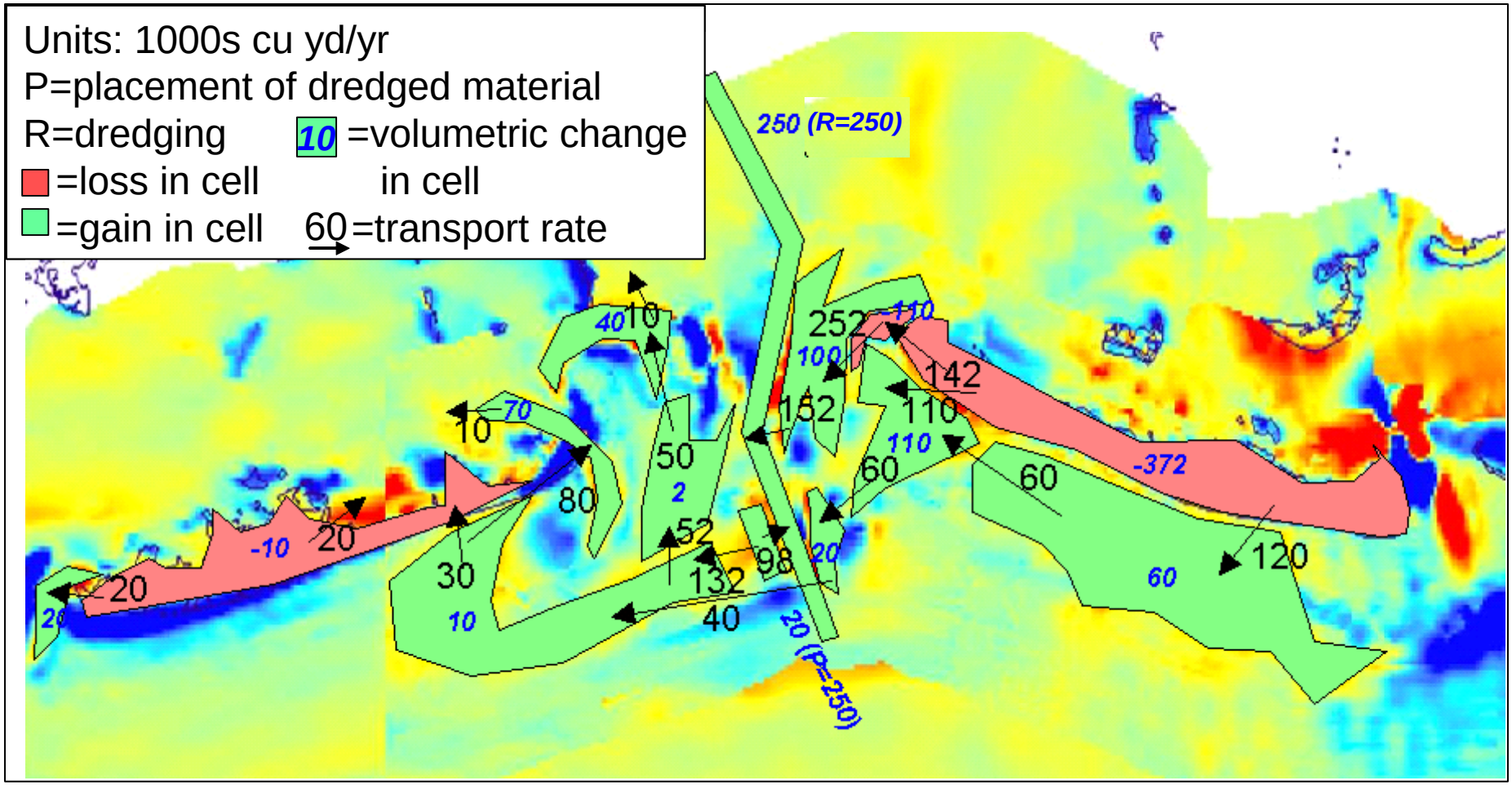


Data courtesy Darin Lee, LDNR and BICM Study, UNO

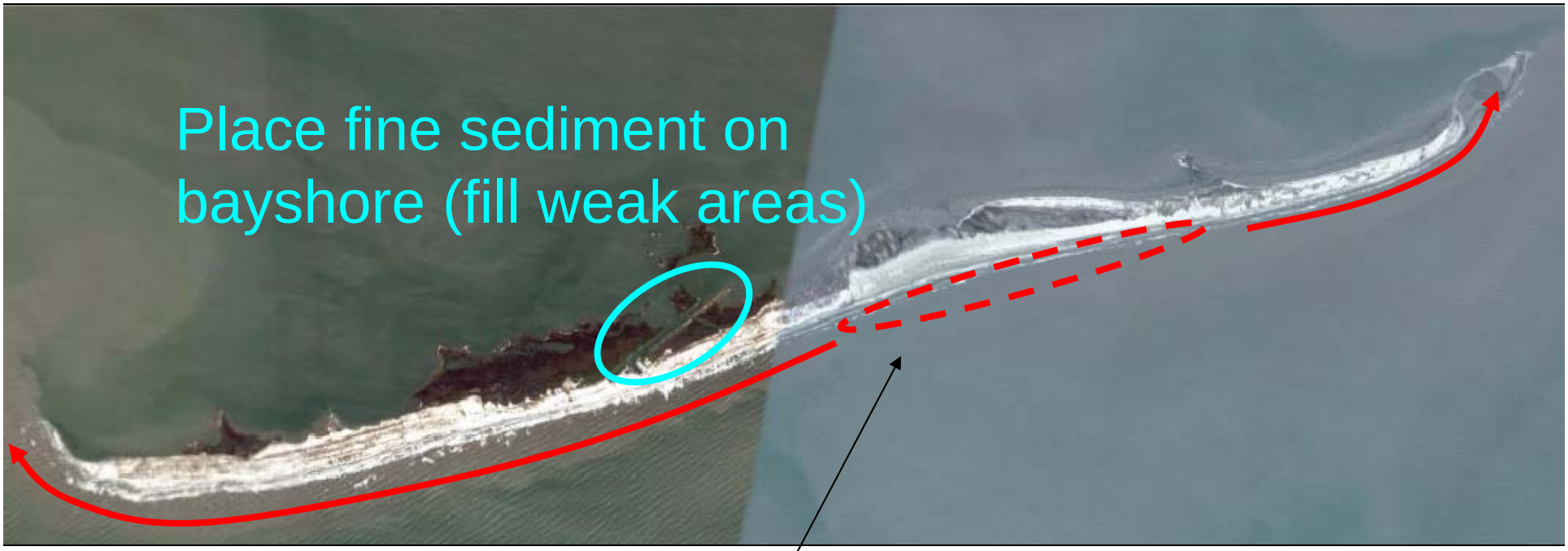
Sediment Transport Pathways inferred from Morphologic Change



Final Interim With-Deepening Budget



Dredged Material Placement Zone on East Island (downdrift of channel)



Recommended nearshore placement zone based on this photograph; more recent photography might indicate a different placement zone.

Summary

- Three levels of sediment budgets
  - Conceptual – based on existing information and simple analyses
  - Interim – additional analysis, numerical modeling
  - Operational – sensitivity and uncertainty estimates; decision-support
- Cat Island Pass Examples
  - Conceptual budget – relied on most realistic information in literature
  - Interim budget
    - Not able to use all historical data because of widely varying trends in bathymetry change
    - Inferred sediment pathways from literature and morphologic change
- Recommendations for CIP
  - Move placement sites further away from channel
  - Place on downdrift beach (Isle Dernieres, East Island) if possible
  - Put sand on Gulf shoreline and fines on bay shore (fill relict channels, if possible)