LONGTERM NEARSHORE SEDIMENTATION ON A RENOURISHED BEACH: HANCOCK COUNTY, MISSISSIPPI

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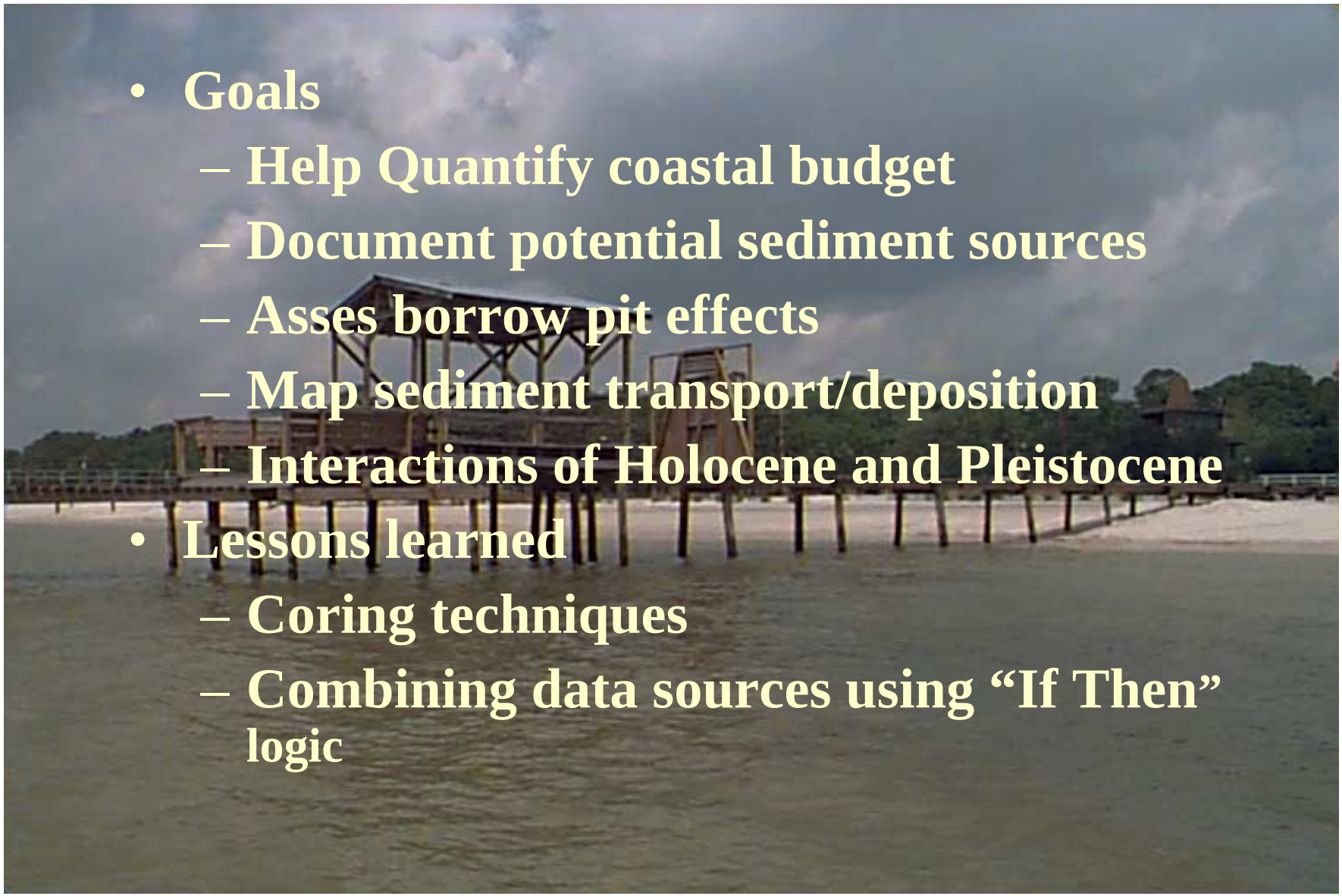
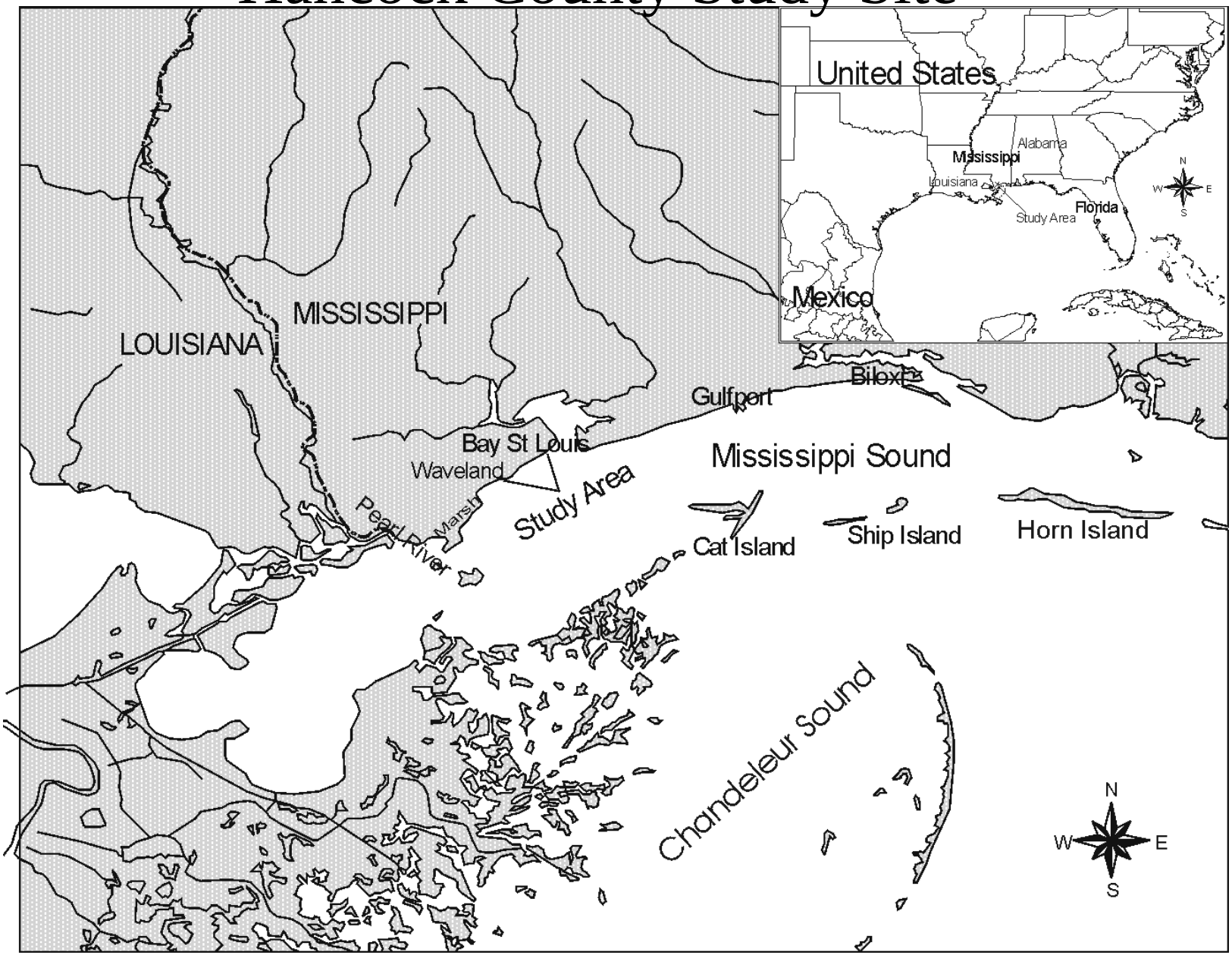
Mississippi Office of Geology

Introduction

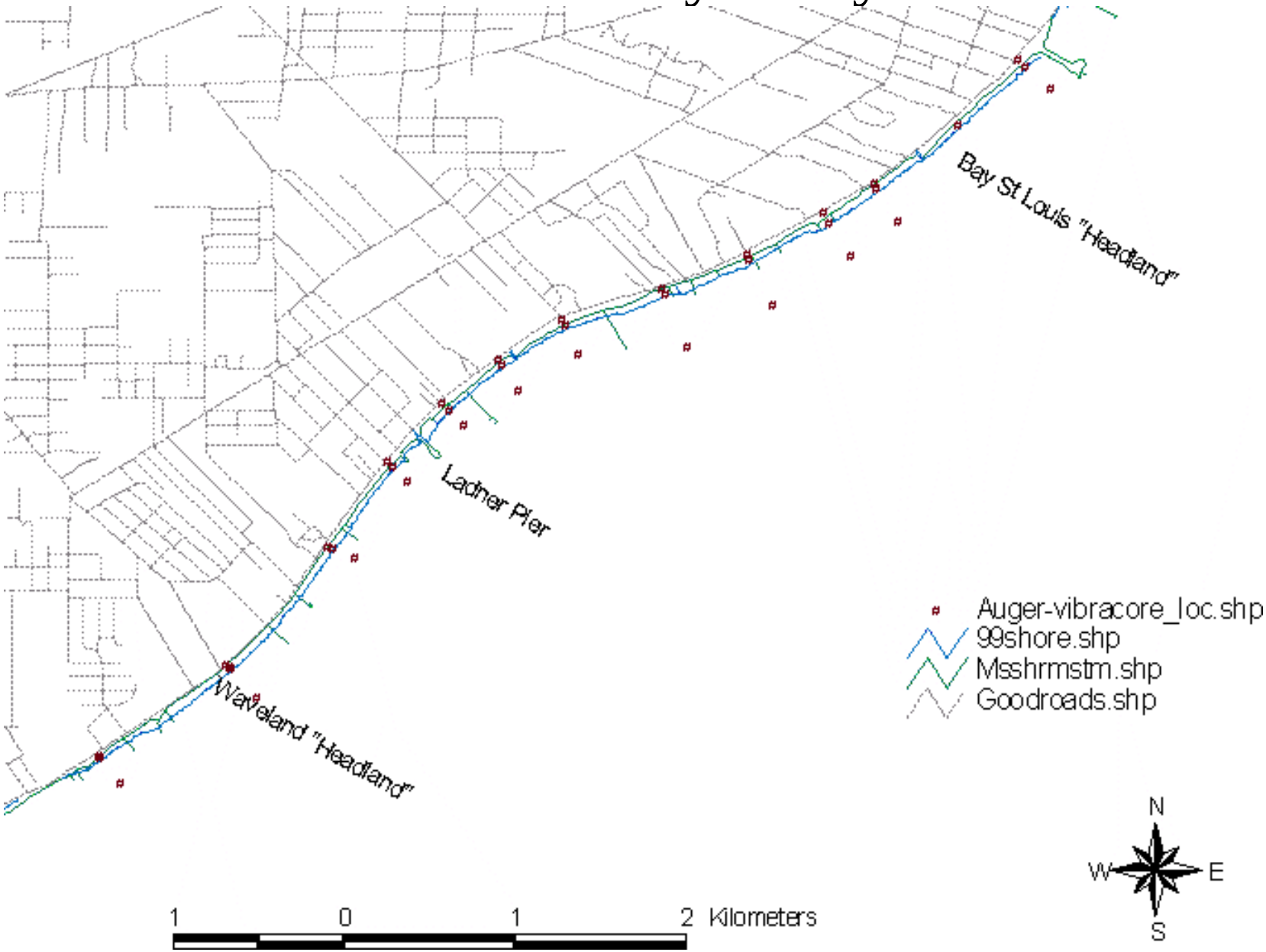


- Goals
  - Help Quantify coastal budget
  - Document potential sediment sources
  - Asses borrow pit effects
  - Map sediment transport/deposition
  - Interactions of Holocene and Pleistocene
- Lessons learned
  - Coring techniques
  - Combining data sources using “If Then” logic

Hancock County Study Site



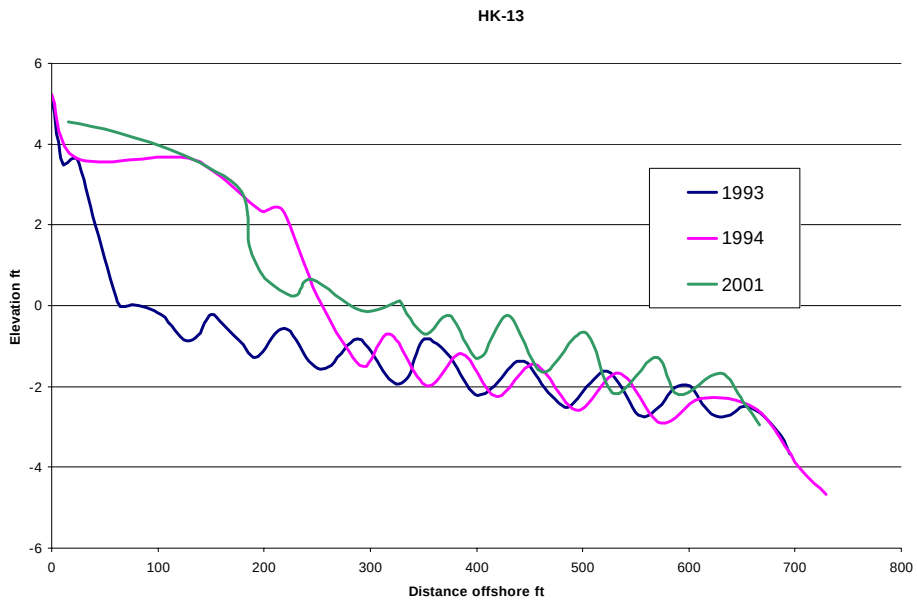
Hancock County Study Site



Background

- Several Renourishments
  - 1941, 1967, 1972, and 1994
  - Most important 1967 and 1994
  - Both created ≈ 200 ft wide beach
  - 600,000 cyds for Waveland section of 1994 project
  - Potential for roughly **1.6 million** cyds of fill for combined 1967 and 1994 projects
- Two Pleistocene units
  - Biloxi
  - Gulfport

	Waveland	Bay St. Louis	Total
1994 Renourishment	560,000	250,000	810,000

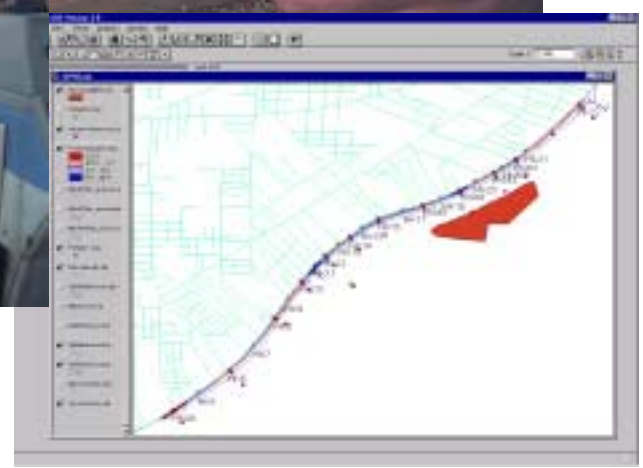


1992

1998

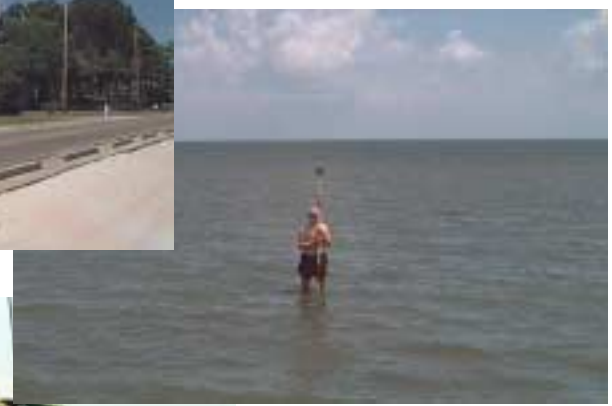
Methods

- Data
  - Profiles
    - total station
  - GPS
  - Augers
    - no sedimentary structures
  - Vibracores
- Analysis
  - Sediments
    - Texture, composition, structures, trace fossils
    - “If then”
  - GIS
    - Interpolation
    - Trends



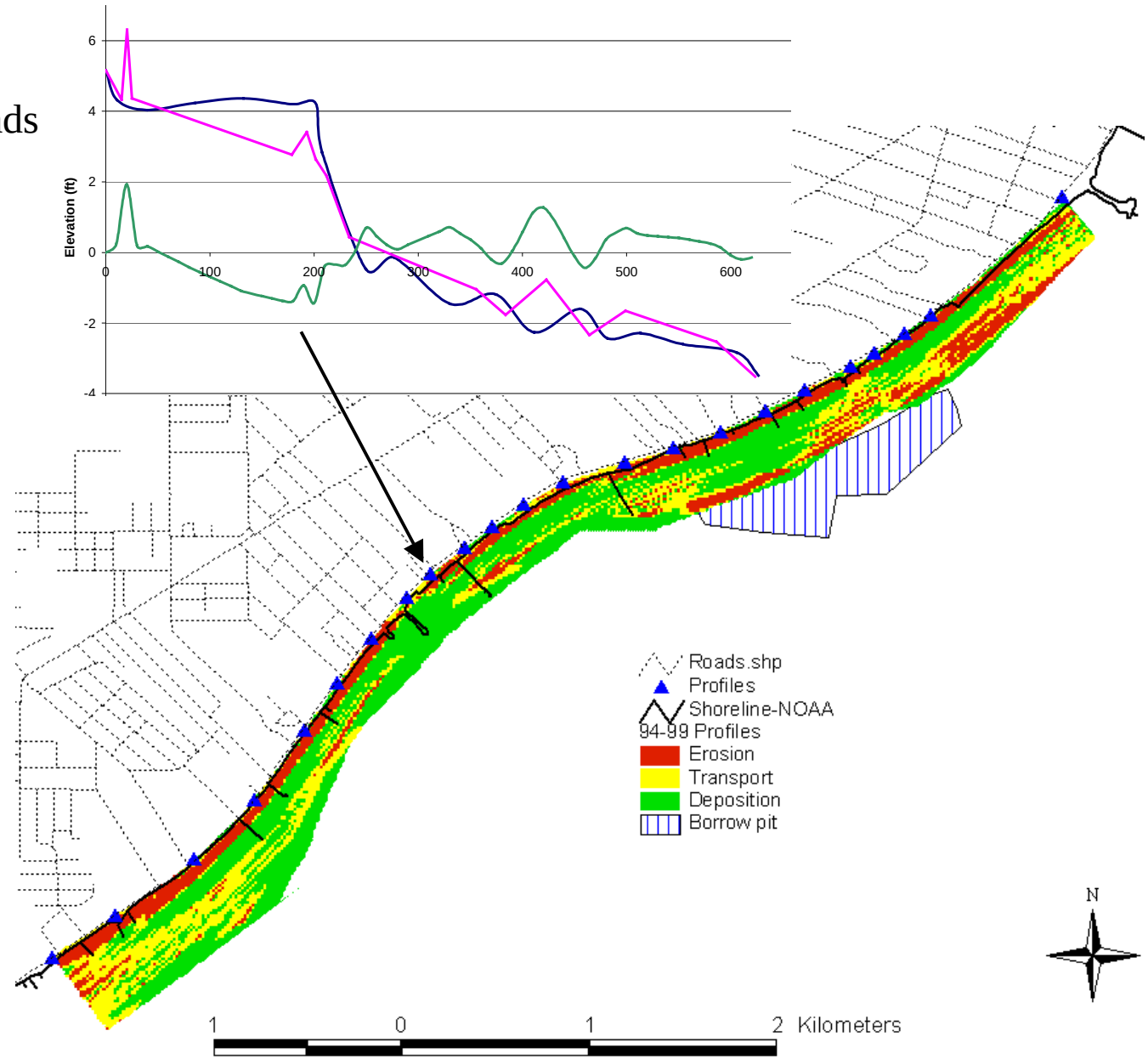
Data

- Profile Comparison
  - Total Station
    - 1993
    - 1994
    - 1999
- Onshore Stratigraphy
  - Facies Change
- Nearshore Stratigraphy
  - Trace Fossils
  - Sedimentation Rates

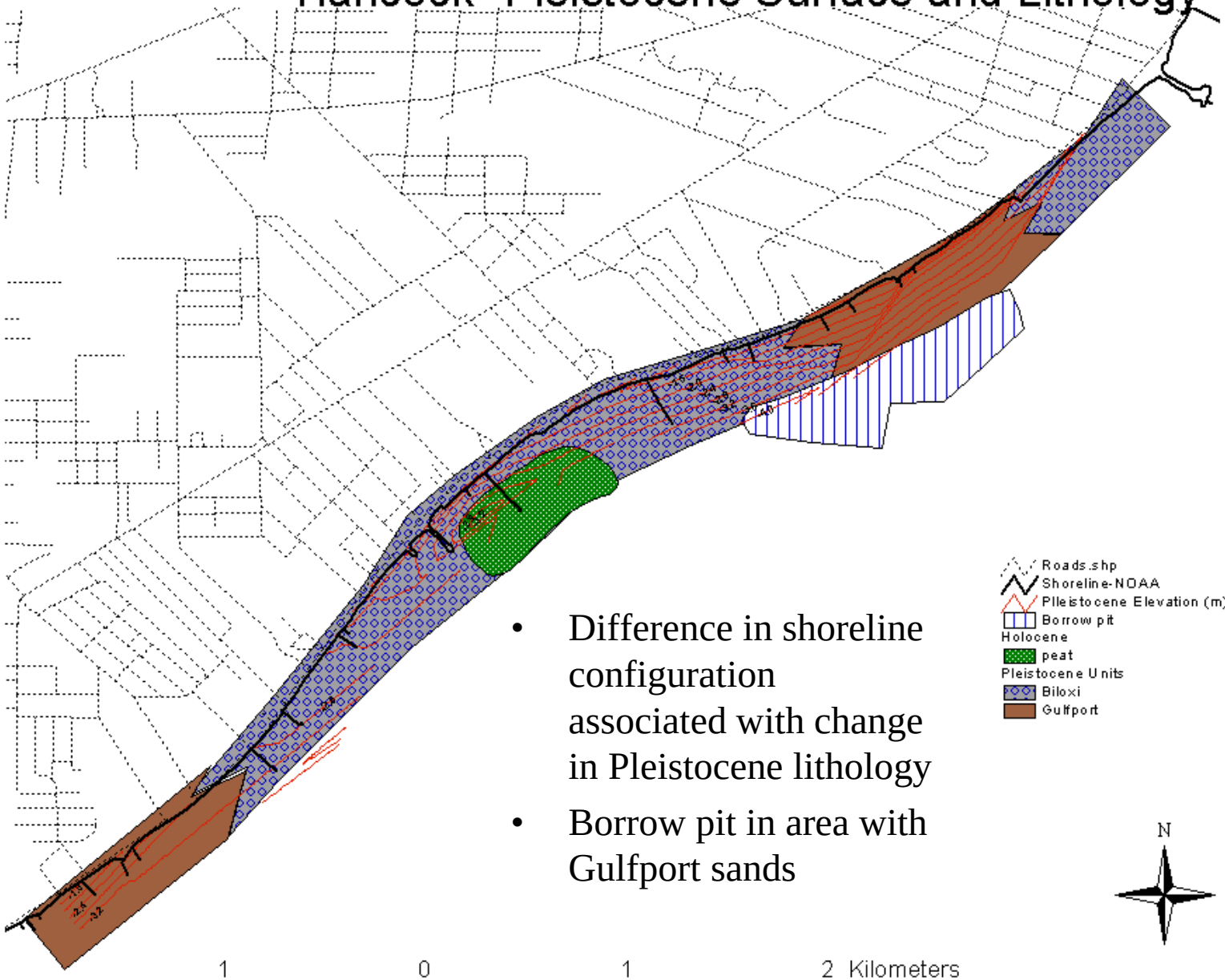


Profiles

- Erosion
  - Onshore
  - East and west ends
  - Adjacent to borrow pit
- Deposition
  - Dominant over nearshore area



Hancock- Pleistocene Surface and Lithology

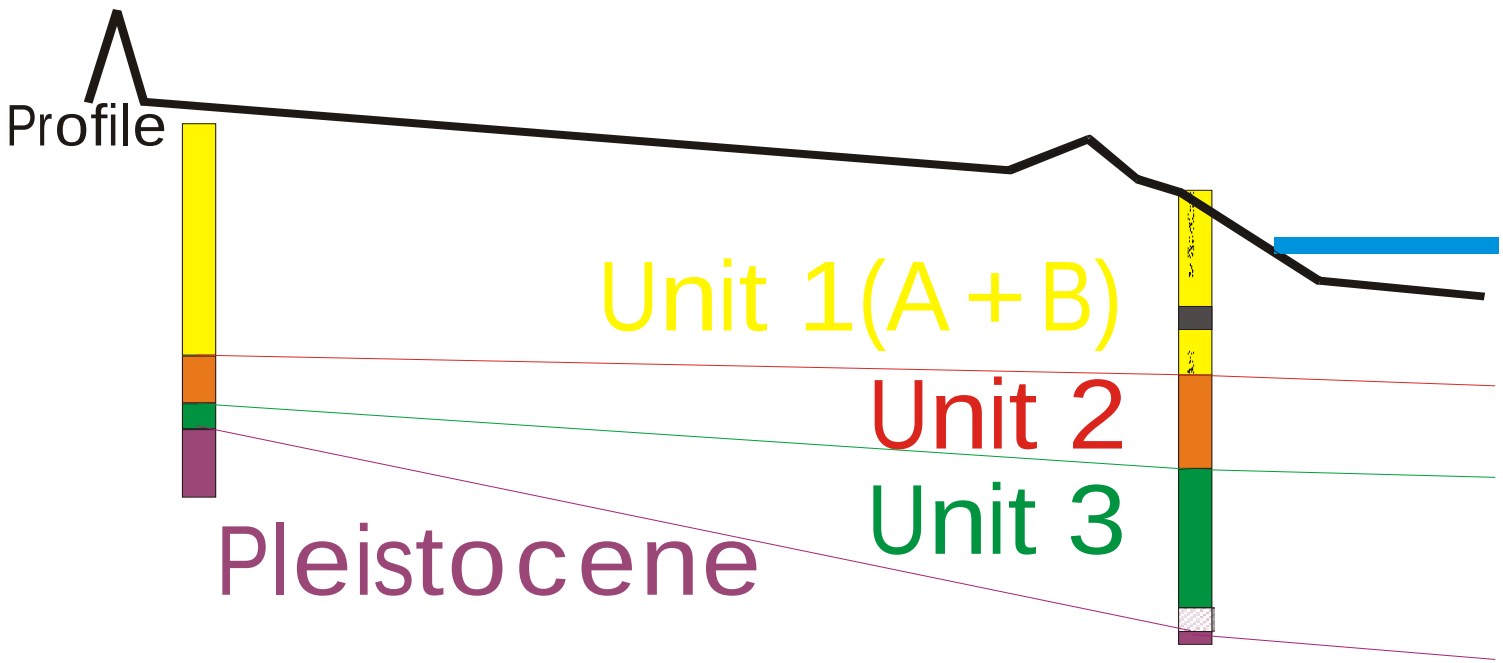


- Difference in shoreline configuration associated with change in Pleistocene lithology
- Borrow pit in area with Gulfport sands

Onshore Units

- Unit 1 = Fill
- Unit 2 = Holo/Fill
- Unit 3 = Holo

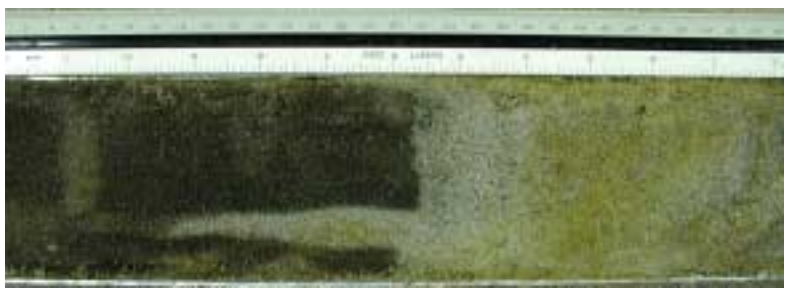
Unit	n	Mean	Sorting (std dev)	Mud%
1A	3	2.01	0.58	0.08
1B	3	2.11	0.60	0.30
2	4	2.48	1.05	5.76
3	3	3.20	1.79	21.36



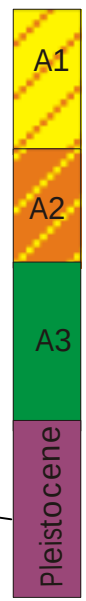
Nearshore

- A1 = Probably Fill
- A2 = Big Question??
  - Characteristics of Holocene and Fill
- A3 = Holocene

Type	n	Mean	Sorting	Mud%
A1	4	2.88	0.90	10.79
A1(TYP)*	3	2.60	0.65	1.66
A2	3	2.72	0.96	5.76
A3	3	3.11	1.25	14.37



Pleistocene



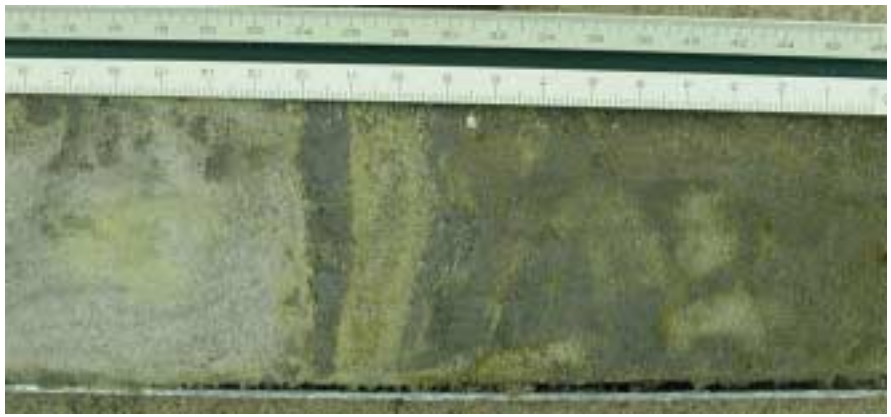
Unit A1

Unit A2

Unit A3

Nearshore-Recent Example

Nearshore Contacts



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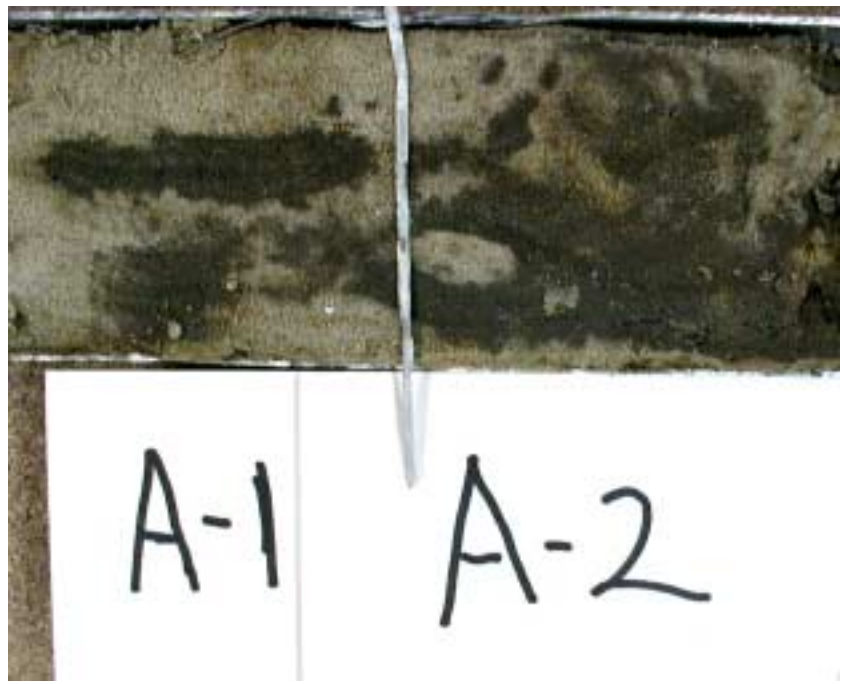
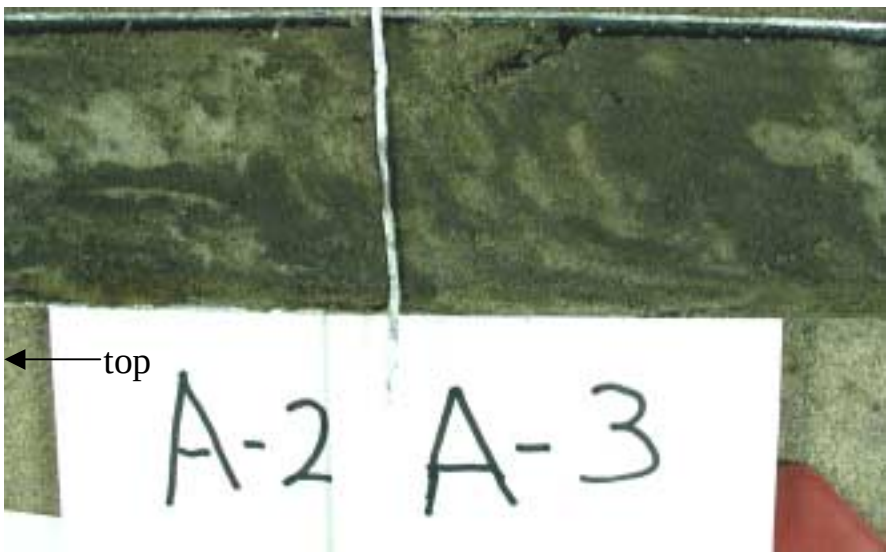


Pleistocene

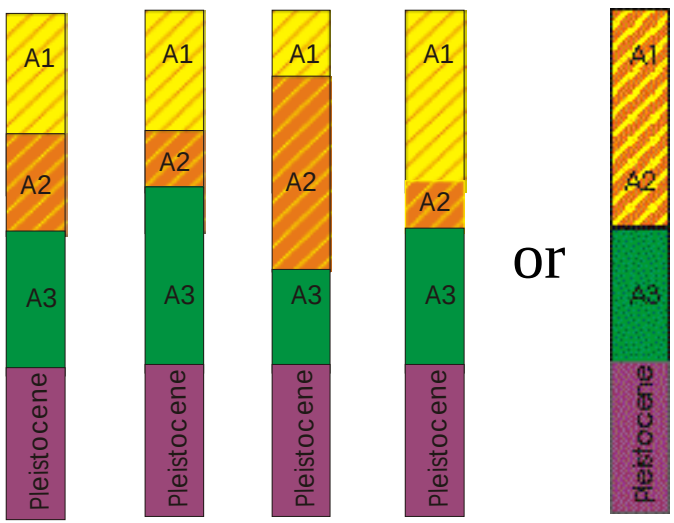
Holo (A-3)



Combined Data

- **Onshore –** Facies change
- **Nearshore –** "If Then" condition
  - Variable 1 = core data
  - Variable 2 = profile change

Variable 1



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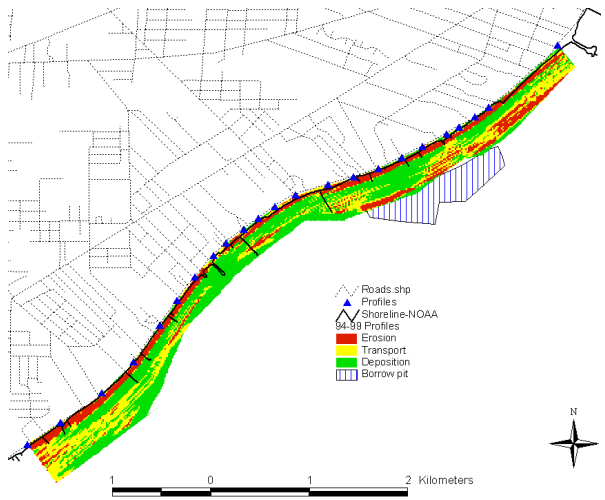
Variable 2



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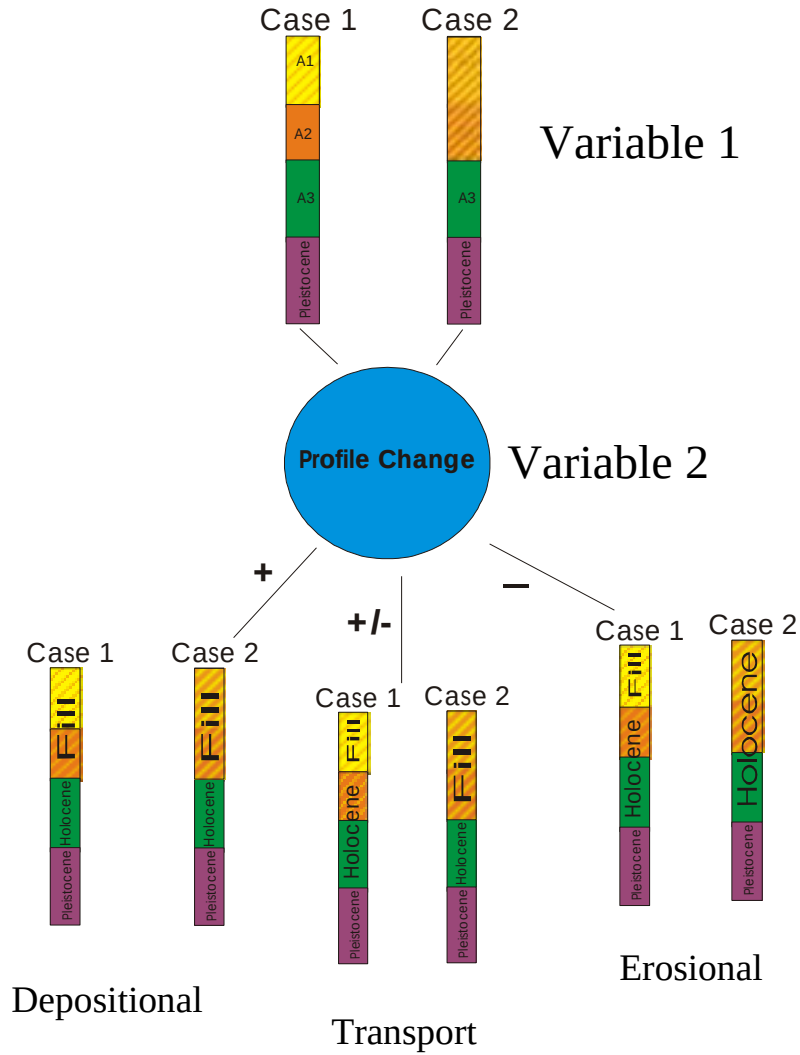
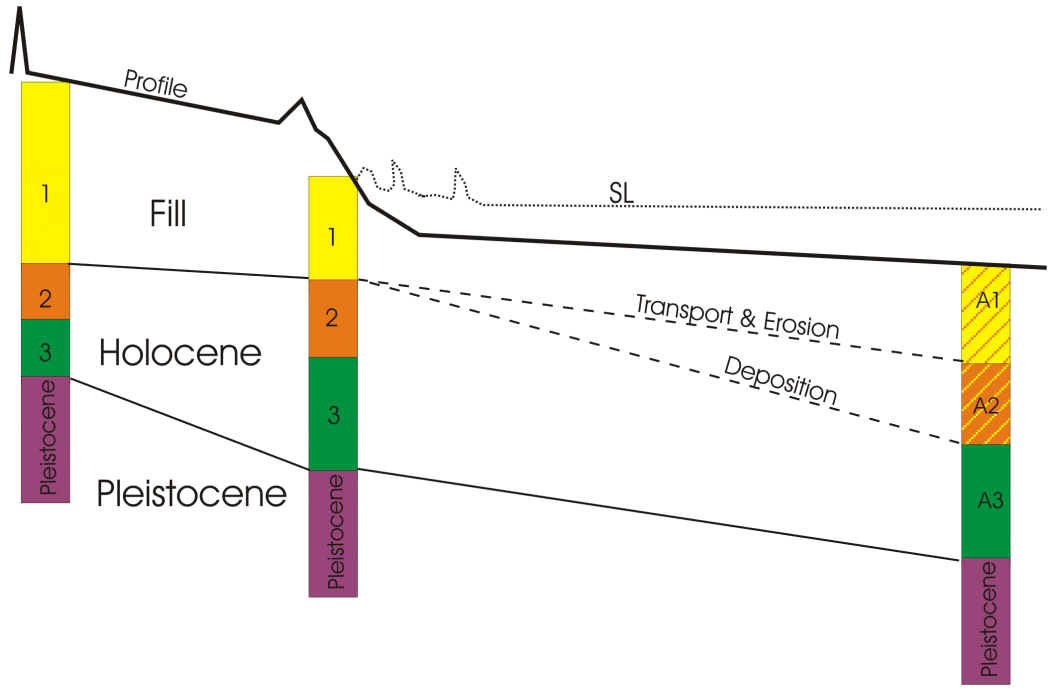
Combined Data (cont)

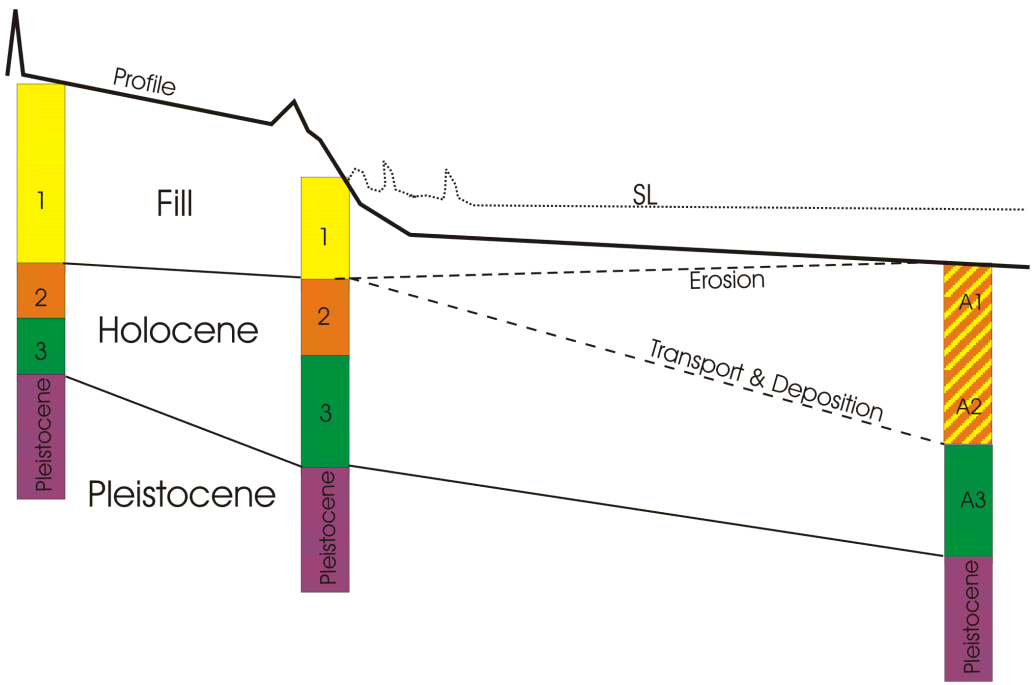
- "If Then" logic
  - Depositional areas have more accommodation space (deep Holocene)
  - Transport areas have higher energy and less accommodation space (if you can't tell the difference it must all be part of the fill unit)
  - Erosional areas have low accommodation space or higher energy
- Some Assumptions must be made
  - Sedimentation patterns during past 5 years are consistent with long-term patterns
  - No large-scale resuspension (major scouring events) of sediment occurred
  - Bedforms are relatively stable



Model Profiles/Cross Sections

Case 1 A1 and A2 **can** be differentiated

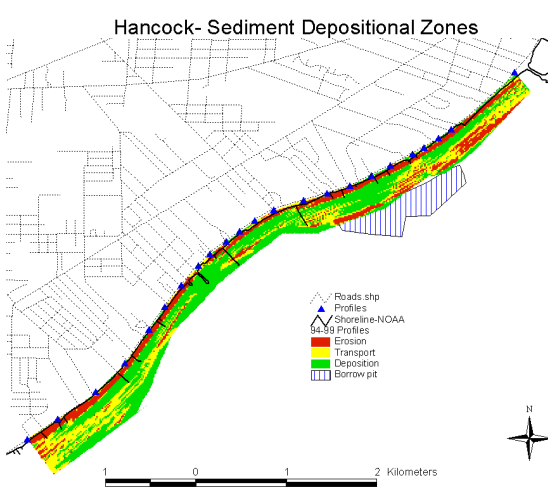


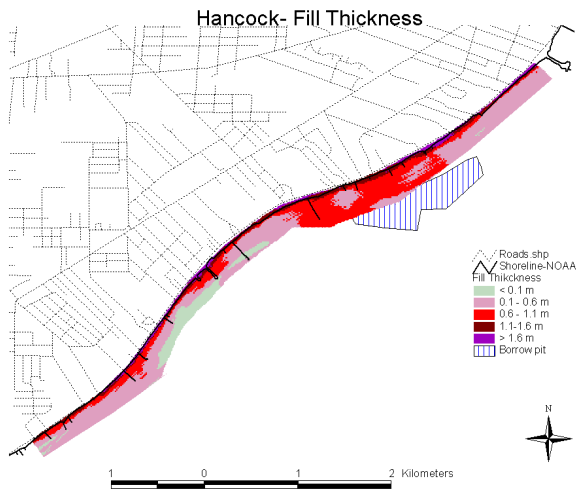


Case 2 A1 and A2 **can not** be differentiated

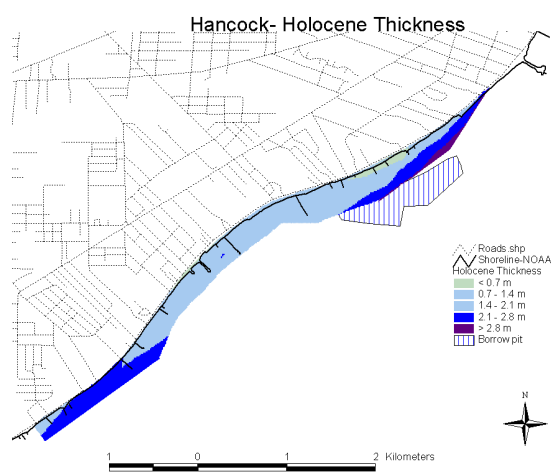
Results

	Onshore	Nearshore	Total
1994 to 1999 change	-76,000	156,000	80,000
Total Fill (1945-1999)	700,000	980,000	1,680,000
Total Holocene*	640,000	3,250,000	3,890,000
*total actual volume higher on the nearshore due to smaller calculation area			

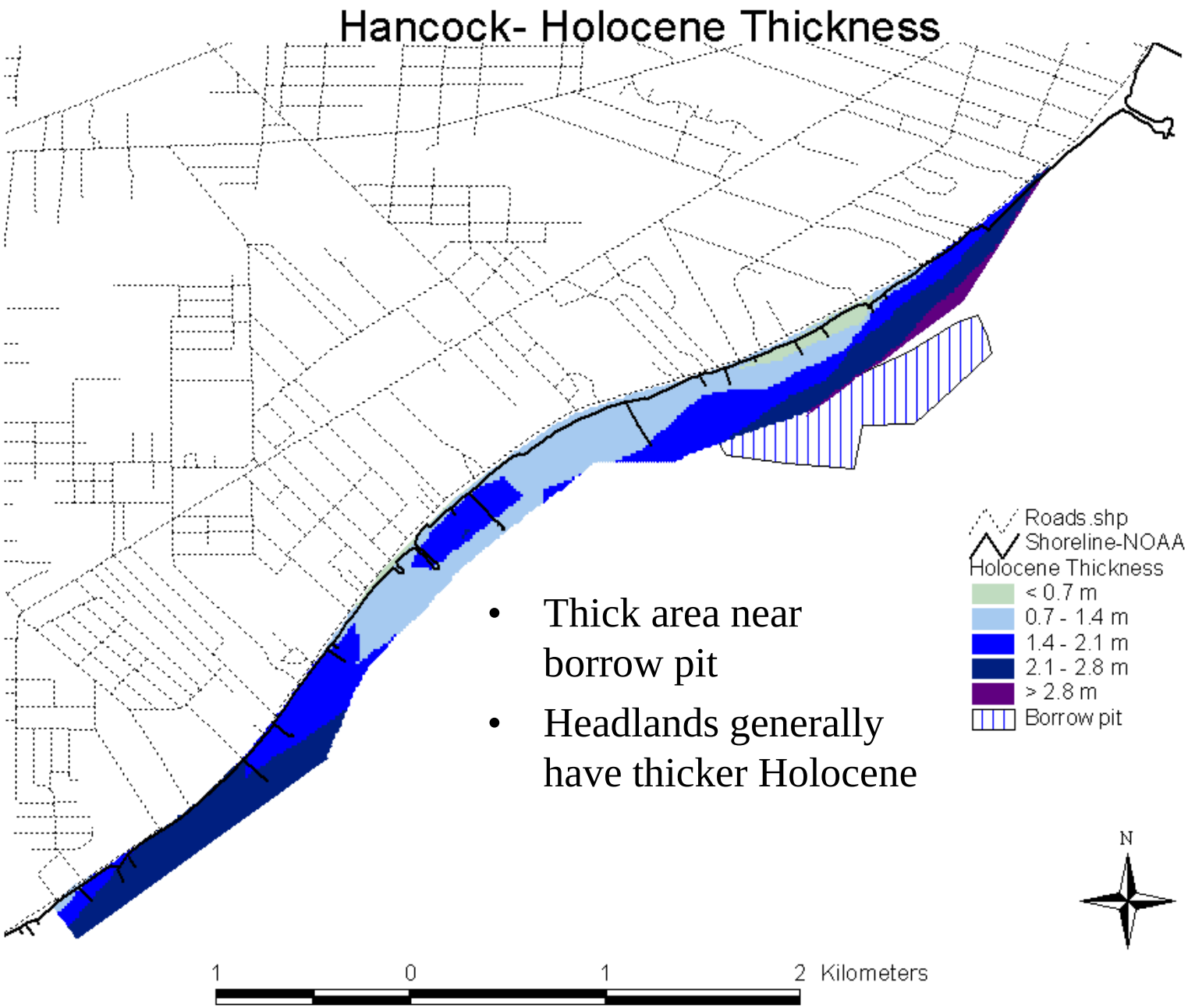




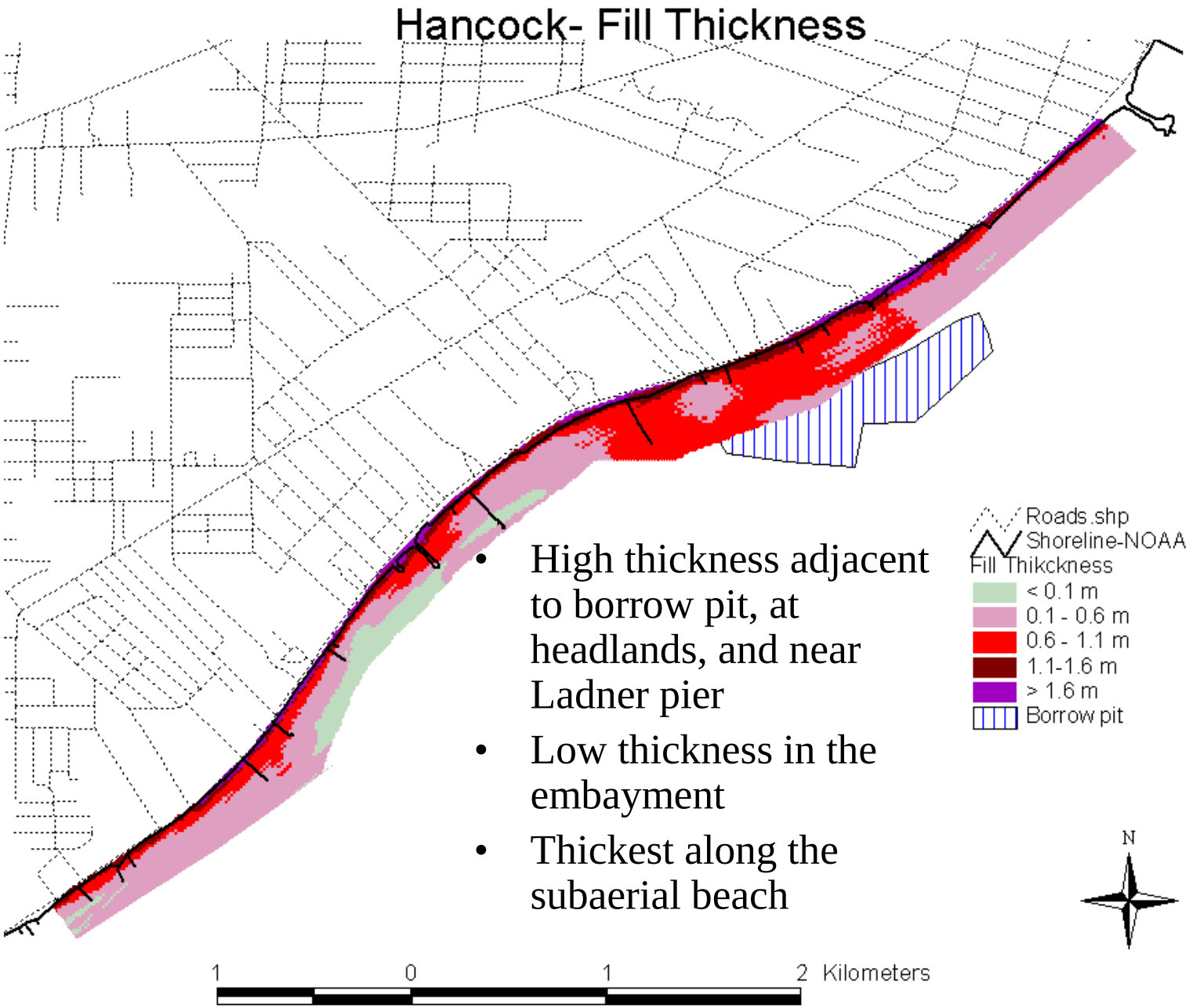
1.7 million cyds



4.2 million cyds



- Thick area near borrow pit
- Headlands generally have thicker Holocene



- High thickness adjacent to borrow pit, at headlands, and near Ladner pier
- Low thickness in the embayment
- Thickest along the subaerial beach

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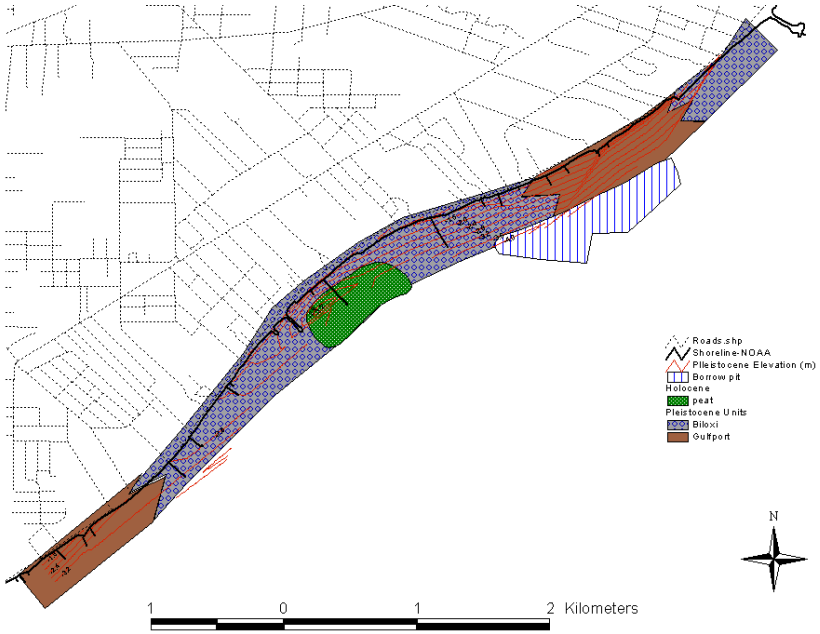

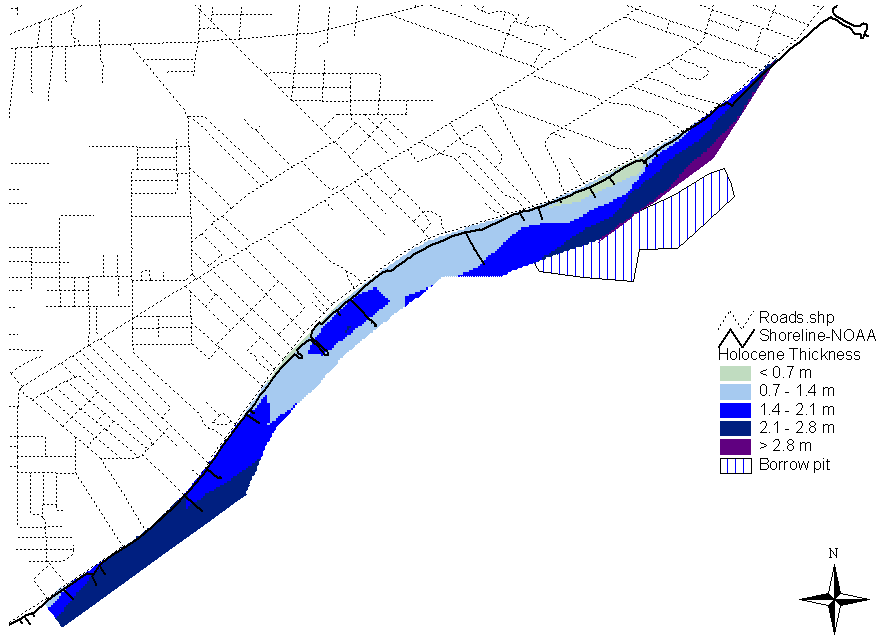

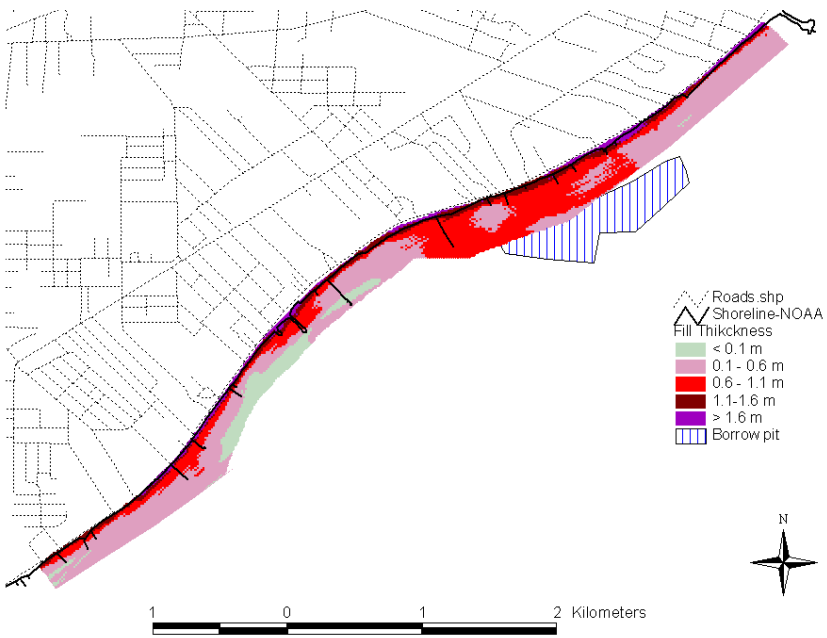

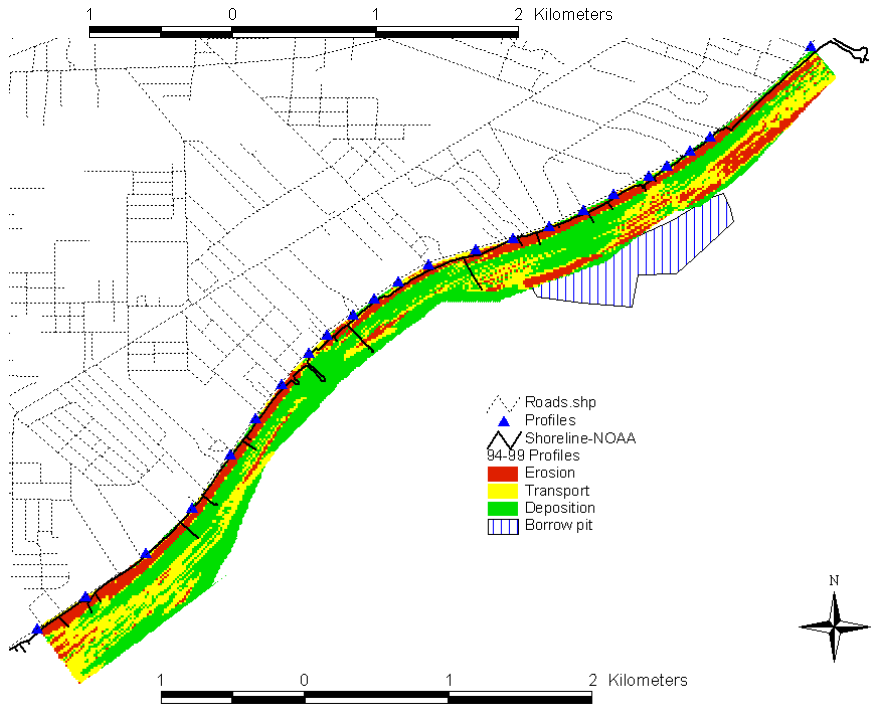

Conclusions

- Volume of calculated fill thickness is in general agreement with theoretical fill volumes
- Thick Holocene sequences are associated with thick fill
- Gulfport units are typically overlain by thicker Holocene sequences than Biloxi units
- Erosion is higher on ends of beach and also near borrow pit
- Borrow pit may have increased erosion on the adjacent nearshore