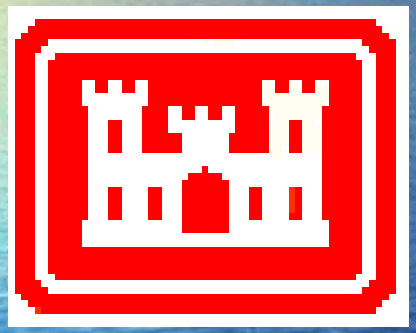
LITTORAL DRIFT IN GALVESTON & JEFFERSON COUNTIES, TEXAS

Tom Campbell & Lindino Benedet

COASTAL PLANNING & ENGINEERING, INC.

Thank you



Jeff Waters David King

Rob Thomas Andrew Morang

U.S. Army Corps of Engineers
Galveston District and, CHL

Thank you

BUREAU OF ECONOMIC GEOLOGY

Scott W. Tinker, Director

JOHN A. and KATHERINE G. JACKSON SCHOOL OF GEOSCIENCES

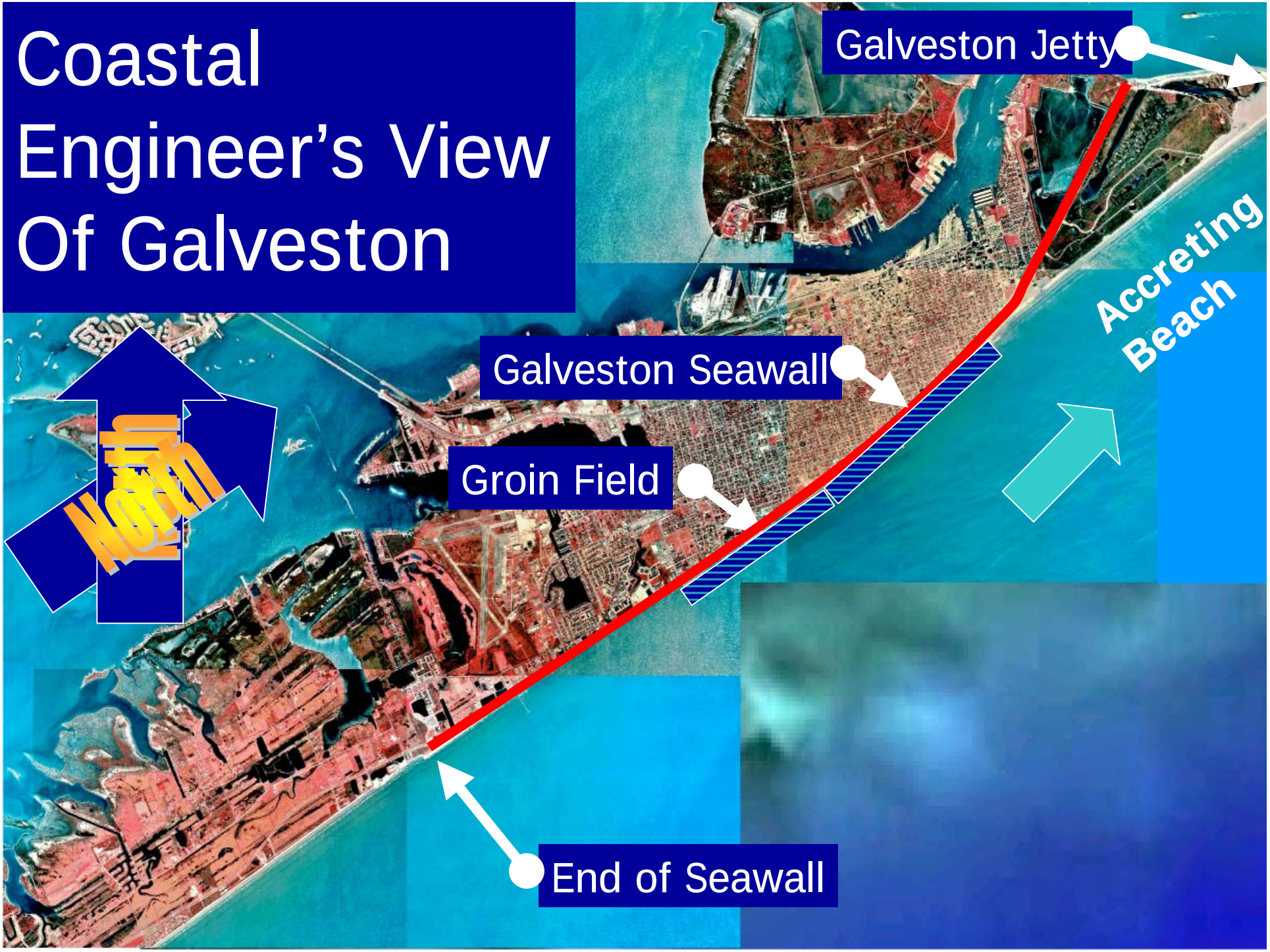
The University of Texas at Austin

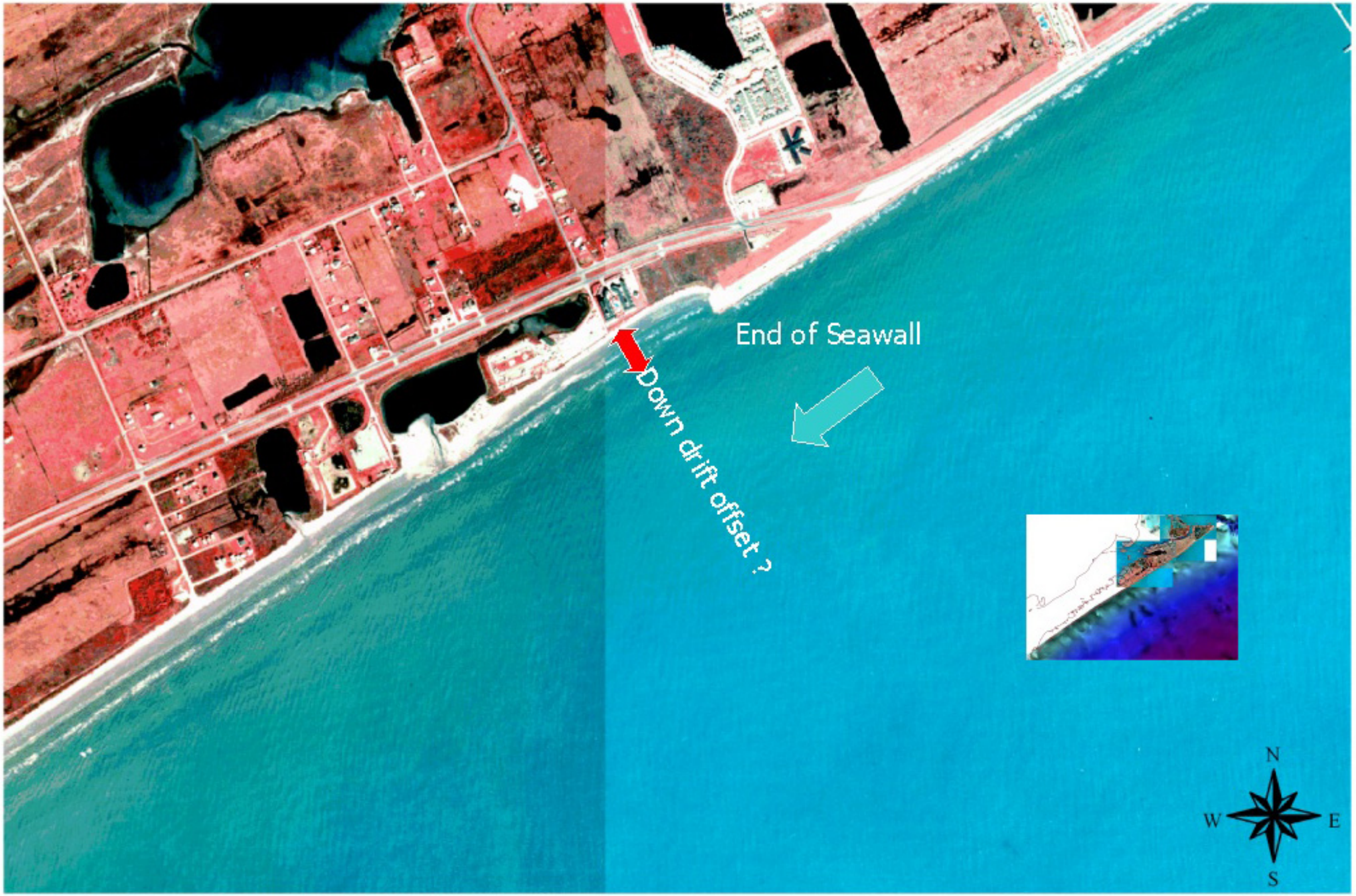
Jim Gibeaut & Team

Shoreline Change Data Used

- BEG developed for USACE Galveston District
- Data cover the period: from 1974 to 2000
- Data Consists of: aerial photographs and lidar surveys

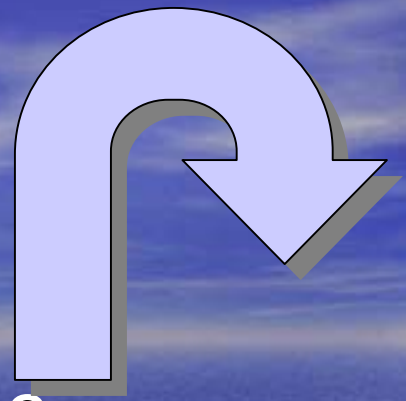
Coastal Engineer's View Of Galveston





10 0 10 20 Miles

Waters' Coastal Conundrum

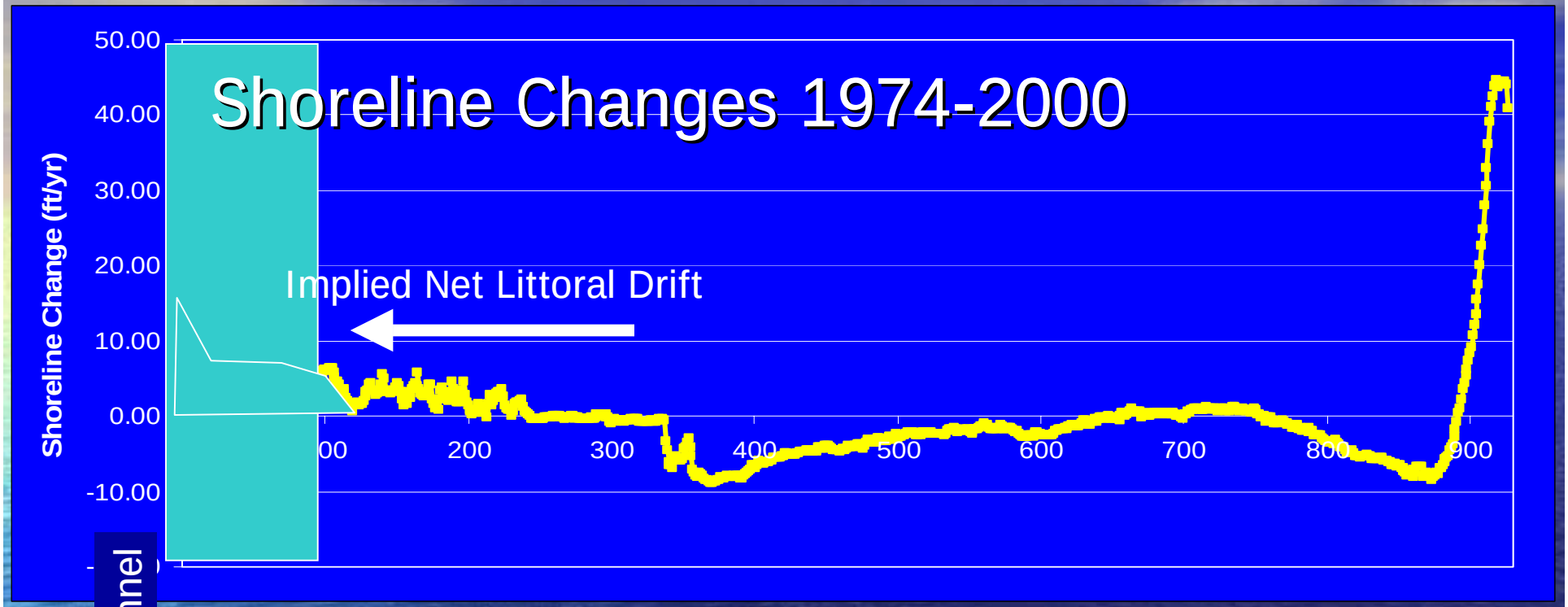


- The erosion at the south end of the seawall is a classic signature for a strong south drift
- Large volume buildup south of the Galveston Jetties suggest northward drift
- Wave refraction of offshore waves suggest drift is north at south end of seawall

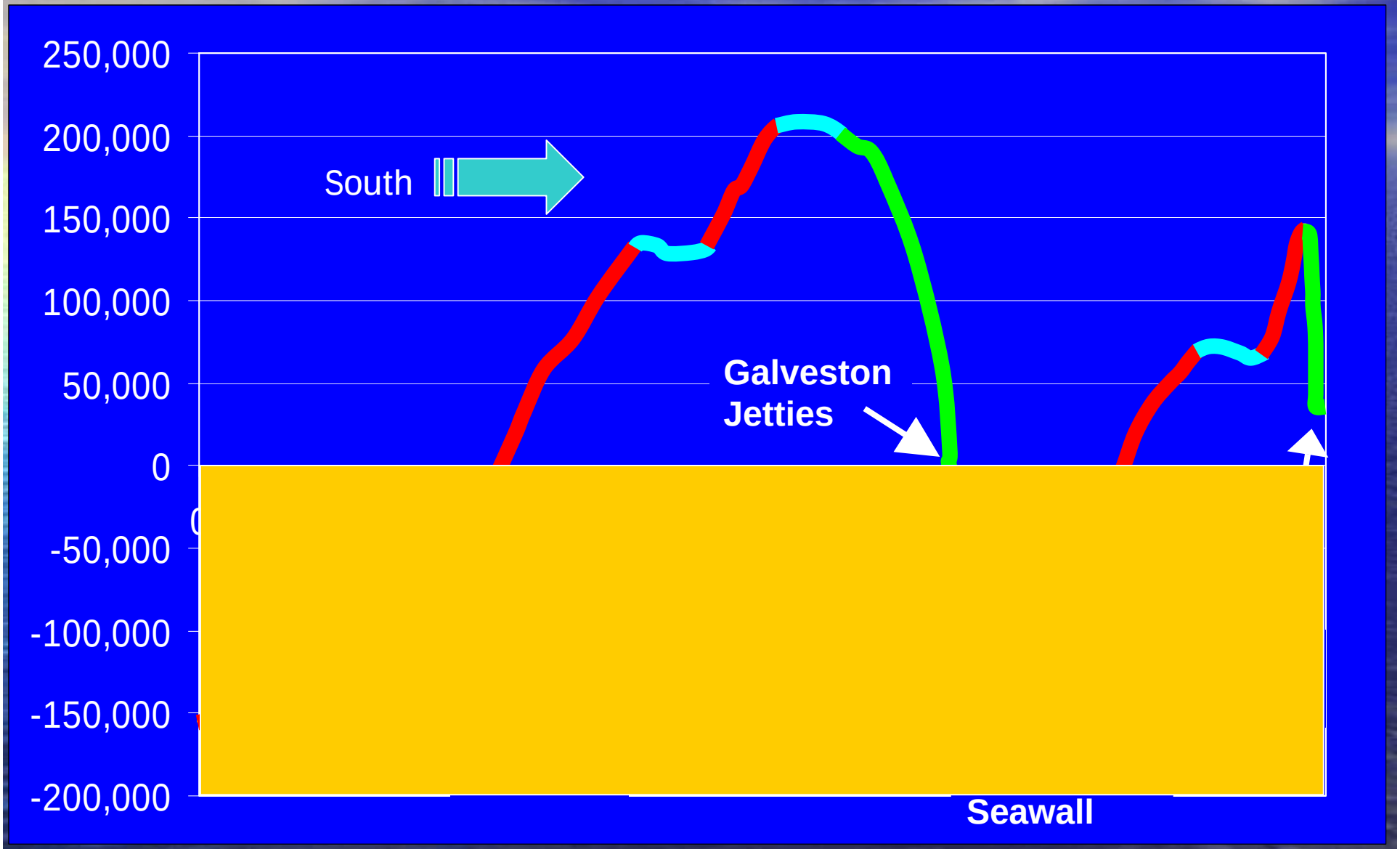
Waters' Coastal Conundrum

- Would a littoral drift analysis based on shoreline change resolve the conundrum?

Littoral Drift and Shoreline Change

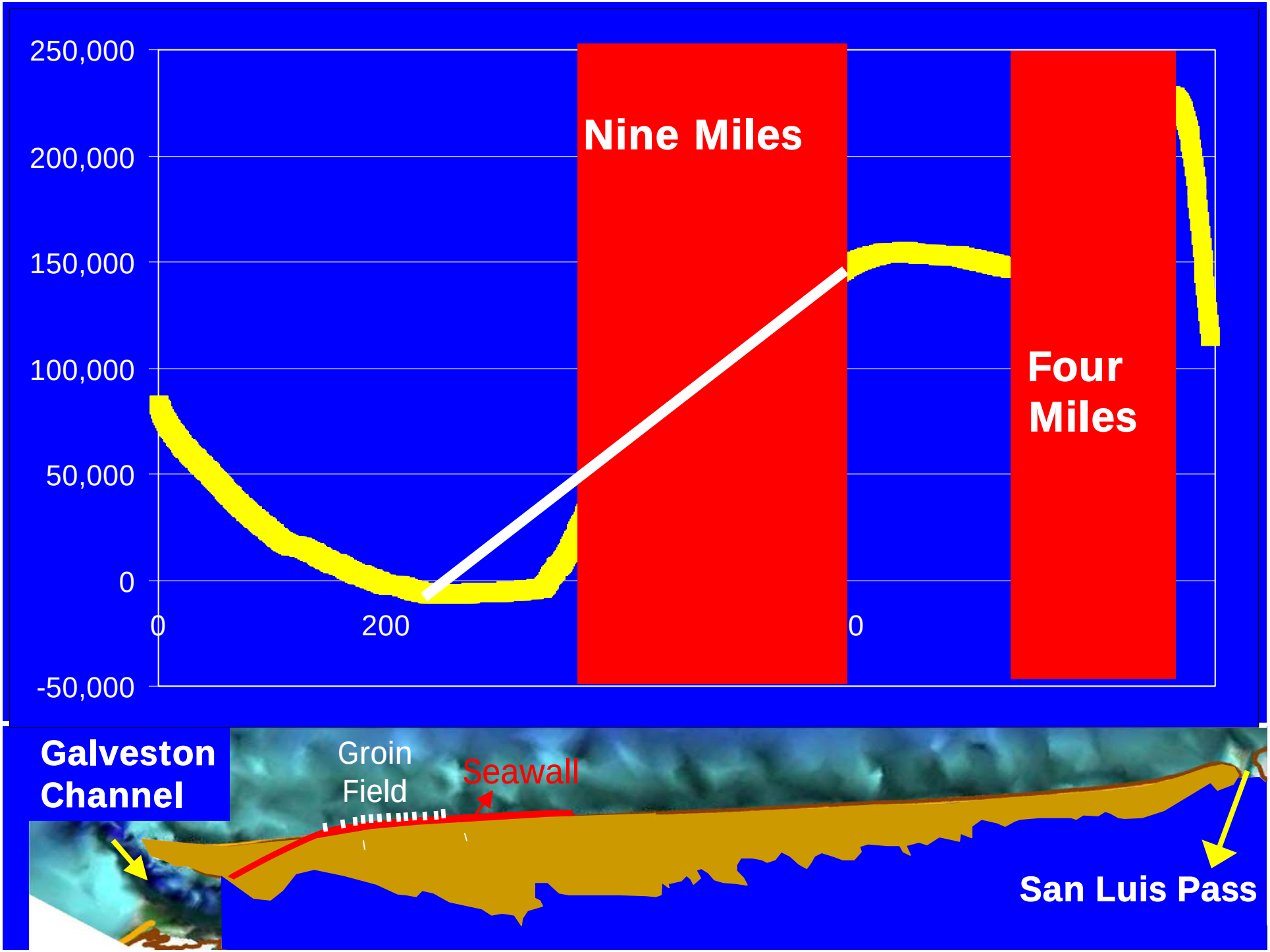


Littoral Drift (in cy/ft) assuming 0 at Galveston South Jetty



Conclusion

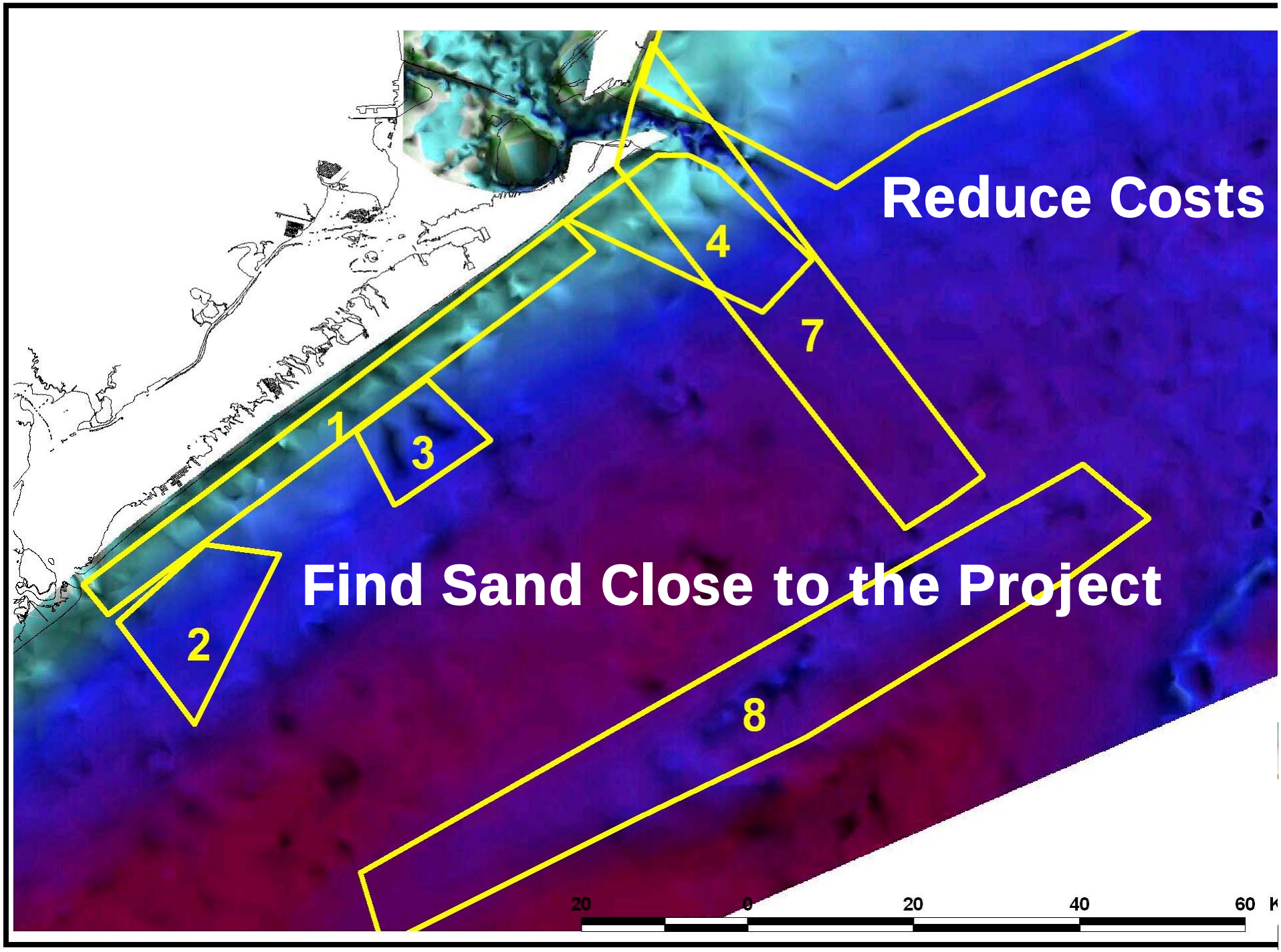
- **Shoreline analysis supports North drift finding**
- **Later local wind wave analysis by the USACE reverses drift back to south**
- **This result remains more believable**
- **Therefore sand must be moving onshore near the Galveston jetties to account for the accretion**

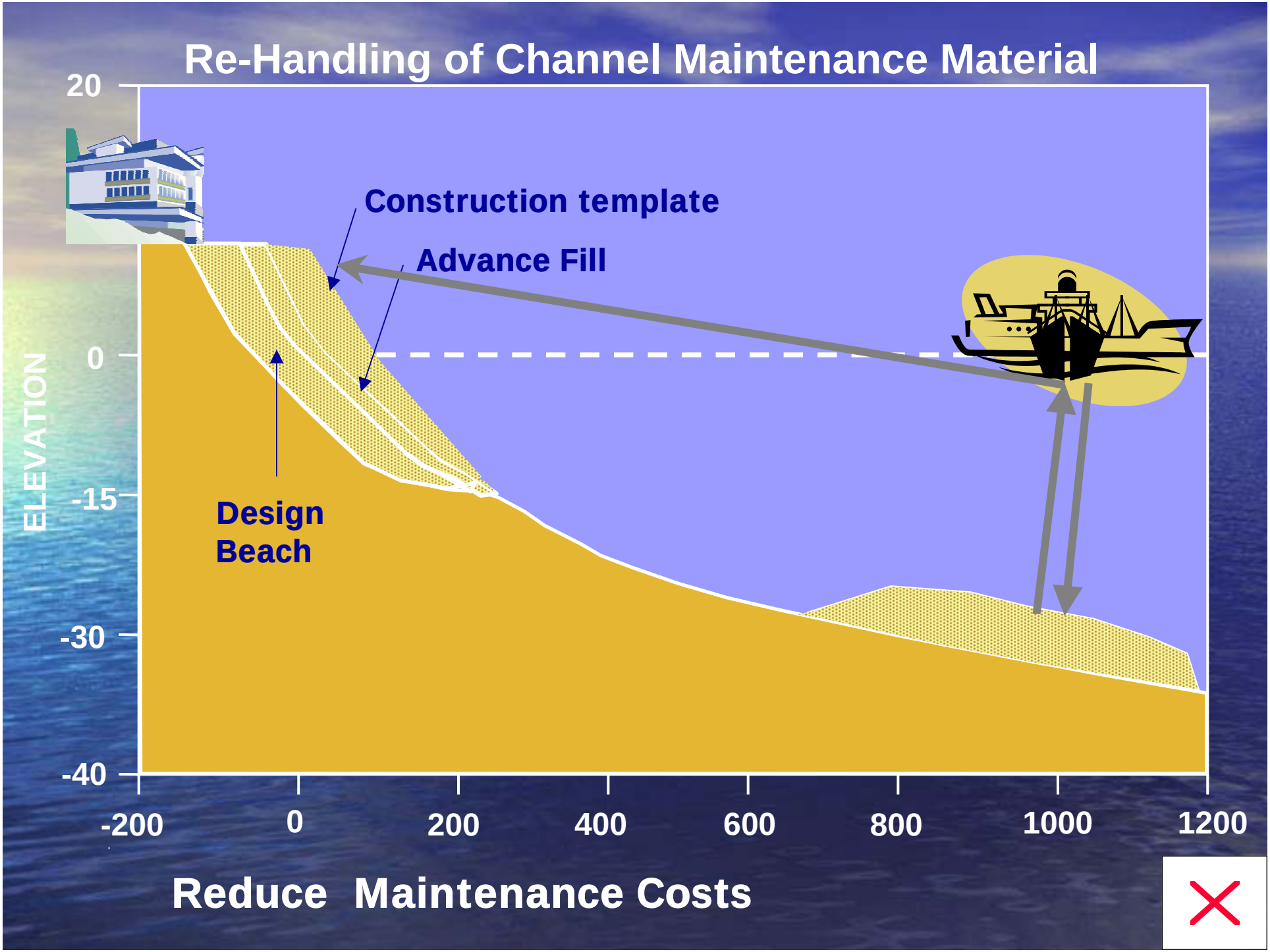

250,000
200,000
150,000
100,000
50,000
0
-50,000
0
200
0
Nine Miles
Four Miles
Galveston Channel
Groin Field
Seawall
San Luis Pass

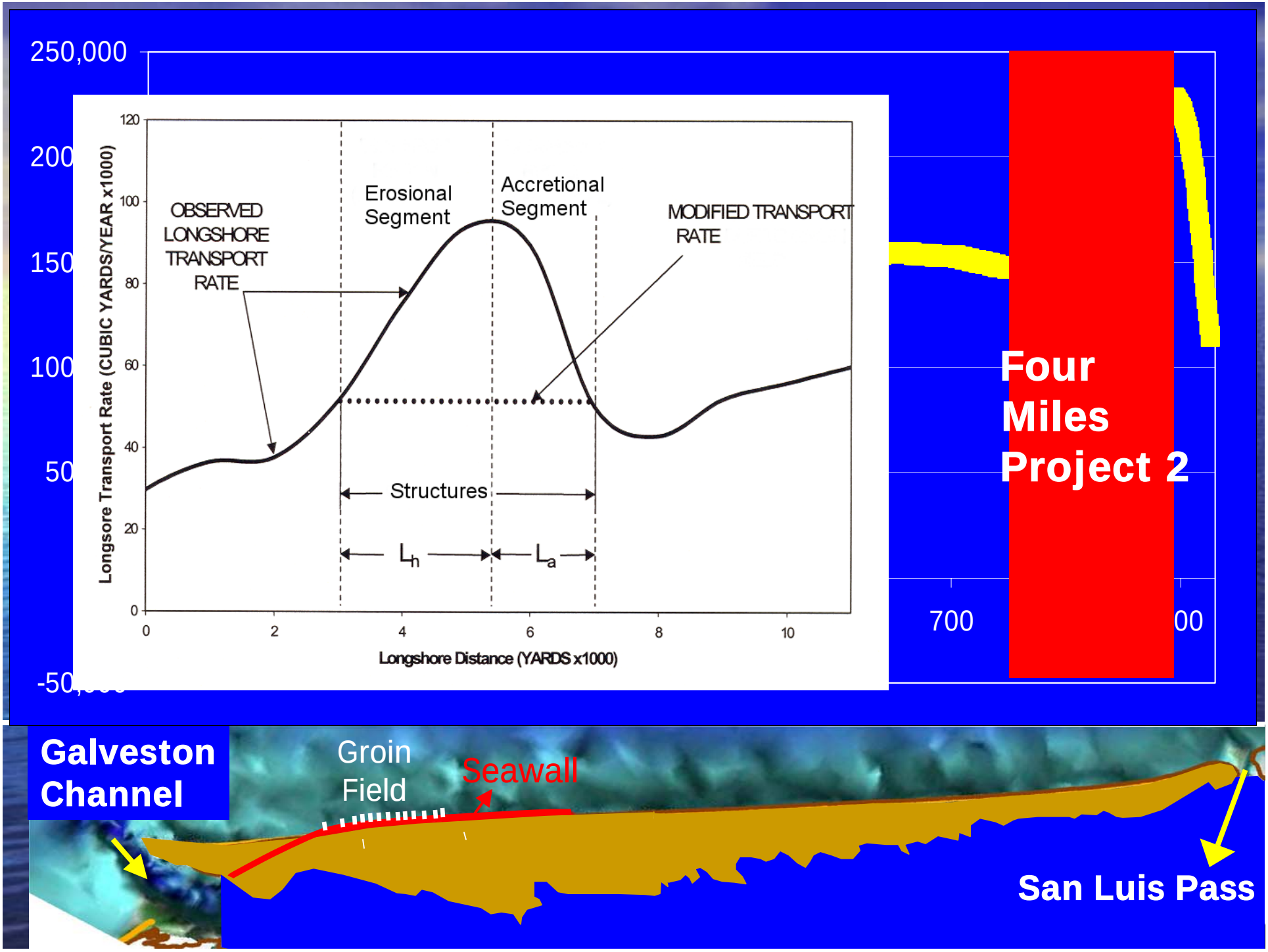

250,000
200,000
150,000
100,000
50,000
0
-50,000
0
200
0
800
Nine Miles
Project 1
Galveston
Channel
Groin
Field
Seawall
San Luis Pass

Project 1 - Downdrift of Galveston Seawall

- **Storm design fill @ 50cy/ft X 50,000 ft = 2,500,000 cy**
- **Ten years of Advanced fill @150,000 cy/yr = 1,500,000 cy**
- **Total First nourishment = 4,000,000cy**
- **First nourishment Cost Range = $20-40Million**
- **Maintenance every 10 years = $10-20 Million**

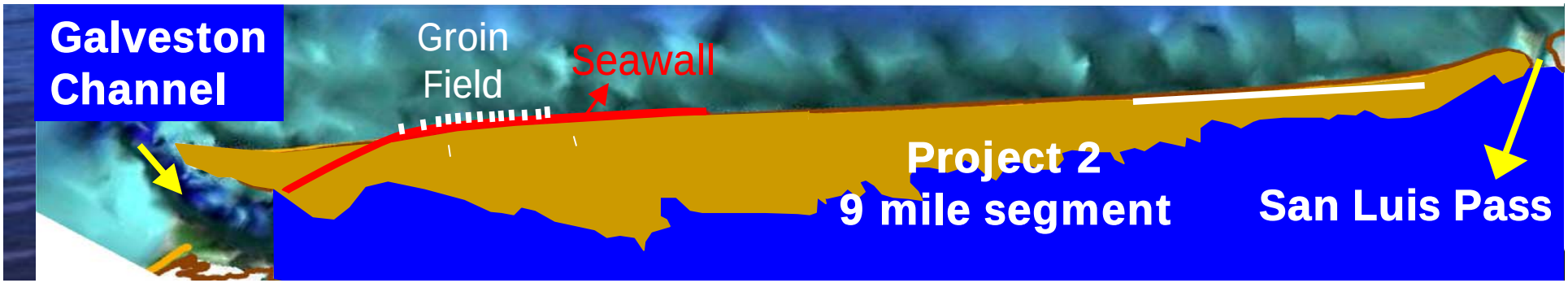

Reduce Costs
Find Sand Close to the Project
1
2
3
4
7
8
20
0
20
40
60


Re-Handling of Channel Maintenance Material
20
0
-15
-30
-40
ELEVATION
Construction template
Advance Fill
Design
Beach
-200
0
200
400
600
800
1000
1200
Reduce Maintenance Costs


250,000
200
150
100
50
-50
700
00
Four
Miles
Project 2
Longsore Transport Rate (CUBIC YARDS/YEAR x1000)
120
100
80
60
40
20
0
0
2
4
6
8
10
Longshore Distance (YARDS x1000)
OBSERVED
LONGSHORE
TRANSPORT
RATE
Erosional
Segment
Accretional
Segment
MODIFIED TRANSPORT
RATE
Structures
L_h
L_a
Galveston
Channel
Groin
Field
Seawall
San Luis Pass

Project 2 - Updrift of San Louis Pass

- Storm design fill @ 50cy/ft X 20,000 ft = 1,000,000 cy
- Ten years of Advanced fill @75,000 cy/yr = 750,000 cy
- Total First nourishment = 1,750,000cy
- First nourishment Cost Range = $10-20 Million
- Maintenance every 10 years = $4-10 Million



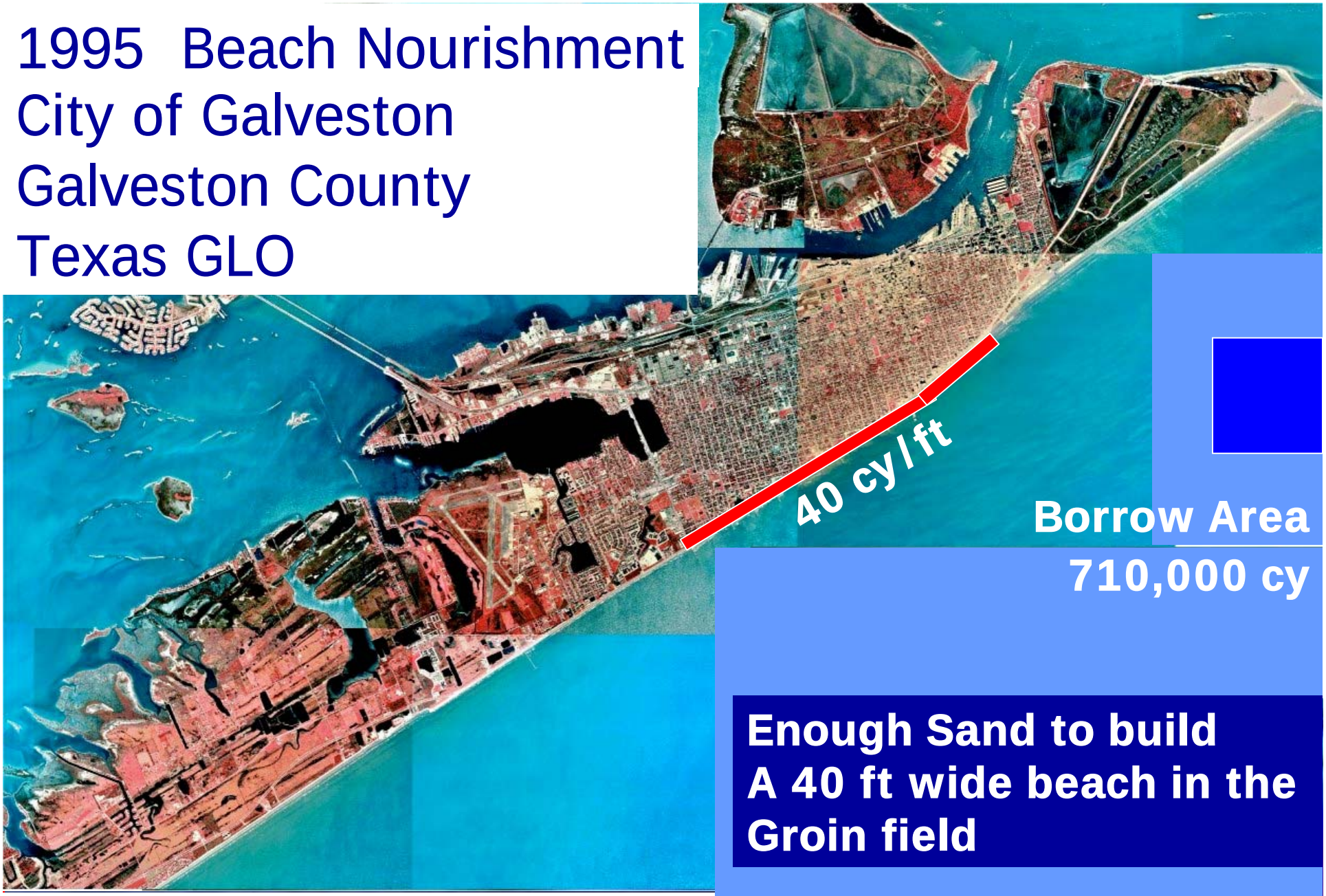
Project 2 – Achieving Lower Costs

- Use San Luis Pass ebb shoals as borrow source
- Consider use of structures

But can it be done?

- Yes

1995 Beach Nourishment
City of Galveston
Galveston County
Texas GLO



Enough Sand to build
A 40 ft wide beach in the
Groin field

Budget Limited Project

Concluding Remarks

- Littoral budgets can help define project needs
- Regional project development can improve project performance and save money
- Beach nourishment projects are feasible in the Galveston area and are in scale with projects being built throughout the country