# Tidal Inlet Reservoir Model

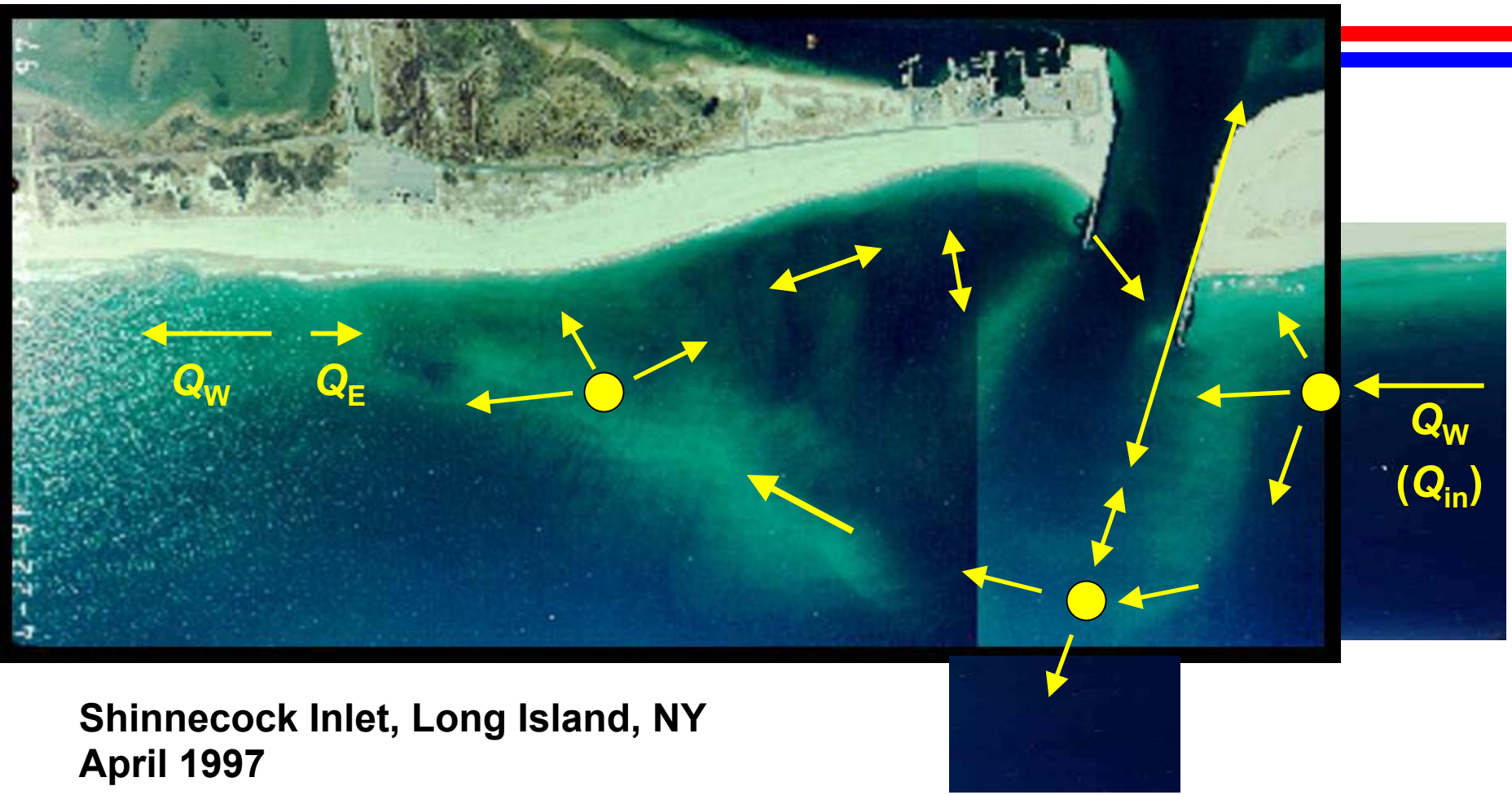
Grays Harbor, WA, North Jetty

***For calculating long-term …***

- ***Sand bypassing***
- ***Change in volume***

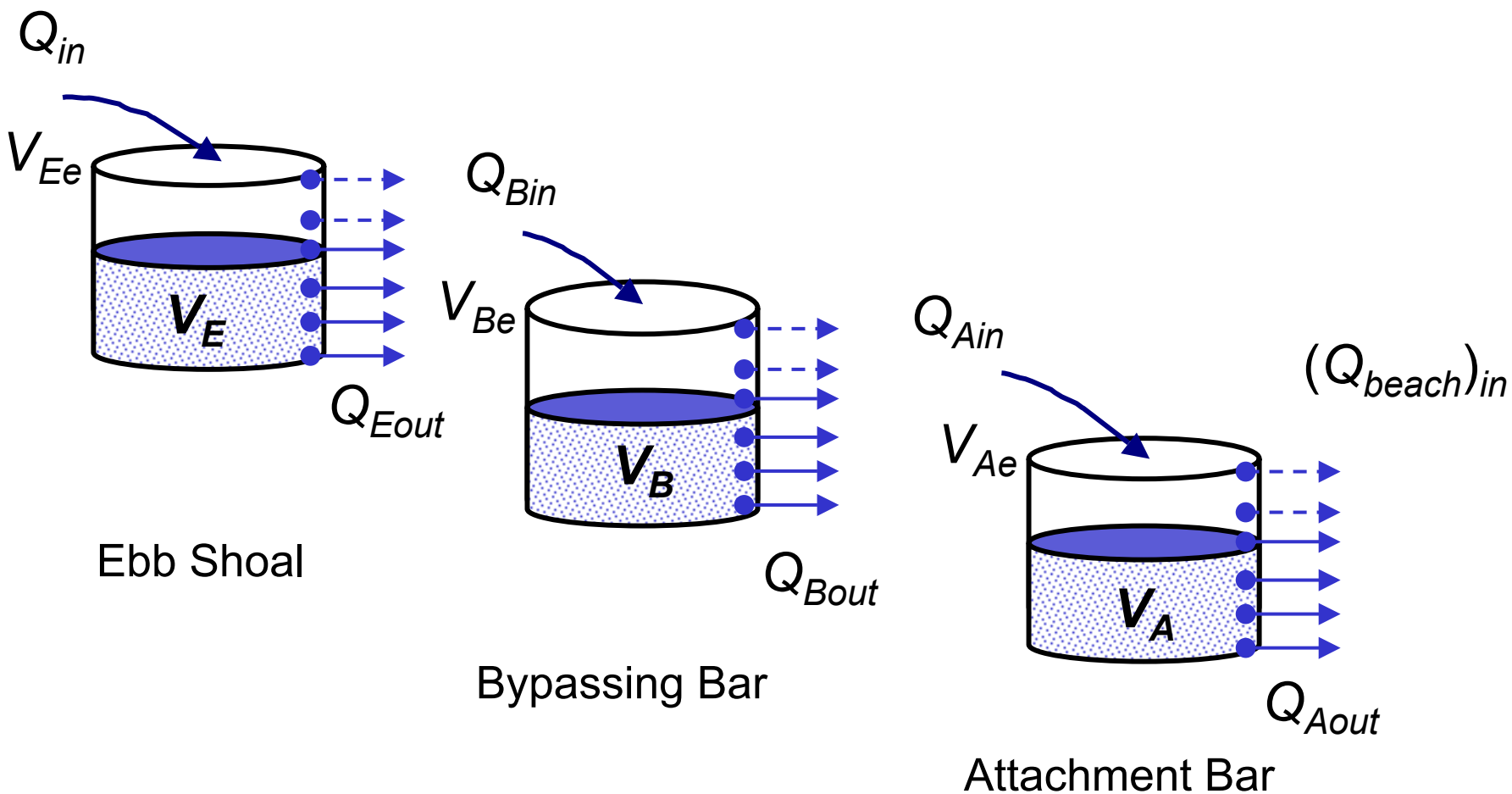
***of inlet morphologic features***

**Motivation:** ***Inlets evolve at long time scales; Need to know sediment pathways and growth of morphology for engineering studies***




**Shinnecock Inlet, Long Island, NY**
**April 1997**

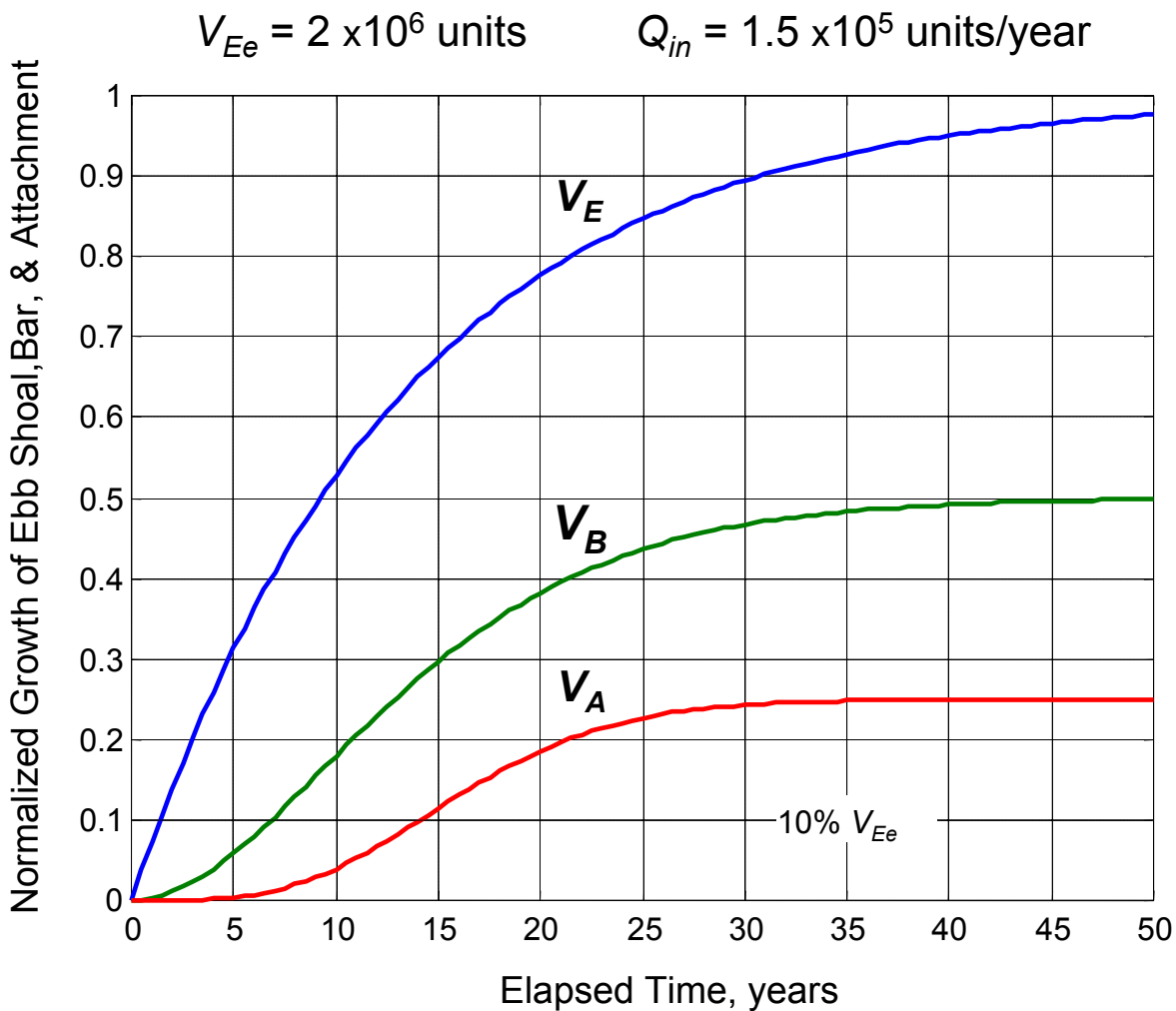
# Reservoir Model Model Concept



# Example Analytical Solution -- unidirectional transport

## Growth of Ebb Shoal, Bypassing Bar, Attachment Bar

Reservoir Model predicts time delays in growth of morphologic features

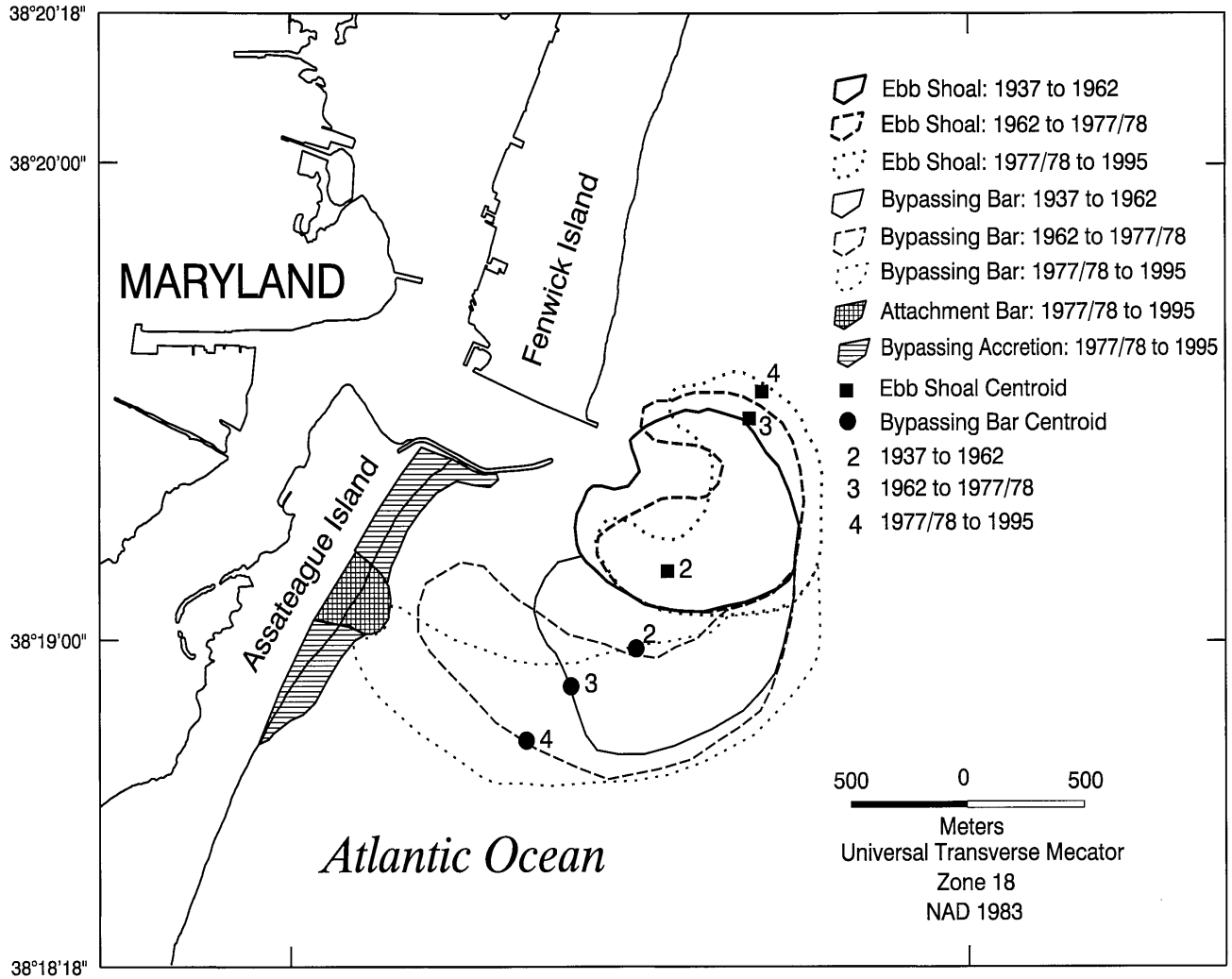


# Ocean City, Maryland

## (opened by hurricane, August 1933)

## Need to bypass sand to Assateague Island

# Ocean City Inlet, 1933-1937, 1937-1962
# 1962-1977/78, 1977/78-1995

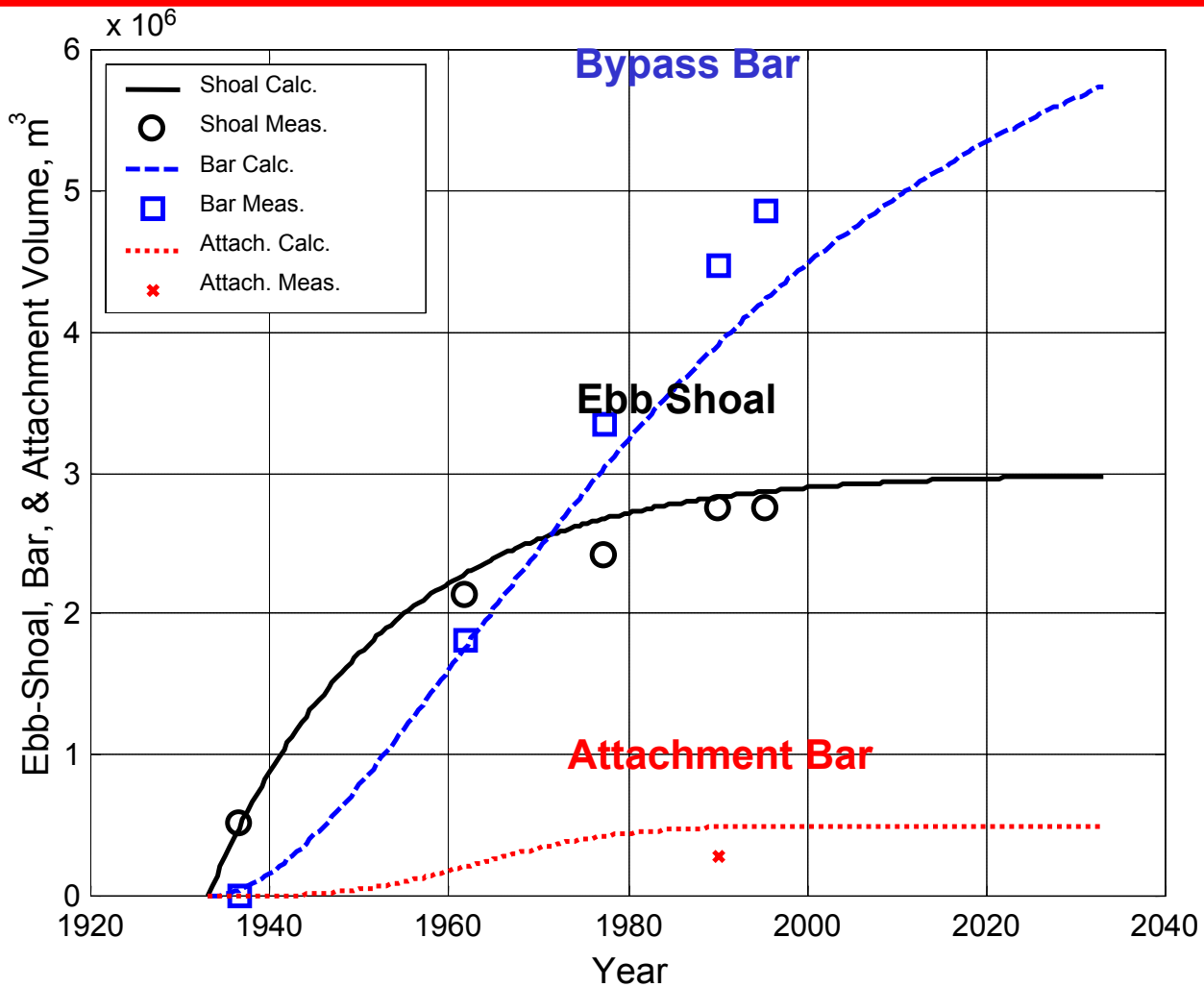


# Growth of Ebb Shoal, Bypassing Bar, & Attachment Bar

$Q_{in}$ = 150,000 m³/year; $V_{Ee}$ = 3 x 10⁶ m³

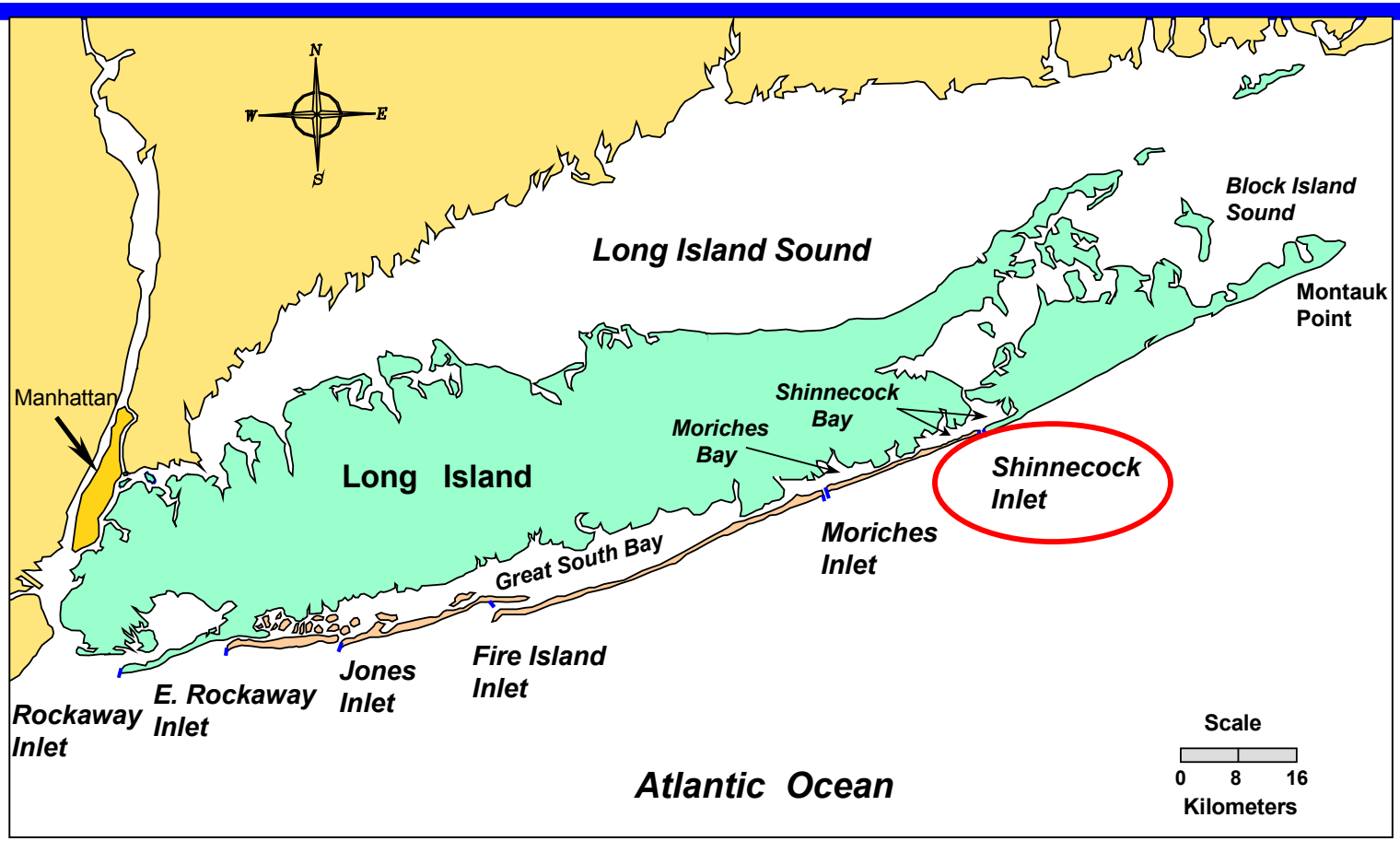
$V_{Be}$ = 7 x 10⁶ m³; $V_{Ae}$ = 0.5 x 10⁶ m³

Field validation of Reservoir Model



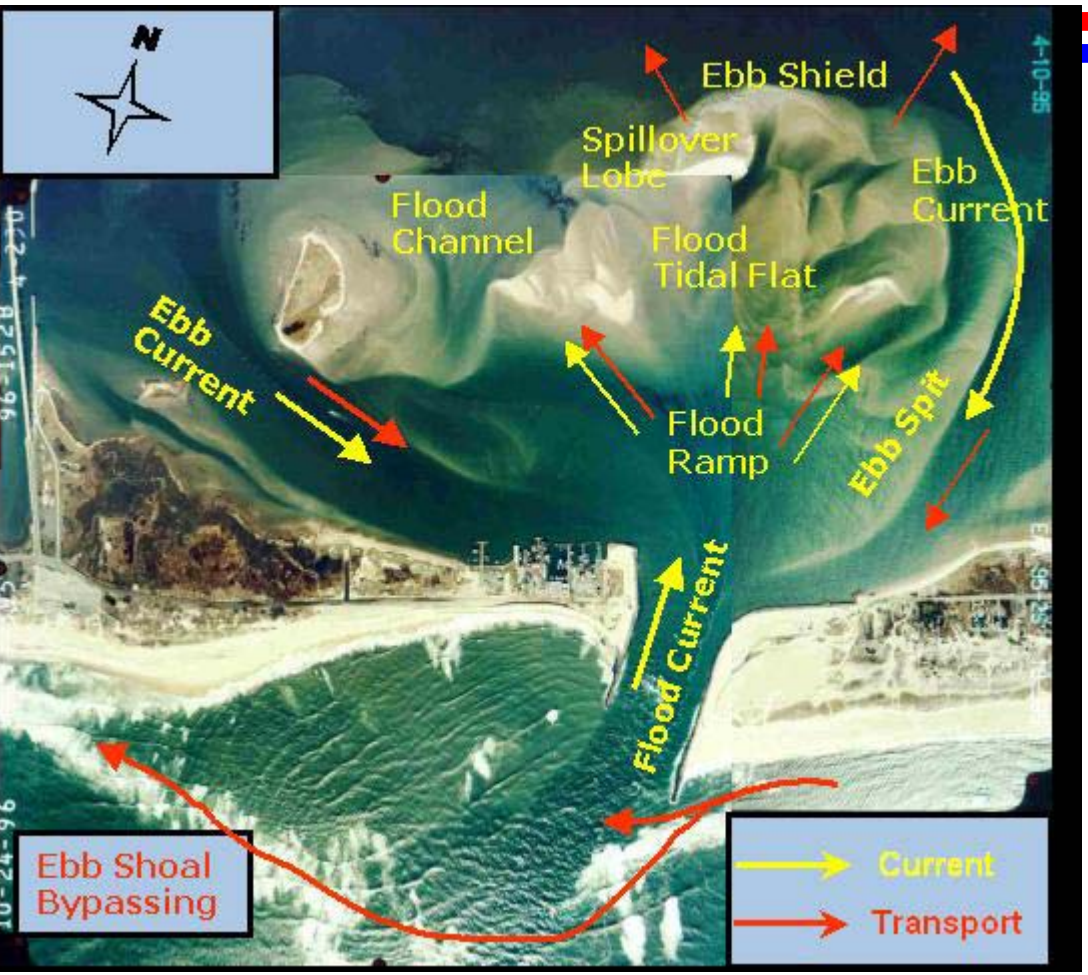
# Shinnecock Inlet, Long Island, NY

## Need to bypass sand; consider mining ebb and flood shoals



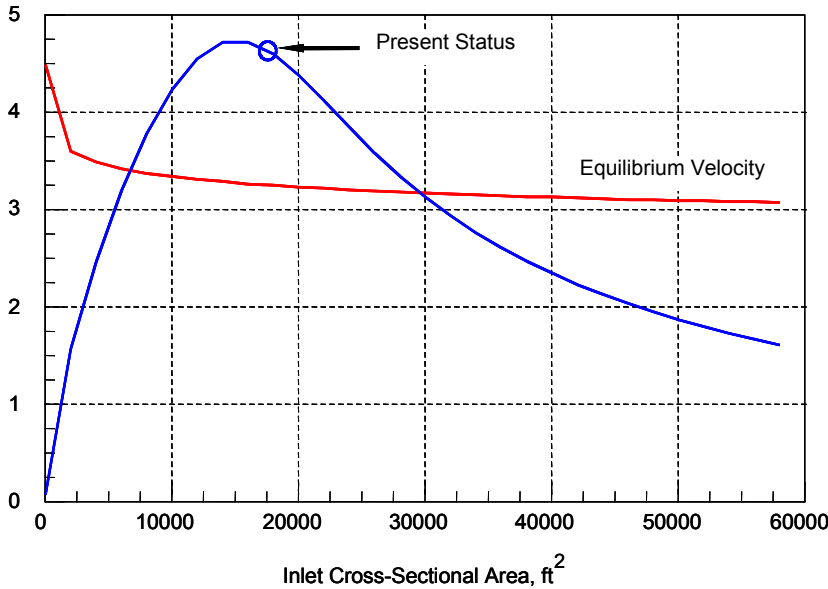
# Shinnecock Inlet

## (Opened by hurricane, September 1938)



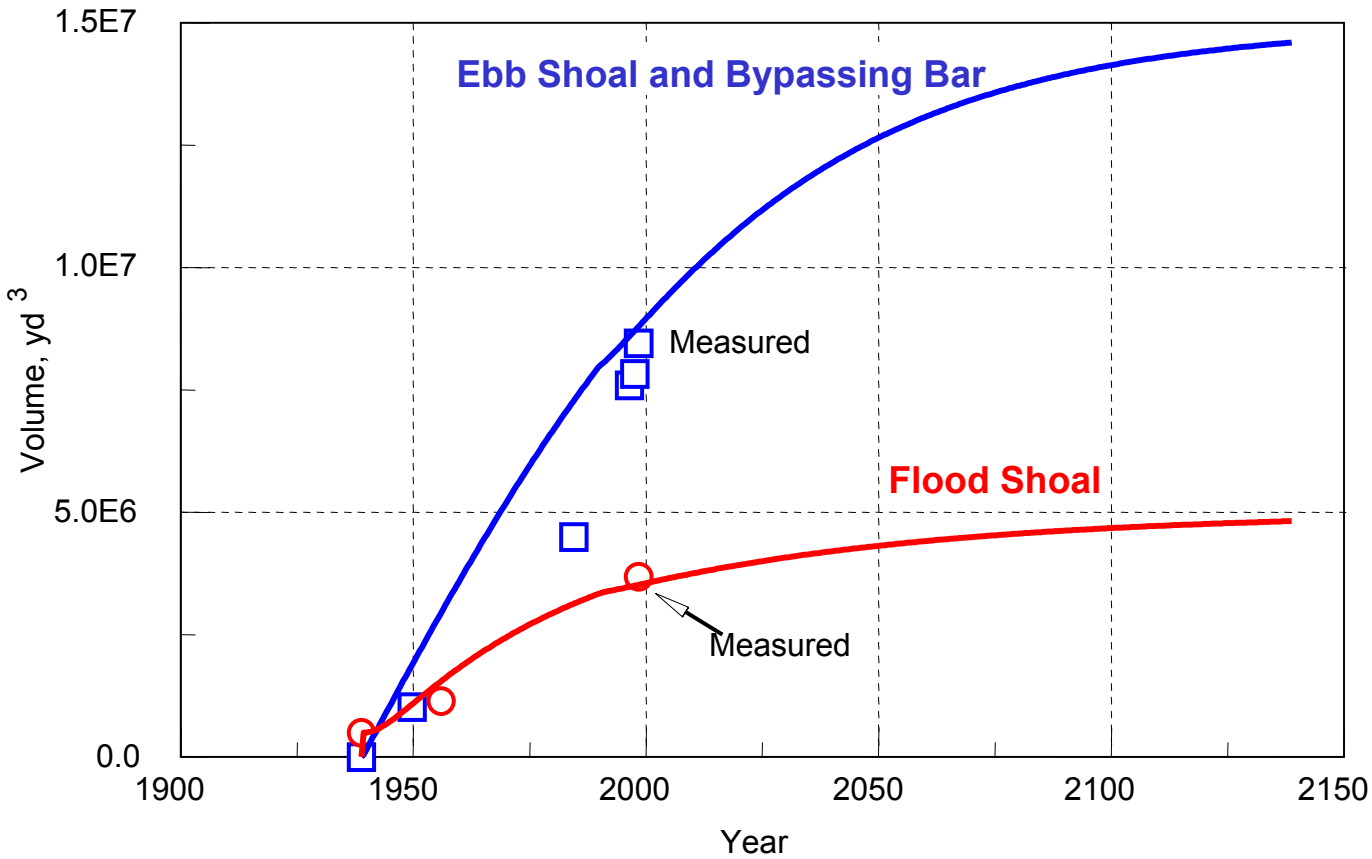

Apr 1995 – Oct 1996)

## Escoffier stability diagram



# Shinnecock Inlet

Reservoir Model validation



# Shinnecock Inlet

## Flood Shoal

Shinnecock Inlet
Flood shoal growing --

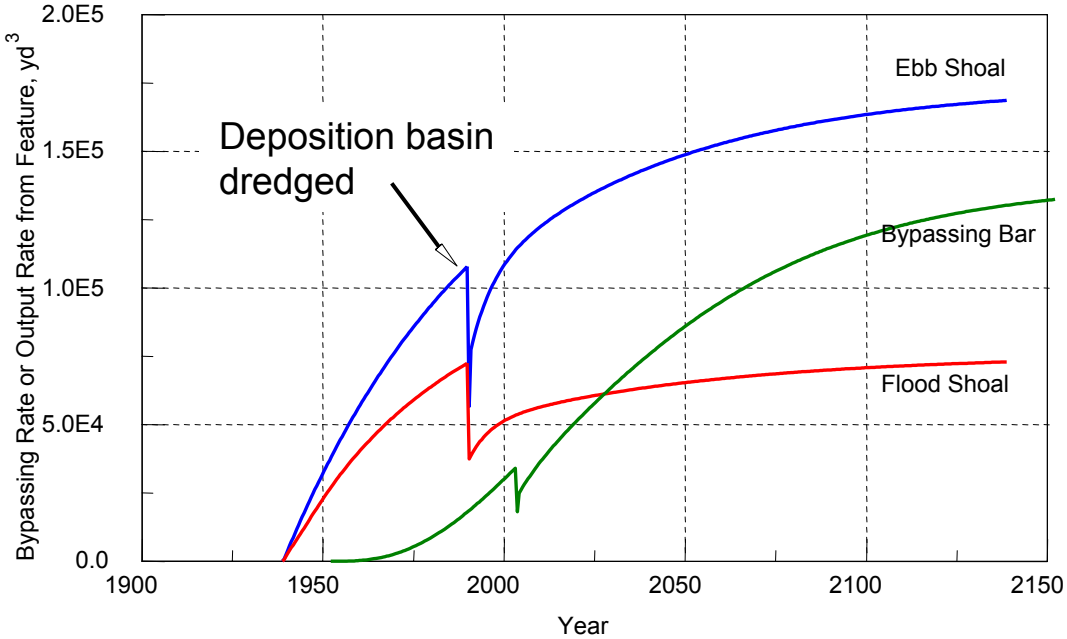
- constricting channel
- removing sand from beach
- potential borrow source

Flood shoal is part
of an inter-connected
Geomorphologic system

**Suppose you mine it!**

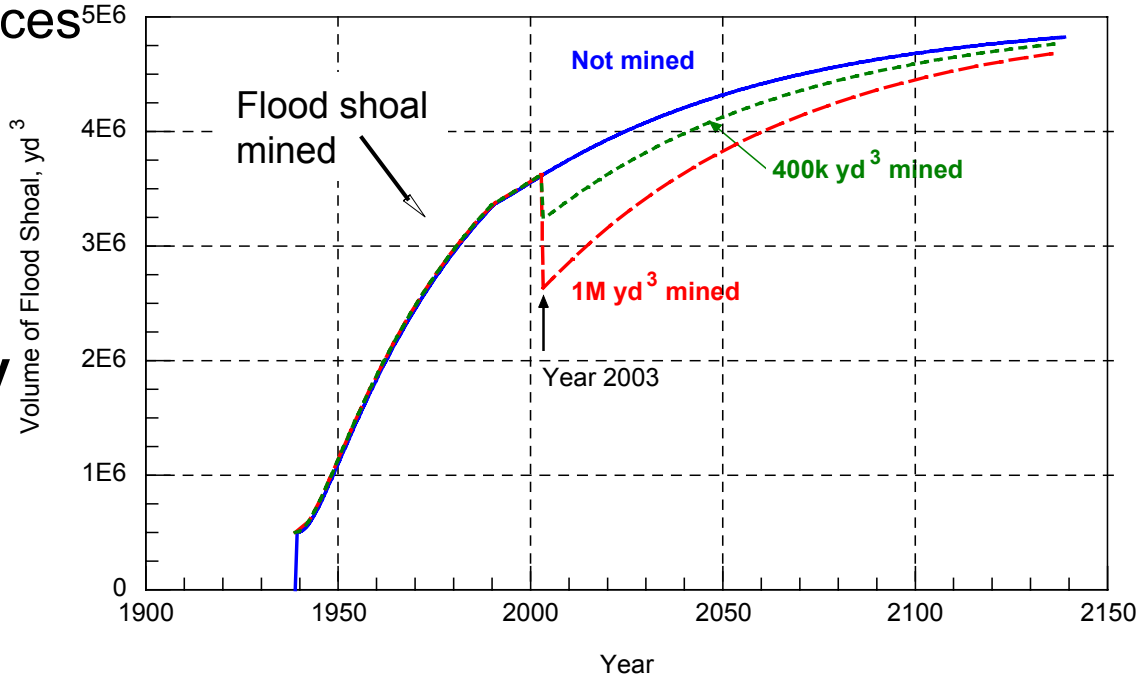
## Reservoir Model

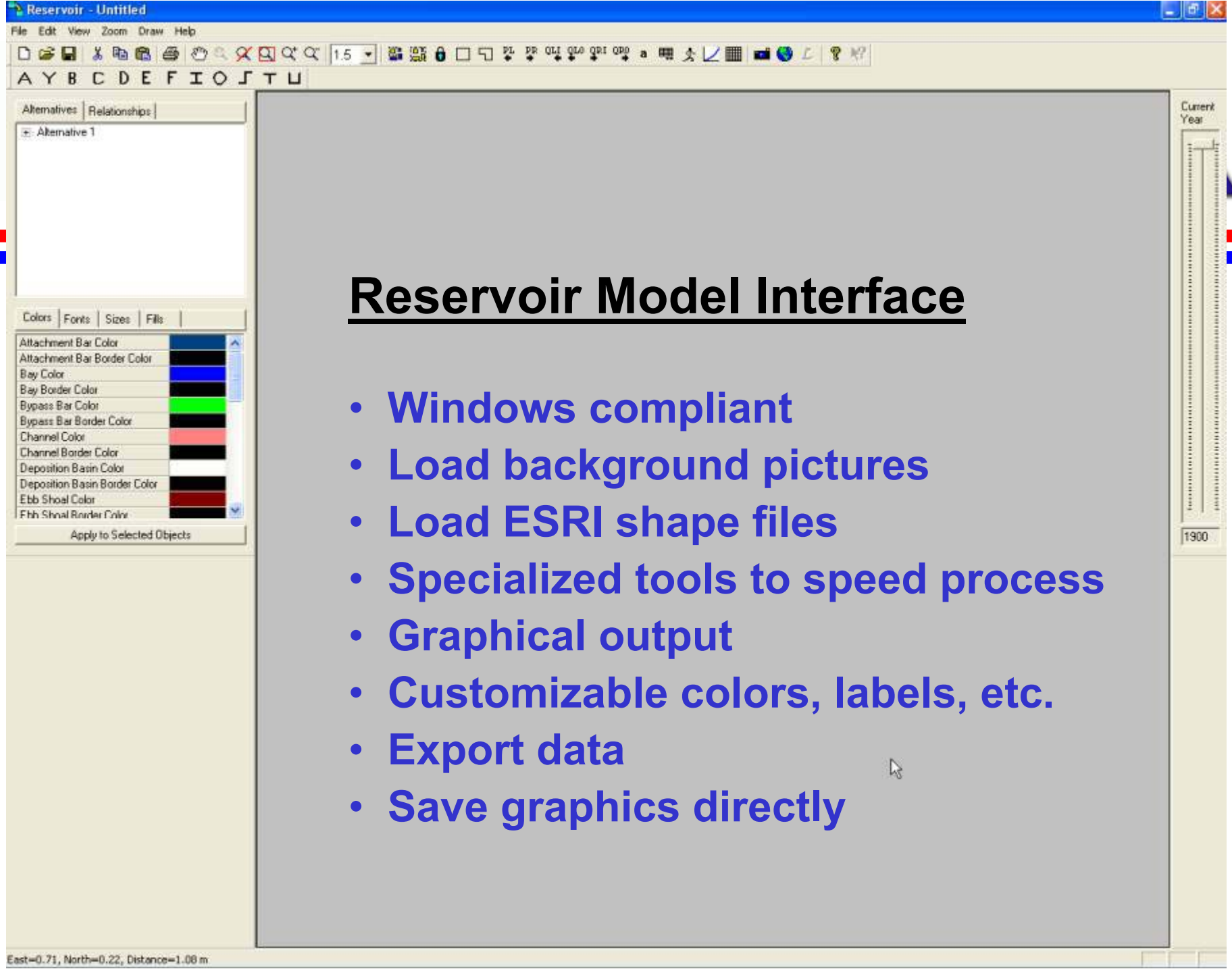
*Answering the engineering questions --*




Evaluate consequences of mining a geomorphic feature

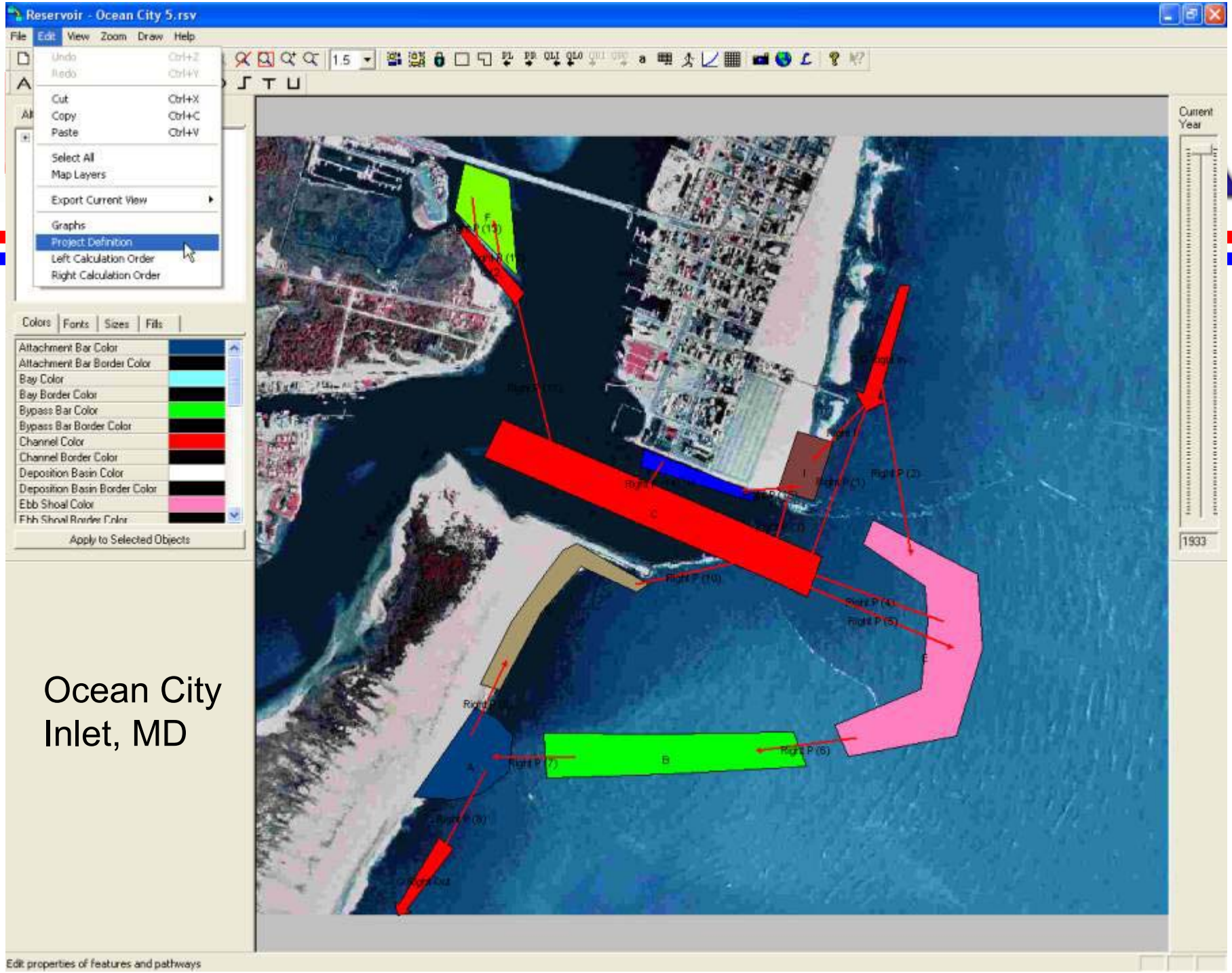
- **Time delays**
- **Time for recovery**



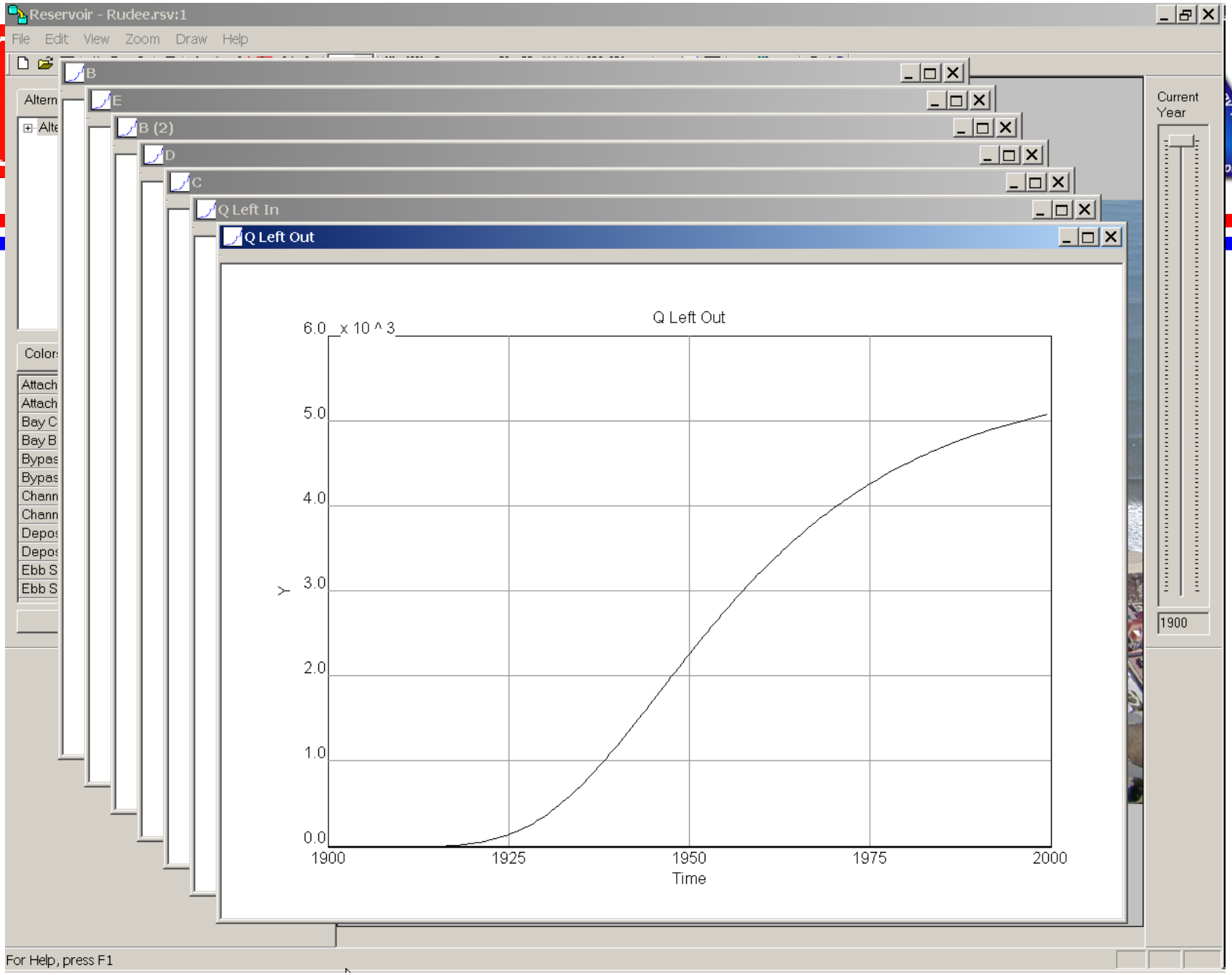



# Reservoir Model Interface

- Windows compliant
- Load background pictures
- Load ESRI shape files
- Specialized tools to speed process
- Graphical output
- Customizable colors, labels, etc.
- Export data
- Save graphics directly




Ocean City Inlet, MD


Reservoir - Rudee.rsv:1
File Edit View Zoom Draw Help
B
E
B (2)
D
C
Q Left In
Q Left Out
Q Left Out
x 10 ^ 3
6.0
5.0
4.0
3.0
2.0
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0.0
Y
1900
1925
1950
1975
2000
Time
Current Year
1900
For Help, press F1

# Inlet Reservoir Model
## Tech Transfer

- Model is in user-friendly interface
- CHETN series for theory and usage
- Applications at many locations
- New features being added at user requests
- Underway – interactive help within interface