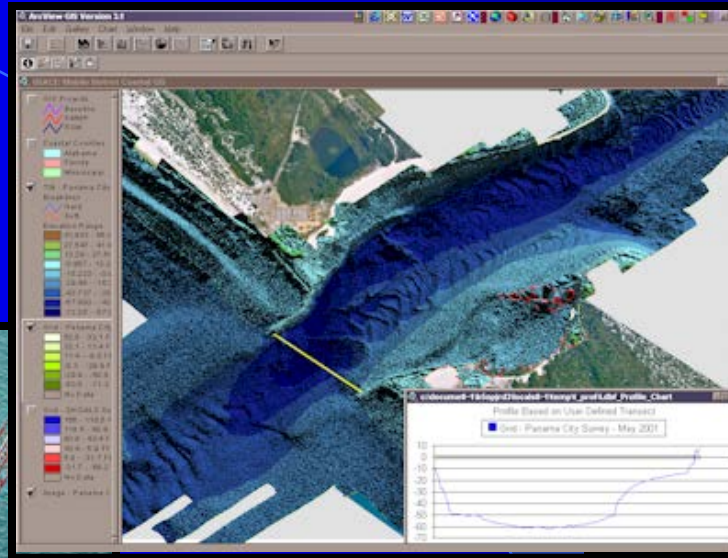# Effectively Using Dredge Information in a Coastal GIS Environment
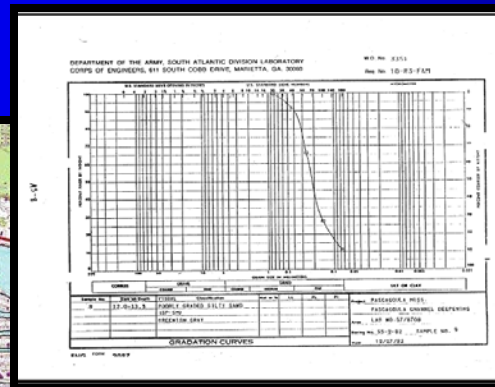
Hal Gates
Operations Division

US Army Corps of Engineers ®
Mobile District

Program Goal

- Regional Sediment Management (RSM) requires the capability for managers to explore the broad spatial and temporal impacts of potential management actions.

RSM Tools

- Several tools have emerged as necessary components for effective planning and management.

- A geographic information system (GIS) was developed to provide baseline information for the region and quick access to historic data.

Custom Applications

SBAS

Volume Tools

Historic Information

Design Disposal Areas

GIS Applications

- Applications assist user in gathering values for the Regional Sediment Budget
- Custom GIS applications were designed to work with numerous geospatial datasets
- These functions include:
  - retrieving pertinent hydrographic information
  - creating bathymetric profiles and volume changes
  - extracting dredging information from district databases

Regional Sediment Budget

- Establishing a regional sediment budget was the primary function of the GIS.

- The budget was calculated by quantifying sediment erosion and accretion throughout the region caused by material processes:
 - storms
  - man-made actions, such as dredging

Sediment Budget Analysis System Application (SBAS-A)

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Untitled - ArcMap - ArcView

File Edit View Insert Selection Tools Window Help

1:2,476,771

Editor Task: Create New Feature Target:

100%

P

Layers
xrate_all_dd
   NETALL
   -101265.60 - -37032
   -37032.23 - 2582.52
   2582.53 - 37157.13
   37157.14 - 84532.74
   84532.75 - 181804.6
regboxes
   <all other values>
   LEGEND
   Cell Balance
   Cell Gain
   Cell Loss
baycounty_dd

eastpass_dd

panamacity_dd

perdidopass_dd

rsm_dd_gulfcc
   <all other values>
   STATE_NAME
   Alabama
   Florida
   Mississippi

Display Source

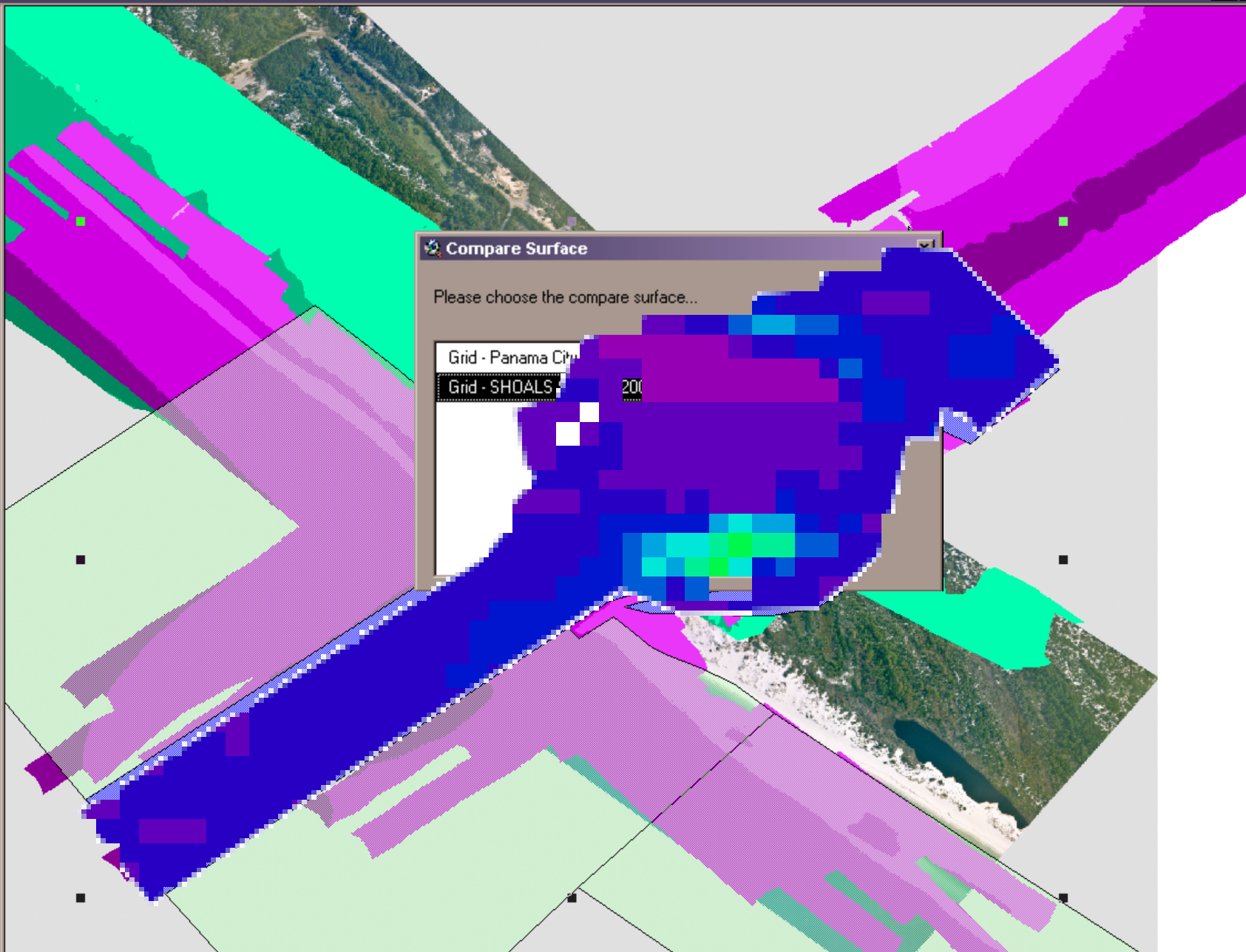Arial
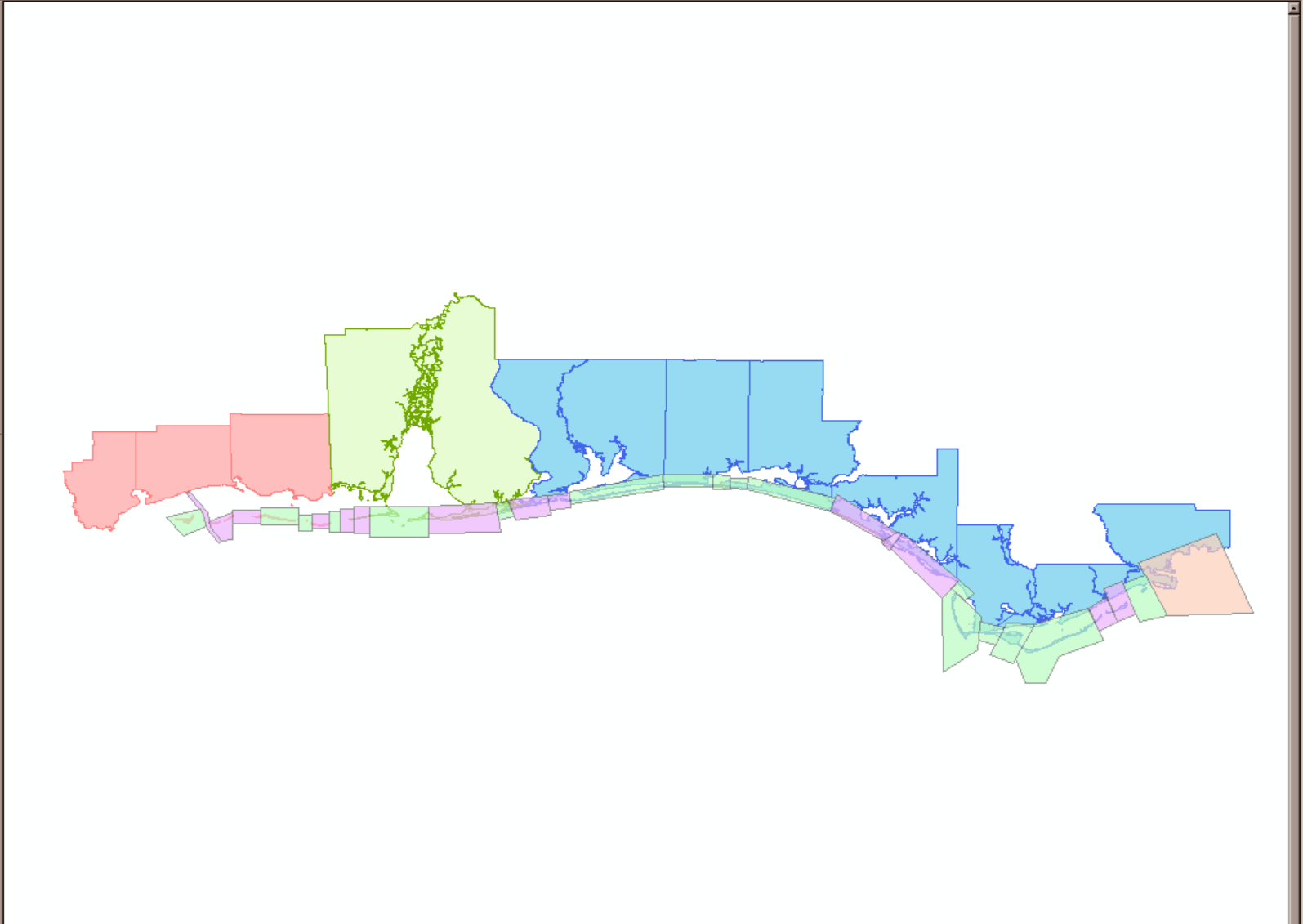
Survey Calculations

- Calculations can be computed between different surveys

  – Littoral Cells can be used as boundaries for the volume calculation

- Profiles can be create on-the-fly with a simple transect drawn through survey datasets

ArcView GIS Version 3.1

File Edit View Theme SAMOPJ-Toolbox Analysis Surface Graphics XTools Window Help DMMP Menu RSM Menu

Scale 1: 14,663

-85.71
30.13

RSM - Sub-Region 05

Panamacity_dd.shp

Grid - Panama City S
52.8 - 32.1 Ft
32.1 - 11.4 Ft
11.4 - -9.3 Ft
-9.3 - -29.9 Ft
-29.9 - -50.6 Ft
-50.6 - -71.3 Ft
No Data

Grid - SHOALS Surv
156 - 118.5 Ft
118.5 - 80.9 Ft
80.9 - 43.4 Ft
43.4 - 5.9 Ft
5.9 - -31.7 Ft
-31.7 - -69.2 Ft
No Data

Image - Panama City

Grid4_Volume Chan
-2.543 - -0.761
-0.761 - 1.021
1.021 - 2.803
2.803 - 4.585
4.585 - 6.366
6.366 - 8.148
8.148 - 9.93
9.93 - 11.712
11.712 - 13.49
No Data

Compare Surface

Please choose the compare surface...

Grid - Panama City
Grid - SHOALS   200

File   Edit   View   Theme   SAMOPJ-Toolbox   Analysis   Surface   Graphics   Window   Help   DMMP Menu   RSM Menu

Scale 1: 14,663

-85.74
30.13

RSM - Sub-Region 05

Panamacity_dd.shp

Grid - Panama City S
  52.8 - 32.1 Ft
  32.1 - 11.4 Ft
  11.4 - -9.3 Ft
  -9.3 - -29.9 Ft
  -29.9 - -50.6 Ft
  -50.6 - -71.3 Ft
  No Data

Grid - SHOALS Surv
  156 - 118.5 Ft
  118.5 - 80.9 Ft
  80.9 - 43.4 Ft
  43.4 - 5.9 Ft
  5.9 - -31.7 Ft
  -31.7 - -69.2 Ft
  No Data

Image - Panama City

RSM Tools

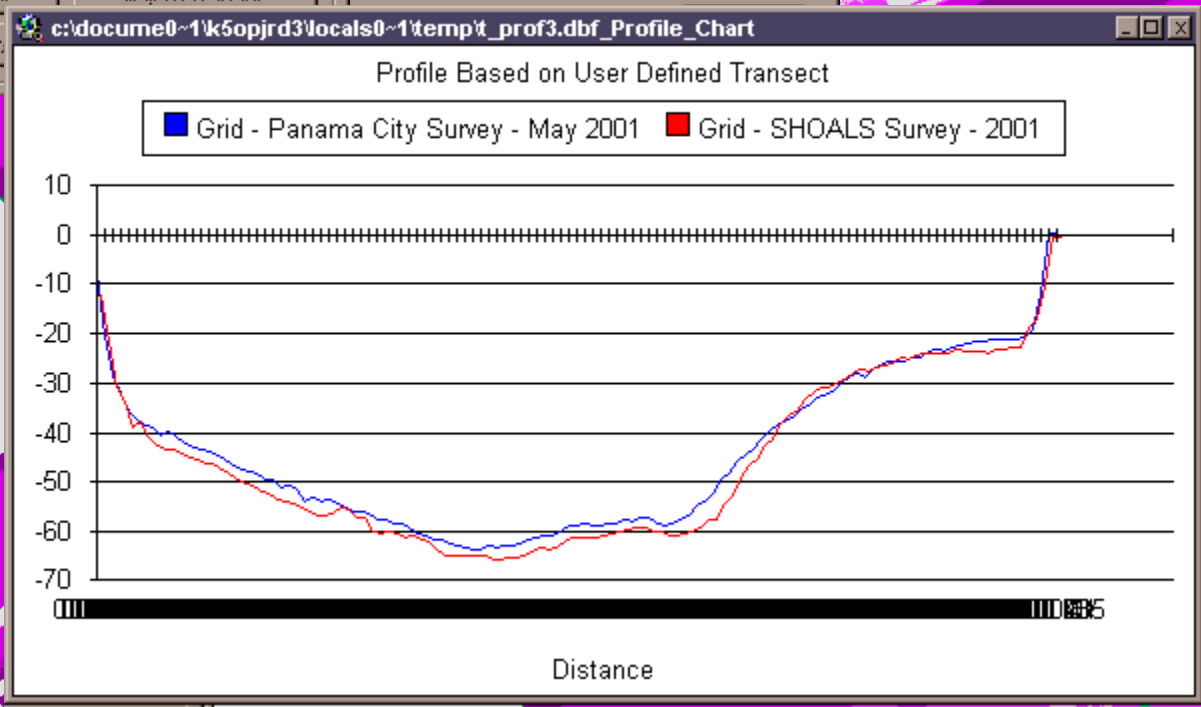### Grid Profiler

☐ Place z-values text   ✚ Profile Point Start

    🞦 Profile Point End

Charted Profiles

Print Profile Chart   Export to Excel

Place Profile Grap

c:\docume0~1\k5opjrd3\locals0~1\temp\t_prof3.dbf_Profile_Chart

Profile Based on User Defined Transect

■ Grid - Panama City Survey - May 2001   ■ Grid - SHOALS Survey - 2001

10

0

-10

-20

-30

-40

-50

-60

-70

Distance

Dredge Volumes

- GIS tools are used to calculate:
  - the volume to be dredged based on conventional channel condition surveys
  - hydrographic surveys taken before and after dredging events.

Integrating Dredge Information

- Historical and/or current dredge information becomes vital in the process of calculating a sediment budget.

- With dredging tools, numerical models can be run in the GIS
  - design disposal scenarios
  - evaluate the long-term placement of material.

Dredging Management

Dredging History

- Users can query on Channel and Dredging Events

- View Dredging History for Event Location

- Dredging records aid development of sediment budgets by providing volumes removed or placed

Laboratory Reports

- Boring Log Reports can be queried by boring location

- Detailed reports for past and present Boring Events

Placement Design

- Identify shoaled areas to be dredged

- Distinguish open water disposal locations

Dredging History Manager

Menu Bar

Edit View Theme SAMOPJ-Toolbox Analysis Surface Graphics XTools Window SBAS Menu RSM Menu Help DMMP Menu

Dredging Channels

Boring Logs

Navigation Channel
- Arlington
- Bayou La Bat
- Bayou Coden
- Bon Secour R
- Bayou La Bat
- Chickasaw C
- DI Ferry Char
- DI Fort Gaine
- Pass Drury
- Dog River
- DI Village Ch.
- Fowl River
- Garrows Ben
- Mobile Bar Ch
- Mobile Lower
- Mobile River
- Mobile Upper
- Snake Bayou
- Theodore Shi

Navigation Channel

Navigation Channel
- Arlington
- Bayou La Bat
- Bayou Coden
- Bon Secour R
- Bayou La Bat
- Chickasaw C
- DI Ferry Char
- DI Fort Gaine
- Pass Drury
- Dog River
- DI Village Ch.
- Fowl River
- Garrows Ben
- Mobile Bar Ch

Historical D

Select Channel

Coastal Zone

ID	Desc
MB	Mob
ML	Mob
MR	Mob

Qu...

Set S...

Dredging Report – Historical Record – Mobile District Coastal GIS

Project Key: MB001

Printed: 13-May-2002

Project Data:

Project
Mobile Bar Channel

Start Station Location
1865+00

Disposal Area
Gulf Open Water

Dredge Name
Padre Island

End Station Location
1915+00

Contractor
NATCO

Contract Data:

Advertising Num
DACW01-96-B-0106

Contract End Date
20-Aug-1997

Net Cost Per CYD

Contract Num
DACW01-97-C-0003

Contract Begin Date
01-Jul-1997

Gross Cost Per CYD
$1.45

Drawing File Num

Contractor Earnings Mob Demob $7,600.00

Unit Price

Disosal Area File Num

Contractor Earnings DA Activities

% Non-Pay Yardage

Contract Period Days
300

Contractor Earnings Dredging
$1,345,713.11

Contract Type
Rental

Total Contractor Earnings
$1,353,313.11

Dredging Statistics:

Diesel Horsepower

Pipeline Size In

Gross Hourly Digging CYDS
466.43

Avg Daily Digging Hours
19

Cubic Yards Gross
546,383

Net CYDS Per FT

Total Operating Time Hours
2,496

Total Dredge Advance Ft

Beach Fill Tool

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File   Edit   View   Theme   SAMOPJ-Toolbox   Analysis   Surface   Graphics   XTools   Window   SBAS Menu   RSM Menu   Help   DMMP Menu
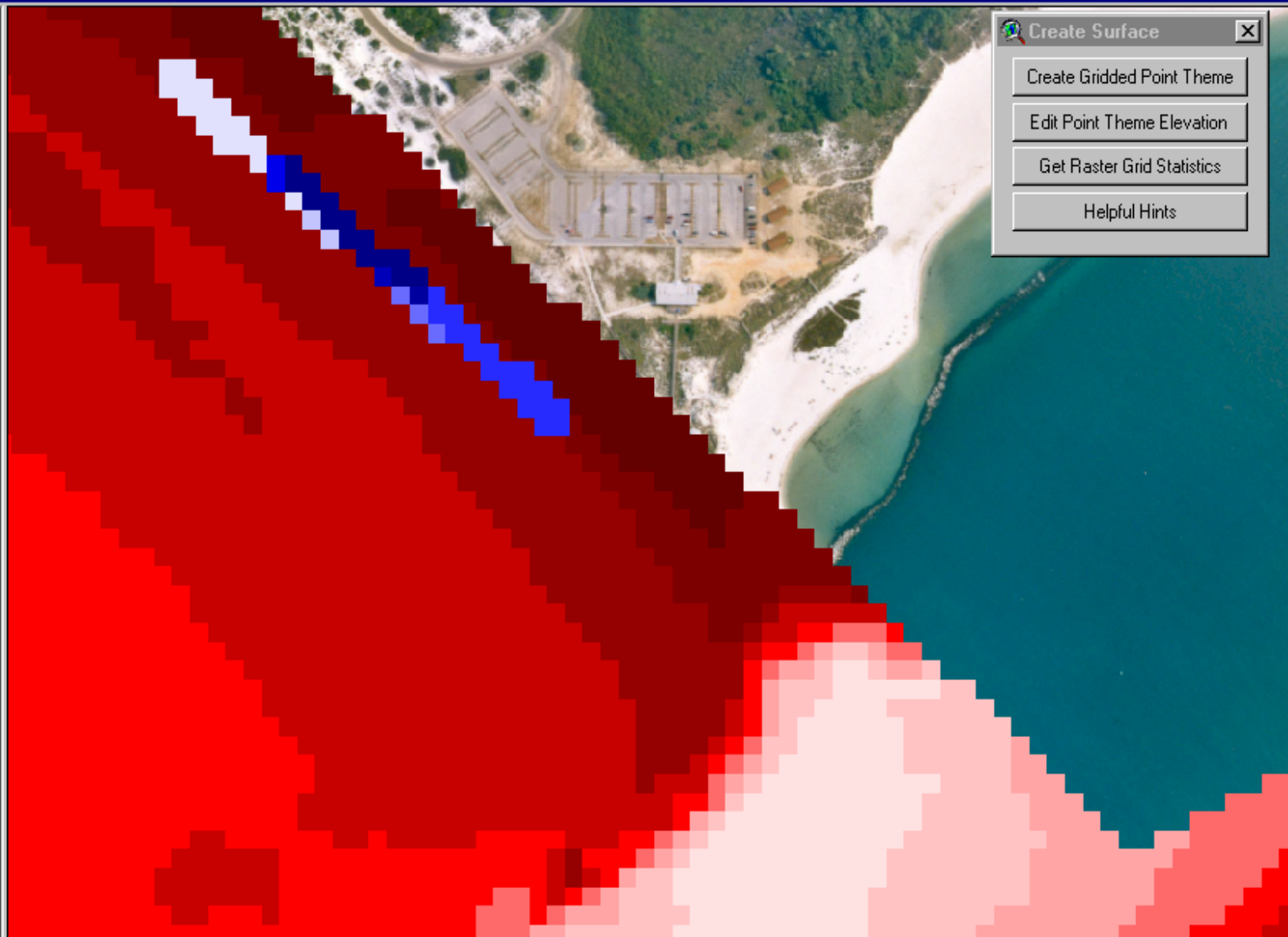
Scale 1: | 4,959 |

RSM - Sub-Region 05

✔ Nwgrd6
- 10 - 11.111
- 11.111 - 12.22
- 12.222 - 13.33
- 13.333 - 14.44
- 14.444 - 15.55
- 15.556 - 16.66
- 16.667 - 17.77
- 17.778 - 18.88
- 18.889 - 20
- No Data

✔ Grd00905
- -61.459 - -52.
- -52.396 - -43.
- -43.332 - -34.
- -34.269 - -25.
- -25.205 - -16.
- -16.142 - -7.0
- -7.079 - 1.985
- 1.985 - 11.048
- 11.048 - 20.1
- No Data

✔ Pc_mosaic_dd.sid

Create Surface ✕

Create Gridded Point Theme

Edit Point Theme Elevation

Get Raster Grid Statistics

Helpful Hints

Dredging & GIS

- Integration of dredge information and dredge related applications enhance the GIS as a tool for regional sediment management.

- It enables users to:

  - calculate a regional sediment budget

  - design dredging disposal scenarios

  - evaluate long-term placement of material

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Future of Coastal Tools in ArcGIS

- With the advent of new ArcGIS technologies, customizations must be recoded from Avenue to Visual Basic

- Prior to the recoding process, all developers with Coastal GIS tool met to review common tools.
  - Chose the best tool in each category
  - Only best tools will be recoded

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Recode Process

SAMOPJ

SAMOPJ Toolbox

RSM - Toolbox

DMMP - Toolbox

- Add Theme/View Metadata
- Bathymetric Profile
- Plot Data Application
- Bathymetric Volume Calculator
- Data Catalog
- Document Manager
- Dredge History Manager
- Boring Log Application
- Import GPS Points
- Geographic to UTM Coord Calculator
- UTM to to Geographic Coord Calculator
- Historical Photos Application
- Beach Fill Scenario Tool
- Quick Query
- Quick Print
- Quick Tools

ERDC

DMSMART

HyPAS

Recoding Responsibilities

- SAMOPJ
  - Data Catalog
  - Document Manager
  - Dredge History Manager
  - Boring Log Application
  - Import GPS Points
  - Geographic to UTM Coord Calculator
  - UTM to to Geographic Coord Calculator
  - Historical Photos Application
  - Beach Fill Scenario Tool
  - Quick Query
  - Quick Print
  - Quick Tools

- ERDC
  - Add Theme/View Metadata
  - Bathymetric Profile
  - Plot Data Application
  - Bathymetric Volume Calculator

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