Final Report: HMTAP Task Order 18

Mississippi Coastal Analysis Project

Grid Development Report (Task 4)

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Appendices

Appendix A QA/QC Forms
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ADCIRC	Advanced Circulation Model for Oceanic, Coastal, and Estuarine Waters
CTP	Cooperating Technical Partner
DEM	Digital Elevation Model
ELF	Elevated Linear Features
EMRL	Environmental Modeling Research Laboratory
ERDC	Engineer Research and Development Center
ESRI	Environmental Systems Research Institute
FIRM	Flood Insurance Rate Maps
FIS	Flood Insurance Study
GPS	Global Positioning System
IPET	Interagency Performance Evaluation Task Force
JABLTCX	Joint Airborne Lidar Bathymetry Technical Center of Expertise
Lidar	Light Detection and Ranging
MDOT	Mississippi Department of Transportation
NAVD	North American Vertical Datum
NLCD	National Land Cover Dataset
NOAA	National Oceanic and Atmospheric Administration
QA	Quality Assurance
QC	Quality Control
SHOALS	Scanning Hydrographic Operational Lidar Survey
SMS	Surface Water Modeling System
UND	University of Notre Dame
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

In the Mississippi Coastal Flood Hazard Project the **Ad**vanced **Circ**ulation Model for Oceanic, Coastal, and Estuarine Waters (ADCIRC) was used extensively. This report explains the development of the unstructured mesh grid that was specially created by the URS project team for the three coastal counties of Mississippi. The report covers the development process, from its starting points with a pre-existing ADCIRC grid and newly processed lidar (light detection and ranging) data, through the development of auxiliary features including various coefficients that were based on land-use coverage.

The following information is provided in this report:

- Model characteristics used
- Specific grid system and sub-grid systems employed
- Grid used for bottom topography (bathymetry) and the shoreline
- Special treatment for small-scale features, such as harbors and barrier islands
- Locations and conditions applied to the grid for the open boundaries
- Method used to determine cell-averaged ground elevations and water depths
- Method used to account for wind drag and blockage coefficients
- Manning-n values for bottom and overland friction
- Treatment of barriers, inlets, and rivers

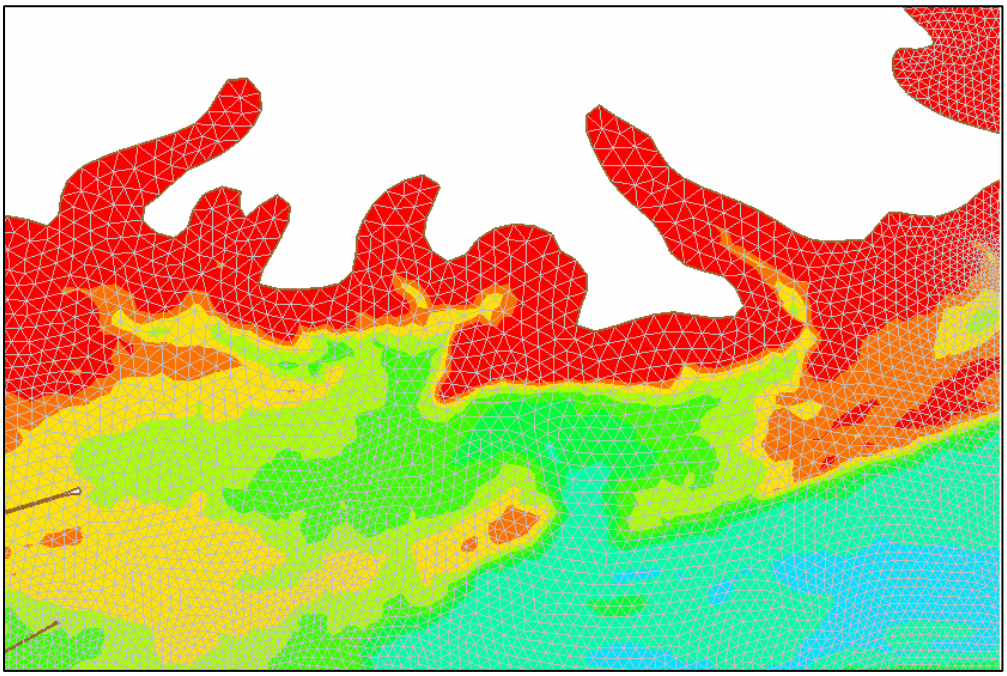
This data submittal corresponds to Deliverable 6 in the Technical Work Plan, described as a "description of data resources for ADCIRC grid development." This description of the ADCIRC grid development also includes a digital input file of the grid components and a digital display of the ADCIRC basins (E-size maps).

This report is part of the overall series of project reports listed in Appendix A. Some of the supporting data and background information for the grid development work is described in other project reports titled: 1*) Geospatial Technology Task Report,* 2) *Field Investigation of the Continuous Seawall, South Side of US Highway 90 in Mississippi*, 3) *Summary of Work Performed by Ayres Associates in Support of the URS Storm Surge Modeling for FEMA Region 4,* and 4) *Coastal Documentation Report – Technical Overview.*

The ADCIRC model uses the finite element computational method to solve the shallow water equations. The finite element method permits the use of a triangular grid, which has several advantages over a traditional quadrilateral grid. Namely, it offers more flexibility in designing grid elements so account for topographic features. This also allows for a significant difference in element sizes, so that resolution can be placed in the necessary areas. While these triangular grids have many advantages, the time required to set them up can be extensive. This section of the report documents the development of the triangulated grid used for the Mississippi coastal modeling studies.

2.1 BASE GRID

The development of the triangular grid for this project began with a pre-existing grid ***(TF01_V6)*** provided to URS by Dr. Joannes Westerink of the University of Notre Dame. This base grid covers the entire Western North Atlantic Ocean from the 60-degree west meridian eastward, and includes the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. TF01 grid was developed during the IPET project (Re: Interagency Performance Evaluation Task Force, 2006) as a refinement of the earlier S08 grid. However, this grid did not have adequate resolution in Hancock, Harrison, and Jackson Counties in Mississippi. Figure 2.1 shows the ADCIRC TF01_V6 grid zoomed in on Bay St. Louis, MS. This figure reveals that a substantial modification to the existing grid is necessary to better represent the important small-scale features (e.g., barriers and floodways) that control storm surge propagation in coastal Mississippi.



2.2 MISSISSIPPI GRID DESIGN

2.2.1 Geospatial Data

The *Geospatial Technology Task Report* provided detailed information about the data collected for this project, including processing of lidar data to a digital elevation model (DEM), survey control data, aerial photography, and field surveys. That report included the extent of topographic and bathymetric mapping, key mapping parameters (e.g., contour intervals and accuracy standards), horizontal and vertical datum, and other pertinent information describing the extent and quality of survey information to be used in the study. The geospatial task had several components that fed into the grid development work. This includes processing of detailed topographic data, offshore bathymetric data, inshore and river bathymetric data, and nearshore/beach elevation data.

A primary source of project elevation data came from existing lidar studies. Hancock and Jackson Counties were flown in their entirety by EarthData International, Inc. (EarthData) for the National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center in early 2005. Harrison County was flown in its entirety by EarthData for the Mississippi Department of Environmental Quality in early 2004. These datasets have been checked by the contracting agencies and by the FEMA Cooperating Technical Partner (CTP) contractor for accuracy using ground checkpoints and for data cleanliness by visual inspection. These lidar datasets represent the best-available, pre-Katrina topographic information.

The Joint Airborne Lidar Bathymetry Technical Center of Expertise (JABLTCX) flew the Scanning Hydrographic Operational Lidar Survey (SHOALS) system along the Mississippi shoreline and barrier islands. Due to the turbidity of the water, no bathymetric lidar data were collected. The topographic data on the mainland are redundant to the EarthData dataset described above, and are not used in this study; however, the SHOALS data are the only post-Katrina topographic data for the barrier islands and were crucial for developing the storm surge model grid. SHOALS data for the barrier islands were extracted from Woolpert's post-Katrina dataset. During the quality control (QC) process, the post-Katrina elevations were compared to the seamless Mississippi lidar dataset and found to be acceptable. Since rivers and streams are important for further propagation of storm surge, the riverine depths were collected from the existing study reports conducted during the production of Flood Insurance Rate Maps (FIRMs). The detailed methodology is explained in Section 2.2.3.

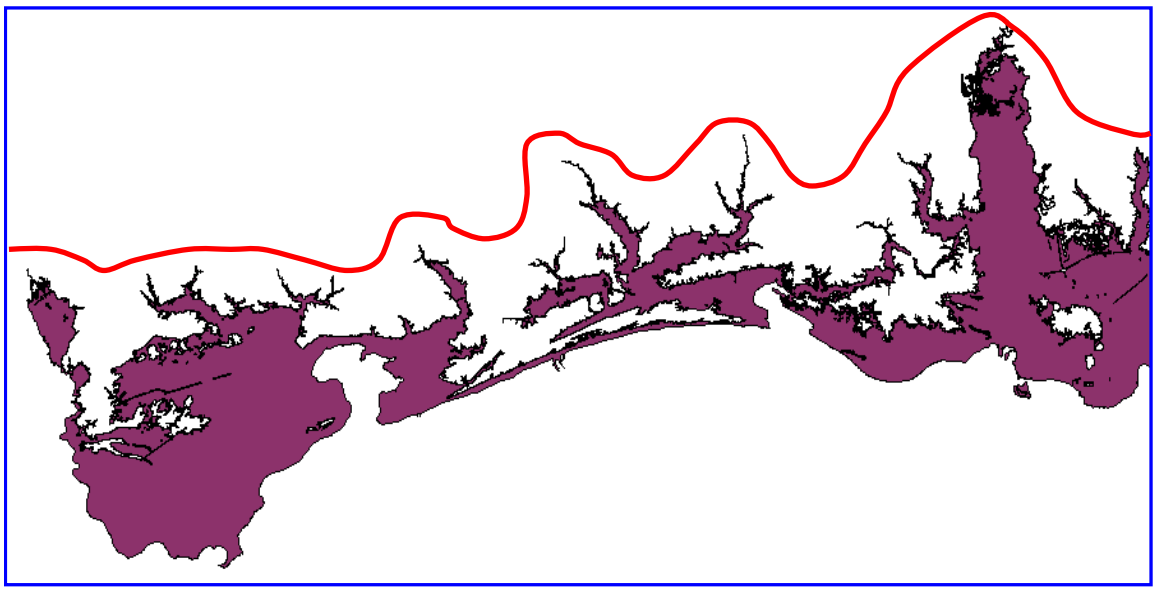
A list of the Geospatial Data received by the modeling group follows:

1. Lidar → xyz text file (in decimal degrees, with positive z values representing elevations).
2. Elevated Linear Features (ELF) Shape → Environmental Systems Research Institute (ESRI) PolyLineZ (ESRI polyline shape file containing elevations as Z values embedded within the Shapefile.
3. ELF Text → xyz text file representing tops of elevated roads or other features (in decimal degrees, with positive z values representing elevations).
4. Hydrographic Breaklines → ESRI Shapefile representing river and stream banks.

5. NOAA High Resolution Shoreline File → ESRI Shapefile representing 0 elevation contour along the Mississippi Coast.
6. Northern Gulf Littoral Initiative Bathymetric Data Set → xyz text file (in decimal degrees, with positive z values representing depth).

2.2.2 MS11G Grid Development

One of the challenging tasks was to determine the boundary of the modeling domain (i.e., the extent of the ADCIRC grid). Technically, the modeling domain must be extended beyond the inundation limits of the most severe storms. To start with, the overland surge limits of Hurricane Katrina were used, and later the Mississippi grid was extended to +25.0 meters (North American Vertical Datum of 1988 [NAVD 88]) ground contour in Hancock and Harrison Counties. The model grid for Jackson County was extended further north and into Georges County (at about the 50.0-meter contour) to represent the low Pascagoula River drainage way. Figure 2.2 shows the outline of the ADCIRC model grid laid on top of the hurricane Katrina surge limits. Since rivers, streams, roads, and barriers play key roles in accurate modeling of storm surge inundation, these features must be represented as accurately as possible in the ADCIRC model grid. The following sections describe in detail how the Mississippi grid extension incorporates these features into the final grid product.



2.2.2.1 Details of Design Using SMS

The U.S. Army Corps of Engineers (USACE) Surface Water Modeling System (SMS) software tool was used for the expansion of the base grid over Mississippi. SMS was developed by the Environmental Modeling Research Laboratory (EMRL) at Brigham Young University in cooperation with the USACE, Engineer Research and Development Center (ERDC), and is recognized as a comprehensive hydrodynamic modeling and support system.

After the extent of the Mississippi grid was determined, a grid development team divided the coastal Mississippi grid into sections to account for the various hydrodynamic features

previously mentioned. These sections created various minigrids, which were later combined into the large final grid. A team of 10 people worked closely together to produce the grid. Each had access to SMS. Considerable emphasis was placed on uniform use of the grid-marking software so that each team member produced the same representations of topographic features.

2.2.2.2 Data Manipulation of Hydrographic Breakline

Stream data received from Earth Data required an extensive amount of analysis and manipulation before incorporation into the ADCIRC grid though the SMS software. The channel breaklines shapefiles were imported into SMS by the modelers and converted to feature objects using the Shapefile → Feature Objects tool in SMS. Table 2-1 shows the criteria used for simplifying stream networks. Using aerial photography and these criteria, the modelers selected the appropriate streams to be included in the final grid (see Figure 2.3).

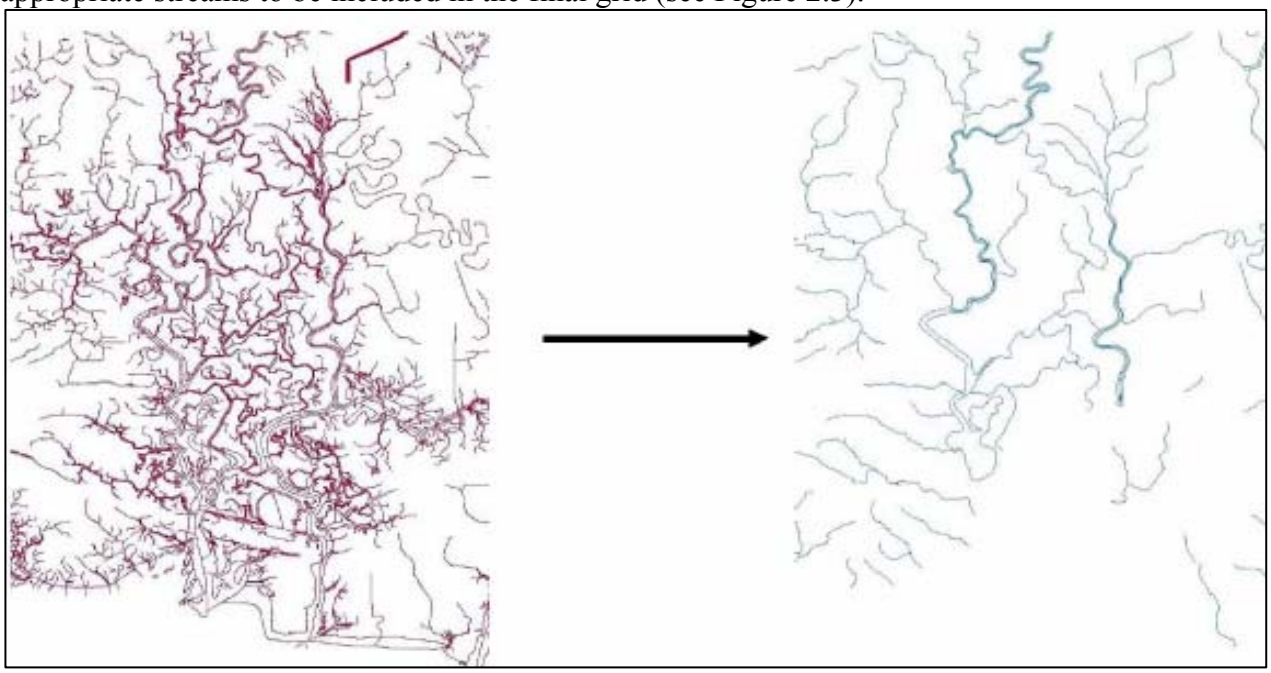


Figure 2-3. Example of edited hydrographic breaklines. The image on the left shows the complete data set as imported into SMS. The image on the right shows the edits made by the modelers.

2.2.2.3 Adding Gridded Features

The SMS software allows the user to set the grid-node spacing by setting external and internal boundaries that delineate. Also, user-placed boundaries determines which features will and will not be included in the final grid. For the initial gridding process, each team member worked on a sub-section to create a minigrid. The spacing at the exterior boundary in Mississippi and at the boundary between minigrids ("internal" boundaries) was set from the beginning. The resolution at the interior boundaries between grids was changed based on coordination with the team member working on the adjacent minigrid section.

The first step was to import the bathymetric/topographic data and visualize the scatter dataset in SMS. Most of the feature arcs representing major roads and streams were supplied by EarthData. Next, the orthometric photographs were imported into SMS so that important features such as lakes, bays, inlets, harbors, shipping channels, streams, etc., could be viewed. Feature arcs (a line in SMS) were created along these water features by digitizing the photographs. The vertices along these feature arcs were redistributed to either create equal spacing along that line, or to allow for a transition from an area of dense spacing around curves to wide spacing along long, straight lines. Table 2.1 lists the vertices spacing for several features. This table also lists the smallest physical features that were represented in the grid. For example, the table shows that streams that were less than 240 meters wide and less than 500 meters long, and not connected to a major water body, were not delineated by feature arcs. In other words, in the Mississippi ADCIRC grid, these features were simply represented as topographic depressions, not as channels.

Table 2-1. Typical vertices spacing for various grid feature types.

Feature Type	Vertices Spacing	Factors for feature elimination
Small Streams (≤ 240 meters wide)	80 meters	<500 meters long
Big Streams (> 240 meters wide)	80 meters	<500 meters long
Shoreline	200-500 meters	-
Islands	500 meters	<500 meters

After all the feature arcs (i.e., the spacing guides) were set, SMS was used to create a grid based on the spacing controlled by the feature arcs. During the creation of the grid, the scatter bathymetric/topographic data were interpolated to this grid using the internal linear interpolation function.

The grid generation process creates a text file (fort.14 file) that was then run through a Visual Basic program to check: 1) that the aspect ratio of all of the grid cells was less than 1.3 (meaning that the interior angles ranged from 40 to 80 degrees), 2) that the minimum element size was at least 60 meters, and 3) that the maximum element size was no more than two kilometers. The SMS program helps the user check for areas where there was: 1) a sharp change in slope, 2) an element area change between grid elements, or 3) for nodes that had more than eight connecting elements. Problem areas so identified were fixed by manually adjusting the nodes to create more equilateral elements or eliminating extra nodes. A FORTRAN program was used to identify areas where the elevation data in the ADCIRC grid differed from the original lidar elevation data by more than 1.0 foot. When a problem was identified, the area was manually adjusted within SMS, usually by adding an additional data point and then re-interpolating the data to the grid.

As a quantity assurance procedure, each team member documented any major decisions made regarding streams and other features on working forms that are included in the appendices of this report.

2.2.2.4 Grid De-Refine

The TFO1_V6 grid provided to URS by the University of Notre Dame (UND) contained a large number of ADCIRC nodes in Western Louisiana and Eastern Texas which were important for USACE studies, but not necessary to the Mississippi storm surge modeling. The Mississippi grid de-refine objective was to significantly reduce the number of ADCIRC nodes in the densely spaced grid west of the Mississippi River, while maintaining fundamental the topographic and bathymetric representation of the region. As shown in Figure 2-4, West of Mississippi River grid nodes were originally densely spaced, and the Mississippi River itself had a large number of ADCIRC nodes not necessary for the Mississippi project. Ayres Associates Inc. was tasked to de-refine this section of the TFO1_V6 grid. All levee and flow-controlling structures (levee height and gaps) were maintained in the De-Refined Grid, however node spacings were increased. Figures 2-5 and 2-6 show a section of the Mississippi River in the TFO1_V6 grid and in the De-Refined Grid. This De-Refined Grid was later patched with the Mississippi ADCIRC grid.

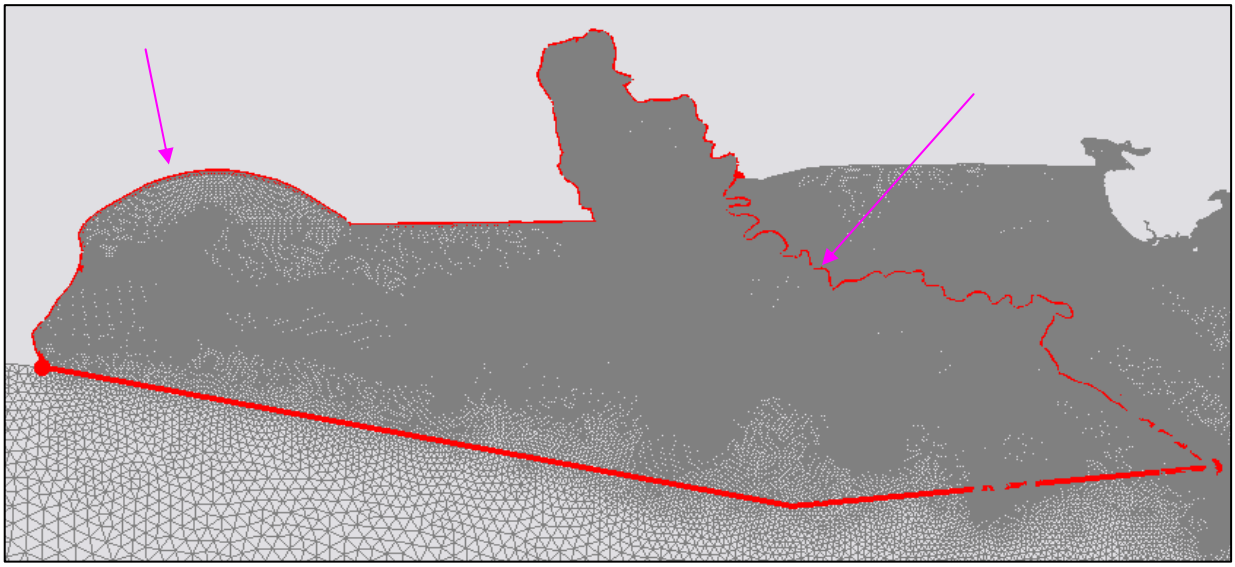


Figure 2-4. Grid De-Refinement Boundary (Red Polygon), Existing Node ~198000.

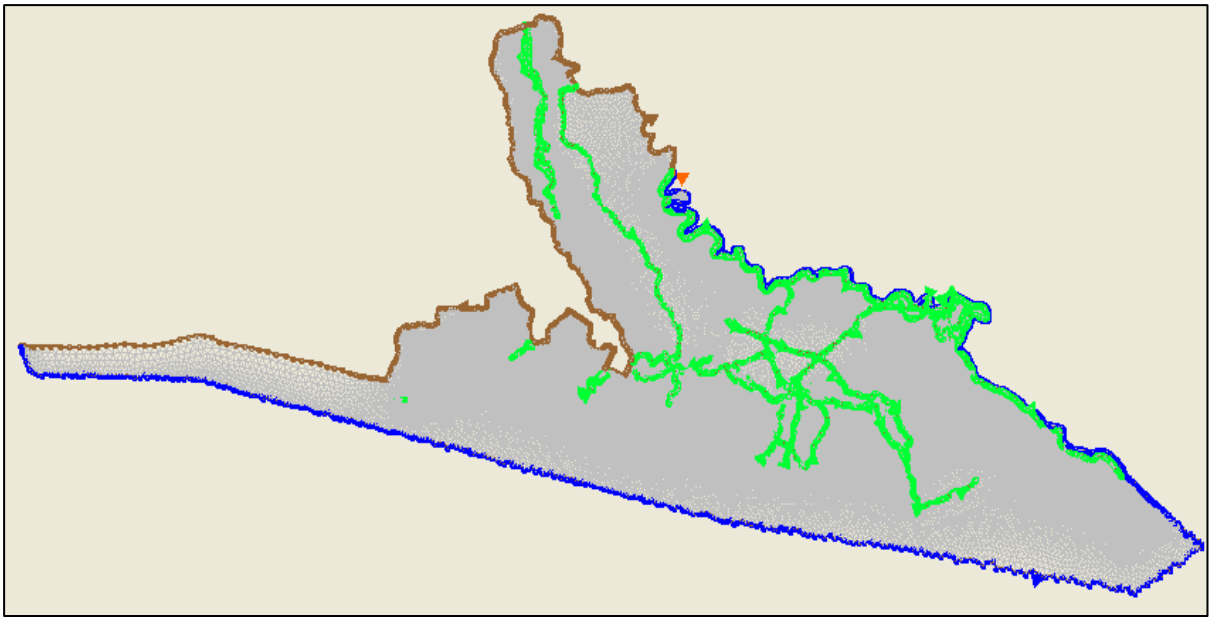


Figure 2-5. De-Refined Grid (Total Node ~100,000). Almost 50 percent of the nodes were reduced.

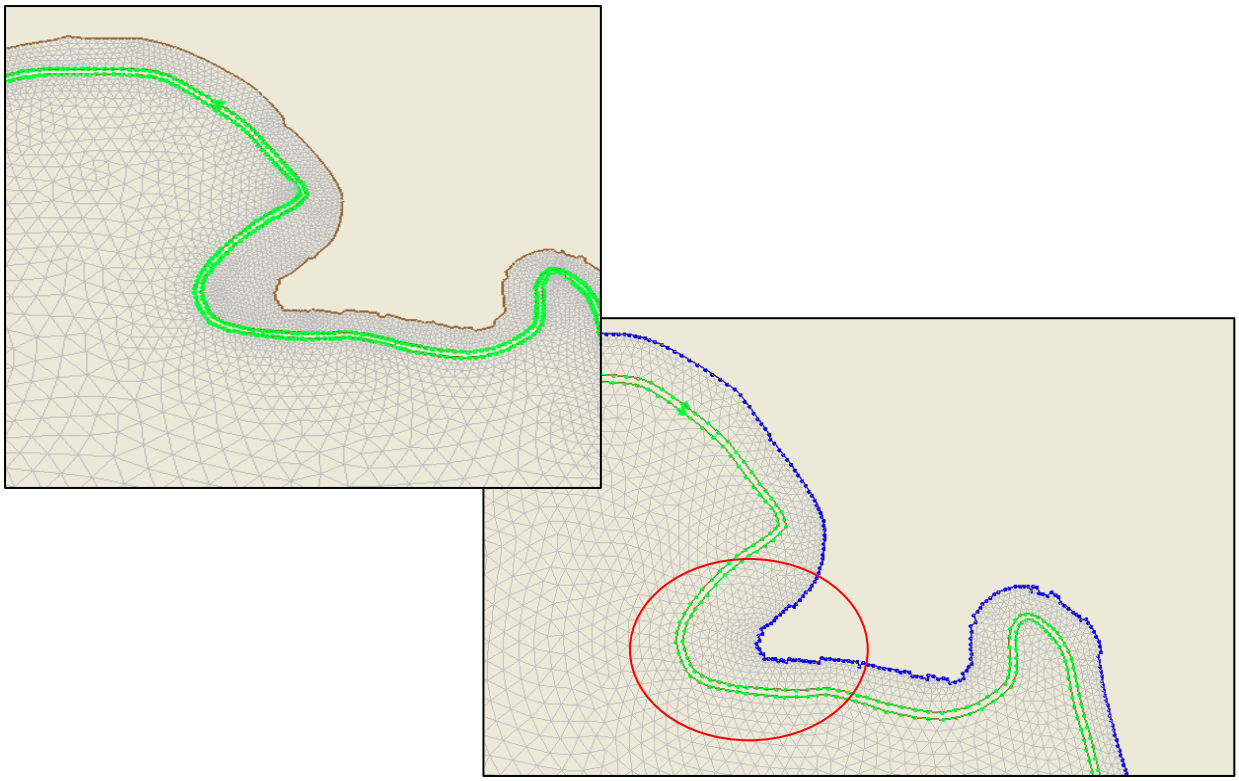


Figure 2-6. Mississippi River in TFO1_V6 Grid, (b) in De-Refined Grid.

2.2.3 Adding Sub-Grid Features

Sub-grid features are special provisions in the ADCIRC code that allow small or narrow land flow-controlling features to be represented even though they are too small to be resolved by shaping the triangular grid elements. In ADCIRC these are positive features that form barriers such as embankments or walls. There are no sub-grid elements for negative linear features such as streams or ditches.

All the sub-grid features included in the initial grids were considered internal overflow boundaries, and were treated as weirs (as specified by ADCIRC). These features were typically embankments, roads more than 1.5 feet above grade, etc. In this sense, the "back" side of the weir only gets wet if the oncoming flow exceeds its height, or the water flows around the obstruction to the other side.

For the initial grid, most roads, railroads, and offshore barrier islands were included in the grid as internal overflow boundaries. The process for defining the internal overflow boundaries was similar to the gridding process described above. In SMS, the barriers were identified as feature arcs on either side of the road, railroad, etc. The vertices along the feature arcs were redistributed based on the required element spacing. With this process it was necessary to guarantee that there were equal numbers of nodes on each side of the barrier. The elevations of these overflow boundaries were collected as 3D arcs by EarthData. Later these data were processed through a FORTRAN routine to amend the grid text file (fort.14) to accurately represent the barrier heights. Figure 2.7 provides an example, with the internal overflow boundary (the I-10 Roadway in this case) marked in green. Table 2.2 shows the section of the grid text file (fort.14) where this internal boundary information and the heights are defined. In this example, the road barrier (Boundary Type 24 in ADCIRC model) consists of seven node pairs with heights (above geoid) shown in the third column of the table.

Table 2-2. Section of the digital grid file showing barrier information

Node No (Pair 1)	Node No (Pair 2)	Height of Barrier (m)	Weir Coeff1	Weir Coeff1
880492	610483	4.585	1	1
880491	610484	4.661	1	1
880490	612055	4.62	1	1
880489	613641	4.785	1	1
880488	615223	4.573	1	1
880487	616787	4.615	1	1
880486	618327	4.606	1	1

All Mississippi barrier islands (e.g., Deer Island, Cat Island) were gridded as topographic features that could be overtopped.

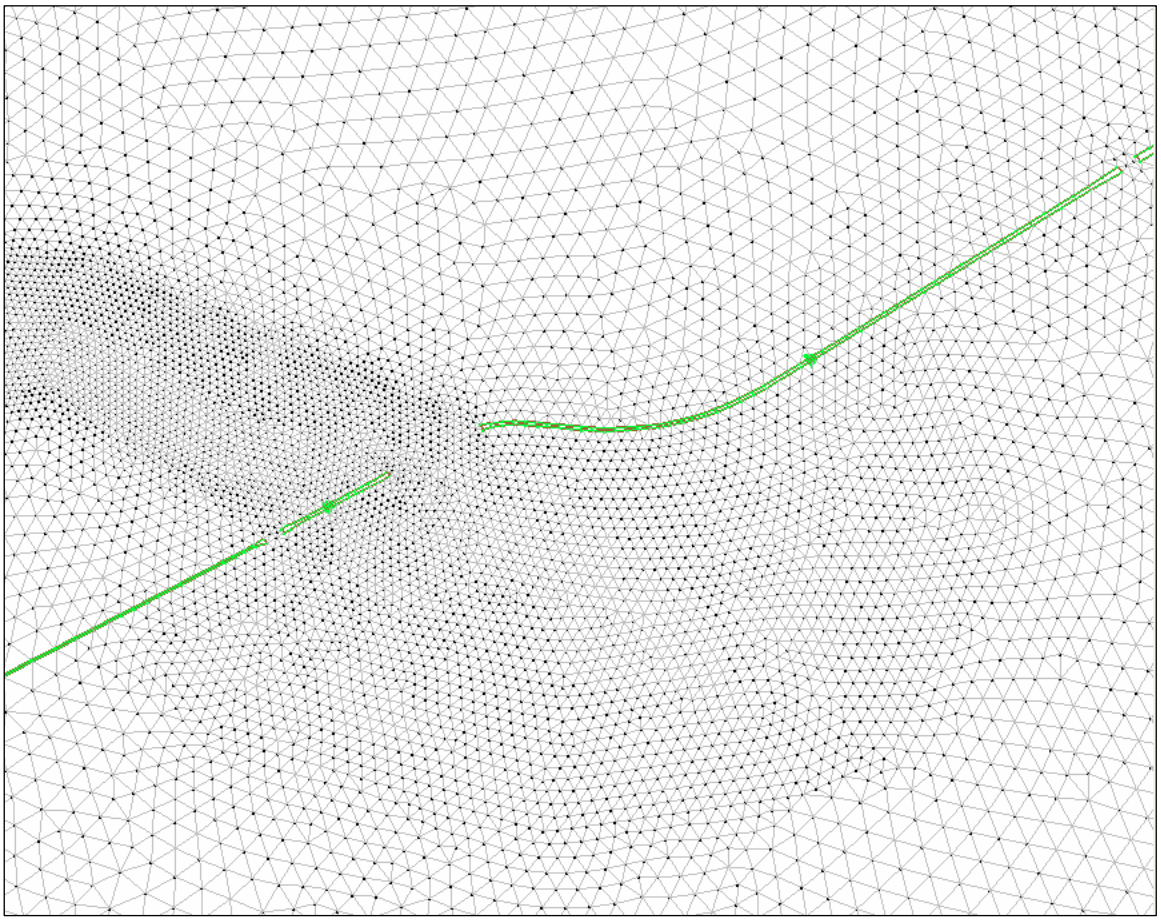


Figure 2-7. Example of an internal overflow boundary in the Mississippi ADCIRC grid.

2.2.3.1 Modeling Streams

Streams that were long enough to incorporate into the model were divided into two categories: small streams (<240 meters wide) and big streams (>240 meters wide). The numerical stability limitation of the ADCIRC model requires at least three nodes across a stream or channel feature. The nominal minimal grid spacing is 80 meters. The small streams were modeled by creating a feature arc down the center of the streamline. This usually resulted in a v-notch stream shape with one bathymetric node in the center of the stream and two topographic nodes on either side representing banks. For the big streams, feature arcs were placed on either side of the stream which, when gridded by SMS, created a trapezoidal stream cross-section.

The small streams with the v-notch led to instability problems with the ADCIRC model. This model often needs at least two elements across a feature to create a stable flow pathway. To overcome this stability problem, the narrow streams were artificially widened and made shallower to allow for a more stable flow pathway in the model. A FORTRAN program was used to make this adjustment in the channel while maintaining equivalent hydraulic conveyance (hydraulic radius). These amendments were documented in relevant working forms that are included in the appendices to this report. As an example, Wolf River at Biloxi (Figure 2.8a),

south of the I-10 roadway is approximately 92 meters wide and its bank-full depth is approximately 3 meters. Considering rectangular channel shape, the wetted cross-sectional area can be approximated to 276 square meters.

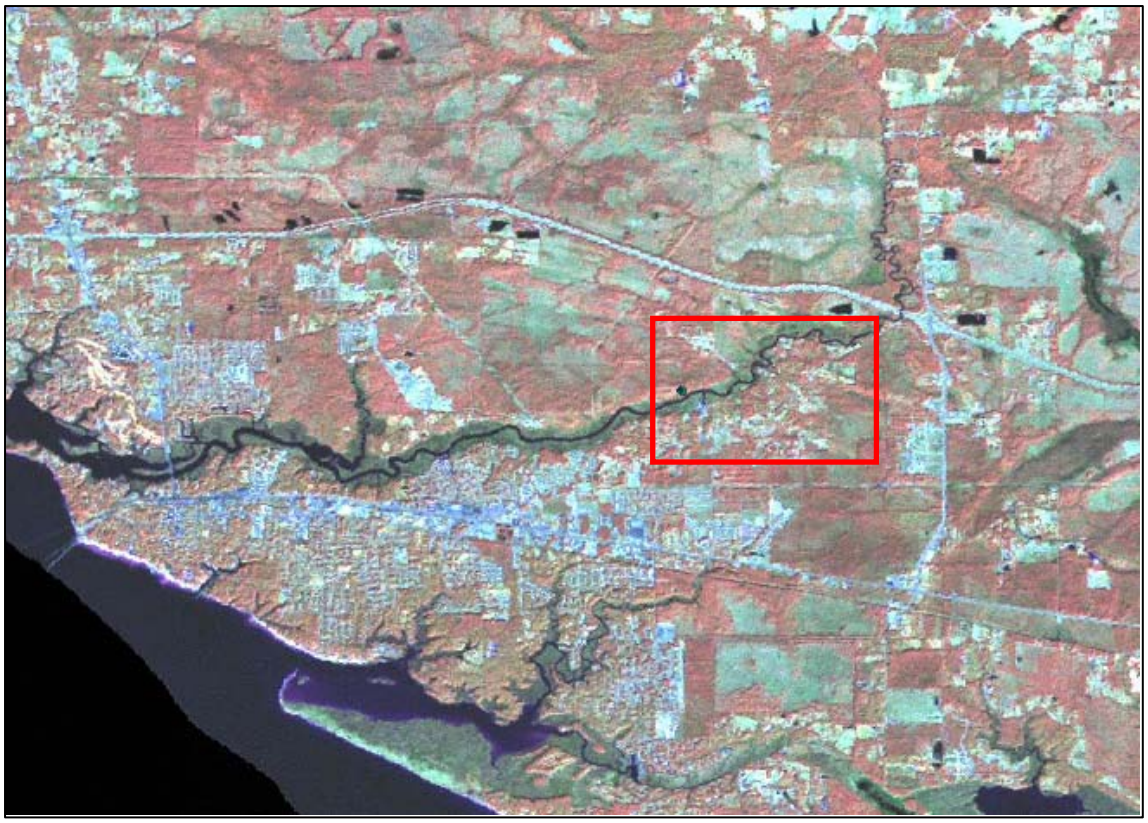


Figure 2-8a. Aerial photograph, Wolf River, Biloxi.

In the Mississippi (MS) ADCIRC grid, Wolf River was artificially widened to 270 meters in order to accommodate three elements across (Figure 2.8b). However, to keep the cross-sectional area identical, the depth of the river was reduced to 1 meter. To enhance ADCIRC model stability, most of the narrow valleys were treated similarly, and these decisions were documented in the working forms.

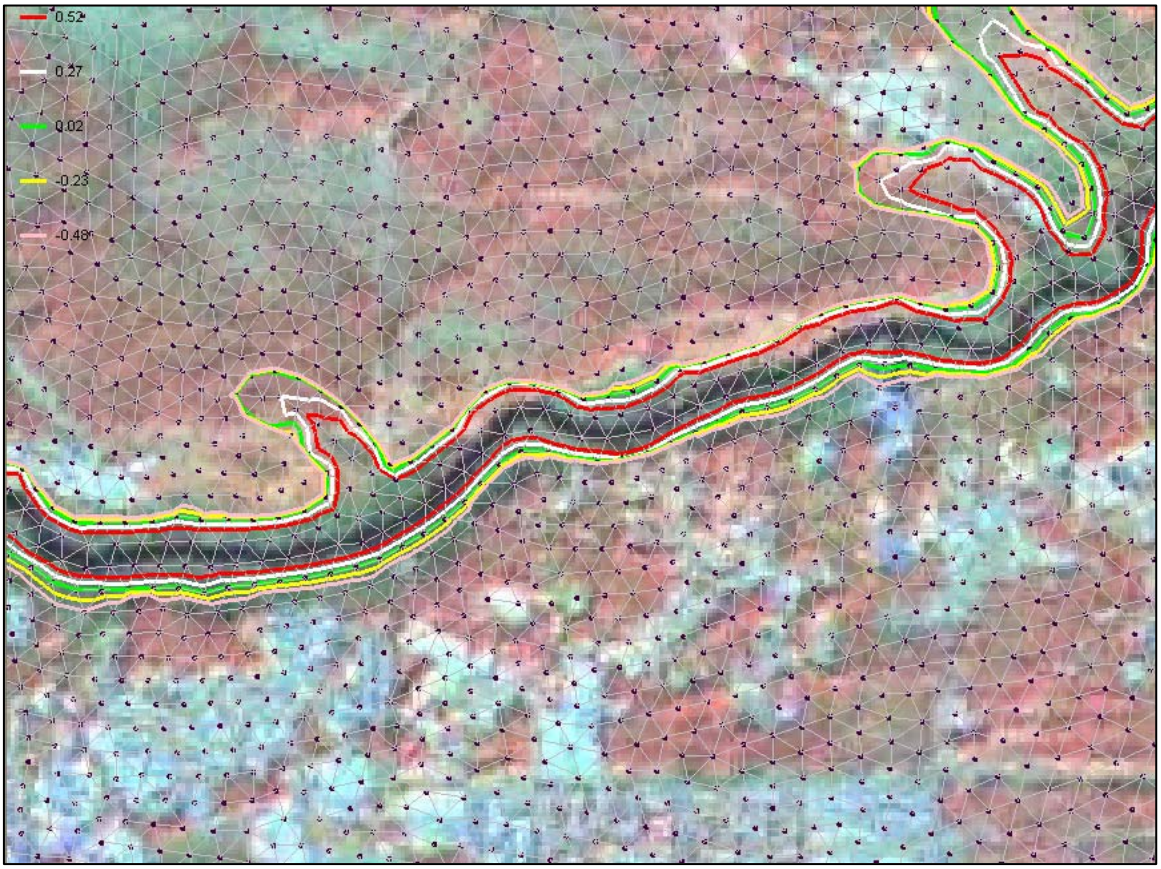


Figure 2-8b. ADCIRC Grid representation of Wolf River, Biloxi.

2.2.3.2 Modeling Structures

Identification of water conveyance structures that intersect with elevated roads was important, as they function as preferential flow paths during storm surge inundation. The types of structures identified included bridges, culverts, elevated roads, and overpasses. The Mississippi Department of Transportation (MDOT) was contacted with a request for information in a digital format. The availability of these data was limited. URS obtained information on some larger facilities from the MDOT Division of Bridges, but no smaller structures. As these data were incomplete, and time constraints did not allow for an onsite review of electronic records, a decision was made to conduct a field survey to complete the structure database.

Two URS employees were designated to drive Mississippi roads identified from the lidar dataset. They were instructed to identify the following types of structures:

- Road overpasses at intersections
- Stream and drainage crossings with culverts or other structures
- Roads that are elevated above grade with pilings—allowing free flow across the road
- Other features that may influence across-land flow during storm surge—railroad embankments, etc.

In addition to verifying the structure type, the proper dimensions and location of the feature are key inputs into the ADCIRC model. The survey team recorded the following attributes of identified features on field data sheets:

- A Global Positioning System (GPS) latitude/longitude
- Length of the structure
- Height of the structure opening
- Distance from the road crest to the top of the structure
- Distance from the top of the structure to the bottom of the invert (when possible)
- Type of structure
- Photograph of the structure
- Feature intersected by the structure (creek, road, etc.)
- Any additional notes that might be helpful

Details of the field survey report are explained in the project report title *Geospatial Technology Task Report*. Data from the field sheets were entered into a spreadsheet with assigned elevation values and their dimensions. The elevation of the bottom of the invert for each structure was calculated using the following equation:

Bottom Elevation = (crest of road elevation) – (distance from the road crest to the top of structure) – (height of the structure as shown in Figure 2.9)

The locations and dimensions of the structures were then exported to an xyz scatter file for application to the ADCIRC model.

It must be recognized that in spite of the ability of a triangular stretched net grid to resolve some of the smaller topographic features, there are many others that are geometrically distorted or simply left out. For example, small and low islands can be distorted to the point of vanishing where grid points span over them. Small tidal flow-ways can be left out and adjacent land areas lowered to maintain the essence of the flow-way.

2.2.3.3 River Depths

The depths of rivers and streams were needed as input into the ADCIRC model. Two methods were used to find the depths.

1. During the production of previous FIRMs, selected rivers and streams were studied in detail. Surveyors use various methods to determine depths in pre-defined locations, after which hydrologists will “connect-the-dots” of these depths to create a river profile. The results of these studies are presented in the Flood Insurance Study (FIS) text. These depths were extracted from the flood profiles and entered as features into an ESRI ArcGIS database. The extracted depths were positioned using aerial photography, vector road files, and rectified digital topographic maps, and cross-referencing the labels present on the flood profiles to determine the location where the studied streams crossed prominent features. In addition, significant changes in the bottom slope were extracted and entered into the database.

2. For rivers and streams that were not surveyed in earlier projects, Strahler's stream order system was implemented to determine the depths (see Figure 2.10). This stream order system uses a simple method of classifying stream segments based on the number of tributaries upstream. For example, a stream with no tributaries is considered a first-order stream. A segment downstream of the confluence of two first-order streams is a second-order stream. Once the stream order was determined for all the rivers and streams in the study area, and using the depths extracted from the FIS profiles as a guide, nominal depths were applied to the entire stream length, as listed in Table 2.3.

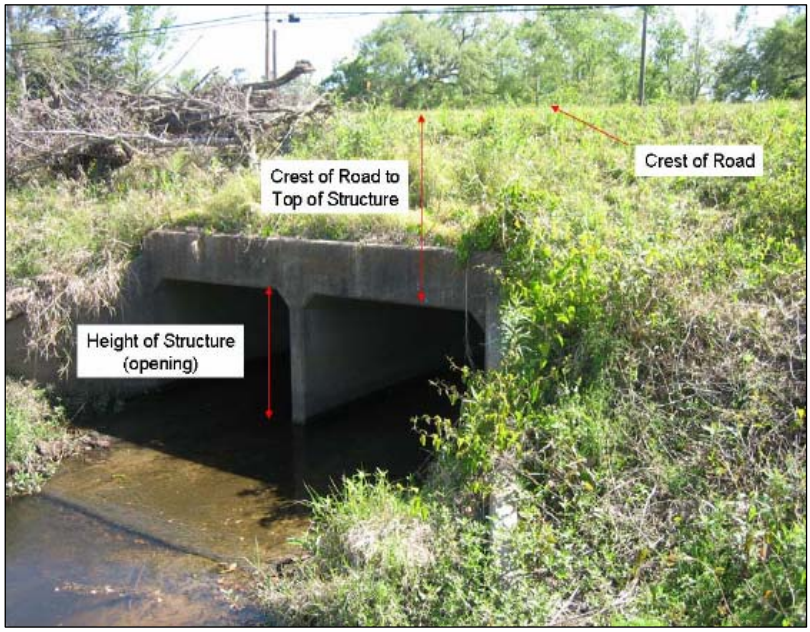


Figure 2-9. A drainage structure.

Table 2-3. Stream Order and Assisted Depths

Stream Order	Depth (m)
1st	2
2nd	3
3rd	5
4th	6
5th	8
6th	10

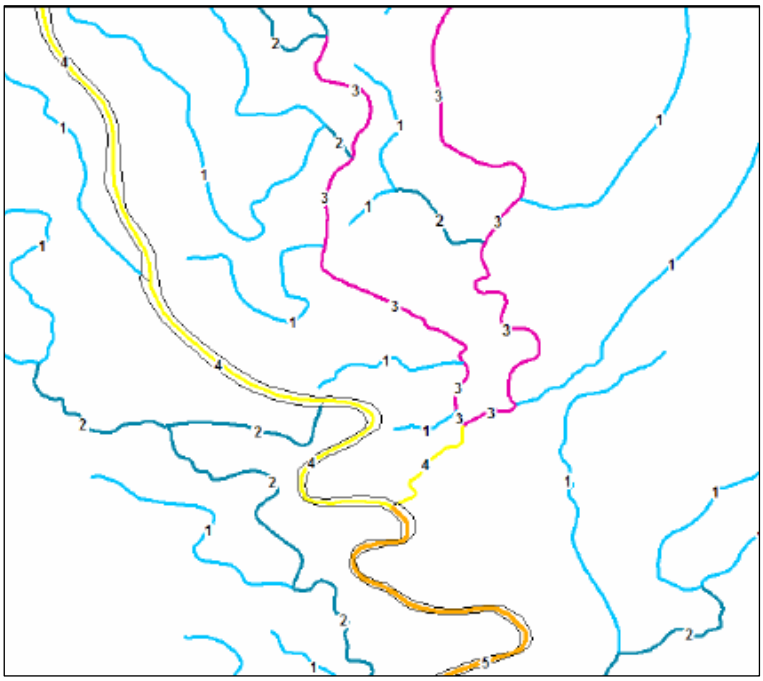


Figure 2-10. Example of Strahler's Stream Order System in Hancock County.

2.3 UNIVERSITY OF NOTRE DAME COORDINATION AND SUPPORT

After completion of the grid, both tides-only and storm-surge runs were tested on this initial Mississippi grid. The grid experienced stability problems in several areas. Small tests were done to change the element and node configuration and smooth the bathymetric/topographic data transitions. Still, problems remained. The URS grid was provided to the research group led by Dr. Joannes Westerink at UND. This group combined the details in the Mississippi area into the grid they were using for similar work with USACE in Louisiana. They then made changes in the Mississippi grid by eliminating unimportant road networks that were near grade (less than 1.5 feet) and changing these areas to gridded elements. The resolution along the barrier islands was increased to a nearly constant 100-meter element network. The resulting grid contained over 2.13 million nodes. This also included a highly resolved section of southwestern Louisiana and Texas which was deleted by Ayres Associates and the URS modeling team as explained in Section 2.2.3.4. The resulting grid (See Figure 2.11) was now reduced to 900,450 nodes, still a large number, but more manageable than the previous 2.13 million. After extensive tests with both tides-only ADCIRC model runs and storm surge runs with tides, winds, and radiation stress forcing, no instabilities occurred, and this grid version (MS11g) was used for the rest of the study.

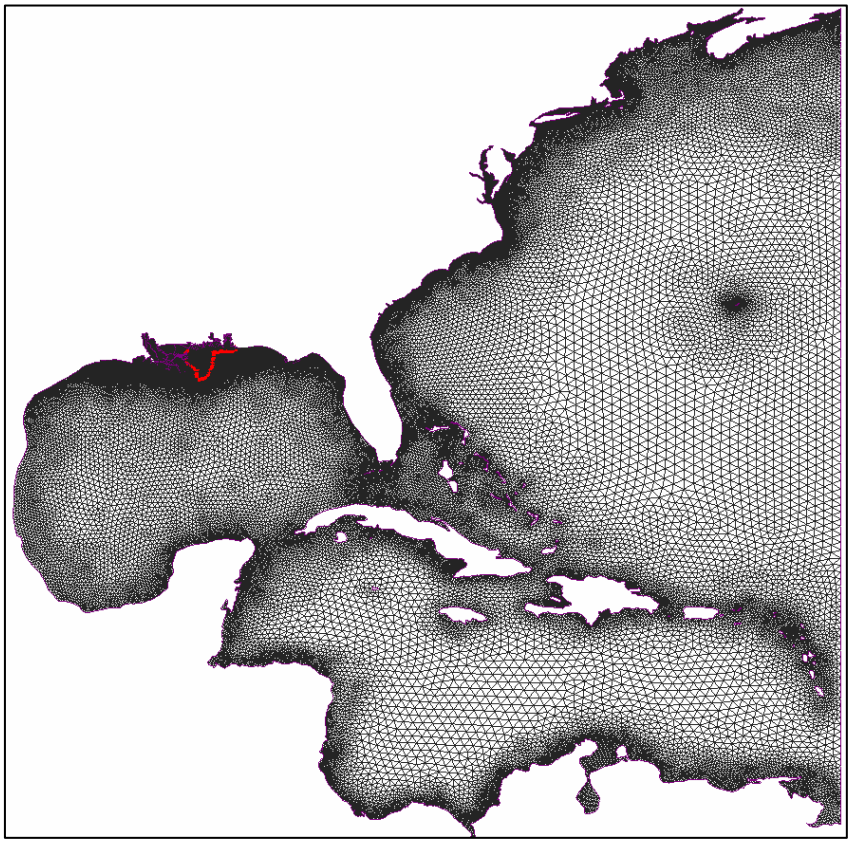


Figure 2-11. Image of the entire node and element configuration for the final URS grid. The patch area (shown in Figure 2-11) is shown with a red boundary line in this figure.

2.4 PARAMETERIZATION

The ADCIRC grid is also used to define frictional characteristics of the land and water. Standard hydraulic and meteorlogic parameters that describe frictional resistance to water and wind must be defined on the same spatial scale as the grid nodes to model hurricane storm surge. The following sections summarize how frictional characteristics are defined in the MS ADCIRC grid. The technique is very robust, and details of the formulation and methodology are presented in a separate project report titled *Summary of Work Performed by Ayres Associates in Support of the URS Storm Surge Modeling for FEMA.*

2.4.1 Manning's-n

Manning's-n is an isotropic scalar parameterization used to approximate resistance to flow from a variety of physical mechanisms, including form drag and skin friction. For the depth-averaged ADCIRC model, the Manning-n value should correlate to the roughness of the land use type at the spatial scale of the computed flow. There is a substantial body of literature with accepted ranges of Manning-n values for many classes of land use. The final values used for this study to characterize the bottom friction in Mississippi are shown in Table 2-4. These representative

Manning-n values are all within the expected range of values for their land use categories according to standard hydraulic texts.

The source of the land use data was the National Land Cover Dataset (NLCD). These land uses were converted to a corresponding value of the Manning's-n parameter for every land grid point of the ADCIRC grid.

Table 2-4. Manning's-n Assignment

CLASS	Man-n	Description
1	0.06	agriculture
2	0.025	fresh Water
3	0.045	aquaculture
4	0.025	estuarine Water
6	0.035	farmed wetlands
7	0.05	estuarine emergent
8	0.06	estuarine woody
9	0.055	palustrine emergent
10	0.14	bottomland hardwood
11	0.06	riverine swamp
12	0.16	pine savannah
13	0.07	fresh water (shrub/scrub)
14	0.03	palustrine non-vegetated
15	0.032	transportation
16	0.15	high density urban
24	0.025	urban fresh water
25	0.04	wet soil
26	0.18	urban pine
27	0.16	urban hardwood
28	0.07	urban low herbaceous
29	0.035	urban grassy pasture
30	0.12	bare urban I
31	0.12	bare urban II
32	0.036	clear cuts
50	0.16	low density pine
51	0.18	medium density pine
52	0.2	high density pine
53	0.15	medium density hardwood
54	0.17	high density hardwood
55	0.16	mixed forest
56	0.052	recent harvest
57	0.18	cypress/tupelo
60	0.06	agriculture
61	0.042	grassy pasture
62	0.047	low herbaceous vegetation
63	0.08	evergreen shrub
71	0.045	wetland
80	0.03	bare
81	0.03	sand bar/beach

2.4.2 Surface Directional Wind Effective Roughness Length

The wind boundary layer depends on the roughness conditions upwind of the location. This upwind effect is particularly important in the nearshore region, where winds are traveling either offshore or onshore and transitioning to or from open marine conditions. Accurate winds are critical in these near-shore and low-lying overland regions that experience either drawdown or flooding. The wind stress term in the shallow water equations is inversely proportional to total water column height, and thus the sensitivity to the wind forcing is great. To account for directionality in the upwind parameters, the compass is divided into 12 equal, 30-degree slices, and the roughness length value is computed for each of the 12 upwind directions around an ADCIRC node. Land use data average over a 10-kilometer length upwind at each of the grid nodes in each of the 12 directions was used to specify the coefficient.

2.4.3 Surface Canopy Coefficient

Roughness length scales, as described earlier, are correlated to the height of roughness elements and indicate the amount of shielding from the wind to the water column that will be provided. There are large-scale features, such as heavy forest canopies, that shelter the water surface from the wind stress by transferring little or no momentum flux to the water column. Therefore, in heavily canopied regions where U.S. Geological Survey (USGS) land use maps define a roughness length greater than 0.39 (except for urban areas), no wind stress is applied at the water surface.

2.4.4 Sea Surface Height above the Geoid

The sea surface height above the geoid was used to simulate a steric effect where water levels in sea are higher in warm seasons due to thermal expansion. The ADCIRC model creates an initial offset of the sea surface from the geoid. A steric offset of 0.3658 meters has been widely used in many studies to account for the expansion of warmer Gulf of Mexico waters in September (Westerink et. al 2006) This offset was used as a starting sea level for the calibration and production runs.

2.4.5 Numerical Parameter (τ_0)

In ADCIRC, the τ_0 parameter controls the dispersion properties of the solution, and its optimal selection avoids a folded dispersion curve and optimizes phase propagation properties. Extensive numerical experimentation and comparisons to the functionally equivalent Finite Element solution provide guidance in the specification of the τ_0 parameter.

The friction term increases as depth decreases and a higher τ_0 is required in shallow, nearshore regions (generally less than 30 feet deep); a smaller value is more appropriate in deep basins.

τ_0 = 0.005 in quiescent waters deeper than 30 feet outside of Southern Louisiana and Mississippi
τ_0 = 0.02 in waters shallower than 30 feet outside of Southern Louisiana and Mississippi

τ_0 = 0.03 in waters shallower than 30 feet or in rivers and inlets where higher velocities lead to higher frictional resistance within Southern Louisiana and Mississippi.

Operationally, we have accommodated spatially variable τ_0 with the following criteria described in the project report *Summary of Work Performed by Ayres Associates in Support of the URS Storm Surge Modeling for FEMA.*

A graphical depiction of the model cells and grid system covering the region-wide study area is attached, and includes annotations of barrier islands, road networks, streams/rivers, and land/water boundaries for the grid system. The grid topography and bathymetry are color coded to define grid elevations. The specific information for each grid cell is included in the digital fort input files for ADCIRC. Figure 3-1 shows the MS11g ADCIRC grid in Mississippi covering three coastal counties, whereas Figures 3-2, 3-3, and 3-5, are the sections of the grid in Bay St. Louis, Biloxi Bay, and Pascagoula Bay, respectively.

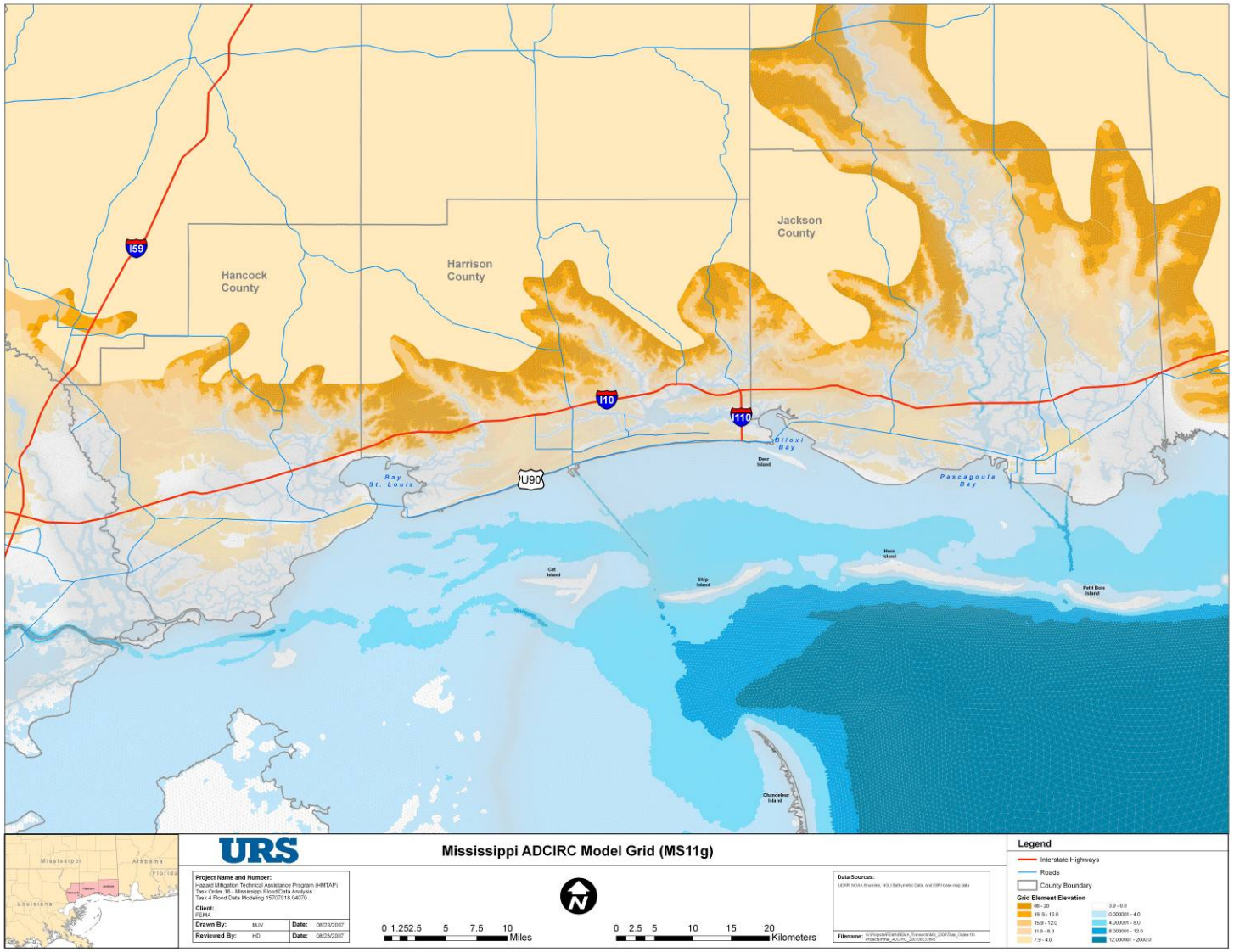


Figure 3-1. MS11g ADCIRC Grid

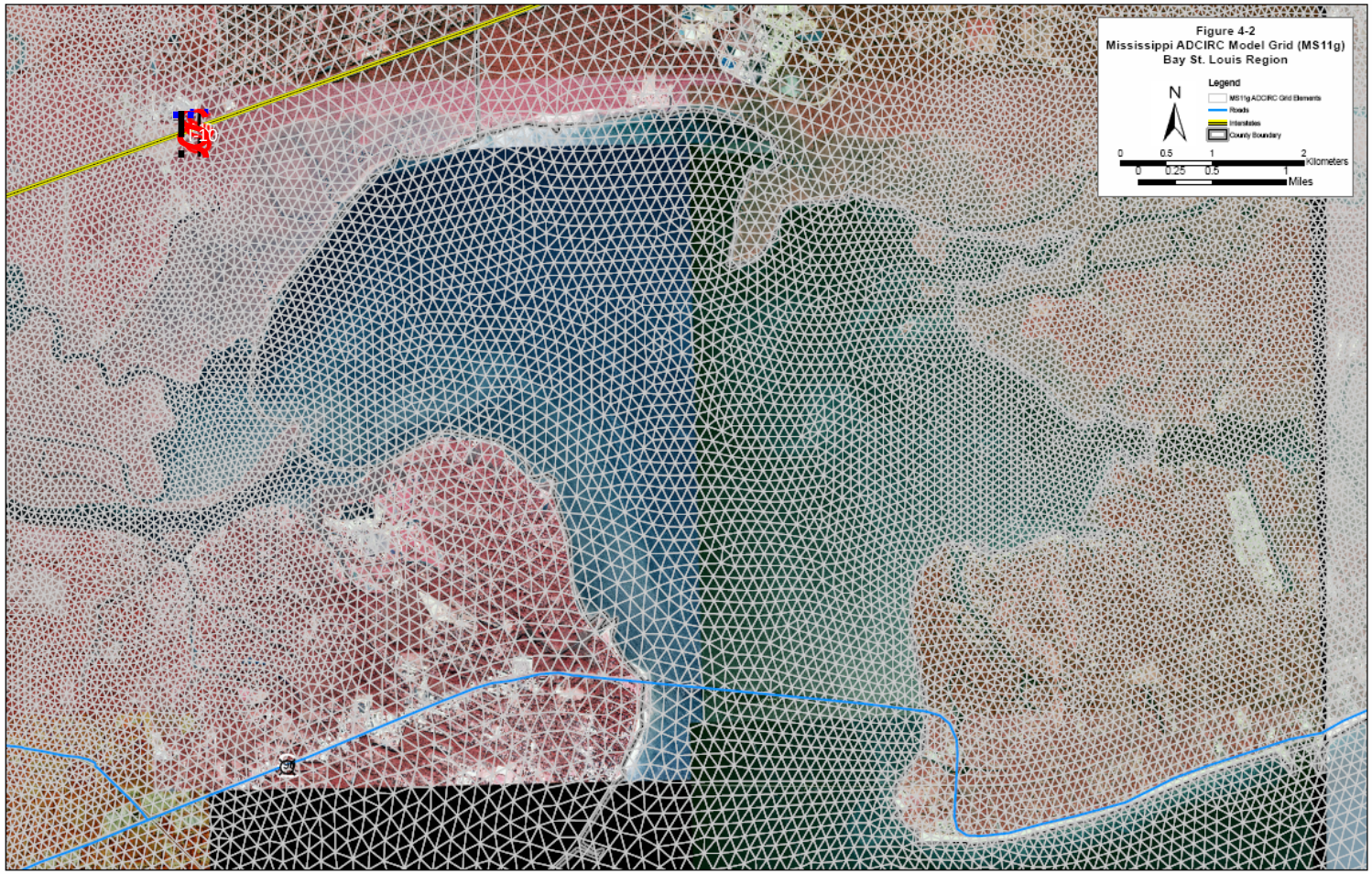


Figure 3-2. Display of MS11g ADCIRC Grid (Bay St. Louis).

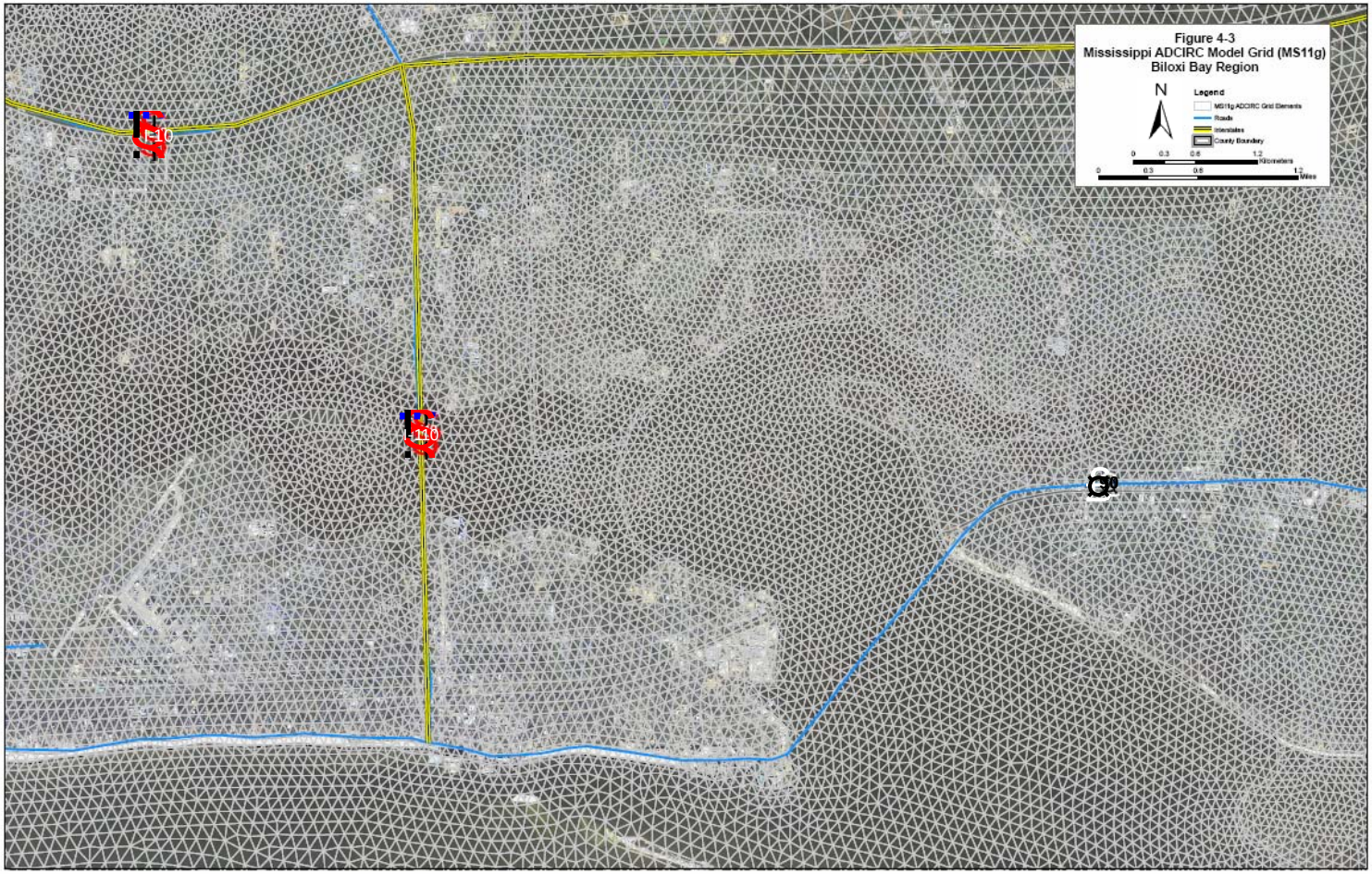


Figure 3-3. Display of MS11g ADCIRC Grid (Biloxi Bay).

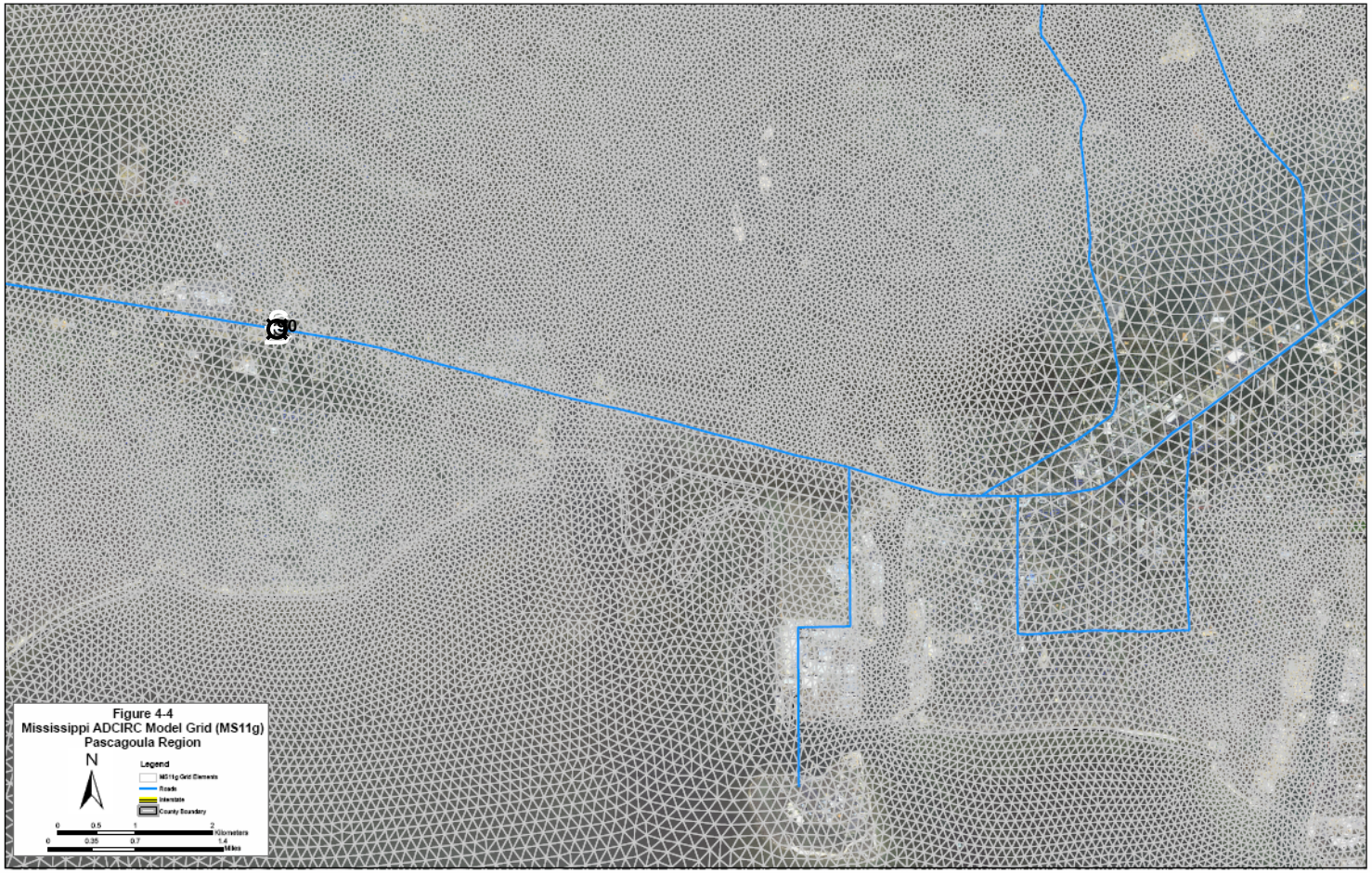


Figure 3-4. Display of MS11g ADCIRC Grid (Pascagoula Bay).

The ADCIRC Grid Development work included an extensive Quality Assurance/Quality Control (QA/QC) process. The QA/QC process involved checking each grid section against bathymetric and topographic datasets for accuracy, and then assessing whether the features represented in each grid section met established criteria. Issues identified during the QA/QC process were documented on a QA/QC form, developed specifically for this work, and submitted to the grid developer for resolution. The grid was then rechecked to confirm that the issue had been resolved. A sample QA/QC form is shown in Figure 4.1. In this example, a reviewer identified irregular channel bathymetry in a section of the grid and passed his written comments to the respective member of the grid development team. The grid developer then revisited the portion of the grid of concern. Both the reviewer and the grid developer signed the QA/QC form to document the issue and its resolution. This procedure was maintained throughout the grid development phase. Prior to hydraulic modeling, several issues as highlighted in the attached QA/QC forms were resolved, and there were no systematic trends of anomalies. Copies of all QA/QC forms are attached in Appendix A, and working documents are attached in Appendix B.

REVIEW COMMENT FORM URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 6b Topo (72081 Elements/38917 Nodes)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 17, 2006 COMMENTS DUE DATE: April 19, 2006 RETURN COMMENTS TO: Mike Seering

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: RD ORGANIZATION: ☒ URS ☐ Client ☐ FEMA/NSP ☐ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE ORIGINATOR Sign & Date 4/19/2006 REVIEWER Sign & Date 4/20/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Node Elevation	Check elevation around boundary node 20103. Sharp changes from adjacent nodes	C	Scatter data was extrapolated north to cover this node and other nodes with no bounding scatter data.	
2	Weir	Change the element configuration around node #22498, 25051. Make weir arrangement to extend towards boundary. DON'T merge the weir pair to the existing one.	C	These no flow areas were changed to weirs with new adjacent elements.	
3	Road/Levee	Merge two nodestrings around node 34821. The meshed region is too small to consider two roads separately. Make a wide No flow boundary (Wide weir)	C	This small area of mesh was deleted.	

INITIAL DISPOSITION CODES: C = Will Comply D = Delete Comment F = Further Clarify FINAL DISPOSITION CODES: C D Ver: Incorporation of C (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

Figure 4-1. Example QA/QC form.

The gridding process introduces distortions to the topography related to the size of each grid cell. With ADCIRC, it was necessary to introduce additional adjustments to the shape of flow-ways, channels, and streams to avoid numerical instabilities. For this reason, small topographic features required distortions of their elevations. As explained earlier, small streams were

widened with the specified criteria (Re: Section 2.2.3.1). Along the shoreline, these adjustments distorted the detailed geography. Some low areas with numerous tidal channels or dug canals could not be resolved and were treated by combining the overall effect of the waterway and the adjacent low land. These arrangements significantly enhanced the stability of the hydrodynamic model. Figures 4.2a and 4.2b show the effect of such widening in a small subdivision in Hancock County, where the actual land elevation was reduced due to widening of three small creeks. The average land elevation in that subdivision was 1.0-2.0 meters above sea level. However, in the process of widening the channels, land elevation in that section was altered to 0.0.0-0.3 meters below sea level. Other geographic distortions near the shoreline resulted from the spanning of small features by the grid nodes. These were checked to ensure that the fundamental hydraulic processes were not significantly distorted. It was considered acceptable for the grid to fail to delineate these small features.

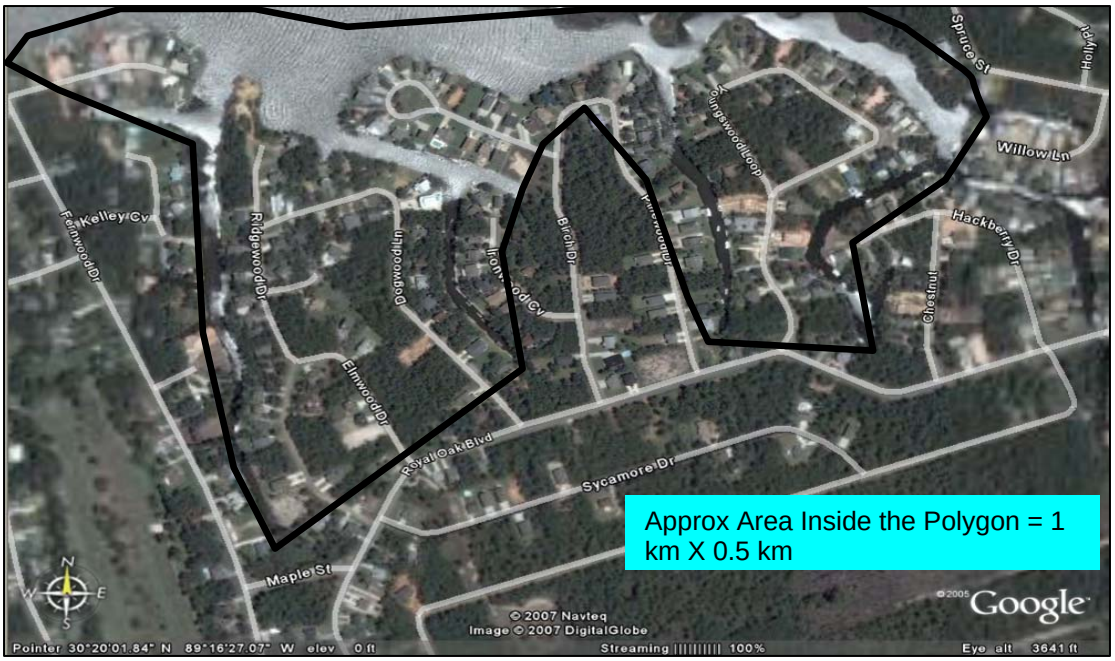


Figure 4-2a. Aerial Photograph indicating the location of the subdivision and channel network in Hancock County.

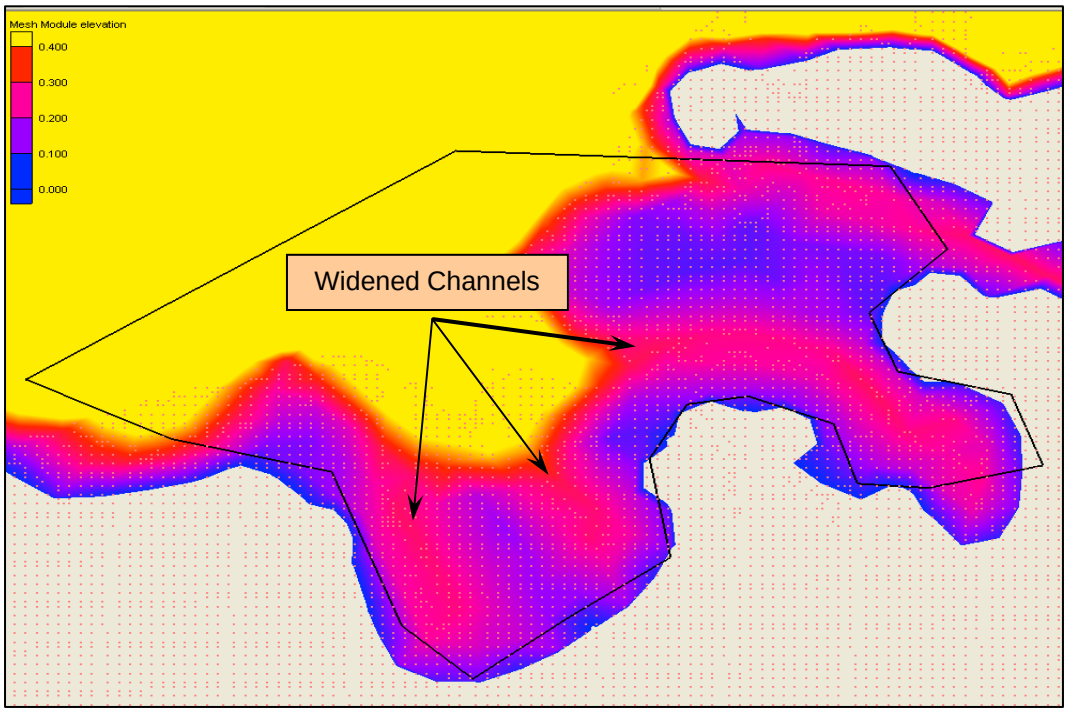


Figure 4-2b. ADCIRC bathymetry with lidar data in the same area.

As part of our QA/QC procedures, it was discovered that the 187-acre Singing River Island in the Mississippi Sound south of Pascagoula (Figure 4.3) did not match the best available topographic data. This island has a maximum elevation of +3 meters, but it was originally specified in our model grid as a low sand shoal at a 0-meter elevation. This discovery was made in the production phase as the modeling neared completion. An investigation was conducted to determine whether the flood hazard analysis needed adjustment. Nineteen of the synthetic storm events affect the island. Figure 4.4 shows the trackline of these storms. The original grid was modified to reflect the island's actual elevation. Nineteen storms were simulated over both the original and modified grids. Analysis of the results shows that the difference in surge height on the Singing River Island, due to its modified land elevation, does not exceed 10 centimeters (Figure 4.5).

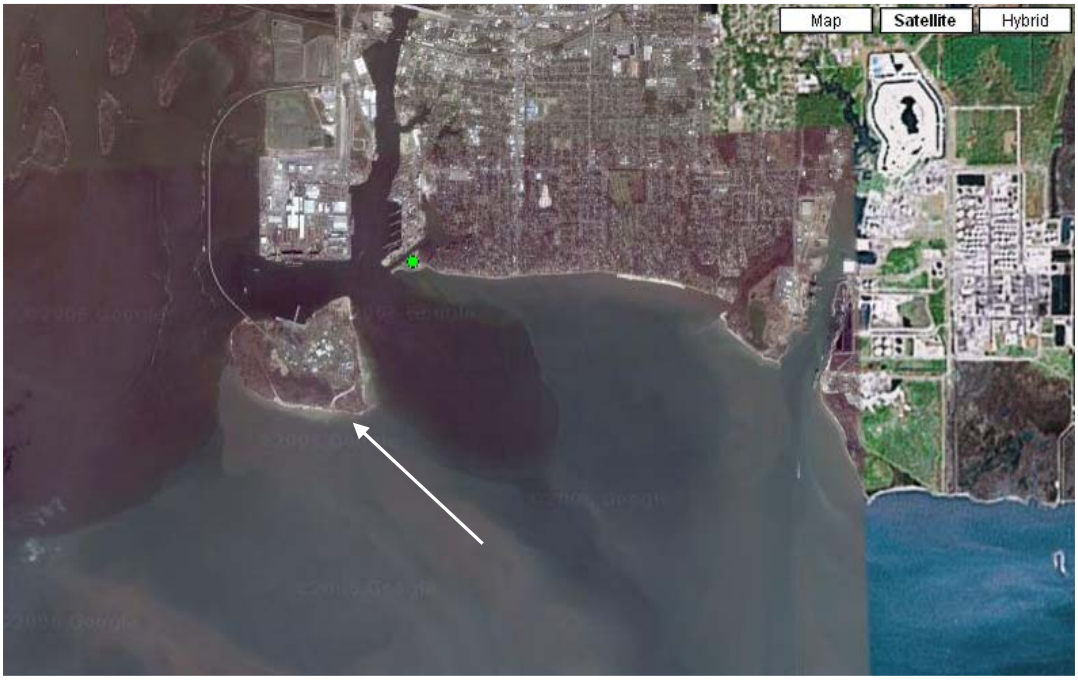


Figure 4-3. Singing River Island in the Pascagoula Bay Area.

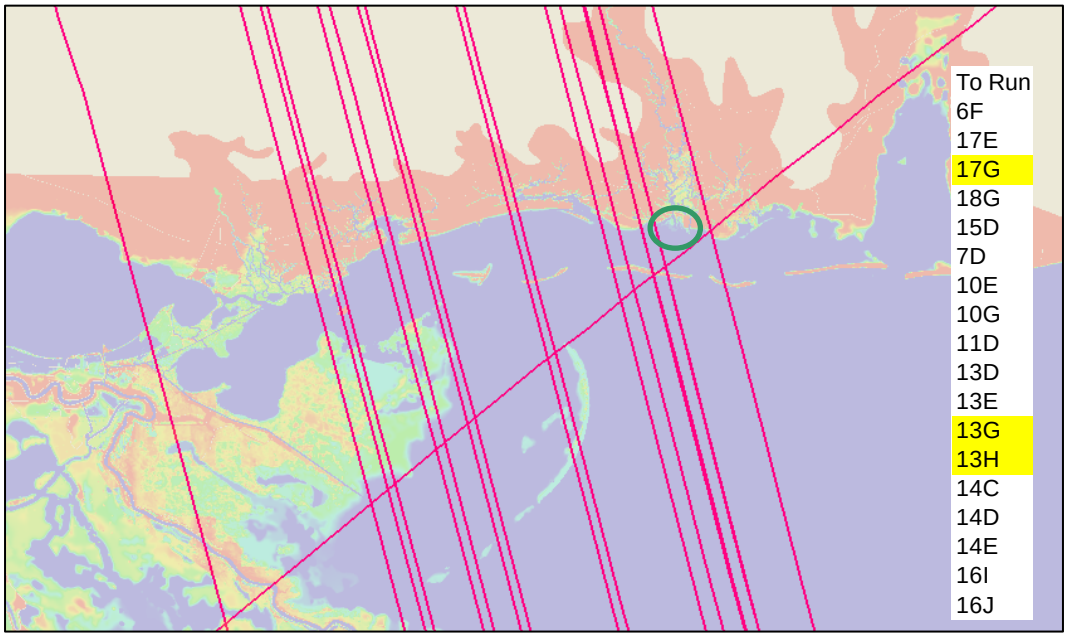


Figure 4-4. Storm tracklines potentially affecting Singing River Island.

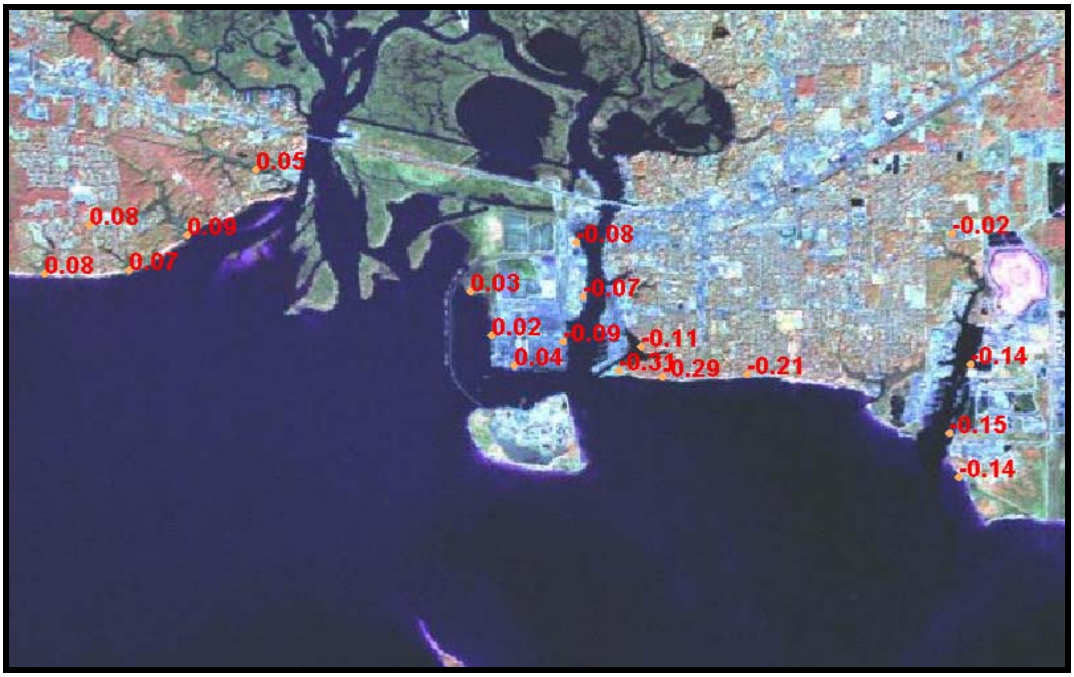


Figure 4-5. Storm surge difference in maximum water surface elevation (feet) around Singing River Island.

Westerink, J.J., R.A. Luettich, Jessee C. Feyen, J. Atkinson, Clint Dawson, M. Powel, J. Dunion, H. Roberts, E. Kubatko, Hassan Pourtaheri, 2006, "A Basin to Channel Scale Unstructured Grid Hurricane Storm Surge Model Applied to Southern Louisiana," *Monthly Weather Review*.

Appendix A

QA/QC Forms

REVIEW COMMENT FORM

URS

ORIGINATOR			
CLIENT: FEMA Region IV	PROJECT NUMBER: 15707018	PROJECT NAME HMTAP Coastal Analysis for Mississippi	
DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 6b Topo (72081 Elements/38917 Nodes)			
REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP			
DATE: April 17, 2006	COMMENTS DUE DATE: April 19, 2006	RETURN COMMENTS TO: Mike Seering	
RESOLUTION MEETING DATE AND TIME:		RESOLUTION MEETING LOCATION: Tallahassee Office	
APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:			

REVIEWER: HD	ORGANIZATION: ☒ URS ☐ Client ☐ FEMA/NSP ☐ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 4/19/2006

REVIEWER Sign & Date 4/20/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Node Elevation	Check elevation around boundary node 20103. Sharp changes from adjacent nodes	C	Scatter data was extrapolated north to cover this node and other nodes with no bounding scatter data.	
2	Weir	Change the element configuration around node #22498, 25051. Make weir arrangement to extend towards boundary. DON'T merge the weir pair to the existing one.	C	These no flow areas were changed to weirs with new adjacent elements.	
3	Road/Levee	Merge two nodestrings around node 34821. The meshed region is too small to consider two roads separately. Make a wide No flow boundary (Wide weir)	C	This small area of mesh was deleted.	

INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Delete Comment **F** = Further Clarify

FINAL DISPOSITION CODES: C D

Ver: Incorporation of **C** (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 1 Bathymetry

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: March 17, 2006 COMMENTS DUE DATE: March 22, 2006 RETURN COMMENTS TO: Nicole Bailey

RESOLUTION MEETING DATE AND TIME: March 20, 2006 4:30 pm RESOLUTION MEETING LOCATION: URS Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: HD ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date Nicole Bailey 3/23/06

REVIEWER Sign & Date 04/17/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Mesh quality	Node 7475 is a 41 m element side…element size violation.	C	Will fix element side length.	
2	Mesh quality	Offshore islands should not have a grid. Long linear island can later be converted to weirs.	C	Will remove grid from offshore island.	
3	Mesh quality	There is a sharp change in nodal elevation at Nodes 1492 and 1493. Avoid sharp changes in nodal elevation. Correct these node elevations.	C	Will correct node elevation.	
4	Mesh quality	Some element sides around node7474 are <60m in length. Also transition from small to large elements is abrupt. Please correct that section.	C	Element transitions and side lengths will be corrected.	
5	Mesh quality	Area around node 5151has element sizes <60m in length. Please correct these.	C	Will fix angle.	
6	Mesh quality	Check AR3.txt file from Processor.exe and correct everything less than 60m.	C	Will run updated Processor.exe file and correct all elements.	

INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Delete Comment **F** = Further Clarify

FINAL DISPOSITION CODES: **C** **D** **Ver:** Incorporation of **C** (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 2 Bathymetry

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: March 17, 2006 COMMENTS DUE DATE: March 22, 2006 RETURN COMMENTS TO: Bud Brock

RESOLUTION MEETING DATE AND TIME: March 20, 2006 4:30 pm RESOLUTION MEETING LOCATION: URS Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: Jeff Gangai ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 3-28-06

REVIEWER Sign & Date 3/28/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Mesh quality	Element 41 has interior angle violation.	C	Will fix angle.	JG
2	Mesh quality	Elements 12430 and 12431 have interior angle violations.	C	Will fix angles.	JG
3	Mesh quality	Elements 8429 and 8504 have interior angle violations.	C	Will fix angles.	JG
4	Mesh quality	Element 13300 has interior angle violation.	C	Will fix angle.	JG
5	Mesh quality	Element 12768 has interior angle violation.	C	Will fix angle.	JG
6	Island	Offshore island near southern boundary may need better refinement due to steep slopes.	C	Grid will be removed and remaining grid will be better refined.	JG
7	Rivers	Some of the river channels up in the East Pascagoula River can be defined better near end of mesh.	C	Channels will be better defined.	JG
8	Missing Scatter	Need to add some scatter points where missing in side pools of river (around element 11543).	C	Will add scatter points in side pools.	JG
9	Channels	Need to define river depth better around element 8644.	C	Will better define river depth at that location.	JG
10	Deep Nodes	Nodes 3219 and 4026 are deep holes. Change elevation to match surrounding nodes.	C	Will fix elevations to remove holes.	JG

No.	Reference	Comment	Disp.	Response	Ver.
11	Island & channels	Need to define the channel and island better around node 3040.	C	Channel and island will be better defined.	JG
12	Channel	Switch element side between nodes 699 and 700.	C	Will switch element side at that location.	JG
13	Islands	Islands at mouth of Pascagoula River will need to be better defined.	C	Islands will be better defined.	JG
14	Channels	By-pass channel near mouth of Pascagoula River needs better definition.	C	Channel will be better defined.	JG
15	Lake	In lake along by-pass, nodes around 4760 look low in elevation.	C	Will fix elevations at that location.	JG
16	Channels	Channel around nodes 4882 and 5551 needs to be better defined.	C	Channel will be better defined at those locations.	JG
17	Island	Navy Island just offshore needs to be no grid or need to find topo.	C	Grid will be removed from island.	JG
18					
19					
20					

INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Delete Comment **F** = Further Clarify

FINAL DISPOSITION CODES: **C** **D**

Ver: Incorporation of **C** (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR			
CLIENT: FEMA Region IV	PROJECT NUMBER: 15707018	PROJECT NAME HMTAP Coastal Analysis for Mississippi	
DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 3 Bathymetry (17052 Elements)			
REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP			
DATE: March 17, 2006	COMMENTS DUE DATE: March 22, 2006	RETURN COMMENTS TO: Elena Drei-Horgan	
RESOLUTION MEETING DATE AND TIME: March 22, 2006		RESOLUTION MEETING LOCATION: URS, Tallahassee Office, FL	
APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:			

REVIEWER: Jeff Gangai	ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date: Elena Drei-Horgan 3/22/06

REVIEWER Sign & Date: Jeffrey Gangai 3/22/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Eastern Channel	The mouth of stream to the east has a channel that is too wide	C	Scatter data adjusted along channel and banks	JG
2	Sharp point	Add another element north of node 4549	C	Added element	JG
3	Island channel	Define channel between islands in Biloxi bay on west end of mesh	C	Defined channel and adjusted mesh	JG
4	Deep channel	Deep channel by bridge in Biloxi Bay gets cut off. Place nodes in channel	C	Placed nodes and adjusted mesh	JG

INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Delete Comment **F** = Further Clarify

FINAL DISPOSITION CODES: **C** **D** **Ver:** Incorporation of **C** (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 4 Bathymetry (15766 elements)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: March 17, 2006 COMMENTS DUE DATE: March 22, 2006 RETURN COMMENTS TO: Amelia Vincent

RESOLUTION MEETING DATE AND TIME: March 20, 2006 4:30 pm RESOLUTION MEETING LOCATION: URS Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: Jeff Gangai ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date Amelia Vincent 3/24/06

REVIEWER Sign & Date Jeffrey Dangai 3/24/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Offshore Islands	The ends of the islands should not come to a point. Could cause instability.	C	Squared off ends of islands.	JG
2	Node elevations	Node #635 elevation should not be zero.	C	Elevation of node 635 was changed to -2.91 meters to match underlying scatter data.	JG
3	Islands	Islands in Biloxi Bay need better definition.	C	Islands will be better defined once new LIDAR data is available.	JG
4	Shoreline	Revise grid to follow shoreline better in Biloxi Bay.	C	Boundary of mesh grid was edited/moved to follow shoreline better.	JG

INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Delete Comment **F** = Further Clarify

FINAL DISPOSITION CODES: **C** **D** **Ver:** Incorporation of **C** (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 6 Bathymetry (17052 Elements)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: March 17, 2006 COMMENTS DUE DATE: March 22, 2006 RETURN COMMENTS TO: Rigel Rucker

RESOLUTION MEETING DATE AND TIME: March 23, 2006 RESOLUTION MEETING LOCATION: Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: HD ORGANIZATION: ☒ URS ☐ Client ☐ FEMA/NSP ☐ _____

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date Rigel R. 3/28/06

REVIEWER Sign & Date 03/28/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Node ID # 1420	Hot Spot? Please smooth the bathymetry.	C	Will raise elevation to correspond with surrounding area.	✓
2	Channels	Bathymetric adjustment where channel was artificially widened.	C	Will adjust elevations where channel was widened.	✓
3	Channels	Node elevations along channel should be modified. Channel did not show up properly.	C	Will modify bank stations to reflect surrounding topography.	✓
4	Islands	Offshore island -> Remove mesh on large island	C	Large island will be removed and left as a void in the mesh.	✓
5	Element 16990	Element approximately 68m.	D	Element sides can be a minimum of 40m	N/A

INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Delete Comment **F** = Further Clarify

FINAL DISPOSITION CODES: **C** **D** **Ver:** Incorporation of **C** (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR			
CLIENT: FEMA Region IV	PROJECT NUMBER: 15707018	PROJECT NAME HMTAP Coastal Analysis for Mississippi	
DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 5 (# of elements = 10376)			
REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP			
DATE: March 17, 2006	COMMENTS DUE DATE: March 22, 2006	RETURN COMMENTS TO: Mike Seering	
RESOLUTION MEETING DATE AND TIME:		RESOLUTION MEETING LOCATION:	
APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:			

REVIEWER: HD

ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☐ _____

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date: 4/17/06

REVIEWER Sign & Date: 04/17/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1.		Approach channels are not well represented. Change nodal elevations (Manual changes) so that channels are identified. Mainly there are 3 such channels along Northern grid domain.	C	Manually defined 3 channels by selecting a string of nodes along streamline, and assigning each node ~~an elevation~~ the lowest elevation of a nearby Scatter Data Point.	
2.		ADCIRC bathymetry should be reversed. (+ means water). You can alter this bathymetry later.	C	DONE	

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FINAL DISPOSITION CODES: C D

Ver: Incorporation of C (Initials)

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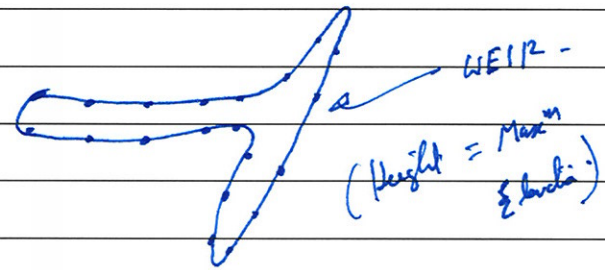
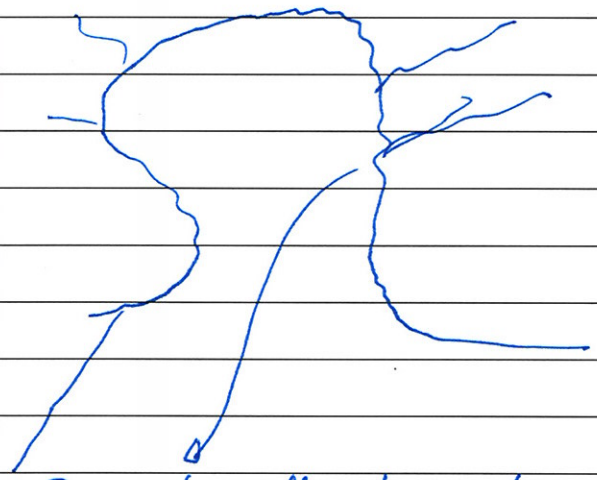
No.	Reference	Comment	Disp.	Response	Ver.
3.		Offshore barrier island : Have to find some way to represent as weir. We will discuss about that.	C	Placed 2 Weirs as Island Barriers, left 4 triange sides as no-flow due to island geometry.	
					
4.				// Have to check after TOPO Grid in caflek. //	
		(*) Check the spacing often combined with Topographic grid. (can address later after the tidal calibration)			

INITIAL DISPOSITION CODES: C = Will Comply D = Delete Comment F = Further Clarify

FINAL DISPOSITION CODES: C D

Ver: Incorporation of C (Initials)

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 7 & 8 (# of elements = 36470)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: March 17, 2006 COMMENTS DUE DATE: March 22, 2006 RETURN COMMENTS TO: Darren Rose

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION:

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: HD ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☐

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 4-17-06

REVIEWER Sign & Date 04/17/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1.		Re-Interpolate to bathymetric data. ( )		Done.	✓
2.		Check HOT-SPOTS (Sudden change in bathymetry) eg. Node # 5109, 776.		Fixed 0-Z-values along boundary.	✓
3.		Change sign of grid elevation. It can be done after combining the grid.			

INITIAL DISPOSITION CODES: C = Will Comply D = Delete Comment F = Further Clarify

FINAL DISPOSITION CODES: C D Ver: Incorporation of C (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 1A Topo (22,038 Elements\12,168 Nodes)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 19, 2006 COMMENTS DUE DATE: April 20, 2006 RETURN COMMENTS TO: Amelia Vincent

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: URS Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: Jeff Gangai ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date Amelia Vincent 4/20/06

REVIEWER Sign & Date Jeffrey Gangai 4/20/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	All Node strings	Combine all the node strings that are along the same stretch of road.	C	Merged all node strings along same stretch of road	JG
2					
3					
4					

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REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 1B Topo (Elements 23328/Nodes 12573)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 18, 2006 COMMENTS DUE DATE: April 18, 2006 RETURN COMMENTS TO: Nicole Bailey

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: URS Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: Jeff Gangai ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date Nicole Bailey 4/19/06 REVIEWER Sign & Date Jeffrey A Gangai 4/19/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	High elevation	Node 8530 has a large elevation compared to surrounding nodes.		Will adjust elevation of node 8530.	JG
2	Low elevation	Node 10316 has a low elevation compared to surrounding nodes		Will adjust elevation of node 10316.	JG
3	Stream/Road crossing	Drop the elevations of nodes 6400 and 11224 to match the stream.		Will adjust elevations of nodes 6400 and 11224.	JG
4	Stream/Road crossing	Drop the elevations of nodes 11093 and 8015 to match the stream.		Will adjust elevations of nodes 11093 and 8015.	JG
5	All Node strings	Combine all the node strings that are along the same stretch of road.		Will combine node strings.	JG

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CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

REVIEW COMMENT FORM

URS

ORIGINATOR			
CLIENT: FEMA Region IV	PROJECT NUMBER: 15707018	PROJECT NAME HMTAP Coastal Analysis for Mississippi	
DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 2 Topo (104704 Elements/ 56917 Nodes)			
REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP			
DATE: April 20, 2006	COMMENTS DUE DATE: April 21, 2006	RETURN COMMENTS TO: Elena Drei-Horgan	
RESOLUTION MEETING DATE AND TIME:		RESOLUTION MEETING LOCATION: URS, Tallahassee Office, FL	
APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:			

REVIEWER: Jeff Gangai	ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE	ORIGINATOR Sign & Date	Elena Drei-Horgan 4/21/06	REVIEWER Sign & Date	Jeffrey Gangai 4/21/06

PROJECT MANAGER/ PRINCIPLE-IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Rivers at Coastline	Check Bathy elevations where rivers come to coastline, merge River elevation to match Bathy.	C	Adjusted river elevations in order to match bathy.	JG
2	Stream Intersection	Lower node elevation at node #14341 so that the two streams merge.	C	Lowered elevation along the stream at -2.5 m.	JG
3	Stream intersection with bathy	The stream around Node 23042 should merge into the channel from the bathy around -3 meters	C	Adjusted elevation in order to match the -3m at the bathy.	JG
4	Mesh Quality	Area element change quality need to be fixed around node #25068	C	Fixed mesh quality by adding one node.	JG
5	Stream cuts	Fix breaks in stream node #11989 and 11783 and 12160 and 11688	C	Elevations along stream were adjusted to remove breaks.	JG
6	Ground cut	Swap the edge between node 37429 and37500 so that the high ground does not cross low point.	C	Swap edge between the two nodes.	JG
7	All Node strings	Combine all the node strings that are along the same stretch of road.	C	Merge node strings	JG
8	Node Strings	Remove the node strings on the bridges	C	Removed node strings at bridges.	

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REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region George County Topo (12735 Elements/6518 Nodes)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 19, 2006 COMMENTS DUE DATE: April 20, 2006 RETURN COMMENTS TO: Rigel Rucker

RESOLUTION MEETING DATE AND TIME: April 19, 2006 RESOLUTION MEETING LOCATION: Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: HD ORGANIZATION: ☒ URS ☐ Client ☐ FEMA/NSP ☐ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date Rigel Rucker 4/19/06

REVIEWER Sign & Date HD 04/20/06.

PROJECT MANAGER/ PRINCIPLE-IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Channel Depth	Verify with Kevin whether channel depth is in the order of 10m all through. It looks pretty high to me.	C	Verified with Kevin that depth should be order of 10m throughout. See attached e-mail.	HD
2	Road/Levee	There is a major road running across the Pascagoula river. Find a way to represent that road in the grid. May be a nodestring across will serve the purpose.	C	Mesh will be moved to better represent road location. Because no road data is available for this area, it is assumed that the road is elevated approximately 1m above highest adjacent ground. These elevations will be added in manually. It is also assumed that the portion of the road crossing the Pascagoula River and its surrounding area is a bridge and will not be represented by higher elevations. Documentation will be added for this area.	HD

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CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

From: Kevin Slover <kjslover@gmail.com>
To: Rigel_Rucker@urscorp.com

Date: Wednesday, April 19, 2006 04:42PM
Subject: Re: pescagula river

Are the depths at -10, or is there a 10m difference between the stream and the surrounding terrain? If b is true, then that is correc t...

Rigel_Rucker@URSCorp.com wrote:

> Hey Kevin,
>
> HD noticed that the Pescagula River in George County was 10 m deep throughout the entire county, and he wanted me to verify that this is correct. Let me know if this is right. Thanks.
>
> Rigel

This e-mail and any attachments are confidential. If you receive this message in error or are not the intended recipient, you should not retain, distribute, disclose or use any of this information and you should destroy the e-mail and any atta chments or copies.

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 3 Topo (Elements 75437/Nodes 41673)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 20, 2006 COMMENTS DUE DATE: April 21, 2006 RETURN COMMENTS TO: Kumiko Yamazaki

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: URS Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: HD ORGANIZATION: ☒ URS ☐ Client ☐ FEMA/NSP ☐ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 4/21/06

REVIEWER Sign & Date 4/21/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Element	Delete element around Node # 26219. You may need to readjust Nodestring. This will eliminate sharp angle	C	Deleted element and eliminated sharp angle.	
2	Boundary	Node #20388, You don't need to widen that since this will be the model boundary. Check similar adjustment in your domain (e.g., #21144, 5453)	C	Added element to fill in gap near the model boundary. Also extended nodestring. Fixed node #41679 as well.	
3	Node String	Delete single element representation of channels around Node #41456. This may lead instability. You will need to rearrange nodestring representation in that area. Check area near node #7885	C	Deleted elements and combined nodestrings.	
4	Sharp Element	Eliminate Node #29416. In that way, you can avoid sharp transition. Check other similar areas and adjust accordingly (e.g., Node #4100, #26219, #26301).	C	Deleted nodes and adjusted mesh in order to eliminate sharp transitions.	
5	Node String	Around node #13819, combine two nodestrings to one. These are close enough to treat as a single nodestring	C	Combined the 2 nodestring pairs by deleting the 2 inner nodestrings	
6	Elements	Elements around Node #38216 can be eliminated, BUT you can do that after merging with adjacent area.	C	Will delete elements once we merge grids.	

No.	Reference	Comment	Disp.	Response	Ver.
7	Bathymetry	Check with Kevin the bathymetric shift across Node #25573. Looks like high ground (~6 m difference) run parallel. Please check row data and data units if they are from different sources. We need to proof that from surveyed data.	C	Asked Kevin about the data and confirmed with Jeff – a small ridge does exist in the area.	

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 4 Topo (66736 Elements/36559 Nodes)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 15, 2006 COMMENTS DUE DATE: April 15, 2006 RETURN COMMENTS TO: Rigel Rucker

RESOLUTION MEETING DATE AND TIME: 4/17/2006 RESOLUTION MEETING LOCATION: Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: Jeff Gangai ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date Rigel R. 4/17/06

REVIEWER Sign & Date Jeffrey Gangai 4/17/06

PROJECT MANAGER/ PRINCIPLE-IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Stream cut	Swap the edge between node 12725 and12724 so that the two streams do not connect.	C	Element edge will be swapped and mesh quality will be checked.	JG
2	Node string	Combine the node strings into one divided between node # 30907 and 24799	C	Will combine all adjacent nodestrings.	JG
3	All Node strings	Combine all the node strings that are along the same stretch of road.	C	Will combine all adjacent nodestrings.	JG
4	Missing Element	Make an element above node 5029 to make mesh boundary smooth.	C	Will add an element.	JG

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REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 5 Topo (Elements 87895/Nodes 48033)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 18, 2006 COMMENTS DUE DATE: April 19, 2006 RETURN COMMENTS TO: Bud Brock

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: URS Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: Jeff Gangai ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 4-19-06

REVIEWER Sign & Date 4-19-06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Stream cut	Around Node # 42638 the stream gets cut off by high ground	C	Will adjust elevation	JG
2	Min interior Angle	Element #53109 needs to be adjusted. One of the Interior Angles is too small.	C	Will adjust element so angle meets the requirements.	JG
3	Node String	Stop node string at nodes 10669 and 10618	C	As discussed, will end node string one node into intersection.	JG
4	Node String	Stop node string at nodes 14513 and 15471	C	As discussed, will end node string one node into intersection.	JG
5	Node String	Stop node string at nodes 14621 and 13371	C	As discussed, will end node string one node into intersection.	JG
6	Node Strings	Stop all node stings along I10 before road intersections	C	As discussed, will end node string one node into intersection.	JG
7	Node Pairs	Node pairs along node string for road are misaligned around node #44104	C	Will align node pairs.	JG

REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 6A Topo (23592 Elements/12836 Nodes)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 21, 2006 COMMENTS DUE DATE: April 21, 2006 RETURN COMMENTS TO: Darren Rose

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: HD ORGANIZATION: ☒ URS ☐ Client ☐ FEMA/NSP ☐ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 4-21-06

REVIEWER Sign & Date 9/21/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Refine	Area around Node #3891 should be refined (2 elements). Readjust adjacent area so that you can populate 2 element across the gap	C	Bridge. Gap very small. Decided to remove bridge and connect road as weir, in mesh and map file. Also decreased elevation at nodes.	
2	Refine/Derefine	Area around Node #12155 should be reworked. Right now there are single elements across. Make a wide area across by deleting the elements. You may need to readjust the nodestrings.	C	Deleted elements and inside nodestrings to make larger weir in area.	
3	Bathymetry	Bathymetry around Node#9030 should be modified. It is part of a meandering river and depth should be corrected.	C	Increased depth in high ground between meanders of stream	

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REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region 6b Topo (72081 Elements/38917 Nodes)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 17, 2006 COMMENTS DUE DATE: April 19, 2006 RETURN COMMENTS TO: Mike Seering

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: HD ORGANIZATION: ☒ URS ☐ Client ☐ FEMA/NSP ☐ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 4/20/2006 REVIEWER Sign & Date 04/21/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Node Elevation	Check elevation around boundary node 20103. Sharp changes from adjacent nodes	C	Scatter data was extrapolated north to cover this node and other nodes with no bounding scatter data.	
2	Weir	Change the element configuration around node #22498, 25051. Make weir arrangement to extend towards boundary. DON'T merge the weir pair to the existing one.	C	These no flow areas were changed to weirs with new adjacent elements.	
3	Road/Levee	Merge two nodestrings around node 34821. The meshed region is too small to consider two roads separately. Make a wide No flow boundary (Wide weir)	C	This small area of mesh was deleted.	

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REVIEW COMMENT FORM

URS

ORIGINATOR

CLIENT: FEMA Region IV PROJECT NUMBER: 15707018 PROJECT NAME HMTAP Coastal Analysis for Mississippi

DOCUMENT BEING REVIEWED: Storm Surge ADCIRC Mesh Region LA Topo (16075 Elements/8867 Nodes)

REVIEW TYPE: ☒ Detailed Check ☐ ITR ☐ Client ☐ FEMA/NSP

DATE: April 17, 2006 COMMENTS DUE DATE: April 18, 2006 RETURN COMMENTS TO: Mike Seering

RESOLUTION MEETING DATE AND TIME: RESOLUTION MEETING LOCATION: Tallahassee Office

APPROPRIATE SECTION OF FEMA GUIDELINES AND SPECIFICATIONS:

REVIEWER: Jeff Gangai ORGANIZATION: ☐ URS ☐ Client ☐ FEMA/NSP ☒ Dewberry

RESOLUTION MEETING FINAL CONCURRENCE

ORIGINATOR Sign & Date 4/19/2006 REVIEWER Sign & Date Jeffrey Dangai 4/19/06

PROJECT MANAGER/ PRINCIPLE–IN-CHARGE/ DESIGNEE Sign & Date

No.	Reference	Comment	Disp.	Response	Ver.
1	Node Elevation	Check elevation at node 7328 and 7234	C	Scatter data extrapolated, by single value method, over the small gap in data to include these mesh nodes. Node 7095 (with current renumbering), is still a lower point, but is scatter verified.	JG
2	Road node spacing	The node spacing along road around node #7289 appears to be too dense for how close it is to western boundary.	C	Node spacing increased as road approaches western boundary.	JG
3	Bathy Merge	Road on southern island will have to be fixed when merged with Bathy mesh	C	Will comply after the merge with bathymetry.	JG
4	Road/Levee	Add the road as a weir in the northeast. It stands out in to topo.	C	The road was added as a weir along the portion where LIDAR data showed a significant rise in elevation	JG
5	Missing Elements	Looks like some elements are missing around node #5712 along the road.	C	Elements were added to the left part of this "no flow" block.	JG
6	Node Strings	Combine all the node strings that are along the same stretch of road.	C	Adjacent nodestrings were merged.	JG

INITIAL DISPOSITION CODES: **C** = Will Comply **D** = Delete Comment **F** = Further Clarify **FINAL DISPOSITION CODES:** **C** **D** **Ver:** Incorporation of **C** (Initials)

CC: PROJECT QUALITY ASSURANCE FILE, OFFICE QUALITY ASSURANCE OFFICE

Appendix B
Working Documents

Shoreline Mesh Grid Creation Process

SAVE SAVE SAVE: Save as new projects every time you start something new so that if you make a mistake or lose something you can go back to previous version.

I. Scatter Module
   1. Import bathymetry data as x,y,z data
      a. Make sure X&Y data are assigned to the right columns.
      b. Triangulate data (this happens automatically unless the option is checked off in the import dialog)
   2. Define coordinates: Edit | Current Coordinates
      a. Geo NAD83 (horizontal)
      b. Local meters (vertical)
   3. Delete triangles connecting edges of the data set (we should not have to worry about this)

II. Map Module
   1. Change type to IMS-ADCIRC
      a. Right click on the icon label under map data ( ). Point to type, and click on IMS-ADCIRC. Tip: Under Edit > Preferences, you can change your default coverage type to IMS-ADCIRC so that you do not have to change this for every map.
   2. Create feature arcs (digitize coastline, islands, levees, channels, etc.)
      a. Create different coverages for islands, lakes, long linear features, etc.
      b. Place nodes at inflection points where there is an area of major change.
      c. Keep grid spacing intact for borders (The outer boundary cannot be changed, but the interior area boundaries between working groups can be changed but must be immediately coordinated with person working on adjacent area)
      d. Rivers should be broken into small parts to make as many straight reaches as possible.
      e. Add guidelines or refinement points in large areas of open water and (ex. set spacing at ~1000 meters).
      f. Redistribute vertices
         - Example number of segments (job specific):
           (a) 80 meter spacing for small streams (≤3000 m width)
           (b) 200 – 500 meters along shoreline
           (c) 500 meter spacing for islands
           (d) 2 km spacing offshore
           (e) Delete any reservoir or basins that are < 500m at widest
           (f) To manually check spacing between two vertices, click on Select Feature Vertex, hold the shift key and click on both vertices. Distance will appear on the lower right screen.
         - Make sure that there are an equal number of vertices on opposite sides of levees, channels, roads, etc. so that patching and weir functions can be used. This also means that nodes must be placed on both sides of these areas in equivalent locations.
         - Use bias settings to transition ends from dense spacing around curves to wider spacing along long straight areas (shorelines)

   g. Go in and manually add in any vertices that need to be clustered to make a smooth transition.
   h. Get rid of all excess nodes (nodes that only connect two elements) by converting them to vertices (never delete nodes as that will delete the entire arc).
3. Resolve bounding arcs
   a. Coordinate with adjacent grids for spacing and joining arcs
   b. Copy map coverage to your folder and then open
4. Merge arc files – never delete. If you merge two arc files, you will not retain any elevation data in either of the files.
5. Run the Clean tool
   a. (Make sure to save the project just before doing this as the clean tool may delete arcs that overlap or dangle).
      Example: For intersecting arcs, SMS will create a node at the intersection and then delete any dangling arcs.
   b. Before running clean - Remove Dangling Arcs → set tolerance to 0.001
6. **<u>GET ARCS REVIEWED</u>**
7. Join the arcs so all the arcs form polygons.
8. Build polygons
9. Set polygon attributes
   a. For land masses, rivers, and oceans set the mesh type to none, patch, and paving respectively. If a river has inconsistent boundaries use paving for it.
   b. Scatter set – linear interpolation
   c. Material type – Leave as default
   d. Interpolation linear
10. If polygon is bisected by multiple scatter data files, merge them into one. You can do this in SMS or by using a text editor to combine text files. If the scatter data is too large to merge, you may split your map file into smaller pieces, so that you can interpolate from smaller scatter sets.
11. Map → 2D Mesh
    a. Turn off delete existing mesh
12. **<u>GET MESH REVIEWED</u>**

III. Mesh Module
1. Turn on mesh quality under display options
2. If the polygons still need to be associated to the bathymetry and LIDAR data then need to interpolate to mesh (Scatter | Interpolate to mesh)
3. Clean any errors by using relax (run relax tool twice for selected area to refine mesh), moving nodes, adding nodes, deleting nodes, etc.
   a. Display Options | Mesh Quality Options | Set maximum slope to 10000. The default value of 0.1 is incorrect. Units are (decimal degrees / meters).
   b. In order to be able to add nodes when fixing errors, set Node tolerance to zero (Nodes | Node Options).
   c. Should not have any nodes surrounded by only 4 triangles. To fix, make sure that "Retriangulate voids when deleting" option is selected (Nodes | Node Options) and delete the node.

   d. Select "interpolate z-value from scatter" in node options so any newly created nodes will take elevation from scatter data and not from adjacent mesh node elevations.
4. Triangle aspect ratio should be < 1.2 ($L_3/L_1 < 1.2$) (This will be checked with a batch program separately)
5. Minimum element size should be 60 meters
6. Largest element < 2 km
7. Mesh quality options
   a. Area change ≈0.55
   b. Interior angle – 40.0 min, 80.0 max)
   c. Slope change – 10,000
   d. Connecting elements – 8
8. Fix all triangles with aspect ratio > 1.2 (L_3/L_1 should be < 1.2)
   a. Display Options | 2D Mesh tab | Mesh Quality Options | Set minimum interior angle to 40.0 and maximum interior angle to 80.0. This will help detect any triangles that violate the aspect ratio threshold of 1.2.
   b. As a backup, can check using a batch program (processor.exe) file.
      (1) Copy file into separate folder called Grid_Check
      (2) Select the Create Nodestring tool and click on a corner of the mesh. Go to Nodestrings and select Renumber. Save the mesh file.
      (3) IMS-ADCIRC | Run IMS-ADCIRC. This will generate the fort.14 file. Copy fort.14 file into folder that contains the batch program.
      (4) Run the batch program. Three files will be generated: stability.txt, AR1.txt, AR2.txt, and AR3.txt
      (5) The AR1 and AR2 text files contain a list of all elements that violate the 1.2 aspect ratio, while the AR3 file contains a list of elements that violate the element size of 60m. Check the DelX1, DelX2, and DelX3 columns in the AR3.txt file and correct those elements that are < 60m.
   c. If the shoreline boundary was changed during the cleaning process, must make sure the updated shoreline is used to generate the inland grid. Data | Mesh → Map | select Mesh boundaries → Polygons and Create New Coverage
9. **<u>GET MESH REVIEWED</u>**
10. **<u>GRID CHECK - ADCIRC TIN VS. NGLI TIN</u>**
11. Post-Grid Check corrections
   a. Check mesh in areas where grid check detected that ADCIRC TIN deviated from NGLI TIN by more than 2m
      (1) Zoom into area where offset occurred and check the scatter data elevations against the grid elevations. The grid elevations may need to be manually changed to better reflect the scatter data.
      (2) For channels, may have to manually change channel depths in areas where the mesh grid shows a very uneven channel depth throughout the length of the channel. Change the scatter data elevations and then re-interpolate mesh to scatter data by Scatter Module → Scatter | Interpolate to mesh (choose linear interpolation and Map Z).
      (3) Use a similar approach for LLF, such as barrier islands. Grid may not have captured the entirety of the LLF, so may have to manually change elevations of the grid nodes should define the outer boundary of the LLF. Easiest method is to

create a scatter point on top of the grid node and adjust the point to the desired elevation. Re-interpolate mesh to scatter data by Scatter Module → Scatter | Interpolate to mesh (choose linear interpolation).

(4) The approach used in both (2) and (3) can be used to define features (e.g. underwater channels) that were not defined at all by the grid, but showed up in the Grid Check.

b. Make sure that the following option is selected in Scatter Module → Scatter Options | Retriangulate voids when deleting. Otherwise, when a scatter point is deleted, a void will be created.

c. When finished correcting mesh, Mesh Module → Data | Map Elevation | choose your mesh in upper box and click Select. Due to the manual changes made in steps (1) through (4), the s and z values may not match, so this function updates the mesh so that all s and z values match.

12. Save final mesh grid as a .2dm file
13. Merge final grids (.2dm files) together
    a. Open new project
    b. Set node options tolerance to 0.00001 – Have to play with this option (setting tolerance too high will increase the append time)
    c. Open adjacent grids – select append and yes to delete all boundary conditions previously assigned to original mesh

Things to Remember:

1. When digitizing land masses, an easy way to see where land stops and water begins is by making anything with an elevation of 0+ one color, and making anything with 0- a different color. Another way is to show contour lines of -.5, 0 and .5 so that you have a good idea of how much "play" room you have within a certain area. (You will be given a 0 ft shoreline arc)
2. **Do Not** open someone else's map file in your project as you may overwrite their data. Instead move a copy of their map file to another file manually so that you can open it without overwriting data. Same goes for any original file that should not be altered (e.g. Area Boundaries, Roads and Hydro break lines, etc).
3. You can either build a mesh with elevation data already added, or build mesh and then interpolate Z coordinates from your scatter data. The second option is recommended when working with exceptionally large data sets.
4. Save a project before creating a mesh, as it may result in system crashes that need to be de-bugged. Try to create entire mesh at one time (instead of polygon by polygon) as it seems to be less buggy.
5. To convert shapefile to .map – In GIS mode, go to Mapping | Shapes | Feature Objects
6. When importing a 2dm file, make sure that you have the Duplicate node tolerance set higher than (usually .000001 is the default setting).

Special Problems

1. If a linear stream arc splits at the convergence with a water polygon because of an island, choose only the main channel for the path of the linear arc, and ignore the ancillary streamline.

2. For a harbor or other area with many small finger channels, encircle the entire area as a polygon and use the same spacing as for a large stream.

Inland Topo Mesh Grid Creation Process

Make copy of Shoreline .sms project and copy into a separate folder.

IV. Scatter Module

1. Import updated bathymetry data (with positive elevations removed) as x,y,z data
   a. Make sure X&Y data are assigned to the right columns.
   b. Triangulate data (this happens automatically unless the option is checked off in the import dialog)
2. Define coordinates: Edit | Current Coordinates
   a. Geo NAD83 (horizontal)
   b. Local meters (vertical)
3. Delete triangles connecting edges of the data set (we should not have to worry about this)

V. Map Module

1. Change type to IMS-ADCIRC
   a. Right click on the icon label under map data ( ). Point to type, and click on IMS-ADCIRC. Tip: Under Edit > Preferences, you can change your default coverage type to IMS-ADCIRC so that you do not have to change this for every map.
2. Clean the feature arcs of the inland streams (i.e. hydro break lines)
   a. In separate .sms project, open the hydro break lines file and trim to the region on which you are working. Save .sms project.
   b. In the working .sms project, open the .map file that you just saved.
   c. Begin cleaning the inland streams using the following criteria:
      - Cut off tight meanders
      - Delete all channels/tribs < 500 m long, provided they are not connected to a large water body or to any other significant feature
      - Smallest vertex spacing = 100m
   d. Create different coverages for islands, lakes, long linear features, etc.
   e. Place nodes at inflection points where there is an area of major change.
   f. Keep grid spacing intact for borders (The outer boundary cannot be changed, but the interior area boundaries between working groups can be changed but must be immediately coordinated with person working on adjacent area)
   g. Rivers should be broken into small parts to make as many straight reaches as possible.
   h. Redistribute vertices
      - Make sure that there are an equal number of vertices and nodes on opposite sides of levees, channels, roads, etc. so that patching can be used.
      - Use bias settings to transition ends from dense spacing around curves to wider spacing along long straight areas (shorelines)
   i. Go in and manually add in any vertices that need to be clustered to make a smooth transition.
   j. Get rid of all excess nodes (nodes that only connect two elements) by converting them to vertices (never delete nodes as that will delete the entire arc).
3. Resolve bounding arcs
   a. Coordinate with adjacent grids for spacing and joining arcs
   b. Copy map coverage to your folder and then open

4. Merge arc files – never delete
5. Run the Clean tool
   a. Make sure to save the project just before doing this as the clean tool may delete arcs that overlap or dangle.
      Example: For intersecting arcs, SMS will create a node at the intersection and then delete any dangling arcs.
   b. Before running clean - Remove Dangling Arcs → set tolerance to 0.001
6. **<u>GET ARCS REVIEWED</u>**
7. When streams are done, start on the roads.
8. If you have a 3-D shape file, then each vertex will have an elevation associated with it. However, if you merge arc coverages it removes the elevations. Therefore the roads need to be copied from the shape file into the stream arc coverage. The elevations are important to retain in the arc file so they can be copied directly into the node strings created from the road arcs.
9. The roads will be modeled as weirs, so need two arcs with the same number of vertices (node pairs). The vertices in each node pair do not have to be directly across from each other, but they should be somewhat close. The important thing is that they must have exactly the same number of vertices and nodes in each arc.
10. Where the streams cross a road, need to break both the stream line and the road. If the crossing structure is a culvert or small bridge, then just insert nodes at the crossing location. (A small bridge is any structure with a span less than twice the grid spacing, i.e. grid spacing = 80m so span ~ 160m.) The easiest way to do this is to use the clean tool. Select the crossing arcs, go to the clean tool, make sure only the "Intersect Selected Arcs" box is checked, and click OK. This puts nodes at the locations of the intersecting arcs.
11. Remember to delete the short portion of the stream between the two road lines.
12. Redistribute the vertices on both the stream and the road arcs.
13. If the structure is a bridge with a wide enough span (larger than ~160m) then the road file needs to be broken at this location.
14. The ends of the road at the structure need to be flared out to match the grid spacing (~80m).
15. At roadway intersections, the 90-degree angles need to be softened. Add angled arcs connecting the two intersecting roadways. Remember to keep the length of the angled arcs at least the size of the grid spacing. This is hard if the roads do not intersect at right angles but do the best you can. Just remember that the number of vertices in all the angled arcs needs to be the same.
16. For intersections of highways or interstates, need to make sure you have the same number of segments in each angled arc. Will need to keep track of the highest elevations along the road and adjust the elevations of the vertices as appropriate. It is important to keep the highest points along the roadway because this helps determine how high the water has to back up before overtopping the road or what areas are potentially protected. The number of segments of the arcs and the elevations of the node pairs need to match both adjacent angle arcs (the one above and the one to the side).
17. Set the road arcs as Boundary Conditions. Double click on the arcs (you can select multiple arcs and then, holding down the shift key, double click on one of them). This brings up the attributes box. Select "Mainland Barrier" and leave all others at the defaults (Essential selected, Tangential Slip not selected, don't worry about the values in the

Elevation and Supercritical boxes, things will get changed later). This will guarantee that nodestrings will be built along with the mesh.

18. **<u>GET ARCS REVIEWED</u>**
19. Join the arcs so all the arcs form polygons.
20. Run the Clean tool
    a. Make sure to save the project just before doing this as the clean tool may delete arcs that overlap or dangle.
        Example: For intersecting arcs, SMS will create a node at the intersection and then delete any dangling arcs.
    b. Before running clean - Remove Dangling Arcs → set tolerance to 0.001
21. Build polygons
22. Add refinement points in large areas of open land with no crossing streams/roads. Click on create feature point to create node → double click on node to bring up the Refine Attributes dialog box. Select Refine Point and set the element size (ex. 0.002 will refine the area around the point to 200 m. You may also use guiding arcs to do this.
23. Set polygon attributes
    a. For land masses, rivers, and oceans set the mesh type to none, patch, and paving respectively. If a river has inconsistent boundaries use paving for it.
    b. Scatter set – linear interpolation
    c. Material type – Leave as default
    d. Interpolation linear
24. If polygon is bisected by multiple scatter data files, merge them into one if possible. Otherwise, may have to create grid sections separately and merge later.
25. Map → 2D Mesh
    a. Turn off delete existing mesh
26. **<u>GET MESH REVIEWED</u>**

VI. Mesh Module

1. Turn on mesh quality under display options
2. If the polygons still need to be associated to the bathymetry and LIDAR data then need to interpolate to mesh (Scatter | Interpolate to mesh)
3. Clean any errors by using relax (run relax tool twice for selected area to refine mesh), moving nodes, adding nodes, deleting nodes, etc.
    a. Display Options | Mesh Quality Options | Set maximum slope to 10000. The default value of 0.1 is incorrect. Units are (decimal degrees / meters).
    b. In order to be able to add nodes when fixing errors, set Node tolerance to zero (Nodes | Node Options).
    c. Should not have any nodes surrounded by only 4 triangles. To fix, make sure that "Retriangulate voids when deleting" option is selected (Nodes | Node Options) and delete the node.
    d. Select "interpolate z-value from scatter" in node options so any newly created nodes will take elevation from scatter data and not from adjacent mesh node elevations.
4. Minimum element size should be 60 meters
5. Largest element < 2 km
6. Mesh quality options
    a. Area change ≈0.55

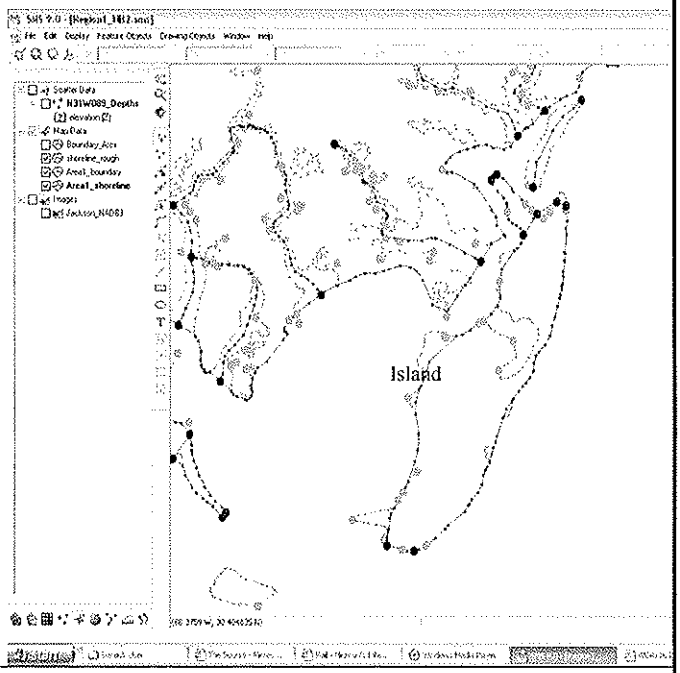
   b. Interior angle – 40.0 min, 80.0 max
   c. Slope change – 10,000
   d. Connecting elements – 8
7. Fix all triangles with aspect ratio > 1.2 (L_3/L_1 should be < 1.2)
   a. Display Options | 2D Mesh tab | Mesh Quality Options | Set minimum interior angle to 40.0 and maximum interior angle to 80.0. This will detect any triangles that violate the aspect ratio threshold of 1.2. (Hint: can continue to incrementally increase interior angle option to as high as 41.8)
   b. As a backup, can check using a batch program (Processor_Topo.exe) file.
      (1) Copy file into separate folder called Grid_Check
      (2) Select the Create Nodestring tool and click on a corner of the mesh. Go to Nodestrings and select Renumber. Save the mesh file.
      (3) IMS-ADCIRC | Run IMS-ADCIRC. This will generate the fort.14 file. Copy fort.14 file into folder that contains the batch program.
      (4) Run the batch program. Two files of interest will be generated: Element_Ratio.txt and Element_Size.txt
      (5) The Element_Ratio text file contains a list of all elements that violate the 1.2 ratio, while the Element_Size text file lists all elements that violate the 60m element side length.
   c. Do not alter the shoreline boundary as the inland grid will have to be merged with the shoreline grid.
8. **<u>GET MESH REVIEWED</u>**
9. Save final mesh grid as a .2dm file
10. Merge final grids (.2dm files) together
    a. Open new project
    b. Set node options tolerance to 0.00001 – Have to play with this option (setting tolerance too high will increase the append time)
    c. Open adjacent grids – select append and yes to delete all boundary conditions previously assigned to original mesh.
11. Select each nodestring pair (a pair at a time) and set the boundary attributes to Island Barrier under the IMS-ADCIRC -> Assign BC menu. **Any lone nodestrings must have attributes set to "Unassigned."** There has to be an equal number of nodes in the nodestrings that comprise the nodestring pair or SMS will not allow you set them as Island Barrier (or it may just crash).
12. Run IMS-ADCIRC to produce a new version of your fort.14 file. (The .grd file can be used in place of the fort.14 file if desired.)
13. Create a scatter data set from your map data
    a. Right click on your map file and select convert -> map to 2D scatter
    b. Select "Arc Node and Vertex Elevations." Make sure that triangulate is selected. Click OK.
    c. Turn on the contours for the new scatter that you created. Change the contour setting to color ramp, and make sure that a large enough interval is set that all contours will be shown.
    d. Look for any road elevations that may have a bust. This will be visible by a large color change on the contours. Change the value on these road nodes so that they

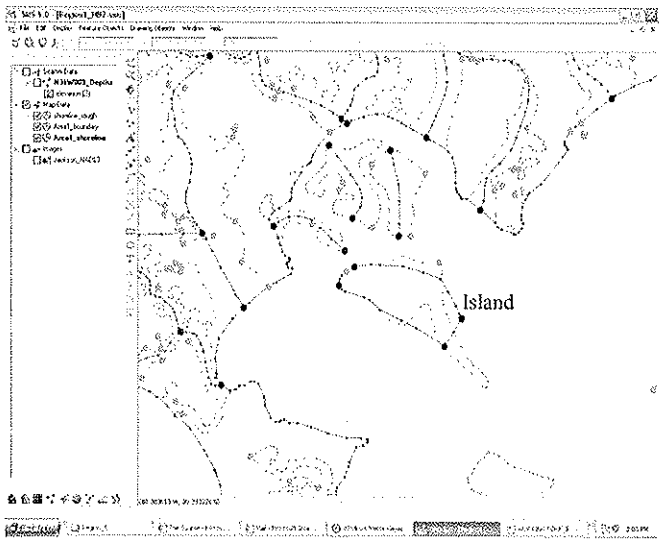
match the original road data. After this is complete, delete your scatter set and reproduce it as noted above.

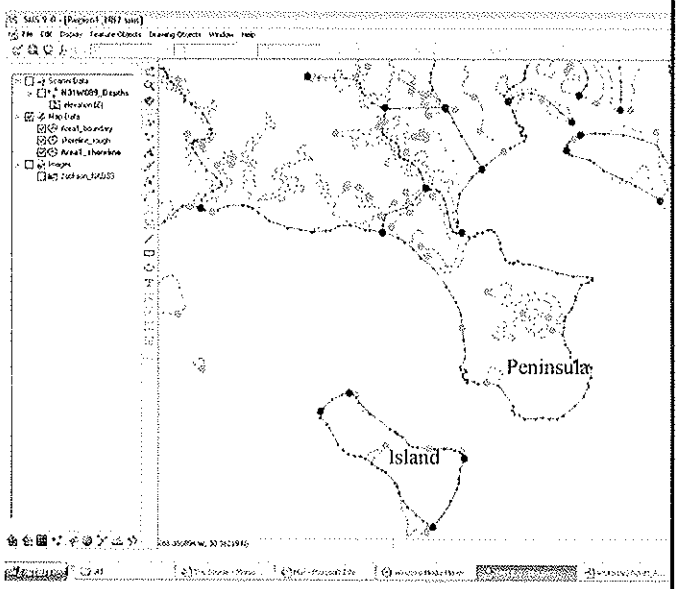
14. Save your scatter file as a text file.
    a. Change your current module to "scatter."
    b. Click File -> Save As.
    c. Navigate to where you want the text file to be placed. Change your file type to .txt and type in a name that you will remember (like scatter.txt). Then click Save.
    d. An export dialog should appear. Change the precision to 10 (you can put it higher, but it defaults back to 10).
    e. Click on each data tab and select x location, y location, and elevation for 1, 2 and 3 respectively. Click OK.
15. Assign elevations to your nodestring pairs.
    a. Select your most current versions of your fort.14 and your scatter.txt (created from step 14) files and place them in a folder with the AssignWeir.exe program and its associated files.
    b. Double-click AssignWeir.exe.
    c. When prompted enter the name of the fort.14 file, your scatter data set, what you want the new fort.14 file to be named, and what you want the weir output file to be named (weir.txt). **Note: Make sure to specify the file extensions (.txt, .14, .grd) for all of the files**.
    d. Enter a tolerance for the x and y coordinates. .0001 being 10 meters and .0002 being 20 meters. Try the smallest setting first and work your way up if you run into to many errors that are not easily fixed by manipulating the arc file or the txt files.
    e. Once you hit enter, the program will begin. It will stop if it encounters an error, and you must hit enter for it to continue. Once it finishes, you may run it again with a different tolerance, or fix the errors manually.
    f. The two files this program creates, and named as specified in step 15.c., are a new fort.14 file which includes elevations for nodestrings, and a weir text file that can be used for fixing errors and to check if the program found the correct elevations.
16. There are two options when fixing errors for your text file.
    a. Open the weir.txt file in Wordpad or Notepad. Use the find command and search for -99 (the AssignWier.exe program places -99.999999 in the x, y, and z columns when it can't find a match between the fort.14 file and the scatter data file). Make sure that "match entire word" is selected. Get the node number from the beginning of each row containing -99, go into SMS and do a search for the node. Move the arc nodes in the map file so that they match your nodestrings at these locations. Go back to step 13.
    b. An alternative method is to find the nodes with errors in the same method as 16.a. Get the x and y coordinates for the nodes from SMS and enter them into your scatter.txt file utilizing Wordpad or Notepad. Use the elevation from the corresponding node in the map file. Go back to step 15. **Note:** This is **NOT** the preferred method, as you will lose these changes if you have to regenerate your scatter set (which is very likely).
17. Once you finish fixing your new data you can bring it into SMS.
    a. You can either open your new fort.14 file in an SMS project file, or rename it as a .grd file and then open it in an SMS project. You can also overwrite your .grd file in

your latest project; however by overwriting the pervious data you will of course lose that version.

b. Do a spot check to make sure your nodestrings have elevations. Select the nodestring pair and go to IMS-ADCIRC -> Assign BC -> Island Barrier Parameters. Check the elevations against the map file to make sure they match.

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Offshore islands* *Shoreline – 88.3679 W 30.3954 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. Large island shape was altered so that it could be resolved. Dimensions are now 1550m x 150m. Area deleted from island is compensated for by area added in other locations. The smaller island located northwest of the large island (~ 400m long) was too small to resolve and was therefore digitized as a break line.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Nearshore islands Shoreline – 88.3779 W 30.3922 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. Large island shape was altered so that it could be resolved. Size is now approximately 380m x 160m (was 560m x 105m). Area deleted from island is compensated for by area added in other locations. The smaller islands north of the large island (~280m long each) were too small to resolve and was therefore digitized as a break line. Small jetty (~250m long) was also digitized as a break line.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Peninsula and Nearshore island Shoreline – 88.3822 W 30.3887 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. Small creeks on peninsula were not major flow ways and were therefore not digitized. Also, the large island shape was slightly altered so that it could be resolved. Dimensions are approximately 560m x 100m. Area deleted from island is compensated for by area added in other locations.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM

ORIGINATOR NAME: Nicole Bailey

COUNTY: Jackson

AREA NUMBER: Region 1	*AREA NAME: Bay & Inland Island Shoreline – 88.4065 W 30.3699 N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:

Black lines are digitized lines, blue lines were deleted.

1. Nearshore islands were too small (< 200m) to be resolved and were not digitized Shoreline boundary was smoothed to include part of the islands.
2. Because the shoreline is not resolvable in the bay and at the peninsula tip due to the curvature, the shape of both the bay and peninsula were altered. The depth of bathymetry data ranges from 0.1m to -2.4m with an average being approximately -0.17m. The volume of the bay area excluded by the new shoreline was calculated as a rectangle:

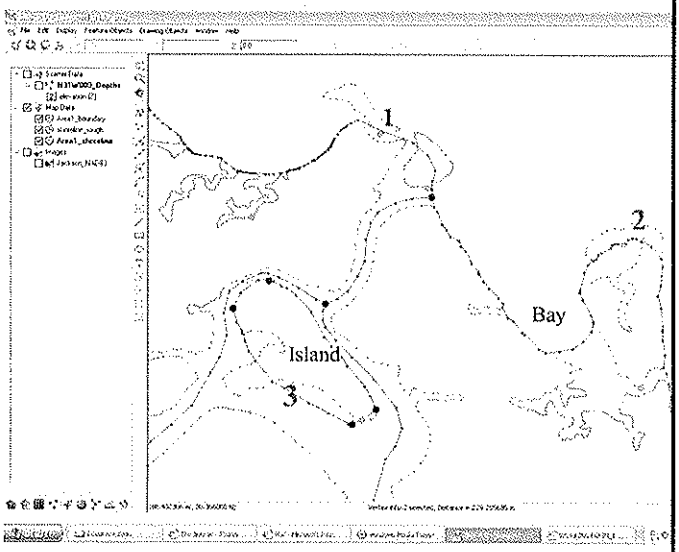
   $V_{bay} = b \times h \times d$

   $= 280m \times 160m \times 0.17m$

   $= 7616\ m^3$

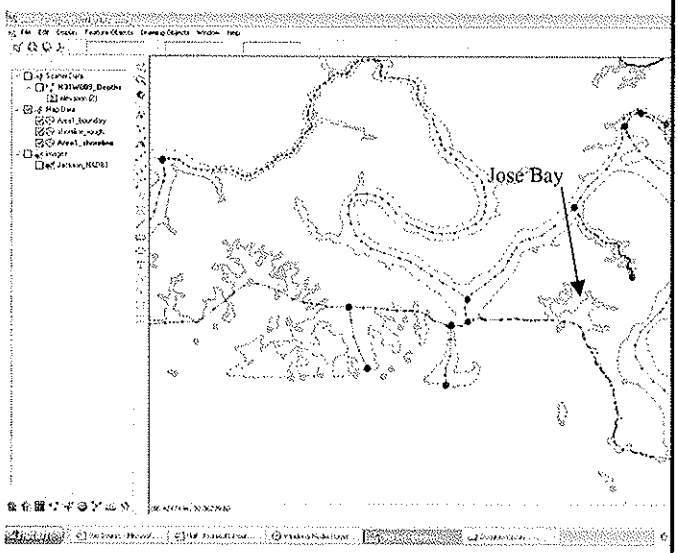
   Applying the missing volume over the entire bay area, the bathymetry data should be adjusted by -0.05m. Since this depth is well below the sensitivity threshold of the model, no change to the bathymetry data is needed.
3. Interior island shape was altered so that it could be resolved. Area deleted from island (~7800 m^2) is compensated for by area added in other locations (~7650 m^2).

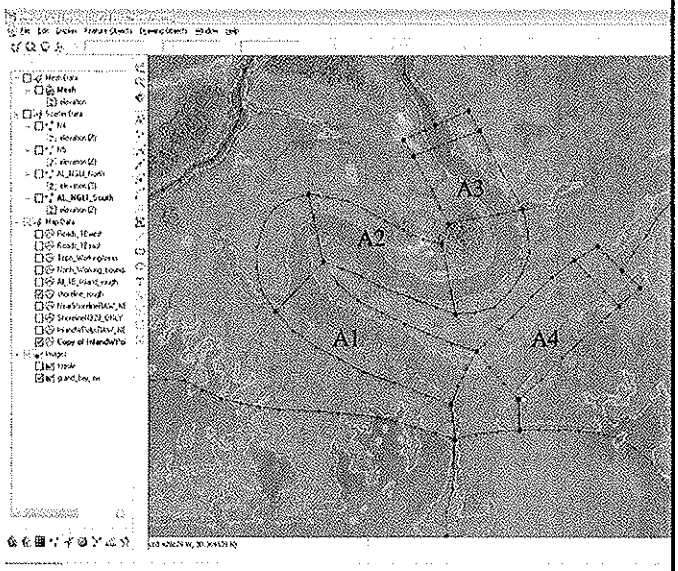
Screen Shot

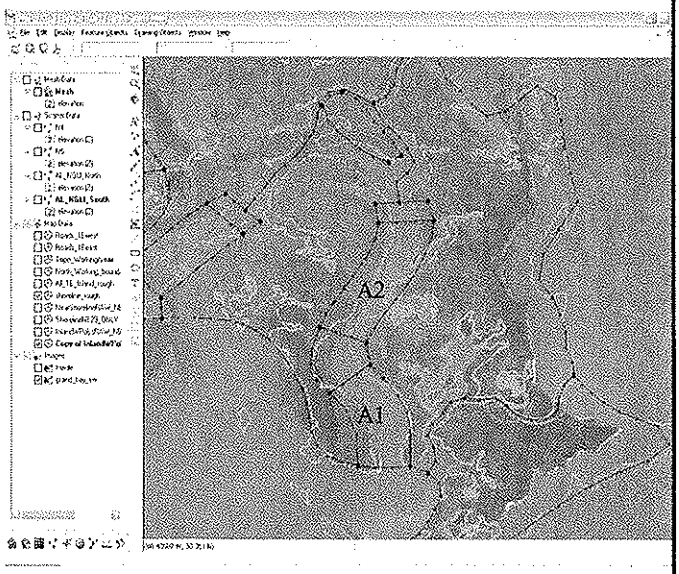


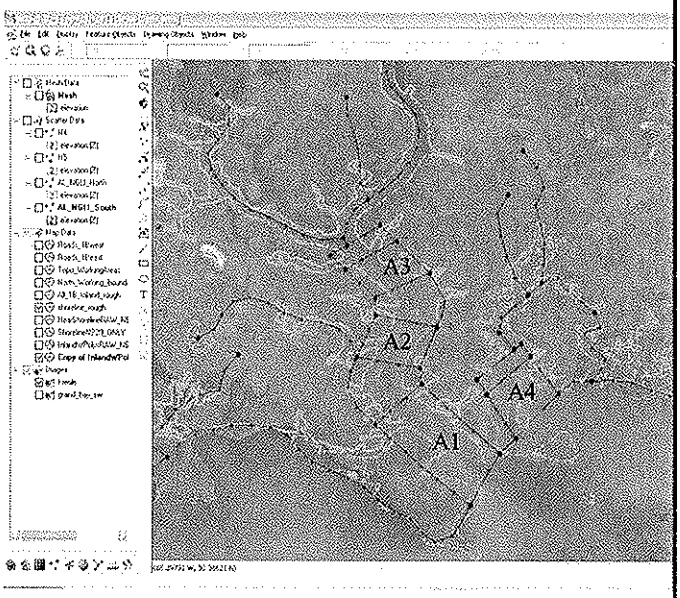
MAP MODULE

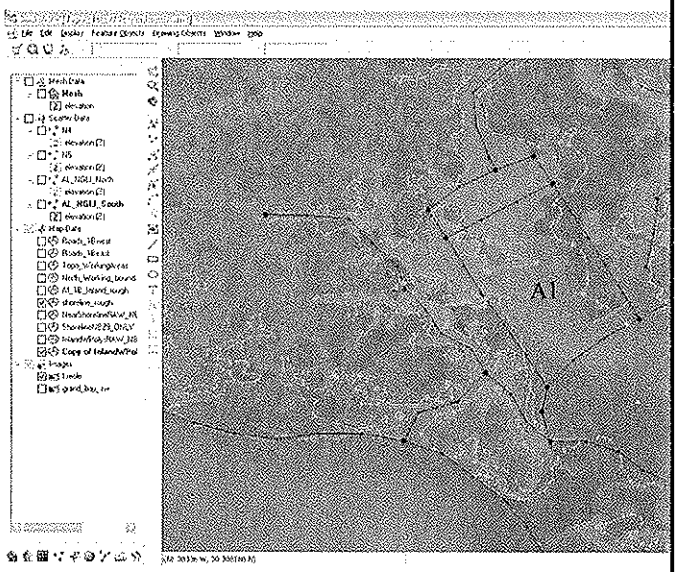
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

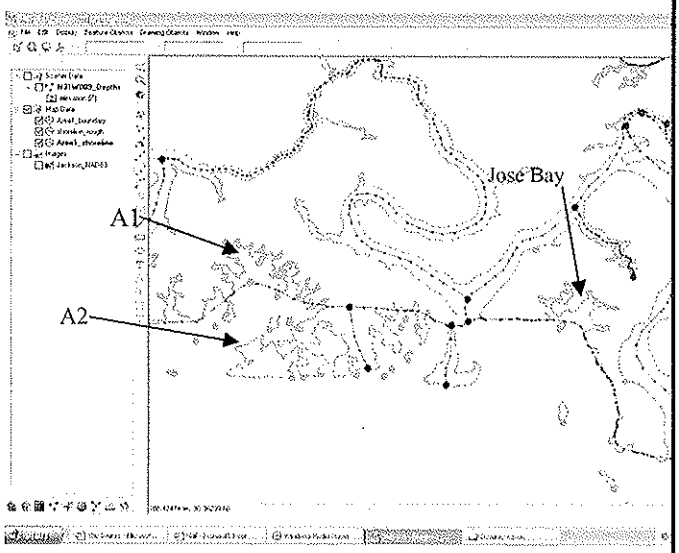
WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Area near Jose Bay Shoreline – 88.4129 W 30.3580 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. Shoreline is very jagged throughout this area and could not be resolved, therefore it was smoothed. A break line was placed along a jetty.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

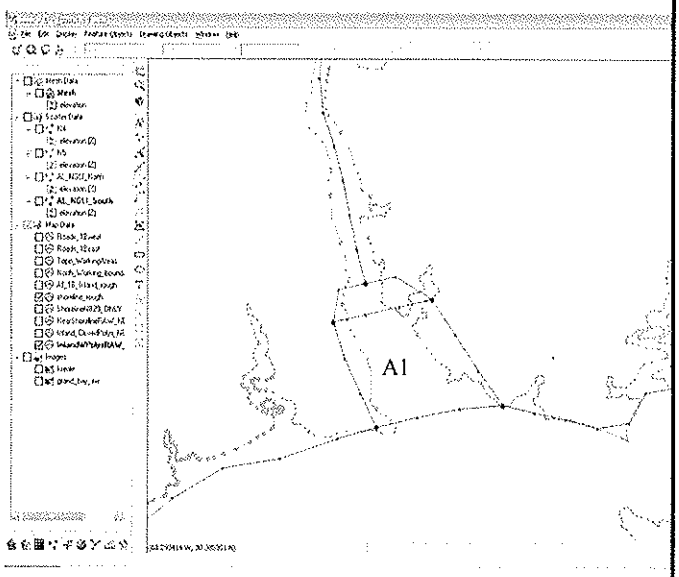
WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Nearshore channels 1* *Shoreline – 88.4213 W 30.3629 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. The width of the channels upstream of where they split falls within the transition range (80m<width<240m) and have therefore been widened to 240m. To account for the increase in volume due to the widening of the channels, the bathymetry data will be adjusted based on a ratio of the existing area to the 240m width area. Area Ratios: A1 = 0.50 A2 = 0.46 A3 = 0.44 A4 = 0.53 Areas A1 through A4 will be gridded as patch, while the areas in between will be gridded as paving.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Nearshore channel 2* *Shoreline – 88.4065 W 30.3575 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. The width of the channel falls within the transition range (80m<width<240m) and has therefore been widened to 240m. To account for the increase in volume due to the widening of the channel, the bathymetry data will be adjusted based on a ratio of the existing area to the 240m width area. Area Ratios: A1 = 0.73 A2 = 0.56 Note: Areas A1 and A2 will be gridded as patch, while the areas in between will be gridded as paving.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Nearshore channels 3* *Shoreline – 88.3979 W 30.3893 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. The width of the channels upstream of where they split falls within the transition range (80m<width<240m) and have therefore been widened to 240m. To account for the increase in volume due to the widening of the channels, the bathymetry data will be adjusted based on a ratio of the existing area to the 240m width area. Area Ratios: A1 = 0.64 A2 = 0.60 A3 = 0.50 A4 = 1.00 Areas A1 through A4 will be gridded as patch, while the areas in between will be gridded as paving.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Nearshore channel 4* *Shoreline – 88.3813 W 30.3905 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. The width of the channels upstream of where they split falls within the transition range (80m<width<240m) and have therefore been widened to 240m. To account for the increase in volume due to the widening of the channels, the bathymetry data will be adjusted based on a ratio of the existing area to the 240m width area. Area Ratios: A1 = 0.78 Area A1 will be gridded as patch, while the surrounding areas will be gridded as paving.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Area near Jose Bay Shoreline – 88.4129 W 30.3580 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. Shoreline is very jagged throughout this area and could not be resolved, therefore it was smoothed. A break line was placed along a jetty. It was not necessary to account for the increase in ocean volume due to the smoothing of the shoreline, as the ratio of the existing area to the digitized area would have to applied to the entire offshore area and would therefore be minimal Area Ratio: A1/A2 = 0.38	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

WORKING FORM	
ORIGINATOR NAME: Nicole Bailey	
COUNTY: Jackson	
AREA NUMBER: Region 1	*AREA NAME: Nearshore channel 5 Shoreline – 88.2927 W 30.3879 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Black lines are digitized lines, blue lines were deleted. The width of the channels upstream of where they split falls within the transition range (80m<width<240m) and have therefore been widened to 240m. To account for the increase in volume due to the widening of the channels, the bathymetry data will be adjusted based on a ratio of the existing area to the 240m width area. Area Ratios: A1 = 0.71 Area A1 will be gridded as patch, while the surrounding areas will be gridded as paving.	Screen Shot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:

Calculations - Nearshore Channel Volume Changes
Region 1 (Jackson County)

3/15/06

① Area Name: Nearshore channels
Shoreline - 88.4213 W 30.3629 N

$$A_1 = \frac{\text{Existing Channel Area}}{\text{Digitized Channel Area}} = \frac{90000\ m^2}{180\,000\ m^2} = 0.5$$

$$A_2 = \frac{60000}{130000} = 0.46$$

$$A_3 = \frac{40000}{90000} = 0.44$$

$$A_4 = \frac{70000}{130000} = 0.53$$

② Area Name: Nearshore channel 2
Shoreline - 88.4065 W 30.3575 N

$$A_1 = \frac{110,000}{150,000} = 0.73$$

$$A_2 = \frac{100000}{180000} = 0.56$$

③ Area Name: Nearshore channels 3
Shoreline - 88.3979 W 30.3893 N

$$A_1 = \frac{90000}{140000} = 0.64$$

$$A_2 = \frac{30000}{50000} = 0.60$$

③ (continued)

$A_3 = \frac{20000}{40000} = 0.50$

$A_4 = \frac{60000}{60000} = 1.0$

④ Area Name: Nearshore channel 4
Shoreline - 88.3813 W 30.3905 N

$A_1 = \frac{70000}{90000} = 0.78$

⑤ Area Name; Area near Jose Bay
Shoreline - 88.4129 W 30.3580 N

$\frac{A_1}{A_2} = \frac{90000}{240000} = 0.38$

⑥ Area Name: Nearshore channel 5
Shoreline - 88.2927 W 30.3879 N

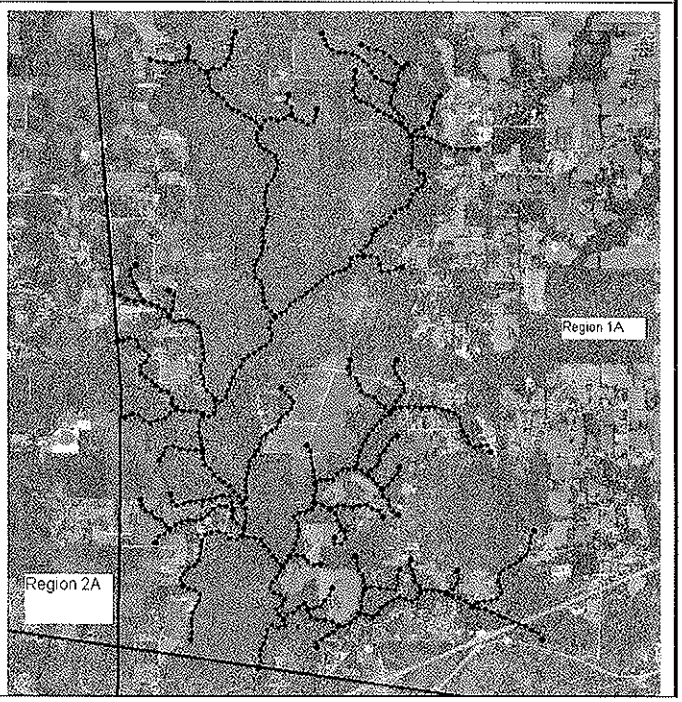
$A_1 = \frac{50000}{70000} = 0.71$

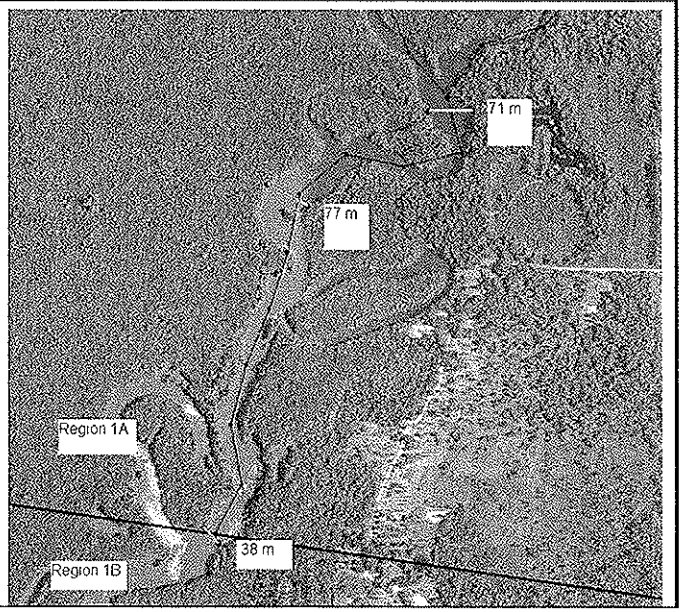
WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

STREAMS CLEANING

AREA NUMBER: 1A	*AREA NAME*: All of Region 1A
General assumptions/Comments: - No streams in Region 1A were wider than 300 meters, therefore all streams were represented by single breaklines - Stream spacing not less than 100 meters	

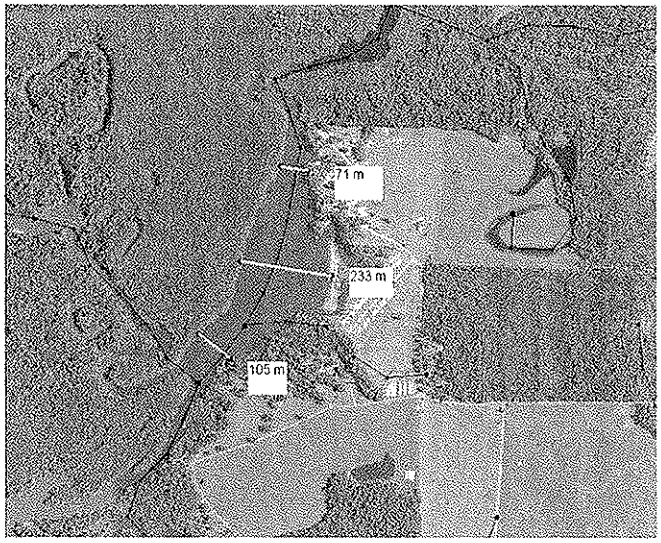
WORKING FORM	
ORIGINATOR NAME: Amelia Vincent	
COUNTY: Jackson	
STREAMS CLEANING	
AREA NUMBER: 1A	*AREA NAME*: 88.438W 30.472N At border with Region 1B
General assumptions/Comments: - Stream at boundary of Regions 1A and B is 38 meters wide. - Single breakline drawn for stream	

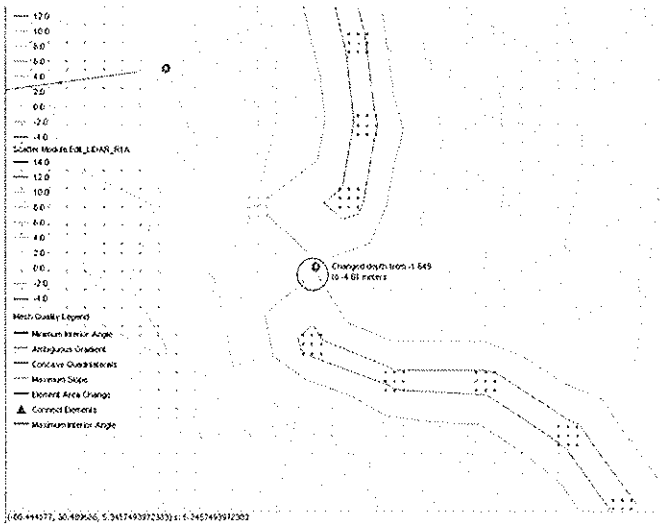
WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

STREAMS CLEANING

AREA NUMBER: 1A	*AREA NAME*: 88.433W 30.487N
General assumptions/Comments: - Stream widens to 233 m - Single breakline drawn for stream	

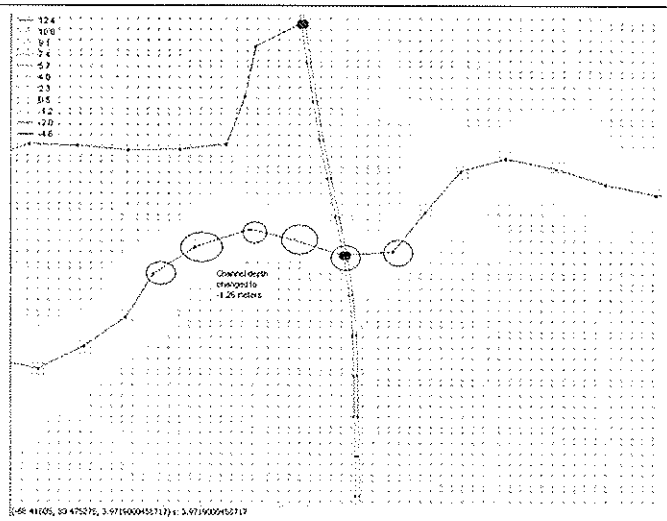
WORKING FORM	
ORIGINATOR NAME: Amelia Vincent	
COUNTY: Jackson	
SCATTER DATA	
AREA NUMBER: 1A	*AREA NAME*: -88.441524 W, 30.489703 N
General assumptions/Comments: - Changed elevation at confluence to match major stream channel	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

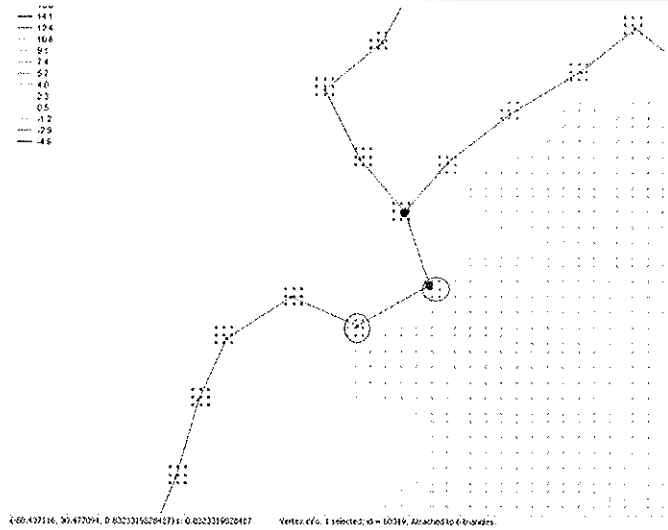
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth at road	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

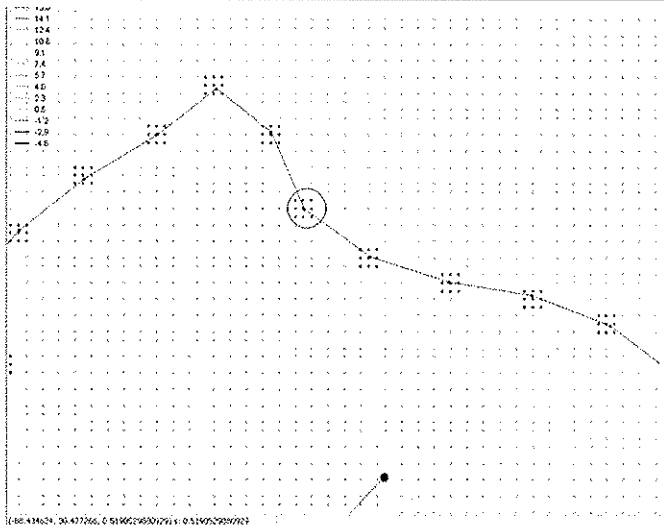
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

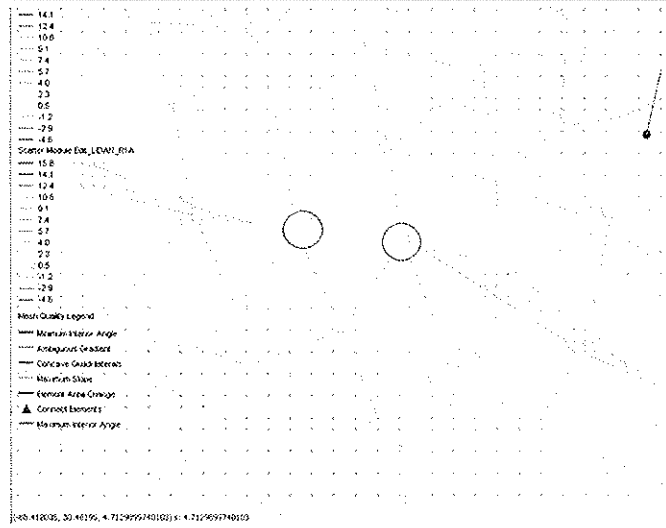
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

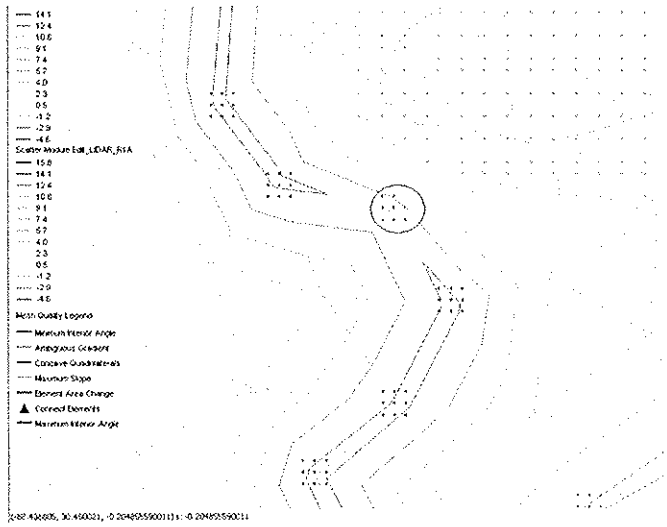
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

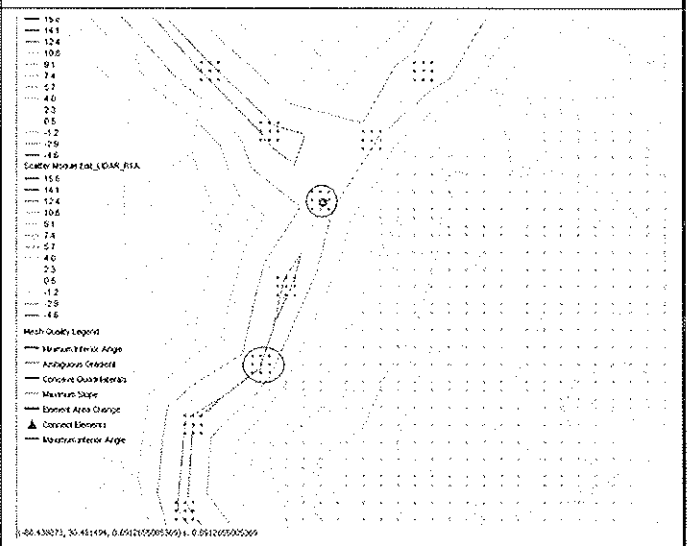
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

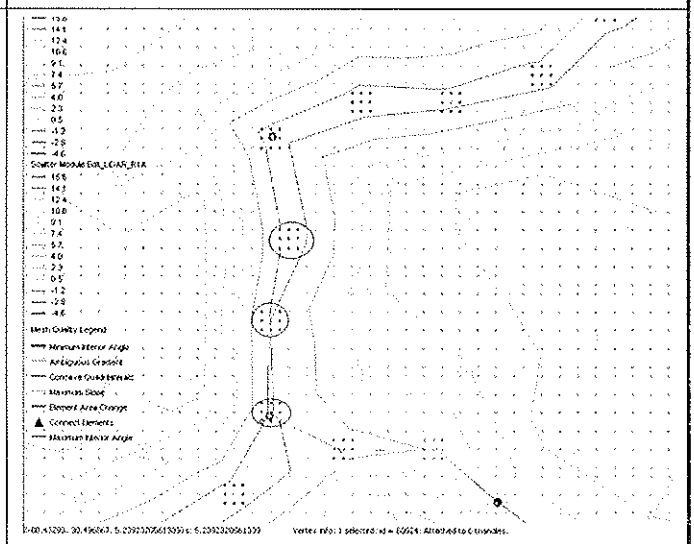
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

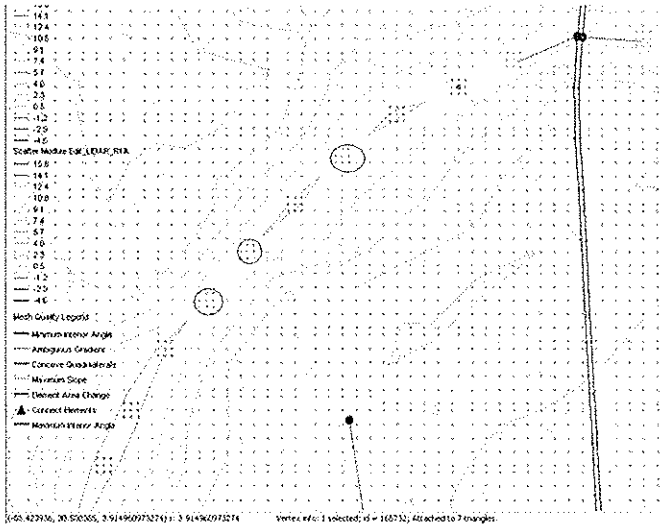
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

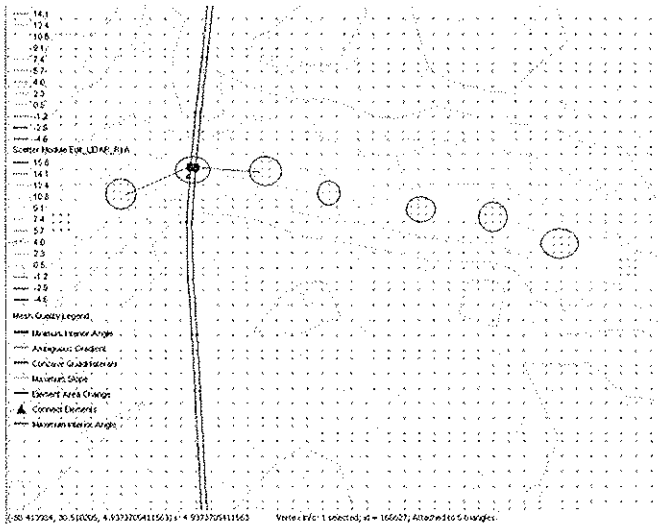
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

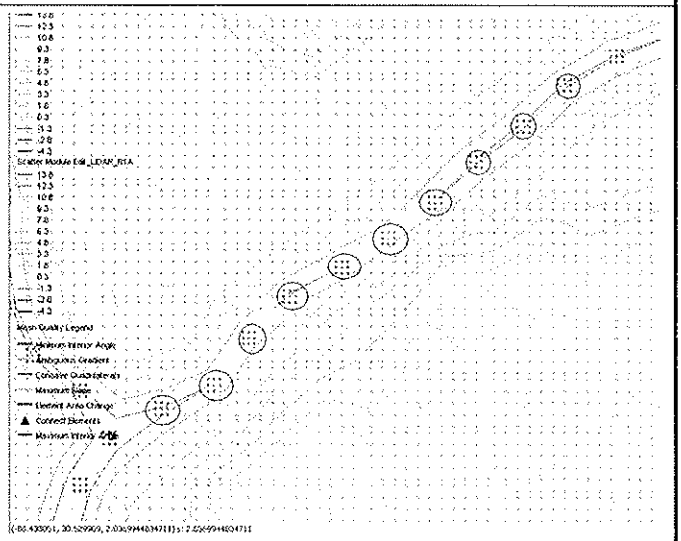
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

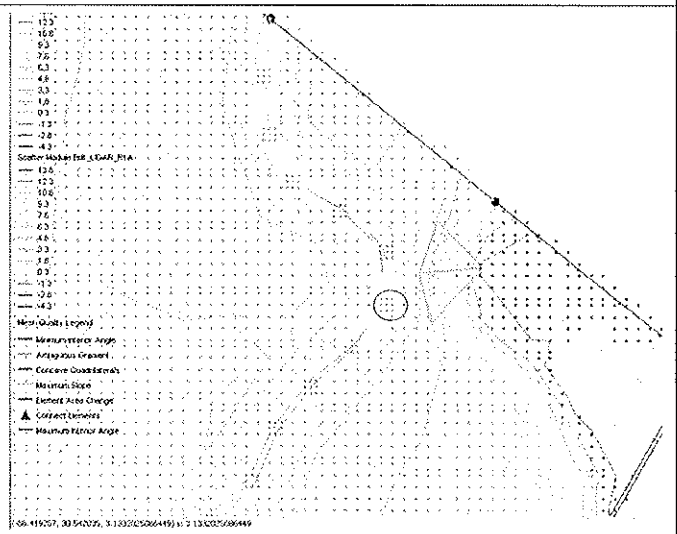
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

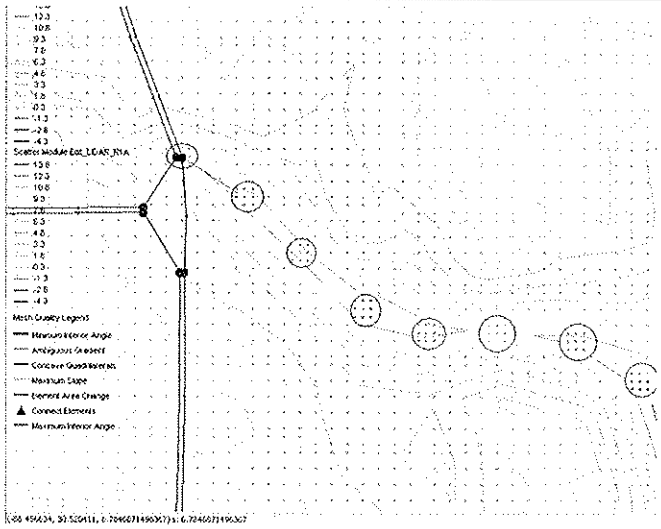
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

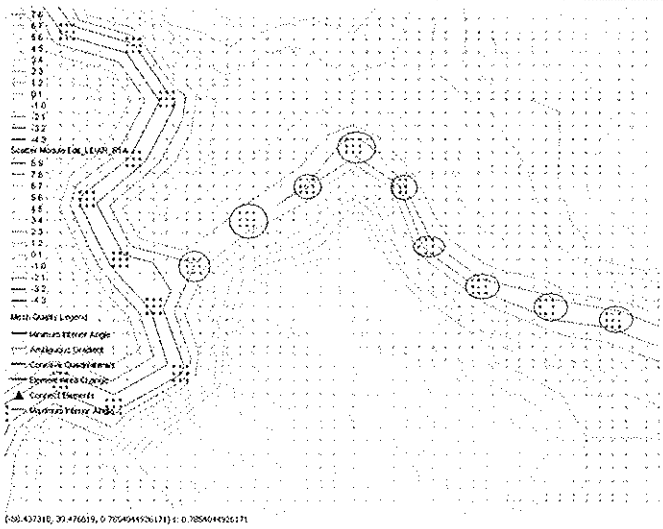
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

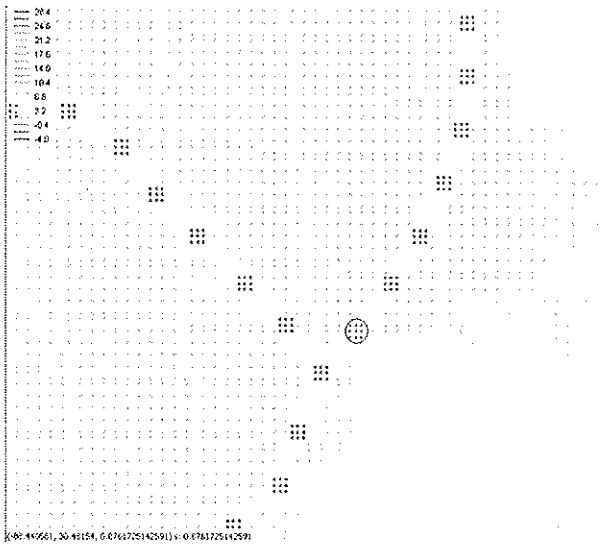
AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Jackson

SCATTER DATA

AREA NUMBER: 1A	*AREA NAME*
General assumptions/Comments: - Changed elevations to maintain channel depth	

WORKING FORM

ORIGINATOR NAME: Bud Brock

COUNTY: Jackson

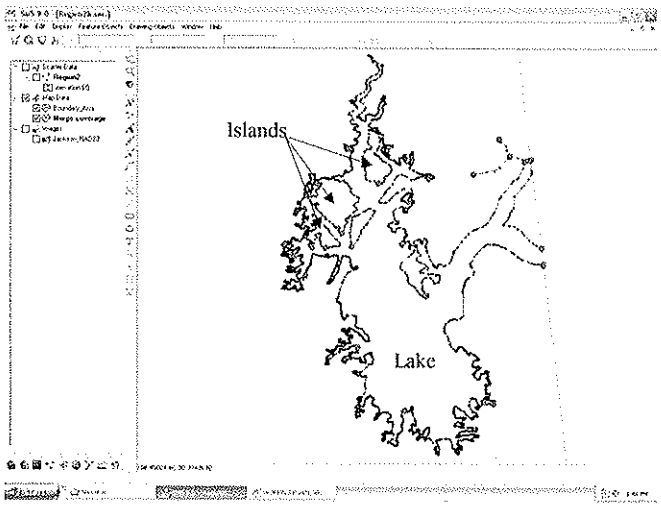
AREA NUMBER: Region 2	*AREA NAME:* Bangs Lake

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:

There are numerous large and small islands in Bangs Lake. The channel ways between the island and between the islands and the mainland are not wide enough to be resolved by the grid (<80m). The islands will be merged to the mainland and to each other to remove the small channel ways. The merged islands will be trimmed and small island deleted is such a way to compensate for the reduction in the Lake volume.

Screen Shoot



MAP MODULE

Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:
General assumptions/Comments:	Screen Shoot

WORKING FORM

ORIGINATOR NAME: Bud Brock

COUNTY: Jackson

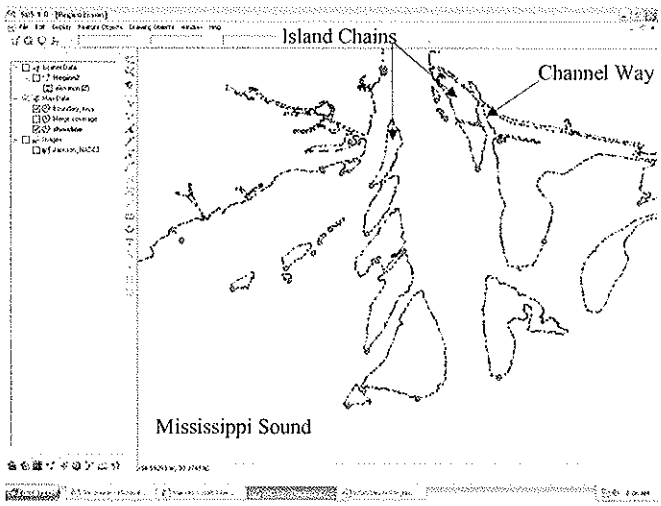
AREA NUMBER: Region 2	*AREA NAME:* Mouth of the West Pascagoula River

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:

There are two chains of islands at the mouth of the West Pascagoula River that will be combined for modeling purposes. The space between the islands is too small to be resolved based on the grid spacing (80m). The first chain will be combined into one large island. The second chain is close to the mainland so it will be merged into the coastline. The significant north-south channel way between the island and the mainland will be modeled using a controlling arc.

Screen Shoot



MAP MODULE

Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:
General assumptions/Comments:	Screen Shoot

WORKING FORM

ORIGINATOR NAME: Bud Brock

COUNTY: Jackson

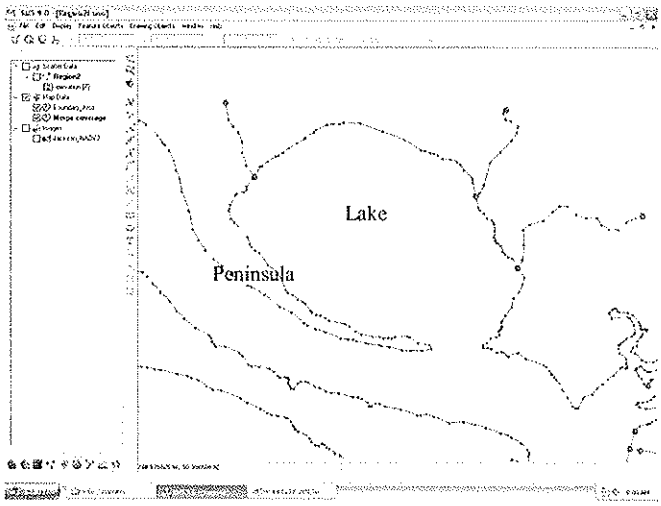
AREA NUMBER: Region 2	*AREA NAME: Lake Catch-Em-All*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:

Small peninsula is to narrow to show up in the grid (width <80m), so it was removed from the shoreline file. Resultant volume of the lake needs to be compensated for the volume of the peninsula. Approximate volume of peninsula can be calculated based on the area of a triangle (½bh) and depth of the lake (~1m). Pre-modified volume of the lake can be calculated by the area of a circle (pi*r^2) and depth of the lake (~1m). The depth of the lake will be adjusted to compensate for the area of the peninsula. Based on the calculations, the bathymetry depths need to be adjusted by 0.1m.

Screen Shoot



MAP MODULE

Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:
General assumptions/Comments:	Screen Shoot

Lake Catch - Em - All Volume Calc (deletion of Peninsula)

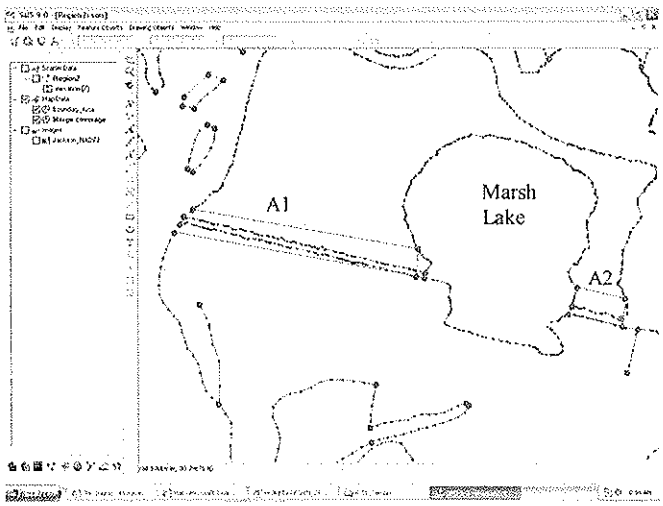
$V_p = \frac{1}{2} b h d = \frac{1}{2} \times (127)(922)(1) = 58{,}547 \ m^3$

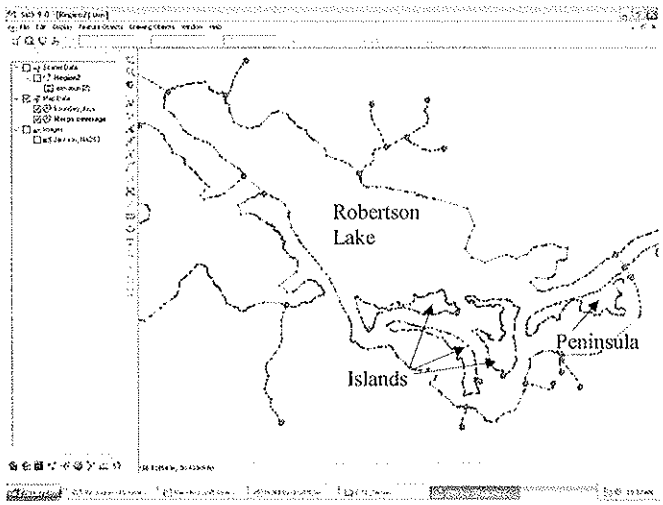
$V_L = \pi r^2 d = \pi (400)^2 (1) = 502{,}655 \ m^3$

$V_{L+P} = 58457 + 502655 = 561202 \ m^3$

$d_N = \frac{V_{L+P}}{\pi r^2} = \frac{561202}{(445)^2} = 0.9 m$

$d_o - d_N = 1.0 - 0.9 = 0.1 m$

WORKING FORM	
ORIGINATOR NAME: Bud Brock	
COUNTY: Jackson	
AREA NUMBER: Region 2	*AREA NAME:* Marsh Lake
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: The width of the Marsh Lake connecting channels will be widened from the present width of approximately 70m to 240m. The channels will not be converted to guiding arcs because they connect a large body of water (Marsh Lake) to major channel ways leading to the Gulf. To account for the increase in volume due to the widening of the channels, the bathymetry data will be adjusted based on a ratio of the existing area to the 240 width area. Ratios: A1 = 0.28 A2 = 0.28	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Bud Brock	
COUNTY: Jackson	
AREA NUMBER: Region 2	*AREA NAME:* Robertson Lake
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: There are three islands and a peninsula within Robertson Lake that the majority of their area is below the grid resolution of 80meters. Therefore, these islands and the peninsula will be deleted from the model. To compensate for the increase in volume in the Lake, the bathymetry data will be adjusted by a ratio of the existing and new area of the lake. Area Ratio = 0.89	Screen Shoot 

Channels into Marsh Lake Volume Calc (converting channel width to 240m)

$A1_e = \frac{1}{2}(w_1 + w_2) * \frac{1}{2}(L_1 + L_2) = \frac{1}{2}(78 + 49) * \frac{1}{2}(1925 + 1910) = 121{,}761\ m^2$

$A1_{240} = \frac{1}{2}(242 + 240) * \frac{1}{2}(1760 + 1884) = 439102\ m^2$

$\text{depth ratio} = \frac{A1_e}{A1_{240}} = \frac{121761}{439102} = 0.2773$

$A2_e = \frac{1}{2}(72 + 63) * \frac{1}{2}(394 + 423) = 27573.75$

$A2_{240} = \frac{1}{2}(242 + 240) * \frac{1}{2}(423 + 382) = 97002.5$

$\text{depth ratio} = \frac{A2_e}{A2_{240}} = \frac{27573.75}{97002.5} = 0.28425$

Robertson Lake Volume Calc (deletion of islands)

Areas from SMS are in 1^0sq so to convert to m^2 need to calc by $100\ km^2 = 10^{10}\ m^2$

$A_{I1} = 0.000008 * 10^{10} = 80{,}000\ m^2$

$A_{I2} = 0.000007 * 10^{10} = 70{,}000\ m^2$

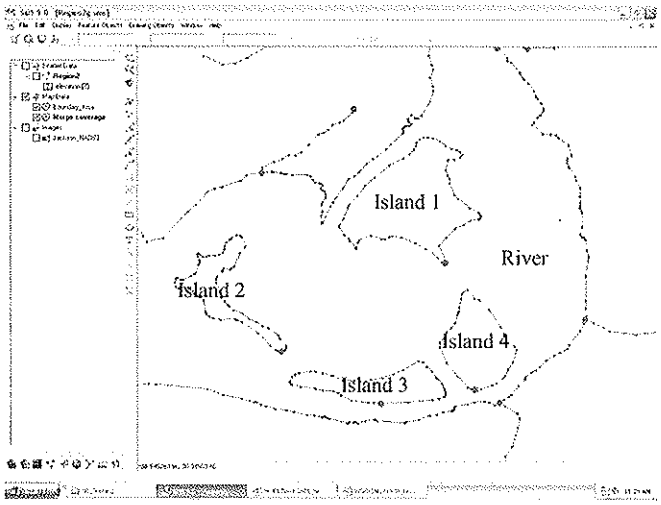
$A_{I3} = 0.000010 * 10^{10} = 100{,}000\ m^2$

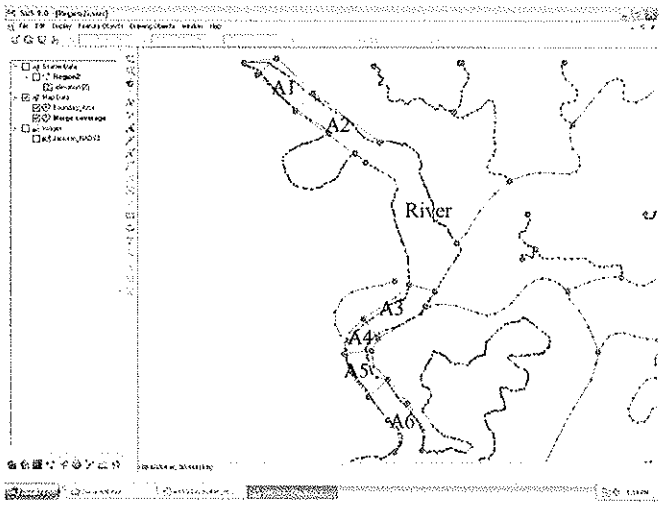
$A_P = 0.000009 * 10^{10} = 90{,}000\ m^2$

$A_L = 0.000286 * 10^{10} = 2{,}860{,}000\ m^2$

$A_{Ln} = 0.000320 * 10^{10} = 3{,}200{,}000\ m^2$

$\text{depth ratio} = \frac{A_L}{A_{Ln}} = \frac{2860000}{3200000} = 0.89375$

WORKING FORM	
ORIGINATOR NAME: Bud Brock	
COUNTY: Jackson	
AREA NUMBER: Region 2	*AREA NAME:* East Pascagoula River
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: There are four islands in the main channel way of East Pascagoula River. Three of the islands are too small to be resolved in the grid (<80m). The channel ways between the islands and between the islands and the mainland is too small to be resolved in the grid. Therefore, island 1 will be joined with the land. To compensate for the decrease in the River volume, island 2 will be deleted. Island 3 and 4 will be deleted and the bathymetry data adjusted to compensate for the change in River volume. The depth of bathymetry data ranges from 0.1m to -2.4m with an average being approximately -1m. The volume of Island 3 was calculated using the area of a triangle (½bh) times the depth. The area of Island 4 was calculated based on the area of a circle (pi*r^2) times the depth. The volume of the River was calculated based on the area of a simi-circle (½pi*r^2) times the depth. Based on the volume calculations, the bathymetry data needs to be adjusted by -0.06m (2.3inches). The change in depth is well below the sensitivity of the model and therefore, no change to the bathymetry data is needed.	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Bud Brock	
COUNTY: Jackson	
AREA NUMBER: Region 2	*AREA NAME:* West Pascagoula River
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Portions of the West Pascagoula River fall within the width transition criteria (80<width<240). The width of the areas will be widened to 240m. To account for the increase in volume, the bathymetry data will be adjusted based on a ratio of the existing area to the 240 width area. Ratios: A1 = 0.62 A2 = 0.90 A3 = 0.81 A4 = 0.72 A5 = 0.84 A6 = 0.97	Screen Shoot 

East Pascagoula River Volume Calc (deletion of islands)

$V_{I3} = \frac{1}{2} b h d = \frac{1}{2}(144)(443)(1) = 31{,}896\ m^3$

$V_{I4} = \pi r^2 d = \pi(143)^2(1) = 64{,}467\ m^3$

$V_{I3+4} = 64467 + 31896 = 96363\ m^3$

$V_R = \frac{1}{2}\pi r^2 d = \frac{1}{2}\pi(1000)^2(1) = 1{,}570{,}796\ m^3$

$V_{Rn} = V_{I3+4} + V_R = 96363 + 1570796 = 1{,}667{,}160\ m^3$

$d_n = \frac{\frac{1}{2}\pi r^2}{V_{Rn}} = \frac{\frac{1}{2}\pi(1000)^2}{V_{Rn}} = \frac{1570796}{1667160} = 0.94$

$\Delta d = 1 - 0.94 = 0.06\ m \approx 0.19\ ft \approx 2.28\ in$

West Pascagoula River Volume Calc (converting channel width to 240m)

$A1_e = \frac{1}{2}(w_1 + w_2) * \frac{1}{2}(L_1 + L_2) = \frac{1}{2}(117 + 190) * \frac{1}{2}(497 + 470) = 74{,}217\ m^2$

$A1_{240} = \frac{1}{2}(242 + 244) * \frac{1}{2}(481 + 502) = 119434.5\ m^2$

depth ratio $= \frac{A1e}{A1_{240}} = \frac{74217}{119434.5} = \underline{0.6214}$

$A2e = \frac{1}{2}(190 + 239) * \frac{1}{2}(819 + 780) = 171{,}492.75\ m^2$

$A2_{240} = \frac{1}{2}(244 + 239) * \frac{1}{2}(813 + 772) = 191{,}388.75\ m^2$

depth ratio $= \frac{A2e}{A2_{240}} = \frac{171492.75}{191388.75} = 0.8960$

$A3_e = \frac{1}{2}(154 + 241) * \frac{1}{2}(541 + 691) = 121660\ m^2$

$A3_{240} = \frac{1}{2}(241 + 239) * \frac{1}{2}(539 + 718) = 150840\ m^2$

depth ratio $= \frac{A3e}{A2_{240}} = 0.8065$

$A4e = \frac{1}{2}(154 + 187) * \frac{1}{2}(366 + 195) = 47825.25\ m^2$

$A4_{240} = \frac{1}{2}(239 + 239) * \frac{1}{2}(409 + 147) = 66442\ m^2$

depth ratio $= 0.7198$

$A6e = \frac{1}{2}(226 + 247) * \frac{1}{2}(677 + 808)$

$= 175601.25\ m^2$

$A6_{240} = \frac{1}{2}(247 + 245) * \frac{1}{2}(655 + 812)$

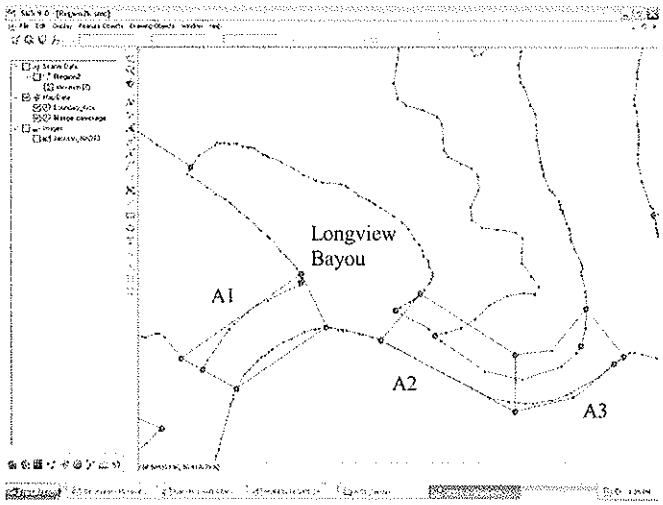
$= 180441\ m^2$

depth ratio $= 0.9732$

$A5e = \frac{1}{2}(187 + 227) * \frac{1}{2}(483 + 335) = 84663\ m^2$

$A5_{240} = \frac{1}{2}(239 + 245) * \frac{1}{2}(496 + 339) = 101035$

depth ratio $= 0.83796$

WORKING FORM	
ORIGINATOR NAME: Bud Brock	
COUNTY: Jackson	
AREA NUMBER: Region 2	*AREA NAME:* Longview Bayou
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: The width of the Longview Bayou connecting channels fall within the transition range (80m<width<240m) and will therefore be widened to 240m. To account for the increase in volume due to the widening of the channels, the bathymetry data will be adjusted based on a ratio of the existing area to the 240 width area. Area Ratios: A1 = 0.73 A2 = 0.53 A3 = 0.45	Screen Shoot 

Longview Bayou channels Volume Calc. (conversion to 240 width)

$A1_e = \frac{1}{2}(w_1 + w_2) * \frac{1}{2}(L_1 + L_2) = \frac{1}{2}(149 + 211) * \frac{1}{2}(536 + 444) = 88200\ m^2$

$A1_{240} = \frac{1}{2}(242 + 243) * \frac{1}{2}(574 + 427) = 121371\ m^2$

depth ratio $= \frac{A1_e}{A1_{240}} = \frac{88200}{121371} = 0.7267$

$A2_e = \frac{1}{2}(138 + 104) * \frac{1}{2}(542 + 536) = 65,219\ m^2$

$A2_{240} = \frac{1}{2}(245 + 242) * \frac{1}{2}(434 + 577) = 123,089\ m^2$

depth ratio $= \frac{65219}{123089} = 0.5299$

$A3_e = \frac{1}{2}(104 + 143) * \frac{1}{2}(299 + 442) = 45,757\ m^2$

$A3_{240} = \frac{1}{2}(242 + 246) * \frac{1}{2}(356 + 482) = 102,236\ m^2$

depth ratio $= \frac{45757}{102236} = 0.4476$

MESH DESCRIPTION FORM

ORIGINATOR NAME: Bud Brock

COUNTY: Jefferson

AREA NUMBER: Region 2	*AREA NAME:* Deep Channels

MESH GENERATION

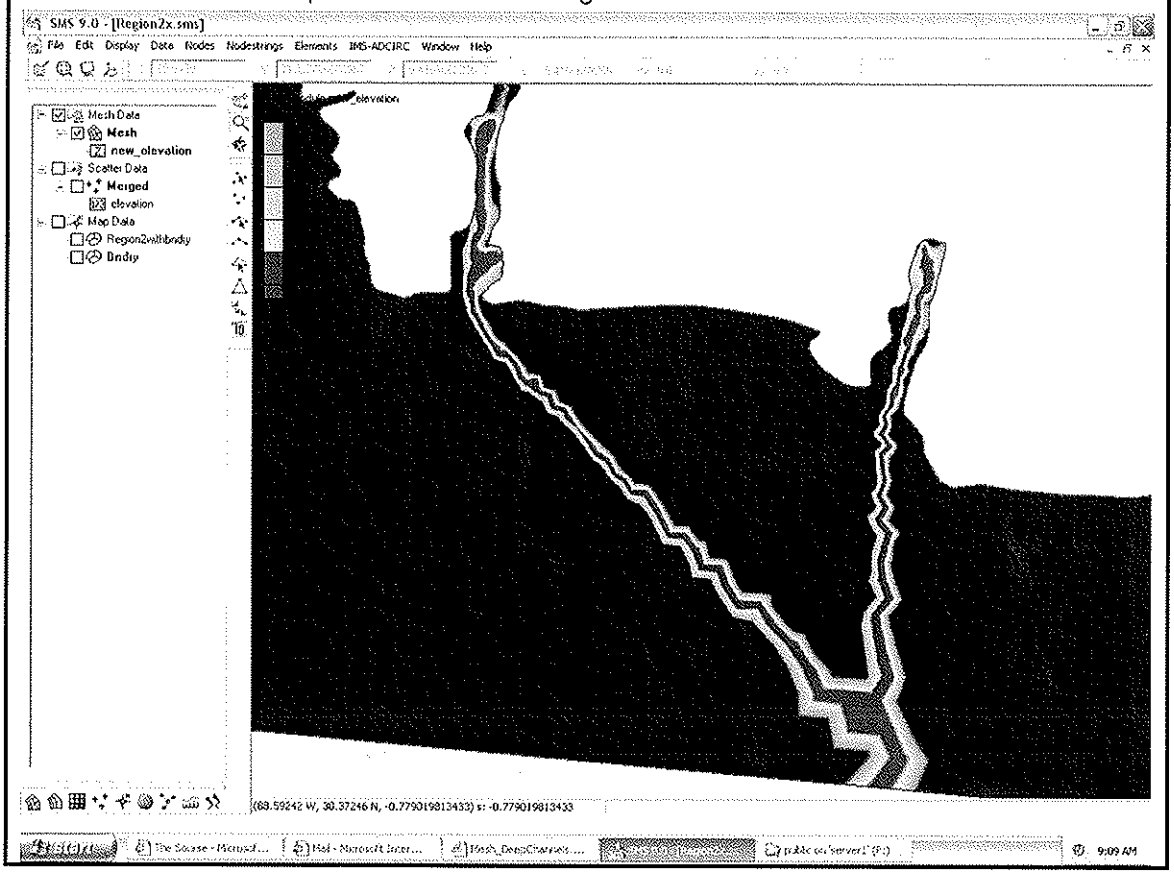
Type of Mesh: IMS-ADCIRC	

General assumptions:

TROUBLESHOOTING

Technical Problems: Due to the mesh grid spacing, the deep water channels were not consistently represented. The mesh would show stretches of the deep water channels with gaps were the deeper elevations were not picked up by the mesh.

Resolution: Points were added to the scatter data at locations corresponding to the mesh grid node points. These new points were given the elevation of the deep water channel (-11.8m) so the channel would be represented in the mesh grid.



MESH DESCRIPTION FORM

ORIGINATOR NAME: Bud Brock

COUNTY: Jefferson

AREA NUMBER: Region 2	*AREA NAME:* Missing Scatter Data Points

MESH GENERATION

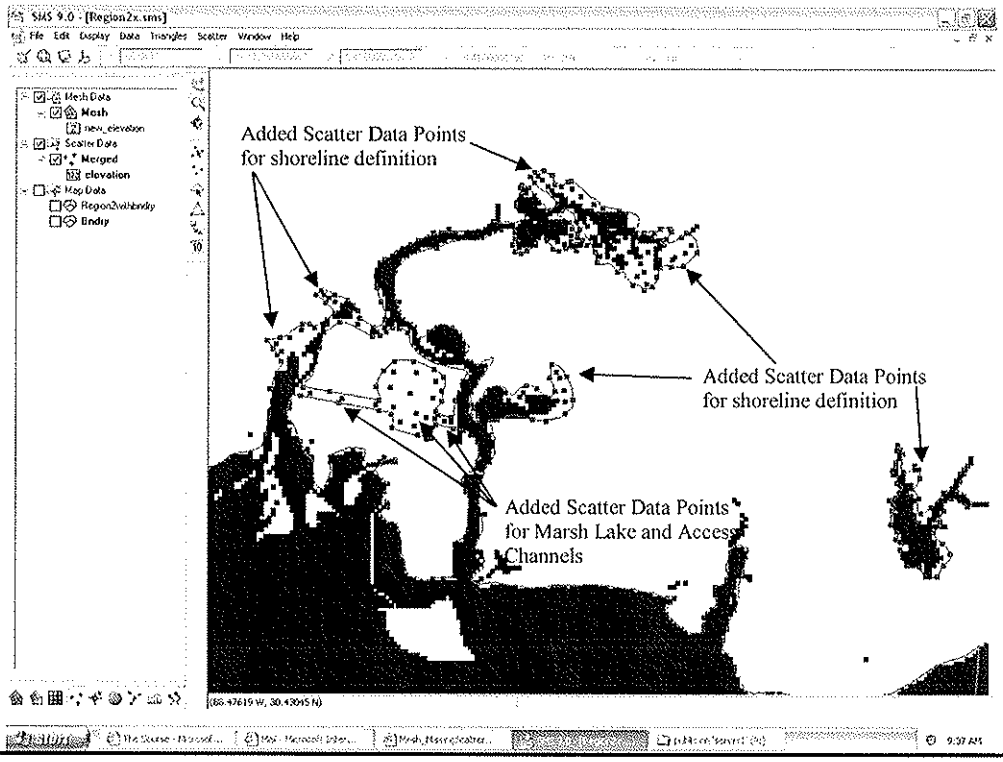
Type of Mesh: IMS-ADCIRC	

General assumptions:

TROUBLESHOOTING

Technical Problems: The scatter data does not have depth points close to some of the shorelines and in the shallow channels leading to Marsh Lake and within the Marsh Lake.

Resolution: Points were added to the scatter data along some of the shorelines so the shoreline is defined. Depths along the shore were set at 0.0 meters with interim points interpolated from the existing scatter data and the zero depth along the shoreline. Points were added in the shallow access channels leading to Marsh Lake and within Marsh Lake so the channels and lake will be represented in the mesh. The 1 meter depth for the lake was taken from NOAA Nautical Charts. The depths for the access channels were interpolated from the existing scatter data in the adjoining channels and the depth of Marsh Lake.



MESH DESCRIPTION FORM

ORIGINATOR NAME: Bud Brock

COUNTY: Jefferson

AREA NUMBER: Region 2	*AREA NAME:* Island Missing Scatter Data

MESH GENERATION

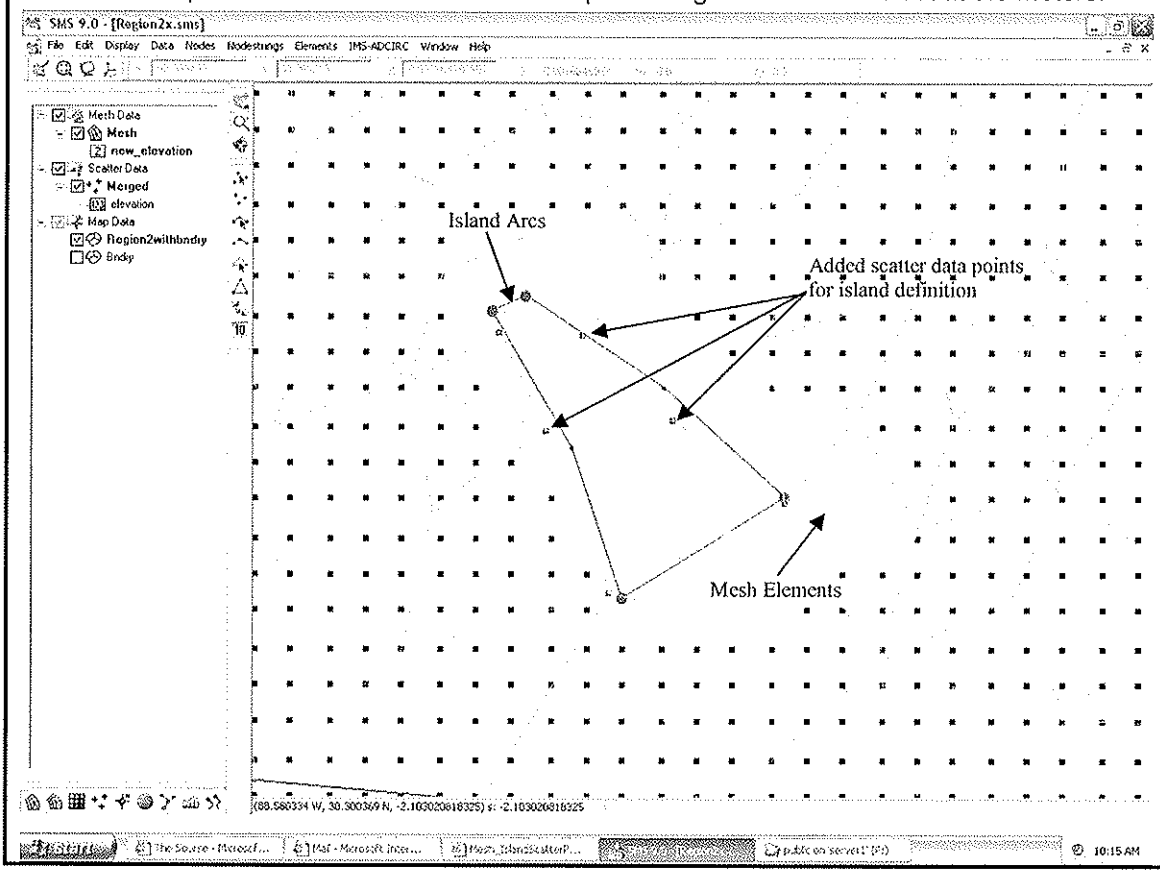
Type of Mesh: IMS-ADCIRC	

General assumptions:

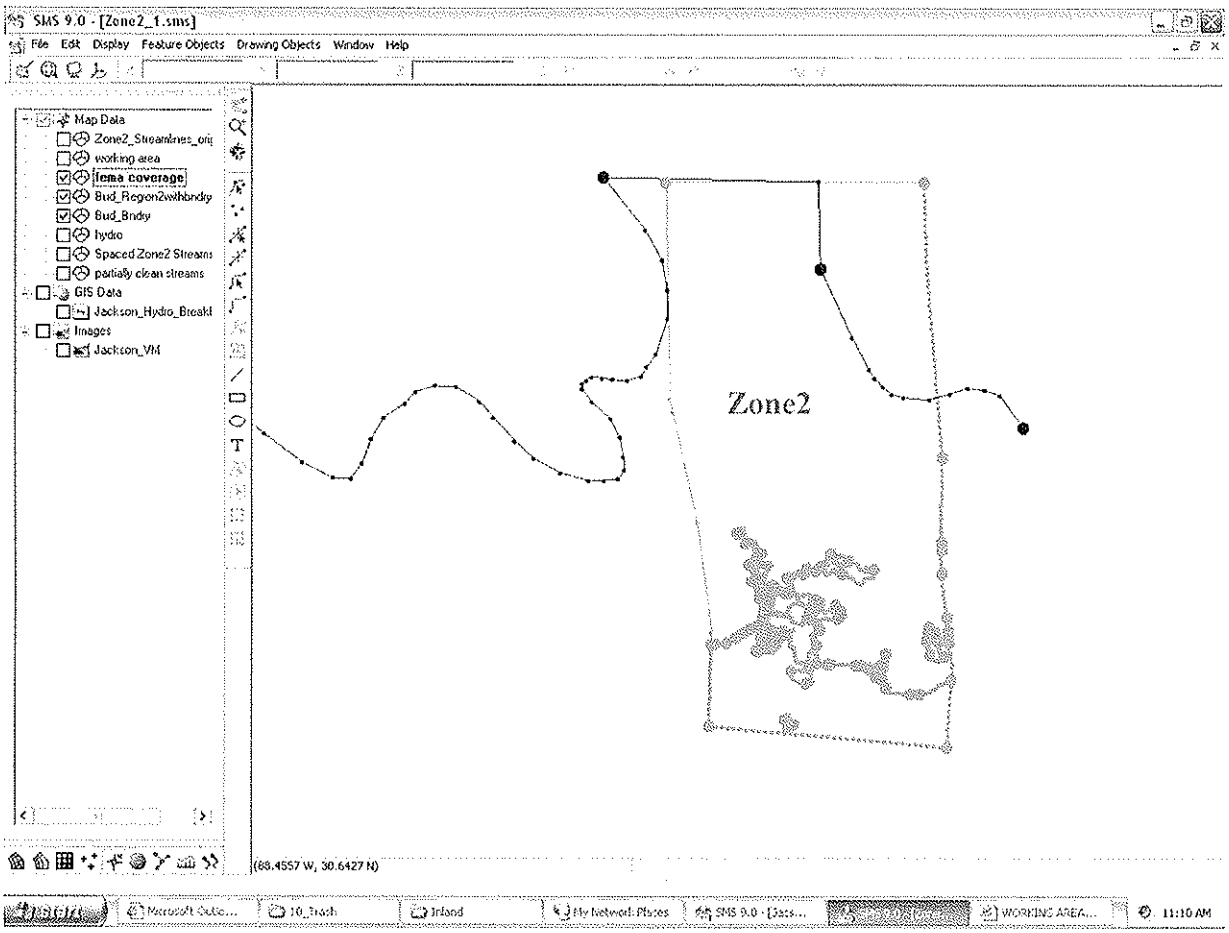
TROUBLESHOOTING

Technical Problems: The scatter data does not have depth points close to one of the islands.

Resolution: Six points were added to the scatter data along one of the small islands at the closest mesh points so the island is defined. Depths along the island were set at 0.0 meters.



ZONE 2 TOPO WORKING AREA



Master Criteria for Cleaning Hydro-breaklines

- Small streams (≤300 m wide) ➔ 100 m spacing;
- Big streams (> 300 m wide) ➔ 100 m spacing;
- Shoreline ➔ 200-500 m spacing;
- Islands ➔ 500 m spacing;
- Offshore ➔ 2000 m spacing.
- Reservoirs, basin, islands <500 m ➔ Delete
- Smallest vertex spacing ➔ 100 m
- Cut off tight meanders
- Streams < 500 m ➔ Delete

- Channel < 500 m ➔ Delete

Mesh Quality Criteria

- AR=1.5
- Area change =0.55
- Interior angle: min. 40, max 80
- Max slope change = 10000
- Connecting elements = 8

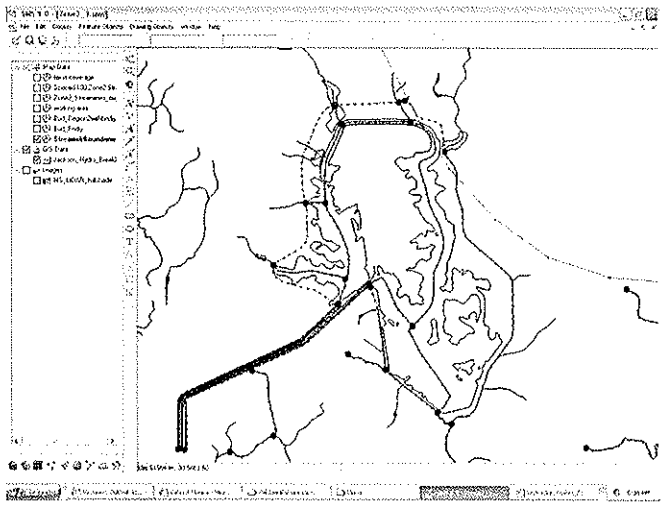
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

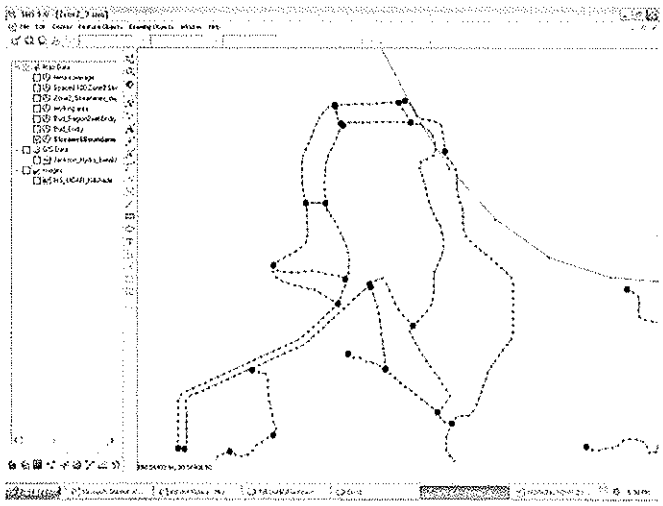
COUNTY: Jackson Co, MS

AREA NUMBER: Zone 2	*AREA NAME:* Three Rivers

HYDROLINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shoot
Little streams were removed following master criteria. Area was simplified in order to avoid abundant streamlines that would just generate complicated mesh elements.	

MAP MODULE

Spacing Distribution: 100 m for all streams	Segments Number:
Bias: 1	Type of Mesh:
General assumptions/Comments: Reservoir was preserved by building a polygon around the entire area.	Screen Shoot 

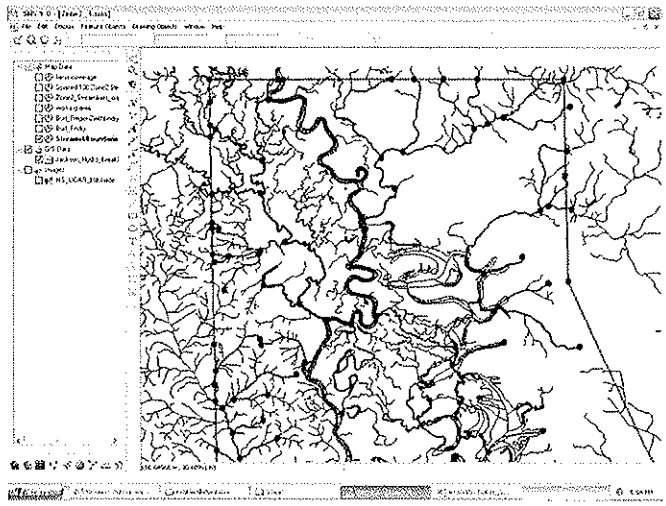
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

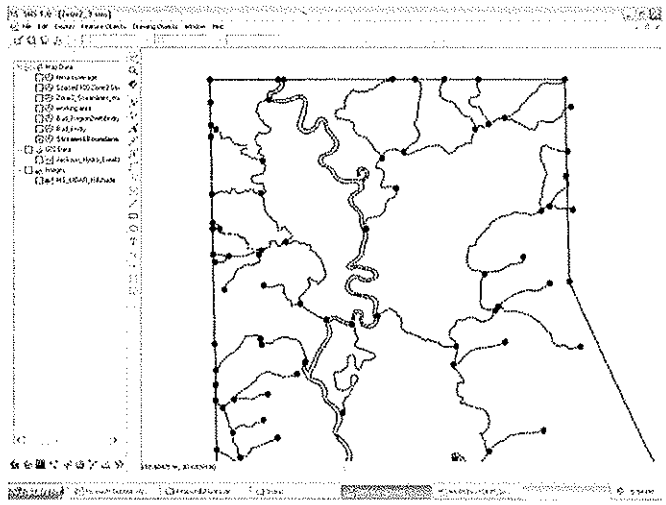
COUNTY: Jackson Co, MS

AREA NUMBER: Zone 2	*AREA NAME: Easen Hill / Harleston*

HYDROLINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shoot
The streamline shp file shows a wide floodplain enclosing several meanders and streams. From Quads and DEM it can be seen that majority of the meanders are now abandoned and filled in with vegetation. All the floodplain is going to be flooded during the simulation. No need, therefore, to digitize the many streams that would just generate complicated mesh elements.	

MAP MODULE

Spacing Distribution: 100 m along all the streams	Segments Number:
Bias: 1	Type of Mesh:
General assumptions/Comments: Final streamlines work.	Screen Shoot 

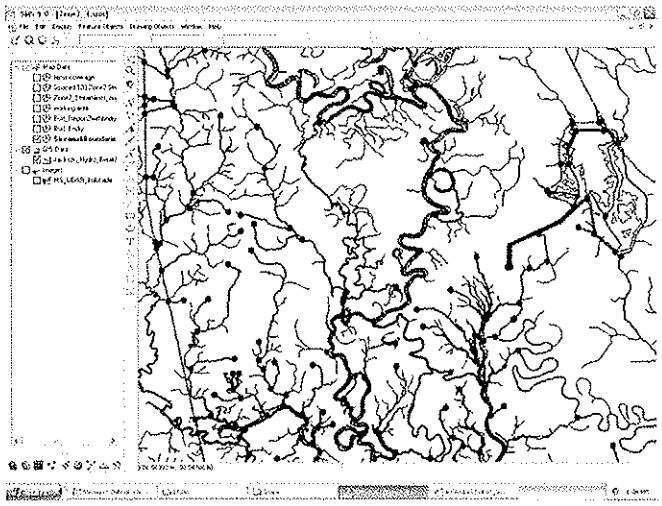
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

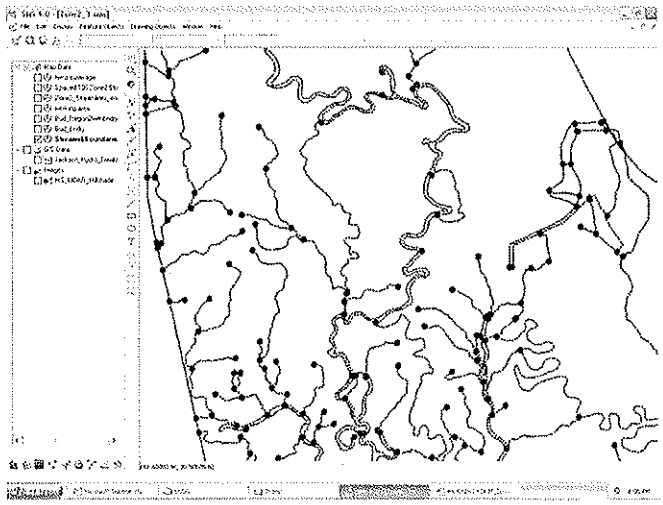
COUNTY: Jackson Co, MS

AREA NUMBER: Zone 2	*AREA NAME: Vanclave & Three Rivers*

HYDROLINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shoot
The streamline shp file shows a wide floodplain enclosing several meanders and streams. From Quads and DEM it can be seen that majority of the meanders are now abandoned and filled in with vegetation. All the floodplain is going to be flooded during the simulation. The main streams, on the western side where the ground becomes higher, are kept in order to identify the direction of the main flow. Shorter streams were deleted in order to avoid generating complicate mesh elements.	

MAP MODULE

Spacing Distribution: 100 m along all the streams	Segments Number:
Bias: 1	Type of Mesh:
General assumptions/Comments: Final streamlines work.	Screen Shoot 

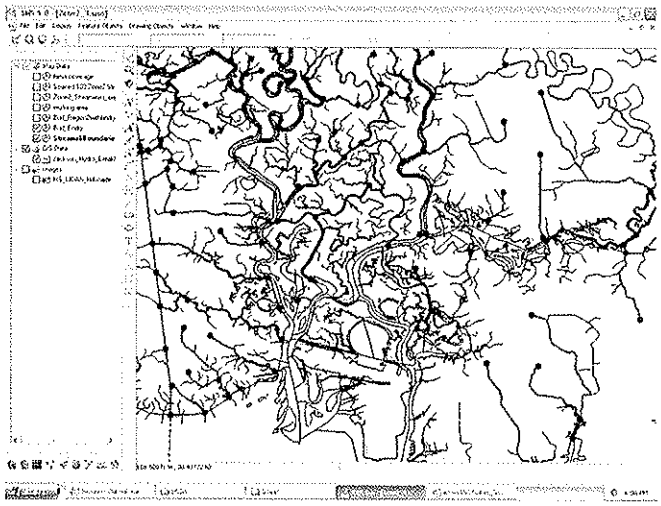
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

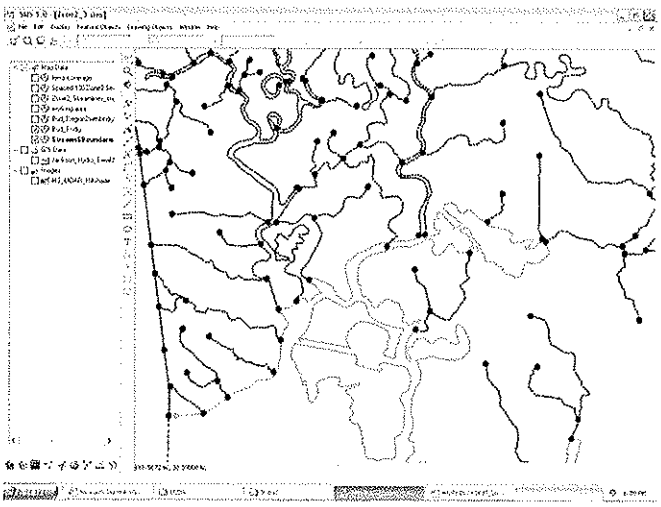
COUNTY: Jackson Co, MS

AREA NUMBER: Zone 2	*AREA NAME: Gautier & Pascagoula*

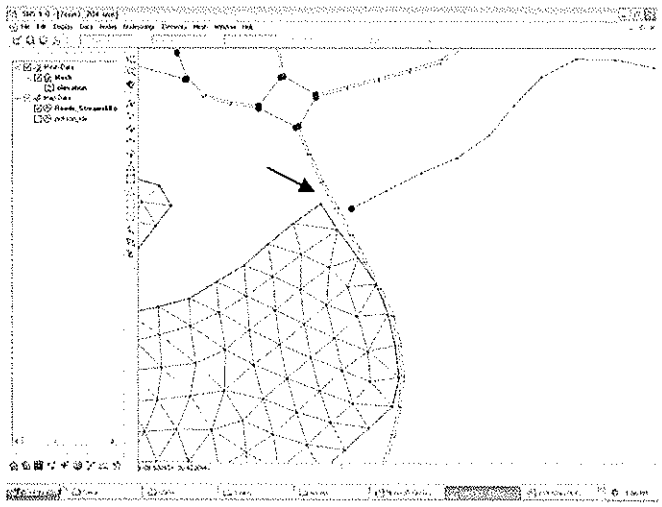
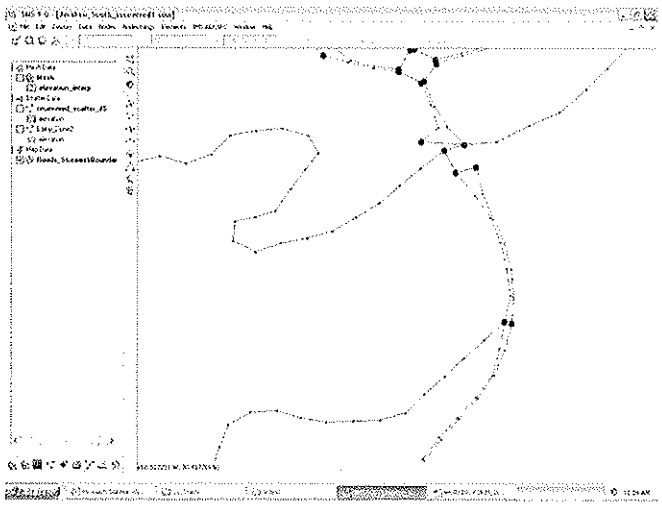
HYDROLINE DIGITIZING/CLEANING

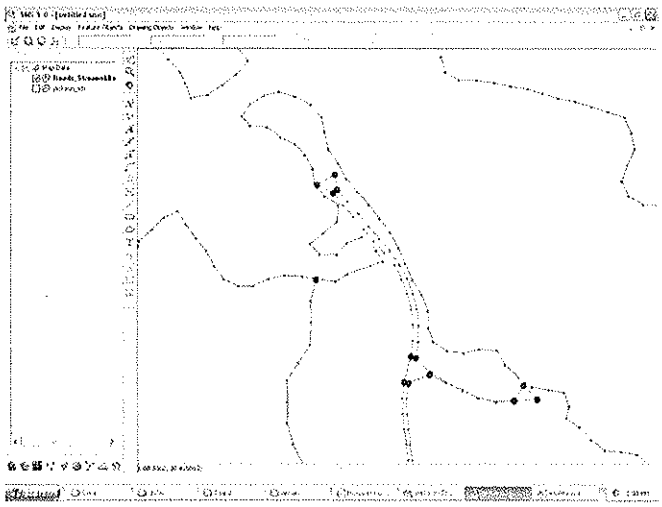
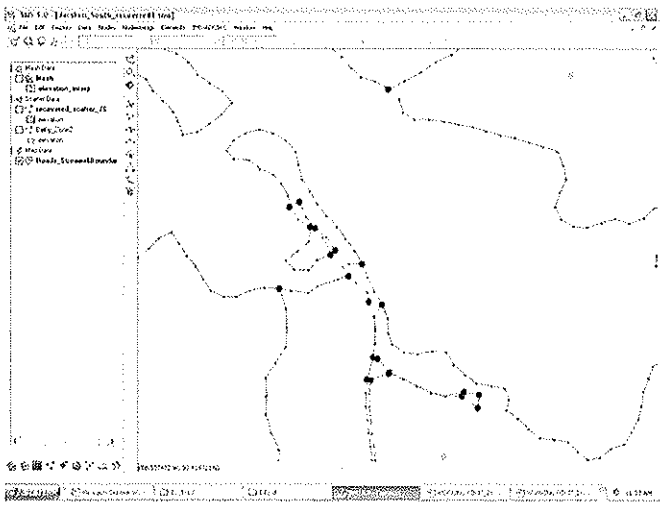
General assumptions/Comments:	Screen Shoot
Floodplain widen closer to shoreline. Only main river and streams are kept in order to identify the principal flows.	

MAP MODULE

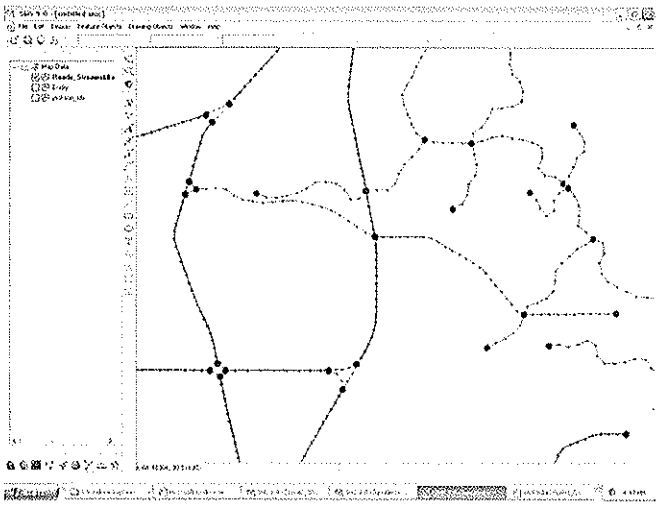
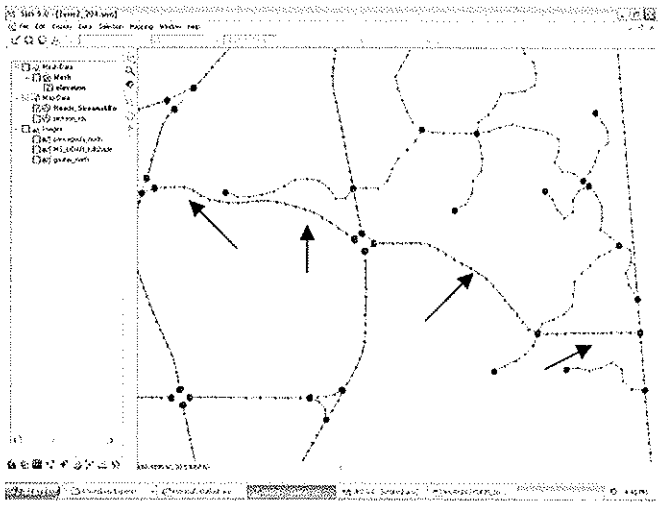
Spacing Distribution: 100 m for all streams	Segments Number:
Bias: 1	Type of Mesh:
General assumptions/Comments: Final line work. Line work connects with shoreline and canals used to mesh the offshore grid.	Screen Shoot 

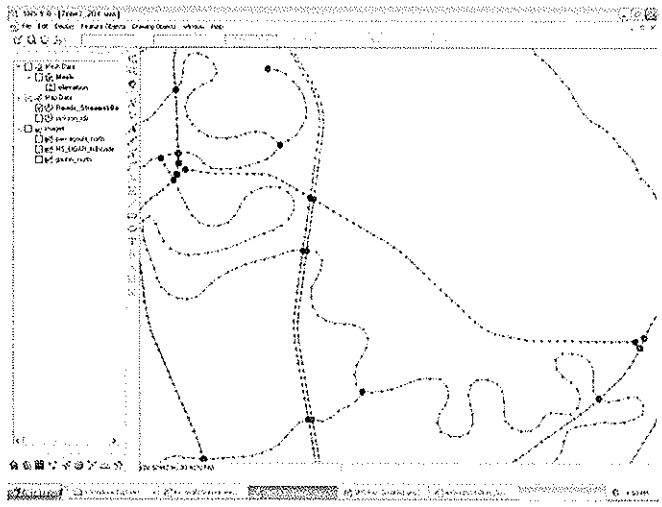
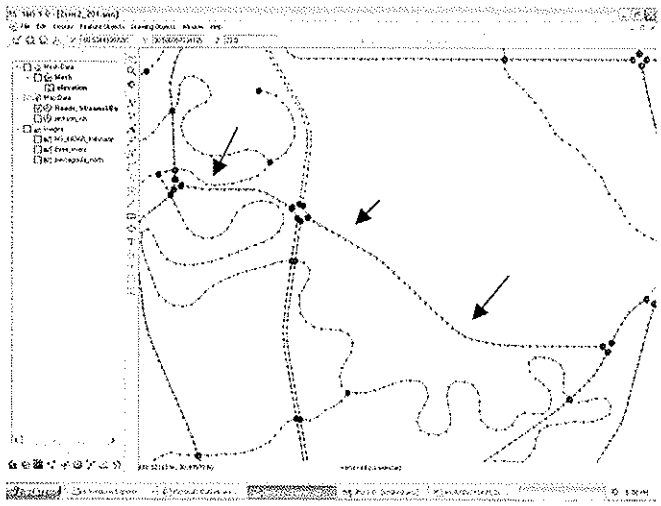
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson Co, MS	
AREA NUMBER: Zone 2	*AREA NAME: Pascagoula*
ROADS DIGITIZING/CLEANING	
General assumptions/Comments: In an instance like this, where the bathymetric grid gets too closer to the road, the road boundary gets modified in order to match the shoreline location. Gridding, between the shoreline and the road, will not occur given the width only of 36 m in the larger spot	Screen Shoot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:
General assumptions/Comments: Final line work	Screen Shoot 

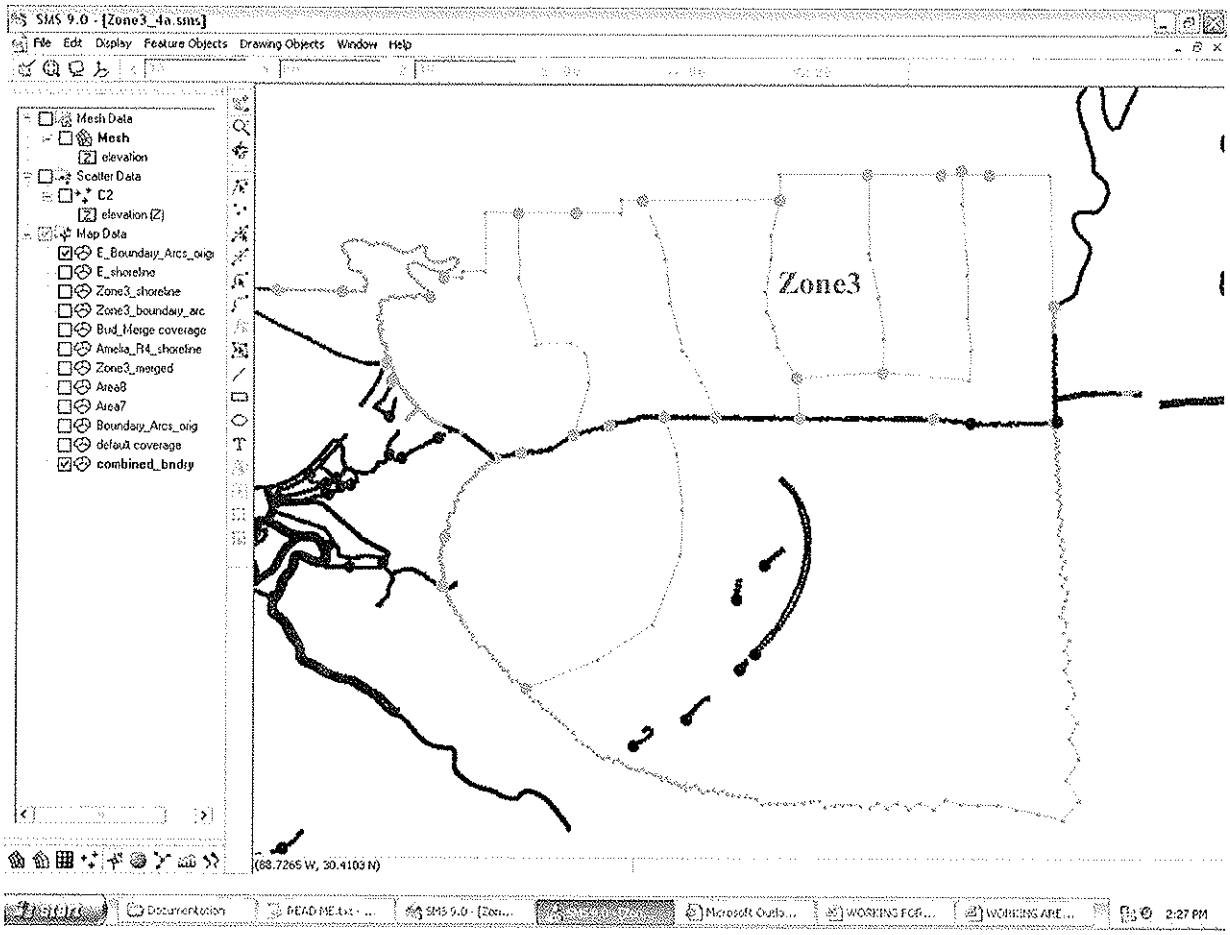
WORKING FORM	
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson Co, MS	
AREA NUMBER: Zone 2	*AREA NAME: PascagoulaNorth*
ROADS DIGITIZING/CLEANING	
General assumptions/Comments: Road has been widened and matches the shoreline in two areas. It was too narrow to generate a grid between the road and the shoreline.	Screen Shoot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:
General assumptions/Comments: Final line work	Screen Shoot 

WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson Co, MS	
AREA NUMBER: Zone 2	*AREA NAME: Three Rivers / Big Point*
ROAD DIGITIZING/CLEANING	
General assumptions/Comments: Single line road from shp file	Screen Shoot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:
General assumptions/Comments: Line was digitized in order to have a double line road. Elevations were adjusted using the ones along the original line	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson Co, MS	
AREA NUMBER: Zone 2	*AREA NAME: Three Rivers / Pascagoula North*
ROAD DIGITIZING/CLEANING	
General assumptions/Comments: Single line road from shp file	Screen Shoot 
MAP MODULE	
Spacing Distribution:	Segments Number:
Bias:	Type of Mesh:
General assumptions/Comments: Line was digitized in order to have a double line road. Elevations were adjusted using the ones along the original line	Screen Shoot 

ZONE 3 WORKING AREA



Master Spacing Criteria

- Small streams (≤240 m wide) ➔ 80 m spacing;
- Big streams (> 240 m wide) ➔ 80 m spacing;
- Shoreline ➔ 200-500 m spacing;
- Islands ➔ 500 m spacing;
- Offshore ➔ 2000 m spacing.

Mesh Quality Criteria

- AR=1.5
- Area change =0.55
- Interior angle: min. 40, max 80
- Max slope change = 10000
- Connecting elements = 8

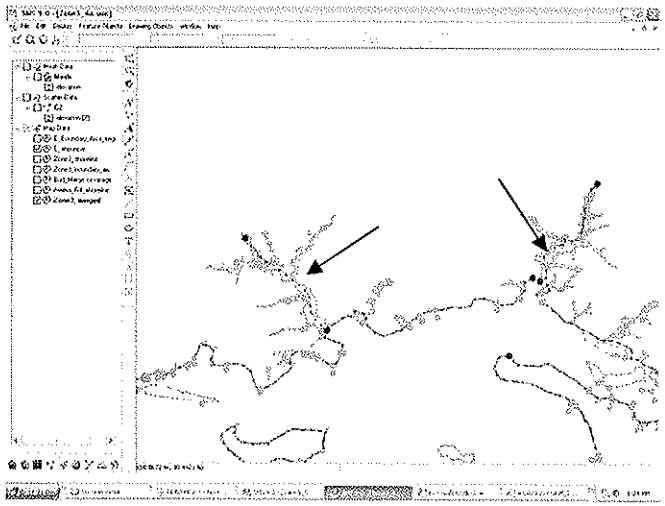
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

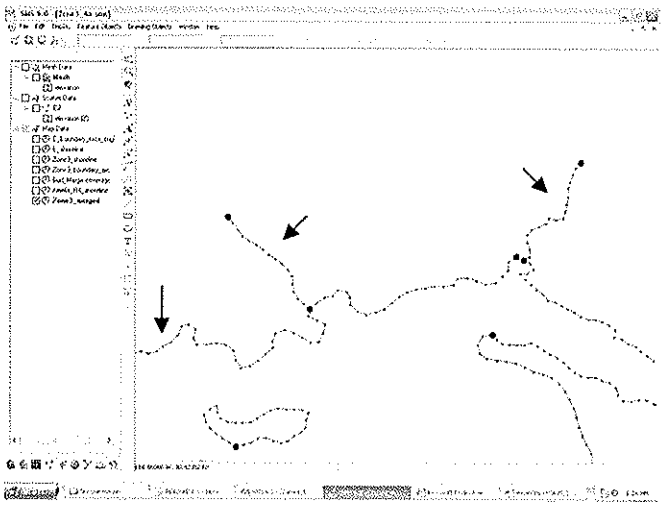
COUNTY: Harrison / Jackson Co, MS

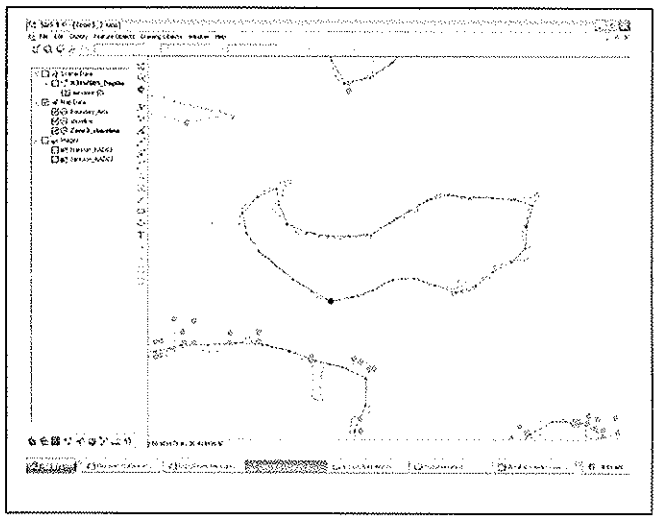
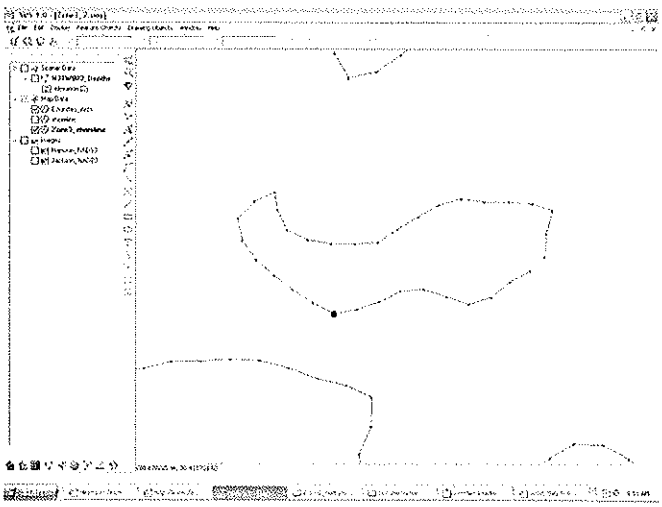
AREA NUMBER: Zone 3	*AREA NAME:* Back Bay of Biloxi

SHORELINE DIGITIZING/CLEANING

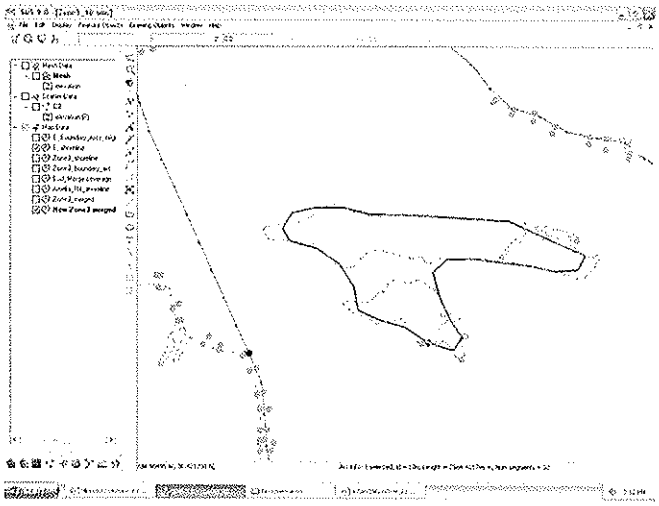
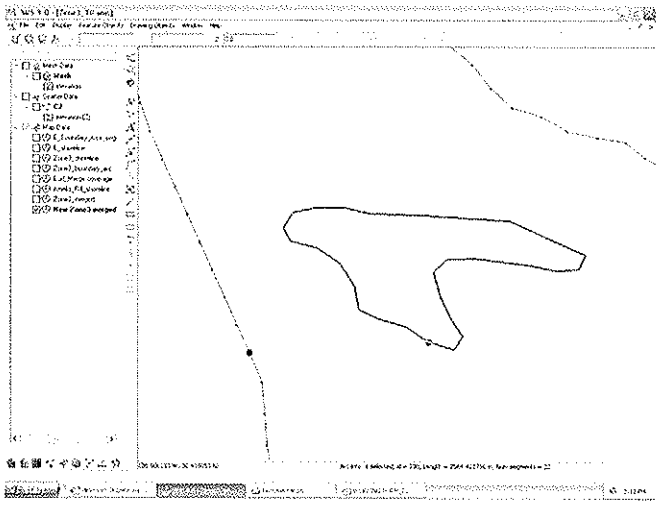
General assumptions/Comments:	Screen Shoot
Northern inland coastline. Streams ~ 80 m and 100 m wide at estuary. Too small to resolve. Removed from shoreline.	

MAP MODULE

Spacing Distribution: 100 m (inland coastline), 80 m for guideline arcs	Segments Number: Segments Number: 91 (inland coastline), 16 (western guiding arc), 18 (eastern guiding arc)
Bias: 1	Type of Mesh: paving
General assumptions/Comments: Guiding arcs are placed along removed streams to guide inland flow	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Harrison \ Jackson, MS	
AREA NUMBER: Zone 3	*AREA NAME:* Back Bay of Biloxi
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Island left as is	Screen Shoot 
MAP MODULE	
Spacing Distribution: 80 m	Segments Number: 34
Bias: 1	Type of Mesh: paving
General assumptions/Comments: A paving type of mesh is used in the surroundings.	Screen Shoot 

WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Harrison Co, MS	
AREA NUMBER: Zone 3	*AREA NAME:* Back Bay of Biloxi
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Islands cannot be disregarded but channel in the middle is too narrow (~97 m) to be properly resolved. Islands are merged together.	Screen Shoot 
MAP MODULE	
Spacing Distribution: 80 m	Segments Number: 32
Bias: 1	Type of Mesh: paving
General assumptions/Comments:	Screen Shoot 

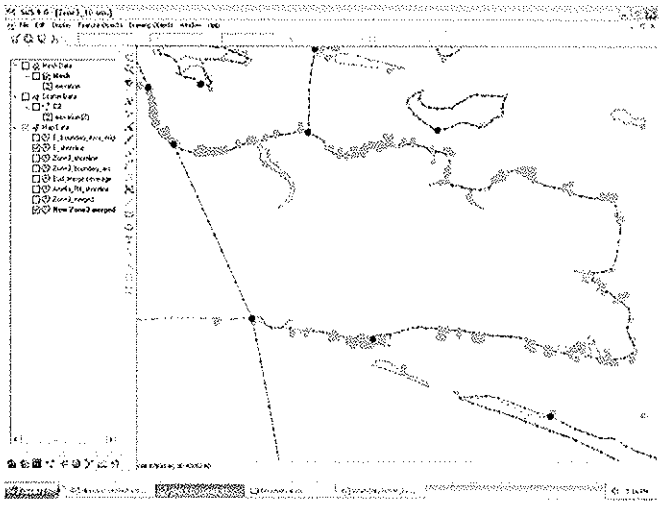
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

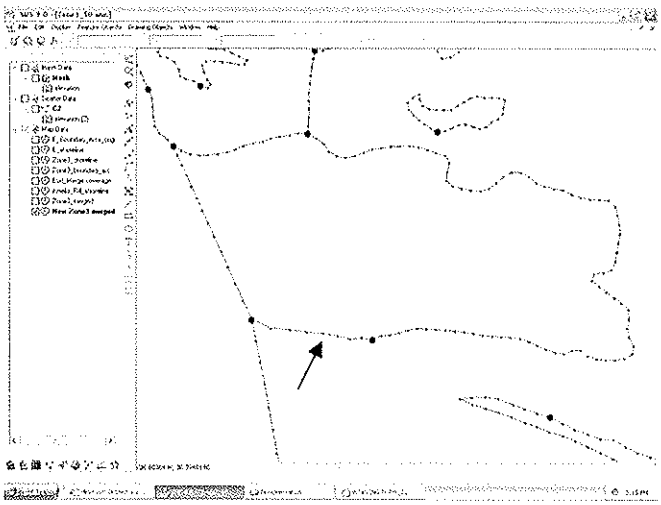
COUNTY: Harrison Co, MS

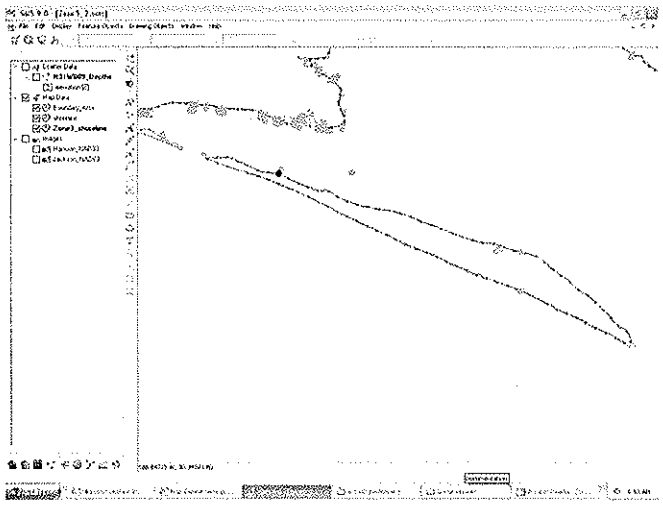
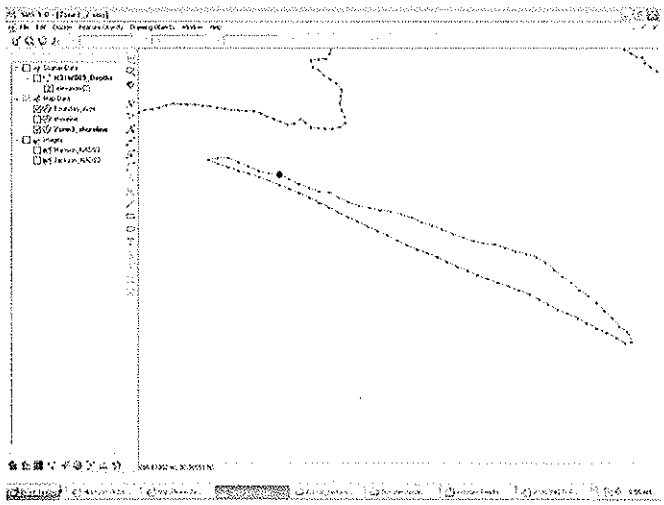
AREA NUMBER: Zone 3	*AREA NAME:* Back Bay of Biloxi, Biloxi Bay

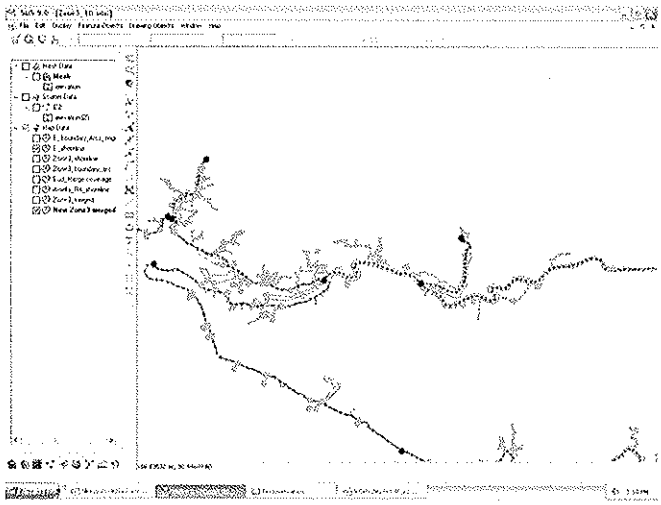
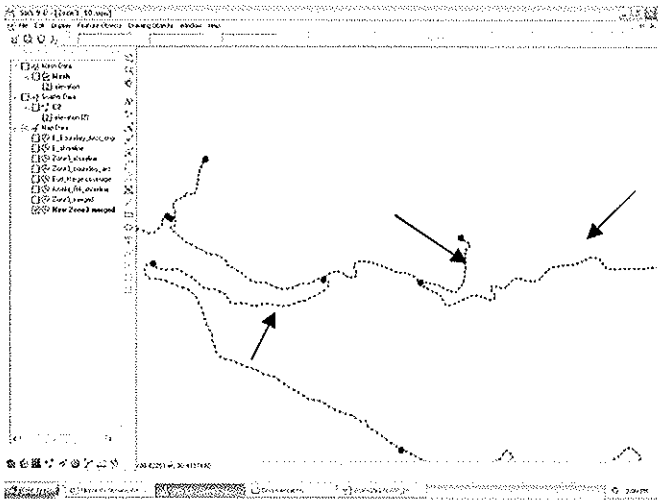
SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shoot
In the major area, all little streams were removed because below resolution.	

MAP MODULE

Spacing Distribution: 100 m	Segments Number: 103
Bias: 1	Type of Mesh: paving
General assumptions/Comments: Variables refer to major above ground area. Open coast shoreline, on the south side close to the boundary, has a spacing of 150 m with 2 bias, in order to better merge with adjacent zone. Segments number: 8.	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Harrison Co, MS	
AREA NUMBER: Zone 3	*AREA NAME:* Biloxi Bay, Gulf of Mexico
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Smaller island, west of larger one, was removed because smaller than master criteria.	Screen Shoot 
MAP MODULE	
Spacing Distribution: 150 m	Segments Number: 87
Bias: 1	Type of Mesh: Paving
General assumptions/Comments:	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson Co, MS	
AREA NUMBER: Zone 3	*AREA NAME:* Old Fort Bayou
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Estuary area cleaned out of little streams and islands smaller than master criteria.	Screen Shoot 
MAP MODULE	
Spacing Distribution: 90 m at both side of outer estuary and 80 m along guiding arcs	Segments Number: 73 (estuary), 22 (shorter arc), 178 (longer arc)
Bias: 1	Type of Mesh: paving
General assumptions/Comments: Main narrow stream was removed, but since scatter data support depth, a guiding arc replaces it. Added a second small guiding arc to drive flow inland	Screen Shoot 

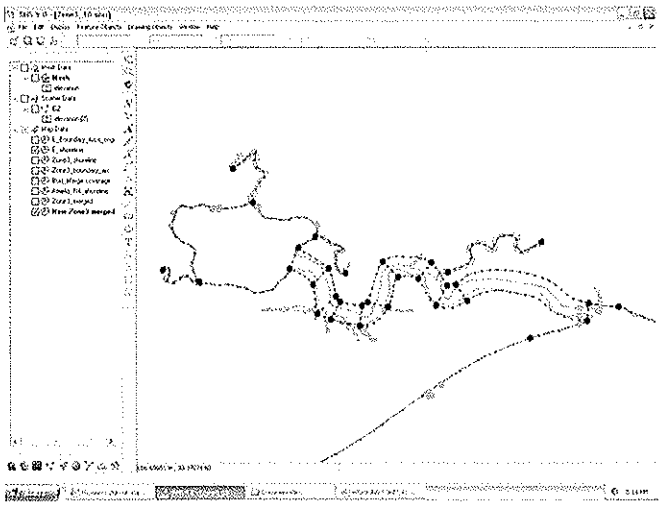
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

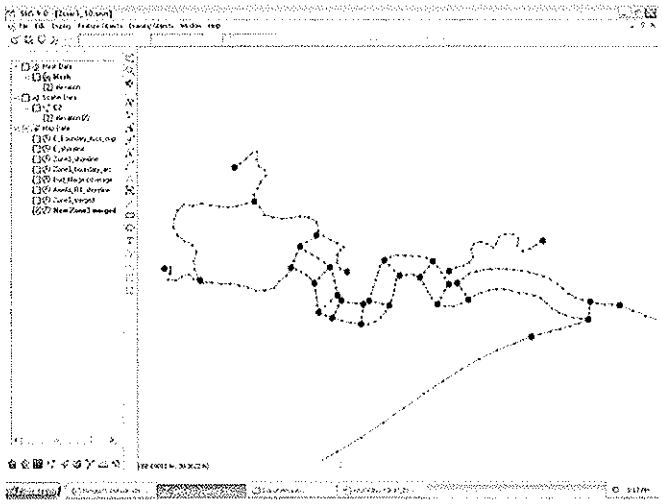
COUNTY: Jackson Co, MS

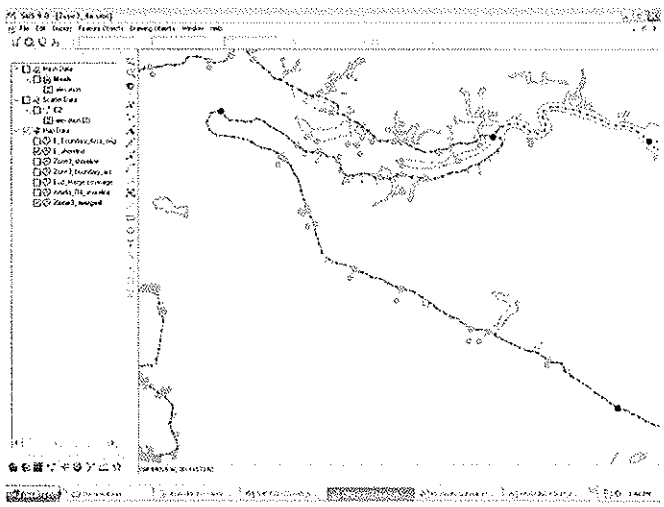
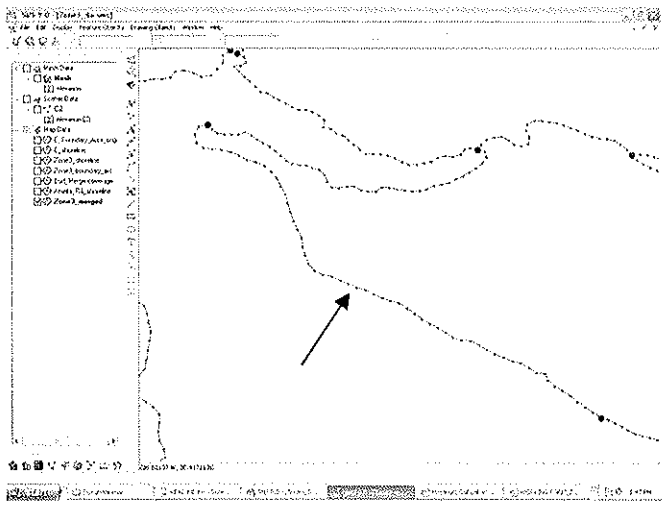
AREA NUMBER: Zone 3	*AREA NAME:* Graveline Bayou

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shoot
Lake and channel cleaned out of little streams smaller than master criteria	

MAP MODULE

Spacing Distribution: 100 m (around the lake), 80 m (along channel and arcs)	Segments Number: 42 (lake)
Bias: 1	Type of Mesh: paving and patch
General assumptions/Comments: Channel banks were enlarge compared to original ones in order to capture and resolve the channel. Scatter data may need adjustment. Channel width expanded to 240 m in order to have 3 segments. Straight portions of the channel are going to be gridded as patch, while curvilinear portions and the lake are going to be gridded as paving. Area at the estuary, along the shoreline, is spaced at 150 m on both side in order to facilitate the transition from the open coast to the channel	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson Co, MS	
AREA NUMBER: Zone 3	*AREA NAME:* Biloxi Bay
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Straight shoreline cleaned out of piers and little streams, sized below master criteria	Screen Shoot 
MAP MODULE	
Spacing Distribution: 100 m	Segments Number: 60
Bias: 1	Type of Mesh: paving
General assumptions/Comments: Narrow spacing is used here, even if, shoreline is straight. Narrow spacing is needed to resolve the area, complicated by many features such as, barrier islands, islands and estuaries	Screen Shoot 

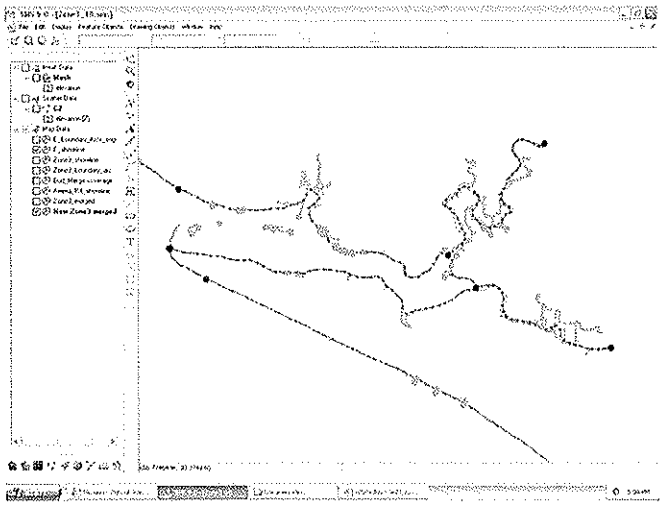
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

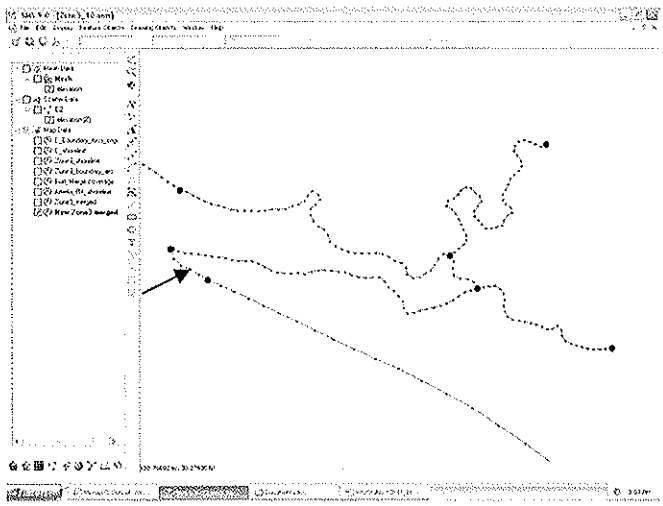
COUNTY: Jackson Co, MS

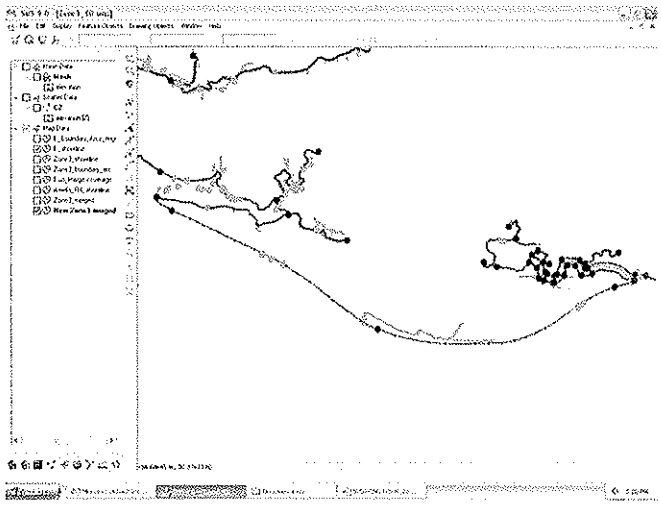
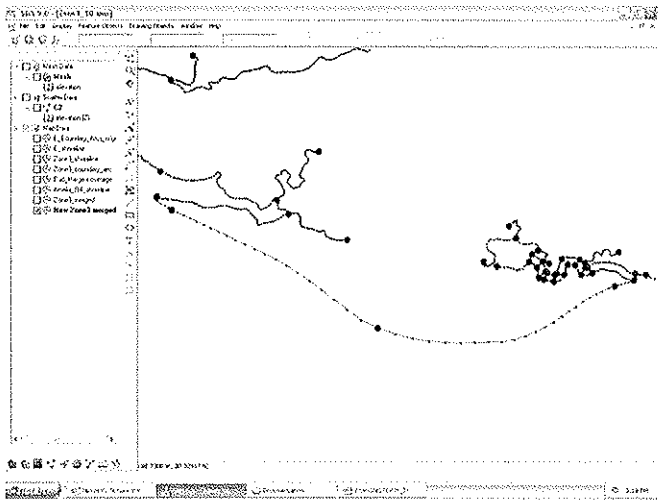
AREA NUMBER: Zone 3	*AREA NAME:* Davis Bayou

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shoot
Estuary area cleaned out of small streams, smaller than master criteria.	

MAP MODULE

Spacing Distribution: 90m (estuary shore), 150 m (tip of barrier island- south side), 80m (guiding arcs)	Segments Number: 108 (estuary), 52 (northern arc), 29 (southern arc), 5 (tip of barrier island – south side)
Bias: 1	Type of Mesh: paving
General assumptions/Comments: Guiding arcs placed to direct flow inland. A straight shoreline begins south of the estuary. A spacing of 150 m is established, on the southern side of the tip, in order to better transition to a coarse spacing.	Screen Shoot 

WORKING FORM	
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson co, MS	
AREA NUMBER: Zone 3	*AREA NAME:*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Straight shoreline cleaned out of small feature. Delimitation of marsh removed since not supported by bathymetric data	Screen Shoot 
MAP MODULE	
Spacing Distribution: 350 m	Segments Number: From central point: 21 (on left), 22 (on right)
Bias: 3	Type of Mesh: paving
General assumptions/Comments: 350 m is considerate an appropriate spacing given the high developed area surrounding this stretch of coast.	Screen Shoot 

MASH DESCRIPTION FORM

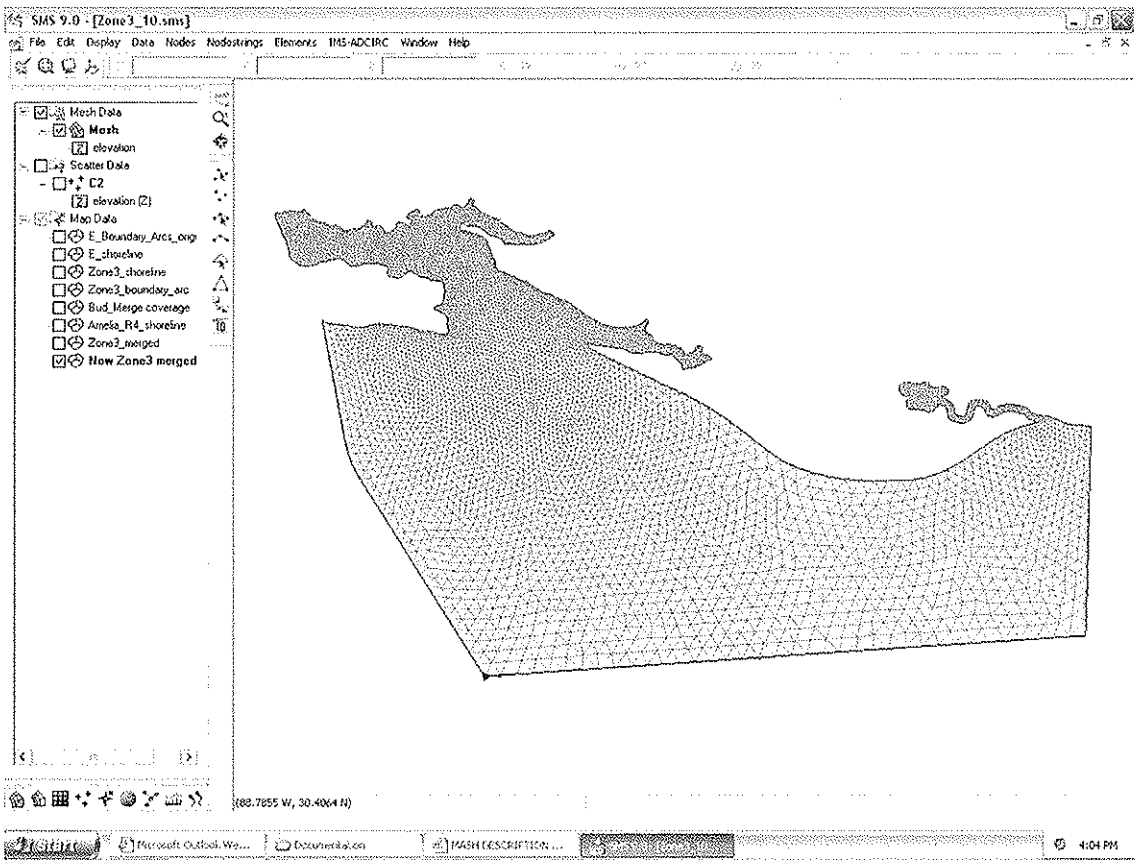
ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Harrison/ Jackson Co, MS	
AREA NUMBER: Zone 3	*AREA NAME:*

MESH GENERATION

Type of Mesh: paving	Patch used in the channel on straight segments

General assumptions:

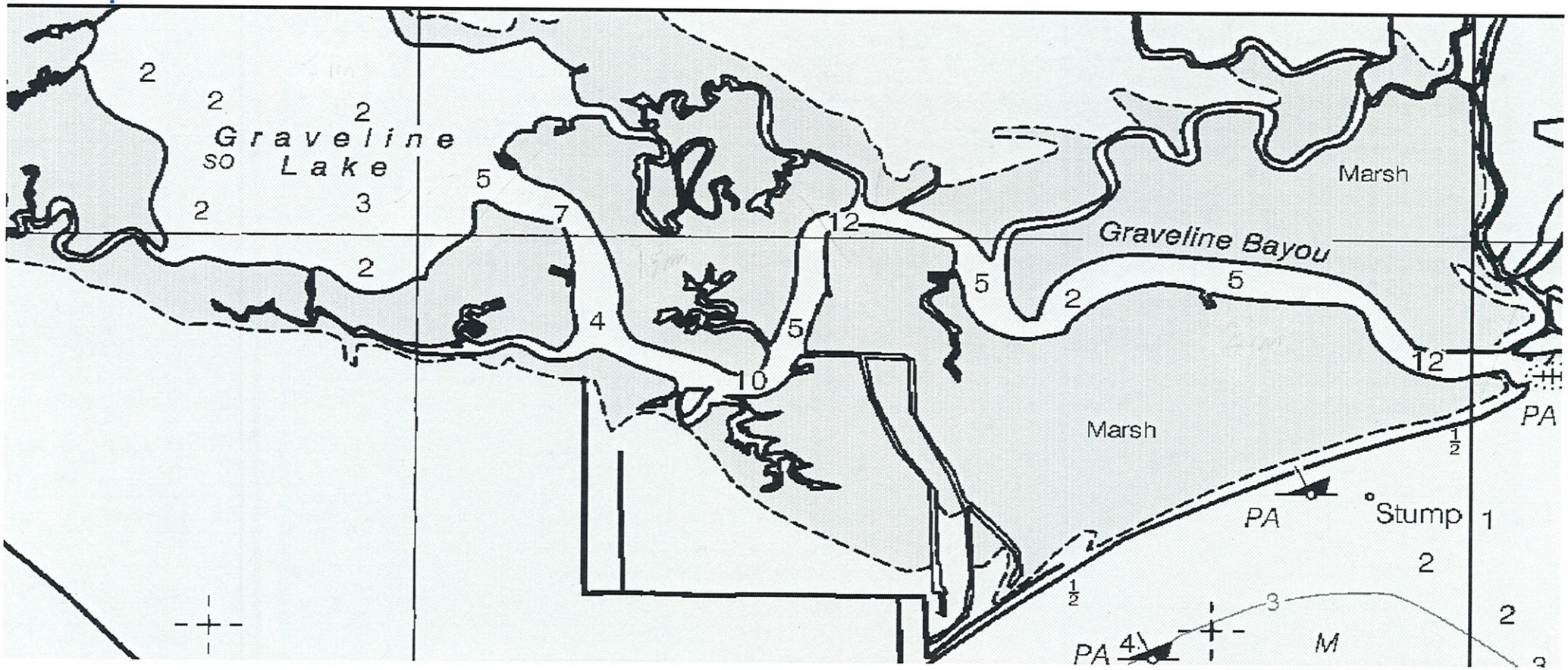
The only assumptions made were taken in order to have the shoreline and the boundaries merging well with the adjacent areas.



TROUBLESHOOTING
Technical Problems: No problems arose during the mesh generation. It only appeared that in estuaries areas and close to the small islands, the grid had element to small (~50 m) given by a spacing of 80 m.
Resolution: It was decided to increase the spacing in those areas to 100m in order to obtain large elements. Please not that the grid showed here has the islands gridded. SMS Project: Zone3_10

Zone 3 Offshore

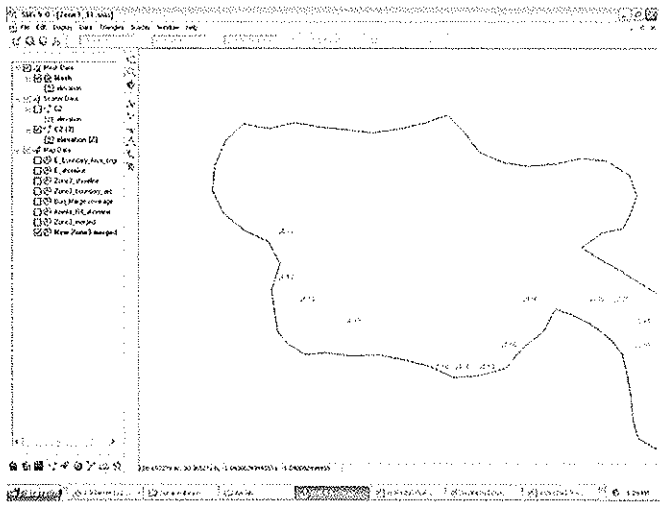
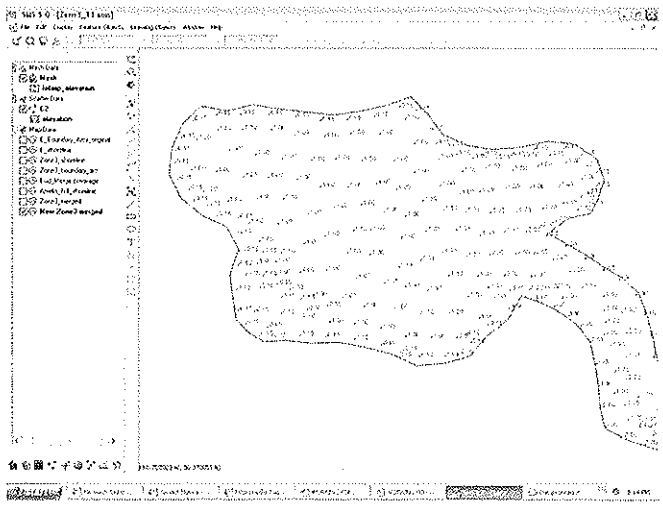
In feet at MLLW



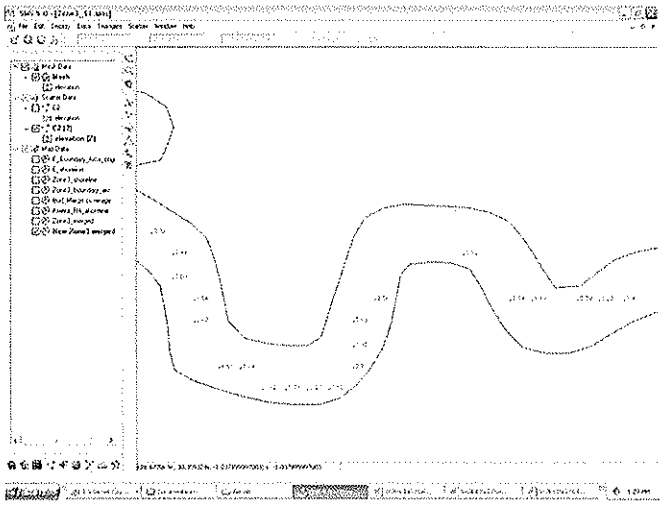
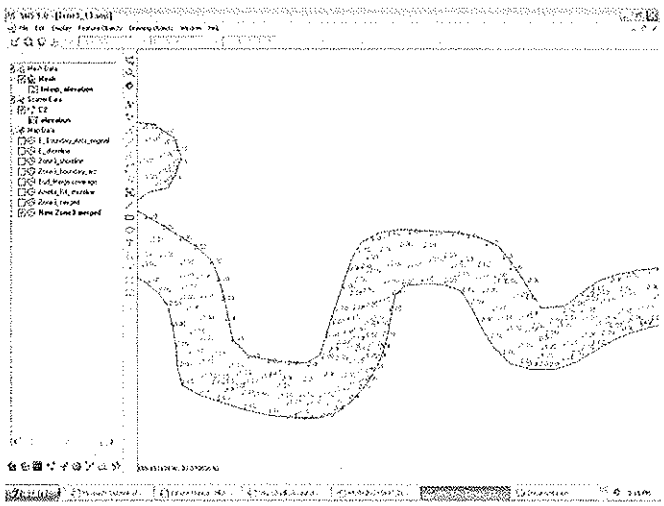
Zone 3_11. sms

shows added elevation &
new interpolation to scatter data

WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson	
AREA NUMBER: Zone 3	*AREA NAME: Graveline lake*
ORIGINAL SCATTER DATA POINTS	
General assumptions/Comments: Limited scatter points in bathymetry require the adding of additional points.	Screen Shoot 
ADDED SCATTER DATA POINTS	
Project showing modification: Zone3_11.sms	
General assumptions/Comments: Scatter points are added using existing data and data from nautical chart. See file 11347_21.tif	Screen Shoot 

WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan	
COUNTY: Jackson	
AREA NUMBER: Zone 3	*AREA NAME: Graveline Bayou*
ORIGINAL SCATTER DATA POINTS	
General assumptions/Comments:	Screen Shoot 
ADDED SCATTER DATA POINTS	
Project showing modification: Zone3_11.sms	
General assumptions/Comments: Scatter points are added using existing data and data from nautical chart. See file 11347_21.tif	Screen Shoot 

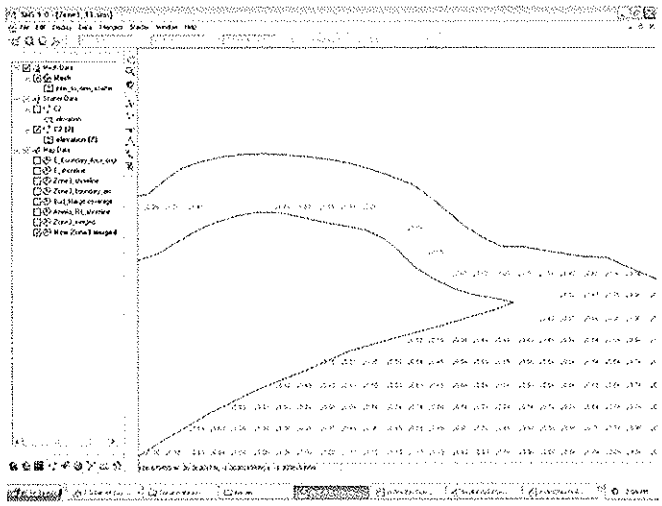
WORKING FORM

ORIGINATOR NAME: Elena Drei-Horgan

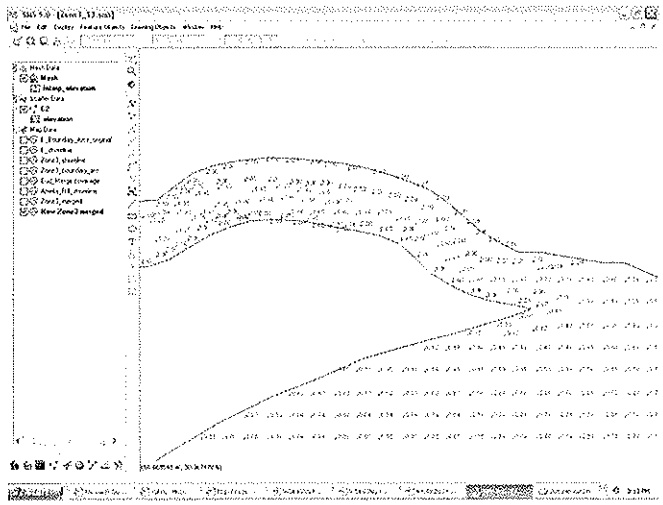
COUNTY: Jackson

AREA NUMBER: Zone 3	*AREA NAME: Graveline Bayou*

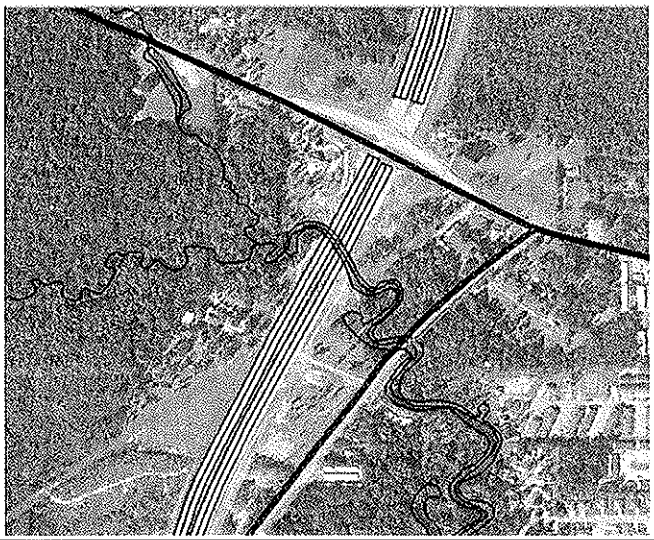
ORIGINAL SCATTER DATA POINTS

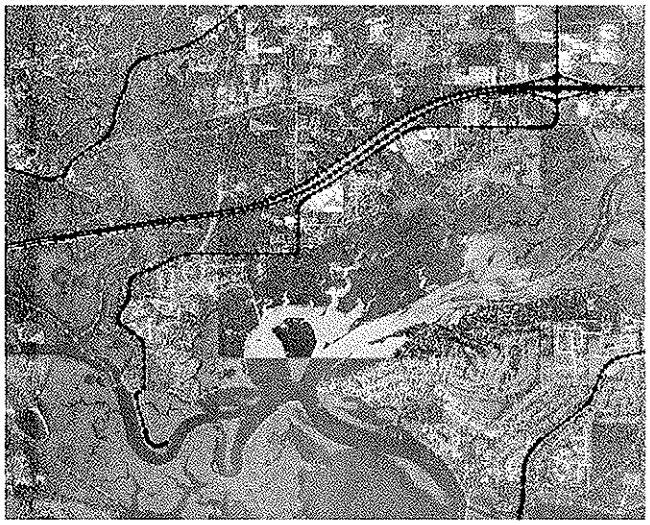
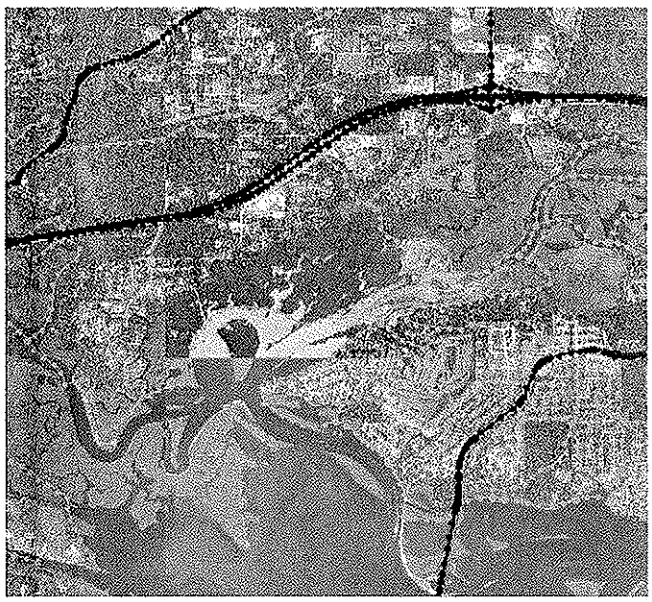
General assumptions/Comments:	Screen Shoot
Limited scatter points in bathymetry require the adding of additional points.	

ADDED SCATTER DATA POINTS

Project showing modification: Zone3_11.sms	
General assumptions/Comments:	Screen Shoot
Scatter points are added using existing data and data from nautical chart. See file 11347_21.tif	

WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Harrison	
AREA NUMBER: 4 - Topo	*AREA NAME:* US-90
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: US-90 spans the entire coastline along area 4. It is 2 – 3 meters above sea level and an average of 70m from the coastline. The closeness to the shoreline produced unreliable results between the road and the coastline Available topo suggests that the coast is steep naturally and that the road is not superelevated above the natural ground. Because of this, the road will be removed to provide a more accurate model of the terrain.	Screen Shot: US-90
MAP MODULE	
Spacing Distribution: N/A	Number of Segments: 0
Bias: N/A	Type of Mesh: N/A
General assumptions/Comments: Terrain break lines with US-90 removed.	Screen Shot:

WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Harrison	
AREA NUMBER: 4 - Topo	*AREA NAME:* Fritz Creek and Lorraine Road
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: Fritz Creek passed through bridges underneath Lorraine Road and an unnamed-incomplete highway. The incomplete highway is much larger and higher than Lorraine Road. The two roads are close enough to each other that it would not be accurate to model between them.	Screen Shot: 
MAP MODULE	
Spacing Distribution: N/A	Number of Segments: 0
Bias: N/A	Type of Mesh: N/A
General assumptions/Comments: Since Lorraine Road is the lower, narrower road it was removed to model flow in the area more accurately. The highway also has a larger bridge, so it is more conservative as it allows more water to pass through.	Screen Shot:

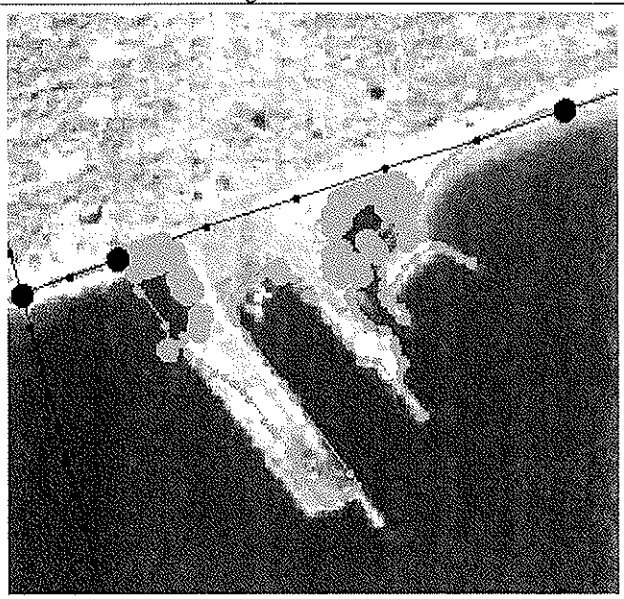
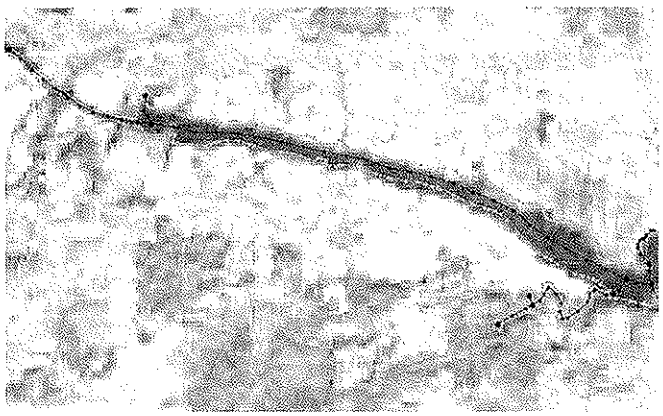
WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Harrison	
AREA NUMBER: 4	*AREA NAME:* West Oaklawn Rd. and South River Drive
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: West Oaklawn Road exits off of I-10 and proceeds southwest along I-10 until it dead ends in a residential area. South River Drive then proceeds south from this area, until it dead ends. Both of these roads are elevated more than a foot above ground level. However, because both roads can be inundated by water flowing around them. For the small portion where water will not flow around them, I-10 will take precedence as it is elevated higher than the other two. For this reason, W. Oaklawn Rd. and South River Dr. will not be modeled as weirs.	Screen Shot: 
MAP MODULE	
Spacing Distribution: N/A	Number of Segments: 0
Bias: N/A	Type of Mesh: N/A
General assumptions/Comments: This is the area with both roads removed.	Screen Shot: 

WORKING FORM

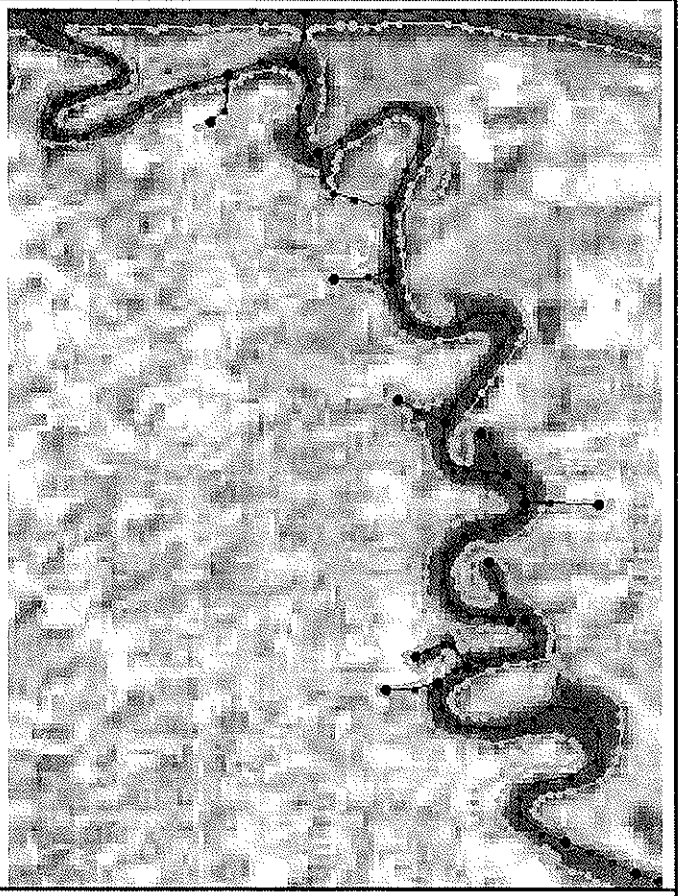
ORIGINATOR NAME: Amelia Vincent

COUNTY: Harrison County

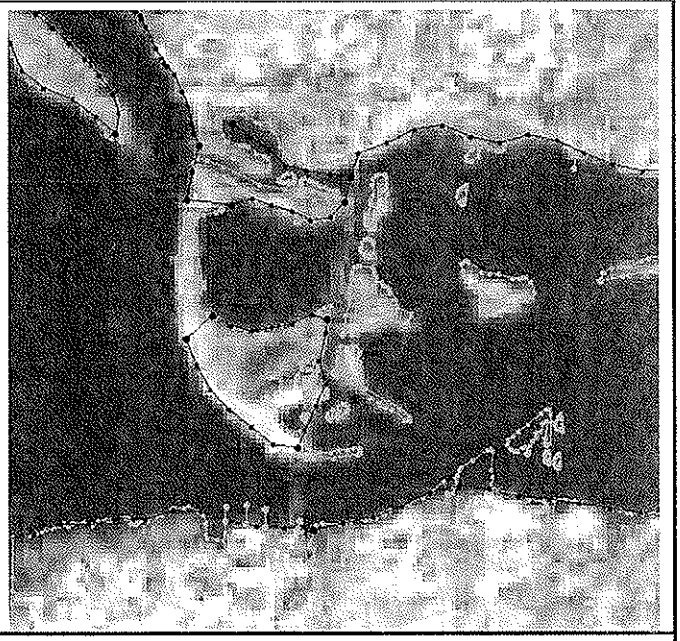
SHORELINE DIGITIZING/CLEANING

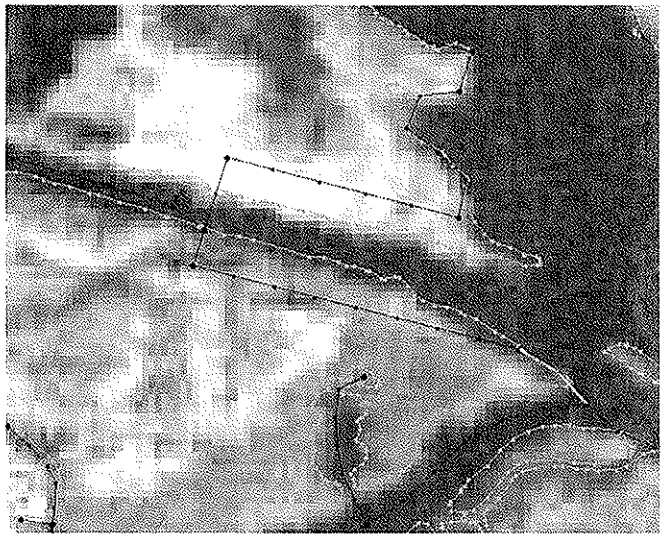
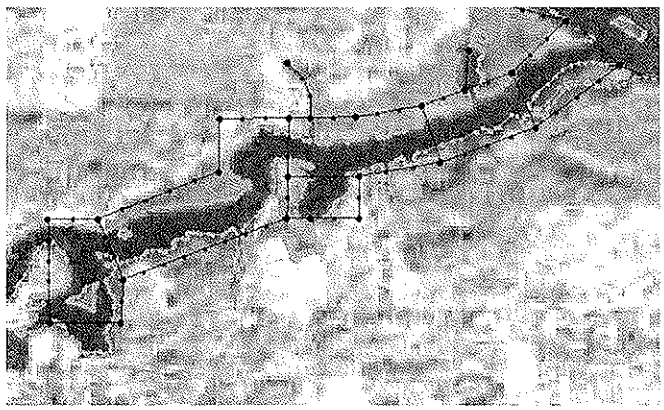
AREA NUMBER: Region 4	*AREA NAME:* Shoreline – 89.09 W 30.35 N Near border with Region 5
General assumptions/Comments: - Jetties are less than 240 meters wide - Urbanized area - Features should not affect storm surge	
AREA NUMBER: Region 4	*AREA NAME:* 89.07 W 30.42 N
General assumptions/Comments: - Linearized stream channel - Channel width is between 90 and 195 meters	
AREA NUMBER: Region 4	*AREA NAME: Industrial Waterway, 89.02 W 30.42 N*

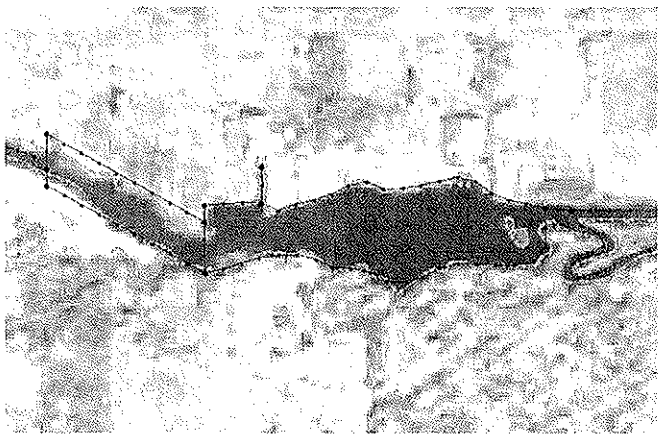
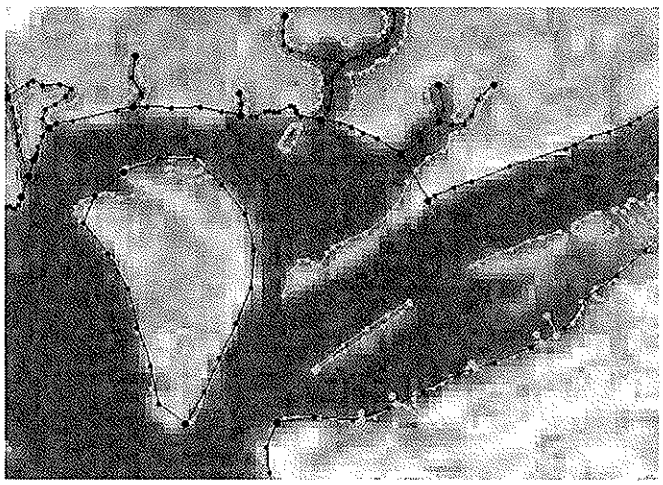
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: - Linearized stream channel - Channel width is between 75 and 110 meters	
AREA NUMBER: Region 4	*AREA NAME: Bernard Bayou, 89.04 W 30.41 N*

SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: - Linearized stream channel - Channel width is between 50 and 180 meters	
AREA NUMBER: Region 4	*AREA NAME: 89.94 W 30.42 N*

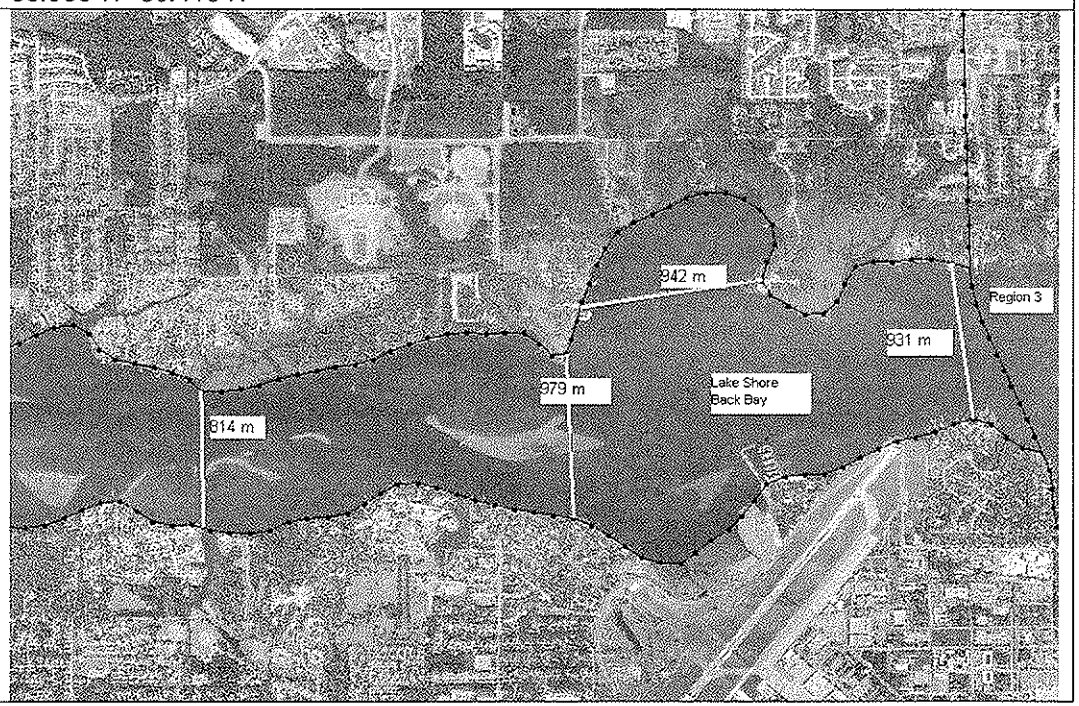
SHORELINE DIGITIZING/CLEANING

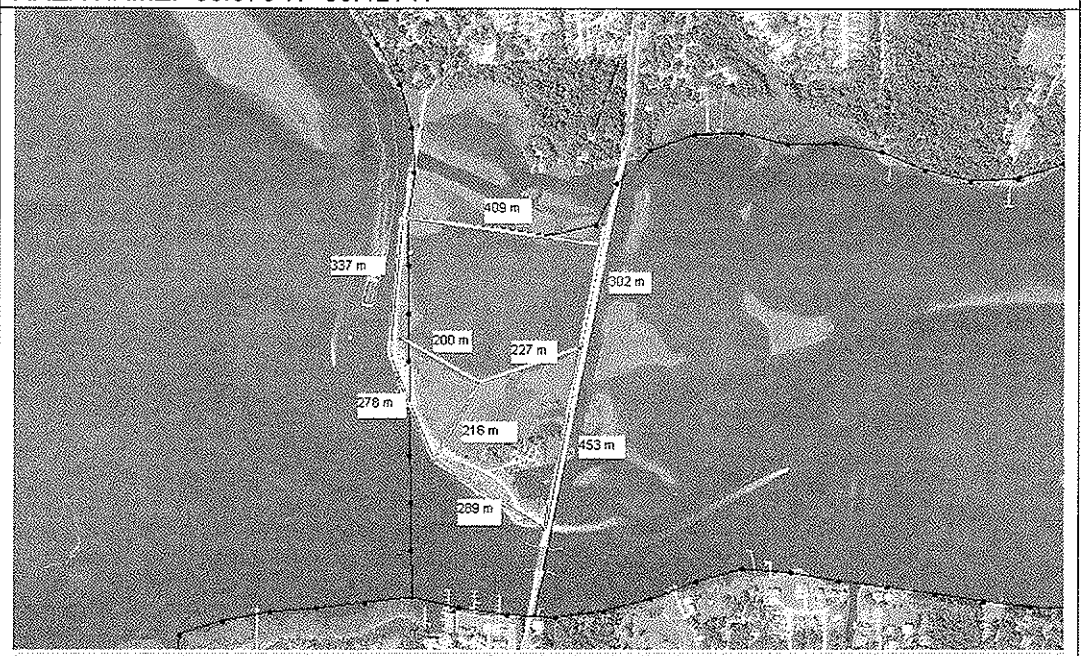
General assumptions/Comments: - Small strip of land is 40 to 70 meters - Need to reduce tidal volume for this area	
AREA NUMBER: Region 4	*AREA NAME: 88.99 W 30.43 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: - Smallest channel width was 155 meters - Increased channel width to 240 meters - Need to reduce tidal volume for this area	
AREA NUMBER: Region 4	*AREA NAME: 89.00 W 30.41 N*
SHORELINE DIGITIZING/CLEANING	

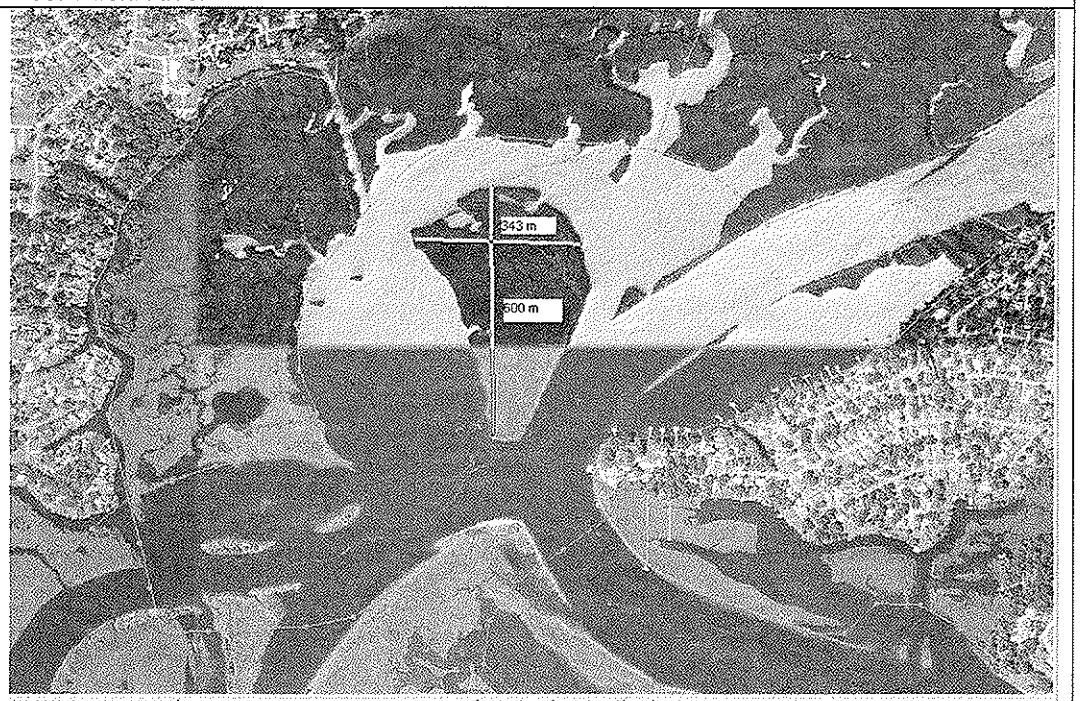
General assumptions/Comments: - Transition area between 80 and 240 meter channel width - Need to reduce tidal volume for this area	
AREA NUMBER: Region 4	*AREA NAME: 89.00 W 30.41 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: - Transition area between 80 and 240 meter channel width - Need to reduce tidal volume for this area	
AREA NUMBER: Region 4	*AREA NAME: 89.06 W 30.42 N*
SHORELINE DIGITIZING/CLEANING	

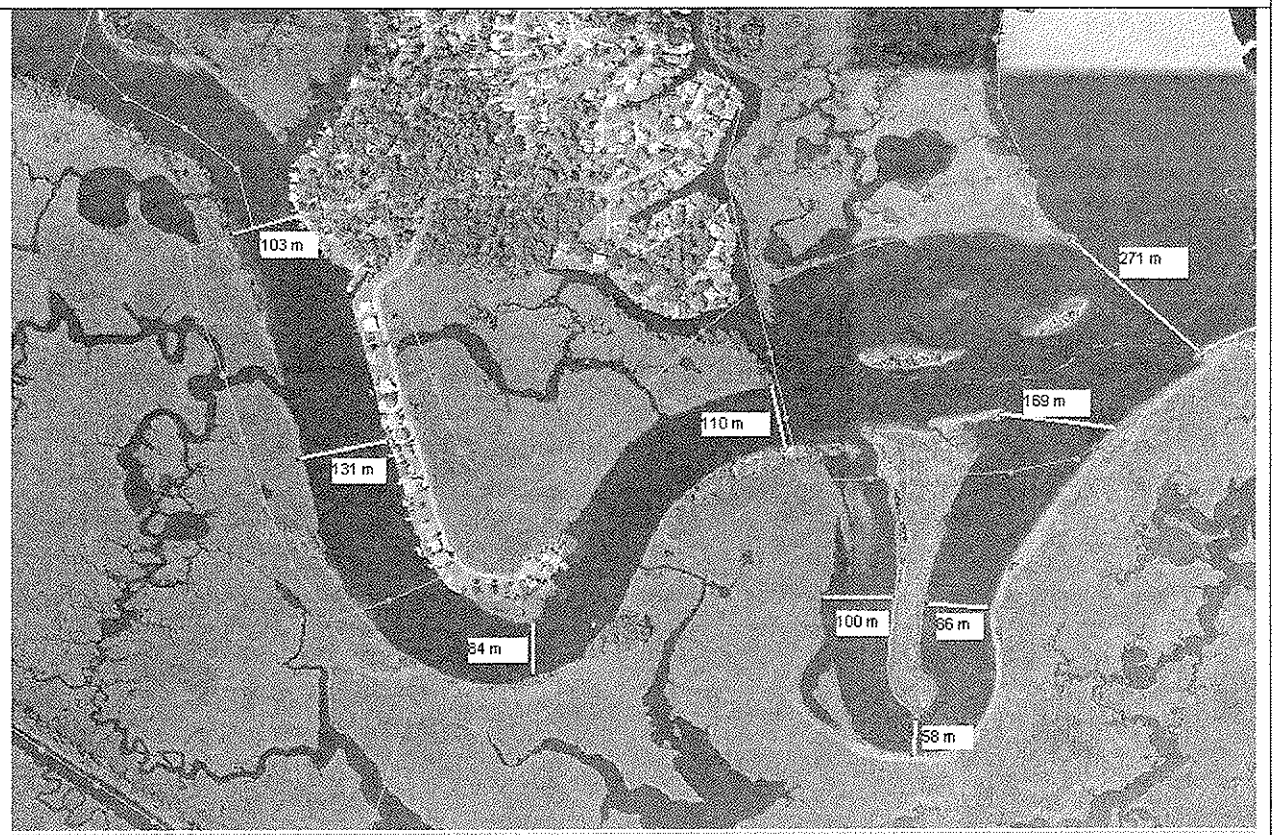
General assumptions/Comments: - Transition area between 80 and 240 meter channel width - Need to reduce tidal volume for this area	
AREA NUMBER: Region 4	*AREA NAME: 89.98 W 30.43 N*
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: - Land segment was 30 meters wide - Need to reduce tidal volume for this area	

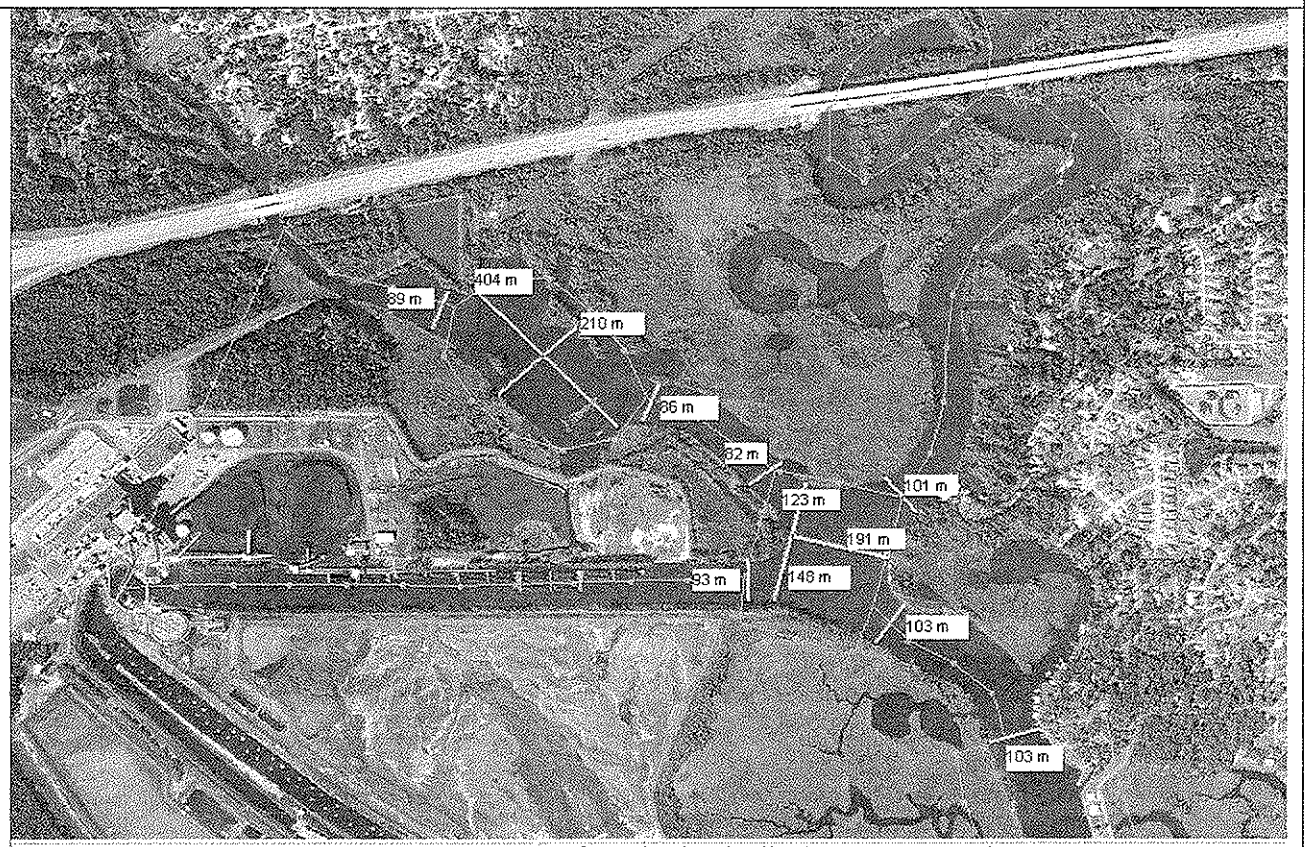
MAP MODULE/SEGMENT SPACING

AREA NUMBER: Region 4	*AREA NAME: Lake Shore Back Bay* *88.935 W 30.419 N*
General assumptions/Comments: - Bay is 800 to 1,000 meters wide - Spacing distribution is 100 meters	

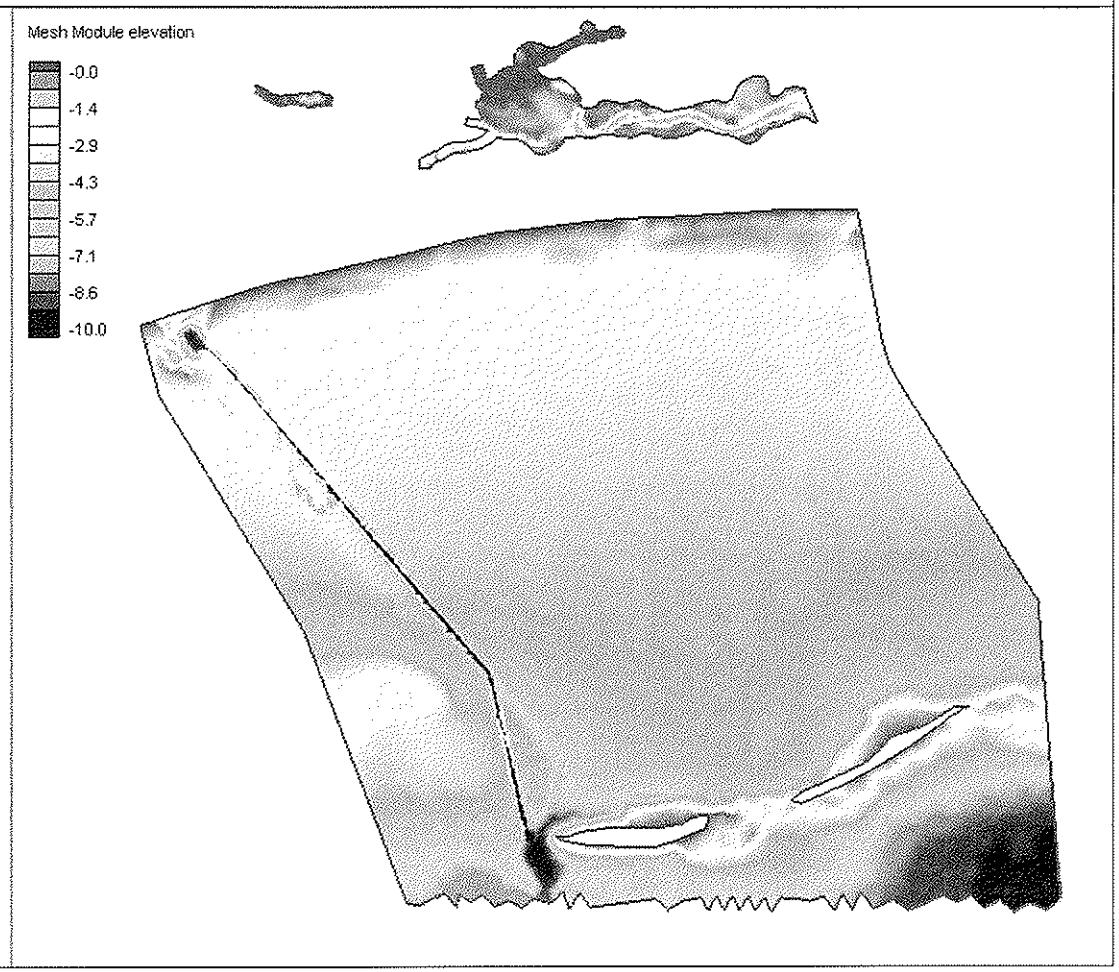
AREA NUMBER: Region 4	*AREA NAME: 88.976 W 30.421 N*
General assumptions/Comments: - Need to adjust tidal volume for this area	

AREA NUMBER: Region 4	*AREA NAME: 88.993 W 30.439 N* *Near Biloxi River*
General assumptions/Comments: - HD told me to remove this feature	

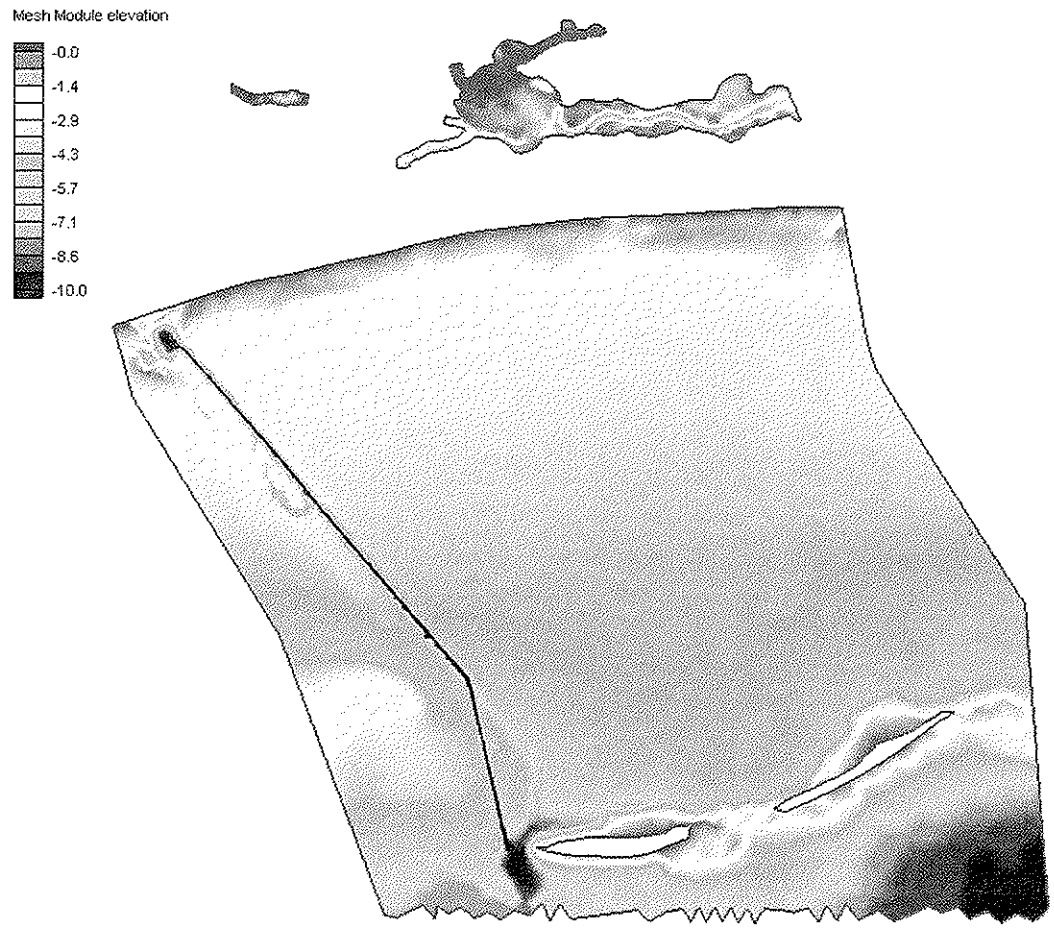
AREA NUMBER: Region 4	*AREA NAME: 89.003 W 30.430 N*
General assumptions/Comments: - Stream less than 240 meters but greater than 80 meters.	

AREA NUMBER: Region 4	*AREA NAME: 89.012 W 30.439 N*
General assumptions/Comments: - Documenting channel widths for future reference	

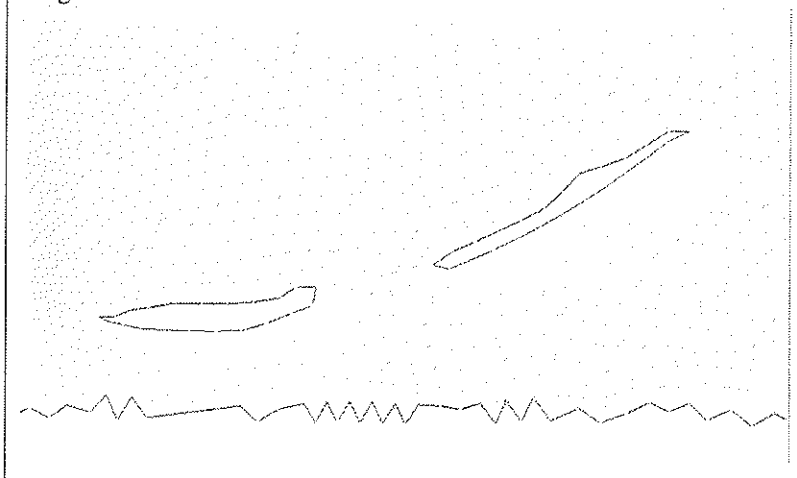
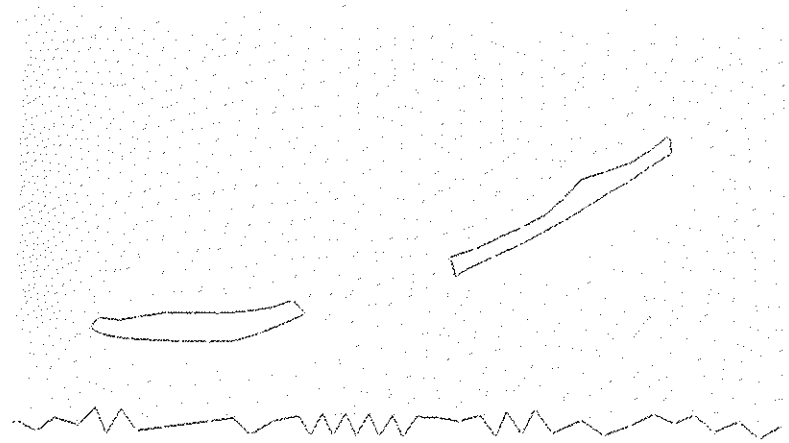
BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME:* Bathymetry Grid; 3-18-06 *FILE NAME:* *P:\06_Working\6.03_Storm_Surge\6.3.01_Mesh\Working\Region_4\Bathy\SMS_Projects\3-18-06** ***R4_bathy_3-18-06b.grd***
General assumptions/Comments: - ADCIRC TIN versus NGLI TIN check indicated differences of 0 to 10 meters along offshore channel and barrier islands. - Checked bathymetry in these areas	

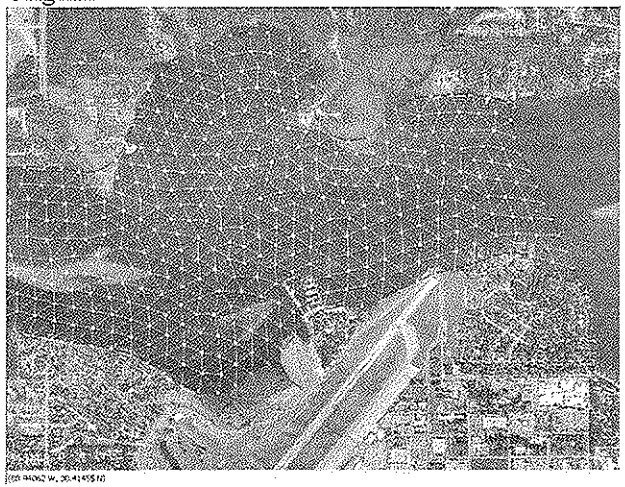
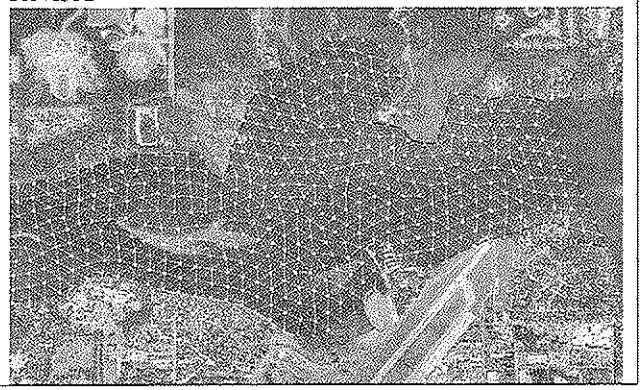
BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME:* Bathymetry Grid *FILE NAME*: P:\06_Working\6.03_Storm_Surge\6.3.01_Mesh\Working\Region_4\Bathy\SMS_Projects\3-20-06\ **R4_mesh_3-20-06_bathy_check.2dm** *NEW SCATTER DATA*: P:\06_Working\6.03_Storm_Surge\6.3.01_Mesh\Working\Region_4\Bathy\SMS_Projects\3-20-06**Edited_Bathy_R4.h5**
General assumptions/Comments: - New scatter data points were added near mesh node locations in offshore channel	

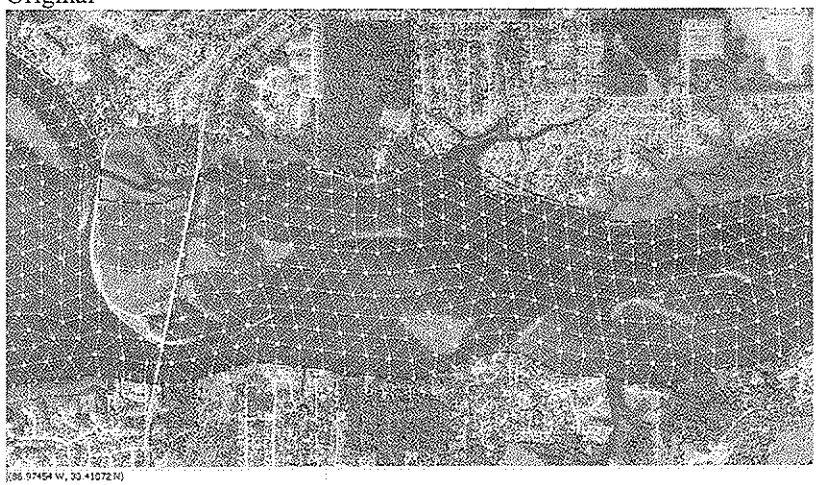
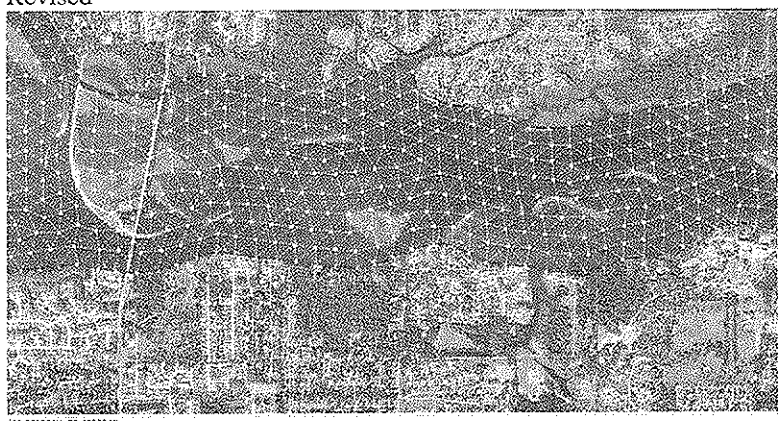
BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME:* Bathymetry Grid – Barrier islands in southern part of Region 4
General assumptions/Comments: - Squared off points on ends of barrier islands reduce possible instability problems in ADCIRC	Original  Revised 

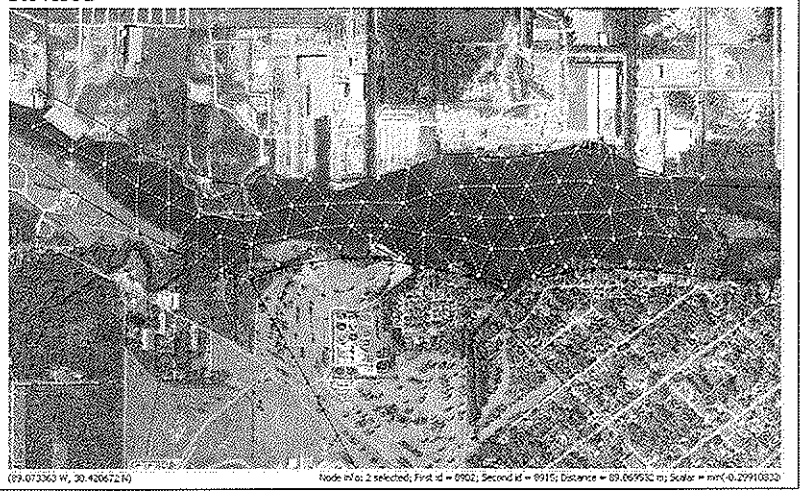
BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME:* Bathymetry Grid – Inland Bay
General assumptions/Comments: - Edited mesh grid to follow shoreline better	Original  Revised 

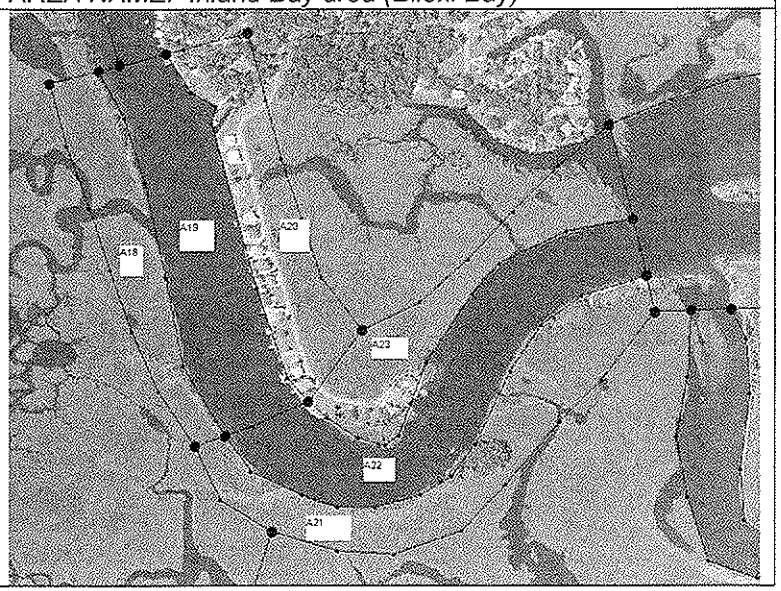
BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME:* Bathymetry Grid – Biloxi Bay
General assumptions/Comments: - Edited mesh grid to follow northern shoreline better	Original  (88.97454 W, 30.41072 N) Revised  (89.98188 W, 30.43233 N)

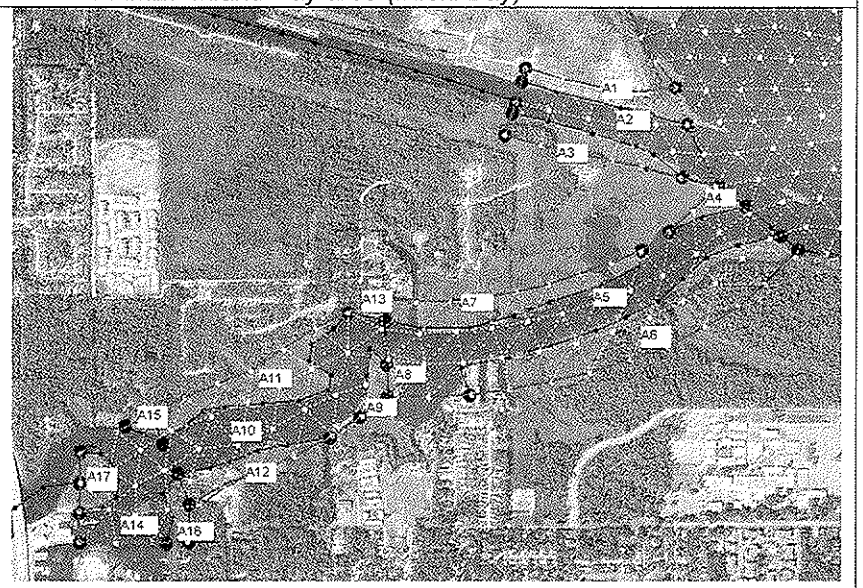
BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME:* Bathymetry Grid 89.0593W 30.4255 N
General assumptions/Comments: - Edited mesh grid to follow northern shoreline better	Revised 

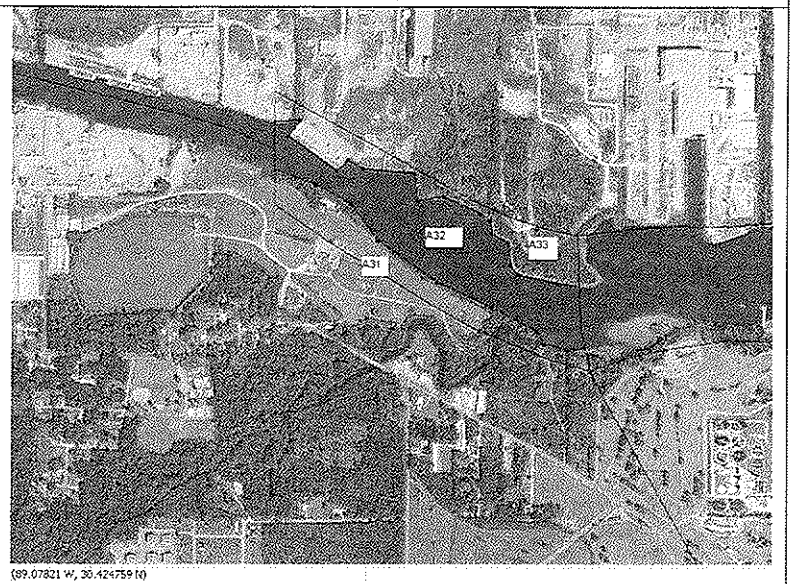
BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME: Inland Bay area (Biloxi Bay)*
General assumptions/Comments: - Adjusted tidal volume in channel - Areas 18, 19, and 20: Ratio of original to total area is 0.50. Reduced scatter data elevations in this area by multiplying current elevation by 0.50. - Areas 21, 22, and 23: Ratio of original to total area is 0.43. Reduced scatter data elevations in this area by multiplying current elevation by 0.43.	

BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME: Inland Bay area (Biloxi Bay)*
General assumptions/Comments: - Adjusted tidal volume in channel - Areas 1, 2, and 3: Ratio of original to total area is 0.54. Reduced scatter data elevations in this area by multiplying current elevation by 0.54. - Areas 4, 5, 6, 7, and 8: Ratio of original to total area is 0.46. Reduced scatter data elevations in this area by multiplying current elevation by 0.46. - Areas 9, 10, 11, 12, and 13: Ratio of original to total area is 0.56. Reduced scatter data elevations in this area by multiplying current elevation by 0.56. - Areas 14, 15, 16, and 17: Ratio of original to total area is 0.70. Reduced scatter data elevations in this area by multiplying current elevation by 0.70.	

BATHYMETRY MESH CHECK AND REVISIONS

AREA NUMBER: Region 4	*AREA NAME: 89.068 W 30.426N*
General assumptions/Comments: - Adjusted tidal volume in channel - Areas 31, 32, and 33: Ratio of original to total area is 0.50. Reduced scatter data elevations in this area by multiplying current elevation by 0.50.	

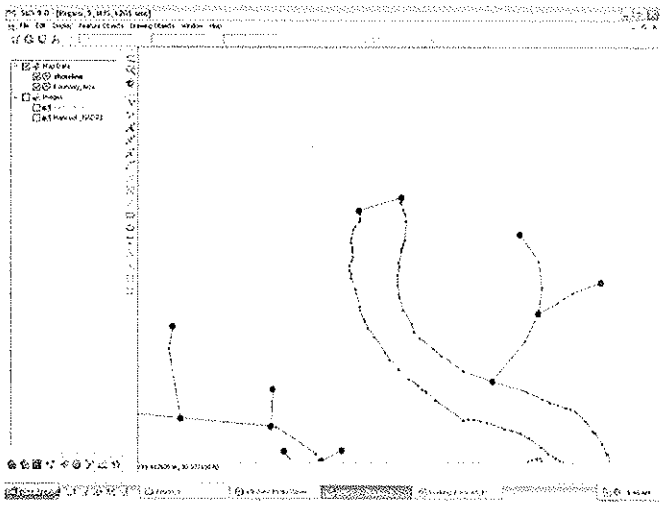
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.405W, 30.372N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
Stopped stream polygon, as shown in the screen shot, for the bathymetry map, because the width was decreasing below 200 m, the scatter data was ending, and the stream was becoming far from the coast.	

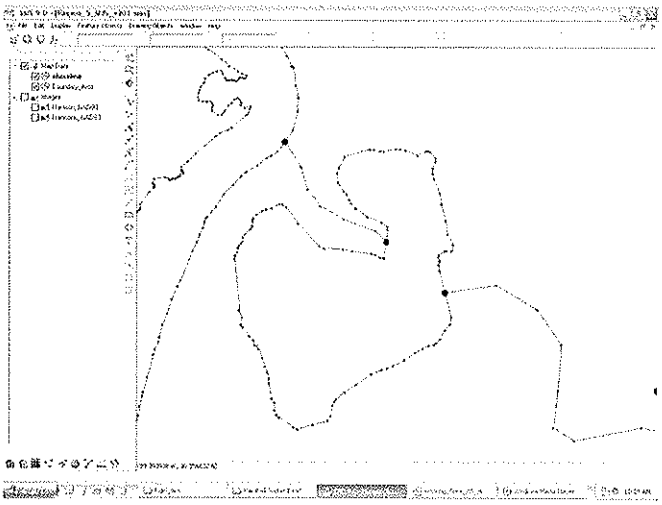
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.393W,30.357N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
The pictured lake feature is being mapped as a polygon, connected to a river polygon by a linear stream arc.	

WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5

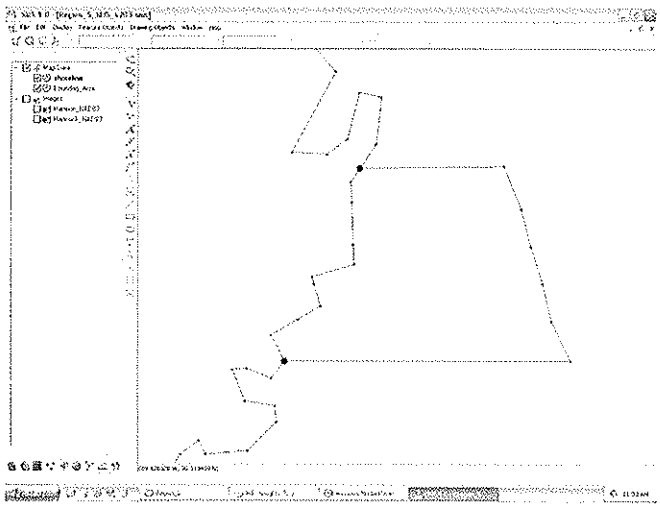
AREA NAME: 89.432W, 30.315N

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:

The polygon feature pictured is a group of finger channels constituting a harbor.

Screen Shot



WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5

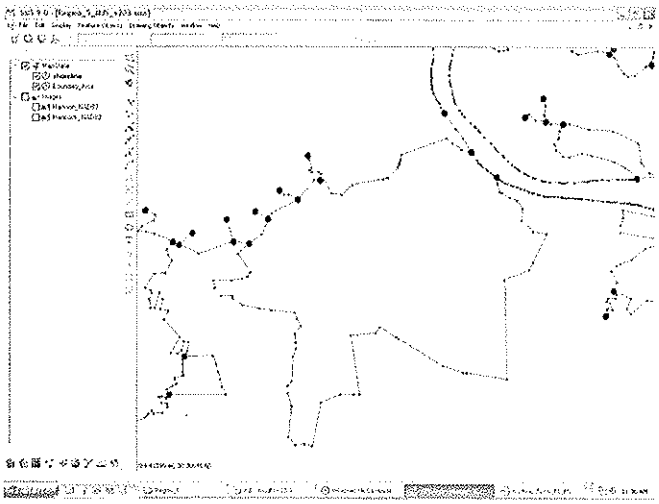
AREA NAME: 89.411W, 30.327N

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:

The polygon feature, in the center of the screen shot, is a group of finger channels constituting a harbor.

Screen Shot



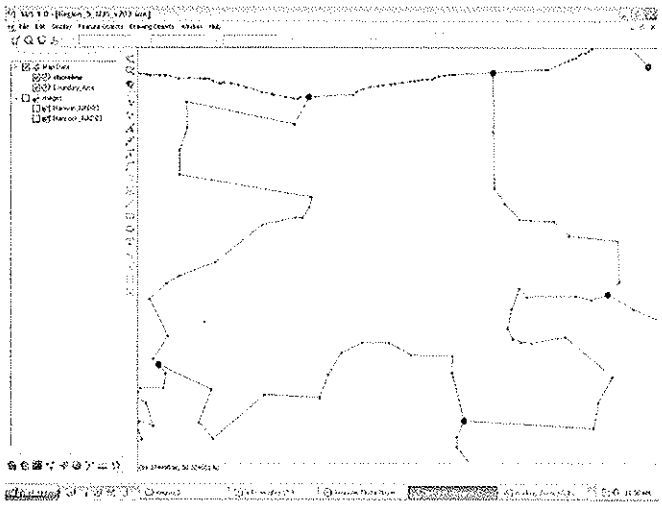
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.376W, 30.329N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
The polygon feature pictured is a group of finger channels constituting a harbor.	

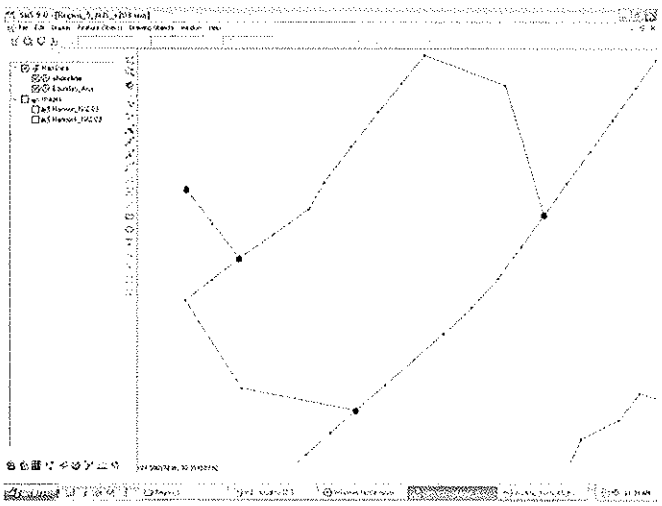
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.380W, 30.356N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
The polygon feature pictured is a group of finger channels constituting a harbor.	

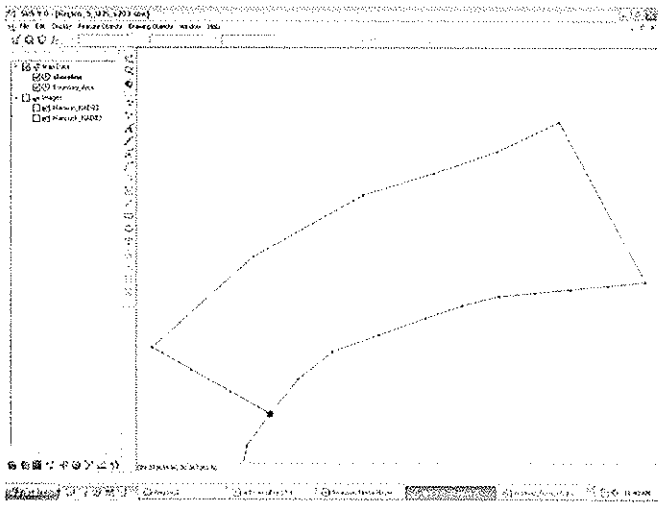
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.374W, 30.366N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
The polygon feature pictured is a group of finger channels constituting a harbor.	

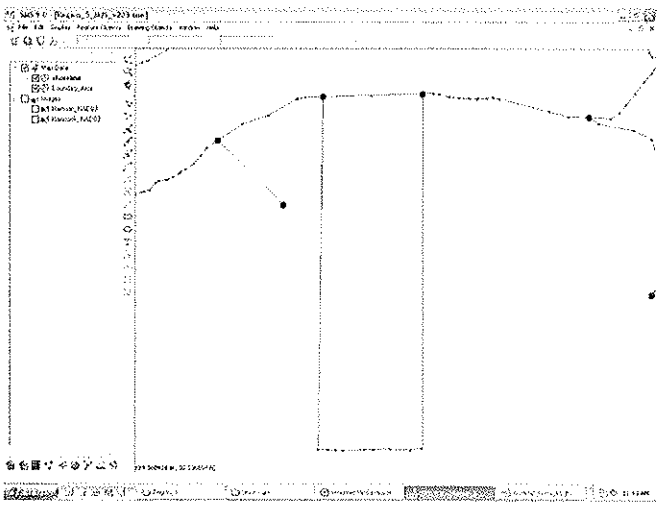
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.365W, 30.333N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
The polygon feature pictured is a group of finger channels constituting a harbor.	

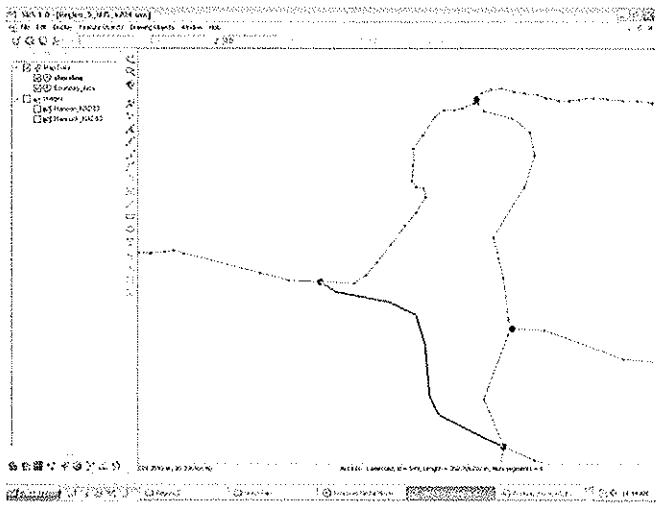
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.360W, 30.336N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
The selected flowpath was identified as an ancillary reach in this case of split flow and deleted.	

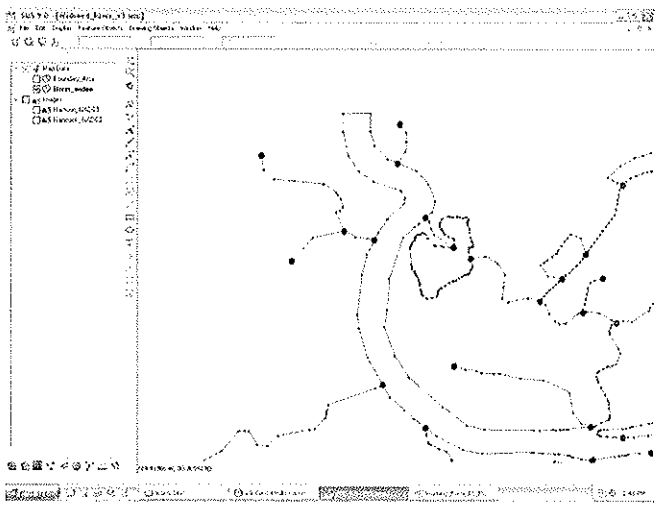
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 5	*AREA NAME: 89.405W, 30.372N*

SHORELINE DIGITIZING/CLEANING

General assumptions/Comments:	Screen Shot
Increased river width from approximately 200 m to approximately 240 m. Depth will need to be adjusted accordingly.	

MESH DESCRIPTION FORM

ORIGINATOR NAME: Rigel Rucker

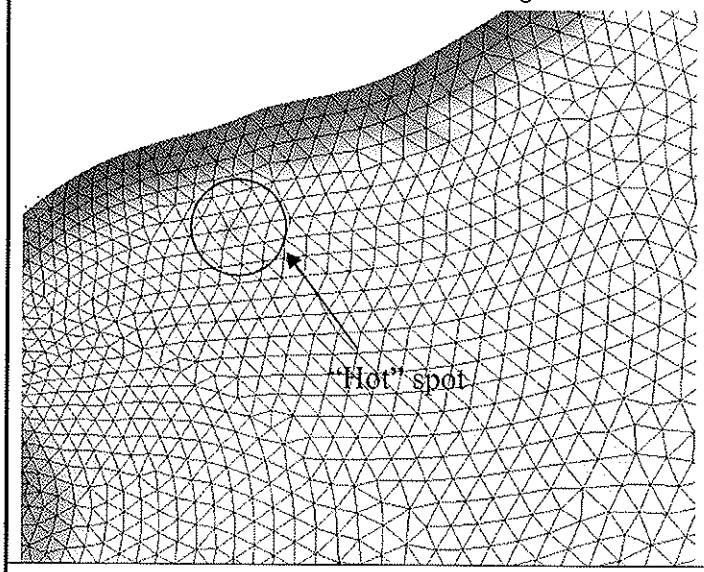
COUNTY: Hancock County

AREA NUMBER: 6 - Bathy	*AREA NAME: North of Bayou Caddy*

MESH GENERATION

Type of Mesh:	

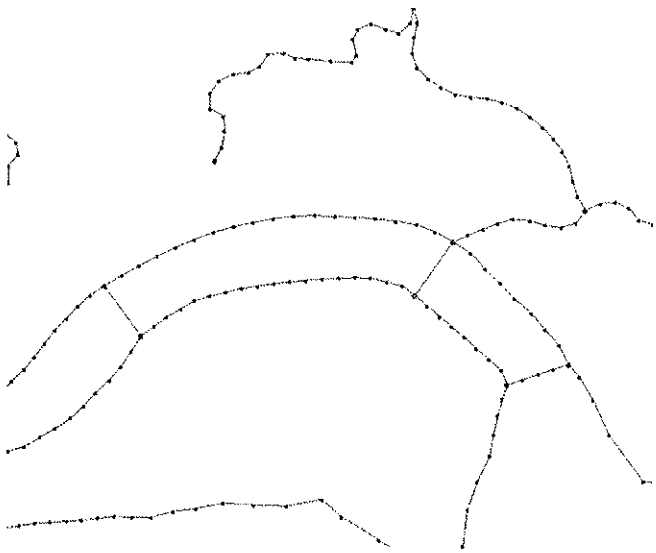
General assumptions: Scatter points in an area just north of Bayou Caddy has are significantly lower than the surrounding area. Because this seems to be an anomaly, the elevations for the scatter data will be changed from -6.03 and -6.22 meters to 3 meters.

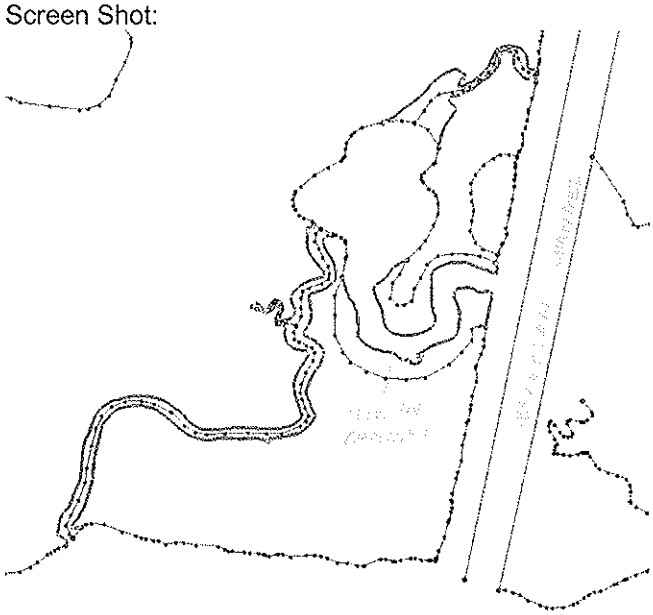
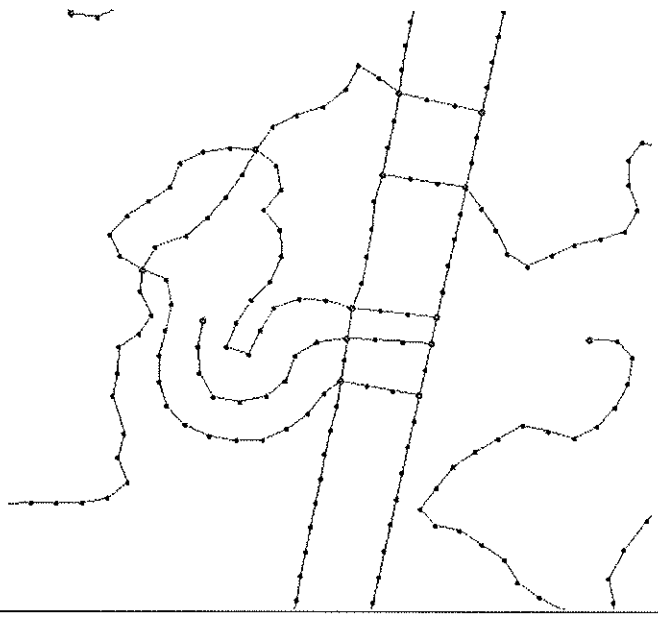


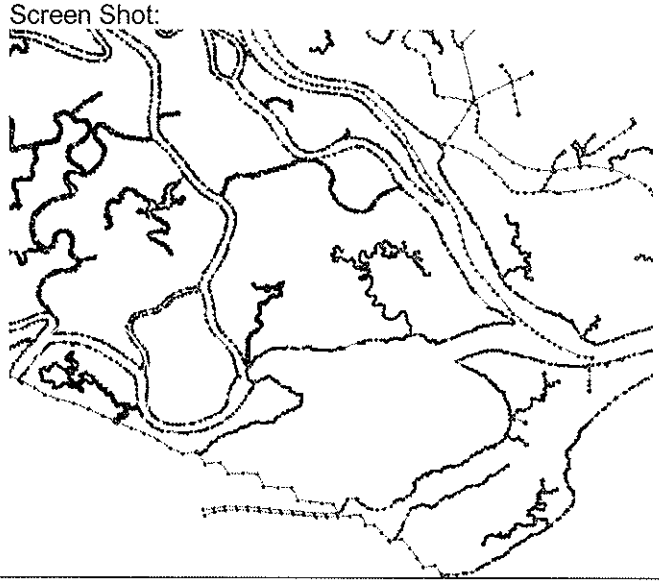
TROUBLESHOOTING

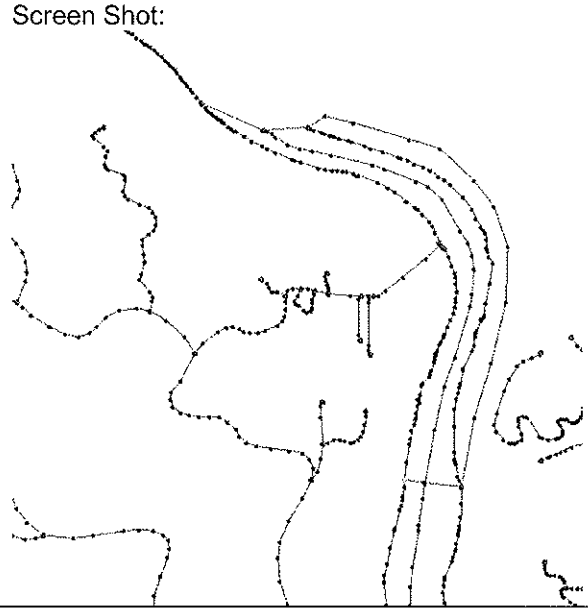
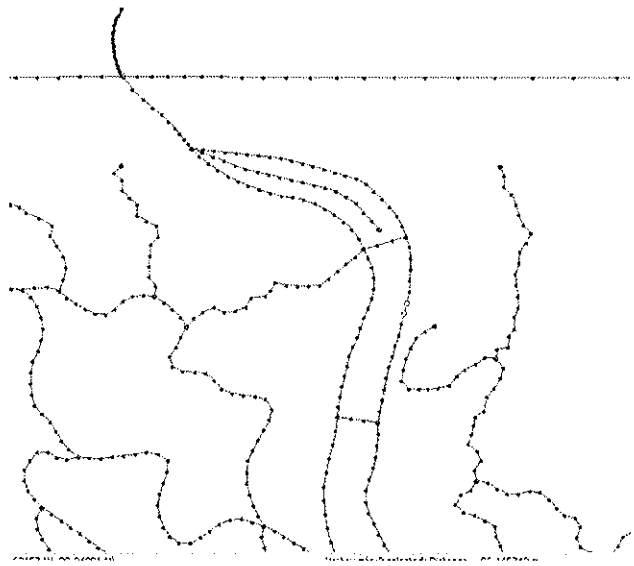
Technical Problems:

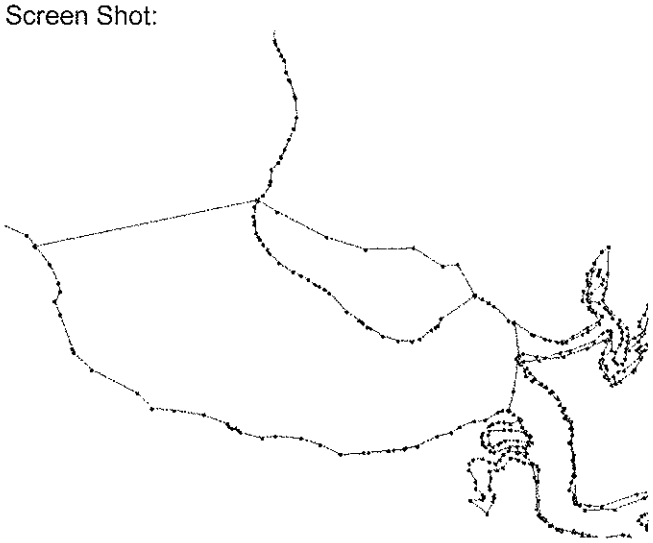
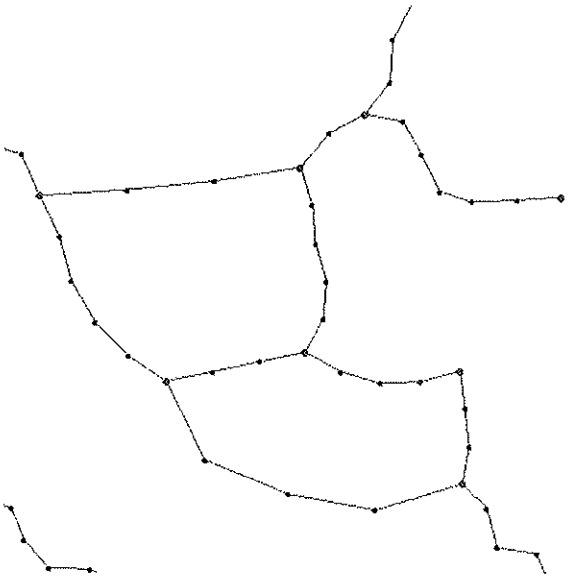
Resolution:

WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Hancock	
AREA NUMBER: 6	*AREA NAME:* Pearl River Outlet
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: The main outlet to the Pearl River is much narrower than the upstream portion of the river. It was originally 230m wide. For consistency, it was widened to 320m. Because of this, the depth was changed from an average of 10m to 7m.	Screen Shot:
MAP MODULE	
Spacing Distribution: 80	Number of Segments: 52
Bias: 1	Type of Mesh: Patch
General assumptions/Comments: This how the final boundary looks with 80m spacing.	Screen Shot: 

WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Hancock	
AREA NUMBER: 6	*AREA NAME:* Campbell Outside Bayou
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: The Campbell Outside Bayou ties into a navigation channel, which leads to the gulf. Because these areas are critical, they were maintained when cleaning the shoreline. All of the green lines on the screen shot were deleted. The tie-in channel was widened from 60m to 240m, and the depth was manually changed from 2m to .5m to maintain the flow area. The channel between the Bayou and the navigation channel was also widened from approximately 80m to 240m. Depth will be manually changed from .5m to .33m. This was done to preserve the Gulf to Bayou relation.	Screen Shot: 
MAP MODULE	
Specified Spacing: .0008	Number of Segments: 38
Bias: 1	Type of Mesh: Patch/Paving
General assumptions/Comments: This is the final representation of the area.	Screen Shot: 

WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Hancock	
AREA NUMBER: 6	*AREA NAME:* Small Lake between East and West Mouth of the Pearl River.
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: This lake has a width a little larger than 240m, however it is only for a short distance. It also has several connections before it reaches any other large bodies of water, and is quite small and shallow in comparison to nearby water bodies. For this reason its connections will only be shown as break lines, instead of a water body.	Screen Shot: 
MAP MODULE	
Specified Spacing: .008	Number of Segments: 26
Bias: 1	Type of Mesh: Paving
General assumptions/Comments: This is the final layout of the area.	Screen Shot:

WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Hancock	
AREA NUMBER: 6	*AREA NAME:* Pearl River
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: The Pearl River is wider than 240 meters for the most part. Once it nears Highway 90 (the limits of the bathymetry data), it narrows to about 180m. Because of this, the river was widened to 240 meters, and the future depths will be changed from an average of 6m feet to 4.5m.	Screen Shot: 
MAP MODULE	
Spacing Distribution: 86	Number of Segments: 39
Bias: 1	Type of Mesh: Patch/Paving
General assumptions/Comments: This is the final layout of the river with a distribution of 86.	Screen Shot: 

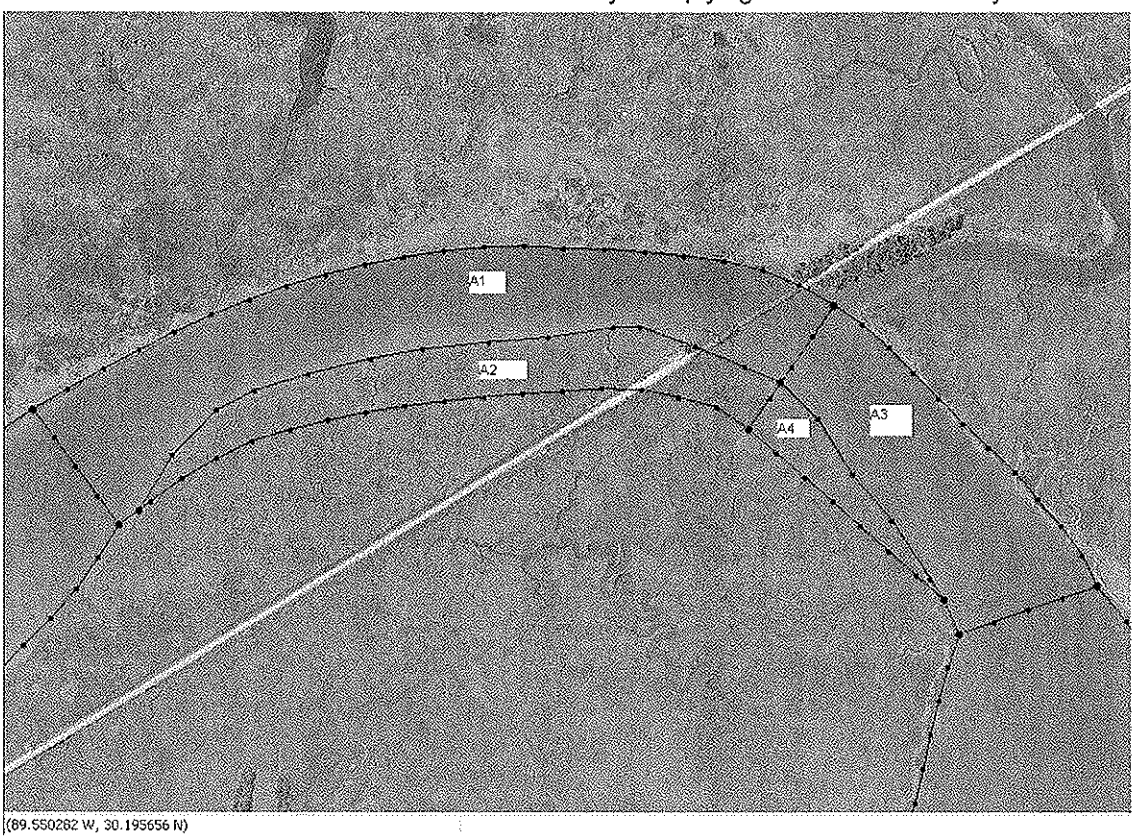
WORKING FORM	
ORIGINATOR NAME: Rigel L. Rucker	
COUNTY: Hancock	
AREA NUMBER: 6	*AREA NAME:* Half Moon Island
SHORELINE DIGITIZING/CLEANING	
General assumptions/Comments: The main outlet to most streams on Half Moon Island narrows as you follow it from the mouth inland. The area shown is about 180m wide. It will be widened to approximately 240m. It is originally .3m deep and will be re-calibrated to be .23m deep.	Screen Shot: 
MAP MODULE	
Spacing Distribution: 80	Number of Segments: 21
Bias: 1	Type of Mesh: Patch
General assumptions/Comments: This how the final boundary looks with 80m spacing.	Screen Shot: 

MESH DESCRIPTION FORM

ORIGINATOR NAME: Amelia Vincent	
COUNTY: Hancock County	
AREA NUMBER: 6 - Bathy	*AREA NAME: Pearl River Outlet*
MESH GENERATION	
Type of Mesh:	

General assumptions:

- Areas 1 and 2: Ratio of actual channel area to meshed channel area is 0.71. Scatter data elevations in this area were reduced by multiplying current elevation by 0.71. Scatter point on bankline with elevation of -1.54 m was not changed.
- Areas 3 and 4: Ratio of actual channel area to meshed channel area is 0.83. Scatter data elevations in this area were reduced by multiplying current elevations by 0.83.

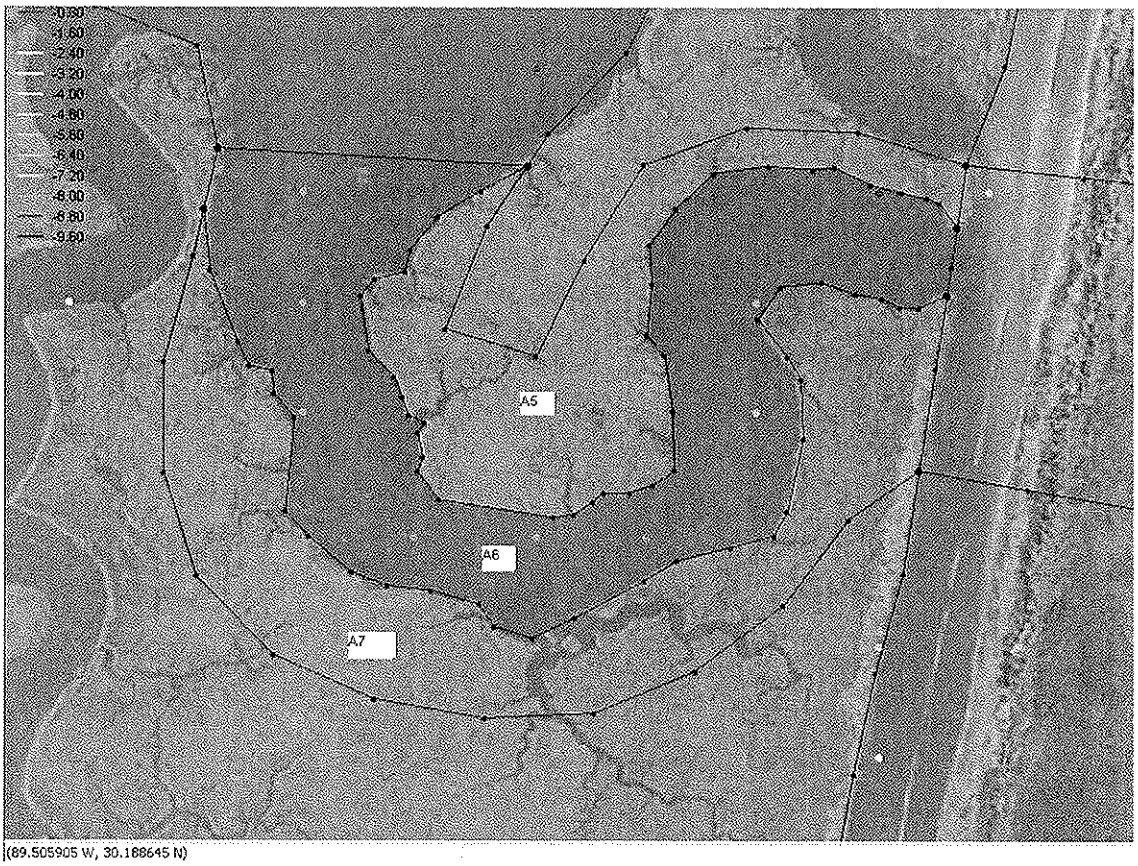


(89.550282 W, 30.195656 N)

MESH DESCRIPTION FORM	
ORIGINATOR NAME: Amelia Vincent	
COUNTY: Hancock County	
AREA NUMBER: 6 - Bathy	*AREA NAME: Campbell Island – Tie-in channel*
MESH GENERATION	
Type of Mesh:	

General assumptions:

- Areas 5, 6, and 7: Ratio of actual channel area to meshed channel area is 0.44. Scatter data elevations in this area were reduced by multiplying current elevations by 0.44.

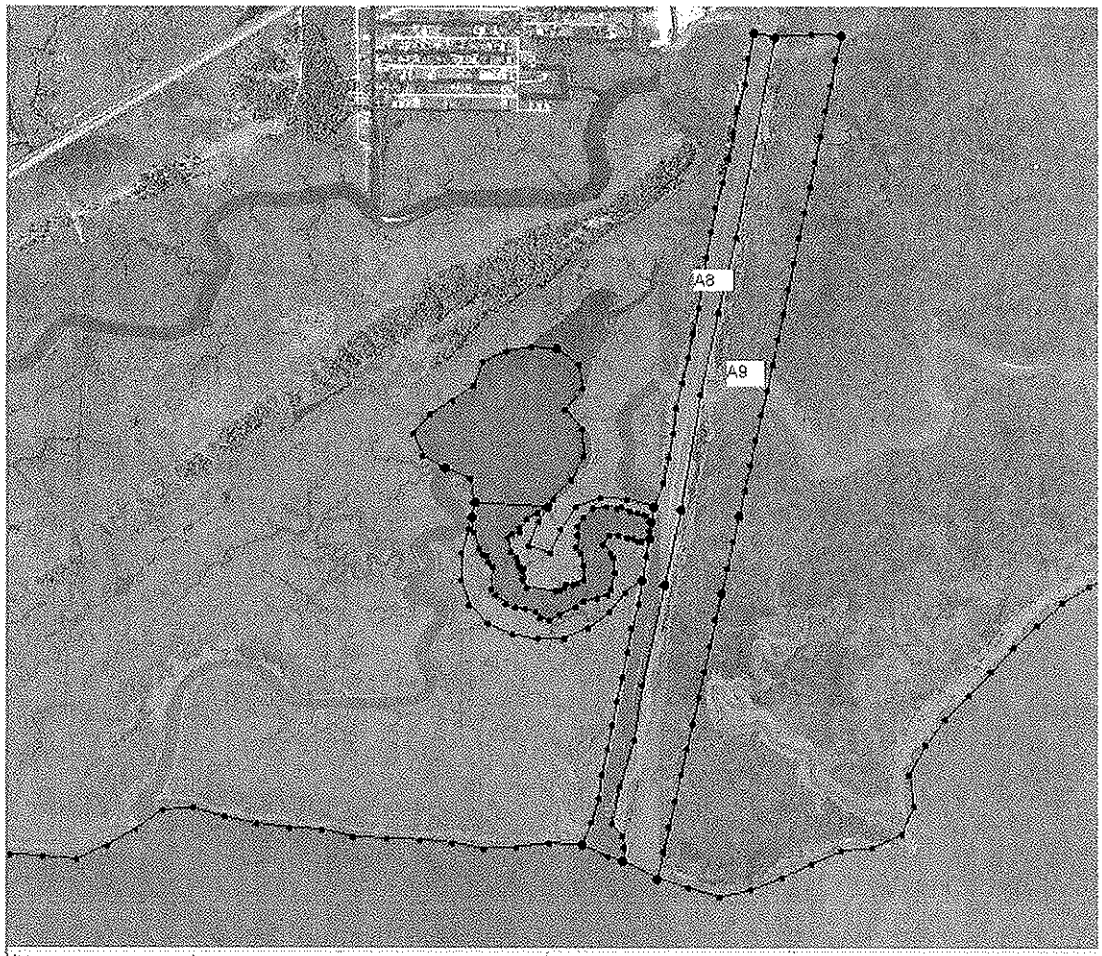


(89.505905 W, 30.188645 N)

MESH DESCRIPTION FORM	
ORIGINATOR NAME: Amelia Vincent	
COUNTY: Hancock County	
AREA NUMBER: 6 - Bathy	*AREA NAME: Campbell Island – Navigation Channel*
MESH GENERATION	
Type of Mesh:	

General assumptions:

- Areas 8 and 9: Ratio of actual channel area to meshed channel area is 0.38. Scatter data elevations in this area were reduced by multiplying current elevations by 0.38.

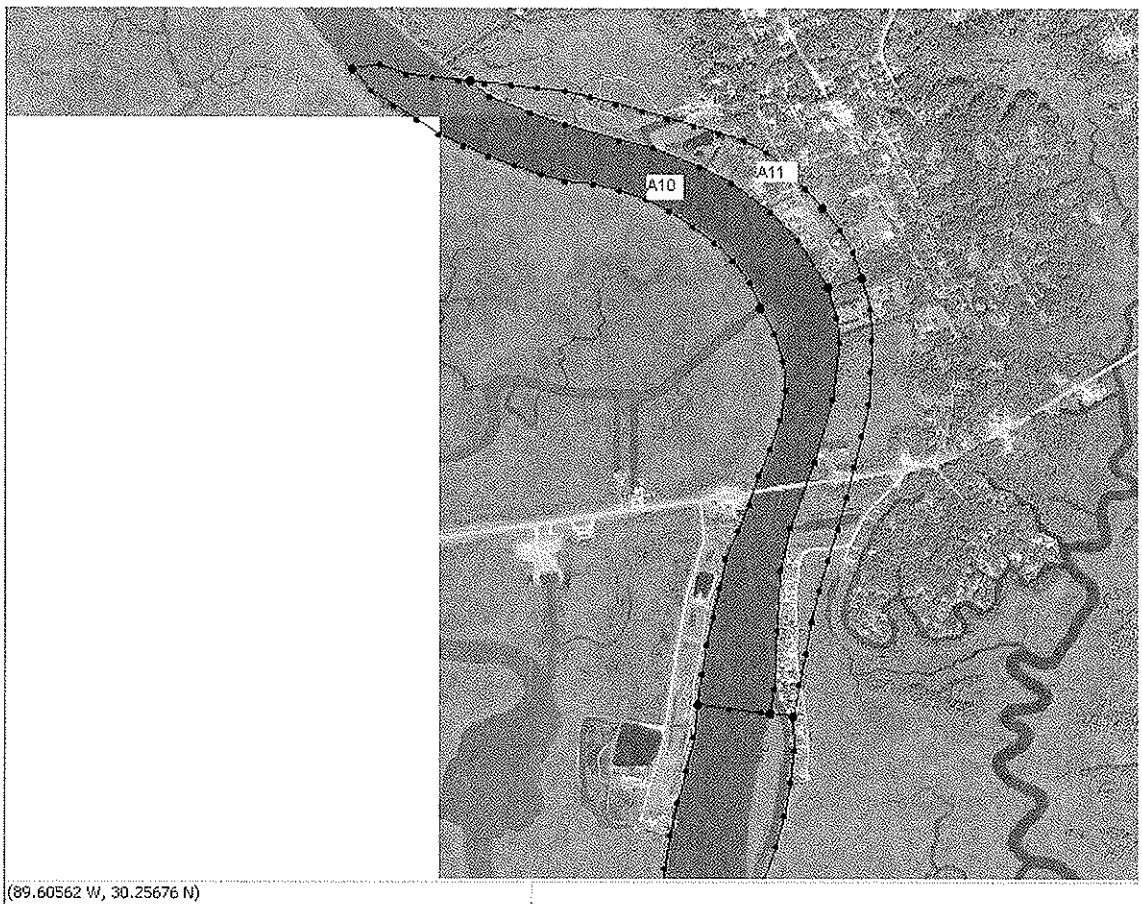


(89.48845 W, 30.1802 N)

MESH DESCRIPTION FORM	
ORIGINATOR NAME: Amelia Vincent	
COUNTY: Hancock County	
AREA NUMBER: 6 - Bathy	*AREA NAME: Pearl River*
MESH GENERATION	
Type of Mesh:	

General assumptions:

- Areas 10 and 11: Ratio of actual channel area to meshed channel area is 0.62. Scatter data elevations in this area were reduced by multiplying current elevations by 0.62.

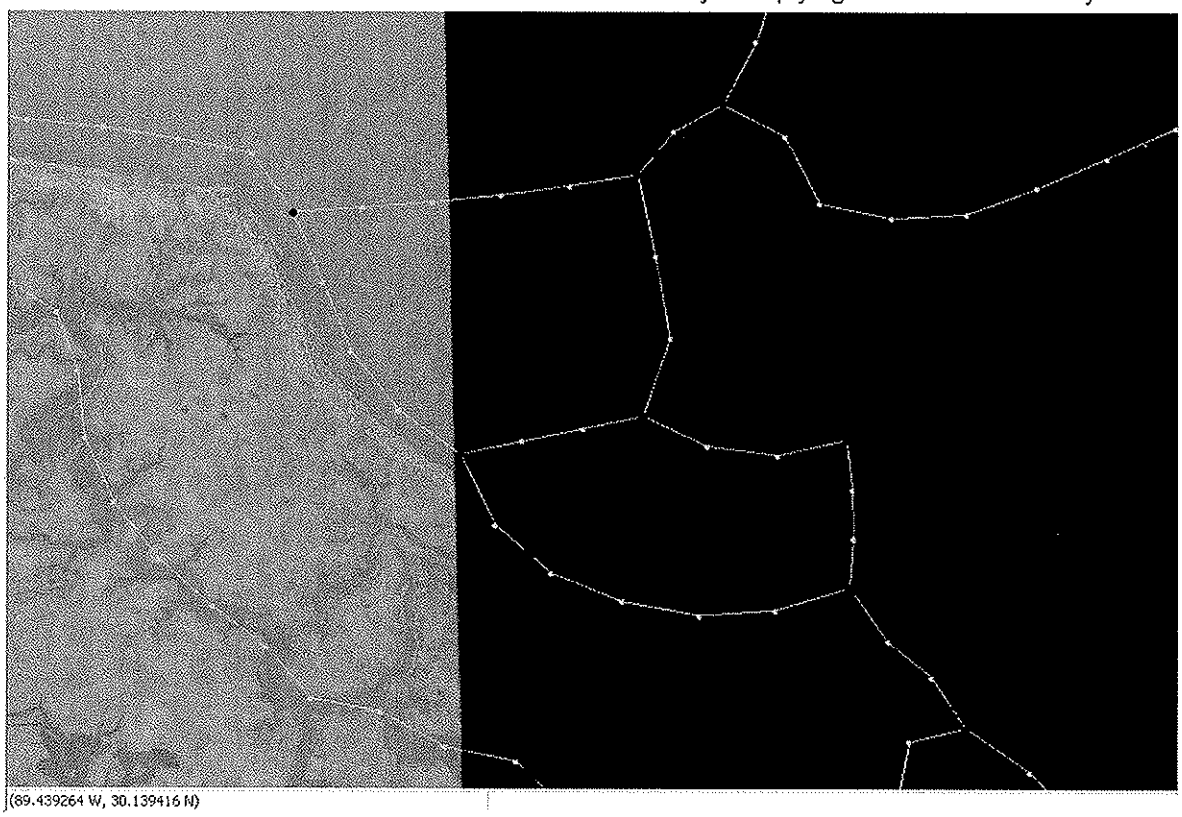


(89.60562 W, 30.25676 N)

MESH DESCRIPTION FORM	
ORIGINATOR NAME: Amelia Vincent	
COUNTY: Hancock County	
AREA NUMBER: 6 - Bathy	*AREA NAME: Half Moon Island*
MESH GENERATION	
Type of Mesh:	

General assumptions:

- No aerial photos are available for this area. Could not determine actual area to total area meshed ratio.
- Rigel stated that depth should be adjusted from 0.3 m to 0.23 m (ratio = 0.77). Therefore scatter data elevations in this area were reduced by multiplying current elevations by 0.77.



(89.439264 W, 30.139416 N)

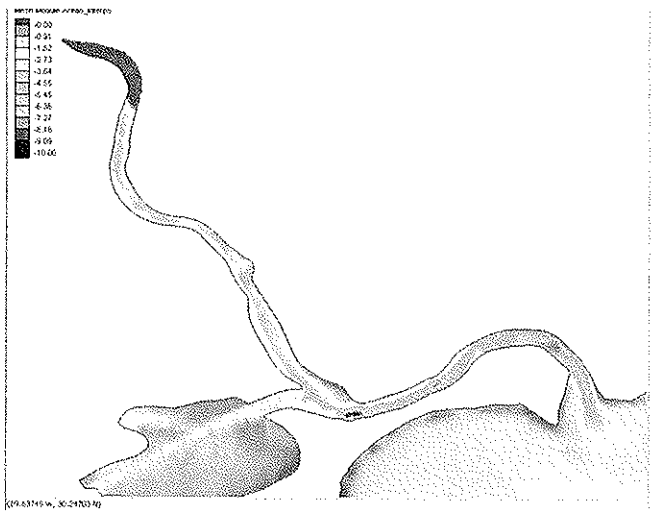
MESH DESCRIPTION FORM

ORIGINATOR NAME: Amelia Vincent	
COUNTY: Hancock County	
AREA NUMBER: 6 - Bathy	*AREA NAME: Pearl River – Channel*
MESH GENERATION	
Type of Mesh:	

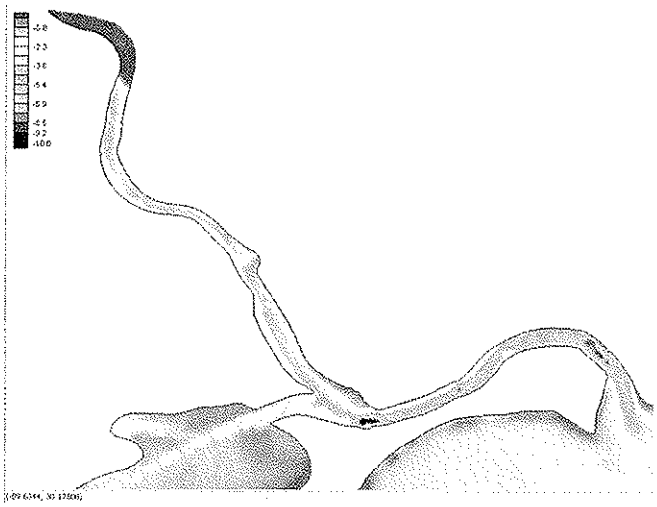
General assumptions:

- New scatter points were added in locations of mesh nodes along the channel so mesh nodes elevations would reflect surrounding bathymetry.

Before



After



MESH DESCRIPTION FORM

ORIGINATOR NAME: Amelia Vincent

COUNTY: Hancock County

AREA NUMBER: 6 - Bathy	*AREA NAME: Offshore Island – Half Moon Island*

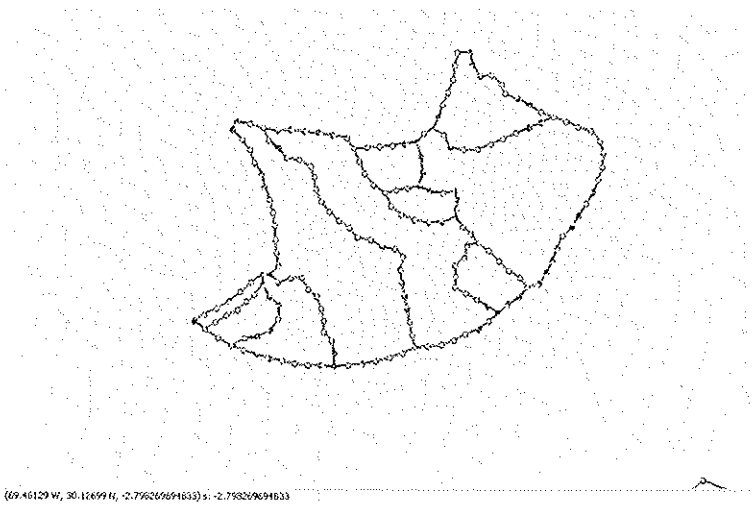
MESH GENERATION

Type of Mesh:	

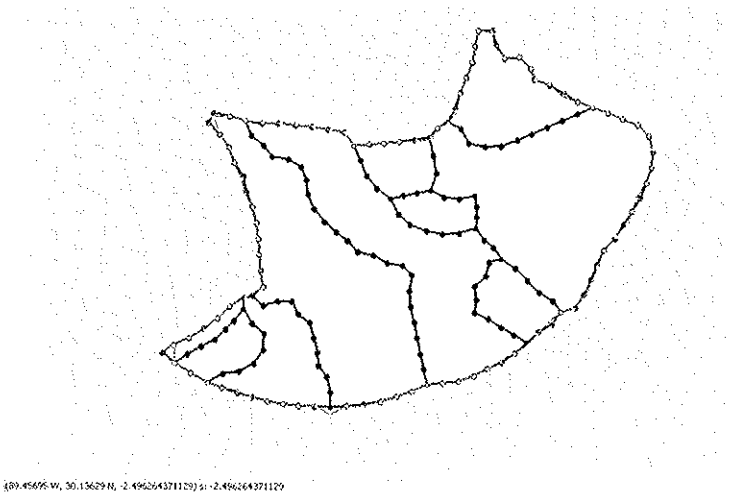
General assumptions:

- Removed mesh on large island

Before



After



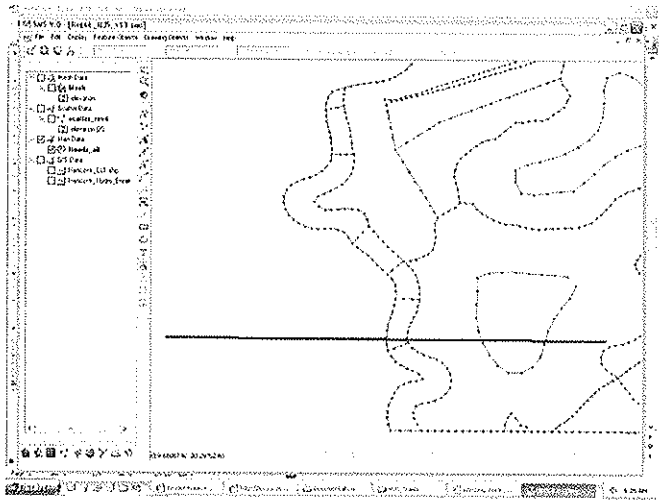
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 6b-Topo	*AREA NAME: 89.64W, 30.28N*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
River widened from ~100 m to ~300 m north of the green line, and from ~130 m to ~300 m south of the green line. Depth was reduced by 1/3 and 2/5, respectively, to represent a more accurate cross-sectional area.	

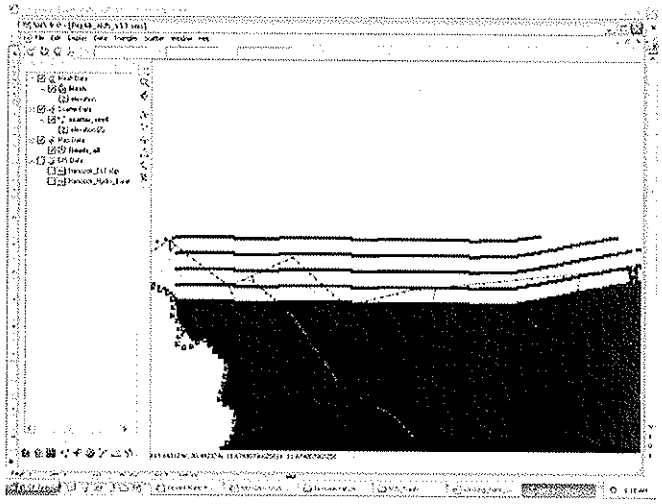
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 6b-Topo	*AREA NAME: Northern Boundary*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
Some sections of mesh along the northern boundary did not have original LIDAR data. The northernmost row of scatter points was copied north at a step of 200 meters until all mesh nodes were covered by scatter triangles.	

WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

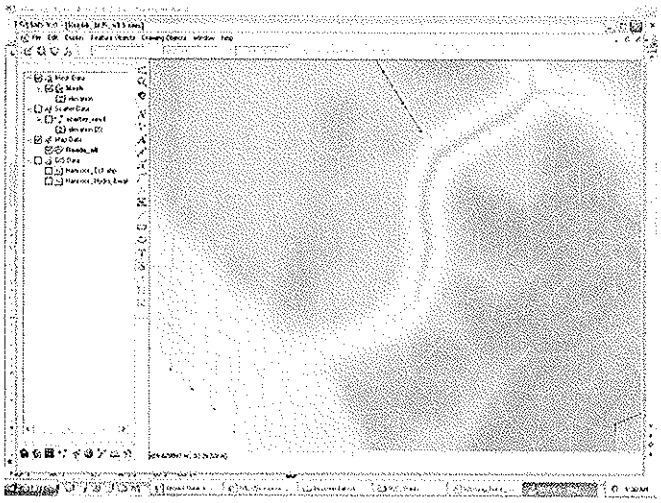
AREA NUMBER: 6b-Topo	*AREA NAME: 89.63W, 30.28N*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:

River depth was decreased at the confluence with the Pearl River for a smoother transition. An adverse slope of 0.005 was used.

Screen Shot



WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

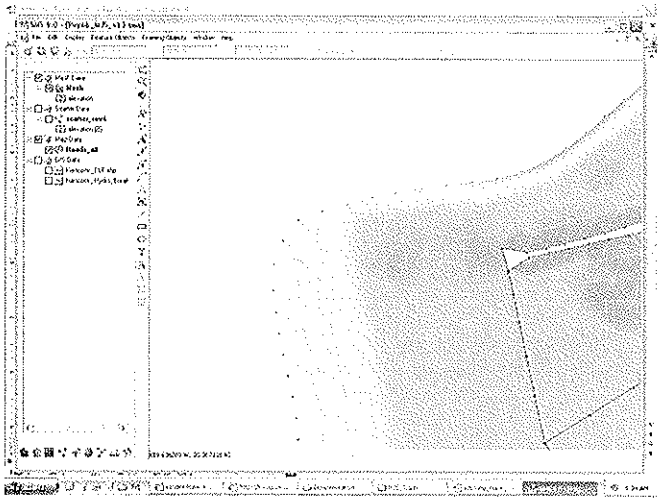
AREA NUMBER: 6b-Topo	*AREA NAME: 89.65W, 30.31N*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:

River depth was decreased for the linear portion of the Pearl River as it approached the polygon region, to provide a smoother transition. An adverse slope of 0.005 was used.

Screen Shot



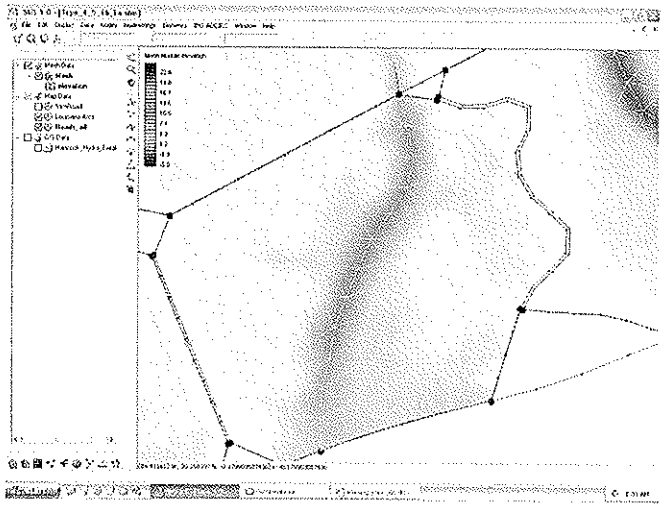
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 6b-Topo	*AREA NAME: 89.412W, 30.258N*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
River depth was decreased as the stream approached the confluence with the bathymetry, to provide a smoother transition with the higher elevations of the bathymetry. An adverse slope of 0.005 was used.	

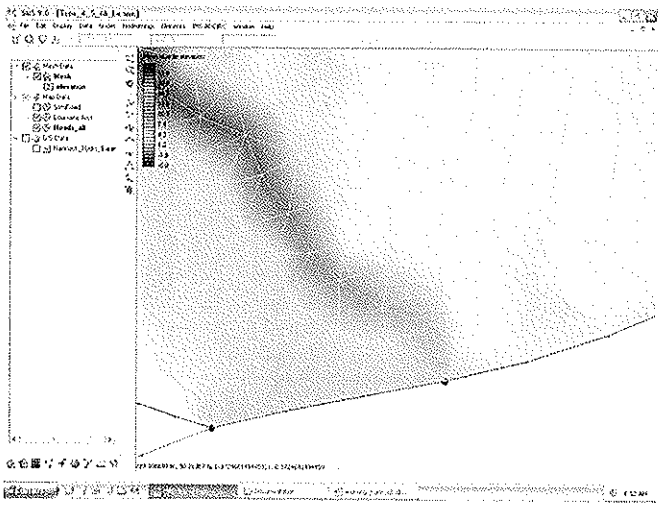
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: 6b-Topo	*AREA NAME: 89.396W, 30.263N*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
River depth was decreased as the stream approached the confluence with the bathymetry, to provide a smoother transition with the higher elevations of the bathymetry. An adverse slope of 0.005 was used.	

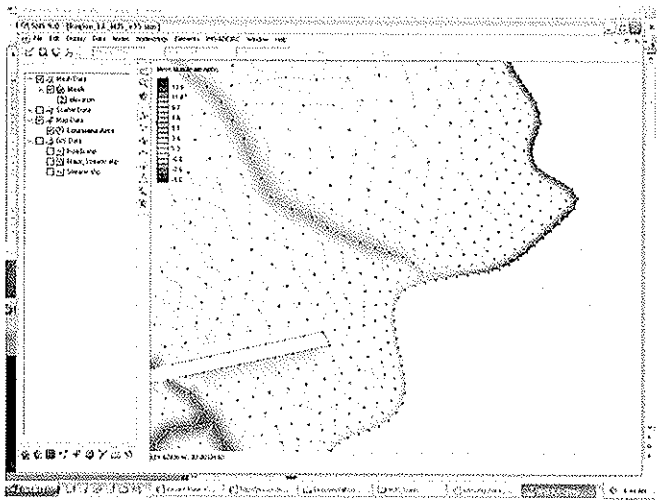
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: LA-Topo	*AREA NAME: Eastern Boundary*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
Elevations of the Pearl River, which is the boundary between Region 6b and Louisiana, were set equal to those of Region 6b.	

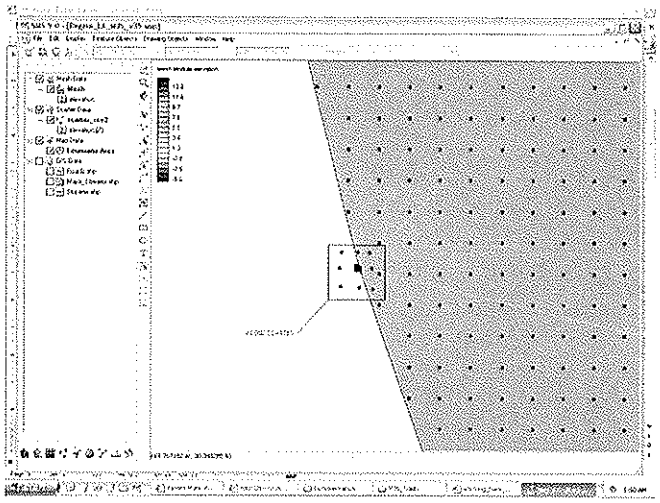
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: LA-Topo	*AREA NAME: Boundaries*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
Some sections of mesh along the region boundary did not have original LIDAR data. A cluster of scatter points was added around each of these mesh nodes, with elevations equal to the nearest scatter point.	

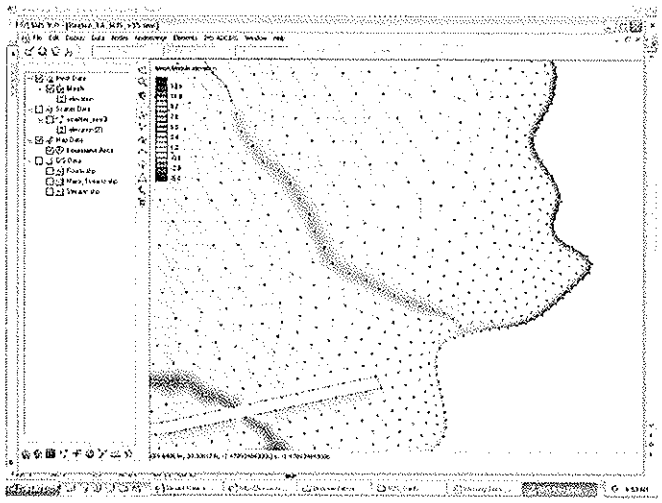
WORKING FORM

ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: LA-Topo	*AREA NAME: 89.64W, 30.31N*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
River depth was decreased at the confluence with the Pearl River for a smoother transition. An adverse slope of 0.005 was used.	

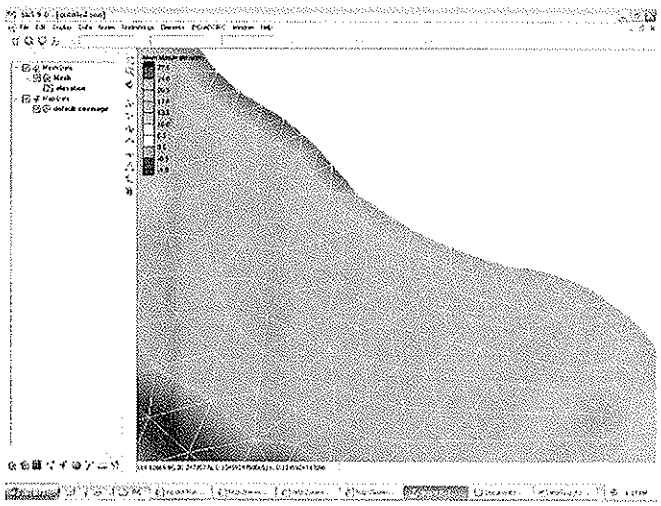
WORKING FORM

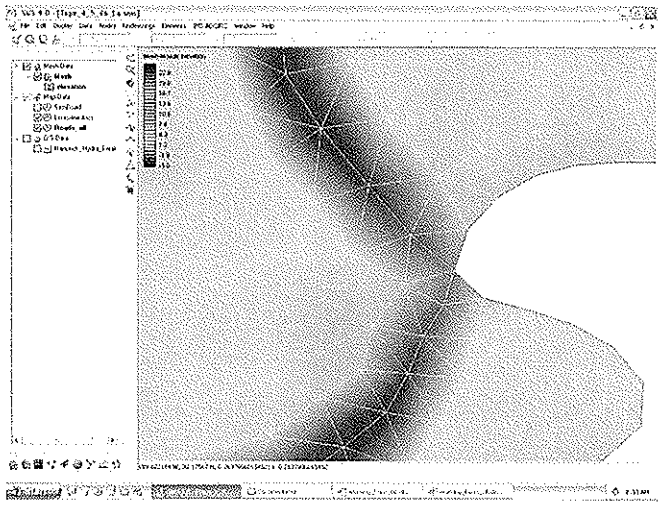
ORIGINATOR NAME: Mike Seering

COUNTY: Hancock

AREA NUMBER: LA-Topo	*AREA NAME: 89.63W, 30.25N*

SCATTER DATA ADJUSTMENT

General assumptions/Comments:	Screen Shot
River depth was decreased by a factor of 2/5 at the border with Region 6a, to accommodate for the forced increase in width for a more accurate cross sectional area.	

WORKING FORM	
ORIGINATOR NAME: Mike Seering	
COUNTY: Hancock	
AREA NUMBER: LA-Topo	*AREA NAME: 89.62W, 30.18N*
SCATTER DATA ADJUSTMENT	
General assumptions/Comments: River depths were decreased as the streams approached the confluence with the bathymetry, to provide a smoother transition with the higher elevations of the bathymetry. An adverse slope of 0.005 was used.	Screen Shot 

MESH DESCRIPTION FORM

ORIGINATOR NAME: Rigel Rucker

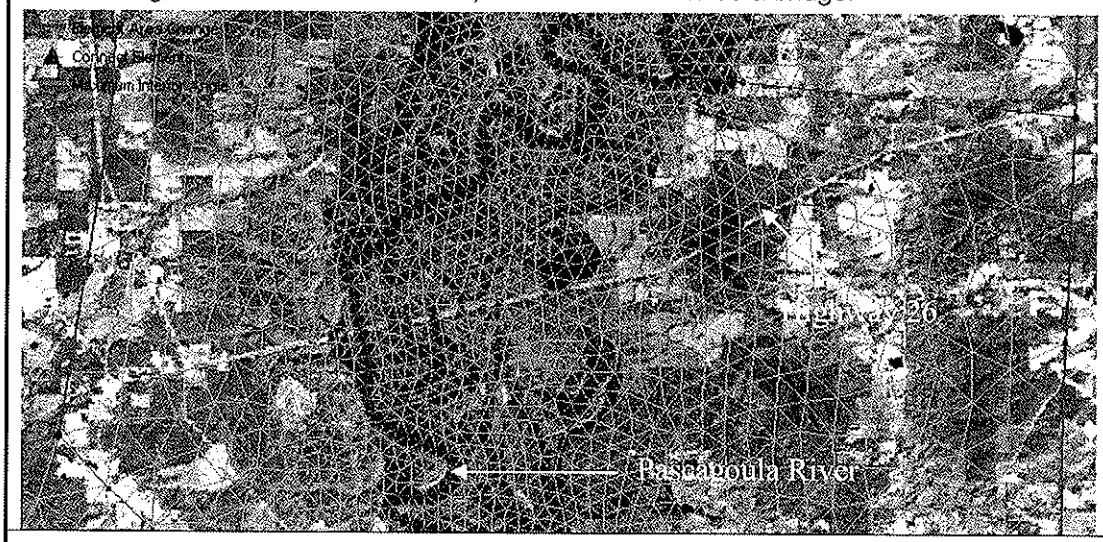
COUNTY: George

AREA NUMBER: N/A	*AREA NAME: George County*

MESH GENERATION

Type of Mesh: Paving	

General assumptions: Highway 26 is the only major road that crosses the Pascagoula River in George County. It is assumed that because it is a major road, it is elevated at least 1 meter above the surrounding area. In order to resolve this issue, the mesh was moved to better represent the location of the road. The elevations in this area were then raised 1 meter above the highest adjacent ground. The area near the Pascagoula River and its surrounding marshland was not raised, as it is assumed to be a bridge.



TROUBLESHOOTING

Technical Problems:

Resolution: