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A comparison of Approximate and Detailed Flood Inundation Models: Matagorda County, Texas

Background: The Federal Emergency Management Agency (FEMA) is responsible for maintaining and updating an inventory of Flood Insurance Rate Maps (FIRMs) for all inhabited areas of the United States of America. For the past several decades FEMA employees and outside consultants have had at their disposal two basic types of flood hazard analysis to determine the inundation extent of the 100-yr floodplain. The two types can be described as approximate and detailed. The differences between the two types of analysis are vast but they essentially boil down to the analytical methodology employed in the study. Detailed analyses can be built using a variety of modeling software options, the most popular being HEC-RAS, HEC-HMS and SWMM. Approximate analyses are constructed by manual or automated delineation of Base Flood Elevations (BFEs) using terrain data. The differences between the two approaches are numerous; approximate modeling far predates detailed, input and output data for approximate is minimal where detailed is much more comprehensive, level of effort and time are greatly increased with the detailed approach over approximate, but the most important distinction between the two is evident when inspecting the accuracy of final results.

Objective: The focus of this term project is twofold, first to demonstrate the differences between the two types of modeling approaches and more significantly the differences in results, and secondly to leverage the divergent results to help explain why there are still counties in high

flood risk areas that do not have effective floodplain mapping. To do this I selected an area in the Texan county of Matagorda, specifically the coastal sections of the city of Palacios to develop an approximate model. The city of Palacios has not had updated effective floodplain mapping since 1986, but preliminary flood hazard products were developed in 2012.

Work Outline: So far, I have extracted these preliminary products to develop a baseline detailed analysis for contrast with the experimental approximate. In working towards the approximate model development, I have downloaded 50cm coastal LiDAR data from the Texas Natural Resources Information System (TNRIS) data clearinghouse and from that created a seamless mosaic raster to use as a terrain base. I've completed a first run of approximate inundation extents using the preliminary BFEs but this will need to be slightly refined before I can use it to create difference grids and footprints. When the approximate data is ready I'll use it and the 2012 preliminary data to develop the difference products and then the final step will be to create the approximate mapping in the same format as the 2012 detailed to provide a visual comparison alongside the tabular data.

Summary of Data Status 10/27/2017:

Data Description	Acquired	Created	To Be Created
2012 Preliminary FIRM Database for Matagorda County	X		
2006 FEMA Coastal LiDAR LAS data	X		
LiDAR-derived Coastal Raster Mosaic		X	
Approximate Inundation Base Flood Elevations		X	
Approximate Inundation Completed Extents			X
Difference Grids from Detailed and Approximate Inundation			X
Difference Polygon Footprints (Detailed/Approximate)			X

Map: The following page displays a portion of the 2012 preliminary flood risk products covering a coastal portion of the City of Palacio within Matagorda county, Texas.



MATAGORDA COUNTY

CITY OF PALACIOS

MATAGORDA COUNTY

9

9

10

11

10

13

14

0 250 500 1,000 1,500 2,000 Feet

Legend

-  LiMWA (Limit of Moderate Wave Action)
-  Political Areas
- Flood Hazard Areas**
 -  X
 -  AE
 -  AE, FLOODWAY
 -  AH
 -  VE