DRAFT

Panhandle Watershed Case Study

TMDL BASINS 02

FLORIDA ATLANTIC UNIVERSITY

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Executive Summary

Flooding is the most common and costly disaster in the United States. Over 98% of counties in the entire United States having experienced a flood and just one inch of water causing up to $25,000 in damage (FEMA 2018). Flooding can impact a community's social, cultural, environmental and economic resources; therefore, producing sound, science-based, long-term decisions to improve resiliency are critical to future prosperity and growth. To meet the longer-term goals to protect life and property, in 1990, FEMA created the National Flood Insurance Program's (NFIP) Community Rating System (CRS) program, a voluntary program for recognizing and encouraging community floodplain management activities. Nearly 3.6 million policyholders in 1,444 communities participate in the CRS program, but this is only 5% of the over 22,000 communities participating in the NFIP.

The Florida Department of Emergency Management (FDEM) contracted with FAU to develop data to enable local communities to reduce flood insurance costs through mitigation and resiliency efforts by developing watershed management plans. There are several steps to address the development of watershed plans including the development of a watershed planning template and development of support documents to establish risk associated with community risk within the watershed.

The effort discussed herein focuses on the development procedures for a screening tool to assess risk in the Panhandle TMDL 02 area of Florida. The watershed located in Northwest Florida combines readily available data on topography, ground and surface water elevations, tidal data for coastal communities, open space and rainfall to permit an assessment of the risk of inundation of property within the TMDL 05 Basin. Such knowledge permits the development of tools to permit local agencies to develop means to address high risk properties.

1.0 Introduction

In 1972, the Florida Legislature created the Northwest Florida Water Management District (NWFWMD) within the passage of the Water Resources Act (Pratt et al., 1996). The NWFWMD encompasses an area of about 11,200 square miles. The Panhandle Basin borders the Suwannee River Water Management District. The Panhandle consists of 5 TMDLs, and this report will focus on the western basin, TMDL 02; it is home to the City of Pensacola. The basin is coastal, so flood risks from rainfall, wet season thunderstorms and tropical storm activity are concerns for local officials and the nearly 400,000 people who live in the watershed. Figure 1 depicts the Pensacola, TMDL 02, shown in red, within the Panhandle region.

The Panhandle is the least populated and most lightly visited portion of Florida and is closer in appearance to its Deep South neighbors than the tropical backdrop that characterizes the rest of the state.

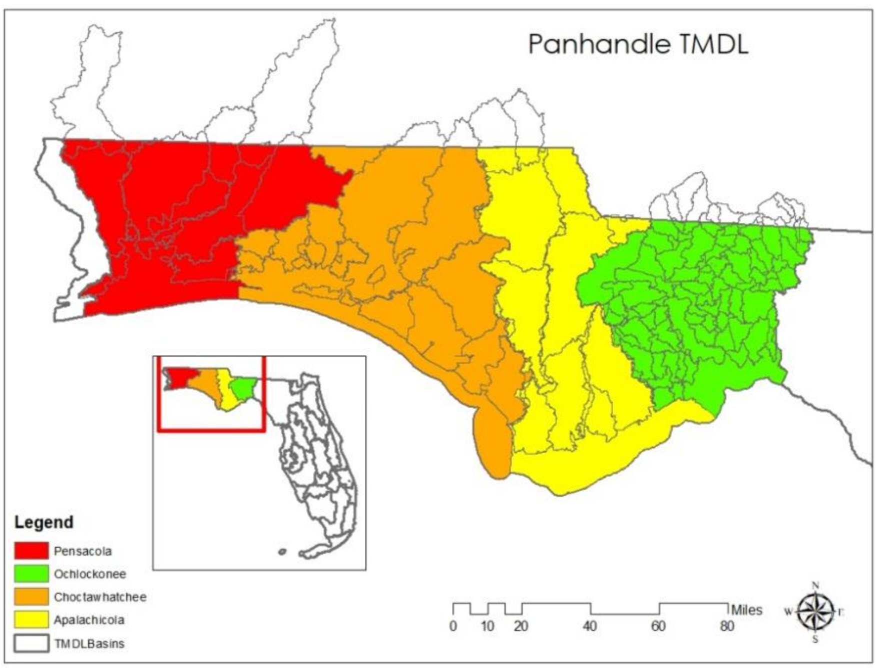

Figure 26. Location of Panhandle

2.0 Summary of Watershed

2.1. General Description of Watershed

2.1.1. Climate/Ecology

Nature reigns supreme in North Florida; forests, preserves and parks remain home to wildlife such as black bears, bald eagles and the rare Florida panther (smilingglobe.com, 2020). Cool freshwater springs can be seen throughout the panhandle area allowing for some recreational opportunities such as tubing, cave diving, etc. Normal annual rainfall ranges from about 55 to 67 inches per year; the average annual rainfall is generally highest in the western portion of the NWFWMD and lowest in the eastern portion (Pratt et al., 1996). There are two distinct rainy seasons each year, the first resulting from frontal storm systems during the winter and early spring, and the second occurring during the summer as a result of afternoon and evening thunderstorms.

2.1.2. Topography and Soils

The regions rolling, hilly terrain more closely resembles areas within Alabama or Georgia than peninsula Florida. Elevations in the highlands area range from 50 to 345 feet above sea level. The highest point in Florida, at 345 feet, is located near the town of Lakewood, which is almost on the Alabama border (smilingglobe.com, 2020). The major physiographic features include the Northern Highlands, and the Coastal Lowlands (Pratt et al., 1996). Panhandle beaches are famous for their white ‘sugar sand’, composed of quartz washed down from the Appalachian Mountains by ancient rivers. Elevations are low, ranging from sea level to about 100 feet above sea level. The native soil and topography create an environment that is highly permeable and can absorb a significant amount of water into the soil: however, the change in the land use has resulted in the flow of water leading to impermeable land where the water collects in pools or runs off rapidly where development has taken place, in direct contrast to the natural condition. The land in many areas is poorly drained due to a flat topography and associated high water table.

2.1.3. Boundaries/Surface Waters

Drained by several large rivers, the region has extensive pine and hardwood forests, springs and swamps. Barrier islands, beaches, and tidal marshes border most of the Gulf Coast (smilingglobe.com, 2020). The key elements of the watershed include the bays (Pensacola Bay and Choctawhatchee Bay), a few lakes, the rivers (Escambia River), the canal system and the rainfall over the area. Figure 2 depicts the TMDL 02 subdivided into 4 HUCs that will later be analyzed individually through the use of CASCADE.

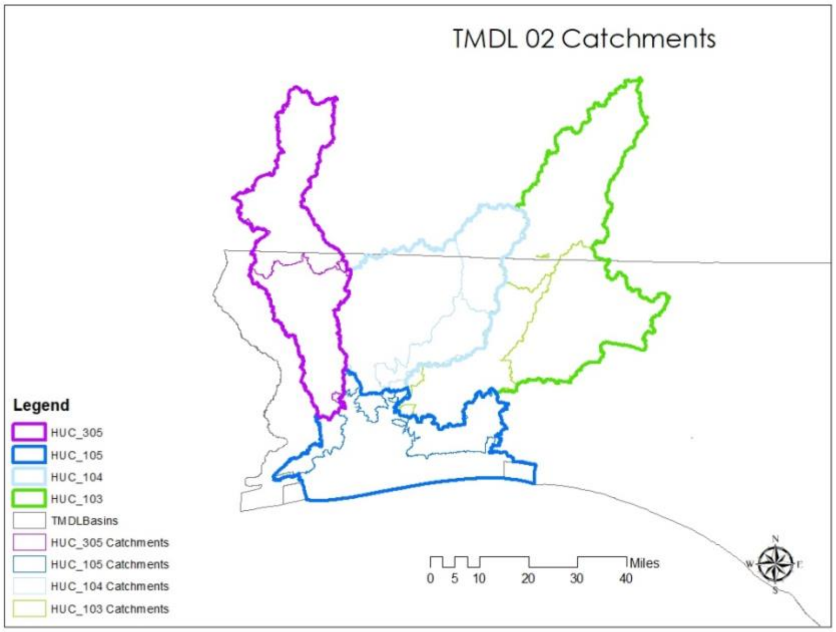

Figure 27. TMDL 02 Catchments

2.1.4. Hydrogeological Considerations

In northwest Florida, the hydrogeologic framework is divided into four groups of sediments that constitute distinct hydrogeologic systems, and each system is a compilation of lithologic beds that have similar hydrogeologic characteristics. (Pratt et al., 1996). Systems are defined by their ability to accelerate or hinder the flow of water and, thus, are not constrained by lithologic or stratigraphic boundaries. In descending order from land surface, the four systems are: Surficial Aquifer System, which includes the Sand-and-Gravel Aquifer; Intermediate System; Floridan Aquifer System; and Sub-Floridan System. In northwest Florida, the Ad Hoc Committee recognized three aquifer systems, which includes the surficial aquifer system, the intermediate aquifer system and the Floridan aquifer system, and two confining units, which includes the intermediate confining unit and the sub-Floridan confining unit. The subsurface characteristics of each system vary both laterally and with depth. The nature of the variability determines ground water availability or the degree of detention for the respective system at any given location.

2.2. Socio-economic Conditions of the Watershed

2.2.1. Demographics (US Census, 2010)

As of the 2010, the 2 counties that make up the TMDL 02 Basin had a total population of 395,051 people and 138,748 households. The average household size for the TMDL 02 was 3 people per household. The population consists of roughly 22% under the age of 18, 16.3% who were 65 years of age or older. The racial makeup of the county was 84% White, 8.5% Black or African American, 2.7% Asian, 0.80% Native American, 0.20% Pacific Islander. As of the 2010, the median income for a household in the county was $64,145, and roughly 11.10% of the population were below the poverty line.

2.2.2. Property

According the US Census, the median property valuation, as of 2018, is roughly near $200,000.

2.2.3. Economic Activity/Industry

As of 2018, the total number of employments within the TMDL 02 area is 44,295, with roughly 4,145 establishments. The total retail sales are roughly $4 million (US Census, 2018). Cool freshwater springs bubble up everywhere, affording recreational opportunities such as tubing, swimming, snorkeling, cave diving and sightseeing on glass-bottom boats (smilingglobe.com, 2020). Outdoor enthusiasts can canoe wild and scenic rivers, camp on an open prairie, cycle along the Gulf of Mexico, catch their own scallops, kayak past centuries-old forts and more.

3.0 Watershed Analysis

3.1. Data Sets

3.1.1. Topography

Figure 3 depicts the results of the LiDAR DEM, using 3-meter tiles, processed conducted for the Panhandle Basin. The highest points are approximately 521 feet above sea level near border of Alabama, and the lowest points are 0 feet at sea level shown along the coast of the panhandle.

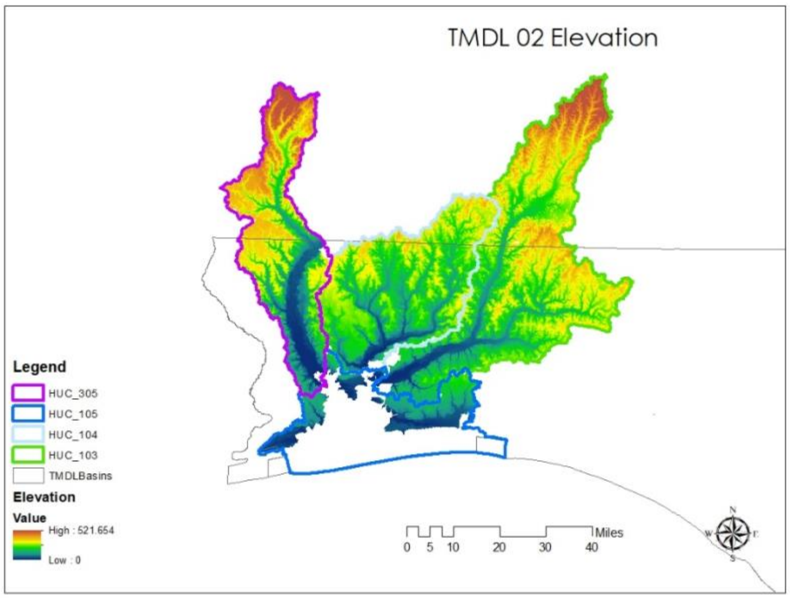

Figure 28. Topography of TMDL 02 based on Lidar DEM

The area with the highest elevation belongs to Upper Yellow River (HUC_103) at 134 feet, which are located within the State of Alabama, seen in Table 1. The largest area is also Upper Yellow River. The catchments were separated by the bodies of water within them, as well as by the location of water stations.

Table 5. TMDL 02 Elevations

HUC_103

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN	ACRES
1	Upper Yellow River	1	1568959	1412063100	25	159	134	80.03845	23.890152	125577047	135	70	159	78	32416.508264
2	Shoal River	2	1411449	1270304100	12	107	95	62.711652	17.05843	88514298	96	66	107	64	29162.169421
3	Lower Yellow River	3	883902	795511800	0	95	95	36.771718	19.279586	32502595	96	39	95	39	18262.438017

HUC_104

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN	ACRES
1	Upper Blackwater River	1	577945	520150500	20	103	83	61.021767	14.186592	35267225	84	67	20	62	11941.012397
2	Big Coldwater Creek	2	1412987	1271688300	0	93	93	51.308673	17.54887	72498488	94	62	93	53	29193.946281
3	Lower Blackwater River	3	437813	394031700	0	80	80	39.029622	20.122497	17087676	81	46	80	42	9045.72314

HUC_105

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN	ACRES
1	Carpenter Creek	1	168966	152069400	0	48	48	16.695607	11.501602	2820990	49	6	48	16	3491.033058
2	Mulatto Bayou	2	110729	99656100	0	52	52	15.711711	14.986108	1739742	53	3	52	8	2287.789256
3	East Bay River	3	429993	386993700	0	70	70	24.684613	15.845869	10614211	71	10	70	25	8884.152893

HUC_305

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN	ACRES
1	Big Escambia Creek	1	1186990	1068291000	8	132	124	80.686733	25.989448	95774345	125	86	132	84	24524.586777
2	Escambia River	2	934884	841395600	0	88	88	36.238993	25.78305	33879255	89	1	88	34	19315.785124

3.1.2. Groundwater

Figure 4 depicts the ground water levels within the Panhandle region. The highest point reaches 230 feet near the Alabama border, and the lowest point is at 0 feet along the coastline.

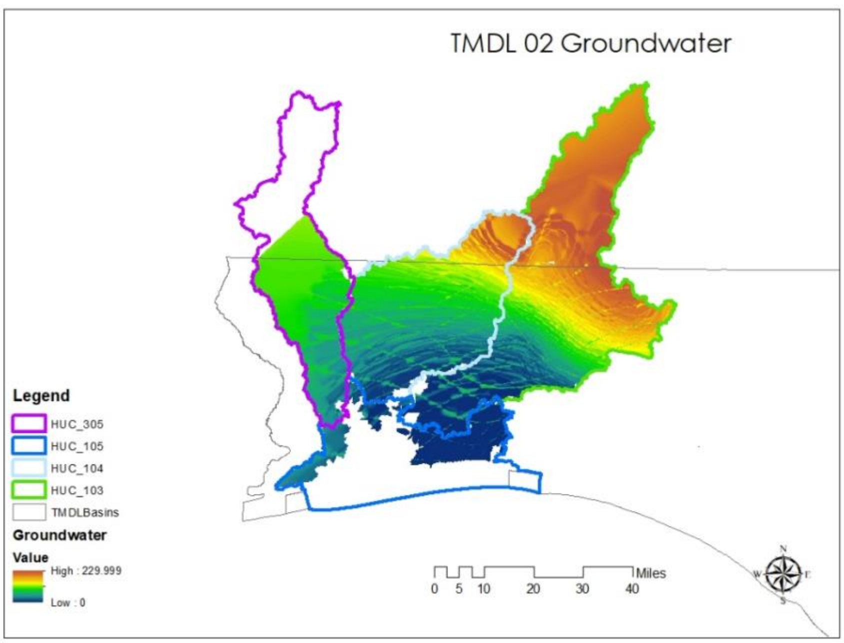

Figure 29. TMDL 02 Groundwater

The area with the highest groundwater level occurs within the Upper Yellow River (HUC_103) and Upper Black water (HUC_104) at 229 feet, as seen in Table 2.

Table 6. TMDL 02 Groundwater

HUC_103

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Upper Yellow River	1	1568588	1411729200	110.002724	229.999298	119.996574	188.595007	17.505619	295827864.305168
2	Shoal River	2	1411336	1270202400	0	220	220	128.044824	59.142109	180714270.227138
3	Lower Yellow River	3	883849	795464100	0	179.996246	179.996246	35.621497	39.800491	31484024.923769

HUC_104

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Upper Blackwater River	1	577744	519969600	60.000881	229.998825	169.997944	148.251045	41.848185	85651151.753277
2	Big Coldwater Creek	2	1412876	1271588400	0	159.996735	159.996735	69.960616	30.581835	98845674.718146
3	Lower Blackwater River	3	437804	394023600	0	109.939255	109.939255	35.314959	20.770407	15461030.252124

HUC_105

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Carpenter Creek	1	168959	152063100	10	59.999908	49.999908	33.842825	7.687729	5718049.79606
2	Mulatto Bayou	2	110722	99649800	0	69.97319	69.97319	16.44378	13.145902	1820688.210005
3	East Bay River	3	429906	386915400	0	89.982285	89.982285	2.467051	10.02245	1060600.115617

HUC_305

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Big Escambia Creek	1	379504	341553600	80	114.391624	34.391624	103.114753	4.254542	39132461.321892
2	Escambia River	2	934878	841390200	10	101.677025	91.677025	71.873271	21.172754	67192739.391622

3.1.3. Impervious Areas

Figure 5represents the impervious areas, primarily roads in the Panhandle region. These are areas where water cannot seep into the soil and as a result seep to unsaturated areas. Most of the impervious areas are located near the coastline.

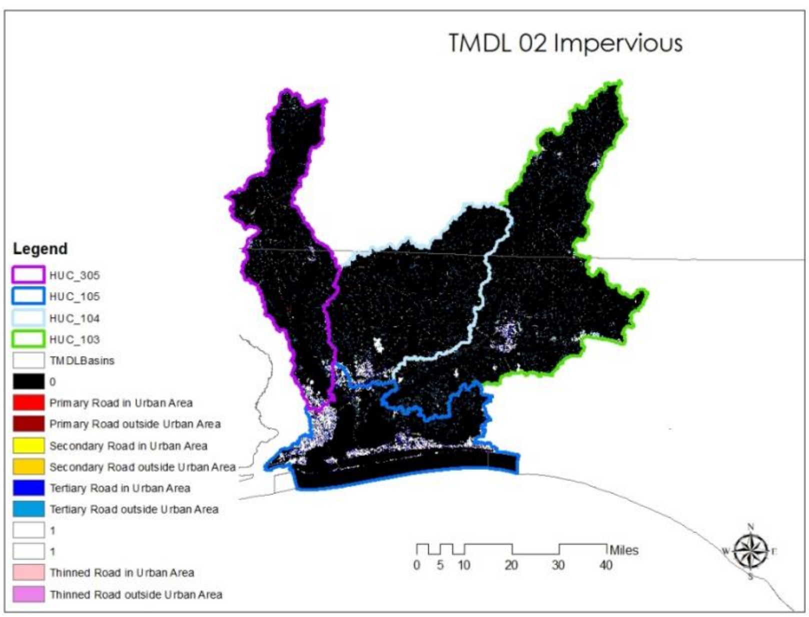

Figure 30. TMDL 02 Impervious Areas

Figure 6 is the water holding capacity. The highest capacity is at 0.74 feet and the lowest is at zero feet.

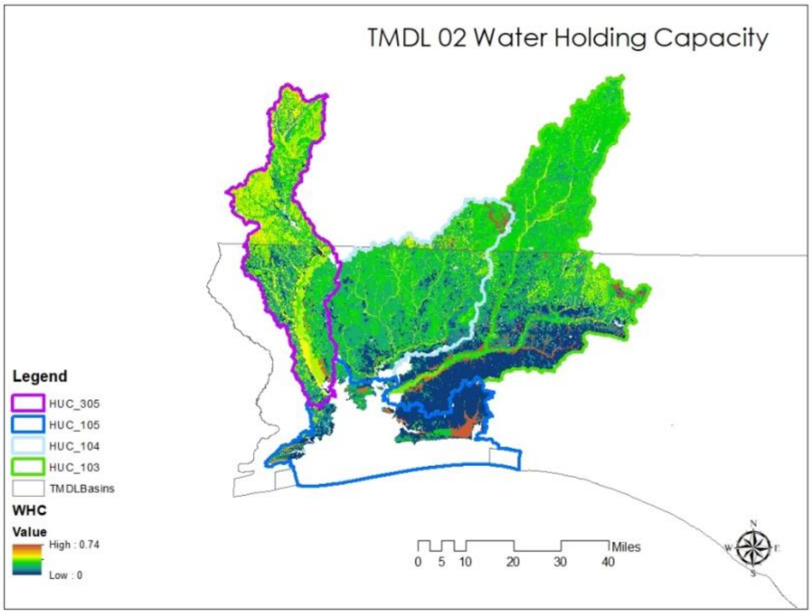

Figure 31. Pensacola Water Holding Capacity

3.1.4. Ground Storage

Figure 7 represents the ground storage within the Panhandle region. The highest levels of ground storage are located in the northern portion and stretch south within HUC_305. The lowest levels are concentrated near the coast.

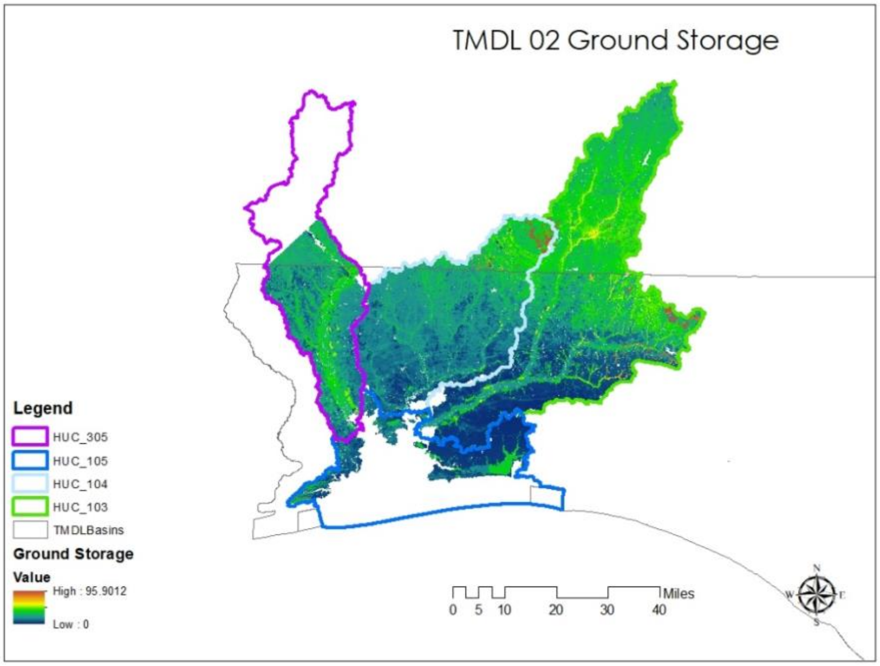

Figure 32. TMDL 02 Ground Storage

The area with the highest ground storage level occurs within the Upper Yellow River (HUC_103) at 95 feet, seen in Table 3.

Table 7. TMDL 02 Ground Storage

HUC_103

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Upper Yellow River	1	1396825	1396825000	0	95.90	95.9011	24.478118	5.840686	341916466.
2	Shoal River	2	1252666	1252666300	0	84.39	84.3905	18.534537	10.754114	232175898.
3	Lower Yellow River	3	7876253	787625300	3.408	46.24	42.8367	11.013274	6.834564	86743333.0

HUC_104

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Upper Blackwater River	1	5166932	516693200	2.344	94.59	92.2551	24.535539	13.179096	12677346
2	Big Coldwater Creek	2	1264796	1264796500	2.278	57.59	55.3172	14.787933	4.399676	18703726
3	Lower Blackwater River	3	3884389	388438900	4.258	39.90	35.6490	11.801868	4.278422	45843047.

HUC_105

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Carpenter Creek	1	1440656	144065600	4.238	35.25	31.0182	11.464736	5.475518	16516741.
2	Mulatto Bayou	2	939717	93971700	4.458	31.66	27.2102	12.022767	4.73915	11297998.
3	East Bay River	3	3811086	381108600	3.654	36.75	33.1023	8.925675	6.697677	34016514.

HUC_305

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Big Escambia Creek	1	3322547	332254700	2.297999	34.419418	32.121419	19.08079	4.890015	63396819.974793
2	Escambia River	2	8267783	826778300	4.567559	39.458672	34.891112	17.284481	5.92034	142904341.451576

3.1.5. Precipitation

Figure 8 depicts the precipitation values within the panhandle region. Precipitation rates drop from north to south. The 25-year/3 day precipitation for northern portions of the watershed is around 11 inches of rainfall while the southern portion can experience up to 14.5 inches of rain. The southern portion is adjacent to the Gulf of Mexico.

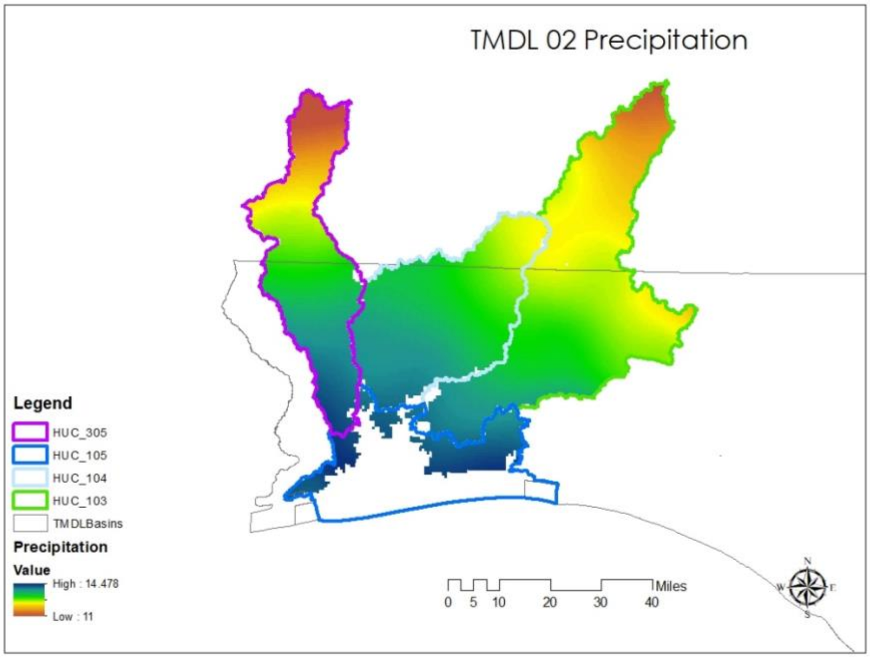

Figure 33. Pensacola Precipitation

Carpenter Creek (HUC_105) and East Bay River (HUC_105) experiences the largest amount of rainfall with roughly 14.5 inches of rainfall, seen in Table 4. Both Carpenter Creek and East Bay River are located in the southwest portion of the Panhandle region. The area with the lowest rainfall, nearly 9.5 inches, is located near Big Escambia Creek.

Table 8. TMDL 02 Precipitation

HUC_103

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Upper Yellow River	1	1847	1415539429.927816	11.652	13.097	1.445	12.595386	0.314854	23263.678001
2	Shoal River	2	1657	1269923570.866482	12.467	13.838	1.371	13.129343	0.267408	21755.321012
3	Lower Yellow River	3	1039	796288829.288035	12.971	14.184	1.213	13.66944	0.330974	14202.547983

HUC_104

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Upper Blackwater River	1	675	520240395.15955	12.787	13.352	0.565001	13.022964	0.152598	8790.500997
2	Big Coldwater Creek	2	1660	1279406008.836819	13.168	14.195	1.026999	13.698205	0.243207	22739.021003
3	Lower Blackwater River	3	509	392299794.275868	13.311	14.142	0.831	13.688682	0.249414	6967.539001

HUC_105

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Carpenter Creek	1	202	157908070.056283	14.23	14.478	0.248	14.352837	0.071981	2899.273
2	Mulatto Bayou	2	127	99278836.124495	14.085	14.291	0.206	14.193173	0.051359	1802.533004
3	East Bay River	3	499	390079836.426164	13.887	14.44	0.552999	14.219533	0.126319	7095.546999

HUC_305

Rowid	NAME	ZONE-CODE	COUNT	AREA	MIN	MAX	RANGE	MEAN	STD	SUM
1	Big Escambia Creek	1	1348	1067530713.773561	11	13.498	2.498	12.617636	0.616759	17008.573004
2	Escambia River	2	1065	843412618.819616	13.281	14.386	1.105	13.881739	0.27909	14784.052011

3.1.6. Surface Waters

Figure 9 shows the location of existing water stations. The data provided from each water station will justify the results obtained from CASCADE. Some HUCs did not contain any existing water stations, however due to the flow of the rivers, the data collected from the basin upstream will be used to prove the validity of the results.

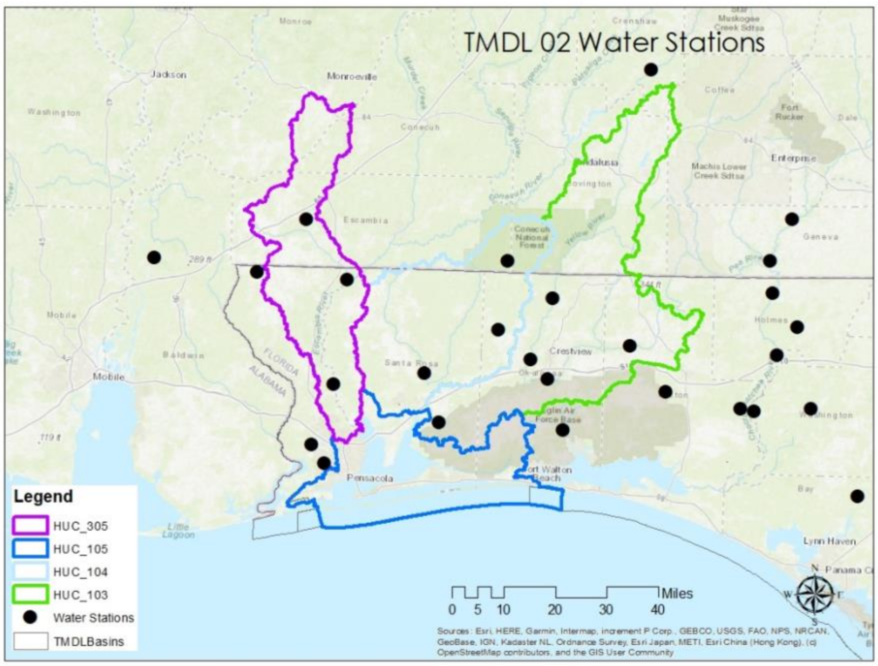

Figure 34. TMDL 02 Water Stations

3.1.7. Open Space

While the soil may have the capacity to store water, the type of land cover will either allow or prevent soil infiltration. If an area is covered by impervious surfaces, the rainfall will not infiltrate the soil causing surface runoff and increased flooding. Only those areas classified as open space, or pervious land, will minimize surface runoff, promoting soil infiltration and storage in the unsaturated zone. Therefore, incorporating impervious surfaces into the calculation of soil storage capacity is important. The National Land Cover Database was used to classify land as either pervious or impervious. Then, impervious surfaces were assigned a value of zero to designate all impervious areas as having no soil storage capacity since rainfall will simply runoff along the surface without any soil infiltration, preventing storage in the unsaturated zone. Figure 10 depicts the open spaces using a binary system. The open spaces are scattered across the TMDL.

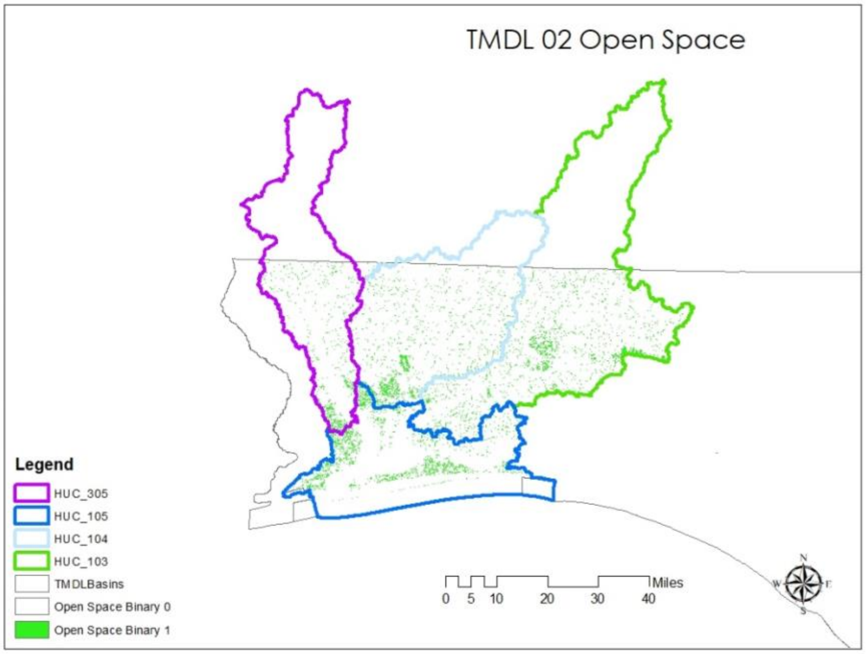

Figure 35. TMDL 02 Open Space

3.2. Modeling Protocol

There are many contributing factors to flooding, including the low land elevations, high groundwater table, and low soil storage capacity. To accurately identify land areas within the watershed that are vulnerable to flooding, all these factors were included in the flood risk model. The previously discussed datasets were used to calculate input parameters needed to run a flood simulation model called CASCADE 2001, which was developed by the South Florida Water Management District. The advantage of this model is that it incorporates several characteristics unique to each watershed, including the topography, groundwater, surface water, tides, soil type, land cover, and rainfall. By following FAU's modeling protocol, all the necessary input parameters to run CASCADE 2001 were either directly calculated or derived from existing datasets. Several surfaces were derived from the data and used to determine characteristics of the watershed, which represent the primary contributing factors to flooding. While a contributing factor such as the land elevation in the watershed can be directly observed using data collection methods such as LiDAR, other factors require further data processing and modeling.

CASCADE 2001 is a multi-basin hydrologic/hydraulic routing model developed by the South Florida Water Management District (SFWMD). The model develops solutions by basin. A basin is defined as an area where all the water that falls via rainfall stays in an area and travels to an outlet. The areas of the basin and the longest time it takes the runoff to travel to the most distance point to reach the point of discharge must be estimated. Rainfall is also needed. The waterway flow paths from ArcHydro as in Figure 11.

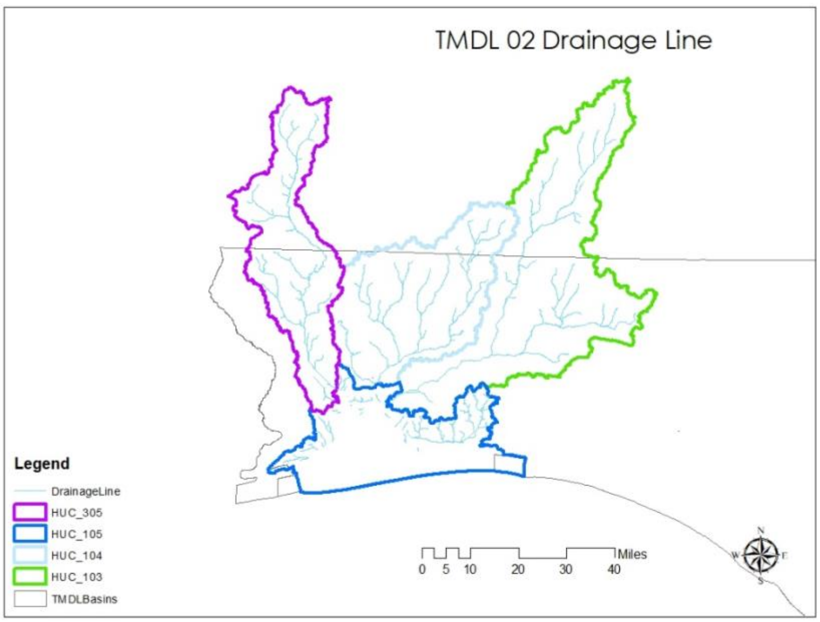

Figure 36. TMDL 02 Flow Paths

The inputs required by the model were prepared based on datasets of DEM, water table, soil storage, and rainfall. The steps are.

1. Area: Basing this information on the DEM values, which were derived from merging the smaller catchments into larger ones, the area was determined and converted to acre-ft.

2. Offsites: These were given to each catchment. Which offsite, was determined by where the water body drained into.
3. The initial stage: This was determined by finding the outlets
4. Ground storage: Data came from soil storage/ ground storage tables
5. Time of concentration: determined by dividing the longest river length by 3600
6. Rainfall: Data was used from precipitation tables
7. Stage-Storage relationship:
8. Structure: Initial stage values were used for gravity structures.

Figure 12-22 are examples interface of the simulation for one catchment in Cascade 2001

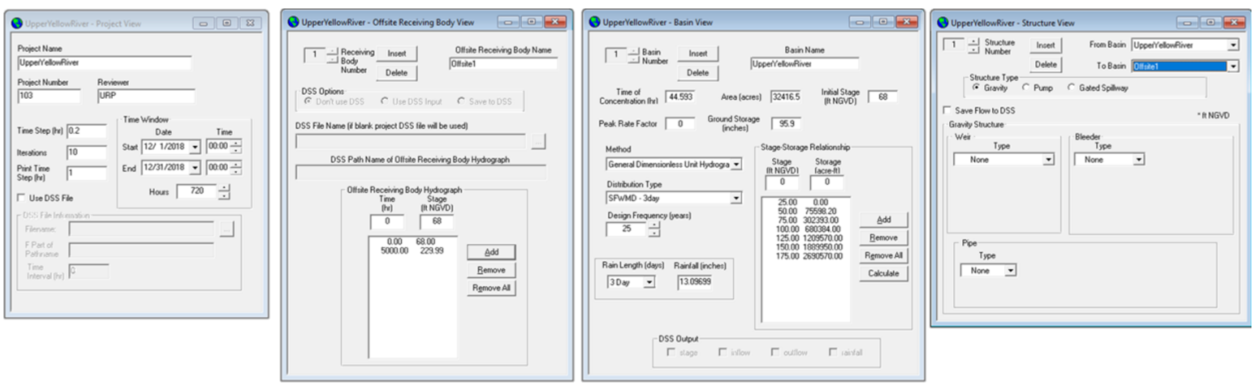

Figure 37. Upper Yellow River Cascade (HUC_103)

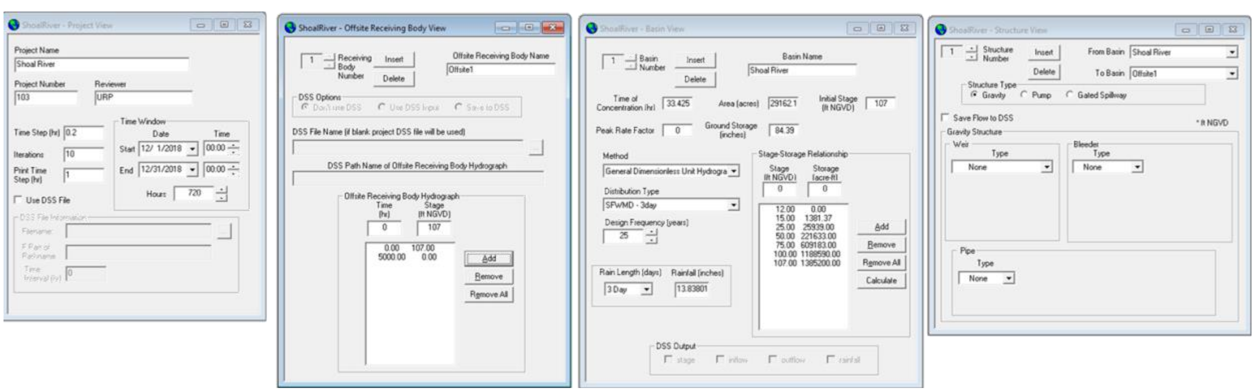

Figure 38. Shoal River Cascade (HUC_103)

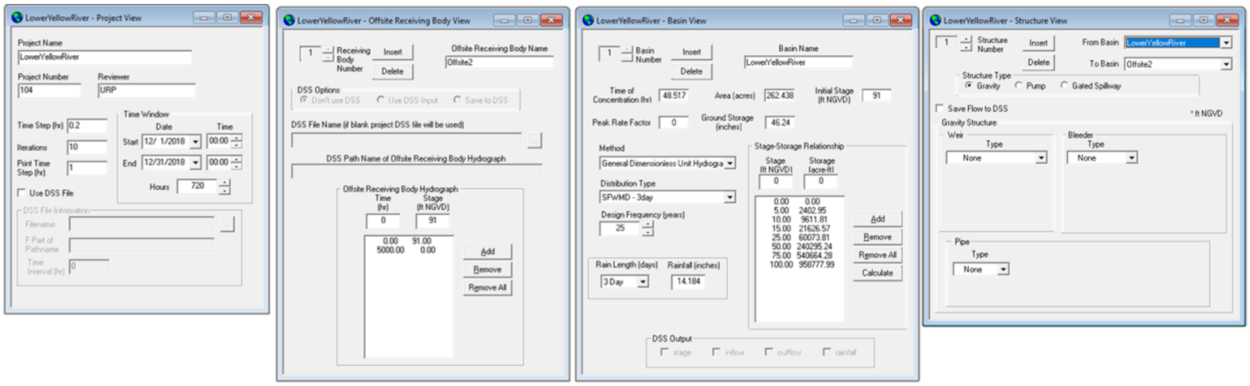

Figure 39. Lower Yellow River Cascade (HUC_103)

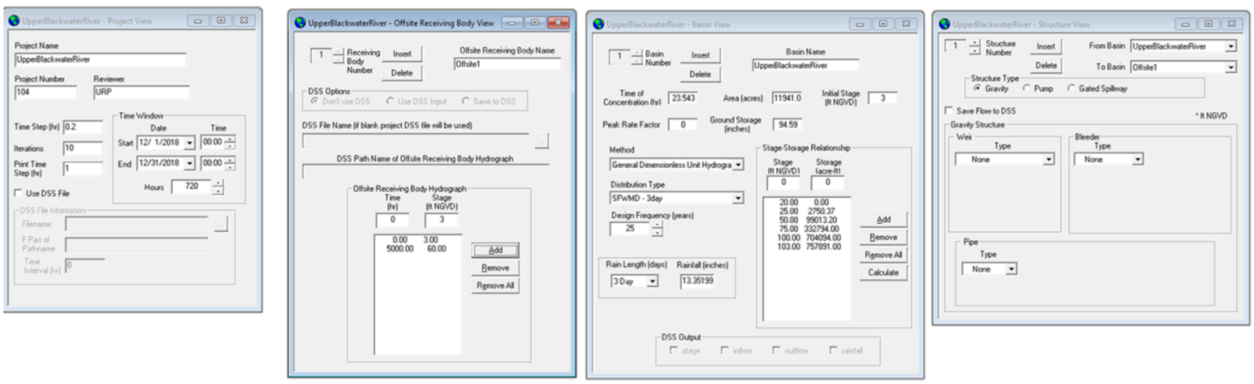

Figure 40. Upper Blackwater River Cascade (HUC_104)

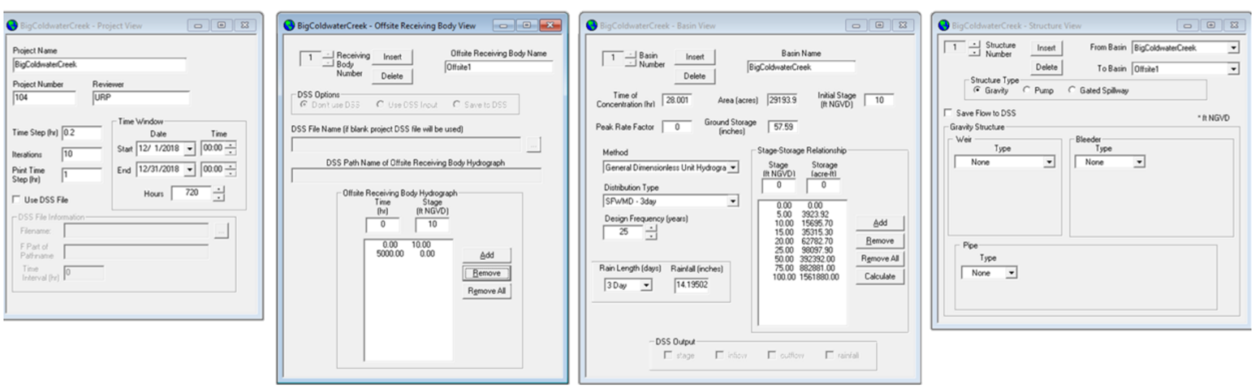

Figure 41. Big Coldwater Creek Cascade (HUC_104)

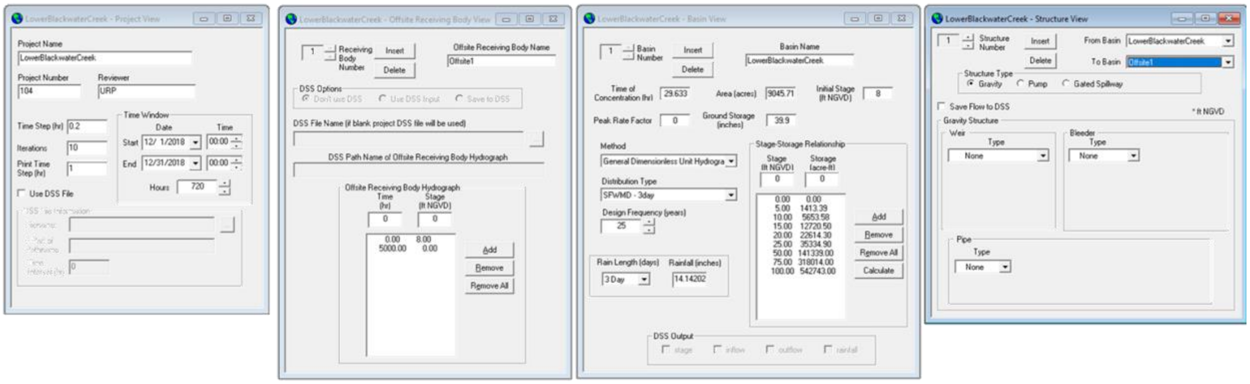

Figure 42. Lower Blackwater Creek Cascade (HUC_104)

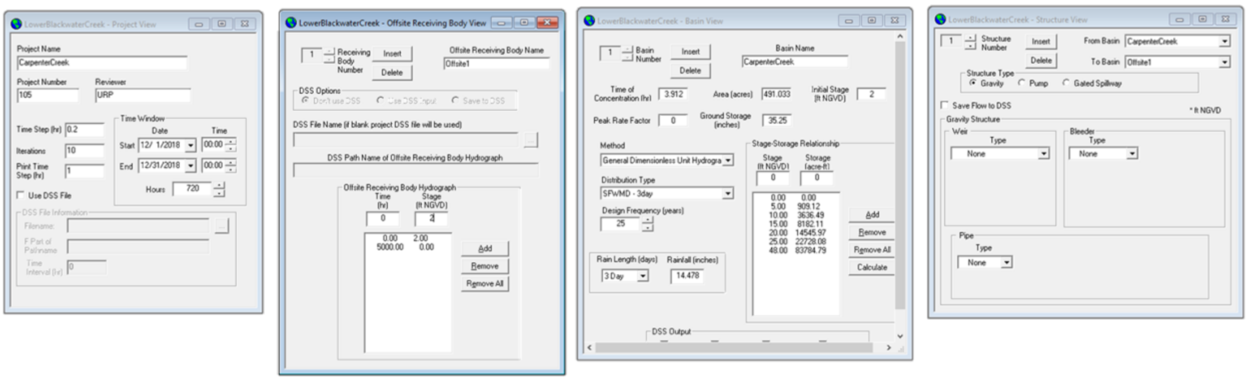

Figure 43. Carpenter Creek Cascade (HUC_105)

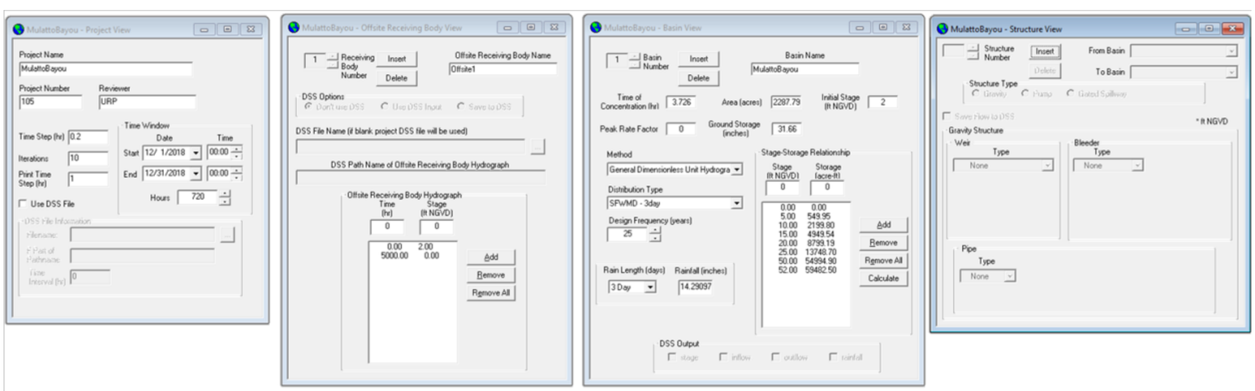

Figure 44. Mulatto Bayou Cascade (HUC_105)

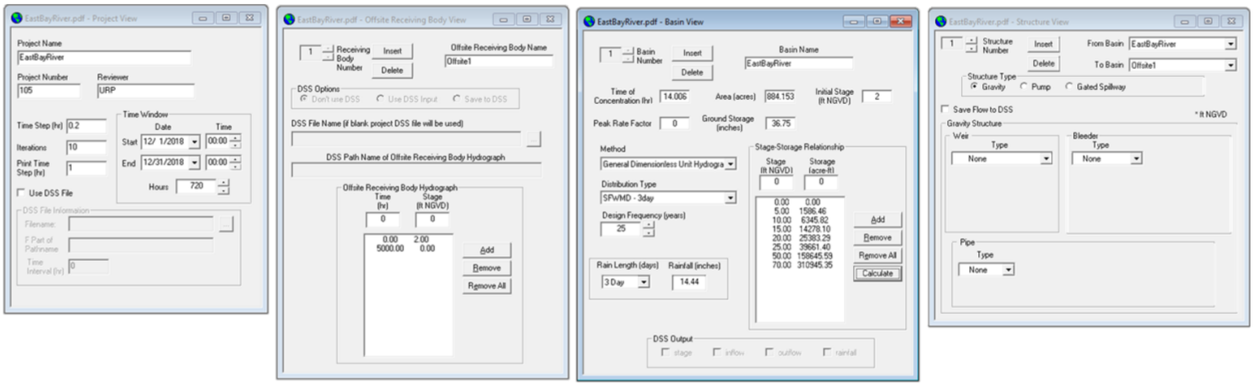

Figure 45. East Bay River Cascade (HUC_105)

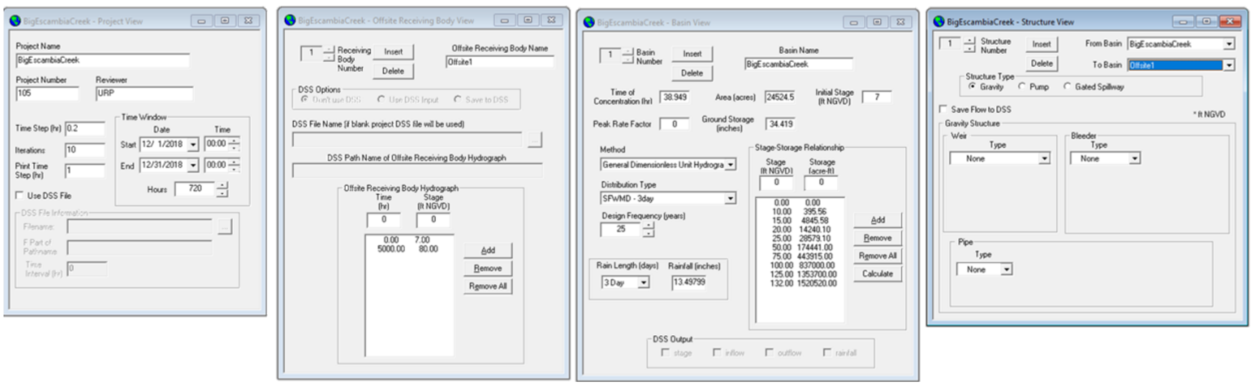

Figure 46. Big Escambia Creek Cascade (HUC_305)

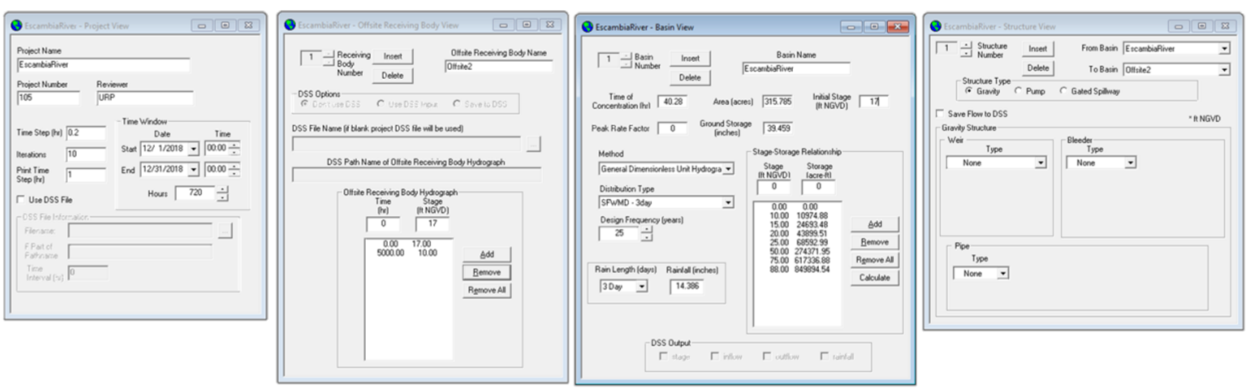

Figure 47. Escambia River Cascade (HUC_305)

3.3. Modeling Results

3.3.1. Vulnerability to Flooding

Figure 23 displays the estimated flood risk for the Pensacola Watershed (TMDL Basin 02) based on a 3-day, 25-year rainfall. The highest risk is found along the coast and the lower portion of the four rivers that drain into Pensacola Bay and East Bay. The area is not densely populated but includes a large urban cluster along the coast. The largest city in the metropolitan area is Pensacola. Other urban settlements include Crestview, Century, and Fort Walton Beach. The highest flooding risk is found in and around the cities of Pensacola and Fort Walton Beach.

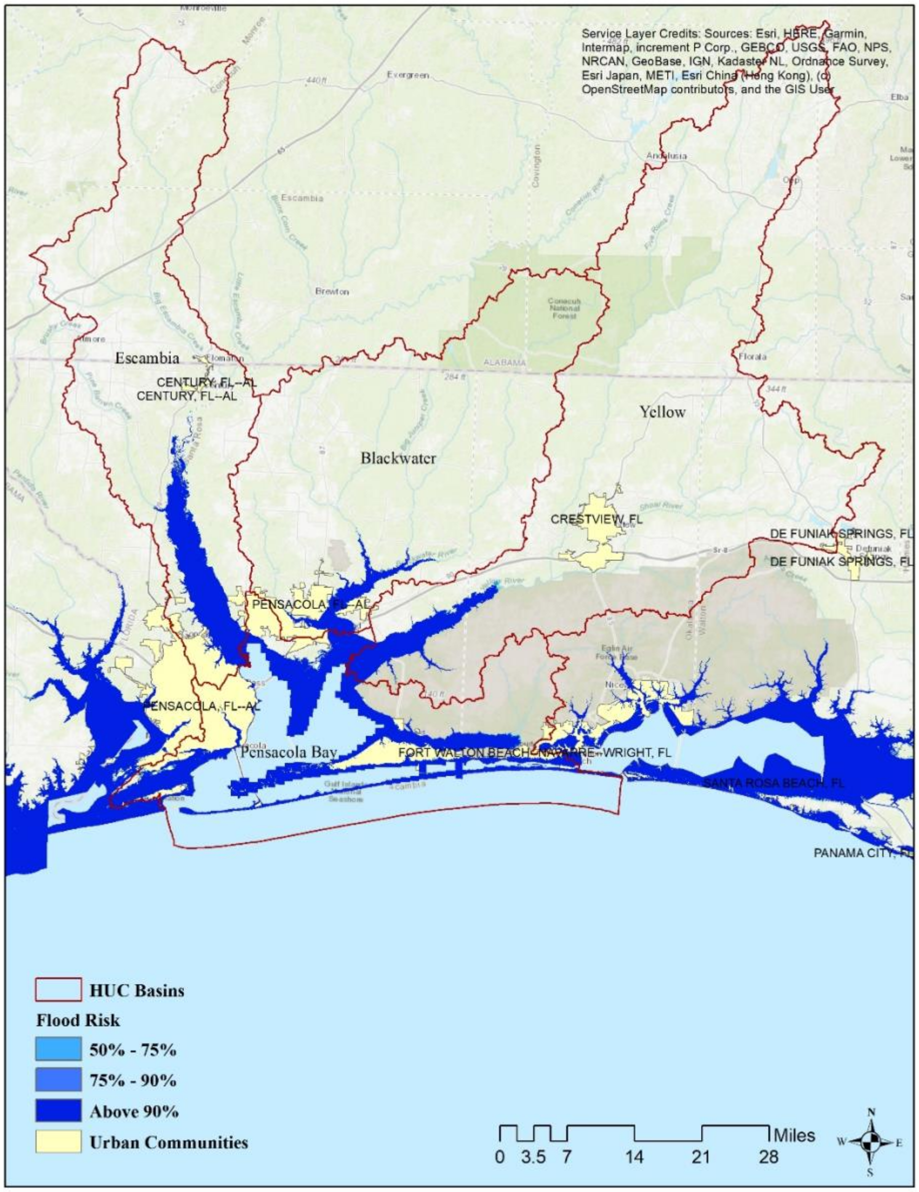

Figure 48. Flood Risk Map

3.3.2. FEMA Flood Map Comparison

For comparison, FEMA flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). SFHAs are defined as the area that will be inundated by the flood event having a “1-percent chance” of being equaled or exceeded in any given year. The 1-percent annual chance flood event is also referred to as a 100-year flood event. SFHAs are labeled as Zone A, Zone AE, and Zone VE. Figure 24 compares the flood risk zones based on the CASCADE results with the maps provided from FEMA. It shows an overlay of the estimated flood risk map with the FEMA’s 100-year floodplain. Table 5 provides a summary of the overlay statistics.

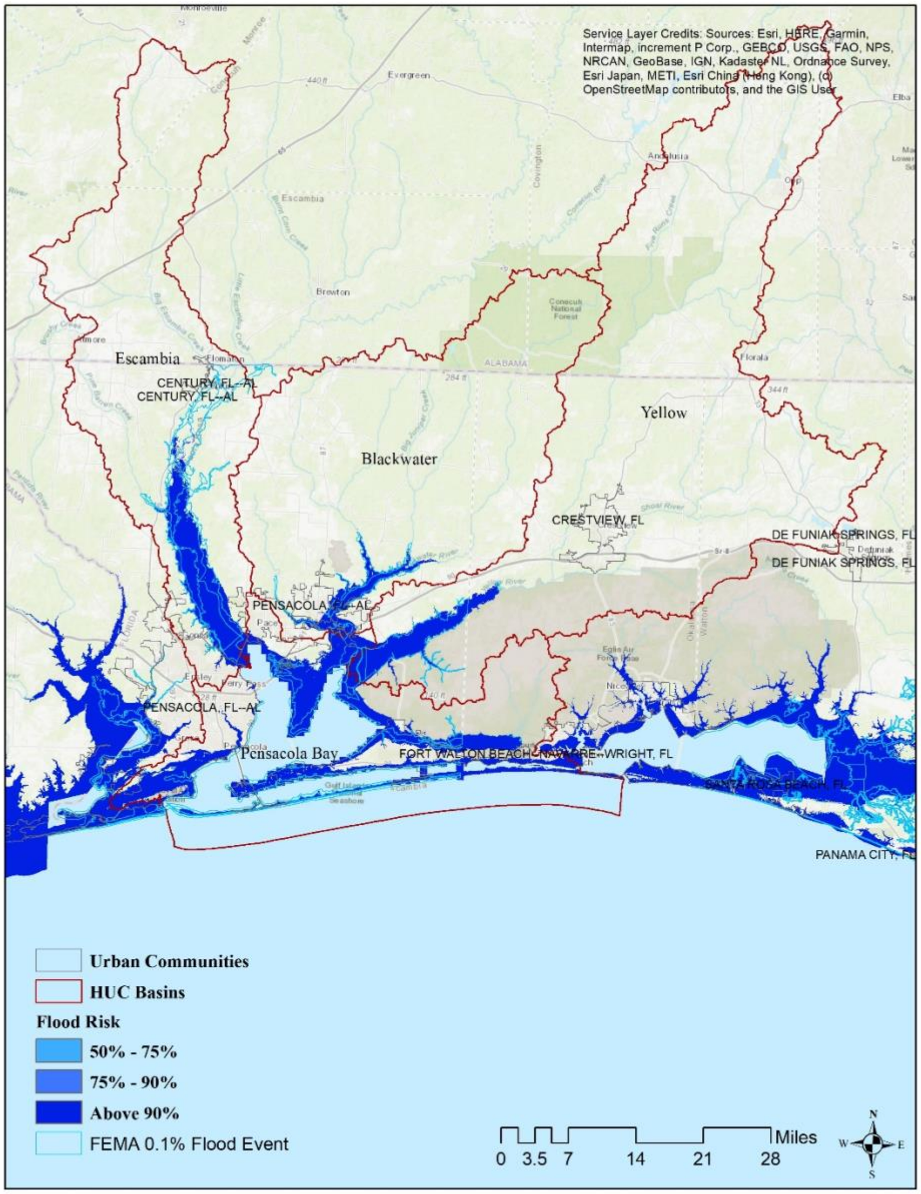

Figure 49. FEMA Flood Map Comparison

Table 5. Comparison between FEMA identified 100-year flood event and the CRT modeled flood region with a high probability for inundation in TMDL Basin #2.

Category	Results
FEMA 1% flooding (total area: km_2)	432.9
Modeled flood risk (total area: km_2)	367.3
Overlapping area (total area: km_2)	255.7
Percent of overlap (FEMA flood zone, in percent)	84.8%
Percent of overlap (estimated flood risk, in percent)	69.6%

3.3.3. Vulnerability to Flooding

The Pensacola TMDL Basin drains includes the Pensacola Metropolitan Area, which incorporates the City of Pensacola (with a population of 52,975, as of 2019) and several unincorporated census-designated places, the largest of which is Navarre (with a population 42,300). The total population of the Pensacola metropolitan area as of 2019 was 502,629. The area is highly vulnerable to flooding as it drains four rivers (Escambia, Blackwater, Yellow, and East Rivers). It is also part of the Pensacola Bay estuarine system, which also includes Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay, and portions of Santa Rosa Sound. Figures 25, 26, and 27 highlight locations vulnerable to flooding in the western, central and eastern parts of the Pensacola Bay estuarine system.

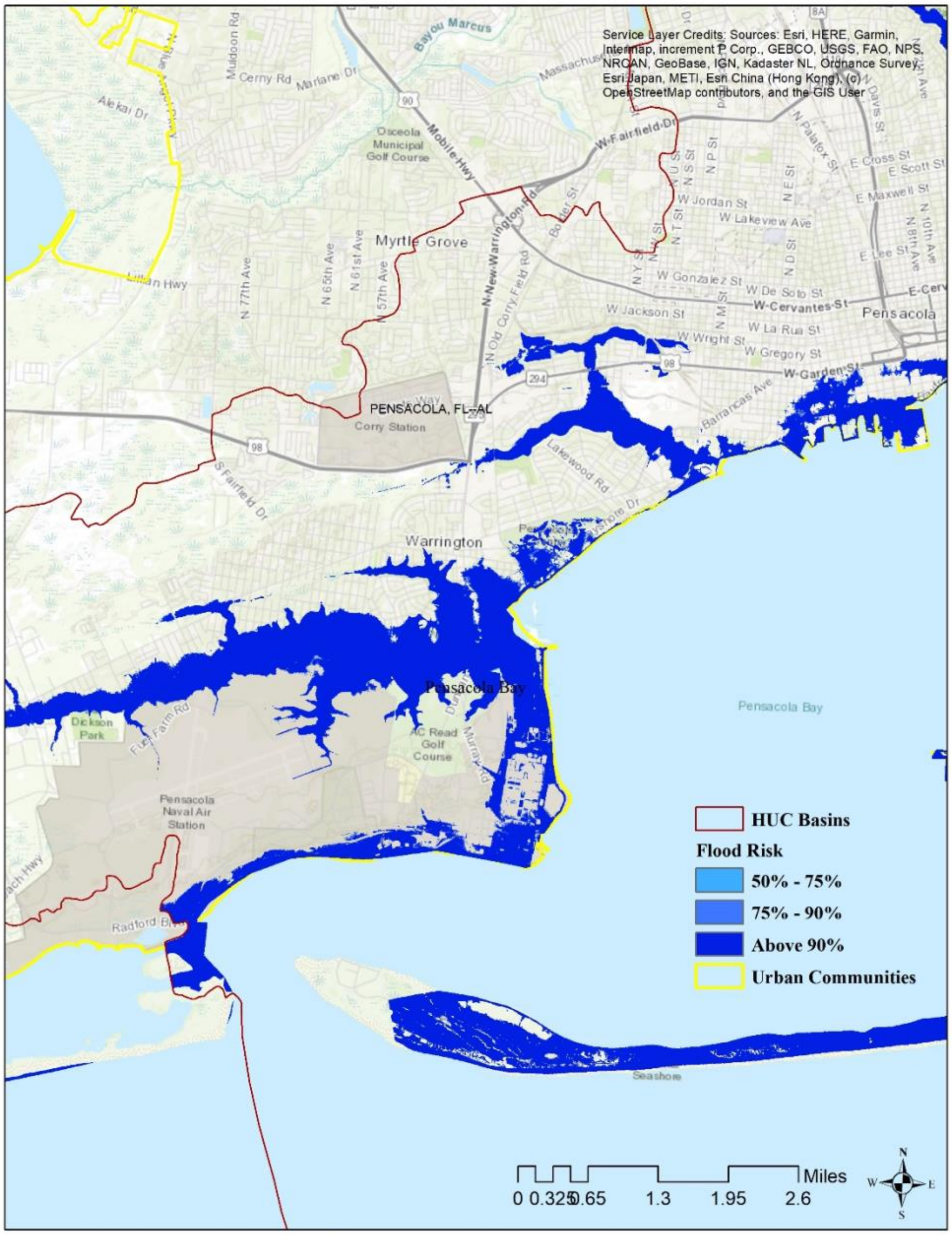

Figure 25. FEMA Flood Map Comparison for Escambia Bay and Blackwater Bay

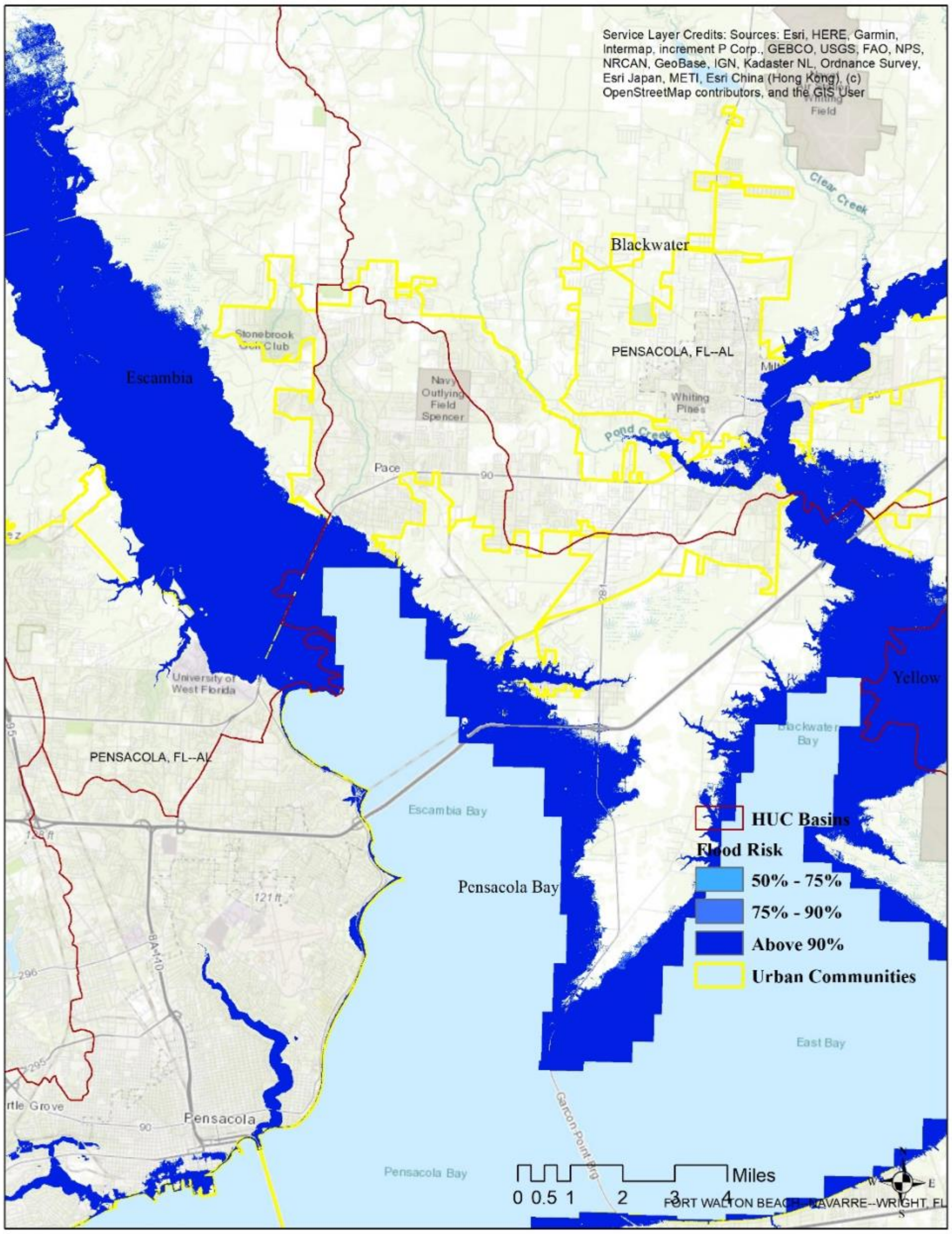

Figure 26. FEMA Flood Map Comparison for Pensacola Bay,

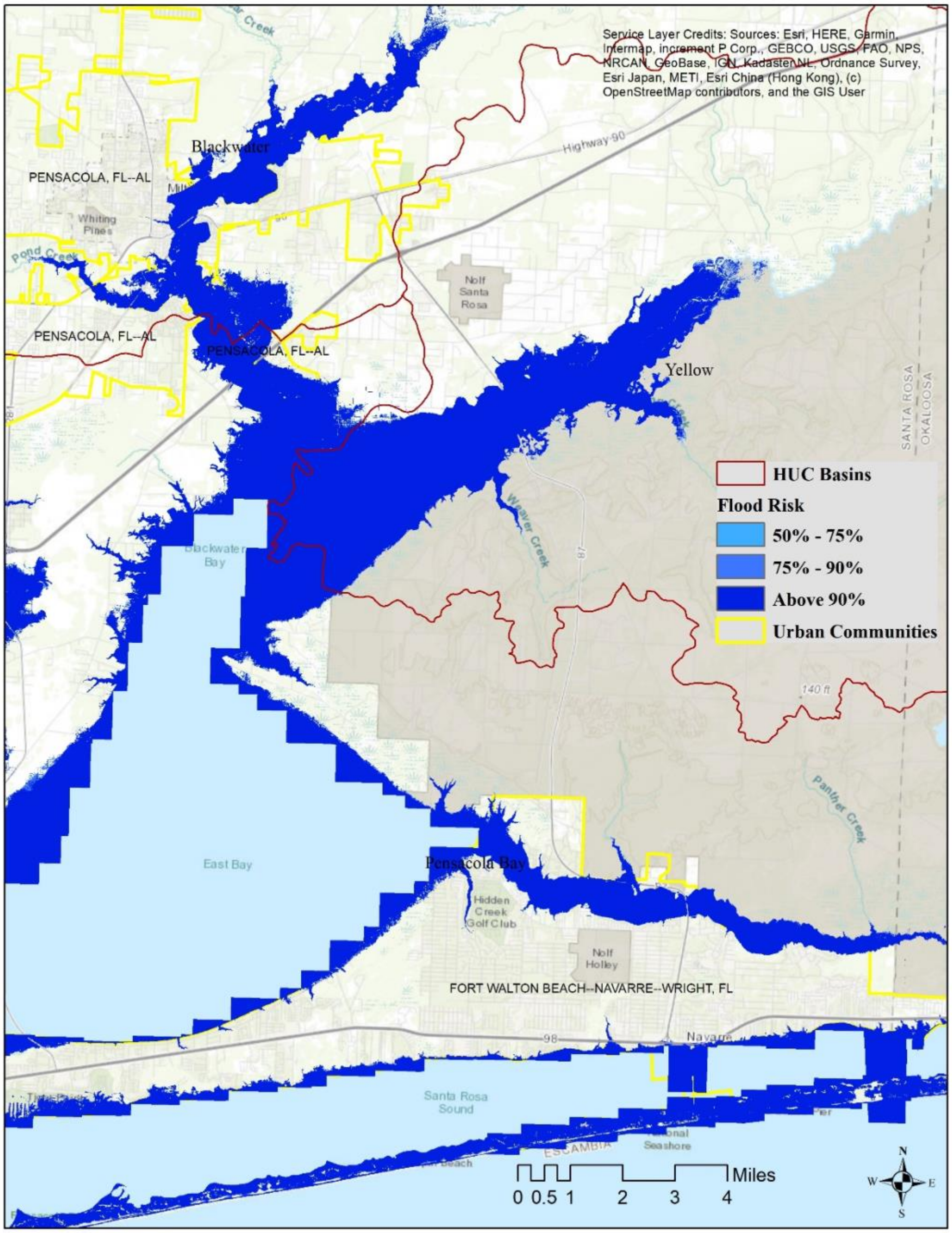

Figure 27. FEMA Flood Map Comparison for Fort Walton/ Santa Rosa Sound

3.3.4. Repetitive Loss Comparison

Figure 28 shows a comparison of the flood map and repetitive loss property locations for the basin. The loss areas coincide with the areas predicted by the FAU model as being at risk for flooding.

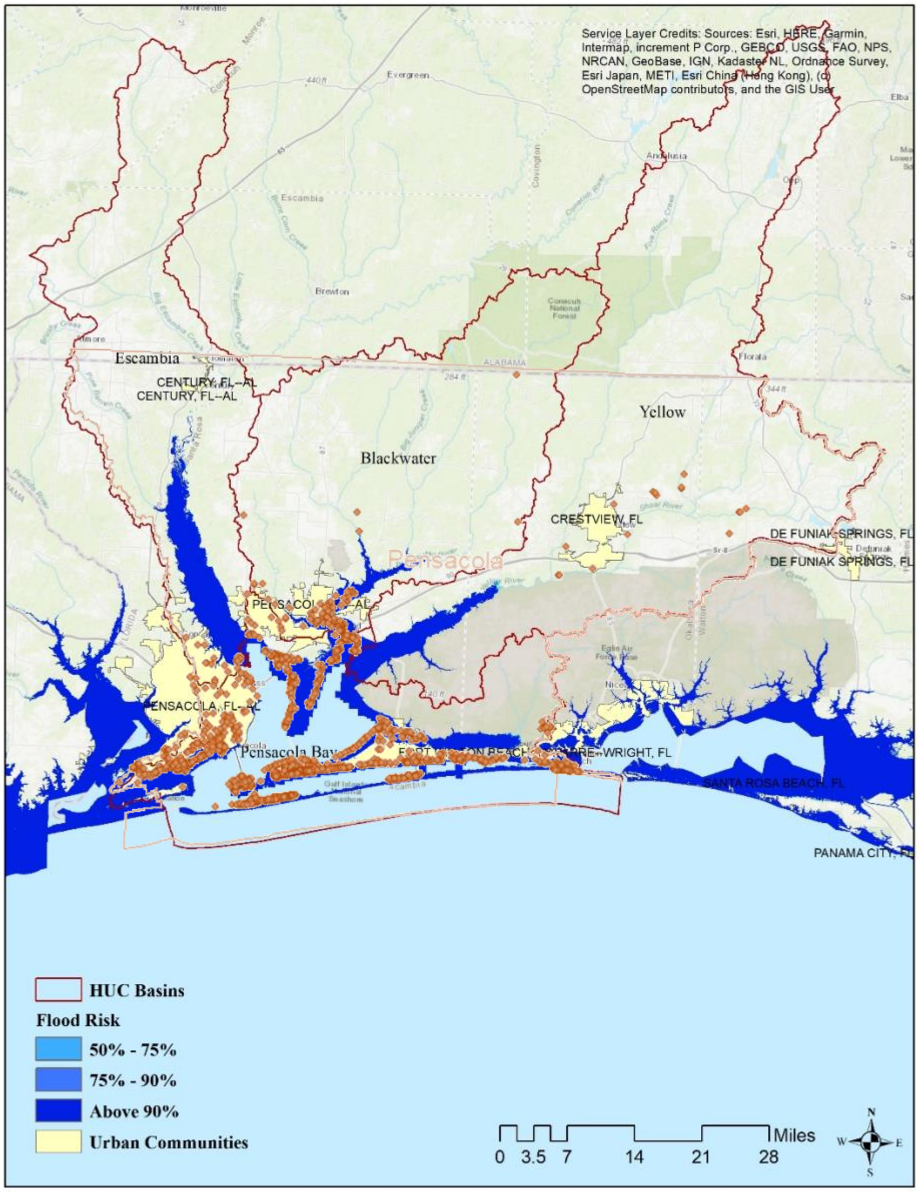

Figure 28. Repetitive loss areas from 2004 -2014 superimposed on the flood risk map created by FAU

4.0 Conclusion

FDEM contracted with FAU to develop a screening tool of flood risk areas for 29 watershed basins. The effort discussed herein focuses on the development procedures for a screening tool to assess risk in the Panhandle area of Florida. The effort discussed herein focusses on the development procedures for a screening tool to assess risk in the Apalachicola watershed basin. The watershed located in Northwest Florida combines readily available data on topography, ground and surface water elevations, tidal data for coastal communities, open space and rainfall to permit an assessment of the risk of inundation of property within the Panhandle Basin.

The basin shows widespread flooding along the beach due to low elevation proximity to the Gulf of Mexico coast and extensive sensitive areas that currently received extensive environmental protection. A drilldown to the local community showed it was are flood prone. The repetitive loss maps confirmed FAU's modeling. Such knowledge permits the development of tools to permit local agencies to develop means to address high risk properties. Solutions to improve flood resiliency in the is basin will yield long term benefits.

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