

Discovery Report

Yalobusha Watershed, 08030205

Calhoun, Carroll, Chickasaw, Grenada, Lafayette, Leflore, Montgomery, Pontotoc, Tallahatchie, Webster, and Yalobusha Counties

Town of Algoma, Village of Big Creek, City of Bruce, Town of Calhoun City, Town of Carrollton, Town of Coffeerville, Town of Derma, Town of Duck Hill, City of Grenada, City of Houston, Town of North Carrollton, Village of Pittsboro, Village of Slate Springs, Town of Vardaman, City of Winona

Mississippi

Report Number 01

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Acronyms and Abbreviations

AAL	Average Annualized Loss
ASPRS	American Society of Photogrammetry and Remote Sensing
CAC	Community Assistance Contact
CAV	Community Assistance Visit
cfs	cubic feet per second
CNMS	Coordinated Needs Management Strategy
CRS	Community Rating System
DEM	Digital Elevation Model
DTM	Digital Terrain Model
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GIS	Geographic Information System
Hazus-MH	Hazards U.S. Multi-Hazard
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
MDEQ	Mississippi Department of Environmental Quality
MEMA	Mississippi Emergency Management Agency
NAD83	North American Datum
NAVD88	North American Vertical Datum
NFIP	National Flood Insurance Program
PDCC	Preliminary DFIRM Community Coordination
Risk MAP	Risk Mapping, Assessment, and Planning
SFHA	Special Flood Hazard Area
USGS	United States Geological Survey

1 General Information

The goal of the Discovery effort is to understand better local flood risk, current mitigation efforts in place, and to spark watershed-wide discussions about increasing resilience to flooding. Discovery helps communities identify areas at risk for flooding, and solutions for reducing that risk. Through the Risk Mapping, Assessment and Planning (MAP) program, the Federal Emergency Management Agency (FEMA) provides information to enhance local mitigation plans, improve community outreach, and increase local resilience to floods.

The Yalobusha Watershed Discovery effort involved an analysis of watershed-wide researched data and information discussed at the Discovery meeting. The inclusion of several communities enabled different community officials to meet with each other and hear how the neighboring community is dealing with similar problems they are facing.

FEMA's Risk MAP program provides communities with flood information based on a watershed model and tools that can be used to enhance mitigation plans and better protect citizens. Risk MAP promotes early and frequent communication with project partners (including all affected communities) to approach risk assessment and mitigation planning on a watershed basis. Discovery is a new Risk MAP task that involves data mining, collection, and analysis. This report summarizes the Discovery tasks that were conducted for the Yalobusha Watershed (HUC # 08030205) in FEMA Region IV.

The FEMA Region IV Discovery data collection entailed a massive collection of tabular and spatial data for all communities from Federal and State sources, as well as information collected through phone interviews and with Discovery data questionnaires sent to each community.

1.1 Background and Statistics

The Region Study Team (RST) Meeting, which occurred on June 18, 2018, assists in the proper pre-planning to ensure that the Risk MAP goals and objectives are met. With Risk MAP's focus on watersheds at a HUC-8 level it is important that the most is made of this phase in the potential projects within the watershed.

Below is a summary of the Project Management Team/Regional Study Team, including team member name, organization, and role in the study that attended the RST:

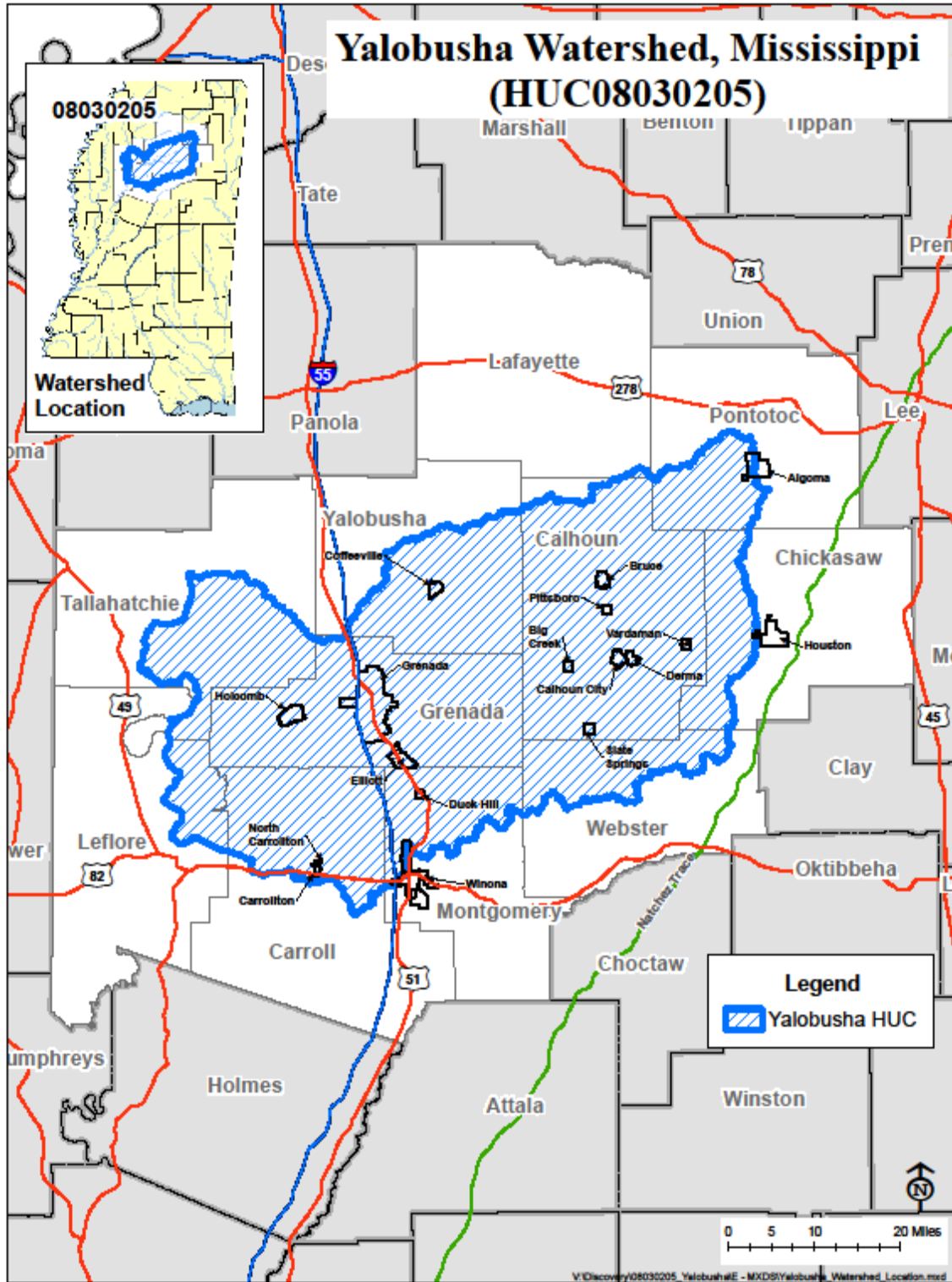
- Ebony Brooks, FEMA Region IV, Community Engagement and Risk Communication Liaison
- Mariam Yousuf, FEMA Region IV, Mitigation Division/Risk Analysis Branch, Civil Engineer
- Steve Champlin, Mississippi CTP PM, Project Manager for the Deer-Steele study
- Brandon Cummins, Mississippi Department of Environmental Quality, Staff Geologist
- Jimmy Bradley, Mississippi Geographic Information, LLC, Geospatial Manager
- Katie Bryant, Mississippi Geographic Information, LLC, Project Engineer
- Tracey Milton, Mississippi Geographic Information, LLC, GIS Specialist

The Yalobusha Watershed is located in north central Mississippi. The watershed has an approximate area of 2,248 square miles and is aligned in an east to west orientation. The watershed varies from a physiographic perspective with multiple regions being represented. While the majority of the area falls in the Southeastern Plains region, areas to the west, including portions of Tallahatchie, Yalobusha, Carroll, Grenada, Montgomery, and Leflore Counties, fall in the Mississippi Valley Loess Plain region and the Mississippi Alluvial Plain region (Stewart, R.A. 2003. Physiographic regions of Mississippi. Handout, Department of Biological Sciences, Delta State University, 6 pp. (with addenda by S.P. Faulkner, 2005). The watershed contains parts of counties 11 counties: Calhoun, Carroll, Chickasaw, Grenada, Lafayette, Leflore, Montgomery, Pontotoc, Tallahatchie, Webster, and Yalobusha.

The Yalobusha watershed is controlled primarily by the Yalobusha and Skuna Rivers which both flow east to west through the watershed. The Yalobusha River flows from Chickasaw county approximately 120 miles west where it confluences with the Tallahatchie River in Leflore County to form the Yazoo River. Grenada Lake, located in Grenada County, splits the Yalobusha River. The Skuna River begins in the Southwest corner of Pontotoc County and flows approximately 55 miles southwest before discharging into Grenada Lake. Other notable streams include Batupan Bogue and its tributaries which also flow into the Yalobusha River near Grenada Lake.

The Watershed's location in Mississippi is illustrated in Figure 1: Watershed Location.

Figure 1: Watershed Location



Most of the communities in the Yalobusha watershed have received modernized maps as part of FEMA’s Map Modernization Program. The current FIS Dates for these communities are given in Table 1.

Table 1: Current FIS Dates

Community	Affected Areas	Type of Map	Effective Date
Algoma, Town of	Western half	DFIRM	August 19, 2010
Big Creek, Village of	All	DFIRM	August 19, 2010
Bruce, Town of	All	DFIRM	August 19, 2010
Calhoun City, City of	All	DFIRM	August 19, 2010
Calhoun County	All but northwestern portion	DFIRM	August 19, 2010
Carroll County	Northern half	DFIRM	May 02, 2017
Carrollton, Town of	All	DFIRM	May 02, 2017
Chickasaw County	Western portion	DFIRM	January 06, 2010
Coffeeville, Town of	All	DFIRM	September 17, 2010
Derma, Town of	All	DFIRM	August 19, 2010
Duck Hill, Town of	All	DFIRM	September 17, 2010
Grenada, City of	All	DFIRM	May 24, 2011
Grenada County	All but small northern portion	DFIRM	May 24, 2011
Houston, City of	Small western portion	DFIRM	January 06, 2010
Lafayette County	Small portion of southeastern corner	DFIRM	November 26, 2010
Leflore County	Eastern portion	DFIRM	May 16, 2012
Montgomery County	Northern half	DFIRM	September 17, 2010
North Carrollton, Town of	All	DFIRM	May 02, 2017
Pittsboro, Village of	All	DFIRM	August 19, 2010
Pontotoc County	Southwestern corner	DFIRM	August 19, 2010
Slate Springs, Village of	All	DFIRM	August 19, 2010
Tallahatchie County	Southeastern corner	DFIRM	May 16, 2017
Vardaman, Town of	All	DFIRM	August 19, 2010
Webster County	Northwestern corner	DFIRM	January 06, 2010
Winona, City of	Northwestern portion	DFIRM	September 17, 2010
Yalobusha County	Southeastern corner	DFIRM	September 17, 2010

Areal distribution of the communities within the Yalobusha Watershed is listed in Table 2. This table lists the communities located in the watershed, their areal extent (in square miles), and the areal percentage that each community occupies in the watershed. Table 2 also shows the communities’ population growth from the year 2000 to 2010 and NFIP data. No Native American tribal lands were identified in the watershed.

Table 2: Statistical Information

Name of Community	CID	Area (square miles)	Percent Area of the watershed	Pop Growth (2000-2010)	Mitigation Plan Current?	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Losses
Algoma, Town of	280333	2.86	0.13%	16.14%	Y	N	*	*	*	*
Big Creek, Village of	280298	1.13	0.05%	21.26%	Y	N	*	*	*	*
Bruce, Town of	280026	2.44	0.11%	-7.53%	Y	Y	14	\$ 1,756,000.00	\$ 89,221.00	1
Calhoun City, City of	280027	2.37	0.10%	-5.23%	Y	Y	19	\$ 3,028,400.00	\$ 36,805.00	1
Calhoun County	280288	552.12	24.17%	-0.71%	Y	Y	*	*	*	*
Carroll County	280191	238.29	10.43%	-1.60%	Y	Y	14	\$ 2,503,600.00	*	4
Carrollton, Town of	280367	0.78	0.03%	-53.43%	Y	Y	0	\$ 0.00	\$ 0.00	0
Chickasaw County	280269	120.21	5.26%	-10.53%	Y	Y	1	\$ 140,000.00	\$ 0.00	0
Coffeeville, Town of	280186	2.14	0.09%	-2.69%	Y	Y	2	\$ 314,500.00	\$ 0.00	0
Derma, Town of	280217	1.77	0.08%	0.20%	Y	Y	1	\$ 96,300.00	\$ 0.00	0
Duck Hill, Town of	280118	1.03	0.05%	-1.88%	Y	Y	2	\$ 58,000.00	\$ 0.00	0
Grenada, City of	280061	30.02	1.31%	-12.01%	Y	Y	189	\$23,633,700.00	\$ 1,707,708.27	39
Grenada County	280060	417.81	18.29%	-5.83%	Y	Y	122	\$17,464,200.00	\$ 1,900,234.95	23
Houston, City of	280030	0.18	0.01%	-11.18%	Y	Y	11	\$ 955,600.00	\$ 8,170.00	2
Lafayette County	280093	2.33	0.10%	22.22%	Y	Y	68	\$17,160,600.00	\$ 13,160.48	1
Leflore County	280103	67.58	2.96%	-14.84%	Y	Y	537	\$65,073,600.00	\$1,908,094.03	23
Montgomery County	280212	139.04	6.09%	-10.37%	Y	Y	*	*	*	*
North Carrollton, Town of	280028	0.31	0.01%	-5.21%	Y	Y	7	\$ 434,700.00	\$ 762.00	0
Pittsboro, Village of	280218	0.98	0.04%	-4.72%	Y	Y	0	\$ 0.00	\$ 0.00	0
Pontotoc County	280234	105.78	4.63%	12.09%	Y	Y	9	\$1,910,600.00	\$ 6,912.51	1
Slate Springs, Village of	280066	1.42	0.06%	-9.09%	Y	N	*	*	*	*
Tallahatchie County	280206	210.27	9.21%	3.19%	Y	Y	71	*	*	6
Vardaman, Town of	280327	1.36	0.06%	23.57%	Y	Y	6	\$ 487,000.00	\$ 0.00	0
Webster County	280284	135.43	5.93%	-0.40%	Y	Y	1	\$ 55,000.00	\$ 0.00	0
Winona, City of	280119	2.12	0.09%	-8.01%	Y	Y	12	\$2,336,600.00	\$ 0.00	0
Yalobusha County	280239	244.52	10.70%	-2.86%	Y	Y	6	\$ 697,000.00	\$ 0.00	0

*Data not reported

Meetings and 44 CFR Part 66 Compliance:

Initial contact with the communities began in February 2018. Following the initial contact, a questionnaire requesting information was sent to the appropriate community contacts. A copy of these questionnaires as well as all information pertinent to community communication is provided in Appendix A.

The purpose of the Discovery meeting is for FEMA, MS, and local community stakeholders to exchange knowledge and information about known flooding risks, risk assessment capabilities, mitigation practices, emergency management actions, and outreach efforts within the watershed. The Discovery Meeting is part of a larger discovery process comprised of a series of meetings and data collection activities culminating in a more holistic picture of the flooding risks within the watershed and each community. The goal of this process is to help communities become more resilient to flooding disasters by identifying where updated flood studies are needed, assessing areas at risk to flooding, determining solutions that can reduce risk, and providing tools that facilitate communication and outreach.

A watershed-wide Discovery Meeting was held on June 27, 2018, at 9:00 AM at the Grenada County EOC, 1040 South Raceway Road, Grenada, MS. The meeting was set up to facilitate discussion about the Risk MAP program, identify study and mitigation project needs, desired compliance support, and local flood risk awareness efforts. A total of 22 people were in attendance at the meeting, including representatives of Calhoun, Chickasaw, Grenada, Montgomery, and Tallahatchie Counties and several municipalities. Additional partners and stakeholders were also in attendance including representatives of MEMA and MDEQ. The discussion was stimulated using the effective FIRM and Discovery Map’s display of relevant data available in Appendix B. Attendees cooperatively identified areas of concern where new study information is requested. The final study streams are shown in Appendix C. See Appendix B for pertinent Discovery meeting information including sign-in sheets, meeting notes, presentation and other documentation.

Prior to the Discovery meeting, floodplain administrators for each community were contacted to complete surveys and phone interviews to aid with the Discovery process. These surveys and interviews pertained to local floodplain management issues, mitigation activities, ongoing flood studies, data availability (including topography, base data, and flood studies), historical flooding, disasters, and more. Contact information for Floodplain Administrators can be found in Appendix B of this report. The Discovery Meeting Map, located in Appendix B, provides a summary of information obtained through community interviews, survey results and other Pre-Discovery data gathering activities.

Part 66 compliance:

- The CTP has begun and has on record its Case file and docket? X YES NO
- The CTP has written record of its initial contact made to the local communities affected by this Risk MAP project? X YES NO
- The CTP has written record of its request for additional flood study data and base information from the local communities? X YES NO

National Flood Insurance Program (NFIP) Compliance:

According to the most recent Community Assistance Visits, all participating NFIP communities have adopted Flood Damage Prevention Ordinances that are compliant with the minimum

standards established by federal code. Mississippi communities require an official paper copy of a revised Flood Insurance Study from the Map Service Center for adoption.

Local floodplain administrators and County Emergency Management Agency directors were invited to the Discovery meeting and every effort was made to ensure attendance. No updates to the CIS are necessary aside from those that are regularly performed by MEMA Floodplain Management staff.

1.2 Project Summary

The Coordinated Needs Management Strategy (CNMS) analysis revealed several detailed study streams within the watershed that are non-NVUE compliant. Most of these are older studies in and around the municipalities of Grenada and Calhoun Counties with a few in Montgomery County.

This project endeavors to re-study some unverified Zone AE studies, and also to upgrade Zone A streams to AE, at the request of the communities. Other unverified Zone AE studies exist within the watershed, including a 31.5 mile-long portion of the Yalobusha River, but will not be studied as part of this project due to limited project funding. The Discovery Map titled “Mapping Needs: Yalobusha Watershed”, within Appendix B, identifies those stream reaches that are either NVUE compliant, need to be assessed, or are to be studied. Table 3: List of Study Streams shows which streams have been identified for further study and to what detail the streams will be studied.

Table 3: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
Batupan Bogue	AE	From the Grenada-Montgomery County Line to the confluence with the Yalobusha River	11.44	Revised AE w/ floodway	Unverified CNMS status
Browns Creek Tributary	AE	From Govan Street to the confluence with Browns Creek	0.51	Revised AE w/ floodway	Unverified CNMS status
Hurricane Creek	AE	From State Highway 9 to the confluence with Yalobusha River Canal	3.59	Revised AE w/o floodway	Requested by the community and Unverified CNMS status
Little Mouse Creek	A	From approximately 0.28 miles upstream of Sweatman Road to the confluence with Mouse Creek	0.42	New AE w/o floodway	Requested by the community and Unverified CNMS status
Mouse Creek	A	From approximately 0.47 miles upstream of Sweatman Road to the confluence with Little Bogue Creek	2.64	New AE w/o floodway	Requested by the community and Unverified CNMS status
Skuna River Canal	A	From the Calhoun-Chickasaw county line to approximately 0.9 miles upstream of Pontotoc Road (Limit of Study)	12.66	New AE w/o floodway	Unverified per CNMS

Table 3: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
Skuna River Canal	A	From approximately 0.7 miles downstream of State Highway 9 to the Calhoun-Yalobusha County Boundary	9.16	New AE w/o floodway	Unverified per CNMS
Skuna River Canal	AE	From approximately 0.9 miles upstream of Pontotoc Road (Limit of Study) to approximately 0.7 miles downstream of State Highway 9 (Limit of Study)	1.57	Revised AE w/ floodway	Unverified per CNMS
Yalobusha River Canal	AE	From approximately 0.94 miles upstream of the confluence of Hurricane Creek to approximately 0.43 miles upstream of the confluence of Yalobusha River Tributary	1.89	Revised AE w/o floodway	Tie-in to updated Hurricane Creek study
Yalobusha River Tributary 1A	AE	Approximately 180 feet upstream of Eddie Street to the confluence with	0.69	Revised AE w/o floodway	Unverified CNMS status

Table 6 provides a mileage count of streams in the watershed based on Type of Study.

Table 4: Total Stream Mile Counts by Type of Study

	Detailed (Enhanced Level 1)	Limited Detailed (Enhanced Level 2)	Approximate (Base Level Study)	Redelineation (Zone AE with Floodway)	Verified Digital Conversion
Effective Flood Insurance Study	92.3	62.3	875.8		
Updated Effective Studies	11.9	7.7	24.9	0.0	0.0
New Studies Identified	0.0	0.0	0.0		

The list of Flood Insurance Rate Map (FIRM) panels that will be updated by the study is presented in Table 7. Graphical depictions of the effective and proposed updated panels are shown in Appendix C.

Table 5: Proposed FIRM Panel Updates

DFIRM_ID	CO_NAME	FIRM_PAN	SCALE	EFF_DATE
28013C	Calhoun	28013C0225D	24000	8/19/2010
		28013C0250D	24000	
		28013C0255D	12000	
		28013C0255D	12000	
		28013C0165D	12000	
		28013C0170D	12000	
		28013C0260D	12000	
		28013C0170D	12000	
		28013C0200D	24000	
28043C	Grenada	28043C0137C	6000	5/24/2011
		28043C0141C	6000	
		28043C0139C	6000	
		28043C0143C	6000	
		28043C0145C	12000	
		28043C0285C	12000	
		28043C0325C	24000	
28067C	Montgomery	28097C0025D	24000	9/17/2010
		28097C0050D	24000	
		28097C0040D	12000	
		28097C0075D	24000	
		28097C0150D	24000	

We have evaluated the blue book dollars as detailed in FEMA’s document “Estimating the Value of Partner Contributions to Flood Mapping Projects”. An updated estimate of the total partner contribution including Local, State and/or other Federal contributions is presented in Table 8.

Table 6: Partner Contributions/Leveraged Data (Remove from Community Version)

Project Task	FEMA Contribution	Partner Contribution	% Partner Leverage	Total Project Cost
Base Map Preparation—Base Map Data (1-foot Orthophotos)	\$17,000	\$ 8,500	33%	\$ 25,500

2 Watershed Stakeholder Coordination

The population in the Yalobusha Watershed is distributed between 15 autonomous jurisdictions. Of these jurisdictions, three (the Town of Algoma and the Cities of Houston and Winona) have only a portion of their geographic extents within the watershed. Most of the population in the watershed resides in Grenada County. To communicate effectively throughout the life of a possible Risk MAP project in this Watershed, the use of e-mail, telephone, and letters will be essential. A master or central list of stakeholders in the communities within Yalobusha watershed has been established. This list is included in Appendix A.

Representatives from the local governments, including municipalities, are considered fundamental stakeholders in this process because they have been elected or appointed to represent the interests of the residents of the Watershed. In addition to municipal governments, the county officials of Calhoun, Carroll, Chickasaw, Grenada, Lafayette, Leflore, Montgomery, Pontotoc, Tallahatchie, Webster, and Yalobusha counties were invited to participate in the Discovery Meeting. Representatives of various other regional, state, and federal agencies were also encouraged to participate. See Appendix A for a complete list of the stakeholders who were invited to the Discovery Meetings.

The communities invited to participate in the Discovery effort are listed in Table 9. Of these 26 communities, representatives of 20 communities attended. Follow up with communities that did not attend was attempted by letter dated July 20, 2018. An example of the letter is included in Appendix A.

Table 7: Communities in the Yalobusha Watershed

County	Community	Municipality Type
Calhoun	Big Creek	Village
Calhoun	Bruce	City
Calhoun	Calhoun City	City
Calhoun	Calhoun County	County
Calhoun	Derma	Town
Calhoun	Pittsboro	Village
Calhoun	Slate Springs	Village
Calhoun	Vardaman	Town
Carroll	Carroll County	County
Carroll	Carrollton	Town
Carroll	North Carrollton	Town
Chickasaw	Chickasaw County	County
Chickasaw	Houston	City
Grenada	Grenada	City
Grenada	Grenada County	County
Lafayette	Lafayette County	County

Table 7: Communities in the Yalobusha Watershed (cont.)

County	Community	Municipality Type
Leflore	Leflore County	County
Montgomery	Duck Hill	Town
Montgomery	Montgomery County	County
Montgomery	Winona	City
Pontotoc	Algoma	Town
Pontotoc	Pontotoc County	County
Tallahatchie	Tallahatchie County	County
Webster	Webster County	County
Yalobusha	Coffeerville	Town
Yalobusha	Yalobusha County	County

An important phase of Discovery is to request additional information through interviews and data questionnaires. The interviews involved giving community officials information about the Discovery process, and data from various FEMA fact sheets. Communities were asked to identify “Areas of Concern” that could be addressed during the Discovery meeting (e.g., mapping needs, desired mitigation projects, flood prone areas).

The project team worked with FEMA Region IV and the State National Flood Insurance Program (NFIP) Coordinator and State Hazard Mitigation Officers to compile the stakeholder list for the Yalobusha Watershed in Appendix A. Community priorities were established through the use of a Community Worksheet, correspondence, and personal discussions during and after the Discovery meeting to identify those streams that the communities wanted studied. Worksheet forms, included in Appendix B, were completed by some communities. The forms provide additional information regarding available community data and flood mapping issues concerning the communities. The Discovery meeting invitation, sign-in sheet, and Discovery presentation are also included as Appendix B.

3 Data Analysis

3.1 Data Available for Flood Risk Products

The collected data can be used in conjunction with results from the hydrologic and hydraulic analysis and mapping to create new Risk MAP products. New Risk MAP products may include water surface elevation grids, depth grids, flood risk grids, and other enhanced data layers. If available, topographic data and building footprints of structures in the floodplain can be used to develop these products and many more. These products can assist local officials, residents, and developers in the creation and update of long-term and economic development plans. The new Risk MAP products are discussed in further detail in Section 5 of this report.

3.1.1 Base Map Data

Base map data includes transportation lines, hydrographic features, political boundaries, and railroads. The political, state and county boundaries for the counties within the Watershed were collected using FIRM databases and the Mississippi Automated Resource Information System (MARIS) data collections.

3.1.2 Topographic Data

Light Detection and Ranging (LiDAR) elevation data is currently available for the entirety of the Yalobusha watershed. The LiDAR coverage obtained for this area is comprised of three separate projects.

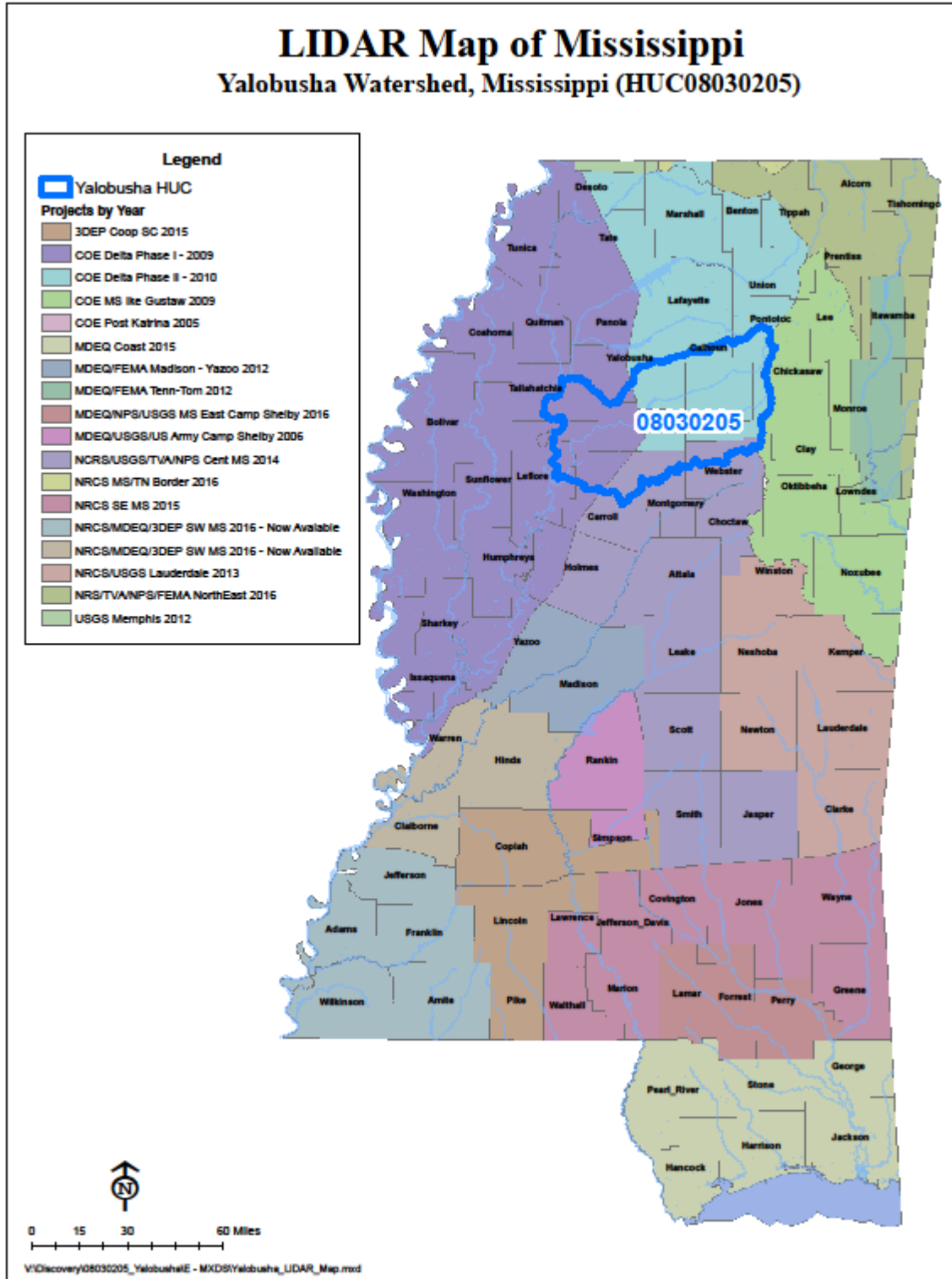
Leflore County, Tallahatchie County, and portions of Carroll and Yalobusha Counties are covered by the United States Army Corp of Engineers Delta Phase 1 (2009), flown and processed by Photo Science, Inc. for the State of Mississippi. The data was collected at a nominal point spacing of 1 meter, with a vertical root mean square error of 15.0 centimeters.

The coverage for Calhoun, Chickasaw, Lafayette, and Pontotoc Counties and the remaining portion of Yalobusha County was produced under the United States Army Corp of Engineers Delta Phase II (2010), acquired by Aeroquest Optimal and subcontractor Laser Mapping Specialists for the State of Mississippi. The data was collected at a nominal point spacing of 1 meter, with a vertical root mean square error of 0.131 meters.

Montgomery County, Webster County, and the remaining portion of Carroll County are covered by the USGS – NRCS Laurel, MS 0.7 NPS LIDAR (2014) for central Mississippi. The data was acquired and processed by Woolpert, Inc. for the State of Mississippi. It was collected at a nominal point spacing of 0.7 meters, with a vertical root mean square error of 0.129 meters.

The LiDAR coverage for the Yalobusha watershed is depicted in Figure 2.

Figure 2: LiDAR coverage for the Yalobusha Watershed



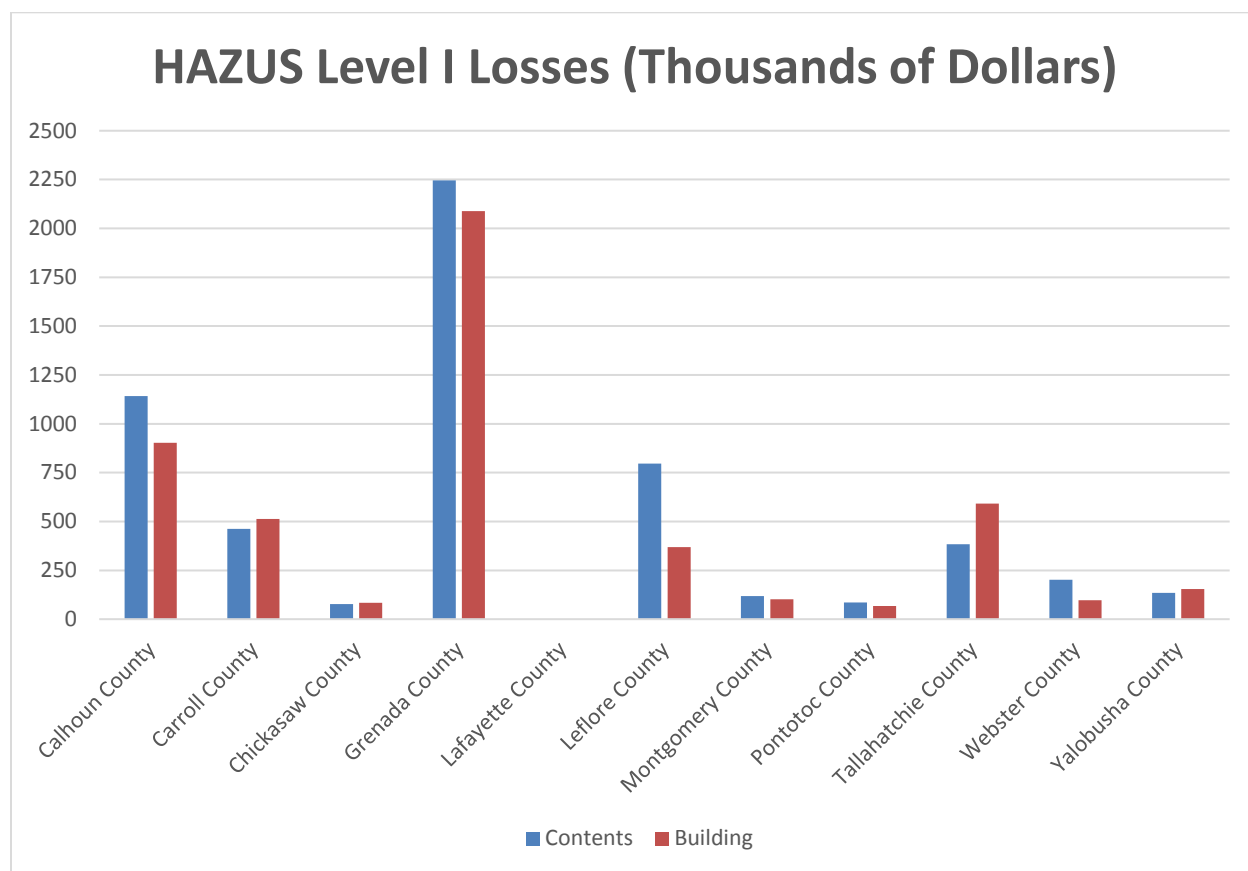
3.1.3 Average Annualized Loss (AAL) / HAZUS

The Hazards U.S. Multi-Hazard (Hazus-MH) tool was used to develop Level I AAL data collected for this Watershed. Hazus-MH is a nationally applicable standardized risk assessment methodology that helps estimate and analyze potential losses from earthquakes, hurricane winds, and floods. Level I uses the default data that is embedded in Hazus-MH and does a basic analysis. For a basic flood risk assessment, the tool essentially intersects flood hazard and population (census block) polygons.

The AAL data provides a general understanding of the dollar losses associated with a certain frequency of flood events within a county and is used to get a relative comparison of flood risk. The existing Hazus-MH analysis is based on approximate flood boundaries and national datasets. The calculation is based on flood elevation estimates using the 30-meter United State Geologic Survey (USGS) Digital Elevation Model (DEM) and flow rates based on rural regression equations. Only rivers with drainage areas of at least 10 square miles are considered in the analysis. Figure shows the distribution of AAL losses within the Yalobusha Watershed by county.

AAL data is summarized at the census block level. The AAL data indicating high losses is shown on the Flood Risk Map in Appendix B. Additional information about the Hazus-MH process and tool can be found at http://www.fema.gov/plan/prevent/hazus/hz_overview.shtm.

Figure 3: HAZUS Level I AAL Losses in Yalobusha Watershed



3.2 Other Data and Information

Available flood hazard and flood risk assessment data for the Watershed was compiled from a search of county and government Geographic Information System (GIS) Web sites and information obtained from the completed questionnaires provided by communities. Table 8: GIS Data Layers Available summarizes the GIS information collected. Hydrography data covering additional areas of the watershed is likely to be developed in the near future and will be utilized for this Risk MAP project as the delivery schedule. Figure 3 also displays recent county orthoimagery collections, coordinated at the State level that can be used to support data development.

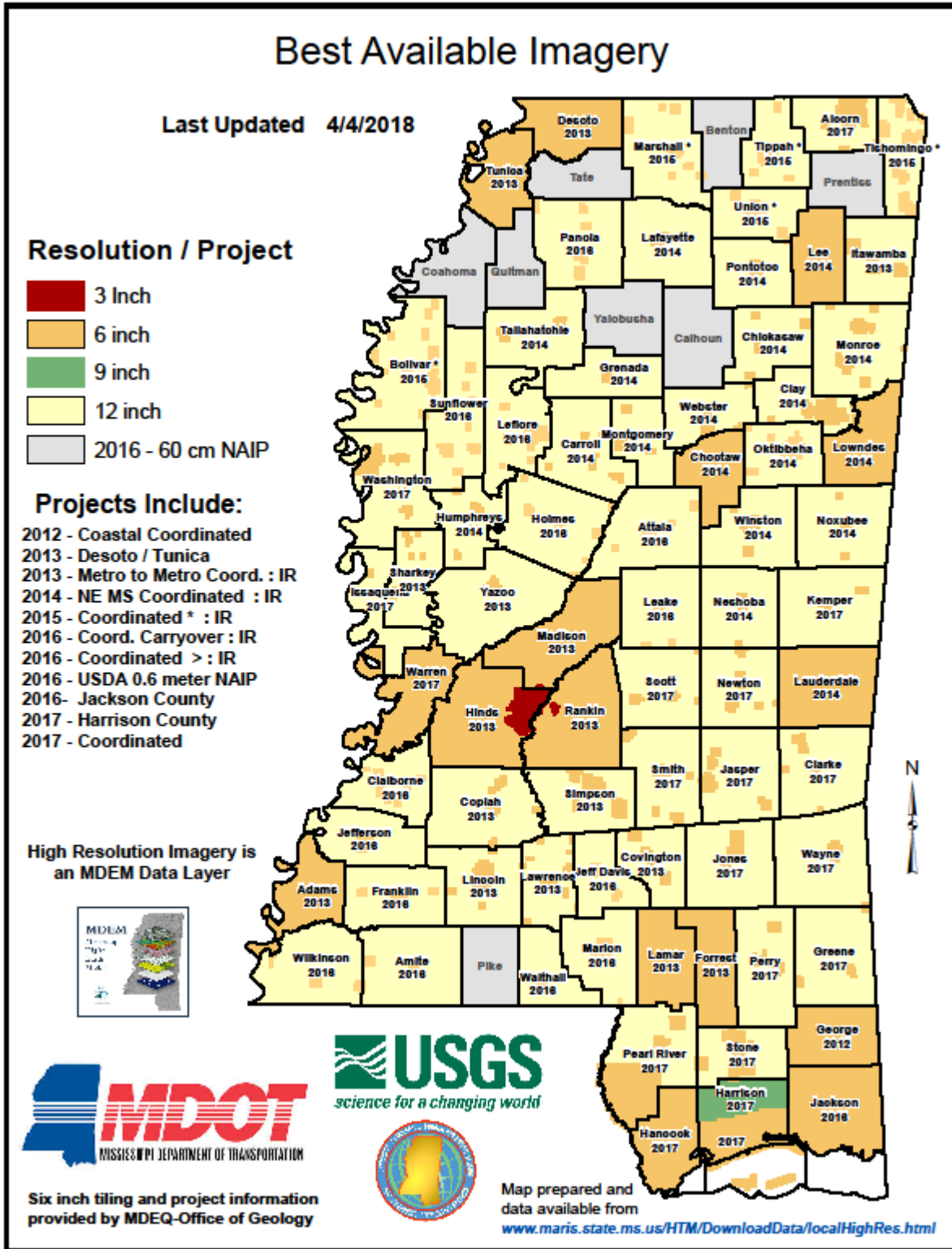
Table 8: GIS Data Layers Available

Data Types	Deliverable/Product*	Vertical/ Horizontal Datum	Use Restrictions Y/N?	Source	Regulatory / Non- regulatory
Demographics	Geospatial Data/Reports	n/a	n	U.S. Census Bureau	Non-regulatory
Insurance Policies	CAV reports	n/a	y	MEMA Floodplain Management Bureau	Regulatory
Mitigation Plans	PDF Document	n/a	n	Mississippi EMA	Non-regulatory
Claims Data	CAV reports	n/a	y	MEMA Floodplain Management Bureau	Regulatory
Letter of Map Change (LOMCs)	Excel Spreadsheets	n/a	n	FEMA Mapping Information Platform	Regulatory
Repetitive Loss	Discovery Map Geodatabase	undefined	y	FEMA RIV	Regulatory
Significant/High Hazard Dams	Discovery Map Geodatabase	NAVD88/NA D83	n	MDEQ—Dam Safety Division USACE	Regulatory
Boundaries: Community	Discovery Map Geodatabase	NAD83	n	Mississippi Automated Resource Information System	Non-regulatory
Boundaries: County and State	Discovery Map Geodatabase	NAD83	n	Mississippi Automated Resource Information System	Non-regulatory
Boundaries: Watersheds	Discovery Map Geodatabase	NAD83	n	U.S. Geologic Survey	Non-regulatory
Effective Floodplains: Modernized SFHAs	Discovery Map Geodatabase	NAD83	n	FEMA's Regional Flood Hazard Layer	Regulatory
Future or recent highway improvement, bridge, culvert, levee locations	Discovery Map Geodatabase	NAD83	n	MDOT—Bridge Division	Non-regulatory
Hydrography	Discovery Map Geodatabase	NAD83	n	Mississippi Digital Earth Model	Non-regulatory

Table 8: GIS Data Layers Available (cont.)

Data Types	Deliverable/Product*	Vertical/ Horizontal Datum	Use Restrictions Y/N?	Source	Regulatory / Non- regulatory
Mitigation Projects: Recent, ongoing, planned, desired FEMA/OFA/local projects	Discovery Map Geodatabase	NAD83	n	FEMA RIV	Non- regulatory
Stream Gages	Discovery Map Geodatabase	NAD83	n	U.S. Geologic Survey, USACE	Non- regulatory
Study Needs: FEMA	Discovery Map Geodatabase	NAD83	n	Coordinated Needs Management System (CNMS)	Regulatory
Study Needs: Recent, ongoing, planned, desired FEMA/OFA/local studies	Discovery Map Geodatabase	NAD83	n	various	Regulatory
Topographic Availability	Discovery Map Geodatabase	NAD83	n	Mississippi Digital Earth Model	Non- regulatory
Transportation: Railroads	Discovery Map Geodatabase	NAD83	n	Mississippi Automated Resource Information System	Non- regulatory
Transportation: Roads	Discovery Map Geodatabase	NAD83	n	Mississippi Digital Earth Model	Non- regulatory
Community Contacts	Excel Spreadsheets	n/a	n	Local websites, State/FEMA updates	Non- regulatory
Cadastral	PDF Document	undefined	y	Local (Leflore)	Regulatory
Digital Orthophotos	Discovery Map Geodatabase	NAD83	n	Mississippi Digital Earth Model, US Department of Agriculture	Non- regulatory
Publicly Owned Lands Data	Discovery Map Geodatabase	NAD83	n	Mississippi Automated Resource Information System	Non- regulatory
ETJ Data	Discovery Map Geodatabase	NAD83	n	Mississippi Automated Resource Information System	Non- regulatory

Figure 4: Mississippi Local High-Resolution Imagery



In order to tie the NDEP/NDOP websites with the MIP, you have to go into the NDEP/NDOP websites and enter the MIP case number in the multi-line text box with the label “**Is there a specific description of the area you would like to provide?**”. Exact location could be in 3 (or so) screens when creating a Tracker entry.

Filename Format: MIPCASE[case number]

National Digital Elevation and Digital Ortho Program Project Tracking System: After the elevation and imagery data is obtained the following project tracking systems should be updated with the following required information.

National Digital Elevation Program (NDEP) Project Tracking System

(<https://hazards.fema.gov/metadata/NDEP/>)

- Data Collection Status: Complete, In work, Planned, or Proposed.
- Vertical Datum: should be NAVD88
- Vertical Accuracy: RMSE per FEMA G&S App-A
- Approx. Planned Posting Spacing: smallest dist. Between points in gridded elevation dataset
- Elevation Data Model: e.g., mass point/breaklines, regular grid, etc...
- Data Collection Method: e.g., cartographic, photogrammatic, LiDAR
- Surface Mapped: usually bare earth
- Use restrictions

National Digital Orthophoto Program (NDOP) Project Tracking System

(<https://hazards.fema.gov/metadata/NDOP/>)

- Data Collection Status: Complete, In work, Planned, or Proposed.
- Image Resolution:
- Vertical Accuracy: in meters
- Data format
- Image Bands:
- Leaf Condition: on/off
- Grid System:
- UTM Zone:
- Horizontal Datum:
- Use restrictions

For further guidance and information about NDEP and NDOP, please contact the RSC.

3.2.1 Mitigation Plans/Status and Mitigation Projects

A Hazard Mitigation Plan is a document that assesses the potential hazards which could occur within communities and it typically includes a detailed list of “Mitigation Actions” that could be taken to prepare the communities for these possible hazards. The Plan must be updated every 5 years and it includes detailed descriptions of mitigation goals and project implementation. The status of current hazard mitigation plans is shown in Table 11 below.

The development and formal adoption of an approved Hazard Mitigation Plan by localities is necessary for Hazard Mitigation Grant Program and Pre-Disaster Mitigation Program eligibility. This requirement is prescribed in the Disaster Mitigation Act of 2000. Some of the larger communities develop single-jurisdictional plans, while smaller communities elect to be covered under a county or regional multi-jurisdictional plan. For the Yalobusha watershed, all counties are covered under regional multi-jurisdictional plans.

Table 9: Status of Hazard Mitigation Plans

Community	Hazard Mitigation Plan Status	Plan Developer	Plan Type
Calhoun County	Effective until Jan. 2019	Atkins	Regional Multi-Jurisdictional
Carroll County	Effective until Jan. 2020	True North Emergency Management, LLC	Regional Multi-Jurisdictional
Chickasaw County	Effective until Jan. 2019	Atkins	Regional Multi-Jurisdictional
Grenada County	Effective until Oct. 2021	Atkins	Regional Multi-Jurisdictional
Lafayette County	Effective until Dec. 2020	MEMA	Regional Multi-Jurisdictional
Leflore County	Effective until Jan. 2020	True North Emergency Management, LLC	Regional Multi-Jurisdictional
Montgomery County	Effective until Jan. 2020	True North Emergency Management, LLC	Regional Multi-Jurisdictional
Pontotoc County	Effective until Dec. 2020	Atkins	Regional Multi-Jurisdictional
Tallahatchie County	Effective until Oct. 2021	Atkins	Regional Multi-Jurisdictional
Webster County	Effective until Jan. 2019	Atkins	Regional Multi-Jurisdictional
Yalobusha County	Effective until Oct. 2021	Atkins	Regional Multi-Jurisdictional

3.2.2 CNMS and NFIP Mapping Study Needs

The Coordinated Needs Management Strategy (CNMS) is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that provides support to data-driven planning and the flood map update investment

process in a geospatial environment. The goal is to identify areas where existing flood maps are not up to FEMA’s mapping standards. More information about CNMS can be found at the following location: <http://www.fema.gov/library/viewRecord.do?id=4628>.

Table 12 summarizes draft results of the validation analysis obtained from CNMS.

Table 10: Current Status in CNMS

County	Approximate			Detailed		Total Stream miles
	Valid	Unverified	Unknown	Valid	Unverified	
Calhoun	0.0	265.5	0.0	4.3	5.2	275.0
Carroll	0.0	65.7	0.0	21.9	0.0	87.6
Chickasaw	0.0	65.2	0.0	0.0	0.0	65.2
Grenada	0.0	196.7	0.0	52.2	44.2	293.1
Lafayette	0.0	0.0	0.0	0.0	0.0	0.0
Leflore	0.0	0.0	0.0	0.0	0.0	0.0
Montgomery	0.0	51.4	0.0	0.0	0.0	51.4
Pontotoc	0.0	41.7	0.0	0.0	0.0	41.7
Tallahatchie	0.0	41.9	0.0	0.0	0.0	41.9
Webster	0.0	36.3	0.0	0.0	0.0	36.3
Yalobusha	0.0	111.3	0.0	20.5	0.0	131.8

Valid: validation status is assigned to NVUE (Newly Validated or Updated Engineering) compliant, or all model backed approximate studies, all digital detailed streams which have been through Phase 3 analysis and passed all critical elements, and failed no more than 3 secondary elements, as well as all ‘bulk valid’ study reaches. Bulk valid study reaches are defined as those which are new or updated during/since Map Mod – roughly 2003.

Unknown: validation status is also "to be assessed", or digital non-model backed approximate studies, all non-digital studies (detailed and approximate), and a very small number of digital detailed studies for which further information is needed from the Region in order to determine validation (such as some playa systems, etc.).

Unverified: validation status is assigned to existing detailed flood hazard studies for which at least 1 critical or more than 4 secondary deficiencies have been identified. See definition for the “VALID” validation status to note exceptions. An “UNVERIFIED” study may either be assigned resources for restudy in a future FY, or is currently being restudied.

The CNMS analysis includes community requests for additional studies. Within the CNMS geodatabase, there is a dataset called ‘S_Request_Ar’ that documents these requests.

3.2.3 Socio-Economic Analysis

More than 30% percent of the watershed population is located within Grenada County with the highest concentration of people residing within the city limits of Grenada. Of the unincorporated areas, Calhoun County follows closely behind Grenada County with 12.87% of the total watershed

population. None of the other counties comprises more than 8% percent of the total watershed population. Population density in and out of the municipalities leans heavily towards outside as only roughly 37% of the total watershed population lives within city limits. Specific population breakdown of the watershed is given in Table 13.

Table 11: Population Statistics in the Yalobusha Watershed

County	FIPS Code ¹	CID ²	Community Name	2010 Watershed Population ³	% of Total Population within Watershed
Calhoun	28013	280298	Big Creek, Village of	154	0.25
Calhoun	28013	280026	Bruce, City of	1,939	3.15
Calhoun	28013	280027	Calhoun City, City of	1,774	2.88
Calhoun	28013	280288	Calhoun County	7,931	12.87
Calhoun	28013	280217	Derma, Town of	1,025	1.66
Calhoun	28013	280218	Pittsboro, Village of	202	0.33
Calhoun	28013	280066	Slate Springs, Village of	110	0.18
Calhoun	28013	280327	Vardaman, Town of	1,316	2.14
Carroll	28015	280191	Carroll County	3,456	5.61
Carroll	28015	280367	Carrollton, Town of	190	0.31
Carroll	28015	280028	North Carrollton, Town of	473	0.77
Chickasaw	28017	280269	Chickasaw County	2,463	4.00
Chickasaw	28017	280030	Houston, City of	89	0.14
Grenada	28043	280061	Grenada, City of	13,092	21.25
Grenada	28043	280060	Grenada County	8,197	13.30
Lafayette	28071	280093	Lafayette County	96	0.16
Leflore	28083	280103	Leflore County	1,560	2.53
Montgomery	28097	280118	Duck Hill, Town of	732	1.19
Montgomery	28097	280212	Montgomery County	1,519	2.47
Montgomery	28097	280119	Winona, City of	790	1.28
Pontotoc	28115	280333	Algoma, Town of	255	0.41
Pontotoc	28115	280234	Pontotoc County	4,501	7.31
Tallahatchie	28135	280206	Tallahatchie County	2,776	4.51
Webster	28155	280284	Webster County	2,233	3.62
Yalobusha	28161	280186	Coffeetown, Town of	905	1.47
Yalobusha	28161	280239	Yalobusha County	3,837	6.23
TOTAL				61,615	100%

Source: U.S. Census Bureau, 2010

¹ FIPS = Federal Information Processing Standard

² CID = Community Identification (Number)

³ Denotes estimated population of the community within the Yalobusha Watershed

Table 14 lists the median and per capita incomes in counties within the watershed. Most of these counties' median family income fall below the state median of \$40,528 with the exception of Carroll County and Lafayette County, which are comparable to the state median.

Table 12: Income Statistics in the Yalobusha Watershed

County	Median Family Income (dollars)	Per Capita income in past 12 months (in 2016 dollars)
Calhoun	\$31,141	\$17,203
Carroll	\$40,278	\$22,519
Chickasaw	\$31,048	\$18,514
Grenada	\$33,026	\$20,562
Lafayette	\$43,162	\$23,833
Leflore	\$25,356	\$15,370
Montgomery	\$31,207	\$19,706
Pontotoc	\$39,869	\$19,743
Tallahatchie	\$29,387	\$12,747
Webster	\$37,083	\$20,722
Yalobusha	\$34,749	\$18,802

The percent of employment by industry in the Yalobusha Watershed counties is listed in Table 15. These figures are estimates derived from whole-county data. Accurate total watershed population figures could not be calculated based on the Census provided data and it should be noted that employers were not required to report data if only a small number of employers exists within any specific field for a county. Most of the working population in the watershed is employed in Grenada County with the most popular industries being manufacturing, retail trade, and accommodation and food services.

Table 13: Percentage of Employment in the Watershed by Industry

Industry Employment Groups	Calhoun County	Carroll County	Chickasaw County	Grenada County	Lafayette County	Leflore County	Montgomery County	Pontotoc County	Tallahatchie County	Webster County	Yalobusha County
Agriculture, forestry, fishing, and hunting	5.51%	2.72%	0.72%	0.85%	*	0.37%	4.54%	*	0.88%	5.80%	0.66%
Mining, quarrying, and oil and gas extraction	*	*	*	*	*	*	*	*	*	*	*
Utilities	2.08%	1.51%	*	0.69%	0.55%	0.45%	0.71%	0.62%	*	*	0.74%

*Data not reported or non-specific placeholder designated

Table 13: Percentage of Employment in the Watershed by Industry (cont.)

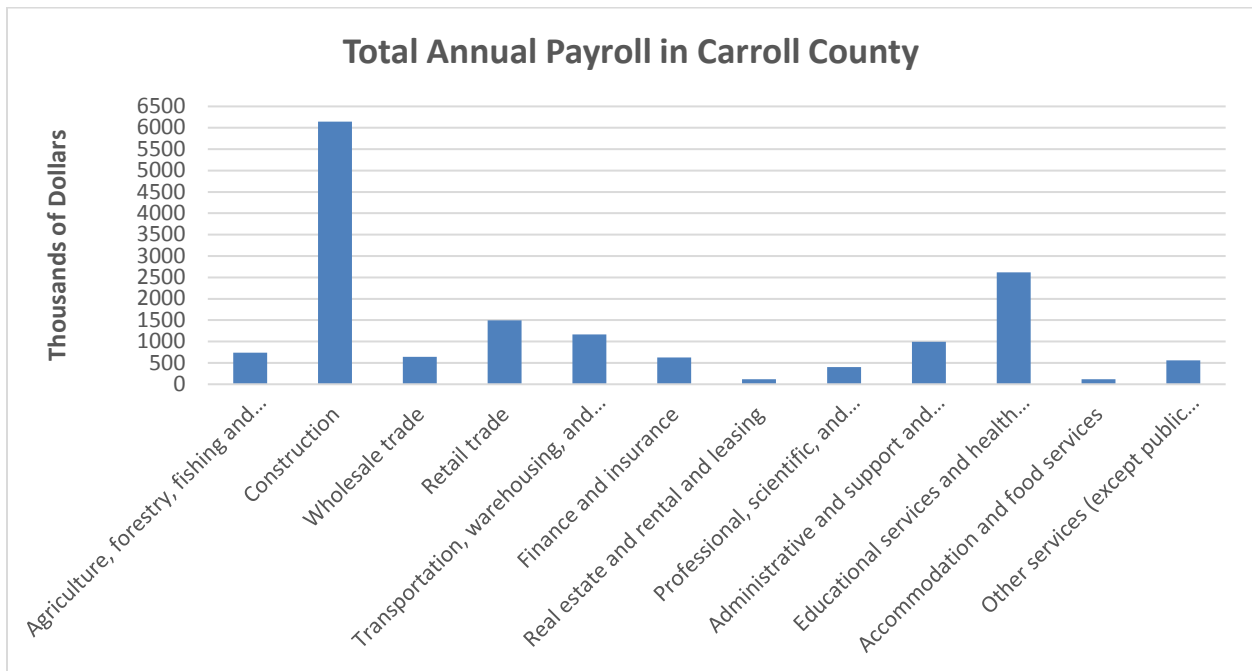
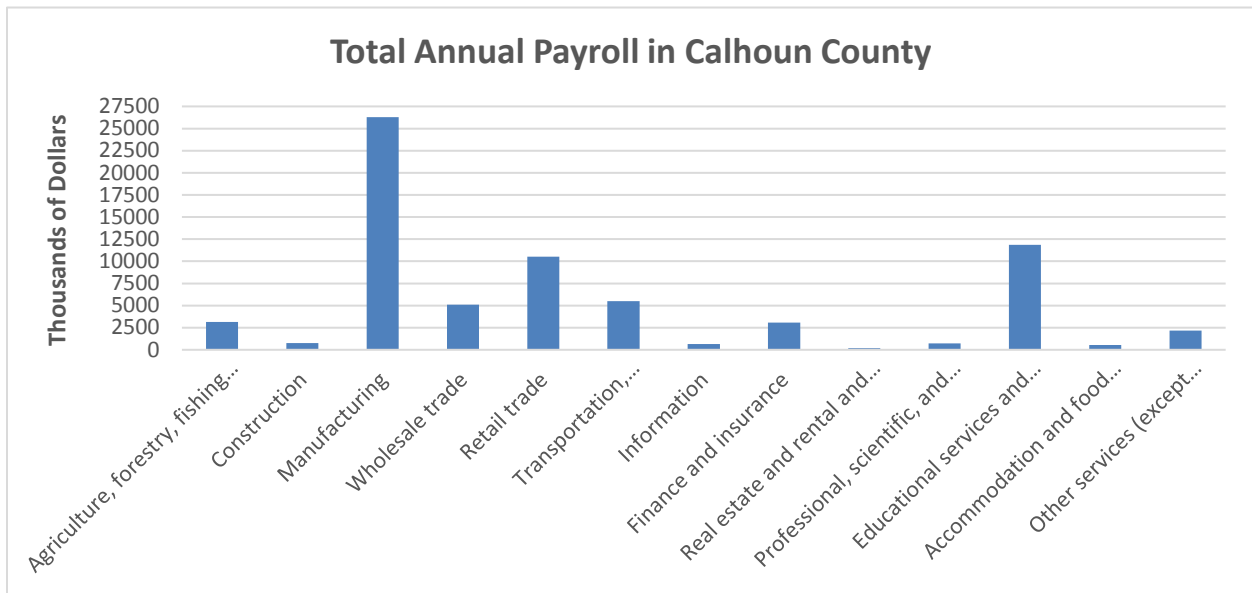
Industry Employment Groups	Calhoun County	Carrroll County	Chickasaw County	Grenada County	Lafayette County	Leflore County	Montgomery County	Pontotoc County	Tallahatchie County	Webster County	Yalobusha County
Construction	1.04%	26.02%	2.00%	1.39%	3.65%	8.00%	2.63%	0.95%	1.98%	7.41%	7.70%
Manufacturing	32.84%	*	57.55%	34.74%	11.09%	18.07%	9.38%	63.80%	*	15.33%	40.51%
Wholesale Trade	6.07%	3.48%	1.94%	2.85%	1.82%	4.95%	0.79%	1.26%	2.26%	*	0.54%
Retail Trade	16.64%	13.01%	13.52%	18.56%	17.13%	15.32%	19.50%	9.32%	14.88%	15.41%	13.50%
Transportation and warehousing	3.91%	5.45%	2.71%	1.84%	0.59%	1.69%	3.33%	3.04%	2.70%	2.79%	3.99%
Information	0.64%	*	0.21%	0.84%	1.88%	1.10%	0.92%	*	0.22%	*	0.41%
Finance and Insurance	2.35%	3.33%	2.19%	2.88%	3.41%	3.14%	4.29%	1.88%	1.87%	3.67%	3.95%
Real estate and rental and leasing	0.20%	0.76%	1.18%	0.88%	1.30%	1.18%	*	0.26%	0.44%	*	*
Professional, scientific, and technical	1.12%	1.51%	1.18%	2.56%	6.59%	2.21%	1.04%	0.95%	2.43%	5.36%	0.49%
Management of companies and enterprises	*	*	*	0.30%	0.09%	1.23%	*	*	*	*	*
Administrative and support and waste management and	*	4.39%	0.47%	5.23%	3.53%	0.31%	5.21%	1.57%	*	*	2.18%
Educational services	*	*	0.76%	*	0.51%	2.34%	*	*	*	*	1.81%
Health care and social assistance	18.75%	18.31%	7.48%	8.94%	15.76%	23.98%	25.50%	7.00%	24.59%	21.20%	14.57%
Arts, entertainment,	*	*	*	0.46%	1.59%	0.57%	*	0.15%	0.83%	*	*
Accommodation and food	1.80%	1.97%	4.58%	13.77%	25.36%	12.16%	13.42%	5.34%	6.34%	8.95%	4.32%
Other services (except public	5.11%	6.66%	2.39%	2.52%	4.93%	2.90%	5.00%	2.65%	4.41%	5.06%	4.20%
Industries not classified	*	*	*	*	0.04%	0.04%	*	*	*	*	*

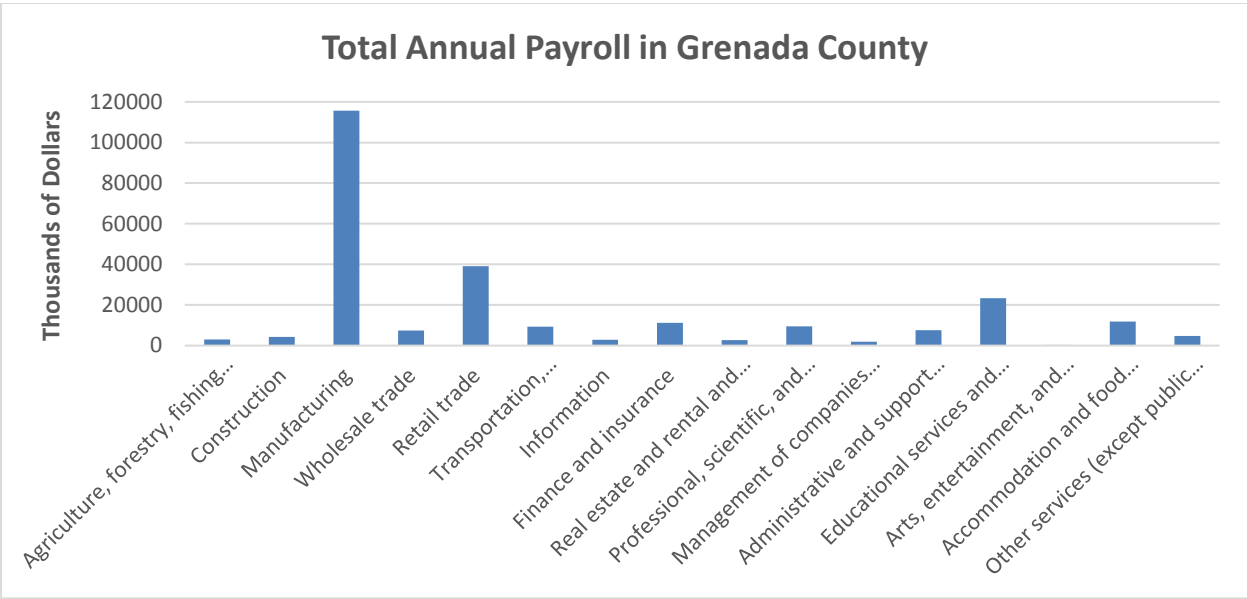
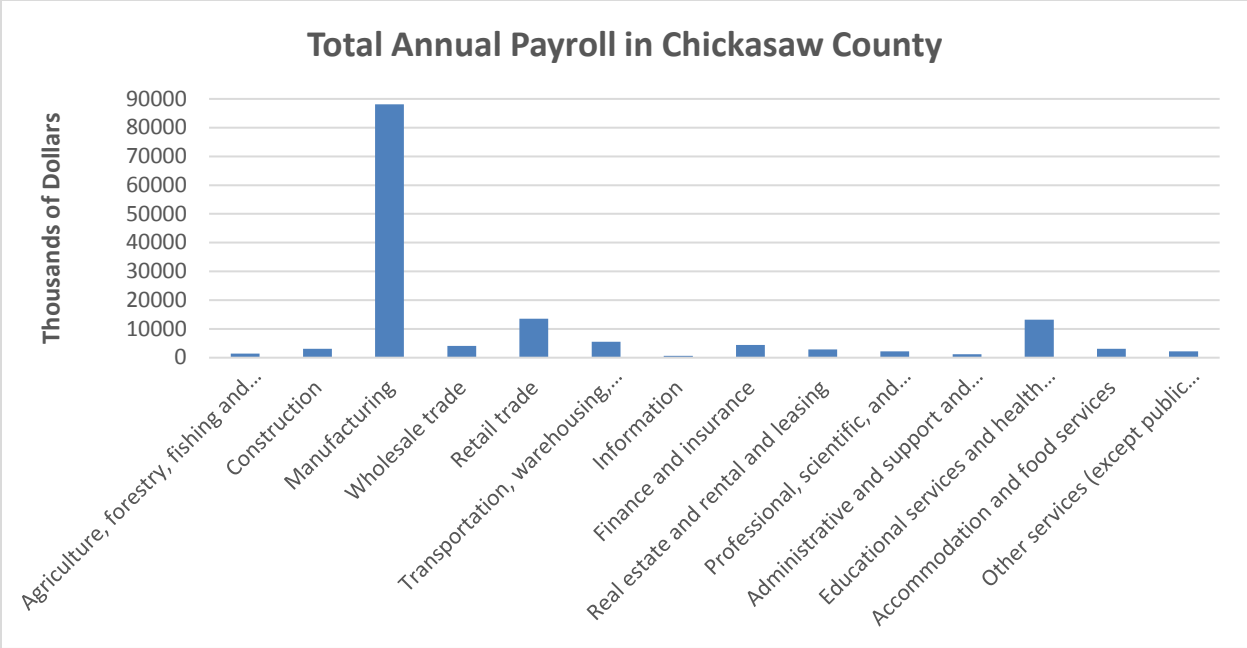
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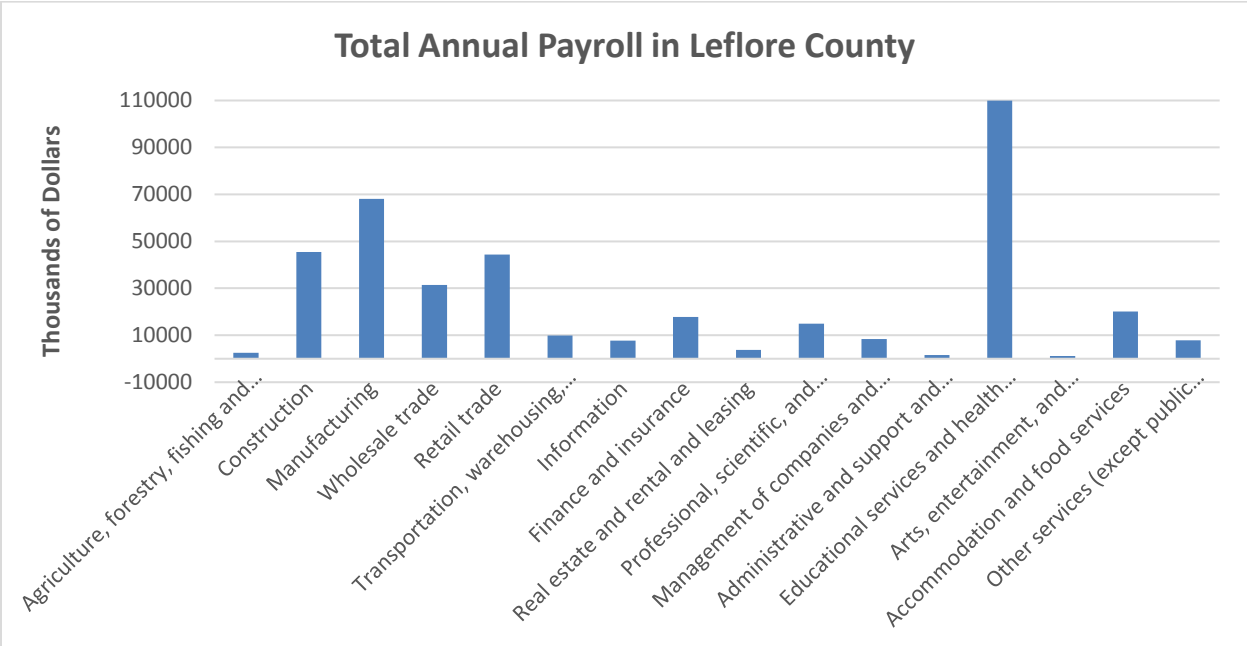
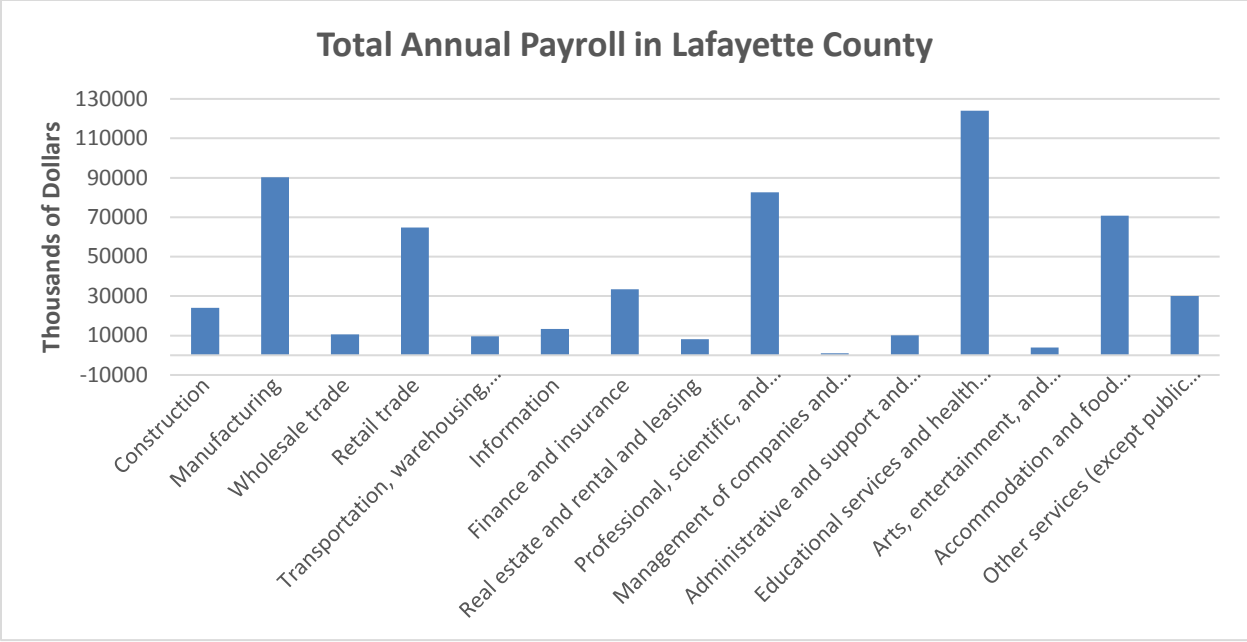
Figure 5 lists the Industries in the Yalobusha Watershed Counties contributing to the total annual payroll.

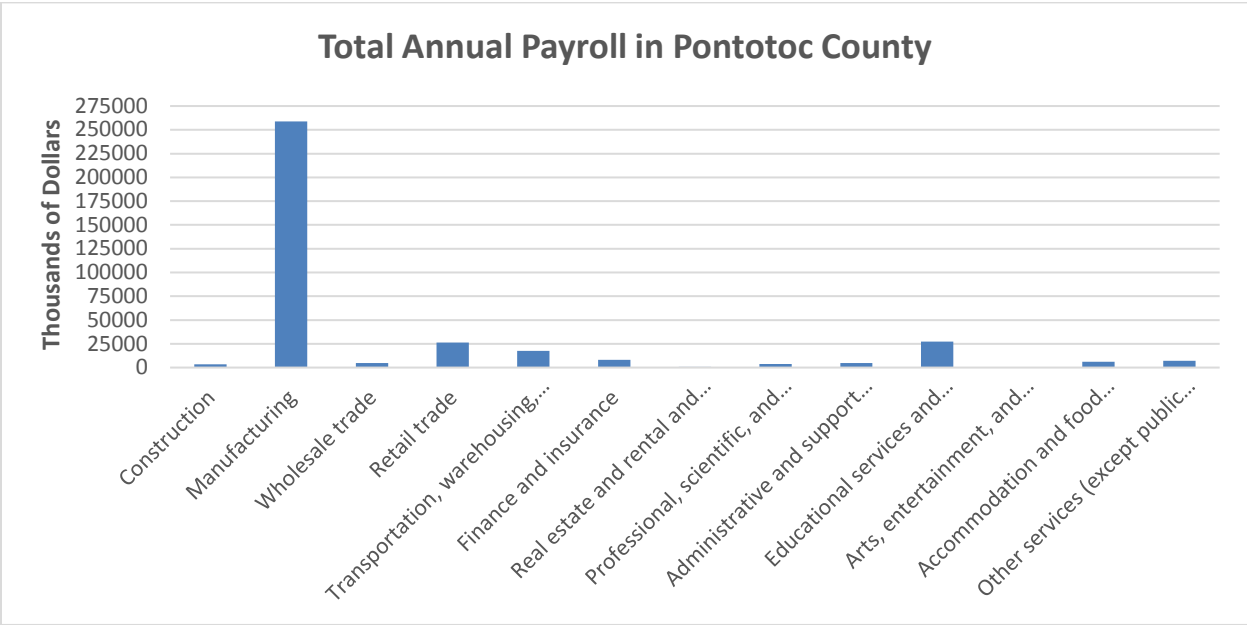
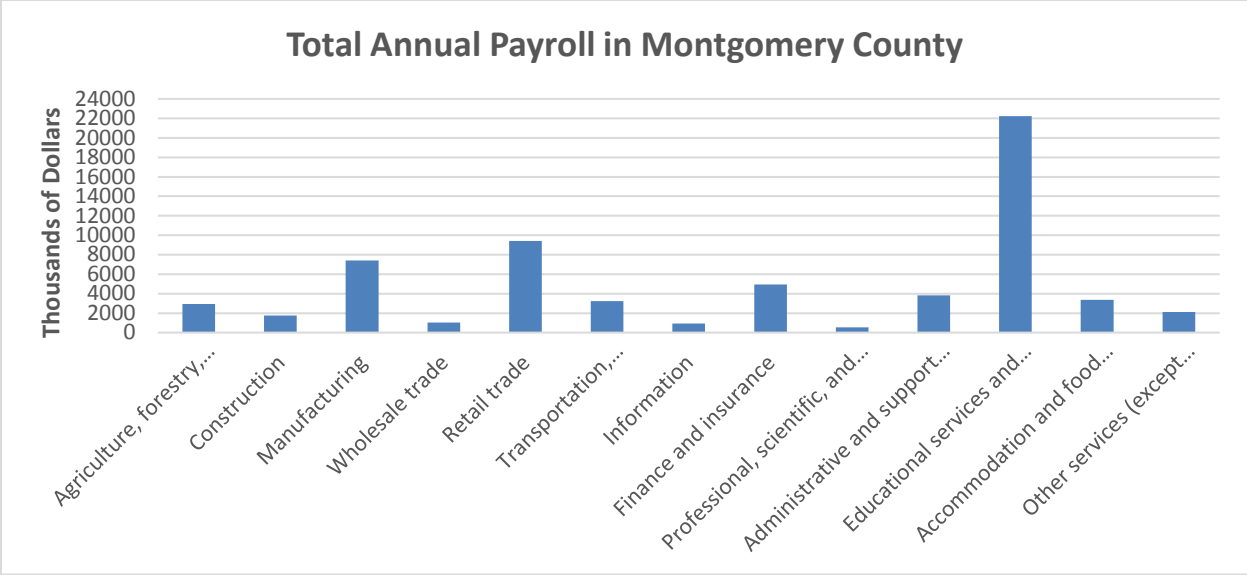
It should be noted that these economic figures are based on the entirety of the county/community, and not just the portion located in the Yalobusha Watershed. In many cases, employers were not required to report payroll data to the Census if only a small number of employers exist within a given industry or occupational field. In those cases, that particular industry has been removed from the figure below. In addition, it should be noted that in some cases, industry categories have been combined to reflect the economic figures provided.

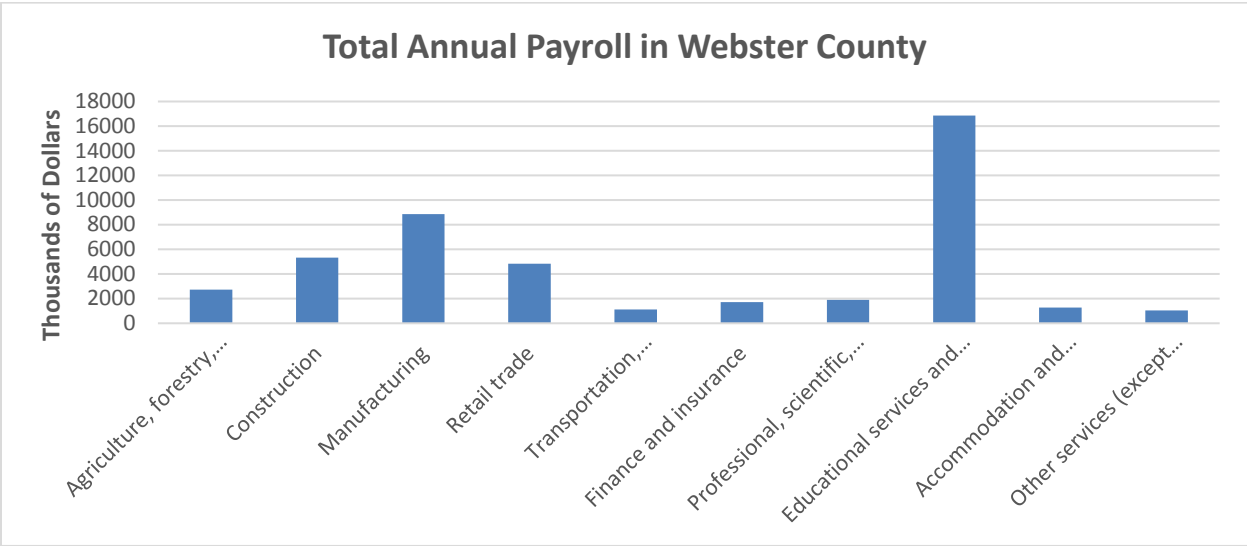
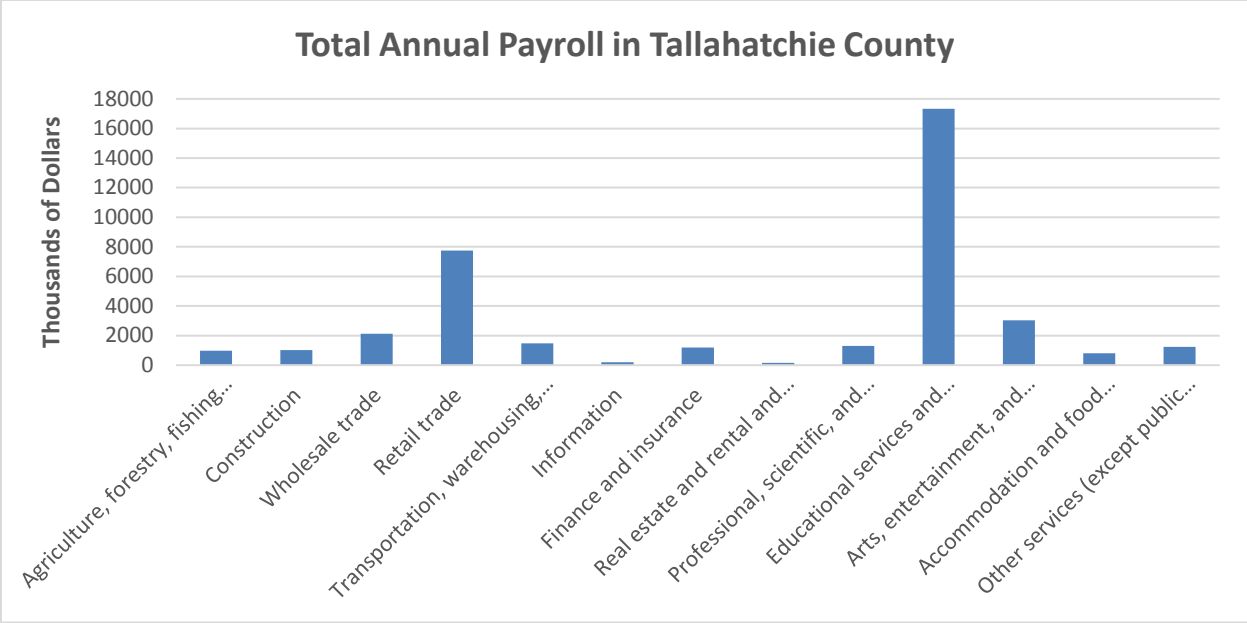
Figure 5: Total Annual Payroll in Yalobusha Watershed by County

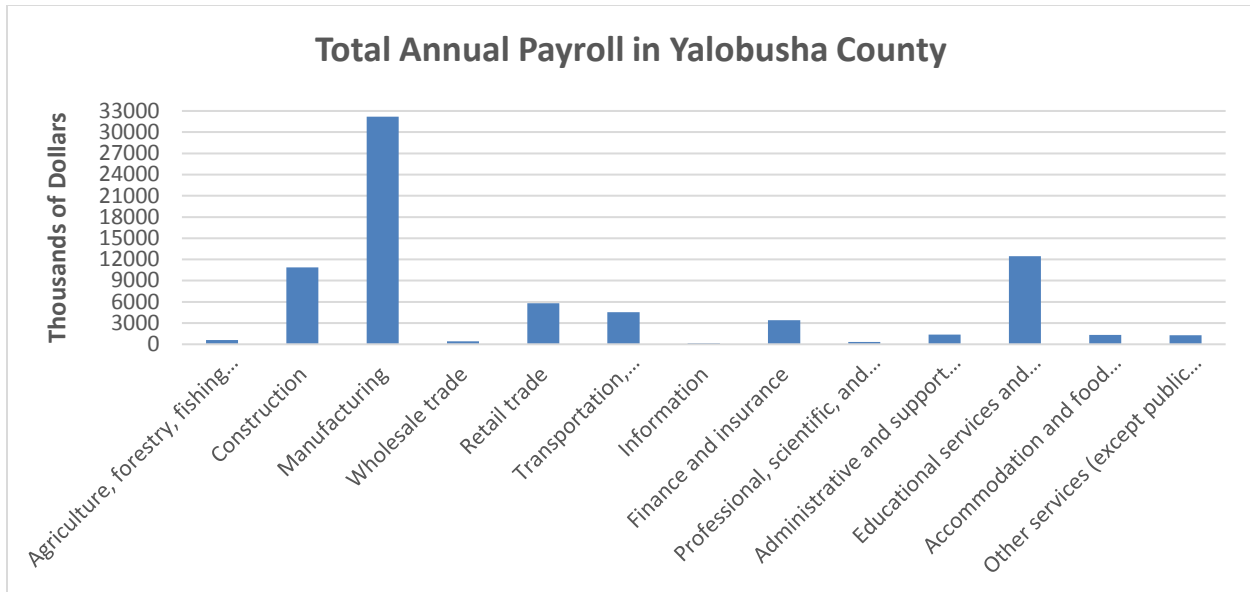












3.2.4 Community Rating System (CRS)/NFIP

The NFIP’s CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: reduce flood losses, facilitate accurate insurance rating, and promote the awareness of flood insurance. A point system is used to determine a CRS rating. The more measures a community takes to minimize or eliminate exposure to floods, the more CRS points that are awarded and the higher the discount on flood insurance premiums. A Class 1 provides a 45% premium reduction and a Class 10 provides no reduction. The national average is Class 8.

All communities within the Yalobusha watershed, with the exception of the Town of Algoma and the Villages of Big Creek and Slate Springs, are participants in the NFIP. Of these 23 participants, none are listed in the CRS Program as of October, 2016. During the Discovery meeting, participation in the CRS and NFIP was encouraged and brochures with additional information on the CRS and NFIP were provided.

3.2.5 Levees/Dams

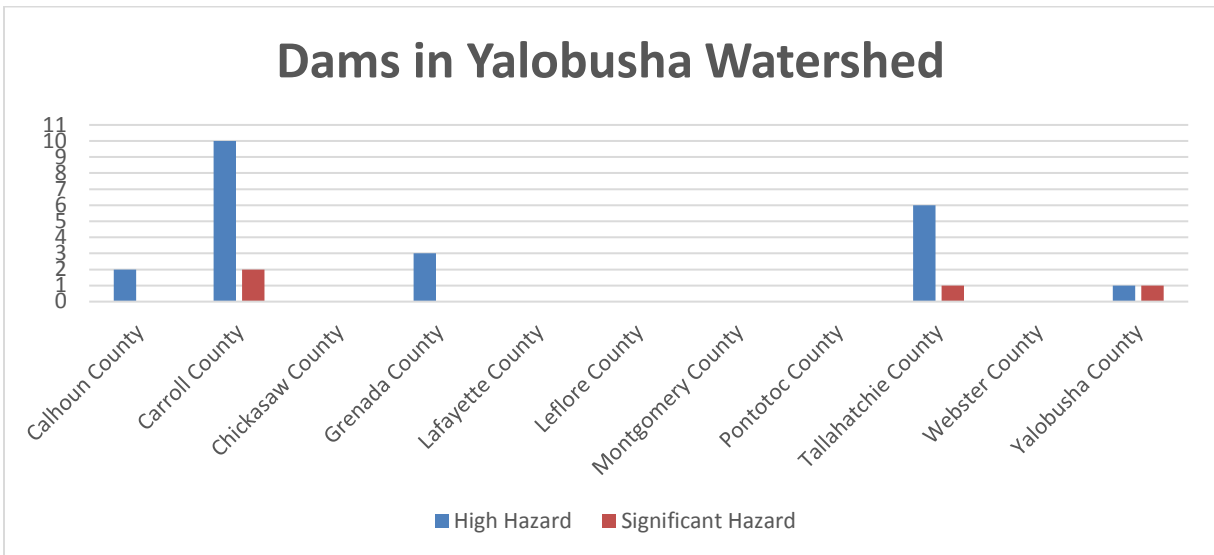
Portions of several levee systems are known to exist in the Yalobusha watershed. Information on the existing levees is presented below.

Table 14: Levees in the Yalobusha watershed

LEVEE NAME	COUNTIES	CERTIFICATION ISSUES	COMMENTS
Ascalmore-Tippo South MS Levee	Tallahatchie	Not certified	Failed inspection as of 4/28/2017
Big Sand, Yalobusha, Teoc Creek, MS Levee	Carroll, Leflore	Not certified	Failed inspection as of 4/22/2014
Coffeerville, MS Levee	Yalobusha	Not certified	Failed inspection as of 4/21/2015
Leflore Historic Levee 3	Leflore	Not Certified	PAL not printed on FIRM
Leflore Historic Levee 4	Leflore	Not Certified	PAL not printed on FIRM
McQuirter Bayou Levee System	Tallahatchie	Not Certified	None
Potacocowa Creek Levee 2	Carroll, Leflore	Not Certified	None
Tallahatchie Levee 7	Tallahatchie	Not Certified	None
Teoc Creek North MS Levee	Carroll	Not Certified	None
Tillatoba Creek Levee 8	Tallahatchie	Not Certified	None

The inventory of regulated dams, as well as the inventory of dams with permits are available from the MDEQ Division of Dam Safety. According to records, there are 26 high or significant hazard dams located in the Yalobusha Watershed. Ensuring regular inspection and maintenance, raising public awareness, and making sure that the Emergency Action Plan is up to date are the most important steps to take to reduce risks associated with dam failure. Hosting a public meeting to educate residents about the risk of living downstream of dams and the value of maintaining a dam or providing remediation services are two additional steps to manage risk. **Figure 6—Dams in Yalobusha Watershed** shows the distribution of significant and high hazard dams per county. The largest number by far occurs in Carroll County. The majority of these dams were as water features for private developments or neighborhoods and may not have been receiving regular inspections and maintenance.

Figure 6: Dams in Yalobusha Watershed



3.2.6 Stream Gage Information

The USGS, along with agency partners, provides surface water flow data for locations within the Yalobusha watershed. Table 17 lists the period of record, gage identification number, and location for both current and historical stream gages in the Yalobusha watershed. Twenty-eight gages are located within the Yalobusha Watershed.

Table 15: Stream gages in the Yalobusha Watershed

Period of Record	Gage ID	Gage Location	County	Latitude	Longitude
1984-1989	7280460	NORTH FORK TILLATOBA CREEK NR TEASDALE, MS	Tallahatchie County	90.02472	34.05778
1999-2015	7281960	YALOBUSHA RIVER AT VARDAMAN, MS	Calhoun County	89.17306	33.86611
1999-2015	7281965	CANE CREEK AT VARDAMAN, MS	Calhoun County	33.87528	89.19083
1999-2011	7281977	YALOBUSHA RIVER AT DERMA, MS	Calhoun County	89.27583	33.83806
1955-2013	7281999	YALOBUSHA RIVER AT CALHOUN CITY, MS	Calhoun County	89.31556	33.83861
1949-2015	7282000	YALOBUSHA R AND TOPASHAW C CA AT CALHOUN CITY, MS	Calhoun County	89.31556	33.83861
1999-2011	7282075	TOPASHAW CREEK CANAL NR HOHENLINDEN, MS	Chickasaw County	89.17861	33.75806
1999-2011	7282090	TOPASHAW CREEK CANAL NR DERMA, MS	Calhoun County	89.24694	33.78000
2000-2011	7282097	BEAR CREEK CANAL NR DERMA, MS	Calhoun County	89.25083	33.78611
1955-2015	7282100	TOPASHAW CREEK CANAL NR CALHOUN CITY, MS	Calhoun County	89.34583	33.81472
1967-1977	7282300	SABOUGLA CR TRIB AT SABOUGLA, MS	Calhoun County	89.45833	33.76944
1940-1949	7282500	YALOBUSHA RIVER AT GRAYSPORT, MS	Grenada County	89.61500	33.81611
1948-2016	7283000	SKUNA RIVER AT BRUCE, MS	Calhoun County	89.34778	33.97361
1955-1984	7283490	CANEY CREEK NEAR COFFEEVILLE, MISS.	Yalobusha County	89.63889	33.92778
1940-1949	7283500	SKUNA RIVER NR COFFEEVILLE, MS	Yalobusha County	89.64167	33.90972
1954-1983	7285000	YALOBUSHA RIVER AT GRENADA DAM NR GRENADA, MS	Grenada County	89.77056	33.80861
1955-1977	7285100	TIE PLANT BR NR GRENADA, MS	Grenada County	89.78889	33.72778

Table 15: Stream gages in the Yalobusha Watershed (cont.)

Period of Record	Gage ID	Gage Location	County	Latitude	Longitude
1985-1997	7285400	BATUPAN BOGUE AT GRENADA, MS	Grenada County	89.78750	33.77389
1909-2016	7285500	YALOBUSHA RIVER AT GRENADA, MS	Grenada County	89.80972	33.78778
1989-1993	7285510	YALOBUSHA RIVER AT NSI INTAKE AT GRENADA, MS	Grenada County	89.80972	33.78778
1965-1977	7285700	LONG CREEK NR CASCILLA, MS	Tallahatchie County	89.98556	33.86167
1938-1984	7286000	ASKALMORE CREEK NR CHARLESTON, MS.	Tallahatchie County	90.06944	33.91806
1950-1966	7286010	BRUSHY CR TRIB NR OXBERRY, MS	Tallahatchie County	90.05278	33.84583
1965-1983	7286200	YALOBUSHA RIVER AT WHALEY, MS	Leflore County	90.11056	33.63167
1951-1970	7286500	THOMPSON CREEK AT MC CARLEY, MS	Carroll County	89.84444	33.52361
1947-1979	7286520	BIG SAND CR TRIB NR CARROLLTON, MS	Carroll County	89.88056	33.52500
1967-1973	7286700	BIG SAND CREEK AT CARROLLTON, MISS.	Carroll County	89.91944	33.51389

3.2.7 High Water Marks and Historic Flooding

Most of the gages presented in the previous section have a historical high measurement that can be gleaned from the record. For the USGS stage gages, the record stage is listed for most stations.

Historic flooding events that have affected communities in the watershed are presented below.

3.2.7.1 Calhoun County Historic flooding

The Calhoun County FIS identifies overflow from the Skuna and Yalobusha Rivers and their tributaries as the principle flood problems for the county.

A USGS stream gage has been operated on the Skuna River at State Highway 9 since October 1947. The highest record flood at this site was 262.99 feet on March 21, 1955. Other historical flooding events along this reach occurred March 16, 1973 (crest of 259.35 feet), and December 26, 1982 (crest of 258.69 feet).

The Yalobusha River Canal shares a floodplain with its major tributary, Topashaw creek Canal. Both were canalized in the late 1960s and USGS stream gages have been operated along these reaches since October 1950. The combined historical flood stage, recorded as 251.94 feet, occurred on December 26, 1982.

Miles Creek also has recorded flood elevations from a large flood that occurred in December 1983. The recorded crest elevation for this event was 264.73 feet under the State Highway 8 bridge and 266.83 feet near a house roughly 1,000 feet upstream along the right bank.

3.2.7.2 Carroll County Historic flooding

The Carroll County FIS identifies seasonal rains (particularly thunderstorms in spring and summer) as the primary cause of flooding along many of the creeks and rivers in Carroll County.

3.2.7.3 Chickasaw County Historic flooding

The Chickasaw County FIS identifies seasonal rains (particularly thunderstorms in spring and summer) as the primary cause of flooding along many of the creeks and rivers in Chickasaw County. Obstructions in the floodplain also cause flooding issues.

3.2.7.4 Grenada County Historic flooding

The Grenada County FIS identifies seasonal rains, particularly in the spring and winter, as the principal cause of flooding. The Yalobusha River also serves as a primary cause of flooding with a historical high flood stage of 177.57 feet at the U.S. Highway 51 bridge on March 16, 1973. This storm produced a maximum rainfall of 2.63 inches in 3 hours and was estimated to have a recurrence interval of 40 years.

The City of Grenada also experienced extensive flooding as a result of the 1973 storm. Several other record floods have occurred over the last several decades.

3.2.7.5 Lafayette County Historic flooding

The Lafayette County FIS identifies seasonal rains, particularly in the spring and winter, as the principal cause of flooding with historical flooding in the City of Oxford occurring on May 10, 1970. The historical storm produced 6.6 inches of rain in 9 hours with a maximum of 1.87 inches of rain falling in 30 minutes.

3.2.7.6 Leflore County Historic Flooding

The Leflore County FIS identifies heavy seasonal rains during the winter and spring as the primary cause of flooding in Leflore County. The Yazoo-Tallahatchie and Yalobusha Rivers are heavily impacted by these storm events. Localized flooding is also identified along Big Sand, Pelucia, Abiaca, Teoc, and Turkey Creeks; along Alligator, Catfish, Gin, Muddy, Tippto, Marsh, and Fighting Bayous; and along the Quiver River.

Leflore County was also subjected to historical flooding from the May 1973 flood. Flooding in the vicinity of Swan Lake occurred for 188 days and at the City of Greenwood for 196 days.

Flooding also occurred in spring of 1974 when rainfall averages varied from 200 to 250 percent above normal.

3.2.7.7 Montgomery County Historic Flooding

The Montgomery County FIS identifies heavy seasonal rains during the winter and spring as the primary cause of flooding in Montgomery County.

3.2.7.8 Pontotoc County Historic Flooding

The Pontotoc County FIS identifies the overflow from Cane, Chiwappa, Coonewar, Lappatubby, Mubby, and Mud Creeks and the Skuna River and their tributaries as the primary sources of flooding in Pontotoc County.

3.2.7.9 Tallahatchie County Historic Flooding

The Tallahatchie County FIS identifies the Tillatoba River and its tributaries as the primary flooding sources in Tallahatchie County with the City of Charleston as one area that is particularly affected by this flooding.

Major flooding of the Tillatoba River have occurred in March 1973, November 1973, and December 1982. These floods had high water marks as measured by the United States Army Corp of Engineers of 173.4 feet, 175.7 feet, and 178.8 feet, respectively.

Tallahatchie County is also affected by flooding of the Yalobusha River.

3.2.7.10 Webster County Historic Flooding

The Webster County FIS identifies Bellafontaine, Calabrella, Little Black, Sabougla, and Sand Creeks, Big Black River and Spring Creek Canals, and the Big Black River as the primary sources of flooding in Webster County.

3.2.7.11 Yalobusha County Historic Flooding

The Yalobusha FIS identifies seasonal rains and localized thunderstorms as the primary sources of flooding in Yalobusha County. The FIS also identifies occasional backwater from Enid Lake and Grenada Lake as additional flooding sources with the highest recorded stage on Enid Lake listed as 271.7 feet on May 1, 1991, and the highest recorded stage on Grenada Lake listed as 237.3 feet on May 29, 1991.

3.2.8 Declared Disasters

The major disaster declarations for the areas within the Yalobusha Watershed that included a flooding component are listed in

Table 18. FEMA's disaster declaration for Mississippi Disaster history can be viewed at: <http://www.fema.gov/disaster/>

Table 16: Disaster Declarations in the Yalobusha Watershed

Date	Disaster Type	Affected County	Incident Begin Date	Incident End Date
2017	Severe Storms, Tornadoes, and Flooding	Calhoun, Carroll, Montgomery, Webster	04/30/2017	04/30/2017
2016	Severe Storms and Flooding	Leflore, Tallahatchie	03/09/2016	03/29/2016
2015	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	Chickasaw, Tallahatchie	12/23/2015	12/28/2015
2012	Hurricane Isaac	Carroll, Grenada, Montgomery	08/26/2012	09/11/2012
2011	Severe Storms, Tornadoes, Straight-Line Winds, and associated Flooding	Calhoun, Carroll, Chickasaw, Grenada, Lafayette, Leflore, Montgomery, Webster	04/15/2011	04/28/2011
2010	Severe Storms, Tornadoes, and Flooding	Lafayette	05/01/2010	05/02/2010
2008	Hurricane Gustav	All	08/28/2008	09/08/2008
2005	Hurricane Katrina	All	08/29/2005	10/14/2005
2005	Hurricane Dennis	Calhoun, Chickasaw, Webster	07/10/2005	7/15/2005
2001	Severe Storms, Tornadoes, and Flooding	Grenada, Lafayette, Tallahatchie	11/24/2001	12/17/2001
1991	Severe Storms, Tornadoes, and Flooding	Calhoun, Carroll, Chickasaw, Grenada, Leflore, Tallahatchie, Webster, Yalobusha	04/26/1991	05/31/1991
1991	Severe Storms and Flooding	Calhoun, Grenada, Leflore, Tallahatchie, Yalobusha	02/17/1991	03/21/1991
1990	Severe Storms, Tornadoes, and Flooding	Tallahatchie	01/24/1990	03/15/1990
1983	Severe Storms and Flooding	Grenada	12/21/1983	12/21/1983
1983	Severe Storms, Tornadoes, and Flooding	Leflore, Tallahatchie	06/01/1983	06/01/1983
1979	Storms, Tornadoes, and Floods	Calhoun, Montgomery, Tallahatchie	04/16/1979	04/16/1979
1973	Heavy Rains, Tornadoes, and Flooding	All	03/27/1973	03/27/1973

3.2.9 Floodplain Management CAV and CAC

Statewide Community Assistance Contacts (CAC) and Community Assistance Visits (CAV) serve as an evaluation and review process between FEMA/MEMA and local officials to ensure that each community adequately enforces local floodplain management regulations to remain in compliance with NFIP requirements. CAVs are also a way to provide technical assistance to communities. Table 17: CAVs Performed within the Watershed lists the most recent CAVs performed within the Yalobusha watershed.

Most communities have improved their programs now that they have a better understanding of floodplain management obligations. Copies of the CAV reports for the communities are included in Appendix E.

Table 17: CAVs Performed within the Watershed

Community	Reviewer	CAV Date	Notes
Bruce, City of	MEMA	09/09/2010	Serious issues identified related to administration/enforcement procedures.
Calhoun City, Town of	MEMA	04/20/2010	No serious violations discovered during last CAV.
Calhoun County	MEMA	06/30/2015	No violations discovered during last CAV.
Carroll County	MEMA	09/06/2016	No violations discovered during last CAV.
Carrollton, Town of	MEMA	03/10/2011	No violations discovered during last CAV.
Chickasaw County	MEMA	08/25/2010	Serious issues identified related to administration/enforcement procedures. Corrective action taken.
Coffeeville, City of	MEMA	04/21/2010	Potential violations include the adoption and use of floodplain permits and placards, floodplain management education of the floodplain administrator, and sending the 2009 Biennial Report to FEMA.
Derma, City of	MEMA	07/20/2010	Potential violations included the need to submit the Biennial Report to FEMA
Duck Hill, Town of	MEMA	02/25/2010	CAV indicates that the floodplain ordinance needed updating.
Grenada, City of	MEMA	01/21/2014	Serious issues identified related to administrative and enforcement procedures.
Grenada County	MEMA	02/03/2014	No serious issues. Minor issues related to administrative and enforcement procedures indicated.
Houston, City of	MEMA	08/26/2010	No violations discovered during last CAV
Lafayette County	MEMA	08/23/2017	No violations discovered during last CAV
Leflore County	MEMA	01/22/2014	Minor issues related to administrative and enforcement procedures as well as some programmatic issues identified.
Montgomery County	MEMA	06/10/2016	No violations discovered during last CAV
North Carrollton, Town of	MEMA	09/13/2010	No violations discovered during last CAV

Table 17: CAVs Performed within the Watershed (cont.)

Community	Reviewer	CAV Date	Notes
Pontotoc County	MEMA	03/25/2013	Serious issues identified related to administrative and enforcement procedures and minor issues with the community's floodplain regulations.
Tallahatchie County	MEMA	01/23/2013	Potential violations include missing elevation certificates on some issued permits.
Vardaman, Town of	MEMA	07/23/2008	CAV indicates a need for updated flood prevention ordinance and updated building permit form to include flood zone, lowest floor, and base flood elevation.
Webster County	MEMA	05/26/2015	Serious issues indicated regarding administrative and enforcement procedures.
Yalobusha County	MEMA	03/20/2018	No violations discovered during last CAV

3.2.10 Effective Regulatory Mapping and LOMC

All counties in the Yalobusha watershed have effective, modernized FIRMs and FIS. Digital databases are readily available for all of these counties. The effective dates for the current FIRMs for these communities are listed in Table 20.

Table 18: Effective FIRM/FIS Reports for Non-Coastal Communities

County	Community Name	Product Types	FIRM Effective Date
Calhoun	All Jurisdictions	FIS & FIRM	08/19/2010
Carroll	All Jurisdictions	FIS & FIRM	05/02/2017
Chickasaw	All Jurisdictions	FIS & FIRM	01/05/2010
Grenada	All Jurisdictions	FIS & FIRM	05/24/2011
Lafayette	All Jurisdictions	FIS & FIRM	11/26/2010
Leflore	All Jurisdictions	FIS & FIRM	11/01/1979-05/16/2012
Montgomery	All Jurisdictions	FIS & FIRM	09/17/2010
Pontotoc	All Jurisdictions	FIS & FIRM	08/19/2010
Tallahatchie	All Jurisdictions	FIS & FIRM	05/16/2017
Webster	All Jurisdictions	FIS & FIRM	01/05/2010
Yalobusha	All Jurisdictions	FIS & FIRM	09/17/2010

A Letter of Map Change (LOMC) is a letter that reflects an official revision to an effective NFIP map. LOMCs are issued in place of the physical revision and republication of the effective FIRM. LOMCs in the Watershed were identified and Table 21 lists the number of LOMCs in each

community within the watershed. This LOMC count includes Letters of Map Amendments (LOMA), Letters of Map Revisions (LOMR), Letters of Map Revision based on Fill (LOMR-F), and Conditional LOMR. No Conditional LOMAs or Conditional LOMR-Fs were included. Clusters of LOMCs indicate a need for updated maps.

Table 19: Letters of Map Change Identified in the Watershed

County	Community Name	LOMC Type	Number of Cases
Calhoun	Calhoun County	LOMA	7
Grenada	Grenada, City of	LOMA	33
Grenada	Grenada County	LOMA	2
Leflore	Leflore County	LOMA	2
Tallahatchie	Tallahatchie County	LOMA	2
Yalobusha	Coffeeville, City of	LOMA	5
Yalobusha	Yalobusha County	LOMA	3

3.2.11 Ordinances

Communities and counties within the Watershed have wide discretion in the implementation of local ordinances. The Watershed’s local jurisdictions have a patchwork of regulations regarding development within known flood hazard areas that can range from ordinances with minimum NFIP requirements to strong, pro-active ordinances that not only regulate and protect new and improved development in existing Special Flood Hazard Areas (SFHA), but seek to mitigate the growth of SFHAs caused by increased runoff from developed areas and the degradation of natural flood control areas, such as wetlands and forests.

It is presumed that the NFIP-participating communities within the watershed have floodplain management regulations in place and have a mechanism for updating their ordinances. Additional information about local ordinances was requested at the Discovery meeting. During final phases of this Risk MAP project the community ordinances will be reviewed and recommendations will be provided.

3.2.12 Flood Insurance Policies and Repetitive Loss

This Discovery project also gathered data regarding the flood insurance policies and repetitive losses in the Watershed through the NFIP. Table 22: NFIP Statistics in the Yalobusha Watershed lists the details of the number of flood policies, total coverage amount and the total cost of repetitive losses within the Yalobusha Watershed communities. It should be noted that all data entries except repetitive loss properties are based on the full geographical extents of the community, not just the portion within the watershed.

Table 20: NFIP Statistics in the Yalobusha Watershed

Name of Community	CID	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Losses
Algoma, Town of	280333	N	*	*	*	*
Big Creek, Village of	280298	N	*	*	*	*
Bruce, Town of	280026	Y	14	\$ 1,756,000.00	\$ 89,221.00	1
Calhoun City, City of	280027	Y	19	\$ 3,028,400.00	\$ 36,805.00	1
Calhoun County	280288	Y	*	*	*	*
Carroll County	280191	Y	14	\$ 2,503,600.00	*	4
Carrollton, Town of	280367	Y	0	\$ 0.00	\$ 0.00	0
Chickasaw County	280269	Y	1	\$ 140,000.00	\$ 0.00	0
Coffeeville, Town of	280186	Y	2	\$ 314,500.00	\$ 0.00	0
Derma, Town of	280217	Y	1	\$ 96,300.00	\$ 0.00	0
Duck Hill, Town of	280118	Y	2	\$ 58,000.00	\$ 0.00	0
Grenada, City of	280061	Y	189	\$23,633,700.00	\$ 1,707,708.27	39
Grenada County	280060	Y	122	\$17,464,200.00	\$ 1,900,234.95	23
Houston, City of	280030	Y	11	\$ 955,600.00	\$ 8,170.00	2
Lafayette County	280093	Y	68	\$17,160,600.00	\$ 13,160.48	1
Leflore County	280103	Y	537	\$65,073,600.00	\$1,908,094.03	23
Montgomery County	280212	Y	*	*	*	*
North Carrollton, Town of	280028	Y	7	\$ 434,700.00	\$ 762.00	0
Pittsboro, Village of	280218	Y	0	\$ 0.00	\$ 0.00	0
Pontotoc County	280234	Y	9	\$1,910,600.00	\$ 6,912.51	1
Slate Springs, Village of	280066	N	*	*	*	*
Tallahatchie County	280206	Y	71	*	*	6
Vardaman, Town of	280327	Y	6	\$ 487,000.00	\$ 0.00	0
Webster County	280284	Y	1	\$ 55,000.00	\$ 0.00	0
Winona, City of	280119	Y	12	\$2,336,600.00	\$ 0.00	0
Yalobusha County	280239	Y	6	\$ 697,000.00	\$ 0.00	0

*Data not reported

3.2.13 Comprehensive Plans

Not all Counties in the watershed have county-wide comprehensive plans. According to Mississippi Code of 1972, a "Comprehensive plan" means a statement of public policy for the physical development of the entire municipality or county adopted by resolution of the governing body, consisting of the following elements at a minimum:

(i) Goals and objectives for the long-range (twenty (20) to twenty-five (25) years) development of the county or municipality. Required goals and objectives shall address, at a minimum, residential,

commercial and industrial development; parks, open space and recreation; street or road improvements; public schools and community facilities.

(ii) A land use plan which designates in map or policy form the proposed general distribution and extent of the uses of land for residences, commerce, industry, recreation and open space, public/quasi-public facilities and lands. Background information shall be provided concerning the specific meaning of land use categories depicted in the plan in terms of the following: residential densities; intensity of commercial uses; industrial and public/quasi-public uses; and any other information needed to adequately define the meaning of such land use codes. Projections of population and economic growth for the area encompassed by the plan may be the basis for quantitative recommendations for each land use category.

(iii) A transportation plan depicting in map form the proposed functional classifications for all existing and proposed streets, roads and highways for the area encompassed by the land use plan and for the same time period as that covered by the land use plan. Functional classifications shall consist of arterial, collector and local streets, roads and highways, and these classifications shall be defined on the plan as to minimum right-of-way and surface width requirements; these requirements shall be based upon traffic projections. All other forms of transportation pertinent to the local jurisdiction shall be addressed as appropriate. The transportation plan shall be a basis for a capital improvements program.

(iv) A community facilities plan as a basis for a capital improvements program including, but not limited to, the following: housing; schools; parks and recreation; public buildings and facilities; and utilities and drainage.

Calhoun County: Calhoun County has a county-wide comprehensive plan adopted June 13, 2005, and amended February 25, 2013.

Carroll County: According to currently available sources, Carroll County has not developed or adopted a Comprehensive Plan.

Chickasaw County: According to currently available sources, Chickasaw County has not developed or adopted a Comprehensive Plan.

Grenada County: According to currently available sources, Grenada County has not developed or adopted a Comprehensive Plan.

Lafayette County: Lafayette County has county-wide comprehensive plan with a final copy date of October 27, 2017. The plan was developed by Slaughter & Associates Urban Planning Consultants.

Leflore County: According to currently available sources, Leflore County has not developed or adopted a Comprehensive Plan. However, the City of Greenwood adopted its own comprehensive plan October 19, 2010, with technical assistance from Johnstone and Associates Planning and Marketing Consultants.

Montgomery County: According to currently available sources, Montgomery County has not developed or adopted a Comprehensive Plan.

Pontotoc County: According to currently available sources, Pontotoc County has not developed or adopted a Comprehensive Plan.

Tallahatchie County: Tallhatchie County falls under the North Delta Planning and Development District. According to currently available sources, the NDPDD has not developed or adopted a current Comprehensive Plan. However, it does have one available for download dated 2012-2017.

Webster County: According to currently available sources, Webster County has not developed or adopted a Comprehensive Plan.

Yalobusha County: According to currently available sources, Yalobusha County has not developed or adopted a Comprehensive Plan.

4 Risk MAP Products for the Yalobusha Watershed

New products will be part of the Risk MAP project. During previous flood studies, three main types of products were generated: DFIRM Database, FIS Report, and DFIRMs. Risk MAP will continue to create these products. Additional new flood risk data and products will be created based on the new flood data; however, they will not be regulatory products. These additional products, including flood risk maps and flood risk reports, will be delivered to stakeholders. The new datasets will help to communicate the risk to the affected individuals and will help community officials communicate flood risk.

During this FIS study, several meetings will be held with the communities, such as a Resilience Meeting, which will provide guidance on integrating Risk MAP products into local planning efforts. A Consultation Coordination Office Meeting where the new FIRMs, FIS and Risk MAP products will be presented to local officials. An Open House for the public will follow the Preliminary DFIRM Community Coordination (PDCC) Meeting. In addition, there is an optional Flood Study Review Meeting that can be requested by the communities to review and comment on draft floodplain boundaries.

3.3 Proposed Enhanced Products

This Risk MAP analysis will provide state and community officials with the following Flood Risk Products:

- Flood Risk Report: a summary of flood risk data for the watershed and each community
- Flood Risk Map: high level overview of specific flood risk data for the watershed
- Flood Risk Database: relational database that stores all flood risk data.

Separate datasets will reside within the Flood Risk Database including:

- Changes since the last FIRM, which include the Horizontal Changes and Results Grid
- Depth Grids for the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance events, the “Percent Annual Chance” grid, and the “Percent 30-Year” grid.
- A refined Flood Risk Assessment with revised AAL results
- Areas of Mitigation Interest

3.3.1 Changes since Last FIRM

Changes Since Last FIRM will show horizontal flood boundary change between effective and previous flood boundaries, which will help to count the structures and population impacted by the change. Information about the engineering, such as whether new engineering was performed and how the updated topographic data was applied, will also be included. This additional information will help communicate the changes of the new maps and help communities to better understand their accuracy.

3.3.2 Flood Depth and Analysis Grids

Flood Depth Grids will be generated for the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events. Each individual grid cell will have a depth value assigned, based on a comparison of the flood elevation and available terrain data. A depth grid represents the likelihood of “getting wet.” This will help to communicate hazards for a non-technical user.

The Percent Annual Chance Grid is an effective communication tool for helping local residents understand the probabilities associated with specific flood frequency events. Used in conjunction with the Percent 30-Year Chance Grid, local stakeholders may gain a better understanding of the relative probability of being flooded for any given location within the mapped floodplain.

Similar to the Percent Annual Chance Grid, the Percent 30-Year Chance Grid provides valuable insight into the potential for being flooded in any given location within the mapped floodplain within a period of time (30-years) equivalent to the standard period of time that home mortgages are held. This grid is very useful in dispelling misconceptions that there is little chance of being flooded by (for example) the 1-percent-annual-chance flood event during the life of a mortgage.

3.3.3 Flood Risk Assessment

A refined HAZUS analysis may be provided as part of the project based on the newly created depth grids. It will provide dollar losses, percent damage, and business disruption based on census blocks. Hot spots will be identified incorporating such factors as previous repetitive loss claim areas, undersized culverts, bridge openings, new developments in the floodplain, and locations of successful mitigation projects for potential hazard mitigation. Unless the communities can provide more detailed infrastructure data, it would be based on the 2010 Census data.

In order to create reliable HAZUS data it is very important that the community provide up to date data, such as essential facilities, building counts, highway and railroad bridges, population, water system facilities, military installations, location/categorization, and replacement value information. The availability of locally-developed building locations will be a key factor in determining whether a refined HAZUS analysis will be a worthwhile undertaking for this project.

3.3.4 Areas of Mitigation Interest

The Areas of Mitigation Interest (AoMI) dataset is intended to communicate areas and issues associated with flood risk reduction opportunities or success stories. This dataset allows local stakeholders to gain a more holistic picture of flood risk related issues that may impact them.

AoMI may include information such as:

- Key emergency routes overtopped during frequent flood events,
- Past claims “hot spots,” including flood claims and properties on the FEMA Repetitive Loss/Severe Repetitive Loss lists, and Individual Assistance/Public Assistance data,
- Areas of significant riverine erosion,
- Locations of at-risk essential facilities and vulnerable locations.

- Areas of mitigation success, or
- Other flood risk areas not identified on the FIRM.

The following mitigation options may be recommended in the AoMI documents:

Property Protection Measures

- Buy outs
- Flood proofing
- Relocation
- Structure elevation

Education and Outreach Measures

- Brochures
- Booths at fairs and festival
- Annual meetings

Prevention Measures

- Flood ordinance,
- Stormwater programs
- Building codes

Natural Resource Protection Measures

- Wetland and stream restoration
- Riparian buffer ordinances

Structural Project Measures

- Levees
- Dikes
- Floodwall
- Culvert replacement
- Bridge Replacement
- Stream maintenance

Emergency Services Measures

- Reverse 911
- Swift water rescue equipment

The flood risk report and flood risk maps will be created prior to the issuance of preliminary maps. A fact sheet at the end of the report will summarize the results of the risk assessment process rolled up to the watershed level. Risk maps will contain all the visual data that was created as part of the

Flood Risk Assessment stage, which will help to visualize the risk and promote risk awareness. All the above mentioned new products aim to identify mitigation actions and to reduce vulnerability.

5 Discovery Meeting

A watershed-wide Discovery Meeting was held on June 27, 2018, at 9:00AM at the Grenada County EOC, 1040 South Raceway Road, Grenada, MS. The meeting was set up to facilitate discussion about the Risk MAP program, identify study and mitigation project needs, desired compliance support, and local flood risk awareness efforts. A total of 16 people were in attendance at the meeting, including representatives of Bolivar, Issaquena, Sharkey, and Washington Counties and several municipalities. Additional partners and stakeholders were also in attendance including representatives of MEMA and MDEQ. The discussion was stimulated using the effective FIRM and Discovery Map's display of relevant data available in Appendix B. Attendees cooperatively identified areas of concern where new study information is requested. The final study streams are shown in Appendix C. Additionally mitigation projects options, compliance issues, and ideas on how to improve the local flood risk communication programs were discussed during the meeting. See Appendix B for pertinent Discovery meeting information including sign-in sheets, meeting notes, presentation and other documentation.

Appendices

Appendix A: Community Information

- Community Contact List
- Community Discovery Data Questionnaire
- Community Correspondence
- LOMC Analysis
- Community Provided Responses to Questionnaires

Appendix B: Discovery Meeting

- Flood Hazard Map
- Flood Risk Map
- Mapping Needs
- Potential Loss
- Discovery Meeting Presentation
- Meeting Minutes
- Sign-in Sheets
- Invitation Letters
- Draft Project Charter

Appendix C: Panel Scheme

- Yalobusha Watershed Proposed FIRM Panel Revisions

Appendix D: CNMS Analysis

- CNMS Summary Spreadsheet

Appendix E: Collected Discovery Data

- Hazard Mitigation Plans
- Grant Information
- CAV
- CRS

Appendix F: Quality Assurance/Quality Control Plan

- QA/QC Plan