

Discovery Report

*Lower Big Black, 08060202 Claiborne, Hinds, Holmes, Madison, Warren, Yazoo
Counties and Incorporated Areas*

Report Number01

1/16/2014



FEMA

Project Area Community List

Community Name
Bentonia, Town of, Yazoo County
Bolton, Town of, Hinds County
Canton, City of, Madison County
Clinton, City of, Hinds County
Edwards, Town of, Hinds County
Flora, Town of, Madison County
Jackson, City of, Hinds County
Learned, Town of, Hinds County
Madison, City of, Madison County
Pickens, Town of, Holmes County
Raymond, Town of, Hinds County
Utica, Town of, Hinds County
Claiborne County, Unincorporated Areas,
Hinds County, Unincorporated Areas
Holmes County, Unincorporated Areas
Madison County, Unincorporated Areas
Warren County, Unincorporated Areas
Yazoo County, Unincorporated Areas

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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 was 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 Lower Big Black 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 Big Black Watershed (HUC # 08060202) 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 November 28, 2012, 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:

- Laura Algeo, Region IV PM Representative, FEMA Region IV, Lead Engineer
- Henrietta Williams, Region IV Outreach Representative, FEMA Region IV, Outreach Lead for Mississippi
- Jason Hunter, Region IV FM&I Representative, FEMA Region IV, Floodplain Management
- Camille Crane, Region IV HMA Representative, FEMA Region IV, HMA Specialist for Mississippi
- Edward Hale, Region IV HMA Representative, FEMA Region IV, Mitigation Plans for Mississippi

- Richard S. Flood, Region IV HMA Representative, FEMA Region IV, HMA Program Lead
- Stacey Ricks, Mississippi NFIP Coordinator, MEMA Floodplain Management Bureau
- Jana Henderson, Mississippi Hazard Mitigation Officer, MEMA Office of Mitigation
- Steve Champlin, Mississippi CTP PM, Project Manager for the Lower Big Black study
- Jaime Shipley, Accenture, RPML, State's point of contact for meeting collaboration
- Charles Curcio, RSC PM, RSC, State's point of contact for technical support and FEMA's project monitor
- Jamie Monohan, Mississippi Geographic Information, LLC, Project Manager

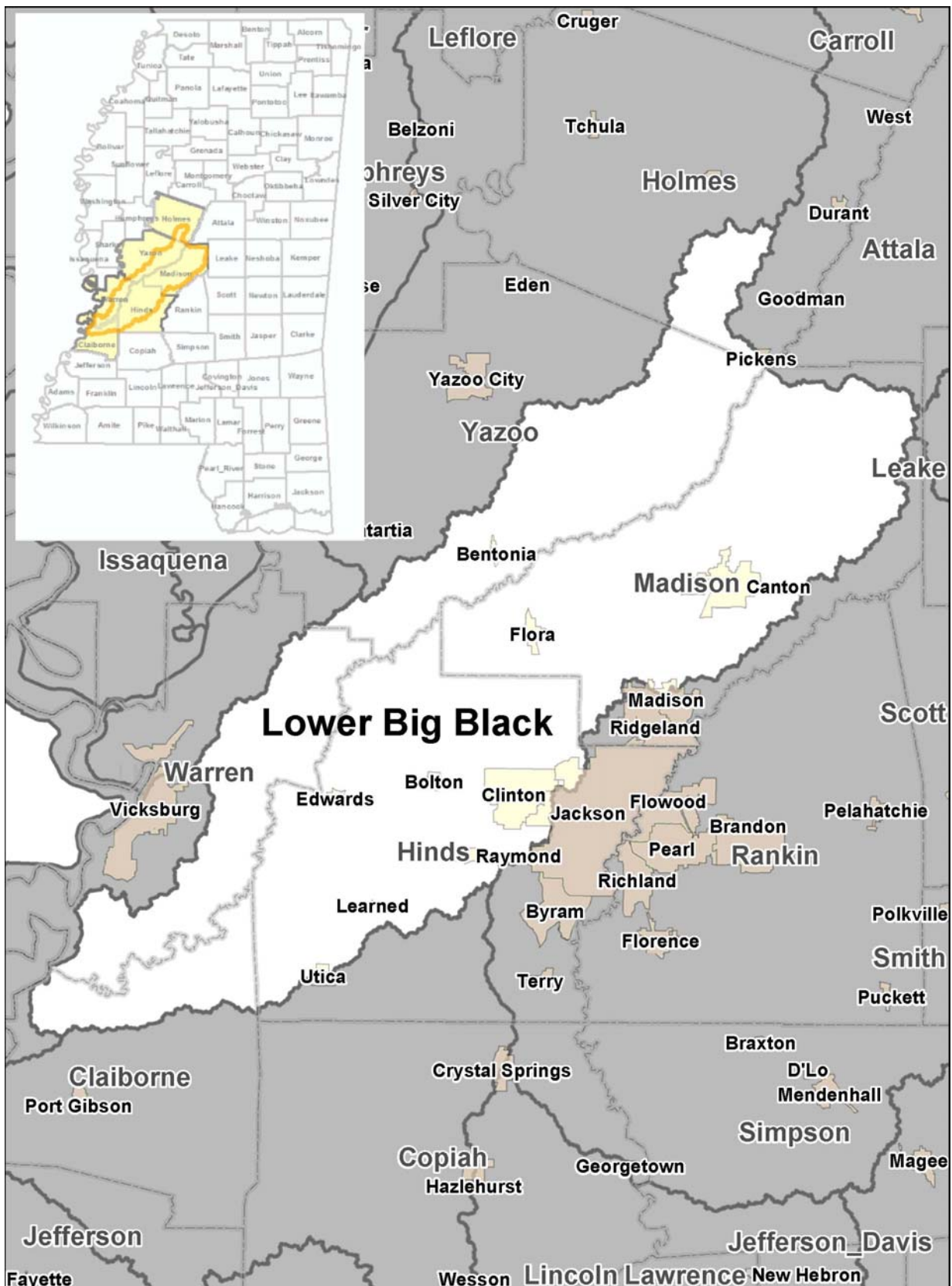
The Lower Big Black Watershed is located in west-central Mississippi. The watershed is approximately 85 miles long and about 25 miles wide and is aligned in a northeast to southwest orientation. The watershed falls mostly within the Loess Bluff and Pine Hills physiographic regions of Mississippi.¹ The watershed contains parts of 6 counties: Claiborne, Hinds, Holmes, Madison, Warren and Yazoo.

The Big Black River originates in north-central Mississippi in Choctaw and Webster counties. It follows a generally southwestward course and joins the Mississippi River near Port Gibson. The river channel, or past routes thereof, forms the eastern boundary of Holmes, Yazoo and Warren counties, and the western boundary of Madison, Hinds, and Claiborne counties. Some of the larger tributaries of the Big Black River, within the Lower Big Black watershed, include Bear Creek, Big Cypress Creek, Doaks Creek, Bogue Chitto Creek, and Fourteenmile Creek.

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

¹ 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)*

Figure 1: Watershed Location



All of the communities in the Lower Big Black watershed have received modernized maps as part of FEMA’s Map Modernization Program. The current FIS Dates for these communities is given in Table 1.

Table 1: Current FIS Dates

Community	Affected Areas	Type of Map	Effective Date
Bentonia, Town of	all	DFIRM	February 16, 2012
Bolton, Town of	all	DFIRM	November 18, 2009
Canton, City of	all	DFIRM	March 17, 2010
Claiborne County	Northern portion	DFIRM	April 19, 2010
Clinton, City of	all	DFIRM	November 18, 2009
Edwards, Town of	all	DFIRM	November 18, 2009
Flora, Town of	all	DFIRM	March 17, 2010
Hinds County	Western portion	DFIRM	November 18, 2009
Holmes County	Southeastern portion	DFIRM	January 18, 2012
Jackson, City of	Western portion	DFIRM	November 18, 2009
Learned, Town of	all	DFIRM	November 18, 2009
Madison County	Western portion	DFIRM	March 17, 2010
Madison, City of	Northern portion	DFIRM	March 17, 2010
Pickens, Town of	Southern portion	DFIRM	January 18, 2012
Raymond, Town of	all	DFIRM	November 18, 2009
Utica, Town of	Northern portion	DFIRM	November 18, 2009
Warren County	Eastern portion	DFIRM	November 5, 2008, July 16, 2013
Yazoo County	Eastern portion	DFIRM	February 16, 2012

Areal distribution of the communities within the Lower Big Black 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. 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	Losses
Bentonia, Town of	280361	1.36	0.07%	-12.00%	No plan	No	-	-	-	-
Bolton, Town of	280216	1.53	0.08%	-9.86%	Yes	Yes	INA	INA	INA	INA
Canton, City of	280109	18.73	0.98%	2.15%	Yes	Yes	171	\$19,248,400	367	\$2,397,704
Claiborne County	280201	111.03	5.83%	-18.82%	Yes	Yes	45	\$1,745,000	396	\$3,297,853
Clinton, City of	280071	24.07	1.26%	8.01%	Yes	Yes	97	\$17,753,000	29	\$225,509
Edwards, Town of	280330	1.67	0.09%	-23.24%	Yes	Yes	1	\$175,000	0	\$0
Flora, Town of	280399	3.40	0.18%	21.99%	Yes	Yes	6	\$777,000	0	\$0
Hinds County	280070	503.47	26.43%	9.25%	Yes	Yes	420	\$73,838,900	136	\$1,495,144
Holmes County	280211	63.12	3.31%	-11.06%	Yes	Yes	51	\$9,172,300	32	\$265,594
Jackson, City of	280072	9.49	0.50%	-5.83%	Yes	Yes	4409	\$699,132,300	2,981	\$50,477,700
Learned, Town of	280315	0.30	0.02%	88.00%	No plan	No	-	-	-	-

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	Losses
Madison County	280228	566.11	29.72%	22.96%	Yes	Yes	374	\$92,052,600	135	\$1,641,833
Madison, City of	280229	2.18	0.11%	64.37%	Yes	Yes	224	\$55,284,300	85	\$418,442
Pickens, Town of	280077	0.16	0.01%	-12.68%	Yes	Yes	INA	INA	INA	INA
Raymond, Town of	280320	2.96	0.16%	16.17%	Yes	Yes	4	\$910,000	0	\$0
Utica, Town of	285263	1.05	0.06%	-15.11%	Yes	Yes	0	\$0	0	\$0
Warren County	280198	247.96	13.02%	-1.75%	Yes	Yes	320	\$39,700,600	1,676	\$15,513,991
Yazoo County	280199	346.13	18.17%	-0.09%	Yes	Yes	213	\$30,224,900	83	\$870,916

Meetings and 44 CFR Part 66 Compliance:

Initial contact with the communities began in November 2012. 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 Discovery Meeting was held for the Lower Big Black Watershed on December 13, 2012 at the Mississippi Department of Environmental Quality, 700 North State Street, Jackson, Mississippi. Attendees included affected community officials, State officials, etc. Meeting Agenda, Sign-in Sheets, Presentation and Minutes can be found in Appendix B of this report.

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 NVUE non-compliant. These are several tributaries to Bear Creek, including Streams E,G, H, I, J, N, part of O, P, and T between Madison and Canton. Also in Madison County, Limekiln Creek and Stream K are unverified. The only other unverified Zone AE stream is Allen Creek in the City of Clinton. There are numerous Zone A streams that are unverified due to the lack of a hydraulic model, however the vast majority are located in sparsely populated, rural areas of the watershed, especially Yazoo County. An assessment of this mileage should reveal any particular streams that should be modeled due to current or planned development. The Discovery Map titled “Mapping Needs: Lower Big Black 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
Allen Creek	AE	From about 0.64 miles downstream of Interstate 20 to about 0.28 miles upstream of Interstate 20	0.92	Updated Detailed	Unverified per CNMS validation

Table 3: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
Big Sand Creek	X	From about 2.28 miles downstream of the Natchez Trace Parkway to about 5.11 miles upstream of the Natchez Trace Parkway	7.39	New Approximate	Completing a study gap between Hinds and Claiborne Counties
Burnt Corn Creek	X	From about 1.77 miles downstream of Virililia Road to about 3.68 miles upstream of Virililia Road	5.45	New Approximate	Unstudied stream with drainage area greater than 10 sq. miles
Commissioners Creek	X	From about 3.89 miles downstream of Old Port Gibson Road to about 0.73 miles upstream of Old Port Gibson Road	4.62	New Approximate	Completing a study gap between Hinds and Claiborne Counties
Dry Creek	X	From about 2.67 miles downstream of Highway 43 to about 6.04 miles upstream of Highway 43	8.71	New Approximate	Unstudied stream with drainage area greater than 10 sq. miles
Hobuck Creek	X	From about 6.03 miles downstream of Cooper Road to about 1.81 miles upstream of Cooper Road	7.84	New Approximate	Unstudied stream with drainage area greater than 10 sq. miles
Limekiln Creek	AE	From about 3.77 miles downstream of Gus Green Road to about 0.78 miles upstream of Gus Green Road	4.55	Updated Detailed	Unverified per CNMS validation
Little Bear Creek	A	From Yandell Road to about 1.13 miles upstream of Yandell Road	1.13	New Limited Detail (AE)	Unverified per CNMS validation
Little Bear Creek Tributary	A	From about 0.49 miles downstream of Yandell Road to about 0.48 miles upstream of Yandell Road	0.97	New Limited Detail (AE)	Unverified per CNMS validation
Lottville Creek	X	From about 1.34 miles downstream of Potluck Road to about 2.78 miles upstream of Potluck Road	4.12	New Approximate	Unstudied stream with drainage area greater than 10 sq. miles
Loves Creek	X	From about 0.67 miles downstream of Highway 51 to about 2.29 miles upstream of Highway 51	2.96	New Approximate	Unstudied stream with drainage area greater than 10 sq. miles
Persimmon Creek	X	From Virililia Road to about 6.14 miles upstream of Virililia Road	6.14	New Approximate	Unstudied stream with drainage area greater than 10 sq. miles
Poorhouse Creek	X	From Highway 17 to about 4.40 miles upstream of Highway 17	4.40	New Approximate	Unstudied stream with drainage area greater than

Table 3: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
					10 sq. miles
Stream E	AE	From mouth to about 3.19 miles upstream of mouth	3.19	Updated Detailed	Unverified per CNMS validation
Stream G	AE	From about 3.07 miles downstream of Endris Road to about 1.36 miles upstream of Endris Road	4.37	Updated Detailed	Unverified per CNMS validation
Stream H	AE	From about 0.90 miles downstream of Cotton Blossum Road to about 0.90 miles upstream of Cotton Blossum Road	1.80	Updated Detailed	Unverified per CNMS validation
Stream I	AE	From about 1.11 miles downstream of Interstate 55 to about 0.68 miles upstream of Interstate 55	1.79	Updated Detailed	Unverified per CNMS validation
Stream J	AE	From Highway 51 to Interstate 55	1.21	Updated Detailed	Unverified per CNMS validation
Stream K	AE	From mouth to about 0.36 miles upstream of Annandale Drive	3.19	Updated Detailed	Unverified per CNMS validation
Stream N	AE	From mouth to about 0.03 miles downstream of Stribling Road Extension	2.23	Updated Detailed	Unverified per CNMS validation
Stream O	AE	From Gluckstadt Road to Ridgefield Drive	1.03	Updated Detailed	Unverified per CNMS validation
Stream P	AE	From mouth to about 0.06 miles upstream of Clarkdell Road	2.56	Updated Detailed	Unverified per CNMS validation
Stream T	AE	From mouth to Interstate 55	1.19	Updated Detailed	Unverified per CNMS validation
Unnamed Stream 1	X	From Hinds/Madison county boundary to 1.76 miles upstream of boundary	1.76	New Approximate	Completing a study gap between Hinds and Madison Counties
Unnamed Stream 2	X	From mouth to about 0.1 miles downstream of Tisdale Road	0.98	New Approximate	Completing a study gap between mouth and City of Madison

Table 4 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	180.7	312.3	1269		
Updated Effective Studies	26.2	2.3	0	0	0
New Studies Identified	0	0	53.4		

The list of Flood Insurance Rate Map (FIRM) panels that will be updated by the study is presented in Table 5. Graphical depictions of the effective and proposed updated panels are shown in Appendix C.

Table 5: Proposed FIRM Panel updates

County	Effective FIS Date	FIRM Panels	Panel Scale	Number of Updated Panels
Claiborne	April 19, 2010	28021C0050C	24000	4
		28021C0075C	24000	
		28021C0175C	24000	
		28021C0200C	24000	
Hinds	November 18, 2009	28049C0279H	6000	1
Madison	March 17, 2010	28089C0125F	24000	20
		28089C0150F	24000	
		28089C0275F	24000	
		28089C0300F	24000	
		28089C0370F	12000	
		28089C0375F	24000	
		28089C0380F	12000	
		28089C0390F	12000	
		28089C0405F	12000	
		28089C0410F	12000	
		28089C0415F	12000	
		28089C0420F	12000	
		28089C0430F	12000	
		28089C0440F	12000	
		28089C0550F	24000	
		28089C0555F	12000	
		28089C0557F	6000	
28089C0576F	6000			
28089C0577F	6000			
28089C0578F	6000			

Several counties in central Mississippi and State have entered into a joint agreement for orthophoto acquisition and processing. Three counties, Hinds, Madison and Yazoo, are part of the 2013 leaf-off acquisition project. Although deliverable specifications will vary from county to county, the base pixel resolution is 1-foot. 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 6.

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

Project Task	FEMA Contribution	Partner Contribution	% Partner Leverage	Total Project Cost
Orthoimagery Acquisition and QA/QC	\$15,320	\$25,000	62.0%	\$40,320

2 .Watershed Stakeholder Coordination

The population in the Lower Big Black Watershed is distributed between 18 autonomous jurisdictions. Most of the population in the watershed resides in Hinds and Madison counties. 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 Lower Big Black has been established. This list is included in Appendix A.

Representatives from the local governments, including cities and towns, 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 Claiborne, Hinds, Holmes, Madison, Warren and Yazoo Counties were invited to participate in the Discovery Meetings. 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 7. Of these 18 communities, only 6 communities attended. Follow up with communities that did not attend was attempted by letter dated January 18, 2013. An example of the letter is included in Appendix A.

Table 7: Communities in the Lower Big Black Watershed

County	Community	Municipality Type
Claiborne	Claiborne County	County
Hinds	Hinds County	County
Hinds	Bolton, Town of	Town
Hinds	Clinton, City Of	City
Hinds	Edwards, Town of	Town
Hinds	Jackson, City Of	City
Hinds	Learned, Town Of	Town
Hinds	Raymond, Town Of	Town
Hinds	Utica, Town Of	Town
Holmes	Holmes County	County
Holmes	Pickens, Town of	Town
Madison	Madison County	County

County	Community	Municipality Type
Madison	Canton, City Of	City
Madison	Flora, Town of	Town
Madison	Madison, City Of	City
Warren	Warren County	County
Yazoo	Yazoo County	County
Yazoo	Bentonia, Town Of	Town

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 Lower Big Black 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-up 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.

3.1.2 Topographic Data

Light Detection and Ranging (LiDAR) elevation data is available for the entirety of Hinds, Madison, and Yazoo counties within the watershed. The Madison and Yazoo LiDAR datasets were acquired during the 2011-12 flying season, while the Hinds County data was acquired in 2006. This data is made available by the Mississippi Digital Earth Model—Geospatial Clearinghouse. The technical specifications for these products include 1.4 meter nominal point spacing for LAS and bare-earth survey points, 18.5 cm vertical root mean square error to support 2-foot contours, 1.0 meter horizontal RMSE, and accuracy tested at 95 percent confidence level.

For all other areas of the watershed not covered by LiDAR, a Digital Terrain Model is available. This dataset consists of mass points and breaklines stereoscopically compiled using 2-ft pixel ortho-imagery, collected in 2006. The horizontal and vertical RMSE are reported as 1.84 ft. and 3.3 ft, respectively, sufficient to support a 5-ft. ASPRS Class II contour interval.

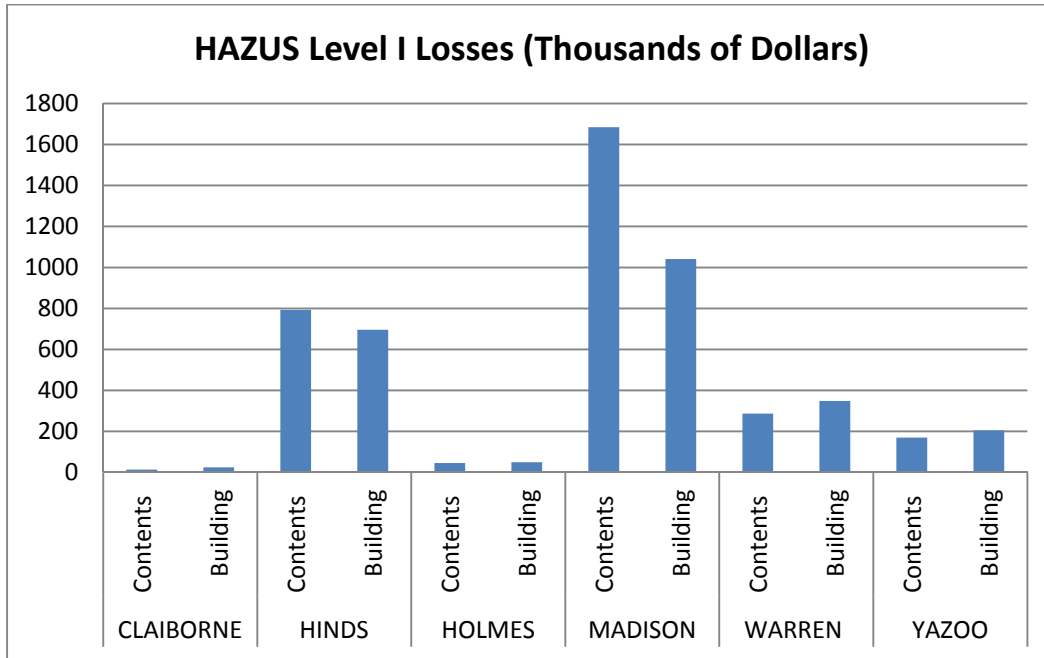
3.1.3 Average Annualized Loss (AAL) / HAZUS

The Hazards U.S. Multi-Hazard (Hanus-MH) tool was used to develop Level I AAL data collected for this Watershed. Hanus-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 Hanus-MH and does a basic analysis.

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 Hanus-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 2 shows the distribution of AAL losses within the Lower Big Black 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 Hanus-MH process and tool can be found at http://www.fema.gov/plan/prevent/hanus/hz_overview.shtm.

Figure 2: HAZUS Level I AAL Losses in Lower Big Black 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.

Table 8: GIS Data Layers Available

Data Types	Deliverable/Product*	Vertical/ Horizontal Datum	Use Restricti ons 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	undefined	y	FEMA RIV	Regulatory

	Geodatabase				
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
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 (Hinds, Madison)	Regulatory
Digital Orthophotos	Discovery Map	NAD83	n	Mississippi	Non-

	Geodatabase			Digital Earth Model, US Department of Agriculture	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

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/>)

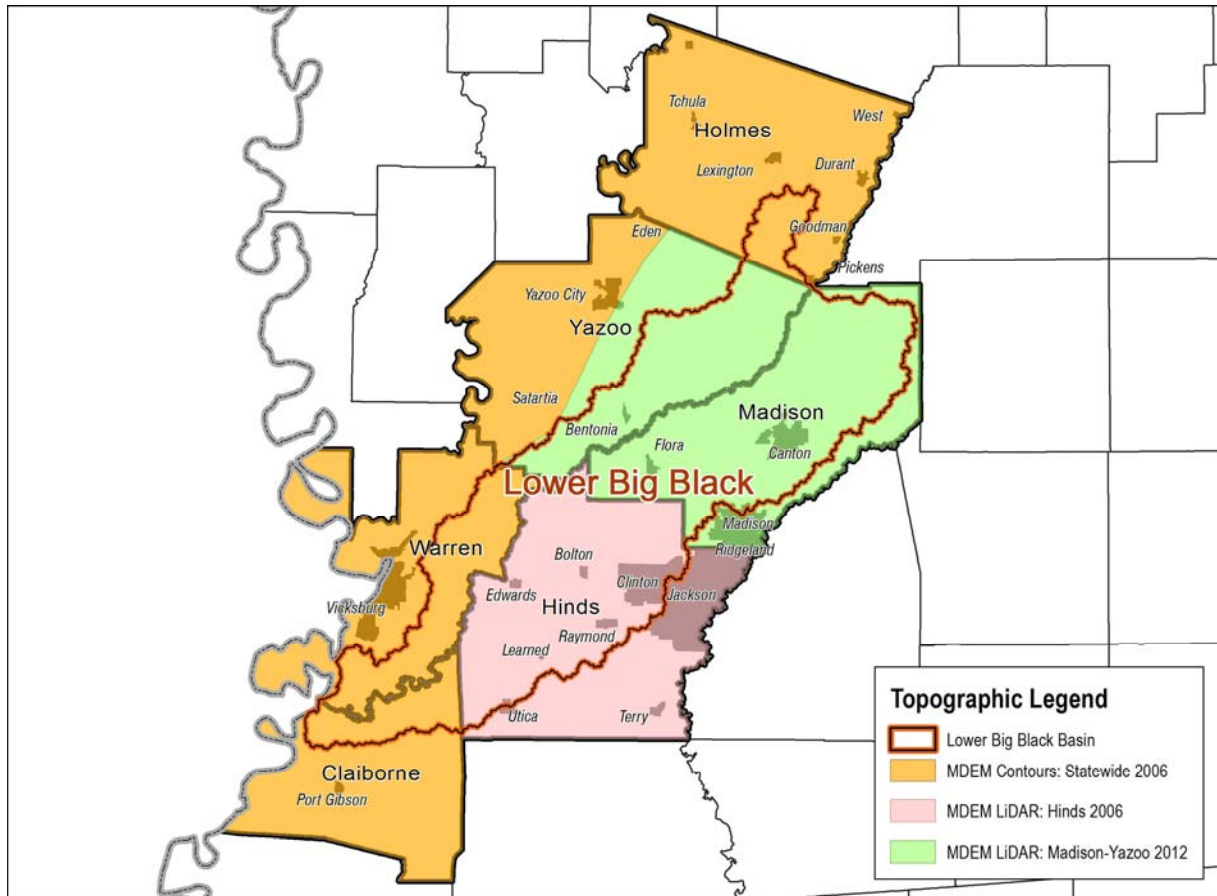
- Data Collection Status: Complete, In work, Planned, or Proposed.
- Image Resolution:
- Vertical Accuracy: in meters
- Data format
- Image Bands:
- Leaf Condition: on/off
- Grid System:
- UTM Zone:
- Horizontal Datum:

- Use restrictions

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

Figure 3 provides a map of the various elevation data sources that are known to exist for the Lower Big Black watershed. Most of the watershed will be able to capitalize on LiDAR coverage by FEMA.

Figure 3—Topographic data sources for Lower Big Black watershed.



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 9: Status of Hazard Mitigation Plans.

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. The Towns of Bentonia and Learned do not have a Hazard Mitigation plan in place.

Table 9: Status of Hazard Mitigation Plans

Community	Hazard Mitigation Plan Status	Plan Developer	Plan Type
Claiborne County	Expires 8/21/2017	Southwest MS Planning and Development District (PDD)	Multi-Jurisdictional (MJ)
Hinds County	Expires 11/29/2016	Central MS PDD	MJ (includes Bolton, Edwards, Raymond and Utica)
Holmes County	Expires 6/13/2017	North Central MS PDD	MJ (includes Pickens)
Madison County	Expires 11/21/2016	Central MS PDD	Single Jurisdiction (SJ)
Warren County	Expires 02/15/2017	Central MS PDD	SJ
Yazoo County	Expires 07/21/2016	Central MS PDD	MJ
Canton	Expires 11/15/2016	Central MS PDD	SJ
Clinton	Expires 09/30/2016	Central MS PDD	SJ
Flora	Expires 09/26/2016	Central MS PDD	SJ
Jackson	Expires 06/27/2016	Central MS PDD	SJ
Madison	Expires 01/11/2017	Central MS PDD	SJ
Bentonia	No Plan	n/a	n/a
Learned	No Plan	n/a	n/a

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>. The CNMS Phase 3 evaluations for the South Carolina counties were completed in July 2011 and

results of the Phase 3 evaluations were incorporated into the CNMS database. Table 10 summarizes draft results of the validation analysis obtained from CNMS.

Table 10: Current Status in CNMS

County	Approximate		Detailed		Total Stream miles
	Valid	Unverified	Valid	Unverified	
Claiborne	19	34	0	0	53
Holmes	0	28	0	0	28
Hinds	87	76	185	2	350
Madison	108	206	75	41	430
Warren	193	21	6	0	220
Yazoo	0	482	0	0	482

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

Nearly 85% percent of the watershed population is located within Hinds and Madison counties. Madison County (unincorporated areas) has the highest percentage (27%) of total population for the watershed, followed by the City of Clinton (20%). Specific population and acreage division of the watershed are listed in Table 11.

Table 11: Population Statistics in the Lower Big Black Watershed

County	FIPS Code ¹	CID ²	Community Name	2010 Watershed Population ³	% of Total Population within Watershed
Claiborne	28021	280201	Claiborne County	490	0.39%
Hinds	28049	280070	Hinds County	18350	14.48%
Hinds	28049	280216	Bolton, Town of	567	0.45%
Hinds	28049	280071	Clinton, City Of	25216	19.90%
Hinds	28049	280330	Edwards, Town of	1034	0.82%
Hinds	28049	280072	Jackson, City Of	7079	5.59%
Hinds	28049	280315	Learned, Town Of	94	0.07%
Hinds	28049	280320	Raymond, Town Of	1933	1.53%
Hinds	28049	285263	Utica, Town Of	316	0.25%
Holmes	28051	280211	Holmes County	1150	0.91%
Holmes	28051	280077	Pickens, Town of	355	0.28%
Madison	28089	280228	Madison County	33634	26.54%
Madison	28089	280109	Canton, City Of	13189	10.41%
Madison	28089	280399	Flora, Town of	1886	1.49%
Madison	28089	280229	Madison, City Of	4237	3.34%
Warren	28149	280198	Warren County	11342	8.95%
Yazoo	28163	280199	Yazoo County	5411	4.27%
Yazoo	28163	280361	Bentonia, Town Of	440	0.35%
				126,723	100%

Source: U.S. Census Bureau, 2010a

¹ FIPS = Federal Information Processing Standard

² CID = Community Identification (Number)

³ Denotes estimated population of the community within the Lower Big Black Watershed

Table 12 lists the median and mean incomes in counties within the watershed. There is a large variation in household income across the watershed.

Table 12: Income Statistics in the Lower Big Black Watershed

County	Median Family Income (dollars)	Mean Family Income (dollars)
Claiborne	21,924	33,048
Hinds	39,290	55,527
Holmes	22,259	32,134
Madison	59,730	84,670
Warren	40,469	55,170
Yazoo	35,505	49,701

The percent of employment by industry in the Lower Big Black Watershed counties is listed in Table 13: Percentage of Employment in the Watershed by Industry. As can be seen, more than half of the working population in the watershed is employed in Hinds County. Most of the population is employed within the education and health care industry followed by retail services. These figures are estimates derived from whole county data, adjusted in accordance with the watershed population estimates in Table 11.

Table 13: Percentage of Employment in the Watershed by Industry

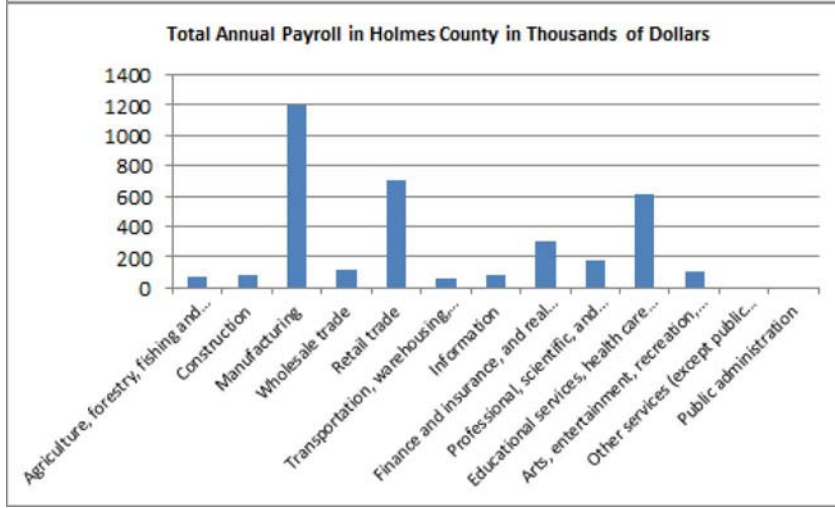
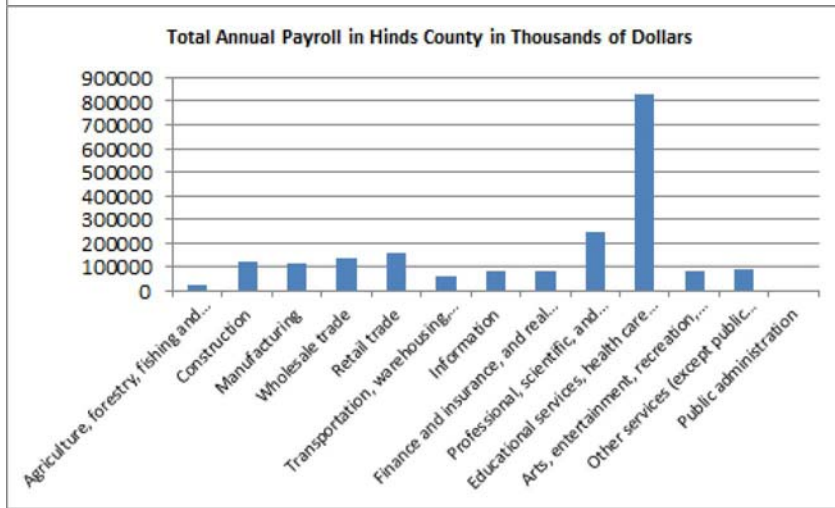
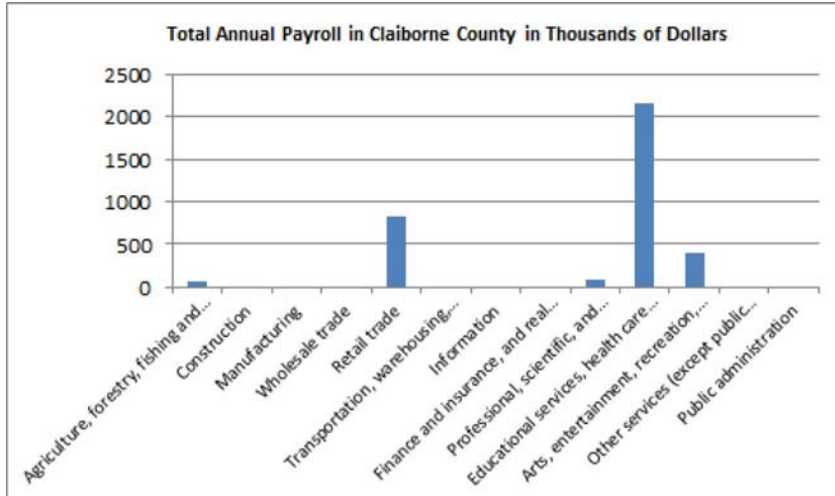
Industry Employment Groups	Claiborne County	Hinds County	Holmes County	Madison County	Warren County	Yazoo County	Combined All Counties
Agriculture, forestry, fishing and hunting, and mining	3.73%	0.95%	4.89%	1.25%	1.50%	5.56%	1.26%
Construction	4.54%	6.09%	6.64%	5.69%	10.05%	5.65%	6.16%
Manufacturing	15.80%	6.52%	25.34%	7.86%	10.52%	11.27%	7.45%
Wholesale trade	1.91%	2.44%	1.78%	3.44%	1.39%	4.10%	2.71%
Retail trade	9.11%	11.96%	11.46%	10.77%	10.27%	12.18%	11.51%
Transportation, warehousing, and utilities	9.59%	5.53%	4.65%	3.52%	7.05%	6.03%	5.10%
Information	1.02%	2.05%	0.83%	2.51%	1.48%	2.61%	2.15%
Finance and insurance, and real estate and rental and leasing	1.58%	5.68%	2.68%	8.94%	3.23%	2.99%	6.32%
Professional, scientific, and administrative and waste management services	3.11%	7.70%	2.00%	11.03%	8.26%	7.31%	8.59%

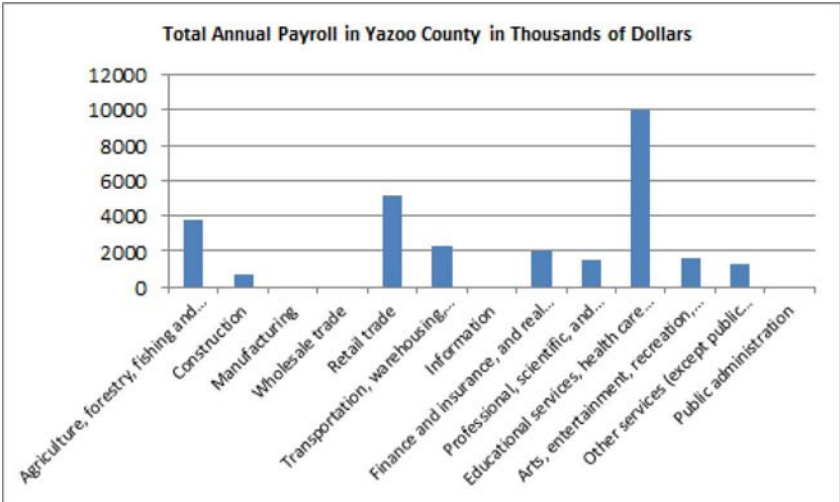
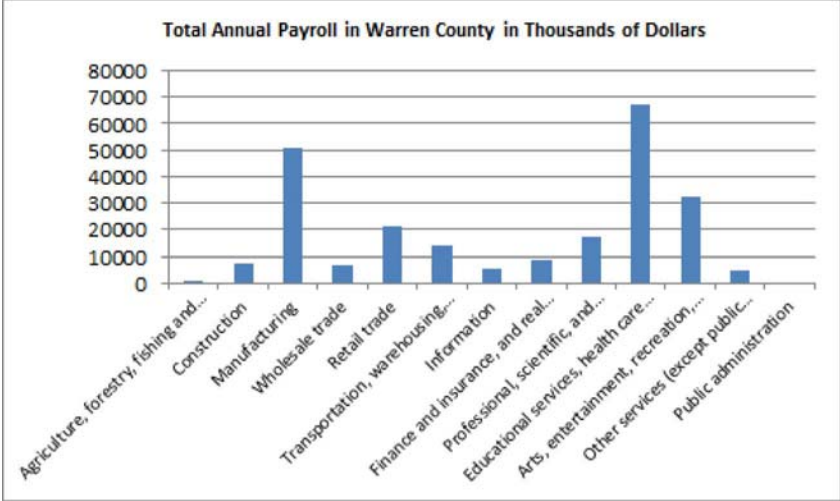
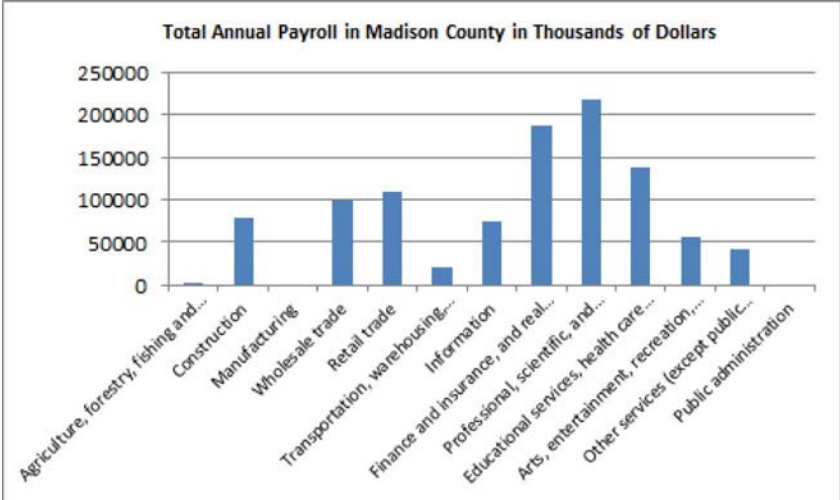
Table 13: Percentage of Employment in the Watershed by Industry

Industry Employment Groups	Claiborne County	Hinds County	Holmes County	Madison County	Warren County	Yazoo County	Combined All Counties
Educational services, health care and social assistance	33.54%	29.05%	24.41%	26.51%	21.32%	26.14%	27.85%
Arts, entertainment, recreation, and accommodation and food services	7.05%	9.17%	4.50%	7.63%	14.35%	5.29%	8.85%
Other services (except public administration)	3.97%	5.07%	4.42%	4.75%	4.60%	4.30%	4.91%
Public administration	5.05%	7.81%	6.39%	6.09%	5.98%	6.54%	7.14%
Grand Total	1.11%	61.58%	0.39%	28.16%	5.49%	3.27%	100%

Figure 3 lists the Industries in the Lower Big Black Watershed Counties contributing to the total annual payroll.

Figure 3: Total Annual Payroll in Lower Big Black Watershed by County





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 Lower Big Black 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.

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 Watershed except for the towns of Learned and Bentonia participate in the NFIP. Of these 10 participants, only the cities of Canton, Jackson, and Madison, along with Hinds County, are currently in the CRS Program. Jackson and Madison have obtained a CRS Class 8 rating. During the Discovery meeting, participation in the CRS and NFIP was encouraged and brochures with additional information on the CRS and NFIP were provided.

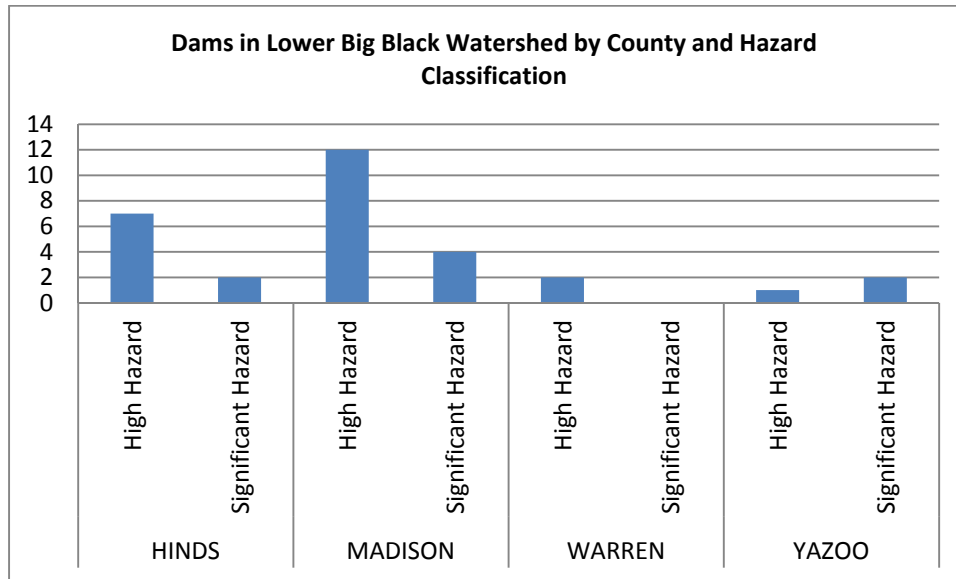
3.2.5 Levees/Dams

FEMA's Midterm Levee Inventory (MLI) project compiled a database of structures that are designed to provide at least the minimum level of protection from the base flood level (1-percent-annual-chance). As per the MLI Status Report, published in May 2010 (Reference: FEMA MLI Status Report), there are no levees located in this watershed that are designed, built, or maintained for providing protection from the base flood.

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 8 dams in the Lower Big Black Watershed classified as significant hazard, and 21 classified as high hazard. Of these high hazard dams, 6 show no Emergency Action Plan on file. 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 4: Dams in shows the distribution of significant and high hazard dams per county. Most of the dams are privately owned and built in conjunction with residential developments. Madison County has the most dams, and due to the rapid rate of development south of Canton, there are likely unpermitted dams that meet the high or significant hazard classification.

Figure 4: Dams in Lower Big Black Watershed



3.2.6 Stream Gages

The USGS National Water Information System Web Interface (<http://waterdata.usgs.gov/nwis/rt>) provides real-time data for select stream gage locations. Table 14 shows the gage identification number, location, and county. Fourteen historical stream gages are located within the Lower Big Black Watershed, however only 2 of these are currently active (listed in **bold** type). These stream gage locations are also shown on the Flood Risk Discovery Map (Appendix B). The latest USGS regression report gives flood frequency data for all of the listed sites, however some of the retired gage locations may be too outdated to be useful in supporting new hydrologic analyses. This would be especially likely in the developing areas of Madison County where the gage records do not reflect recent land development activities.

Table 14: Stream gages in the Lower Big Black Watershed

Gage ID	Period of Record	Gage Location	County	Latitude	Longitude
07289500	1937-1973	Big Black River at Pickens, MS	Holmes	32.881	-89.966
07289505	1960-1970	Big Cypress Creek near Vaughn, MS	Yazoo	32.883	-90.037
07289530	1948-1970	Doaks Creek near Canton, MS	Madison	32.732	-89.994
07289560	1948-1958	Bear Creek near Madison, MS	Madison	32.515	-90.084

Gage ID	Period of Record	Gage Location	County	Latitude	Longitude
07289600	1948-1988	Tilda Bogue near Canton, MS	Madison	32.655	-90.015
07289610	1953-1970	Bachelor Creek at Canton, MS	Madison	32.618	-90.035
07289640	1965-1977	Panther Creek near Flora, MS	Madison	32.608	-90.133
07289641	1964-1985	Panther Creek tributary near Flora, MS	Madison	32.608	-90.133
07289730	1929-present	Big Black River near Bentonia, MS	Madison	32.603	-90.364
07289850	1953-1970	Bogue Chitto near Flora, MS	Madison	32.501	-90.361
07290000	1936-present	Big Black River near Bovina, MS	Hinds	32.348	-90.697
07290005	1953-1988	Clear Creek near Bovina, MS	Warren	32.363	-90.728
07290110	1960-1969	Fleetwood Creek near Bolton, MS	Hinds	32.365	-90.465
07290115	1960-1970	Unnamed Creek near Bolton, MS	Hinds	32.368	-90.494

3.2.7 High Water Marks and Historic Flooding

A search for High Water Marks, including USGS websites, indicated that there is only one HWM available within the watershed. It is located within Transylvania County, NC. This High Water Mark was recorded after the Tropical Storm Frances event on Lake Toxaway.

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

3.2.7.1 *Claiborne County Historic flooding*

The Claiborne County FIS indicates that the greatest flood known to have occurred on the Mississippi River at Natchez were in February 1937 and May 1927. A more recent flood in May 2011 was on par with these older floods in terms of extreme peak stage on the Mississippi River. Because the Big Black River flows into the Mississippi just downstream of the watershed, it is susceptible to backwater effects of high stages on the Mississippi River. The Southwest Mississippi Hazard Mitigation Plan indicates that a major flood occurring on May 24, 1995 affected several counties, including Claiborne, but did not result in a federal disaster declaration. No other historical flood events that specifically affected the Lower Big Black portion of Claiborne County have been identified.

3.2.7.2 *Hinds County Historic flooding*

The Hinds County FIS does not identify any significant flooding events within the Lower Big Black watershed. Rather, the narrative focuses on the much more prevalent flooding in the Pearl River basin that has affected the County and City of Jackson during the late 1970's and early 1980's. The historical FIS report for the City of Clinton identifies extreme flooding on Bakers Creek, following 4.16 inch rainfall (over 5 hours) on June 1, 1967. Other major flood events cited are May 19, 1966 and April 29, 1953. The historical FIS report for the Town of Bolton states that an approximately 5% annual chance flood occurred on April 12-13, 1974, and that most damages to residential property occur along Bakers Creek and Stream 2. The Hazard Mitigation Plan for Hinds County lists several flash flood events that affected portions of the County. A few of the more severe events that may have affected the western portion of the County occurred on the following dates: April 6-7, 2003, August 15, 2005, September 25, 2005,

July 20, 2007, and February 22, 2008. Each of these events resulted in greater than \$100,000 in damage, according to National Weather Service records. Flash flooding can occur during practically any time of the year.

3.2.7.3 Holmes County Historic flooding

The Hinds County FIS report indicates that flood problems result from the overflow of the Big Black River in the eastern region of the County. Other noted flood problems are for areas of the county that lie outside the Lower Big Black watershed. The Holmes County Hazard Mitigation Plan does not list any past flood hazard events that specifically affected the Town of Pickens of southeast Holmes County, although it is likely that flash flooding has caused some minor damages there occasionally. In addition to the Big Black River, there are three small tributaries that flow through or near Pickens. The plan notes that 202 homes in Pickens are located in the Special Flood Hazard Area, and the area of town along the southern extension of Peace Street is particularly flood prone. Some relief has been achieved by installation of larger culverts in 2009, according to the plan.

3.2.7.4 Madison County Historic flooding

The Madison County FIS indicates that flood damages along the Big Black River are minimized due to the absence of development there. Rather, the development is occurring along streams such as Bear and Bachelor creeks and other tributaries. The National Weather Service lists 6 flash flood events since 1999 that resulted in estimated damages of \$50,000 or more. The most severe of these was April 6-7, 2003 when 7-12 inches of rain fell and numerous roads, businesses, apartments, and homes sustained significant flood damage. Canton and Gluckstadt are the areas most frequently referenced in the list of flood events.

USGS stream gage records indicate that the highest flood depth on the Big Black River near Bentonia occurred on May 23, 1983. The stage was 32.48, which is more than 10 feet above flood stage.

3.2.7.5 Warren County Historic flooding

The Warren County FIS indicates that areas are subject to both large-scale river flooding and localized, small-scale flash flooding. Most of the damaging river flooding is from the Mississippi and Yazoo rivers, which are outside this watershed. However, because the Big Black River flows into the Mississippi just downstream of the watershed, it is susceptible to backwater effects of high stages on the Mississippi River. The USGS gage at Bovina has recorded river stages exceeding bank-full more than 97 times since the gage was established in 1936. The highest stage of 40.8 feet was observed on May 24, 1983. The Hazard Mitigation Plan for Warren County lists 3 major flash flood events since 1999 that most likely affected the Lower Big Black portion of Warren County. The most costly of these was on September 25, 2005 when an estimated \$2,700,000 in property damage was incurred as a result of flash flooding across the County.

3.2.7.6 Yazoo County Historic flooding

The Yazoo County FIS does not describe any issues of flooding in the Lower Big Black Watershed, which makes up roughly the eastern two-thirds of the county. Rather it describes the widespread inundation that occurs due to backwater flooding of the Yazoo and Big Sunflower rivers, which flow through the western portion of the County, located in the Delta region of Mississippi. Typically, the streams that drain into the Big Black River are characterized by steeper slopes and narrower floodplains than those in the Delta Region. The Hazard Mitigation Plan for Yazoo County lists significant flood events since 1999 that affected Yazoo County. The most costly of these that likely affected the Lower Big Black portion of the County was on April 6-7, 2003 when an estimated \$10,000,000 in property damage was incurred as a result of flash flooding. This damage total may include properties outside Yazoo County, as this was a widespread flooding event from several rounds of thunderstorms.

3.2.8 Declared Disasters

The major disaster declarations for the areas within the Lower Big Black Watershed that included a flooding component are listed in Table 15. FEMA’s disaster declaration for Mississippi Disaster history can be viewed at:

<http://www.fema.gov/disaster/>

Table 15: Disaster Declarations in the Lower Big Black Watershed Counties

Date	Disaster Type	Affected County	Incident Begin Date	Incident End Date
1965	Hurricane	Claiborne	9/25/65	9/25/65
1973	Hurricane	Hinds, Madison	8/18/69	8/18/69
1973	Heavy Rain	Claiborne, Holmes, Warren, Yazoo	3/37/73	3/37/73
1976	Severe Storms	Madison	4/1/76	4/1/76
1979	Storms	All	4/16/79	4/16/79
1983	Severe Storms	Claiborne	4/16/83	4/16/83
1983	Severe Storms	All	6/1/83	6/1/83
1991	Flooding	Madison, Warren	12/19/90	1/14/91
1991	Flooding	All except Hinds	4/26/91	5/31/91
1997	Flooding	Warren	2/28/97	4/21/97
2001	Severe Storms	Holmes	4/3/01	4/5/01
2003	Severe Storms	All	4/6/03	4/25/03
2004	Hurricane	Claiborne, Hinds, Warren	9/13/04	9/20/04
2005	Hurricane	Hinds, Madison	7/10/05	7/15/05
2005	Hurricane	All	8/29/05	10/14/05
2008	Severe Storms	Warren	3/20/08	5/19/08
2008	Hurricane	Claiborne	8/28/08	9/8/08
2010	Severe Storms	Holmes	4/23/10	4/24/10
2011	Severe Storms	Hinds, Holmes	4/15/11	4/28/11
2011	Flooding	Claiborne, Warren, Yazoo	5/3/11	6/17/11
2012	Hurricane	All	8/26/12	9/11/12

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 16: CAVs Performed within the Watershed lists the most recent CAVs performed within the Watershed.

Only one CAV report revealed serious programmatic issues, in which development in the SFHA was not being permitted. Most reported either one minor issue or no issues, indicating a high level of compliance. A CAV for Town of Pickens has not been recovered, and Utica joined the NFIP too recently to have a CAV yet completed.

Table 16: CAVs Performed within the Watershed

Community	Reviewer	CAV Date	Notes
Bolton	MEMA	12/13/2001	Updated CAV scheduled for 2013
Canton	MEMA	7/21/2010	No issues
Claiborne County	MEMA	5/4/2011	Serious issues identified, corrective action underway
Clinton	MEMA	8/18/2010	Minor issues identified
Edwards	MEMA	1/29/2008	No issues
Flora	MEMA	9/1/2010	Minor issue identified
Hinds County	MEMA	8/24/2010	No issues
Holmes County	MEMA	4/18/2011	Minor issue identified
Jackson	MEMA	4/13-14/2010	Minor issues identified
Madison County	MEMA	5/5/2010	No issues
Madison (City of)	MEMA	5/9/2010	No issues
Raymond	MEMA	1/31/2008	Minor issues identified
Warren County	MEMA	1/17-18/2009	Minor issues identified
Yazoo County	MEMA	6/24/2009	Minor issue identified

3.2.10 Effective Regulatory Mapping and LOMC

All counties in the Lower Big Black watershed have effective, modernized FIRMs and FIS. Digital databases are readily available for all of the counties within the Watershed. A Physical Map Revision is currently underway in Warren County. Most of the panels that cover the Lower

Big Black portion of the county are being updated. This revision is currently scheduled to go effective in June, 2013. The effective dates for the current FIRMs for these communities are listed in Table 17.

Table 17: Effective FIRM/FIS Reports for Non-Coastal Communities

County	Community Name	Product Types	FIRM Effective Date
Claiborne County	All Jurisdictions	FIS & FIRM	4/19/2010
Hinds County	All Jurisdictions	FIS & FIRM	11/18/2009
Holmes County	All Jurisdictions	FIS & FIRM	1/18/2012
Madison County	All Jurisdictions	FIS & FIRM	3/17/2010
Warren County	All Jurisdictions	FIS & FIRM	11/5/2008
Yazoo County	All Jurisdictions	FIS & FIRM	2/16/2012

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 18 lists the number of LOMCs in each county 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 18: Letters of Map Change Identified in the Watershed

County	Community Name	LOMC Type	Number of Cases
Hinds	Hinds County	LOMA	10
Hinds	Clinton, City Of	All	27
Hinds	Jackson, City Of	LOMA	1
Madison	Madison County	All	32
Madison	Canton, City of	All	15
Madison	Madison, City of	LOMA, LOMR-F	5
Warren	Warren County	LOMA	10
Yazoo	Yazoo 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 assumed 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 19: NFIP Statistics in the Lower Big Black Watershed lists the details of the number of flood policies, total coverage amount and the total cost of repetitive losses within the Lower Big Black 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 19: NFIP Statistics in the Lower Big Black Watershed

Name of Community	CID	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Loss Properties
Bentonia, Town of	280361	N	-	-	-	-
Bolton, Town of	280216	Y	INA	INA	INA	INA
Canton, City of	280109	Y	171	\$19,248,400	\$2,397,704	53
Claiborne County	280201	Y	45	\$1,745,000	\$3,297,853	0
Clinton, City of	280071	Y	97	\$17,753,000	\$225,509	3
Edwards, Town of	280330	Y	1	\$175,000	\$0	0
Flora, Town of	280399	Y	6	\$777,000	\$0	0
Hinds County	280070	Y	420	\$73,838,900	\$1,495,144	5
Holmes County	280211	Y	51	\$9,172,300	\$265,594	3
Jackson, City of	280072	Y	4409	\$699,132,300	\$206,659	4
Learned, Town of	280315	N	-	-	-	-
Madison County	280228	Y	374	\$92,052,600	\$1,641,833	2
Madison, City of	280229	Y	224	\$55,284,300	\$418,442	2
Pickens, Town of	280077	Y	INA	INA	INA	1
Raymond, Town of	280320	Y	4	\$910,000	\$0	0
Utica, Town of	285263	Y	0	\$0	\$0	0
Warren County	280198	Y	320	\$39,700,600	\$15,513,991	5
Yazoo County	280199	Y	213	\$30,224,900	\$870,916	1

3.2.13 Comprehensive Plans

All Counties in the watershed have county-wide comprehensive plans. As per Mississippi law, each county is required to create and update Comprehensive Plans for its communities periodically. Based on Section 17 of the Mississippi Code, the comprehensive plan must, at a minimum, address: 1. Goals and objectives for the long-range (20-25 year) development of the county; 2. A land use plan which designates the proposed general distribution and extent of the uses of land; 3. A transportation plan depicting the proposed functional classifications for all existing and proposed streets and roads; and 4. A community facilities plan for capital improvements of housing, schools, parks and recreation, public buildings, utilities and drainage.

Items affecting the county floodplain management in South Carolina counties are identified below:

Claiborne County: The County’s Comprehensive Plan is dated January, 2010. Although the plan does not identify floodplain management objectives explicitly, it does acknowledge the existence of over 64,000 acres of SHFA throughout the County and where these areas are generally located. The goals stated in the plan include potential use of floodplain areas for recreational use. The plan also recommends upgrade of aging stormwater drainage infrastructure, particularly in City of Port Gibson.

Hinds County: The County’s Comprehensive Plan is dated 2002. There is a thorough discussion of drainage and stormwater management issues in the Drainage Element section, beginning on page 146. Flash flooding was identified as a growing problem in unincorporated

areas of the county, where no municipal codes or regulation may have been able to mitigate in increased imperviousness. Although most of the areas identified were outside the Lower Big Black basin, Fourteen Mile Creek, which drains the Raymond area, is one tributary that was noted as having experienced some of this unmitigated growth, and as a result is experiencing intensified flash flooding problems. The plan makes recommendations implementing regional stormwater management in Big Creek and other priority basins.

Holmes County: The County Comprehensive Plan was not readily available for review. According to Steve Russell of the North Central Mississippi Planning and Development District, Holmes County does not have a currently adopted Comprehensive Plan, but they are hoping to develop one soon.

Madison County: The County's Comprehensive Plan is dated March, 2012. An explicit goal of the plan is "to reduce flooding in Madison County within all floodplains designated by FEMA." This objective is to be met with the following policies:

Policy 40—To examine closely the drainage for all proposed new higher density developments prior to approval, because they tend to create drainage problems

Policy 41—To require developers to construct storm water retention/detention basins in all new developments of 5 acres or more.

Policy 42—To require developers to elevate all structures within floodplains to at least one foot above the level of FEMA-designated 100-year floods.

The Plan also recommends considering use of floodplain areas for recreational purposes and open space.

Warren County: The County Comprehensive Plan was not readily available for review. According to Mike Monk of the Central Mississippi Planning and Development District, Warren County does not have a currently adopted Comprehensive Plan.

Yazoo County: The County Comprehensive Plan was not readily available for review. According to Mike Monk of the Central Mississippi Planning and Development District, Yazoo County does not have a currently adopted Comprehensive Plan.

4 Risk MAP Products for the Lower Big Black 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.

4.1 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

4.1.1 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.

4.1.2 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.

4.1.3 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.

4.1.4 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 December 13, 2012 at the Mississippi Department of Environmental Quality, 700 North State Street, Jackson, Mississippi. 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 21 people were in attendance at the meeting, including representatives of Madison, Claiborne, Hinds, Warren and Yazoo Counties, the Cities of Canton, Madison, and the Town of Flora. Additional partners and stakeholders were also in attendance and 10 people participated remotely via the webinar. 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
- Project Charters
- Draft Project Charters
- Community Provided Responses to Questionnaires

Appendix B: Discovery Meeting

- Flood Risk
- Mapping Needs
- Potential Loss
- Discovery Meeting Presentation
- Meeting Minutes
- Sign-in Sheets
- Invitation Letters

Appendix C: Panel Scheme

- Lower Big Black Watershed Paneling Scheme

Appendix D: CNMS Analysis

- CNMS Summary Spreadsheet
- Scoping Streams Shapefiles

Appendix E: Collected Discovery Data

- Hazard Mitigation Plans
- Grant Information
- GIS
 - AAL
 - Boundaries
 - Census
 - Dams & Levees
 - Gages
 - HWMs
 - Insurance Policy Info
 - LOMC
 - Repetitive loss
- CAV
- Declared Disasters
- CRS