Discovery Report

Upper Yazoo, 08030602

Carroll, Holmes, Humphreys, Leflore, Sunflower, and Yazoo Counties

City of Belzoni, Town of Cruger, Village of Eden, City of Greenwood, City of Itta Bena, City of Lexington, Town of Morgan City, Village of Satartia, Town of Sidon, Town of Silver City, Town of Tchula, City of Yazoo City

Mississippi

Report Number 01

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FEMA

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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 Upper Yazoo 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 Upper Yazoo Watershed (HUC # 08060206) 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 18, 2013, 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:

- Kristen Martinenza, 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
- Cathy Strickland, Region IV HMA Representative, FEMA Region IV, HMA Specialist for Mississippi
- Cynthia Bailey, Region IV HMA Representative, FEMA Region IV, Mitigation Plans for Mississippi

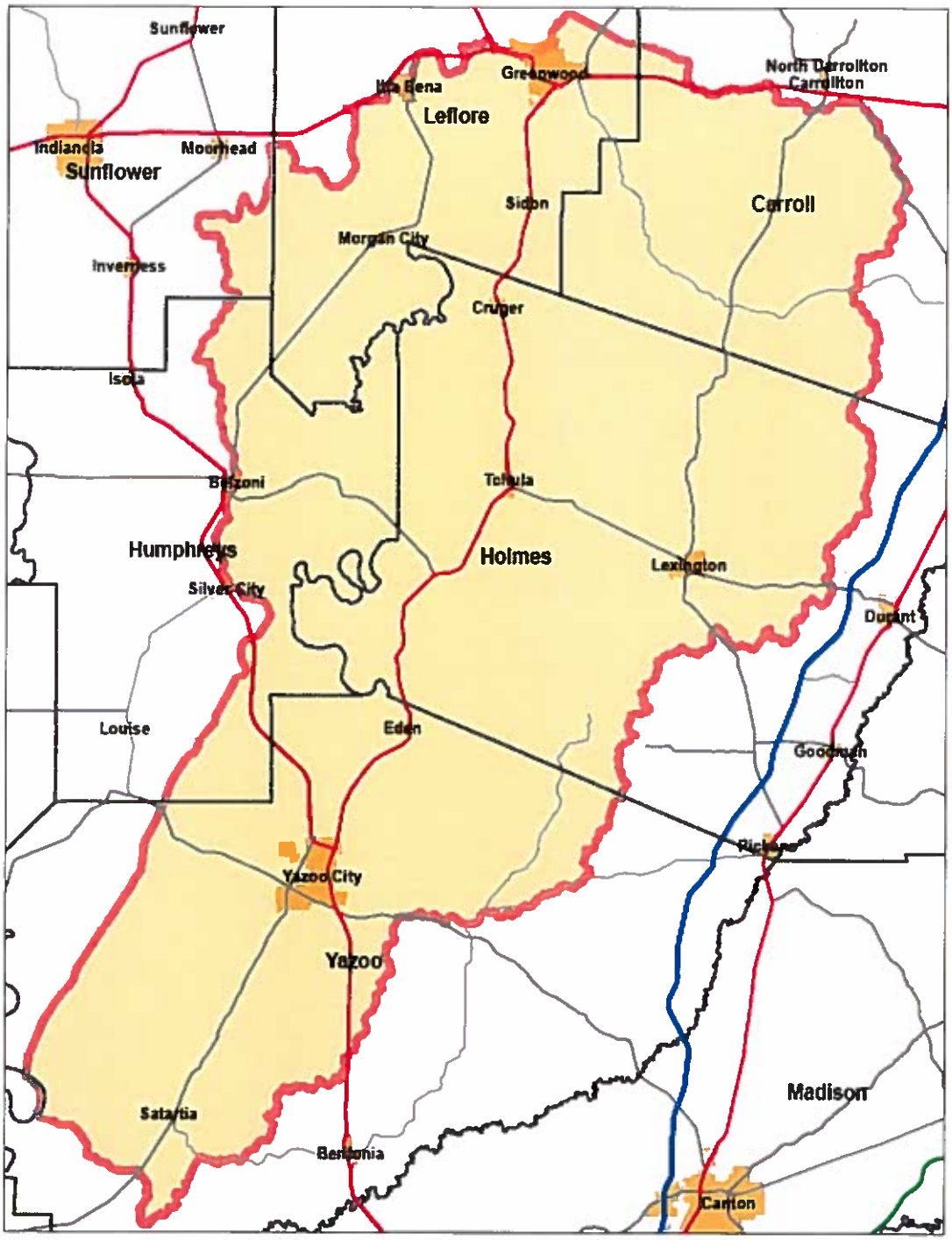
- Richard S. Flood, Region IV HMA Representative, FEMA Region IV, HMA Program Lead
- Stacey Ricks, Mississippi NFIP Coordinator, MEMA Floodplain Management Bureau
- Jana Henderson, Mississippi Hazard Mitigation Officer, MEMA Office of Mitigation
- Steve Champlin, Mississippi CTP PM, Project Manager for the Lower Big Black study
- Nathan Shields, TetraTech, 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 Upper Yazoo Watershed is located in west-central Mississippi. The watershed is approximately 68 miles long and about 38 miles wide and is aligned in a northeast to southwest orientation. About half of the watershed falls within the Loess Bluff physiographic region, while the remainder fall within the Delta region. The watershed contains parts of 6 counties: Carroll, Holmes, Humphreys, Leflore, Sunflower and Yazoo.

The Yazoo River is formed by the confluence of the Tallahatchie and Yalobusha rivers in Greenwood. The river was named by French explorer La Salle as "Riveiere des Yazous" in reference to the Yazoo tribe living in the area. The Yazoo River receives drainage from a total of 5 upstream HUC-8 basins. The river flows north to south through the Upper Yazoo watershed, and most of this course is confined by levees to reduce overbank flooding. The river channel forms a portion of the boundaries between Holmes, Humphreys, and Leflore counties. Some of the larger tributaries of the Yazoo River, aside from the two noted above, include Black Creek, Pelucia Creek, Fannegusha Creek, Abiaca Creek, and Chicopa Creek.

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

Figure 1: Watershed Location



All of the communities in the Upper Yazoo 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
Belzoni, City of	Eastern portion	DFIRM	March 15, 2012
Carroll County	Southwestern portion	FIRM	July 3, 1978
Cruger, Town of	all	DFIRM	January 18, 2012
Eden, Village of	all	DFIRM	February 16, 2012
Greenwood, City of	Southern portion	DFIRM	May 16, 2012
Holmes County	Western portion	DFIRM	January 18, 2012
Humphreys County	Eastern portion	DFIRM	March 15, 2012
Itta Bena, City of	Southern portion	DFIRM	May 16, 2012
Leflore County	Southern portion	DFIRM	May 16, 2012
Lexington, City of	all	DFIRM	January 18, 2012
Morgan City, Town of	all	DFIRM	May 16, 2012
Satartia, Village of	all	DFIRM	February 16, 2012
Sidon, Town of	all	DFIRM	May 16, 2012
Silver City, Town of	Eastern portion	DFIRM	March 15, 2012
Sunflower County	Southeastern portion	DFIRM	January 18, 2012
Tchula, Town of	all	DFIRM	January 18, 2012
Yazoo City, City of	all	DFIRM	February 16, 2012
Yazoo County	Western portion	DFIRM	February 16, 2012

Areal distribution of the communities within the Upper Yazoo 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
Belzoni, City of	280080	0.42	0.03%	-16%	No plan	Y	49	$26,533,800	$655,893	5
Carroll County	280191	240	14.33%	-1.6%	Yes	Y	No data	No data	No data	No data
Cruger, Town of	280313	0.96	0.06%	-14%	Yes	Y	1	$63,000	$0.00	0
Eden, Village of	280188	0.47	0.03%	-18.25%	Yes	Y	No data	No data	No data	No data
Greenwood, City of	280102	10.84	0.65%	-17.5%	Yes	Y	337	$56,014,500	$335,019	1
Holmes County	280211	549.17	32.79%	-11.2%	Yes	Y	51	$9,172,300	$265,594	3
Humphreys County	280192	168.58	10.06%	-16.3%	Yes	Y	155	$17,497,500	$1,333,1 061	25
Itta Bena, City of	280103	0.74	0.04%	-7.2%	Yes	Y	12	$1,417,200	$50,241	0
Leflore County	280101	228.71	13.65%	-14.8%	Yes	Y	913	No data	$68,083, 600	4
Lexington, City of	280076	2.43	0.15%	-14.5%	Yes	Y	31	$5,909,800	$747,860	5
Morgan City, Town of	280101	0.59	0.04%	-16.4%	No plan	Y	0	No data	$1,859	0
Satartia, Village of	280205	0.14	0.01%	-19.1%	Yes	Y	1	$140,000	0	0
Sidon, Town of	280106	0.12	0.01%	-24.25%	Yes	Y	24	$1,141,700	$1,798	0
Silver City, Town of	280323	0.12	0.01%	0.0%	Yes	N	-	-	-	-

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
Sunflower County	280195	16	0.96%	-14.3%	Yes	Y	112	$21,105,600	$129,648	3
Tchula, Town of	280078	1.44	0.09%	-10.1%	Yes	Y	14	No data	$91,069	2
Yazoo City, City of	280199	10.00	0.60%	-21.6%	Yes	Y	305	$32,026,800	$984,241	10
Yazoo County	280199	444.39	26.53%	-0.3%	Yes	Y	213	$30,224,900	$870,916	5

Meetings and 44 CFR Part 66 Compliance:

Initial contact with the communities began in October 2013. 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 December 3, 2013 from 1:30 – 3:30 pm at the Senior Citizens Building, 507 Howard Street, Greenwood, 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 20 people were in attendance at the meeting, including representatives of Yazoo City, Sunflower County, Satartia, Leflore County, and Itta Bena. Additional partners and stakeholders were also in attendance and FEMA staff 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. 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.

Risk MAP Program Measures: (Remove from Community Version)

Verbal commitments to reduce flood risk were not made by any communities at the Discovery Meeting.

1. Signed Charters:

Charters were not distributed to the communities at the meeting. These will be included with copies of the Discovery report that are sent to communities for their review. Draft Project Charters are included in Appendix A.

2. Action Measures

    a. Identified Areas of Mitigation Interest

Identified areas of mitigation interest are new strategies or improved current planned mitigation actions. Through collaboration between Risk MAP project teams and communities, previously identified actions (from Hazard Mitigation Plans (HMP)) are improved or new strategies are developed "on the spot." The following table contains information on specific hazard mitigation activities. Each of these reports speaks to Areas of Mitigation Interest in varying degrees of specificity and are summarized in the following table.

Community / HMP Title	Identified Areas of Mitigation Interest
Carroll County Multi-Jurisdictional Hazard Mitigation Plan – Includes hazard mitigation plans for Carroll County and all incorporated areas.	Section 2, Subsection V. Individual Hazard Mitigation Plans—lists public education and outreach explaining NFIP, flood loss mitigation techniques and strategies targeting property owners in flood prone areas and in dam break inundation areas.
Holmes County Multi-Jurisdictional Hazard Mitigation Plan – Includes hazard mitigation plans for Holmes County and all incorporated areas.	Section 2, Subsection V. Individual Hazard Mitigation Plans—lists public education and outreach explaining NFIP, flood loss mitigation techniques and strategies targeting property owners in flood prone areas.
South Delta Regional Hazard Mitigation Plan -- Includes hazard mitigation planning for Humphreys County, Belzoni and Silver City.	Section C lists public education and outreach explaining NFIP, strict enforcement of flood damage prevention ordinance (not applicable to Silver City), conservation easements, adoption of building codes, repetitive loss buy-outs, maintenance/upgrade of drainage infrastructure, and development of a comprehensive drainage plan as feasible mitigation actions.
South Delta Regional Hazard Mitigation Plan -- Includes hazard mitigation planning for Sunflower County.	Section C lists public education and outreach explaining NFIP, strict enforcement of flood damage prevention ordinance, conservation easements, adoption of building codes, repetitive loss buy-outs, maintenance/upgrade of drainage infrastructure, and development of a comprehensive drainage plan as feasible mitigation actions.
LeFlore County Multi-Jurisdictional Hazard Mitigation Plan – Includes hazard mitigation plans for LeFlore County, Greenwood, Itta Bena, Morgan City, and Sidon.	Section 2, Subsection A. Individual Hazard Mitigation Plans (Leflore County)—lists public education and outreach explaining NFIP, flood loss mitigation techniques and strategies targeting property owners in flood prone areas, conduct assessments for buy-out program, and maintain or upgrade drainage infrastructure. Section 2, Subsection A. Individual Hazard Mitigation Plans (Greenwood)—lists drainage improvements, secure grant to replace stormwater pumps (especially 3 on Lee Street), and public education and outreach explaining NFIP, flood loss mitigation techniques and strategies targeting property owners in flood prone areas. Section 2, Subsection A. Individual Hazard

Community / HMP Title	Identified Areas of Mitigation Interest
	Mitigation Plans (Itta Bena)—lists public education and outreach explaining NFIP, flood loss mitigation techniques and strategies targeting property owners in flood prone areas, conduct assessments for buy-out program, and maintain or upgrade drainage infrastructure. Section 2, Subsection A. Individual Hazard Mitigation Plans (Morgan City)—lists public education and outreach explaining NFIP, flood loss mitigation techniques and strategies targeting property owners in flood prone areas, and conduct assessments for buy-out program.
Yazoo County Multi-Jurisdictional Hazard Mitigation Plan – Includes hazard mitigation plans for Yazoo County, Satartia and Yazoo City (Eden not included).	Section 6. Mitigation Strategy—lists continued NFIP participation, strengthening of development requirements in flood prone areas, assistance with buy-outs, and drainage engineering as mitigation actions for the Yazoo City. For Yazoo County and Satartia, all of the above actions except drainage engineering are recommended mitigation actions.

These plans generally do not identify site-specific ideas or strategies to address flood hazards. They advise communities to continue NFIP participation, look to strengthen development requirements, etc. The only exception is the City of Greenwood, which specifically calls for securing funds for stormwater pumps, especially on Lee Street. The Study team needs to follow-up with the City to determine the status of this activity to see if it can be advanced.

During the community engagement phase, communities were asked to complete questionnaires regarding possible flood mitigation activities. The responses to these questionnaires are summarized in the Table below:

Community	Identified Areas of Mitigation Interest
City of Belzoni	I. Drainage System Evaluation (storm drains clogged at various locations). II. Castle Main Street and Price Street Pumping Stations
Yazoo County	I. Education and Outreach II. Drainage System Evaluation (various locations) III. Re-evaluate NFIP/floodplain record-keeping
Yazoo City	I. Willis Creek Area recently cleaned out. II. Flooding problems at 3 locations (4th location is being addressed by private developer)
Village of Satartia	I. Leaking flood gage during 2011 backwater flood.
City of Itta Bena	I. Drainage System Evaluation at 3 locations

Community	Identified Areas of Mitigation Interest
	II. Repetitive loss mitigation

Approximately five dams in the watershed with risk classification of high, and which had no Emergency Action Plan on file, were identified as Areas of Mitigation Interest for the Discovery meeting. In addition, general locations of repetitive loss properties outside the FEMA Special Flood Hazard area were highlighted as potential Areas of Mitigation Interest.

3. Risk Awareness

Increasing the local communities' awareness of flood risks was discussed during the Discovery meeting. The meeting minutes in Appendix A discusses this issue.

4. New, Verified, or Updated, Engineering (NVUE)

Table 3 below lists the existing (effective) NVUE compliance mileage for the Upper Yazoo Watershed and the expected NVUE compliance mileage after this study is complete. As part of the discovery process, all stream miles have been assessed and categorized as *Verified* or *Unverified*.

Table 3: NVUE Compliance for Upper Yazoo Watershed

	Zone AE			Zone A		
	Verified	Unverified	Unknown	Verified	Unverified	Unknown
Effective Stream Mileage	104.4	10.0	0	2.8	1494.5	0
Stream Mileage to Remain Unchanged by This Study	91.3	0	0	2.8	1491.8	0
Mileage that is Updated by This Study	0	10.0	0	0	3.7	0
Mileage that is Redelineated by This Study	13.1	0	0	0	0	0
Mileage That is Added by This Study (New or Leveraged) [1]	3.7	0	0	3.6	0	0
Total Stream Mileage After Current Study	118.1	0	0	6.4	1491.8	0

[1] 3.7 miles of detail study on current Zone A and 3.6 miles of Zone A on current unstudied stream to address discontinuity at county boundary.

5. Floodplain Boundary Standards

In general, the population density of the Upper Yazoo Watershed is relatively low. Population is concentrated in municipalities, especially the cities of Greenwood, Yazoo City, Belzoni, and Lexington. Based on the current plan of work, the Risk Class for this study will vary between A and C. More specifically, Black Creek and Canal No. 1 are likely classified as A, Piney Creek as B, and Yazoo River and Abiaca Creek as C, based on the current state of development. Table 4: National Metrics shows that all of the stream miles within the watershed currently meet floodplain boundary standards (FBS) and will continue to do so in the proposed study.

The current stream mileage that meets FBS in the Upper Yazoo watershed is 1617.8 miles. This study is anticipated to include 3.6 miles of new riverine study. Therefore, the total stream mileage within the Upper Yazoo watershed meeting FBS at the conclusion of this project is expected to be 1620.9 miles.

Table 4: National Metrics

ITEM	DESCRIPTION	VALUE
Floodplain Boundary Standard	Estimated number of stream miles that will meet FBS for the new Flood Insurance Study (FIS)	1620.9 Miles
Updated Effective Studies, New, Verified, or Updated Engineering (NVUE)	Estimated number of miles that will meet NVUE requirements for the new FIS	124.5 Miles
Area (based on average estimated floodplain width of 0.65 miles)	Area in square miles being mapped with new FIS	21.3 Sq. Miles
Population (Based on watershed population density)	Population being mapped with new FIS	620

1.2 Project Summary

The Coordinated Needs Management Strategy (CNMS) analysis revealed a small number of detailed study streams within the watershed that are non-NVUE compliant. These are Canal No. 1 in the City of Greenville (C6), Black Creek in the City of Lexington (C2), and Piney Creek just north of the City of Yazoo City (C4). A large portion of the Yazoo River between Belzoni and Greenwood was previously believed to be non-NVUE compliant, but upon further examination, this was found to be an error.

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. Two reaches of Zone A study are proposed for this project. The first is a section of the Yazoo River that exists between two detailed study reaches. The other is Abiaca Creek, currently unstudied in Holmes County which flows in from Carroll County with an associated Zone A. Finally, a portion of the Yazoo River is proposed to be redelineated because the current Zone AE/Zone A boundary does not coincide with the levee centerline in Leflore County. The Discovery Map titled "Mapping Needs: Upper

Yazoo Watershed", within Appendix B, identifies those stream reaches that are either NVUE compliant, need to be assessed, or are to be studied.

Table 5: List of Study Streams shows which streams have been identified for further study and to what detail the streams will be studied.

Table 5: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
Abiaca Creek	X	From about 0.9 miles downstream of the Canadian National Railroad to the Carroll-Leflore county line	3.6	New Approximate	Completing a study gap between Carroll and Leflore Counties
Black Creek	AE	From about 0.32 miles downstream of the of the Lexington city limits to about 1.99 miles upstream of the Lexington city limits	5.4	Updated Detailed	Unverified per CNMS validation
Canal No. 1	AE	From confluence with Yazoo River to County Road 339	1.1	Updated Detailed	Unverified per CNMS validation
Piney Creek	AE	From confluence with Yazoo River to about 0.29 miles upstream of U.S. Highway 49E.	3.5	Updated Detailed	Unverified per CNMS validation
Yazoo River	AE	From the Holmes-Humphreys county line to about of Highway 43 to about 6.11 miles upstream of the Holmes-Humphreys county line	6.1	Redelineation	Zone A/AE interface does not coincide with levee centerline. LiDAR topo available.
Yazoo River	AE	From about 9.33 miles downstream of the Holmes-Humphreys county line to the Holmes-Humphreys county line	9.3	Redelineation	Zone A/AE interface does not coincide with levee centerline. LiDAR topo available.
Yazoo River	A	From about 6.32 miles upstream of State Highway 12 to about 10.00 miles upstream of State Highway 12	3.7	New Detailed	Upgrade a short reach of Zone A sandwiched between 2 Zone AE reaches

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

Table 6: 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	111.6	0.0	1506.2		

Updated Effective Studies	13.7	0.0	0.0	15.4	0.0
New Studies Identified	0.0	0.0	3.6		

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 7: Proposed FIRM Panel updates

County	Effective FIS Date	Firm Panels	Panel Scale	Number of Updated Panels
Holmes	**January 18, 2012**	28051C0050E	24000	**6**
		28051C0053E	6000	
		28051C0055E	12000	
		28051C0377E	6000	
		28051C0381E	6000	
		28051C0385E	12000	
Humphreys	**March 15, 2012**	28053C0075D	24000	**4**
		28053C0100D	24000	
		28053C0175D	24000	
		28053C0200D	24000	
Leflore	**May 16, 2012**	28083C0241D	6000	**7**
		28083C0243D	6000	
		28083C0400D	24000	
		28083C0405D	12000	
		28083C0425D	24000	
		28083C0475D	24000	
		28083C0500D	24000	
Yazoo	**February 16, 2012**	28163C0119C	6000	**2**
		28163C0120C	12000	

Several counties in central Mississippi and State have entered into a joint agreement for orthophoto acquisition and processing. Two counties, Carroll and Humphreys, are part of the 2014 leaf-off acquisition project and Yazoo county is part of the 2013 acquisition project. Although deliverable specifications will vary from count 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 8.

Table 8: 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 Upper Yazoo Watershed is distributed between 18 autonomous jurisdictions. Many of these jurisdictions have only a portion of their geographic extents within the watershed. Only the cities of Lexington and Yazoo City, the towns of Cruger, Morgan City, Sidon, and Tchula, and the villages of Eden and Satartia are wholly contained within the watershed. Most of the population in the watershed resides in Greenwood and Yazoo City. 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 Upper Yazoo 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 Carroll, Holmes, Humphreys, Leflore, Sunflower 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 9. 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 9: Communities in the Upper Yazoo Watershed

County	Community	Municipality Type
Carroll	Carroll County	County
Holmes	Holmes County	County
Holmes	Cruger	Town
Holmes	Lexington	City
Holmes	Tchula	Town
Humphreys	Humphreys County	County
Humphreys	Belzoni	Town
Humphreys	Silver City	Town
Leflore	Leflore County	County
Leflore	Greenwood	City

County	Community	Municipality Type
Leflore	Itta Bena	City
Leflore	Morgan City	Town
Leflore	Sidon	Town
Sunflower	Sunflower County	County
Yazoo	Yazoo County	County
Yazoo	Eden	Village
Yazoo	Satartia	Village
Yazoo	Yazoo City	City

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 Upper Yazoo 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 (MARIS) data collections.

3.1.2 Topographic Data

Light Detection and Ranging (LiDAR) elevation data is currently available for approximately western two-thirds of the Upper Yazoo watershed. The LiDAR was acquired by Aeroquest under contract to USACE—Vicksburg District during the 2009-10 flying season. This data is made available by the Mississippi Digital Earth Model—Geospatial Clearinghouse. The accuracy reported for the DEM product is 0.365 feet for open terrain and 0.431 feet for vegetated terrain, tested at 95 percent confidence level. The horizontal error tolerance, based on the LiDAR sensor and flight height, is 1.64 feet. The data was captured at average 1-meter post spacing.

LiDAR coverage for the southeastern portion of the Upper Yazoo watershed is provided by the Madison-Yazoo project, funded by FEMA in Fiscal Year 2012. The LiDAR was acquired by Furgo-Earthdata under contract to MDEQ during the 2012-13 flying season. This data is made available by the Mississippi Digital Earth Model—Geospatial Clearinghouse. The fundamental vertical accuracy reported for the DEM product is 0.256 feet for all land cover types, tested at 95 percent confidence level. The data was captured at average 1-meter post spacing.

LiDAR data for the northeastern portion of the watershed has been collected and is currently being processed under management of the U.S. Geological Survey. These data products should be delivered soon and are expected to be available for data development tasks that may result from this project. The data was captured at 0.7-meter post spacing.

The LiDAR coverage for the Upper Yazoo watershed is depicted in Figure 3.

3.1.3 Average Annualized Loss (AAL) / HAZUS

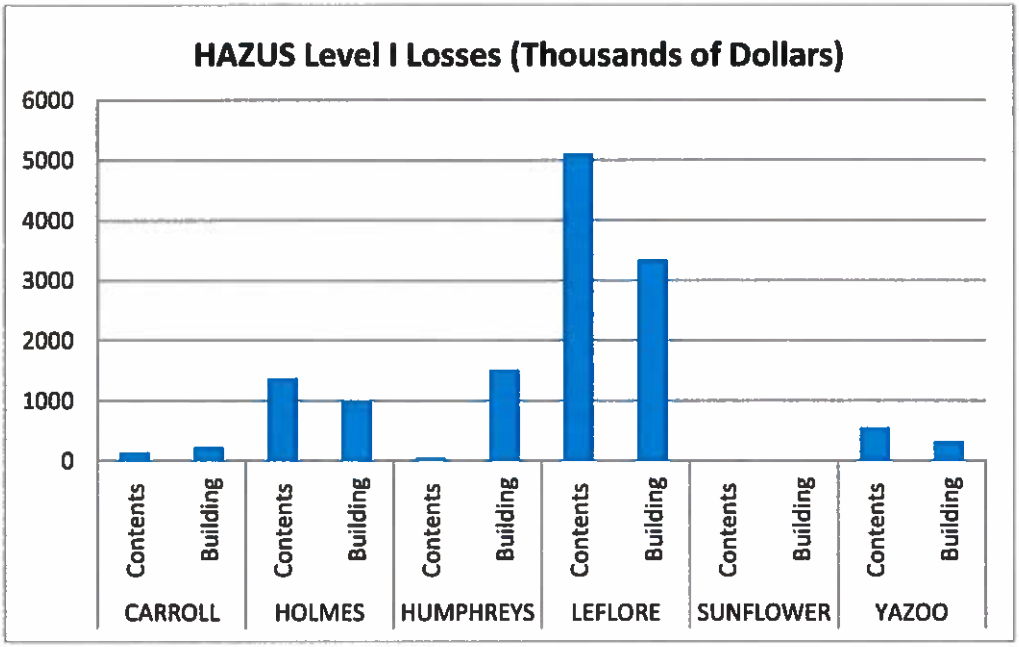
The Hazards U.S. Multi-Hazard (Hazus-MH) tool was used to develop Level I AAL data collected for this Watershed. Hazus-MH is a nationally applicable standardized risk assessment methodology that helps estimate and analyze potential losses from earthquakes, hurricane winds, and floods. Level 1 uses the default data that is embedded in Hazus-MH and does a basic analysis. For a basic flood risk assessment, the tool basically 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 2 shows the distribution of AAL losses within the Upper Yazoo 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 2: HAZUS Level I AAL Losses in Upper Yazoo 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 10: GIS Data Layers Available summarizes the GIS information collected. With regard to the Hydrography listed, at this writing there is high-resolution waterlines/waterbodies data collection planned for the Upper Yazoo watershed that subsequent Risk MAP data development activities may be able to capitalize on, depending on project schedules. Figure 3 also displays recent county orthoimagery collections, coordinated at the State level, that can be used to support data development. Yazoo, Humphreys, and Carroll counties have flown imagery within the last 2 years.

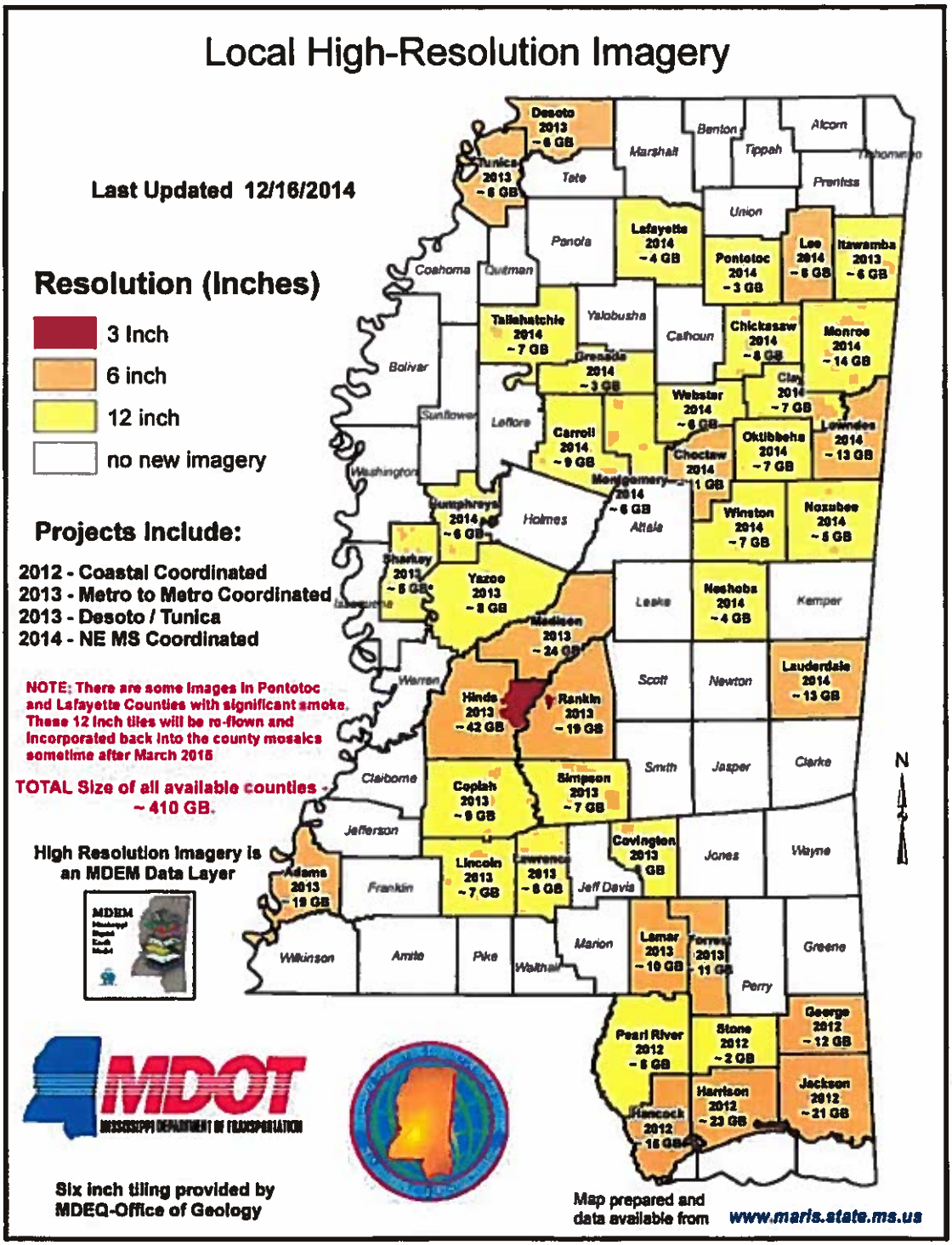
Table 10: GIS Data Layers Available

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	Regulatory

				Floodplain Management Bureau	
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/NAD83	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	NAD83	n	Mississippi	Non-

	Geodatabase			Digital Earth Model	regulatory
Community Contacts	Excel Spreadsheets	n/a	n	Local websites, State/FEMA updates	Non-regulatory
Cadastral	PDF Document	undefined	y	Local (Holmes, 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 3: 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

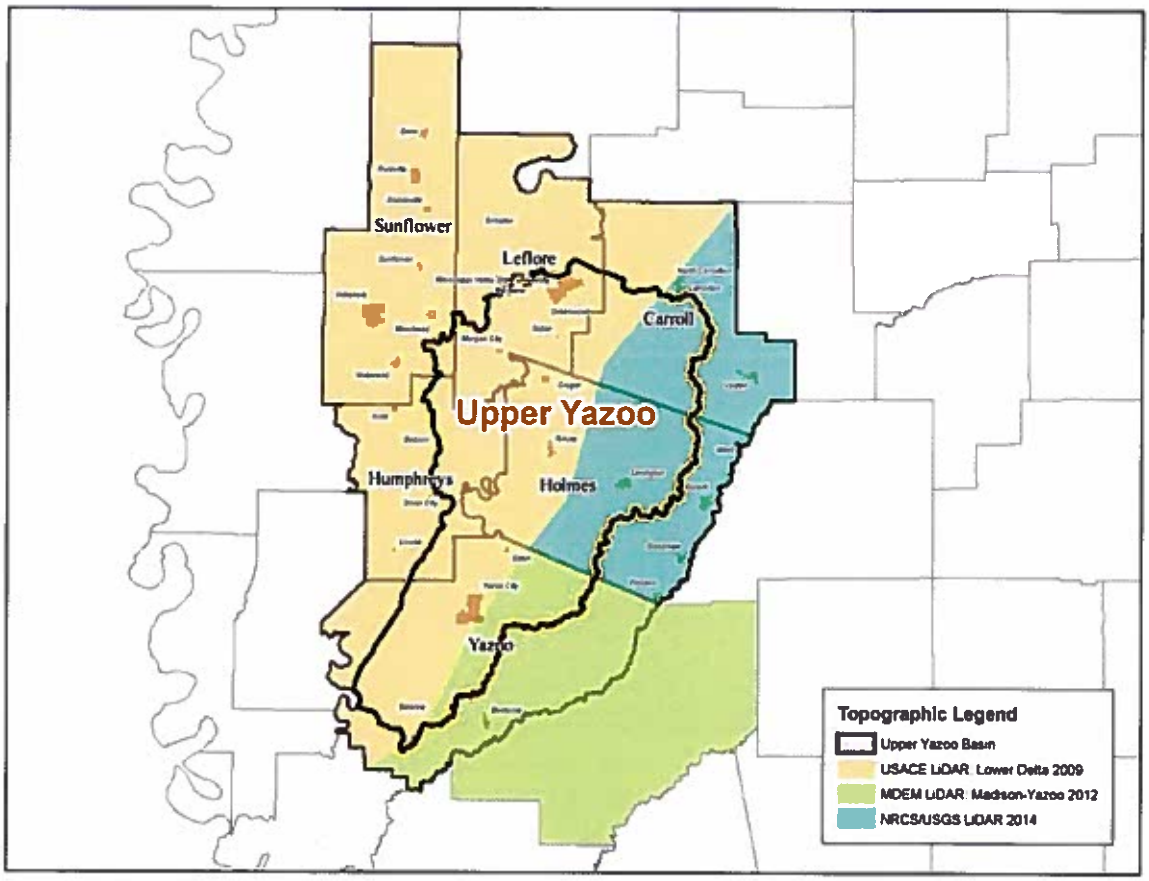
National Digital Orthophoto Program (NDOP) Project Tracking System
(https://hazards.fema.gov/metadata/NDOP/)

- 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.

Figure 4 provides a map of the various elevation data sources that are known to exist for the Upper Yazoo watershed. Most of the watershed will be able to capitalize on LiDAR coverage by FEMA.

Figure 4—Topographic data sources for Upper Yazoo 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 11: 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. For the Upper Yazoo watershed, Humphreys and Leflore, along with their municipalities, are covered under a regional plan. Carroll, Holmes, Leflore, and Yazoo counties, along with their respective municipalities (except for Village of Eden) are included in separate plans. The Village of Eden is not included in a Hazard Mitigation Plan.

Table 11: Status of Hazard Mitigation Plans

Community	Hazard Mitigation Plan Status	Plan Developer	Plan Type
Carroll County	Effective until Sep. 2017	North Central Planning and Development District	Multi-Jurisdictional (MJ)
Holmes County	Effective until June 2017	North Central Planning and Development District	MJ
Humphreys County	Effective until Feb. 2017	South Delta Planning and Development District	MJ
Leflore County	Effective until Sep. 2017	North Central Planning and Development District	MJ
Sunflower County	Effective until Jan. 2015	South Delta Planning and Development District	MJ
Yazoo County	Effective until July 2016	Central Mississippi Planning and Development District	MJ

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

Table 12: Current Status in CNMS

	Approximate		Detailed		Total Stream miles
County	Valid	Unverified	Valid	Unverified	
Carroll	0	50	0	0	50
Holmes	0	419	11	5	435
Humphreys	0	236	18	0	254
Leflore	0	309	36	24	369
Sunflower	1	0	0	0	1
Yazoo	2	481	14	4	501

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 44% percent of the watershed population is located within the two cities of Greenwood and Yazoo City. Of the unincorporated areas, Holmes County has the highest percentage (17%) of total population for the watershed. None of the other communities comprise more than 9 percent of the total watershed population. Generally, population density outside the municipalities is quite low. Specific population breakdown of the watershed is given in Table 13.

Table 13: Population Statistics in the Upper Yazoo Watershed

County	FIPS Code[1]	CID[2]	Community Name	2010 Watershed Population[3]	% of Total Population within Watershed
Carroll	28015	280191	Carroll County	**4,002**	**7.23**
Holmes	28051	280211	Holmes County	**9,656**	**17.45**
Holmes	28051	280313	Cruger, Town of	**386**	**0.70**
Holmes	28051	280076	Lexington, City of	**1,731**	**3.13**
Holmes	28051	280078	Tchula, Town of	**2,096**	**3.79**
Humphreys	28053	280192	Humphreys County	**2,581**	**4.66**
Humphreys	28053	280080	Belzoni, Town of	**939**	**1.70**
Humphreys	28053	280323	Silver City, Town of	**67**	**0.12**
Leflore	28083	280101	Leflore County	**4,970**	**8.98**
Leflore	28083	280102	Greenwood, City of	**12,800**	**23.13**
Leflore	28083	280103	Itta Bena, City of	**1,035**	**1.87**
Leflore	28083	280101	Morgan City, Town of	**255**	**0.46**
Leflore	28083	280106	Sidon, Town of	**509**	**0.92**
Sunflower	28133	280195	Sunflower County	**646**	**1.17**
Yazoo	28163	280199	Yazoo County	**2,111**	**3.81**
Yazoo	28163	280188	Eden, Village of	**103**	**0.19**
Yazoo	28163	280205	Satartia, Village of	**55**	**0.10**
Yazoo	28163	280199	Yazoo City, City of	**11,403**	**20.60**
TOTAL				**55,345**	**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 Upper Yazoo Watershed

Table 14 lists the median and mean incomes in counties within the watershed. All of these counties' family income levels are well below the state average of $39,031.

Table 14: Income Statistics in the Upper Yazoo Watershed

County	Median Family Income (dollars)	Mean Family Income (dollars)
Carroll	31,039	44,656
Holmes	22,325	32,373
Humphreys	23,600	35,566
Leflore	30,285	44,635
Sunflower	31,893	46,488
Yazoo	26,336	39,966

The percent of employment by industry in the Upper Yazoo Watershed counties is listed in Table 15: Percentage of Employment in the Watershed by Industry. According to the data, more than one-quarter of the working population is employed within the education and health care industry followed by manufacturing and retain trades. Leflore County has the highest overall earnings. These figures are estimates derived from whole county data, adjusted in accordance with the watershed population estimates in Table 13.

Table 15: Percentage of Employment in the Watershed by Industry

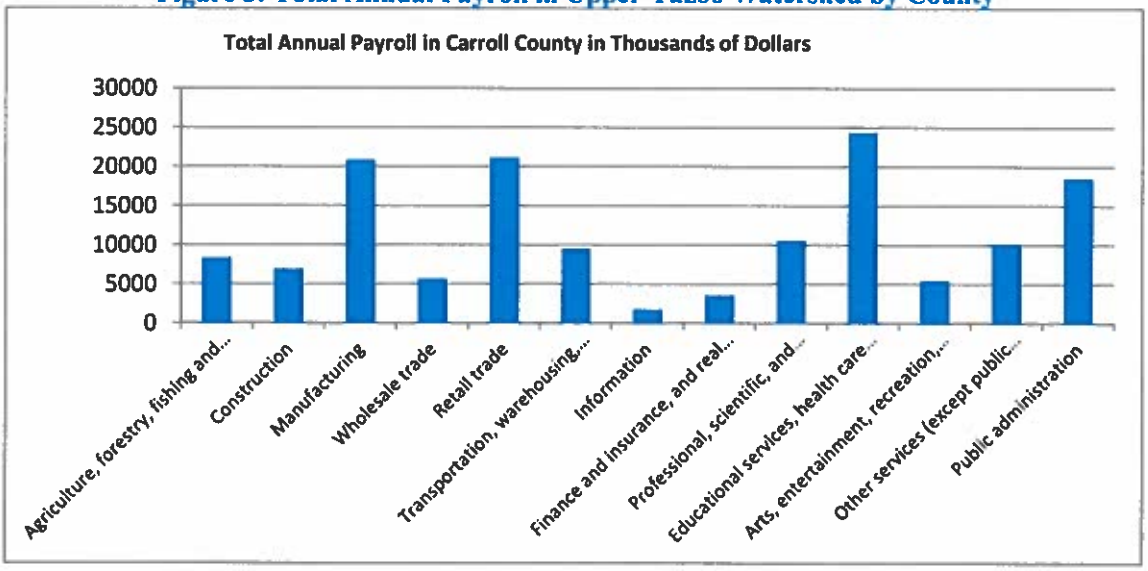
Industry Employment Groups	Carroll County	Holmes County	Humphreys County	Leflore County	Sunflower County	Yazoo County	Combined All Counties
Agriculture, forestry, fishing and hunting, and mining	5.68%	5.14%	12.38%	4.23%	8.82%	6.12%	6.40%
Construction	4.71%	6.10%	8.55%	5.18%	4.84%	6.16%	5.59%
Manufacturing	14.21%	20.19%	14.24%	12.51%	9.98%	10.75%	12.84%
Wholesale trade	3.82%	1.70%	4.68%	2.88%	4.34%	4.32%	3.51%
Retail trade	14.45%	11.12%	9.72%	11.39%	13.92%	10.95%	11.84%
Transportation, warehousing, and utilities	6.48%	4.43%	4.84%	3.47%	4.91%	4.80%	4.53%
Information	1.16%	0.45%	1.17%	0.34%	0.67%	0.69%	0.63%
Finance and insurance, and real estate and rental and leasing	2.41%	2.70%	3.59%	2.72%	3.74%	4.30%	3.29%
Professional, scientific, and administrative and waste management services	7.18%	4.52%	2.46%	4.05%	2.71%	5.80%	4.34%

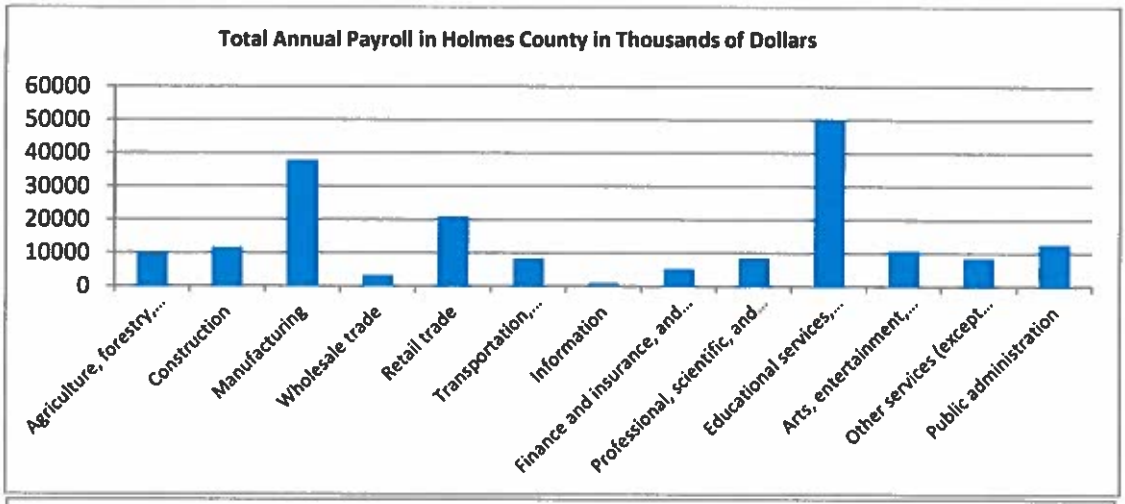
Table 15: Percentage of Employment in the Watershed by Industry

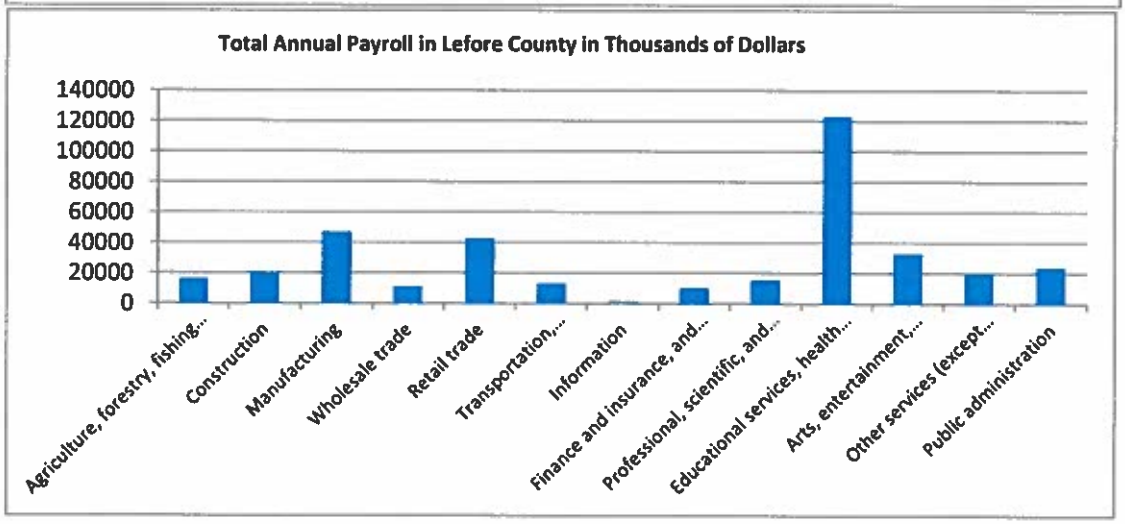
Industry Employment Groups	Carroll County	Holmes County	Humphreys County	Leflore County	Sunflower County	Yazoo County	Combined All Counties
Educational services, health care and social assistance	16.65%	26.71%	27.75%	32.79%	24.95%	26.32%	26.72%
Arts, entertainment, recreation, and accommodation and food services	3.70%	5.70%	6.49%	8.81%	7.42%	6.20%	6.79%
Other services (except public administration)	6.90%	4.50%	4.11%	5.28%	4.82%	5.75%	5.18%
Public administration	12.65%	6.74%	15.17%	6.35%	8.89%	7.84%	8.33%
Grand Total	**8.45%**	**14.91%**	**7.37%**	**25.07%**	**21.84%**	**22.36%**	**100%**

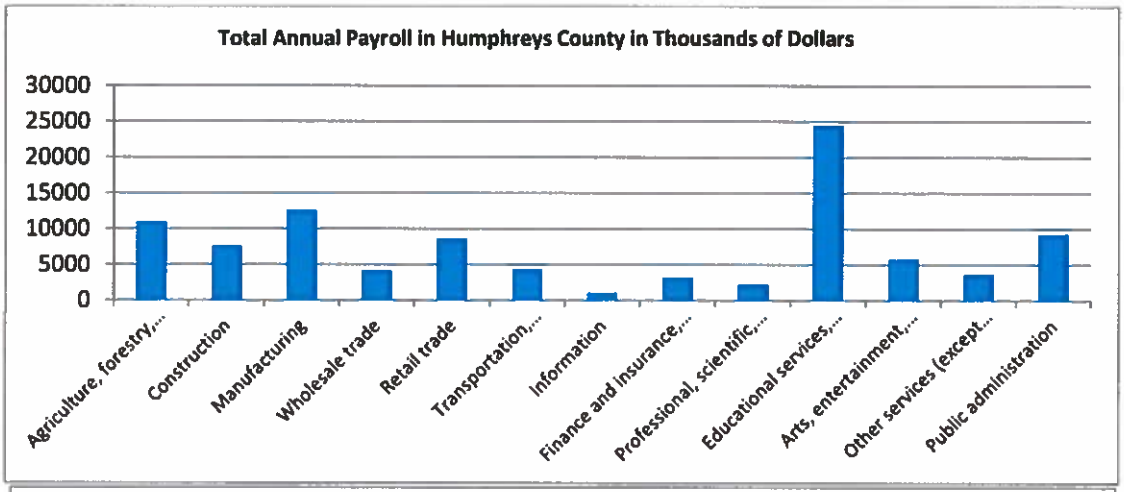
Figure lists the Industries in the Upper Yazoo Watershed Counties contributing to the total annual payroll.

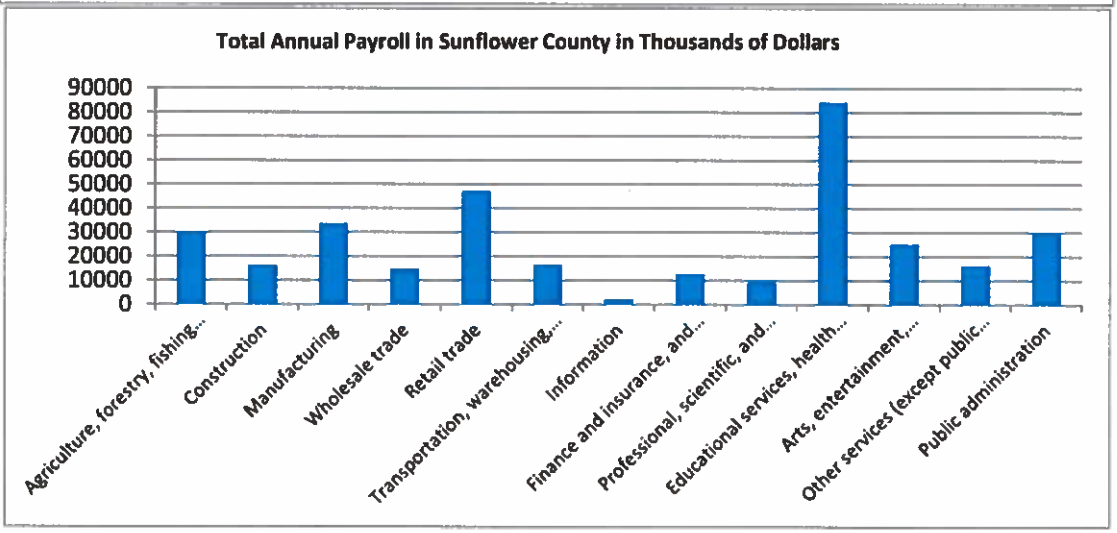
Figure 5: Total Annual Payroll in Upper Yazoo Watershed by County

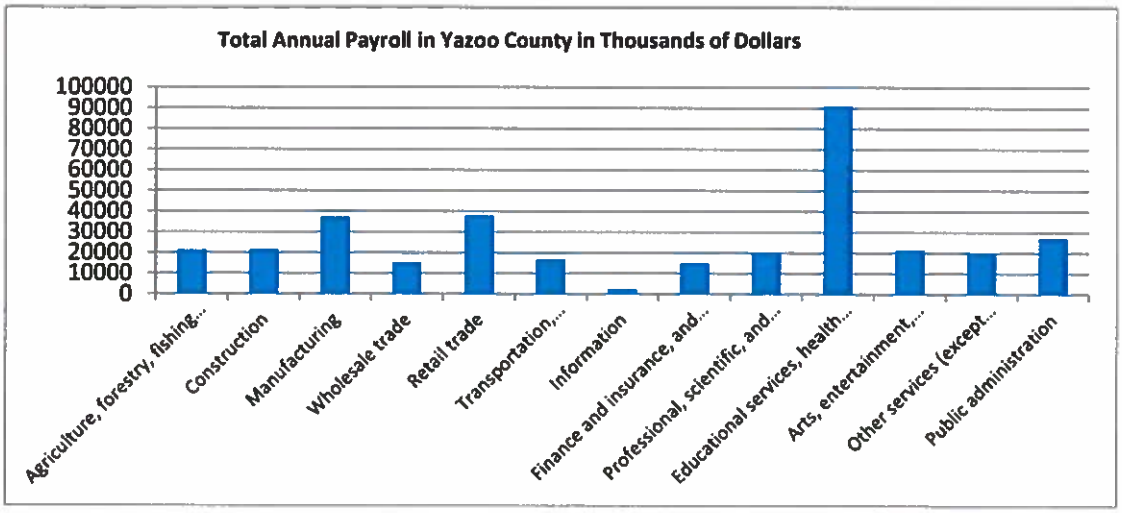



Total Annual Payroll in Holmes County in Thousands of Dollars
60000
50000
40000
30000
20000
10000
0
Agriculture, forestry,...
Construction
Manufacturing
Wholesale trade
Retail trade
Transportation,...
Information
Finance and insurance, and...
Professional, scientific, and...
Educational services,...
Arts, entertainment,...
Other services (except...
Public administration


Total Annual Payroll in Lefore County in Thousands of Dollars
140000
120000
100000
80000
60000
40000
20000
0
Agriculture, forestry, fishing...
Construction
Manufacturing
Wholesale trade
Retail trade
Transportation,...
Information
Finance and insurance, and...
Professional, scientific, and...
Educational services, health...
Arts, entertainment,...
Other services (except...
Public administration


Total Annual Payroll in Humphreys County in Thousands of Dollars
30000
25000
20000
15000
10000
5000
0
Agriculture, forestry,...
Construction
Manufacturing
Wholesale trade
Retail trade
Transportation,...
Information
Finance and insurance,...
Professional, scientific,...
Educational services,...
Arts, entertainment,...
Other services (except...
Public administration


Total Annual Payroll in Sunflower County in Thousands of Dollars
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
Agriculture, forestry, fishing...
Construction
Manufacturing
Wholesale trade
Retail trade
Transportation, warehousing,...
Information
Finance and insurance, and...
Professional, scientific, and...
Educational services, health...
Arts, entertainment,...
Other services (except public...
Public administration


Total Annual Payroll in Yazoo County in Thousands of Dollars
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
Agriculture, forestry, fishing...
Construction
Manufacturing
Wholesale trade
Retail trade
Transportation,...
Information
Finance and insurance, and...
Professional, scientific, and...
Educational services, health...
Arts, entertainment,...
Other services (except...
Public administration

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 Upper Yazoo 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 town of Silver City participate in the NFIP. Of these 17 participants, none of the communities are currently in the CRS Program. 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

The Upper Yazoo watershed includes more levees than any other HUC-8 basin in Mississippi. Several levee systems received provisional accreditation during Map Modernization. Presently, only one of these systems has received an evaluation report by USACE recommending FEMA accreditation, although a positive report is expected for some additional systems in the near future, as minor repairs are completed. A list of known levee systems in the Upper Yazoo watershed is given below in Table 16.

Table 16: Levees in the Upper Yazoo watershed

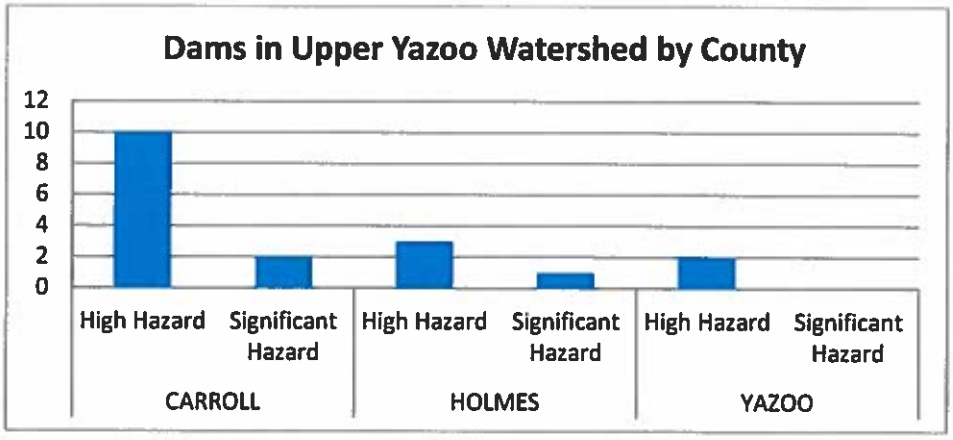
LEVEE NAME	COUNTIES	CERTIFICATION ISSUES	COMMENTS
Yazoo River Right Bank	Humphreys, Leflore, Yazoo	Drainage structure, may have inadequate freeboard	Possible certification within 2 years
Greenwood East	Leflore, Carroll	Drainage structures and geotechnical issues	Possible certification within 5 years
Greenwood West	Leflore	Drainage structures and geotechnical issues	Possible certification within 5 years
Hillside Floodway North	Holmes	Lower end doesn't tie to high ground	Can't be certified under current USACE guidance
Hillside Floodway South	Holmes	Lower end doesn't tie to high ground	Can't be certified under current USACE guidance
Pelucia Creek South	Leflore, Carroll	Drainage structure repaired	Possible certification within 6 months
Rocky Bayou Levee	Yazoo	Lower end doesn't tie to high ground	Can't be certified under current USACE guidance
Satartia Area	Yazoo	None	Certification expires February, 2023

Viking Industrial Park Levee	Leflore	Deficiencies unknown	Non-USACE levee
Viking Range Levee	Leflore	Deficiencies unknown	Non-USACE levee
Whittington Auxiliary Channel - Left Bank	Humphreys, Yazoo	Lower end doesn't tie to high ground	Can't be certified under current USACE guidance
Yazoo City Protection Works - East Bank	Yazoo	Geotechnical issues, although they may be resolved	Possible certification within 1 year
Yazoo River Levee - Bee and Tchula Lakes	Holmes, Humphreys	Lower end doesn't tie to high ground	Can't be certified under current USACE guidance
Yazoo River Left Bank Central (Eden)	Yazoo	Possible utility crossing, may have gap closure issue	Possible certification within 2 years
Yazoo River Right Bank - Yazoo City to Belle Prairie/Wasp Lake	Humphreys, Yazoo	Lower end doesn't tie to high ground	Can't be certified under current USACE guidance

Several of these systems are ineligible for accreditation due to the downstream end not tying into high ground. These so-called "hanging" levee systems are typically designed to control high flows on tributary streams until such point where they flow into a larger receiving stream. Pelucia Creek South is an example, as it prevents unconfined flows in the left overbank of Pelucia Creek from the bluff line to where it empties into the Yazoo River.

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 3 dams in the Upper Yazoo Watershed classified as significant hazard, and 15 classified as high hazard. 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 Upper Yazoo Watershed** shows the distribution of significant and high hazard dams per county. The largest number by far occurs in Carroll County. Nearly all of these dams were built as part of the federal watershed protection and flood prevention programs, authorized by legislation in 1944 and 1954. Most of the dams from these programs were built in the 1960s-70s, and thus are likely approaching the end of their typical 50-year expected service life.

Figure 6: Dams in Upper Yazoo Watershed



As of the drafting of this report, only 4 of the 15 classified high hazard dams in the project area did not show an Emergency Action Plan on file, although those plans may be under development at this time. They include ABOTLAPOOTA WS STR Y-34-11 DAM and ABIACA WATERSHED STRUCTURE Y-34-12 DAM in Carroll County and FW-90-02 SITE NUMBER 30 DAM and FLOOD WATER RETARDING STRUCTURE SITE 35 in Holmes County. The MDEQ Division of Dam Safety will be consulted throughout the project to keep updated on the status of these plans.

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 17 shows the gage identification number, location, and county. Twenty-five gages are located within the Upper Yazoo Watershed, however many of these are historical and no longer active. Of the eleven flow gages, only 2 appear to be currently active, although much of the historical flow data may be suitable for statistical analyses. The fourteen stage gages are all active and also provide real-time measurements. All but one (Bee Lake Tributary) are managed by the Vicksburg District USACE. The stage gages on the Yazoo River would be very useful for model calibrations of proposed new or updated study along the Yazoo River.

Table 17: Stream gages in the Upper Yazoo Watershed

Gage ID	Period of Record	Gage Location	County	Latitude	Longitude
07287160	1991-2011	Abiaca Creek at Cruger, MS	Holmes	33.3383	-90.2357
07287150	1991-2013	Abiaca Creek near Seven Pines, MS	Carroll	33.3373	-90.1508
330304090210100	2012-2013	Bee Lake Tributary No 1 near Thorton, MS	Holmes	33.0511	-90.3503
07287400	1987-2010	Black Creek at Lexington, MS	Holmes	33.1053	-90.0533
07287505	1966-1977	Broad Lake Tributary No. 1 near Yazoo City, MS	Yazoo	32.8750	-90.4900
07287355	1947-2001	Fannegusha Creek near Howard, MS	Holmes	33.1362	-90.1910
07287350	1947-2013	Fannegusha Creek near Tchula, MS	Holmes	33.1767	-90.1685
07287165	1966-1983	Mosquito Lake Trib. No. 1 near Itta Bena, MS	Leflore	33.4763	-90.3250
07287170	1966-1983	Mosquito Lake Trib. No. 2 near Itta Bena, MS	Leflore	33.3186	-90.3222
07287050	1964-1977	Palusha Creek Trib. near Carrollton, MS	Carroll	33.4667	-89.9500
07287480	1951-1980	Piney Creek near Yazoo City, MS	Yazoo	32.9042	-90.3758
07287520	1964-1973	Short Creek Trib. near Yazoo City, MS	Yazoo	32.8025	-90.3700
	2011-2015	Walker Lake (Landside)	Leflore	33.4872	-90.2260
	2012-2015	Walker Lake (Riverside)	Leflore	33.4872	-90.2260

Gage ID	Period of Record	Gage Location	County	Latitude	Longitude
	2003-2015	Wasp Lake (Landside)	Humphreys	32.2020	-90.4215
	2003-2015	Wasp Lake (Riverside)	Humphreys	32.2018	-90.4208
	2000-2015	Yazoo City Pump (Landside)	Yazoo	32.8339	-90.4403
	2003-2015	Yazoo City Pump (Riverside)	Yazoo	32.8339	-90.4403
	2000-2015	Yazoo River at Alligator-Catfish (Landside)	Leflore	33.4015	-90.2479
	2003-2015	Yazoo River at Alligator-Catfish (Riverside)	Leflore	33.4167	-90.2464
	1944-2015	Yazoo River at Belzoni	Humphreys	33.1644	-90.4947
	2003-2015	Yazoo River at Ft. Pemberton (Downstream)	Leflore	33.5292	-90.2388
	1937-2015	Yazoo River at Greenwood	Leflore	33.5225	-90.1808
	1974-2015	Yazoo River at Shell Bluff	Leflore	33.3967	-90.2719
	1943-2015	Yazoo River at Yazoo City	Yazoo	33.8370	-90.4424

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 USACE stage gages, the record stage is listed for most stations, and a number of the sites along the Yazoo River are associated with either the May 1991 or January 1932 flood events.

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

3.2.7.1 Carroll County Historic flooding

The Carroll County FIS does not identify any significant flooding events within the Upper Yazoo watershed. The Hazard Mitigation Plan for Carroll County states that the western portion of the county lies in the Mississippi Delta, and is susceptible to flooding that is characteristic of that area. Other noted flood problems are for areas that lie outside of the Upper Yazoo watershed. The plan states that three countywide flash floods have occurred resulting in $6,000 of property damage. The plan also states that 90 homes within the County are located within the Special Flood Hazard Area, with 4 of the properties suffering repetitive losses.

3.2.7.2 Holmes County Historic flooding

The Holmes County FIS identifies Black Creek in the center of the County, Tchula Lake, and the Yazoo River in the western portion of the county as sources of significant flooding within the Upper Yazoo watershed in Holmes County. The Hazard Mitigation Plan for Holmes County lists 6 major flash flooding events in the County. Flooding within the City of Lexington on June 10, 1997 resulted in $10 million in damages. Five flash flooding events since 1999 in the unincorporated areas of the County have resulted in $1,273,000 in damages. The plan notes that there are a total of 821 homes and 4 other types of structures within the Special Flood Hazard Area in Holmes County, with Tchula having 50 homes within the Special Flood Hazard Area.

Efforts have been made to reduce damages caused by flooding. The number of repetitive loss properties in the County has been reduced from 25 to 5. A recent USACE project to install five water retainer structures has reduced the repetitive loss properties in the City of Lexington from 10 to 1.

3.2.7.3 Humphreys County Historic flooding

The Humphreys County FIS report indicates that flood problems in the county are widespread and in the eastern part of the County it limits the land use essentially to woodlands. The Yazoo River forms much of the county's eastern boundary, while the Big Sunflower River does likewise along the western boundary. During large floods, large portions county may be subject to inundation.

During the flood of 1973, Humphreys County received considerable damage by flooding from the Yazoo and Big Sunflower Rivers and backwater flooding from the Mississippi River. A total of 98,550 acres were inundated during this flood in Humphreys County alone, with a total dollar value of damage reaching $11,559,000 (USACE, 1973). Record stage and discharge measurements were recorded on the Yazoo and Big Sunflower Rivers. The maximum stage at Little Calloo on the Big Sunflower River in 1973 was 103.3 feet, NAVD. At Belzoni, Mississippi, the stage recorded on the Yazoo River at 111.4 feet NAVD has been estimated as a 60-year frequency event.

The county is also vulnerable to localized flash flooding from intense rainfall, as distinguished from riverine flooding. Humphreys County had 10 events of flooding from 1998-2008, for a total of $537,000 in damage to property and $900,000 to crops. In addition it is a tremendous nuisance to property owners, and repetitive losses have cost taxpayers over $1.2 million since 1980. Between 1980 and 1998 there were 175 repetitive loss instances in Humphreys County.

3.2.7.4 Leflore County Historic flooding

The Leflore County FIS indicates that the County has suffered flooding due to several sources. The county suffers from poor drainage due to low relief of the area, and low lying areas suffer from flooding caused by the Yazoo-Tallahatchie and Yalobusha Rivers. Localized flooding also occurs along the Big Sand, Pelucia, Abiaca, Teoc, and Turkey Creeks; along Alligator, Catfish, Gin, Muddy, Tippo, Marsh, and Fighting Bayous, and along the Quiver River.

Heavy rains in the winter and spring are usually the cause of the most severe flooding. Notable heavy rainfalls have occurred in Greenwood on September 20, 1958, when 8.96 inches fell and on November 13, 1961, when 9.25 inches fell at Grenada Dam. Significant flooding has also occurred due to heavy rainfall over a long period of time. Streamflow and gage records show that major floods occurred in 1911-1913, 1917, 1920-1922, 1926-1927, 1931-1933, 1935, 1937, 1939, 1946, 1948, 1950, 1953, 1955, 1958, 1968, and 1973-1974. One of the greatest floods occurred along the Yazoo-Tallahatchie River in 1973. Flooding in the vicinity of Swan Lake occurred for 188 days and at Greenwood, for 196 days. The County sustained flood damage in excess of $12.6 million during the flooding of 1973. Severe flooding also occurred in May to

June 1974 due to rainfall that was 200 to 250 percent above normal. Many newly planted crops were destroyed due to being inundated.

According to the Hazard Mitigation Plan for Leflore County, 25 flash flooding events have occurred since 2007. Leflore County has experienced $19.34 million in property damage and approximately $5 billion in crop damage due to flooding since 1994.

3.2.7.5 Sunflower County Historic flooding

The Sunflower County FIS indicates that low-lying and depressional areas are subject to seasonal saturation and periodic flooding due to overflow of the Big Sunflower and Quiver Rivers and their tributaries This area experienced some of the most severe flooding in 1958 and 1973 along these two rivers as both events were characterized as greater than the 1-percent-annual-chance flood in the headwater reaches.

In the City of Drew, a low-lying area in the eastern part of town is affected by backwater on Powell Bayou. Heavy rainfall can cause ponding along Powell Bayou Tributary 1, where several houses were flooded in 1973. The Town of Inverness saw its greatest flooding in 1973 from Big Sunflower River. High water marks in the area ranged from 107.3 feet to 110.9 feet. The City of Moorhead experiences flooding in the northeast corner of town due to backwater flooding from Quiver River which prevents Moorhead
Bayou from draining. The flooding experienced by the Town of Sunflower results from water backing up into storm-sewer drainage pipes. Flooding also occurs on the east side of town due to backup of the Sunflower Diversion Channel.

There is no systematic flood protection system in place for these flooding sources. Periodic channel clean-out works are performed on some of the larger streams, and natural levees exist along the Big Sunflower and Quiver Rivers.

3.2.7.6 Yazoo County Historic flooding

The Yazoo County FIS does not describe any issues of flooding in the Upper Yazoo 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 Upper Yazoo 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 Upper Yazoo 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 18: Disaster Declarations in the Upper Yazoo Watershed Counties

Date	Disaster Type	Affected County	Incident Begin Date	Incident End Date
1973	Flooding	Carroll, Holmes, Humphreys, Leflore, Yazoo	1973	Flooding
1979	Tornadoes, Flooding	Holmes, Leflore, Yazoo	1979	Tornadoes, Flooding
1983	Severe Storms, Tornadoes, Flooding	Holmes, Leflore, Yazoo	1983	Severe Storms, Tornadoes, Flooding
1990-1991	Severe Storms, Flooding, Tornado	Carroll, Humphreys, Leflore	1990-1991	Severe Storms, Flooding, Tornado
1991	Flooding, Severe Storm	Leflore	1991	Flooding, Severe Storm
1991	Flooding, Severe Storm, Tornado	Carroll, Holmes, Humphreys, Leflore, Yazoo	1991	Flooding, Severe Storm, Tornado
2001	Severe Storms, Flooding	Holmes	2001	Severe Storms, Flooding
2003	Severe Storms, Tornadoes, and Flooding	Holmes and Yazoo	2003	Severe Storms, Tornadoes, and Flooding
2005	Hurricane Katrina	Carroll, Holmes, Humphreys, Leflore, Yazoo	2005	Hurricane Katrina
2008	Hurricane Gustav	Carroll, Holmes, Humphreys, Leflore, Yazoo	2008	Hurricane Gustav
2010	Severe Storms, Tornadoes, and Flooding	Holmes	2010	Severe Storms, Tornadoes, and Flooding
2011	Severe Storms, Tornadoes, Straight-line Winds, Flooding	Carroll, Holmes, Leflore	2011	Severe Storms, Tornadoes, Straight-line Winds, Flooding
2011	Flooding	Holmes, Humphreys, Yazoo	2011	Flooding
2011	Flooding	Holmes, Humphreys, Yazoo	2011	Flooding
2012	Tropical Storm Isaac	Carroll, Holmes, Yazoo	2012	Tropical Storm Isaac
2012	Hurricane Isaac	Carroll, Holmes, Yazoo	2012	Hurricane Isaac

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

Several CAV reports revealed serious programmatic issues, although for many of these communities this was their first time receiving program oversight. Most communities have improved their programs now that they have a better understanding of floodplain management obligations. A CAV for Carroll County has not been recovered, and Eden joined the NFIP too recently to have a CAV yet completed.

Table 19: CAVs Performed within the Watershed

Community	Reviewer	CAV Date	Notes
Belzoni	MEMA	2/24/2010	Minor issue identified Corrective action taken
Carroll County	No CAV	n/a	n/a
Cruger	MEMA	8/14/2007	Serious issue identified Corrective action taken
Eden	No CAV	n/a	n/a
Greenwood	MEMA	3/10/2011	Serious issue identified Corrective action taken
Holmes County	MEMA	4/18/2011	Minor issues identified Corrective action taken
Humphreys County	MEMA	3/23/2011- 3/24/2011	Serious issues identified Corrective action taken
Itta Bena	MEMA	3/9/2011	Serious issues identified
Leflore County	MEMA	10/24/2006	Serious issue identified
Lexington	MEMA	4/19/2011	Serious issues identified Corrective action taken
Morgan City	MEMA	10/25/2007	Serious issues identified
Satartia	MEMA	2/26/2008	Serious issues identified Corrective action taken
Sidon	MEMA	7/16/2008	Serious issues identified
Tchula	MEMA	5/24/2007	Minor issues identified Corrective action taken
Yazoo City	MEMA	6/23/2009	Serious issues identified Corrective action taken
Yazoo County	MEMA	6/24/2009	Minor issue identified Corrective action taken

3.2.10 Effective Regulatory Mapping and LOMC

All counties in the Upper Yazoo watershed except Carroll County have effective, modernized FIRMs and FIS. Digital databases are readily available for all of these particular counties. The Map Modernization process for Carroll County was delayed due to unaccredited levees. It is expected that the preliminary DFIRMs will be allowed to go effective in late 2015. The effective dates for the current FIRMs for these communities are listed in Table 20.

Table 20: Effective FIRM/FIS Reports for Non-Coastal Communities

County	Community Name	Product Types	FIRM Effective Date
Carroll County	Unincorporated Areas	FIS & FIRM	7/3/1978
Carroll County	North Carrollton	FIS & FIRM	4/3/1978
Carroll County	Carrollton	Not studied	-
Carroll County	Vaiden	FIS & FIRM	3/15/1978
Holmes County	All Jurisdictions	FIS & FIRM	1/18/2012
Humphreys County	All Jurisdictions	FIS & FIRM	3/15/2012
Leflore County	All Jurisdictions	FIS & FIRM	5/16/2012
Sunflower County	All Jurisdictions	FIS & FIRM	1/18/2012
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 21 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 21: Letters of Map Change Identified in the Watershed

County	Community Name	LOMC Type	Number of Cases
Carroll	Carroll County	LOMA	1
Holmes	Holmes County	LOMA	1
Leflore	Greenwood	LOMA, LOMR-F, LOMR	44
Leflore	Itta Bena	LOMA	2
Leflore	Leflore County	LOMA, LOMR-F, LOMR	38
Sunflower	Sunflower County	LOMA, LOMR-F	18
Yazoo	Yazoo City	LOMR-F	4
Yazoo	Yazoo County	LOMA, LOMR	8

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 Upper Yazoo Watershed lists the details of the number of flood policies, total coverage amount and the total cost of repetitive losses within the Upper Yazoo 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 22: NFIP Statistics in the Upper Yazoo Watershed

Name of Community	CID	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Loss Properties
Belzoni, Town of	280080	Y	49	$26,533,800	$655,893.34	5
Carroll County	280191	Y	No data	No data	No data	No data
Cruger, Town of	280313	Y	1	$63,000	0.00	0
Eden, Village of	280188	Y	No data	No data	No data	No data
Greenwood, City of	280102	Y	337	$56,014,500	$335,019	1
Holmes County	280211	Y	51	$9,172,300	$265,594	3
Humphreys County	280192	Y	155	$17,497,500	$1,333,1061	25
Itta Bena, City of	280103	Y	12	$1,417,200	$50,241.20	0
Leflore County	280101	Y	913	No data	$68,083,600	4
Lexington, City of	280076	Y	31	$5,909,800	$747,860	5
Morgan City, Town of	280101	Y	0	No data	$1,859	0
Satartia, Village of	280205	Y	1	$140,000	0	0
Sidon, Town of	280106	Y	24	$1,141,700	$1,798	0
Silver City, Town of	280323	N	-	-	-	-
Sunflower County	280195	Y	112	$21,105,600	$129,648	3
Tchula, Town of	280078	Y	14	No data	$91,069	2
Yazoo City, City of	280199	Y	305	$32,026,800	$984,241	10
Yazoo County	280199	Y	213	$30,224,900	$870,916	5

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.

Carroll County: According to Steve Russell of North Central Mississippi Planning and Development District, Carroll County has not developed or adopted a Comprehensive Plan.

Holmes County: 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.

Humphreys County: According to Allyson Denson of the South Delta Mississippi Planning and Development District, Humphreys County does not have a currently adopted Comprehensive Plan.

Leflore County: According to Chancery Clerk Sam Abraham, a Comprehensive Plan was completed for Leflore County by Central Mississippi Planning and Development District. As of this drafting, that information has not been verified.

Sunflower County: According to Allyson Denson of the South Delta Mississippi Planning and Development District, Humphreys County does not have a currently adopted Comprehensive Plan, although in the past they have considered developing one.

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.

3.3 Project Status

(Remove from Community Version)

The MIP Baseline below, Table 23, details the schedule and available funding for the Upper Yazoo Watershed study. Funding for Discovery within the Upper Yazoo Watershed is being provided through Mapping Activity Statement (MAS) FY11.11. Funding for the engineering and mapping study of the Upper Yazoo Watershed is being funded through MAS FY13.13. There are no major changes to scope from the original MAS anticipated scope. There have been no changes from the original MAS funding.

Table 23: MIP Baseline

	Date:	3/15/2015	Baseline Revised:	
PROJECT DESCRIPTION:	Upper Yazoo Watershed, MS - MAS FY13.13			
Performance Period:	Start:	n/a	Finish:	12/31/2017

Activity	Baseline Task Start Date	Baseline Task End Date	Budget	Mapping Activitiy Statement
	(mm/dd/year)	(mm/dd/year)	$	
Discovery - Upper Yazoo Watershed	n/a	n/a	$90,000	MAS FY11.11
Field Surveys	6/1/2015	8/31/2014	$16,326	MAS FY13.13
Topographic Data Development	6/1/2015	8/31/2014	$16,326	MAS FY13.13
Independent QA/QC Review of Topographic Data	8/15/2015	8/31/2015	Included in Topo Data Development	MAS FY13.13
Base Map Acquisition	6/1/2015	8/31/2014	$3,935	MAS FY13.13
Independent QA/QC Review of Base Map	8/15/2015	8/31/2015	Included in Base Map Acquisition	MAS FY13.13
Hydrologic Analysis	9/1/2015	11/30/2015	$22,360	MAS FY13.13
Independent QA/QC Review of Hydrologic Analysis	11/15/2015	11/30/2015	$2,443	MAS FY13.13
Hydraulic Analysis	12/1/2015	3/31/2016	$39,684	MAS FY13.13
Independent QA/QC Review of Hydraulic Analysis	3/1/2016	3/31/2016	$3,969	MAS FY13.13
Floodplain Mapping	11/1/2015	7/15/2016	$36,008	MAS FY13.13
Independent QA/QC of Floodplain Mapping	6/16/2016	7/15/2016	$3,601	MAS FY13.13
Develop Draft DFIRM Database	11/1/2015	7/15/2016	$9,765	MAS FY13.13
Independent QA/QC Review of DFIRM Database	6/16/2016	7/15/2016	$1,424	MAS FY13.13
Produce Preliminary Map Products (including Graphic Specifications)	7/16/2016	9/15/2016	$21,923	MAS FY13.13
Distribute Preliminary Map Products	9/16/2016	9/30/2016	Included in Produce Preliminary Map Products	MAS FY13.13
Post Preliminary Processing	10/1/2016	12/31/2017	$22,236	MAS FY13.13
Total			$290,000	

Unmet Needs

All of the unverified Zone AE stream mileage is updated by this plan of work. The total of unverified Zone A mileage will be reduced by only 3.7 miles. The Zone A study in this plan of work address a currently unstudied (Zone X) stream (Abiaca Creek) which exists as a conspicuous gap in SHFA across the county boundary. The overwhelming majority of unverified Zone A mileage that will persist is located in rural areas with little to no impact on insurable property.

Updated CNMS output is included in Appendix D. CNMS records were updated based on what was contained prior to the update and what will change as a result. For example, the verification status of existing records was changed from *unknown* to *in progress*. New requests from the Community were added to the CNMS database.

4 Risk MAP Products for the Upper Yazoo 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 3, 2013 from 1:30 – 3:30 pm at the Senior Citizens Building, 507 Howard Street, Greenwood, 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 20 people were in attendance at the meeting, including representatives of Yazoo City, Sunflower County, Satartia, Leflore County, and Itta Bena. Additional partners and stakeholders were also in attendance and FEMA staff 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

- Upper Yazoo Watershed Proposed FIRM Panel Revisions

Appendix D: CNMS Analysis

- CNMS Summary Spreadsheet

Appendix E: Collected Discovery Data

- Hazard Mitigation Plans
- Grant Information
- CAV
- CRS