

Discovery Report

Lower Leaf Watershed, 03170005

Forrest, Greene, Jasper, Jones, Lamar, Perry, and Wayne Counties

*City of Bay Springs, Town of Beaumont, Mississippi Band of Choctaw Indians,
City of Ellisville, City of Hattiesburg, Town of Heidelberg, City of Laurel,
Town of Louin, Town of McLain, Town of Montrose, Town of New
Augusta, City of Petal, Town of Richton, Town of Sandersville, and Town
of Soso*

Mississippi

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Table of Contents

Table of Contents	i
Acronyms and Abbreviations	iv
1 General Information.....	1
1.1 Background and Statistics.....	1
1.2 Project Summary.....	10
2 Watershed Stakeholder Coordination	15
3 Data Analysis	17
3.1 Data Available for Flood Risk Products.....	17
3.1.1 Base Map Data.....	17
3.1.2 Topographic Data.....	17
3.1.3 Average Annualized Loss (AAL) / HAZUS.....	18
3.2 Other Data and Information.....	19
3.2.1 Mitigation Plans/Status and Mitigation Projects.....	23
3.2.2 CNMS and NFIP Mapping Study Needs	24
3.2.3 Socio-Economic Analysis.....	25
3.2.4 Community Rating System (CRS)/NFIP	32
3.2.5 Levees/Dams.....	32
3.2.6 Stream Gages	34
3.2.7 High Water Marks and Historic Flooding	35
3.2.8 Declared Disasters	37
3.2.9 Floodplain Management CAV and CAC.....	38
3.2.10 Effective Regulatory Mapping and LOMC	39
3.2.11 Ordinances	40
3.2.12 Flood Insurance Policies and Repetitive Loss	41
3.2.13 Comprehensive Plans.....	42
3.3 Project Status.....	44
4 Risk MAP Products for the Lower Leaf Watershed.....	46
4.1 Proposed Enhanced Products.....	46
4.1.1 Changes since Last FIRM.....	47
4.1.2 Flood Depth and Analysis Grids.....	47
4.1.3 Flood Risk Assessment.....	47
4.1.4 Areas of Mitigation Interest.....	48
5 Discovery Meeting.....	49

Tables

Table 1: Current FIS Dates	4
Table 2: Statistical Information	5
Table 3: NVUE Compliance.....	9
Table 4: National Metrics	11
Table 5: List of Study Streams.....	12
Table 6: Total Stream Mile Counts by Type of Study.....	12
Table 7: Proposed FIRM panel updates.....	13
Table 8: Partner Contributions.....	14
Table 9: Communities in the Lower Leaf Watershed.....	15
Table 10: GIS Data Layers Available.....	20
Table 11: Status of Hazard Mitigation Plans	24
Table 12: Current Status in CNMS.....	27
Table 13: Population Statistics Lower Leaf Watershed.....	26
Table 14: Income Statistics in the Lower Leaf Watershed.....	27
Table 15: Percentage of Employment in the Watershed by Industry	27
Table 16: Levees in the Lower Leaf Watershed.....	33
Table 17: Stream Gage Information	34
Table 18: Disaster Declarations in the Lower Leaf Watershed Counties by Year	37
Table 19: CAVs Performed within the Watershed	38
Table 20: Effective FIRM/FIS Reports for Non-Coastal Communities.....	40
Table 21: Letters of Map Change	40
Table 22: NFIP Statistics in the Lower Leaf Watershed	41
Table 23: MIP Baseline	45

Figures

Figure 1: Watershed Location.....	3
Figure 2: LiDAR Coverage for the Lower Leaf Watershed.....	18
Figure 3: HAZUS Level I AAL Losses in Lower Leaf Watershed	19
Figure 4: Mississippi Local High Resolution Imagery.....	22
Figure 5: Total Annual Payroll in Lower Leaf Watershed by County	29
Figure 6: Dams in Lower Leaf Watershed.....	33

Appendices

Appendix A: Community Information

- Community Contact List
- Community Discovery Data Questionnaire
- Community Correspondence
- LOMC Analysis
- Project Charters (Not yet distributed)

Appendix B: Discovery Meeting

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

Appendix C: Panel Scheme

- Lower Leaf Watershed Proposed FIRM Panel Revisions

Appendix D: CNMS Analysis

- CNMS Summary spreadsheet

Appendix E: Collected Discovery Data

- Hazard Mitigation Plans
- CAV
- CRS

Appendix F: Quality Assurance/Quality Control Plan

Acronyms and Abbreviations

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

1 General Information

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

The Lower Leaf 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 Lower Leaf Watershed (HUC # 03170005) 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 October 15, 2015, 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
- Tamara Hansen, 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
- Danon Lucas, Region IV External Affairs Representative, FEMA Region IV

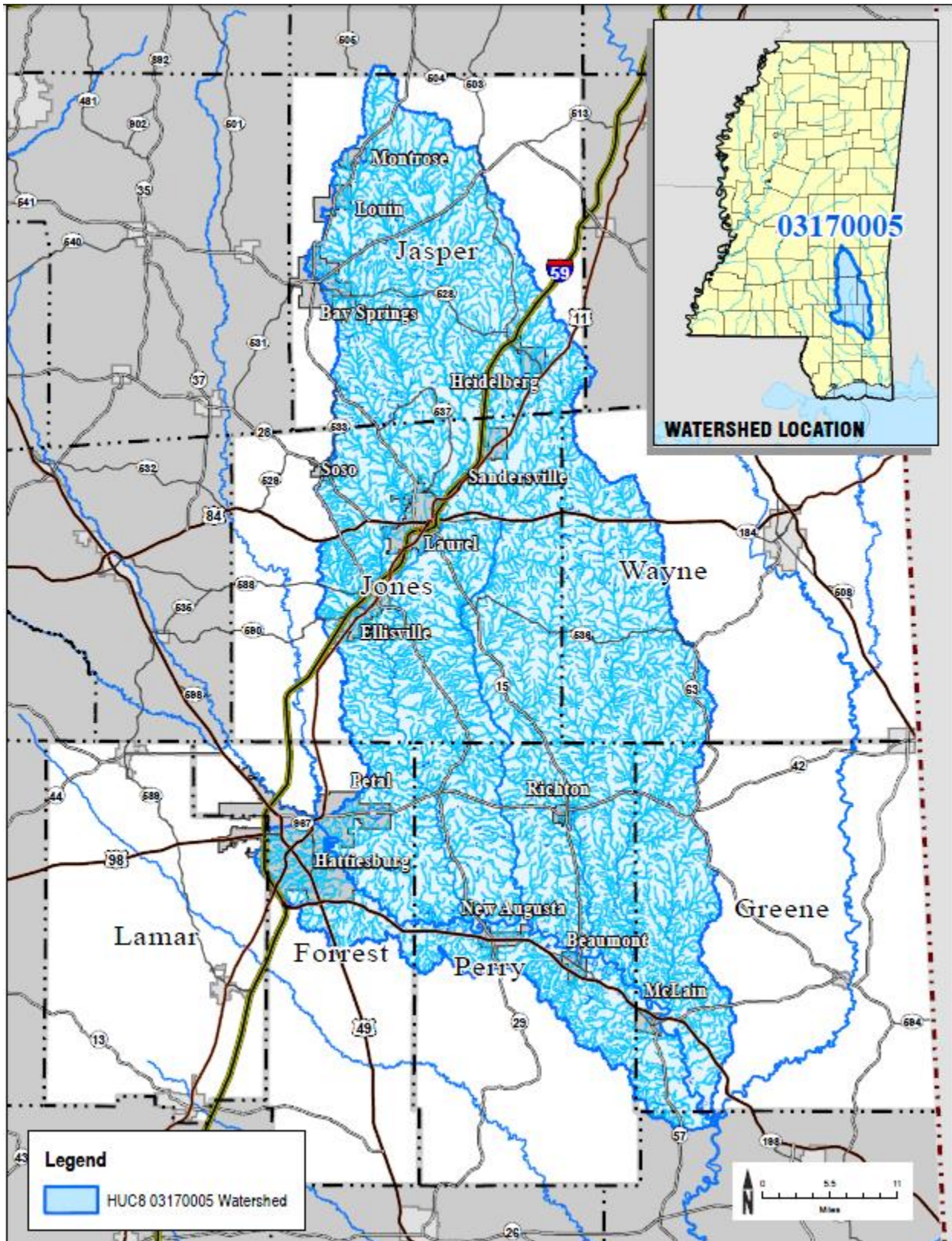
- Stacey Ricks, Mississippi NFIP Coordinator, MEMA Floodplain Management Bureau
- Jana Henderson, Mississippi Hazard Mitigation Officer, MEMA Office of Mitigation
- Steve Champlin, Mississippi CTP PM, Project Manager for the Lower Leaf study
- Nathan Shields, TetraTech, RPML, State's point of contact for meeting collaboration
- Cheryl Johnson, RSC PM, RSC, State's point of contact for technical support and FEMA's project monitor
- Jamie Monohan, Mississippi Geographic Information, LLC, Project Manager

The Lower Leaf Watershed is located in southeast Mississippi. The watershed has an approximate area of 1,825 square miles and is aligned generally in a north to south orientation. The watershed is uniform from a physiographic perspective. Around 95 percent of the watershed falls within the Pine Hills or Longleaf Pine Belt physiographic region, while the remaining 5 percent is in the Central Blacklands or Jackson Prairie region. (Stewart, R.A. 2003. Physiographic regions of Mississippi. Handout, Department of Biological Sciences, Delta State University, 6 pp. (with addenda by S.P. Faulkner, 2005). The watershed contains parts of counties 7: Forrest, Greene, Jasper, Jones, Lamar, Perry, and Wayne.

The Leaf River rises in the Bienville National Forest in southwestern Scott County and flows about 180 miles southeast collecting the Bowie River near Hattiesburg and ending in northern George County, MS, where it joins the Chickasawhay River to form the Pascagoula River. The Leaf River watershed is a headwaters basin. Some of the larger tributaries of the Leaf River include West Tallahala Creek, Oakohay Creek, Tallahala Creek, Bogue Homa Creek, and Thompson Creek.

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

Figure 1: Watershed Location



Most of the communities in the Lower Leaf 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
Bay Springs, City of	Northern and eastern portions	DFIRM	July 4, 2011
Beaumont, City of	all	DFIRM	December 16, 2011
Ellisville, City of	all	DFIRM	September 29, 2010
Forrest County	Northeastern most portion	DFIRM	March 2, 2010
Greene County	Western portion	DFIRM	January 6, 2012
Hattiesburg, City of	All except north eastern portion	DFIRM	March 2, 2010
Heidelberg, Town of	all	DFIRM	July 4, 2011
Jasper County	Central and southern portions	DFIRM	July 4, 2011
Jones County	Central and eastern portions	DFIRM	September 29, 2010
Lamar County	Northeast corner/City of Hattiesburg	DFIRM	March 2, 2010
Laurel, City of	all	DFIRM	September 29, 2010
Louin, Town of	Eastern and southeastern portions	DFIRM	July 4, 2011
McLain, Town of	all	DFIRM	January 6, 2012
Montrose, Town of	All except small northeastern portion	DFIRM	July 4, 2011
New Augusta, City of	all	DFIRM	December 16, 2011
Perry County	Northern half	DFIRM	December 16, 2011
Petal, City of	All except northeastern portion	DFIRM	March 2, 2010
Richton, Town of	all	DFIRM	December 16, 2011
Sandersville, Town of	all	DFIRM	September 29, 2010
Soso, Town of	Eastern half	DFIRM	September 29, 2010
Wayne County	Western portion	DFIRM	July 18, 2011

Areal distribution of the communities within the Lower Leaf 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. Native American tribal lands, belonging to the Mississippi Band of Choctaw Indians, 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
Bay Springs, Town of	2280087	137.80	7.55	3.21%	Y	Y	3	\$ 434,000.00	\$ 31,646.00	0
Beaumont, Town of	280203	36.29	1.99	-0.95%	Y	Y	13	\$ 3,103,700.00	\$ 32,703.22	0
Ellisville, City of	280091	12.60	0.69	12.14%	Y	Y	11	\$ 1,062,100.00	\$ 46,027.32	0
Forrest County	280052	186.99	10.25	8.28%	Y	Y	203	\$ 32,224,700.00	\$ 886,471.10	17
Greene County	280271	3.45	0.19	-26.87%	Y	Y	44	\$ 4,774,900.00	\$ 81,670.53	0
Hattiesburg, City of	280053	8.39	0.46	-14.83%	Y	Y	671	\$ 102,151,900.00	\$ 5,792,327.93	17
Heidelberg, Town of	280088	5.13	0.28	-14.52%	Y	Y	2	\$ 158,800.00	\$ 58,475.01	0
Jasper County	280302	403.32	22.10	-5.99%	Y	Y	25	\$ 4,406,800.00	\$ 3,355.00	0
Jones County	280222	3.27	0.18	-18.29%	Y	Y	131			2
Lamar County	280304	2.64	0.14	10.24%	Y	Y	293	\$ 65,668,200.00	\$ 3,216,251.16	37
Laurel, City of	280092	10.55	0.58	1.60%	Y	Y	284	\$ 26,615,500.00	\$ 398,815.33	0
Louin, Town of	280316	494.02	27.07	4.32%	Y	N	N/A	N/A	N/A	N/A
McLain, Town of	280058	16.53	0.91	0.46%	Y	Y				1
Montrose, Town of	280243	4.99	0.27	-7.35%	Y	N	N/A	N/A	N/A	N/A
New Augusta, Town of	280131	0.87	0.05	7.65%	Y	Y	12	\$ 754,200.00	\$ 45,855.76	0
Petal, City of	280260	2.46	0.13	42.46%	Y	Y	91	\$ 10,220,000.00	\$ 140,027.55	6
Perry County	280233	3.45	0.19	-2.66%	Y	Y	211	\$ 23,611,200.00	\$ 1,465,070.88	36
Richton, Town of	280321	5.34	0.29	-9.93%	Y	Y	8	\$ 680,800.00	\$ -	0
Sandersville, Town of	280404	379.50	20.79	0.92%	Y	N	N/A	N/A	N/A	N/A
Soso, Town of	280363	2.29	0.13	2.89%	Y	N	N/A	N/A	N/A	N/A
Wayne County	280238	216.46	11.86	-2.21%	Y	Y	54	\$ 5,214,700.00	\$ 23,462.36	0

Meetings and 44 CFR Part 66 Compliance:

Initial contact with the communities began in September 2015. 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 November 5, 2015 from 1:30 – 5:00 pm at the Laurel-Jones County EMA Office, 22 Mason Street, Laurel, 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 18 people were in attendance at the meeting, including representatives of Forrest, Jasper, Jones, Perry, Wayne counties, and several municipalities. Additional partners and stakeholders were also in attendance including representatives of MEMA and MDEQ. The discussion was stimulated using the effective FIRM and Discovery Map’s display of relevant data available in Appendix B. Attendees cooperatively identified areas of concern where new study information is requested. The final study streams are shown in Appendix C. See Appendix B for pertinent Discovery meeting information including sign-in sheets, meeting notes, presentation and other documentation.

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

Part 66 compliance:

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

National Flood Insurance Program (NFIP) Compliance:

According to the most recent Community Assistance Visits, all participating NFIP communities have adopted Flood Damage Prevention Ordinances that are compliant with the minimum standards established by federal code. Mississippi communities require an official paper copy of a revised Flood Insurance Study from the Map Service Center for adoption.

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

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
Forrest County Hazard Mitigation Plan – including the jurisdictions of Forrest County, the City of Hattiesburg, and the City of Petal	Section 5. Mitigation Strategies – lists community education, the development and maintenance of facilities and infrastructure, enhanced response procedures and capabilities, and the utilization of technology to protect and develop records and data as specific actions for addressing flood hazard for Forrest County and incorporated areas
Greene County Multi-Jurisdictional Hazard Mitigation Plan – Includes hazard mitigation plan for Greene County, Town of McLain	Section 8. Community Goals and Mitigation Actions – lists public education, enhanced ability to mitigate potential loss of revenue from civil hazards, investment in community facilities and infrastructure, enhanced preparedness strategies to reduce death, injury, property damage, infrastructure damage, response costs, and recovery costs, ensuring structures are not built in the floodplain, enhancement and maintenance of storm water controls, ensured secure operation of water wells, water tanks, and wastewater treatment facilities, and encouraged participation in the

Community / HMP Title	Identified Areas of Mitigation Interest
	NFIP as specific actions for addressing flood hazard for Greene County and incorporated areas
Jasper County Mississippi Hazard Mitigation Plan – Includes hazard mitigation plan for Jasper County and the cities of Bay Springs and Heidelberg and the towns of Louin and Montrose	Section 13. Mitigation Strategies and Plans – lists community education, encouraged participation in the NFIP, and access to grant and loan funds provided by the Rural Utilities Service (RUS) to help accomplish several projects involving water, sewer, storm water, and solid waste disposal facilities as specific actions for addressing flood hazard for Jasper County and incorporated areas.
MEMA District 8 Regional Hazard Mitigation Plan – Includes mitigation plan for Jones County, Perry County, and Wayne County	Section 8. Mitigation Strategy – lists developing a sustainable, comprehensive mitigation program, reducing or avoiding loss of life, injury, and damage to property, the economy, and the environment, enhancing preparedness and effective response to hazards, strengthening and improving local mitigation capabilities, and increasing public awareness of hazard mitigation, hazard risk, and protective measures that can be taken to minimize potential loss and damage as specific actions for addressing flood hazard for MEMA District 8

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, and similar policy measures.

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
Jasper County	I. Community Education/Outreach II. Hazard mitigation grant III. New/Revised Zone A study
Laurel, City of	I. New/Revised Zone AE study (establish BFE) II. Repetitive loss
Perry County	I. Freeboard II. Community Education/Outreach III. Repetitive loss mitigation strategy

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 Lower Leaf 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 Lower Leaf Watershed

	Zone AE			Zone A		
	Verified	Unverified	Unknown	Verified	Unverified	Unknown
Effective Stream Mileage	71.8	26.9	0.0	854.5	0.0	311.6
Stream Mileage to Remain Unchanged by This Study	71.8	0.0	0.0	818.0	0.0	305.2
Mileage that is Updated by This Study	0.0	26.9	0.0	36.5	0.0	6.4
Mileage that is Redelineated by This Study	0.0	0.0	0.0	0.0	0.0	0.0
Mileage That is Added by This Study (New or Leveraged) ¹	1.1	0.0	0.0	0.0	0.0	0.0
Total Stream Mileage After Current Study	142.7	0.0	0.0	818.0	0.0	305.2

¹ 1.1 miles of detail study on current unverified Zone AE that was not accounted for in CNMS.

Floodplain Boundary Standards

In general, the population density of the Lower Leaf Watershed is about average for the state. Population is concentrated in municipalities, especially the cities located in Forrest and Jones Counties. Based on the current plan of work, the Risk Class for this study will vary between A and B. Updated studies in fully developed areas, such as Gordons Creek Tributary in Hattiesburg, are expected to be in Risk Class A. Studies in less developed areas, but with growth potential, such as Priests Creek Tributary 1, are expected to fall in Risk Class B. None of the proposed studies is viewed as a strong candidate for Risk Class C. One possibility is the Leaf River study between New Augusta and Hattiesburg. But the U.S. Highway 98 and Canadian National Railroad adjacent to this reach keep the development potential elevated. 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 Lower Leaf watershed is 926.2 miles. This study is anticipated to include 70.9 miles of updated riverine study. Of this total, 34.4 miles will apply toward unverified or unknown streams in the watershed, while the remainder will upgrade model-backed Zone A streams to Zone AE. We anticipate the total number of stream miles meeting FBS at the conclusion of this project to be 960.7.

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)	960.7
Updated Effective Studies, New, Verified, or Updated Engineering (NVUE)	Estimated number of miles that will meet NVUE requirements for the new FIS	70.9
Area (based on average estimated floodplain width of 0.45 miles)	Area in square miles being mapped with new FIS	31.9 Sq. Miles
Population (Based on watershed population density)	Population being mapped with new FIS	2,363

1.2 Project Summary

The Coordinated Needs Management Strategy (CNMS) analysis revealed several detailed study streams within the watershed that are non-NVUE compliant. Most of these are older studies in and around the municipalities of Jones County. Bulldog Branch, a tributary of Tallahoma Creek, is not part of the CNMS database, but the backwater flooding shown on the effective FIRM was questioned by the City of Laurel floodplain manager. Assessment revealed that the backwater flooding would not account for the SFHA as shown, so a new detailed study is proposed to correct this error.

This project endeavors to re-study all unverified Zone AE studies, and also to upgrade several Zone A streams to AE, at the request of the communities. Most of the upgraded Zone A studies are located in southern Hattiesburg, in an area of industrial development. Problems with edge-matching across county boundaries are not as prevalent with the Lower Leaf watershed as have been found in other recent projects. One such Zone A/AE discrepancy across Perry and Greene counties will be resolved by the updated detailed study of the Leaf River in the vicinity of McLain. Except for Bulldog Branch, no new studies of currently unstudied streams are proposed at this time. The Discovery Map titled “Mapping Needs: Lower Leaf 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
Bee Branch	A	From 0.28 miles downstream of Sharon Road to Lakeview Road	1.85	New AE w/o floodway	BFE's strongly desired by city
Bulldog Branch	AE	From confluence with Tallahoma Creek to 0.14 miles upstream of Flynt Road	1.13	New AE w/o floodway	Entire length shown as backwater which is in error
Burketts Creek	A	From 0.62 miles downstream of James Street to 0.76 miles upstream of U.S. Hwy 11	6.38	New AE w/o floodway	BFE's strongly desired by city
Burketts Creek Tributary 1	A	From confluence with Burketts Creek to 0.27 miles upstream of U.S. Hwy 49	1.92	New AE w/o floodway	BFE's strongly desired by city
Country Club Tributary 1	AE	From confluence with Tallahala Creek to 0.68 miles upstream of U.S. Hwy 84	4.49	Revised AE w/ floodway	Unverified per CNMS
Gardiner Park Tributary	AE	From confluence with Tallahala Creek to 0.17 miles upstream of 21 st Street	2.82	Revised AE w/ floodway	Unverified per CNMS
Gordons Creek Tributary	AE	From confluence with Gordons Creek to 0.18 miles upstream of 34 th Avenue	1.79	Revised AE w/o floodway	Unverified per CNMS
Leaf River	AE	From 1.1 miles downstream of U.S. Hwy 98 to about 3.3 miles upstream of Old MS Hwy 24	7.32	Revised AE w/o floodway	Unverified per CNMS, correct discrepancy
Leaf River	A	From 3.3 miles upstream of MS Rte 29 (Perry County) to about 1.6 miles upstream of confluence of Priests Creek (Forrest County)	17.56	New AE w/ floodway	Tie-in to upstream AE (w/ floodway) required
Priests Creek Tributary 1	A	From confluence with Priest Creek to 0.42 miles upstream of Dover Trace	1.20	New AE w/o floodway	BFE's strongly desired by city
Priests Creek	A	From 0.28 miles downstream of James Street to 1.41 miles upstream of Bonhomie Road	6.74	New AE w/o floodway	BFE's strongly desired by city
Rocky Creek Tributary 2	AE	From confluence with Rocky Creek to 0.04 miles upstream of Royal Street	0.92	Revised AE w/ floodway	Unverified per CNMS
Rocky Creek Tributary 3	AE	From confluence with Rocky Creek Tributary 2 to 0.08 miles upstream of Fridge Street	0.51	Revised AE w/ floodway	Unverified per CNMS
Tallahala Creek	AE	From 0.2 miles downstream of Tuckers Crossing Road to 1.95 miles upstream of Tuckers Crossing Road	1.97	Revised AE w/ floodway	Unverified per CNMS
Tallahala Creek	AE	From 0.59 miles upstream of U.S. Hwy 84 to 1.72 miles upstream of U.S. Hwy 11	3.91	Revised AE w/ floodway	Unverified per CNMS
Tallahala Creek	A	From 0.1 miles downstream of confluence with unnamed stream	3.67	New AE w/ floodway	Tie-in to upstream AE (w/ floodway)

Table 5: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
		to 0.35 miles upstream of confluence with unnamed stream			required
Tallahoma Creek	A	From Interstate 59 to 0.95 miles upstream of Burnt Bridge Road	2.76	New AE w/ floodway	Tie-in to upstream AE (w/ floodway) required
Tallahoma Creek Tributary 1	AE	From confluence with Tallahoma Creek to 0.12 miles upstream of U.S. Hwy 11	1.44	Revised AE w/ floodway	Unverified per CNMS
Tallahoma Creek Tributary 2	AE	From confluence with Tallahoma Creek Tributary 2 to 0.06 miles upstream of Elm Street	0.19	Revised AE w/ floodway	Unverified per CNMS
Thompson Creek Tributary	A	From 0.34 miles downstream of MS Hwy 14 to 0.1 miles upstream of Pecan Street	0.82	New AE w/o floodway	BFE's desired by city
Unnamed Tributary No. 1	AE	From confluence with Leaf River to 5 th Avenue	1.53	Revised AE w/ floodway	Unverified per CNMS

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	71.9	25.0	1168.2		
Updated Effective Studies	41.8	28.0	0.0	0.0	0.0
New Studies Identified	0.0	1.1	0.0		

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

Table 7: Proposed FIRM Panel updates

DFIRM_ID	CO_NAME	FIRM_PAN	SCALE	EFF_DATE
28035C	Forrest	28035C0104D	6000	3/2/2010
		28035C0109D	6000	
		28035C0114D	6000	
		28035C0116D	6000	
		28035C0117D	6000	
		28035C0118D	6000	
		28035C0119D	6000	
		28035C0140D	12000	
		28035C0180D	12000	
		28035C0185D	12000	
28041C	Greene	28041C0215D	12000	1/6/2012
		28041C0220D	12000	
		28041C0302D	6000	
		28041C0310D	12000	
28067C	Jones	28067C0182E	6000	9/29/2010
		28067C0183E	6000	
		28067C0184E	6000	
		28067C0190E	12000	
		28067C0191E	6000	
		28067C0192E	6000	
		28067C0195E	12000	
		28067C0201E	6000	
		28067C0203E	6000	
		28067C0305E	12000	
28067C0310E	12000			
28111C	Perry	28111C0155D	12000	12/16/2011
		28111C0160D	12000	
		28111C0225D	24000	
		28111C0230D	12000	
		28111C0400D	24000	

Several counties in Mississippi and the State have entered into a joint agreement for orthophoto acquisition and processing. One county in the Lower Leaf watershed, Forrest, was included as part of the 2013 leaf-off acquisition project. The pixel resolution 6-inch. No other watershed counties are planned for new orthophoto flights at this time. Most likely they will utilize a lower resolution imagery, such as the National Agriculture Imagery Program. This program should produce 1-meter pixel imagery in the summer of 2016, with products released in late 2016.

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
Base Map Preparation—Base Map Data (1-foot Orthophotos)	\$17,000	\$ 8,500	33%	\$ 25,500

2 Watershed Stakeholder Coordination

The population in the Lower Leaf Watershed is distributed between 14 autonomous jurisdictions. Many of these jurisdictions have only a portion of their geographic extents within the watershed, including the cities of Bay Springs, Hattiesburg, and Petal, and the towns of Montrose, Louin, and Soso. Most of the population in the watershed resides in Jones County. To communicate effectively throughout the life of a possible Risk MAP project in this Watershed, the use of e-mail, telephone, and letters will be essential. A master or central list of stakeholders in the communities within Lower Leaf 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 Forrest, Greene, Jasper, Jones, Lamar, Perry, and Wayne counties were invited to participate in the Discovery Meeting. Representatives of various other regional, state, and federal agencies were also encouraged to participate. See Appendix A for a complete list of the stakeholders who were invited to the Discovery Meetings.

The communities invited to participate in the Discovery effort are listed in Table 9. Of these 24 communities, only 12 communities attended. Follow up with communities that did not attend was attempted by letter dated February 1, 2016. An example of the letter is included in Appendix A.

Table 9: Communities in the Lower Leaf Watershed

County	Community	Municipality Type
Forrest	Forrest County	County
Forrest	Hattiesburg	City
Forrest	Petal	City
Greene	Greene County	County
Greene	McLain	Town
Jasper	Bay Springs	City
Jasper	Heidelberg	Town
Jasper	Jasper County	County
Jasper	Louin	Town
Jasper	Montrose	Town
Jones	Ellisville	City

County	Community	Municipality Type
Jones	Jones County	County
Jones	Laurel	City
Jones	Sandersville	Town
Jones	Soso	Town
Lamar	Lamar County	County
Perry	Beaumont	Town
Perry	New Augusta	Town
Perry	Perry County	County
Perry	Richton	Town
Wayne	Wayne County	County

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

The project team worked with FEMA Region IV and the State National Flood Insurance Program (NFIP) Coordinator and State Hazard Mitigation Officers to compile the stakeholder list for the Lower Leaf 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.

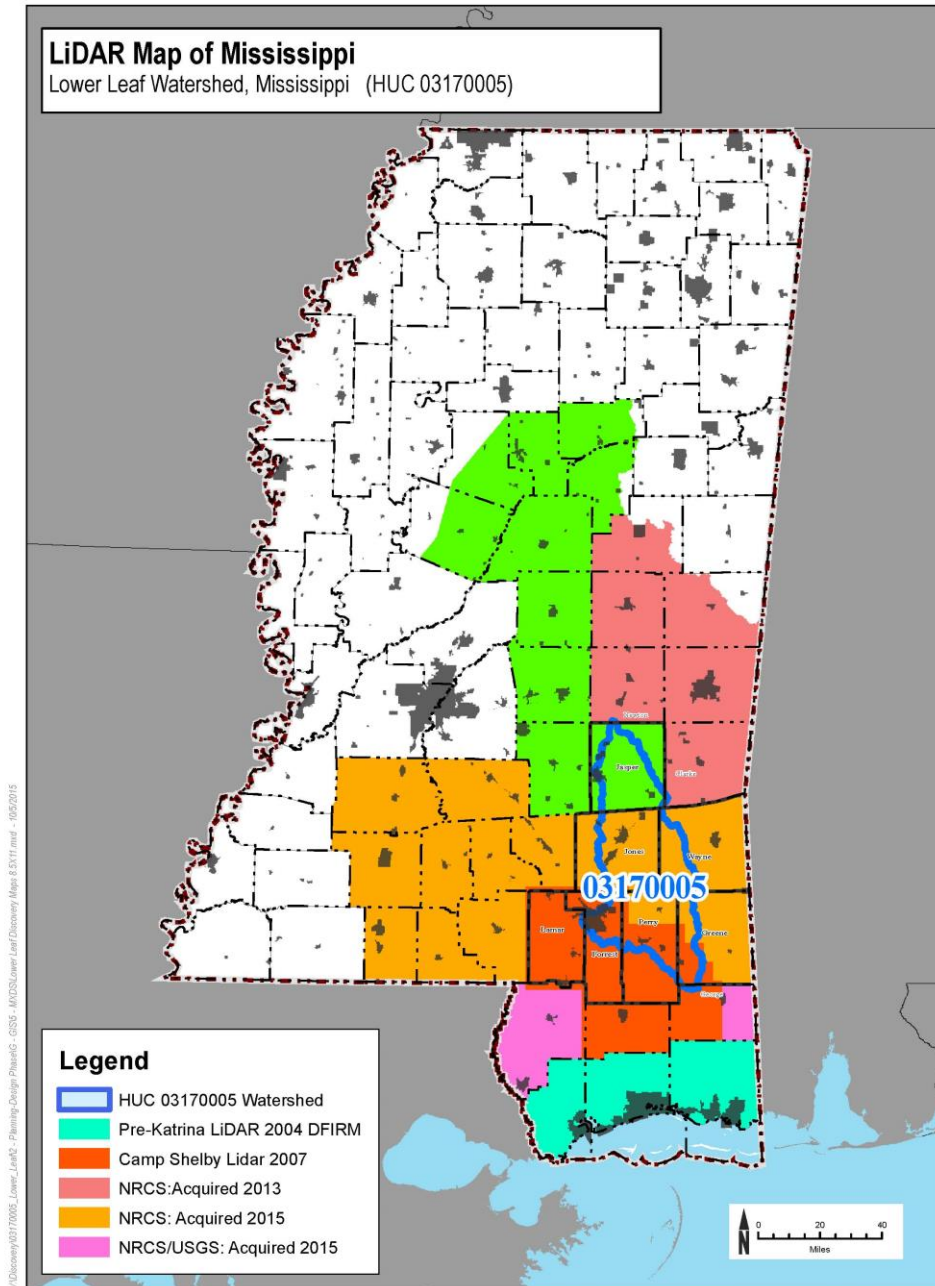
3.1.2 Topographic Data

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

Forrest County and the southern portions of Perry and Greene County are covered by the Camp Shelby 2007 project, completed by Earth Data International for the State of Mississippi. The data was collected at a nominal point spacing of 3-meters, with a vertical root mean square error of 18.5 centimeters. The coverage for Jasper County was produced by Woolpert, LLP for the USGS in 2014. The data was collected at a 0.7-meter point spacing, with a fundamental vertical accuracy of 12.9 centimeters at the 95% confidence level. The coverage for Jones, Wayne, and the remainder of Perry and Greene counties was also performed by Woolpert, LLP for the USGS. This project was completed in 2015, and the fundamental vertical accuracy is 15.8 centimeters at the 95% confidence level. This data was also collected at a 0.7-meter spacing.

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

Figure 2: LiDAR coverage for the Lower Leaf Watershed



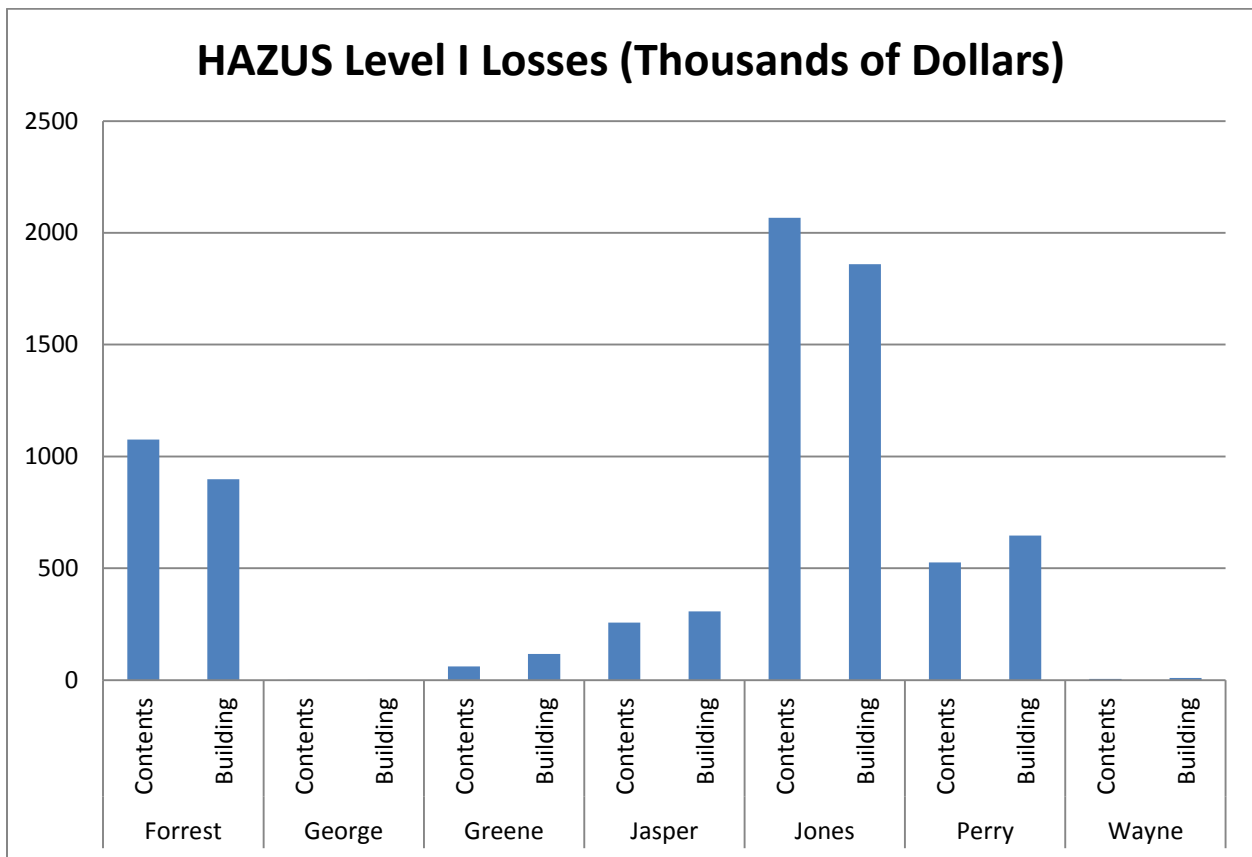
3.1.3 Average Annualized Loss (AAL) / HAZUS

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

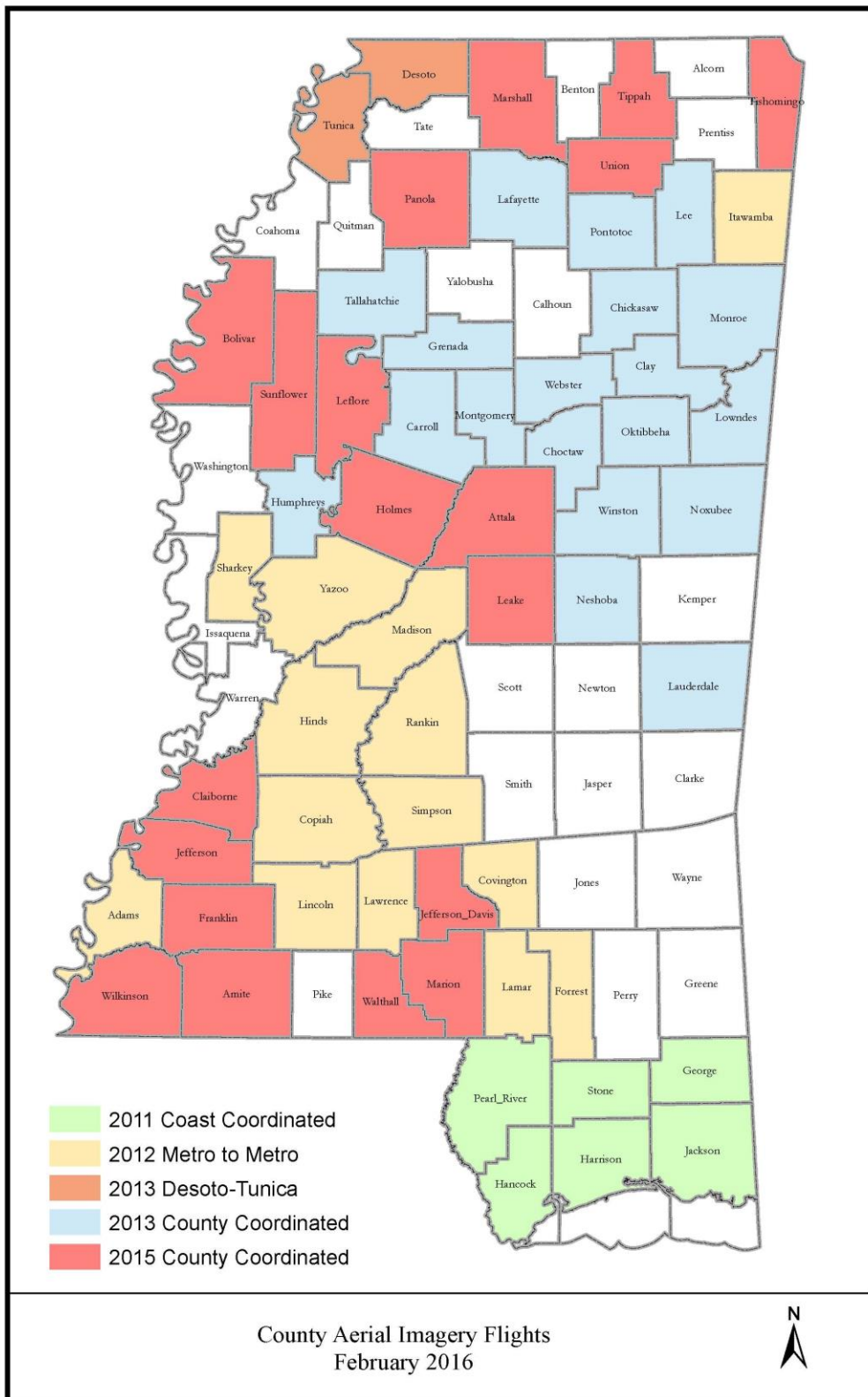
resolution waterlines/waterbodies data produced for the northern portion of the Lower Leaf watershed (mostly Jasper County) that the State of Mississippi has procured. Hydrography data covering additional areas of the watershed is likely to be developed in the near future and will be utilized for this Risk MAP project as the delivery schedule. Figure 3 also displays recent county orthoimagery collections, coordinated at the State level that can be used to support data development.

Table 10: GIS Data Layers Available

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

Mitigation Projects: Recent, ongoing, planned, desired FEMA/OFA/local projects	Discovery Map Geodatabase	NAD83	n	FEMA RIV	Non- regulatory
Stream Gages	Discovery Map Geodatabase	NAD83	n	U.S. Geologic Survey, USACE	Non- regulatory
Study Needs: FEMA	Discovery Map Geodatabase	NAD83	n	Coordinated Needs Management System (CNMS)	Regulatory
Study Needs: Recent, ongoing, planned, desired FEMA/OFA/local studies	Discovery Map Geodatabase	NAD83	n	various	Regulatory
Topographic Availability	Discovery Map Geodatabase	NAD83	n	Mississippi Digital Earth Model	Non- regulatory
Transportation: Railroads	Discovery Map Geodatabase	NAD83	n	Mississippi Automated Resource Information System	Non- regulatory
Transportation: Roads	Discovery Map Geodatabase	NAD83	n	Mississippi Digital Earth Model	Non- regulatory
Community Contacts	Excel Spreadsheets	n/a	n	Local websites, State/FEMA updates	Non- regulatory
Cadastral	PDF Document	undefined	y	Local (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.

3.2.1 Mitigation Plans/Status and Mitigation Projects

A Hazard Mitigation Plan is a document that assesses the potential hazards which could occur within communities and it typically includes a detailed list of “Mitigation Actions” that could be taken to prepare the communities for these possible hazards. The Plan must be updated every 5

years and it includes detailed descriptions of mitigation goals and project implementation. The status of current hazard mitigation plans is shown in Table 11 below.

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

Table 11: Status of Hazard Mitigation Plans

Community	Hazard Mitigation Plan Status	Plan Developer	Plan Type
Forrest County	Effective until Feb. 2019	Forrest County Planning Department	Multi-Jurisdictional (MJ)
Greene County	Effective until Dec. 2015	Greene County Hazard Mitigation Council	MJ
Jasper County	Effective until Aug. 2017	East Central Planning and Development District	MJ
Jones County	Effective until July 2019	Atkins	MJ
Lamar County	Effective until April 2018	Lamar County	MJ
Perry County	Effective until July 2019	Atkins	MJ
Wayne County	Effective until July 2019	Atkins	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

County	Approximate			Detailed		Total Stream miles
	Valid	Unverified	Unknown	Valid	Unverified	
Forrest	328.3	0	0	67.9	23.2	419.4
Greene	524.8	0	0	9.3	5.4	539.5
Jasper	416.0	0	0	0	0	416.0
Jones	58.0	0	426.4	43.6	16.4	544.4
Lamar	366.7	0	0	20.1	23.1	409.9
Perry	432.2	0	0	9.6	0	441.8
Wayne	558.9	0	0	12.3	0	571.2

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

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

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

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

3.2.3 Socio-Economic Analysis

More than 40% percent of the watershed population is located within the cities of Hattiesburg, Petal, and Laurel. Of the unincorporated areas, Jones County has the highest percentage of total population for the watershed (24.87%). None of the other counties comprise more than 7% percent of the total watershed population. Population density in and out of the municipalities is about equal with 51.27% residing within and 48.7% out. Specific population breakdown of the watershed is given in Table 13.

Table 13: Population Statistics in the Lower Leaf Watershed

County	FIPS Code ¹	CID ²	Community Name	2010 Watershed Population ³	% of Total Population within Watershed
Forrest	28035	280052	Forrest County	8006	5.92
Forrest	28035	280053	Hattiesburg, City of	32736	24.22
Forrest	28035	280260	Petal, City of	7784	5.76
Greene	28041	280271	Greene County	2727	2.02
Greene	28041	280058	McLain, Town of	441	0.33
Jasper	28061	280087	Bay Springs, Town of	719	0.53
Jasper	28061	280302	Jasper County	9065	6.70
Jasper	28061	280088	Heidelberg, Town of	719	0.53
Jasper	28061	280243	Montrose, Town of	137	0.10
Jasper	28061	280316	Louin, Town of	165	0.12
Jones	28067	280091	Ellisville, City of	4448	3.29
Jones	28067	280222	Jones County	33622	24.87
Jones	28067	280092	Laurel, City of	18540	13.71
Jones	28067	280404	Sandersville, Town of	761	0.56
Jones	28067	280363	Soso, Town of	218	0.16
Lamar	28073	280304	Lamar County	1673	1.24
Perry	28111	280203	Beaumont, City of	951	0.70
Perry	28111	280131	New Augusta, City of	644	0.48
Perry	28111	280233	Perry County	8313	6.15
Perry	28111	280321	Richton, Town of	1055	0.78
Wayne	28153	280238	Wayne County	2436	1.80
TOTAL				135188	100%

Source: U.S. Census Bureau, 2010

¹ FIPS = Federal Information Processing Standard

² CID = Community Identification (Number)

³ Denotes estimated population of the community within the Lower Leaf Watershed

Table 14 lists the median and mean incomes in counties within the watershed. All of these counties' family income fall around the state median of \$36,919 with the exception of Lamar county which falls well above, and Wayne County, which falls below.

Table 14: Income Statistics in the Lower Leaf Watershed

County	Median Family Income (dollars)	Mean Family Income (dollars)
Forrest	36,726	51,397
Greene	36,888	46,104
Jasper	31,170	43,376
Jones	38,074	51,747
Lamar	51,154	67,740
Perry	36,124	50,074
Wayne	29,925	48,381

The percent of employment by industry in the Lower Leaf Watershed counties is listed in Table 15. As can be seen, more than half of the working population in the watershed is employed in the counties of Forrest, Jones, and Lamar. Most of the population is employed within the education and health care industry followed by manufacturing services. These figures are estimates derived from whole county data, adjusted in accordance with the watershed population estimates in Table 13.

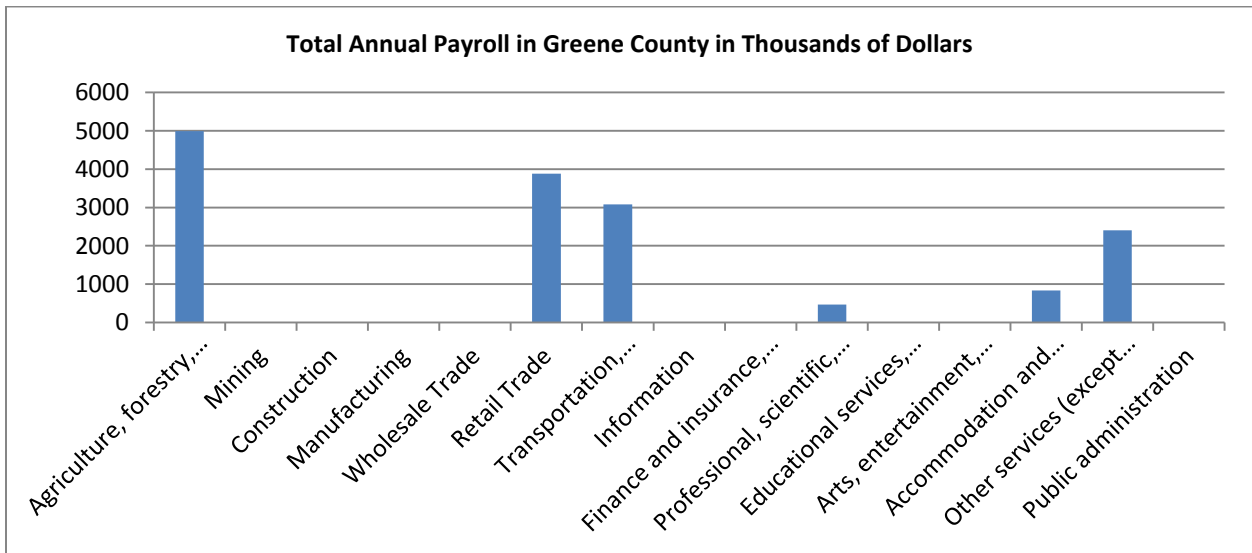
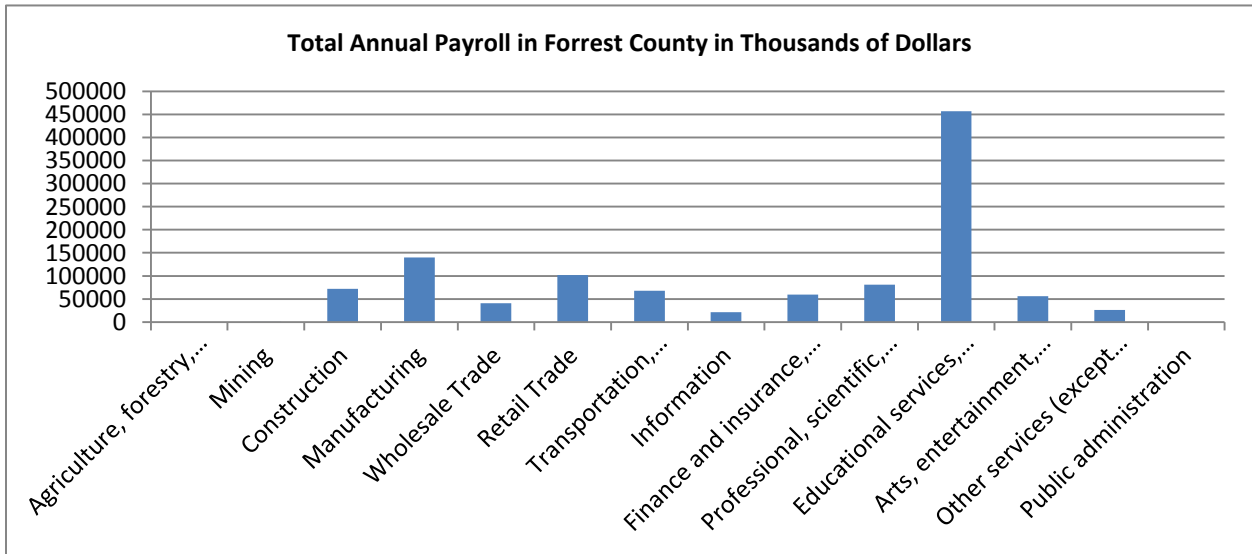
Table 15: Percentage of Employment in the Watershed by Industry

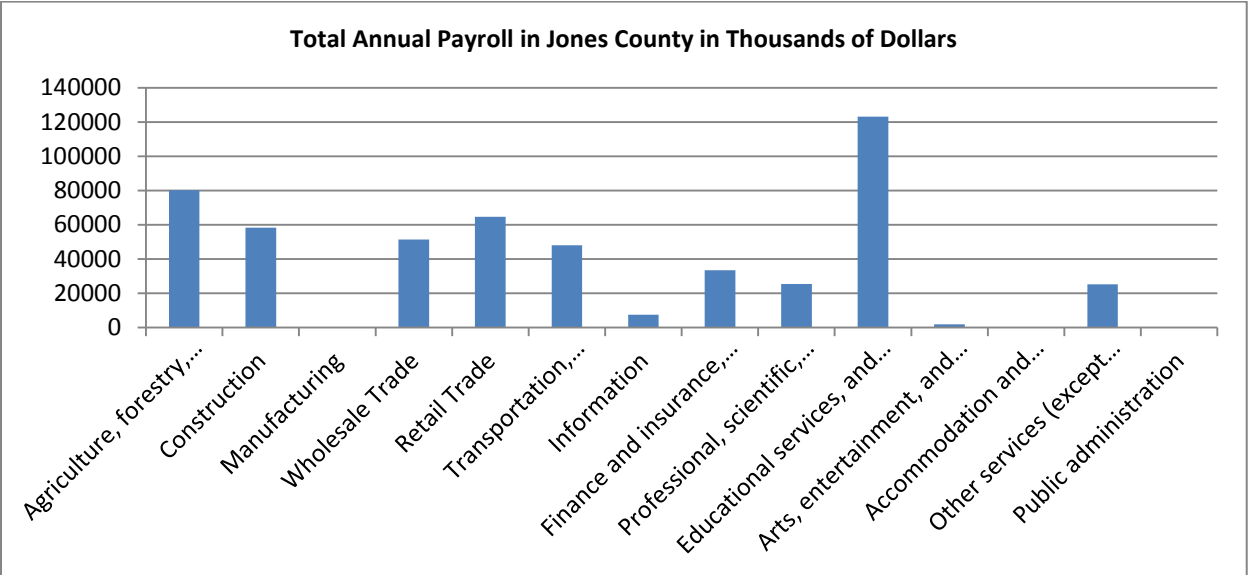
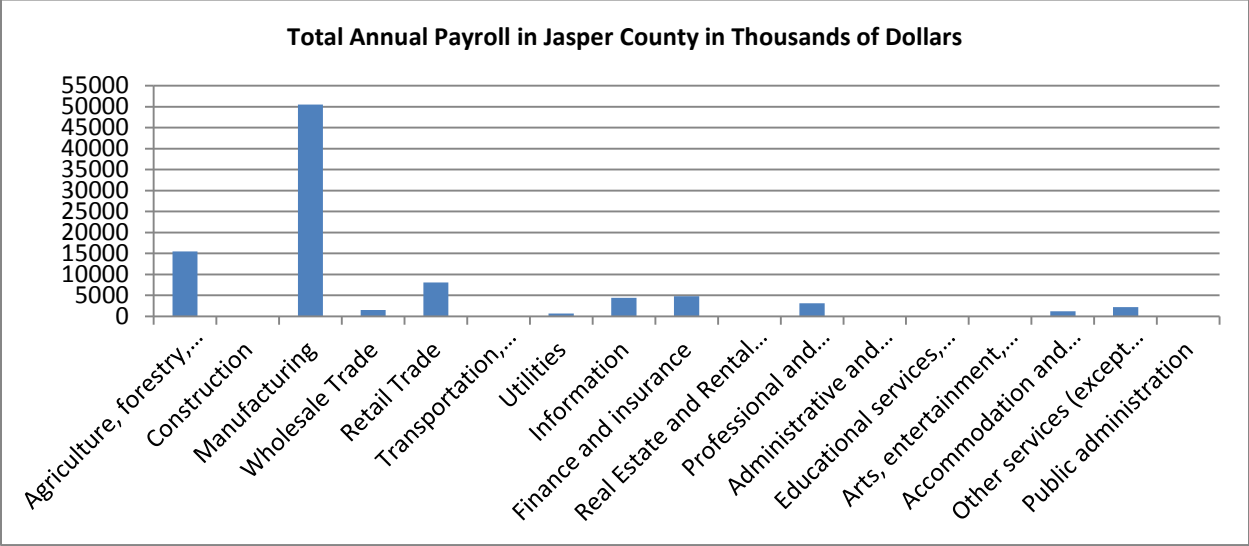
Industry Employment Groups	Forrest County	Greene County	Jasper County	Jones County	Lamar County	Perry County	Wayne County	Combined All Counties
Agriculture, forestry, fishing and hunting, and mining	2.54%	8.84%	7.68%	6.48%	2.74%	3.68%	15.39%	5.26%
Construction	6.30%	17.62%	6.85%	6.52%	7.26%	13.88%	6.99%	7.37%
Manufacturing	8.67%	10.53%	29.11%	20.28%	9.73%	18.18%	20.96%	14.35%
Wholesale trade	2.20%	2.91%	3.90%	2.98%	2.84%	1.72%	2.57%	2.69%
Retail trade	13.89%	9.90%	4.75%	9.42%	13.37%	13.31%	9.56%	11.63%
Transportation, warehousing, and utilities	4.36%	5.04%	4.20%	4.28%	5.05%	3.83%	5.18%	4.57%
Information	1.03%	0.47%	2.15%	1.06%	0.48%	0.00%	0.22%	0.85%

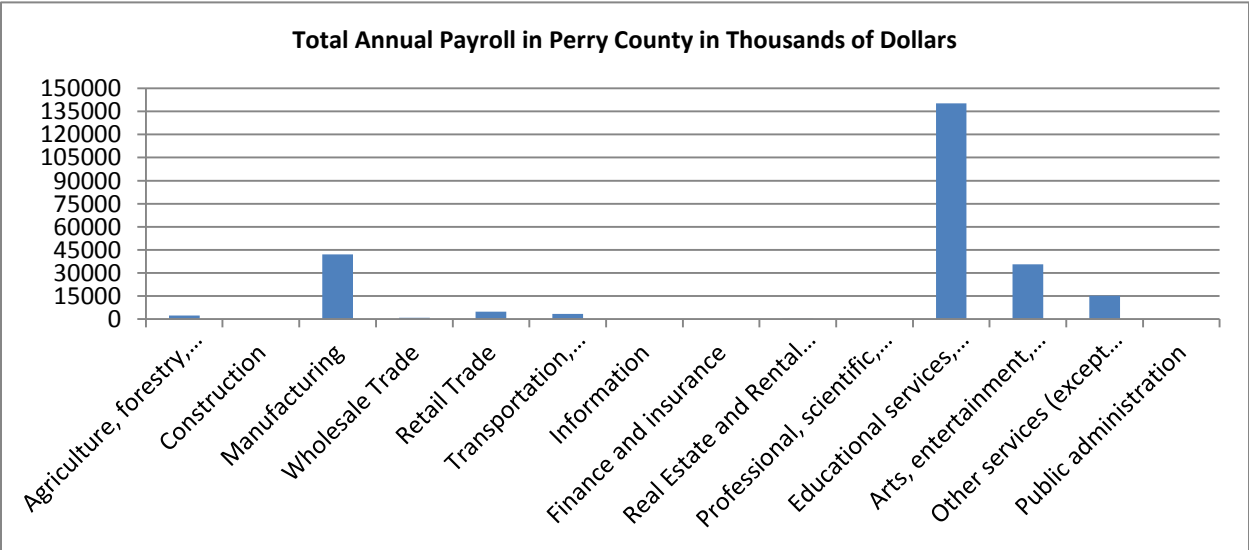
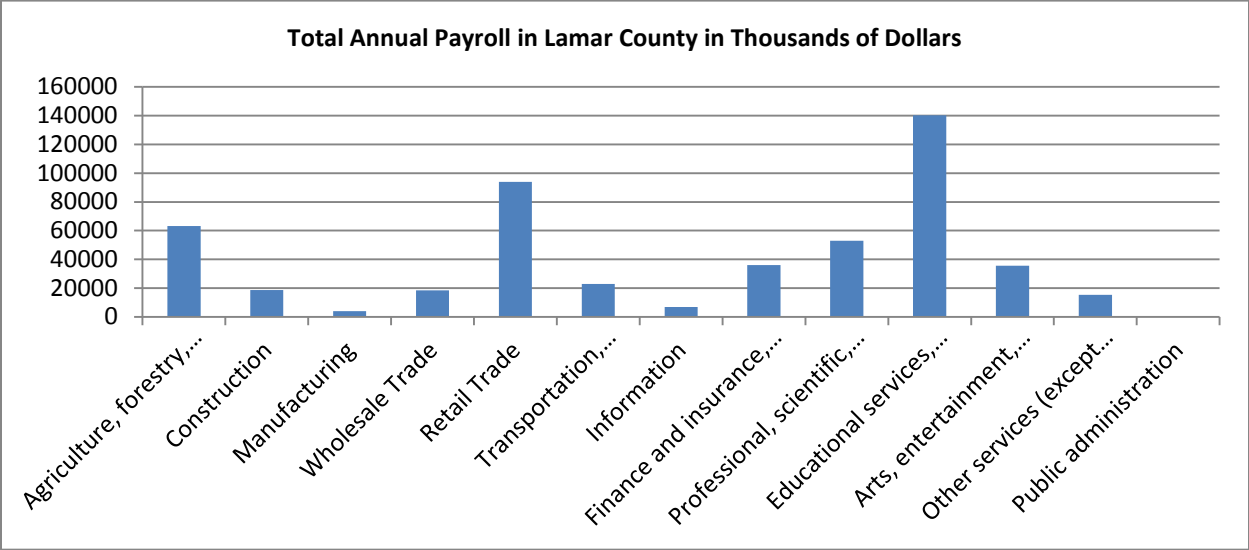
Industry Employment Groups	Forrest County	Greene County	Jasper County	Jones County	Lamar County	Perry County	Wayne County	Combined All Counties
Finance and insurance, and real estate and rental and leasing	4.84%	4.78%	4.34%	3.95%	6.47%	2.06%	3.85%	4.81%
Professional, scientific, and administrative and waste management services	6.58%	6.45%	2.73%	4.91%	5.19%	2.48%	2.43%	5.14%
Educational services, health care and social assistance	29.02%	19.81%	22.86%	23.98%	28.90%	23.16%	18.99%	26.10%
Arts, entertainment, recreation, and accommodation and food services	11.59%	0.83%	4.95%	6.98%	7.88%	6.56%	3.80%	7.99%
Other services (except public administration)	4.69%	3.35%	2.08%	6.06%	6.09%	4.99%	4.91	5.20%
Public administration	4.29%	9.46%	4.39%	3.10%	4.00%	6.14%	5.14%	4.24%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%

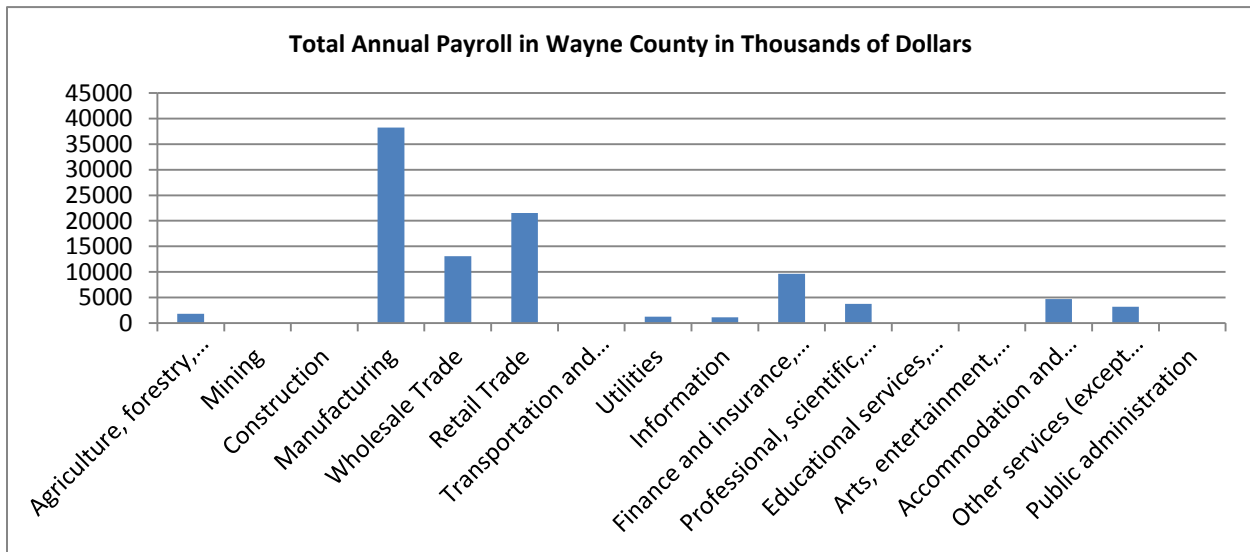
Figure 5 lists the Industries in the Lower Leaf Watershed Counties contributing to the total annual payroll.

Figure 5: Total Annual Payroll in Lower Leaf Watershed by County









It should be noted that these economic figures are based on the entirety of the County/community, and not just the portion located in the Lower Leaf 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. Also, it should be noted that in some cases, industry categories have been combined to reflect the economic figures provided.

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, excluding The Towns of Montrose, Louin, Sandersville, and Soso participate in the NFIP. Of these 17 participants, Lamar County (with a rating of 8) is the only one listed in the CRS Program as of May, 2014. 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

No major levee systems are known to exist in the Lower Leaf watershed. One small levee system known as the Hattiesburg Lagoons Levee, was de-accredited and the two affected FIRM panels

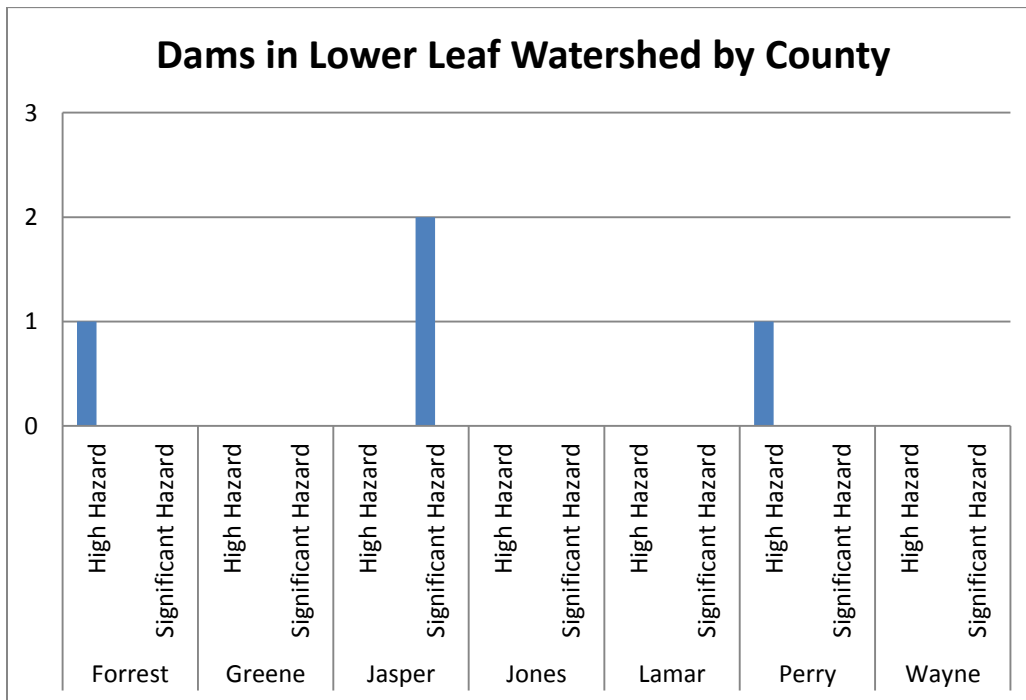
revised as a separate project. Information on the Hattiesburg Lagoons is given in the Table 16 below.

Table 16: Levees in the Lower Leaf watershed

LEEVE NAME	COUNTIES	CERTIFICATION ISSUES	COMMENTS
Hattiesburg Lagoons	Forrest	Not certified	Revised panels 28035C0109E and 28035C0117E, dated March 16, 2015, remove shaded Zone X from inside lagoons

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 2 dams in the Lower Leaf watershed classified as significant hazard, and 2 classified or suspected 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 Lower Leaf Watershed** shows the distribution of significant and high hazard dams per county. The largest number by far occurs in DeSoto County. The majority of these dams were as water features for private developments or neighborhoods and may not have been receiving regular inspections and maintenance.

Figure 6: Dams in Lower Leaf Watershed



As of the drafting of this report, 1 of the 2 classified or suspected 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. The dam that did have an Emergency Action Plan on file includes a full breach analysis. 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 Gage Information

The USGS, along with agency partners, provides surface water flow data for several locations within the Lower Leaf watershed. Table 17 lists the period of record, gage identification number, and location for both current and historical stream gages in the Lower Leaf watershed. Twelve total gages are located within the Lower Leaf Watershed, and seven of these provide real-time flow estimates that can be used for National Weather Service flood forecasting. The stage gages on the Leaf River and Tallahalla Creek would be very useful for model calibrations of proposed new or updated study along these streams.

Table 17: Stream gages in the Lower Leaf Watershed

Period of Record	Gage ID	Gage Location	County	Latitude	Longitude
1961-2014	02473460	Tallahala Creek at Waldrup, MS	Jasper	31.966111	-89.115000
1965-2015	02473480	Tallahattah Creek near Waldrup, MS	Jasper	31.861389	-89.086667
1938-2015	02473500	Tallahala Creek at Laurel, MS	Jones	31.680556	-89.115556
1974-1984	02473610	Tallahala Creek Tributary No. 2 at Grandview at Laurel, MS	Jones	31.678889	-89.155278
1964-2015	02473850	Tallahoma Creek Tributary at Lake Como, MS	Jasper	31.961944	-89.205278
1941-2015	02474600	Bogue Homo near Richton, MS	Perry	31.403611	-89.021667
1900-2014	02473000	Leaf River at Hattiesburg, MS	Forrest	31.343056	-89.280278
1940-2014	02474500	Tallahala Creek near Runnelstown, MS	Perry	31.332778	-89.112500
1900-2014	02474560	Leaf River near New Augusta, MS	Perry	31.221667	-89.053056
1951-2015	02474650	Buck Creek near Runnelstown, MS	Perry	31.363889	-89.052222
1900-1976	02474740	Leaf River at Beaumont, MS	Perry	31.182222	-88.918889
1938-2014	02475000	Leaf River near McLain, MS	Greene	31.102778	-88.808333

3.2.7 High Water Marks and Historic Flooding

Most of the gages presented in the previous section have a historical high measurement that can be gleaned from the record. For the USGS stage gages, the record stage is listed for most stations, and a number of the sites along the Lower Leaf are associated with the Hattiesburg Flood of 1961.

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

3.2.7.1 Forrest County Historic flooding

The Forrest County FIS identifies overflow of the Leaf and Bowie Rivers into low-lying areas as the cause of the most severe flood problems. The severest flooding of the Leaf and Bowie Rivers generally occurs in early spring as a result of rainfall from large frontal systems. Issues from flooding have also been increasing due to growth and development throughout the county.

The latest flooding to occur in the Leaf River floodplain were in 1960, 1974, and twice in 1980 – one in March and one in April with the affected areas declared disaster areas during the April flood. Other factors contribute to flooding in the City of Hattiesburg, including bridges and undersized culverts that easily become constricted from debris at the structures.

In June 1987, the U.S. Army Corps of Engineers (USACE) complete major structural flood protection measures on the Leaf River near Hattiesburg. The measures included clearing and snagging in the channel and selective clearing in the overbank area from a point upstream of U.S. Highway 11 at the confluence of the Leaf and Bowie Rivers to a point 12,500 feet downstream. Other protective measures included removal of a sewage lagoon located in the City of Hattiesburg, the removal of other structural obstructions in the floodplain, and erosion protection with the placement of riprap and bedding material within the riverbank and along the river bottom at the Norfolk Southern Railway and Hardy Street bridges. The lower 2.5 miles of Gordons Creek was rechanneled by the USACE in 1978.

3.2.7.2 Greene County Historic flooding

The Greene County FIS identifies the Chickasawhay and Leaf Rivers as the major sources of drainage for Greene County. The Town of McLain is largely burdened by the floodplain of the Leaf River; however, no flood protection measures are known to exist within the study area.

3.2.7.3 Jasper County Historic flooding

The Jasper County FIS identifies the flooding of streams which provide major drainage for Jasper County as the primary cause of flooding issues and that there have been no known flood protection measures taken within the study area.

3.2.7.4 Jones County Historic flooding

The Jones County FIS indicates that the main flooding sources affecting Jones County are the Bogue Homo 1, the Leaf River, and Tallahala Creek. Of the three, Tallahala Creek has been the source of the most damaging floods.

On April 15, 1974, the City of Laurel experienced record flooding when the Tallahala Creek crested at 224.65 feet (NGVD 1929). Near-record stage floods in Laurel, produced by the Tallahala, also occurred in April and December of 1973. This flooding is caused by frontal storms occurring in winter and spring, which typically last 2 to 4 days.

From 1985 to 1986, the City of Ellisville suffered from several major storms which caused flooding in bottom lands along streams. Some damage incurred in low-lying residential areas. Recently, the most damaging flood in Ellisville occurred on December 25-26, 1973, following a rainfall of 11.39 inches (NOAA, 1976).

3.2.7.5 Lamar County Historic flooding

Though historically minimal, the Lamar County FIS indicates that with the addition of many floodplain encroachments and development in the drainage basins of Mixons Creek, Mixons Creek Tributary 1, Black Creek, and Little Black Creek, flood damage is anticipated to increase.

Major flood-producing storms frequently occur in the winter and spring. In these seasons, major flooding is mostly due to the lack of vegetation and high soil moisture content of the soil which results in higher rates of storm runoff.

The Lamar County FIS also indicates that no flood protection measures are known to exist in the study area.

3.2.7.6 Perry County Historic flooding

The Perry County FIS indicates the main flooding sources affecting Perry County is the overflow of the Leaf River. In addition to the flooding of Leaf River, the Town of Beaumont is also affected by overflow of Carter Creek.

From 1942 to 1961, a streamflow gage was operated by the USGS at the State Highway 15 crossing of Leaf River. Another was operated at the Illinois Central Gulf Railroad crossing of Leaf River from 1941 to 1942. Information on flooding was also collected at this railroad crossing from 1900 to 1974.

The largest known flooding of the Leaf River at State Highway 15 in Beaumont occurred in 1900 with a crest elevation of approximately 91 feet (NAVD 1988), an estimated discharge of 150,000 cfs, and a recurrence interval greater than the 1-percent-annual-chance storm.

On February 25, 1961, the largest flood recorded at the USGS streamflow gage occurred. Its maximum elevation downstream of the bridge was 89.5 feet (NAVD) and its peak discharge was about 128,000 cfs. Approximate flood boundaries were estimated from aerial photography of the

Town of Beaumont taken near the flood’s peak. Later, in April 1974, flooding occurred which crested at an elevation of 89.0 feet (NAVD) downstream of the bridge a peak discharge of approximately 118,000 cfs. Both floods had a recurrence interval greater than the 2-percent-annual-chance storm.

According to the Perry County FIS, no known flood protection measures exist within the study area.

2.2.7.7 Wayne County Historic flooding

The Wayne County FIS indicates major flooding problems in Wayne County are primarily due to the overflow of the Chickasawhay River which flows south-southeast through the county and just to the west of the Waynesboro City limits.

The three largest annual peaks flowsto have occurred during the period of record (1937-1984) are as follows: February 26, 1961, with a crest elevation of 167.8 feet and a discharge of 58,300 cfs; April 11, 1938, with a crest elevation of 167.0 feet and an estimated discharge of 53,100 cfs; December 22, 1961, with a crest elevation of 162.2 feet and a discharge of 35,000 cfs. The peak flow, which occurred in April 1900, had a crest elevation of 170.2 feet and an estimated discharge of 73,000 cfs.

No known flood protection measures exist within the study area at the time of this FIS.

3.2.8 Declared Disasters

The major disaster declarations for the areas within the Lower Leaf 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 Lower Leaf Watershed

Date	Disaster Type	Affected County	Incident Begin Date	Incident End Date
1969	Hurricane Camille	Lamar	8/18/1969	Unknown
1974	Flooding, Heavy Rain	Jasper, Jones, Wayne	4/18/1974	4/19/1974
1979	Hurricane Frederic	Jasper, Jones, Lamar, Perry, Wayne	9/13/1979	Unknown
1980	Flooding, Severe Storm, Tornadoes, Mudslide	Forrest	4/19/1980	4/20/1980
1983	Flooding, Severe Storms, Tornadoes	Forrest, Greene, Lamar, Perry	4/16/1983	4/17/1983
1990	Flooding, Severe Storms, Tornadoes	Forrest, Greene, Jasper, Jones, Perry	1/24/1990	3/15/1990

Date	Disaster Type	Affected County	Incident Begin Date	Incident End Date
1998	Hurricane Georges	Forrest, Greene, Jasper, Jones, Lamar, Perry, Wayne	9/25/1998	10/5/1998
2003	Flooding, Severe Storms, Tornadoes	Jasper, Wayne	4/6/2003	4/25/2003
2004	Hurricane Ivan	Greene, Perry, Wayne	9/13/2004	9/20/2004
2005	Hurricane Dennis	Forrest, Greene, Jasper, Jones, Lamar, Perry, Wayne	7/10/2005	7/15/2005
2005	Hurricane Katrina	Forrest, Greene, Jasper, Jones, Lamar, Perry, Wayne	8/29/2005	10/14/2005
2008	Hurricane Gustav	Forrest	8/28/2008	9/8/2008
2009	Flooding, Severe Weather, Tornadoes	Greene, Wayne	3/25/2009	3/28/2009
2011	Flooding, Severe Storms, Tornadoes, Straight-line winds	Greene, Jasper	4/15/2011	4/28/2011
2013	Flooding, Severe Storms, Tornadoes	Forrest, Greene, Lamar, Perry, Wayne	2/10/2013	2/22/2013
2014	Flooding, Severe Storms, Tornadoes	Jones, Wayne	4/28/2014	5/3/2014

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.

Only two CAV reports revealed serious programmatic issues, and one community's CAV follow-up has been turned over to FEMA Region IV. Most communities have improved their programs now that they have a better understanding of floodplain management obligations. Copies of the CAV reports for the communities are included in Appendix E.

Table 19: CAVs Performed within the Watershed

Community	Reviewer	CAV Date	Notes
City of Bay Springs	MEMA	03/04/2009	Minor issues identified. Corrective action submitted for compliance

Community	Reviewer	CAV Date	Notes
Town of Beaumont	MEMA	10/02/2007	Minor issues identified related to administration/enforcement. Corrective action taken
City of Ellisville	MEMA	2/20/2008	Minor issues identified. Corrective action taken
Forrest County	MEMA	02/01/2011	Serious issues identified related to administration/enforcement. Corrective action submitted for compliance
Greene County	MEMA	03/09/2012	No violations discovered during last CAV
City of Hattiesburg	MEMA	02/13/2012	No violations discovered during last CAV
Jasper County	MEMA	09/31/2013	Minor issues identified related to administration/enforcement.
Jones County	MEMA	02/25/2014	Minor issues identified related to administration/enforcement. Corrective action submitted for compliance
Lamar County	MEMA	06/29/2012	No violations discovered during last CAV
City of Laurel	MEMA	08/22/2011	Minor issues identified related to floodplain management. Corrective action taken
Town of McLain	MEMA	01/21/2014	Serious issues identified. Corrective action submitted for compliance. Follow-up was referred to FEMA.
Town of New Augusta	MEMA	10/03/2007	Minor issues identified. Corrective action taken
City of Petal	MEMA	08/15/2012	Minor issues identified related to the potential violation of the community's floodplain management regulations. Corrective action taken
Perry County	MEMA	01/22/2014	Minor issues identified related to administration/enforcement. Corrective action taken
Town of Richton	MEMA	10/02/2007	No violations discovered during last CAV
Wayne County	MEMA	01/31/2008	Minor issues identified related to the community's floodplain regulations. Corrective action submitted for compliance

3.2.10 Effective Regulatory Mapping and LOMC

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

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

County	Community Name	Product Types	FIRM Effective Date
Forrest County	All Jurisdictions	FIS & FIRM	3/2/2010
Greene County	All Jurisdictions	FIS & FIRM	1/6/2010
Jasper County	All Jurisdictions	FIS & FIRM	7/4/2011
Jones County	All Jurisdictions	FIS & FIRM	9/29/2010
Lamar County	All Jurisdictions	FIS & FIRM	3/2/2010
Perry County	All Jurisdictions	FIS & FIRM	12/16/2011
Wayne County	All Jurisdictions	FIS & FIRM	7/18/2011

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
Forrest	Forrest County	LOMA, LOMR-F	14
Forrest	Hattiesburg, City of	LOMA, LOMR-F	40
Forrest	Petal, City of	LOMA, LOMR-F	19
Greene	McLain, Town of	LOMR-F	1
Jasper	Bay Springs, Town of	LOMA	2
Jasper	Jasper County	LOMA	14
Jones	Jones County	LOMA, LOMR-F	24
Jones	Laurel, City of	LOMA, LOMR-F	23
Lamar	Lamar County	LOMA, LOMR, LOMR-F	44
Perry	Perry County	LOMA	9
Perry	New Augusta, City of	LOMA	1
Perry	Richton, Town of	LOMA	1

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 Lower Leaf Watershed lists the details of the number of flood policies, total coverage amount and the total cost of repetitive losses within the Lower Leaf 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 Lower Leaf Watershed

Name of Community	CID	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Losses
Bay Springs, Town of	2280087	Y	3	\$ 434,000.00	\$ 31,646.00	0
Beaumont, Town of	280203	Y	13	\$ 3,103,700.00	\$ 32,703.22	0
Ellisville, City of	280091	Y	11	\$ 1,062,100.00	\$ 46,027.32	0
Forrest County	280052	Y	203	\$ 32,224,700.00	\$ 886,471.10	17
Greene County	280271	Y	44	\$ 4,774,900.00	\$ 81,670.53	0
Hattiesburg, City of	280053	Y	671	\$ 102,151,900.00	\$ 5,792,327.93	17
Heidelberg, Town of	280088	Y	2	\$ 158,800.00	\$ 58,475.01	0
Jasper County	280302	Y	25	\$ 4,406,800.00	\$ 3,355.00	0
Jones County	280222	Y	131	Not provided in CAV report	Not provided in CAV report	2
Lamar County	280304	Y	293	\$ 65,668,200.00	\$ 3,216,251.16	37
Laurel, City of	280092	Y	284	\$ 26,615,500.00	\$ 398,815.33	0
Louin, Town of	280316	N	N/A	N/A	N/A	N/A
McLain, Town of	280058	Y	28	\$ 1,456,500.00	\$ 252,109.73	1
Montrose, Town of	280243	N	N/A	N/A	N/A	N/A
New Augusta, Town of	280131	Y	12	\$ 754,200.00	\$ 45,855.76	0
Petal, City of	280260	Y	91	\$ 10,220,000.00	\$ 140,027.55	6
Perry County	280233	Y	211	\$ 23,611,200.00	\$ 1,465,070.88	36

Name of Community	CID	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Losses
Richton, Town of	280321	Y	8	\$ 680,800.00	\$ 0	0
Sandersville, Town of	280404	N	N/A	N/A	N/A	N/A
Soso, Town of	280363	N	N/A	N/A	N/A	N/A
Wayne County	280238	Y	54	\$ 5,214,700.00	\$ 23,462.36	0

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.

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

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

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

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

Lamar: The county's plan, adopted December 18, 2008, states several goals regarding storm water/drainage for Lamar County. These goals can be found in Chapter 1: Goals, Objectives, and Policies; Section 7: Storm Drainage and are outlined below, along with their corresponding objectives and policies.

GOAL: To vigorously enforce all provisions of the Lamar County Flood Damage Prevention Ordinance (the 2005 Flood Plain Ordinance) and to make any needed amendments to that Ordinance. The plan acknowledges the following as this goal's objective: To reduce the impacts of all residential, commercial, industrial and public/quasi-public development upon surrounding areas. Specific policies underlying this plan include:

POLICY 65: To require developers to construct storm water retention and/or detention basins in all new developments of 5 acres or more.

GOAL: To reduce flooding in Lamar County within all floodplains designated by the Federal Emergency Management Agency. The plan acknowledges the following as this goal's objective: To improve storm water drainage in areas that are prone to flooding. Specific policies underlying this plan include:

POLICY 66: To examine closely the drainage for all proposed new higher density developments prior to approval, because they tend to create drainage problems.

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

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

3.3 Project Status

(Remove from Community Version)

The MIP Baseline below, Table 23, details the schedule and available funding for the Lower Leaf Watershed study. Funding for Discovery within the Lower Leaf Watershed is being provided through Mapping Activity Statement (MAS) FY11.11. Funding for the engineering and mapping study of the Lower Leaf 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:	5/16/2016	Baseline Revised:	
PROJECT DESCRIPTION:			
Lower Leaf Watershed, MS - MAS FY16.16			
Performance Period:	Start:	10/1/2016	Finish: 2/28/2020

Activity	Baseline Task Start Date	Baseline Task End Date	Budget	Mapping Activity Statement
	(mm/dd/year)	(mm/dd/year)	\$	
Discovery - Lower Leaf Watershed	n/a	n/a	\$90,000	MAS FY12.12 and MAS FY15.15
Field Surveys	10/1/2016	12/31/2016	\$33,000	MAS FY16.16
Topographic Data Development	10/1/2016	12/31/2016	\$17,000	MAS FY16.16
Independent QA/QC Review of Topographic Data	12/15/2016	12/31/2016	Included in Topo Data Development	MAS FY16.16
Base Map Acquisition	12/1/2016	3/31/2017	\$18,500	future MAS
Independent QA/QC Review of Base Map	3/15/2017	10/31/2015	Included in Base Map Acquisition	future MAS
Hydrologic Analysis	1/1/2017	4/30/2017	\$33,000	MAS FY16.16
Independent QA/QC Review of Hydrologic Analysis	5/1/2017	5/31/2017	\$3,300	MAS FY16.16
Hydraulic Analysis	5/1/2017	9/30/2017	\$80,000	MAS FY16.16
Independent QA/QC Review of Hydraulic Analysis	10/1/2017	11/30/2017	\$8,700	MAS FY16.16
Floodplain Mapping	12/1/2017	4/30/2018	\$81,900	future MAS
Independent QA/QC of Floodplain Mapping	5/1/2018	6/30/2018	\$8,190	future MAS
Develop Draft DFIRM Database	12/1/2017	4/30/2018	\$29,300	future MAS
Independent QA/QC Review of DFIRM Database	5/1/2018	6/30/2018	\$2,930	future MAS
Produce Preliminary Map Products (including Graphic Specifications)	7/1/2018	8/31/2018	\$44,500	future MAS
Distribute Preliminary Map Products	9/1/2018	9/30/2018	Included in Produce Preliminary Map Products	future MAS
Post Preliminary Processing	10/1/2018	2/28/2020	\$49,500	future MAS
Total			\$499,820	

Unmet Needs

All of the unverified Zone AE stream mileage is updated by this plan of work. The total of unverified or unknown Zone A mileage will be reduced by over 108 miles. The new Zone A study in this plan of work address several areas of conspicuous SFHA mismatch along county boundaries that, when observed at the watershed level, could raise serious question about the current mappings' validity. 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 Lower Leaf 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.

a. 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

i. 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.

ii. 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.

iii. 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.

iv. 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 November 5, 2015 from 1:30 – 5:00 pm at the Laurel-Jones County EMA Office, 22 Mason Street, Laurel, 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 18 people were in attendance at the meeting including representatives of the City of Ellisville, Forrest County, Jasper County, Jones County, Perry County, and Wayne County. Additional partners and stakeholders were also in attendance including representatives of MEMA and MDEQ. The discussion was stimulated using the effective FIRM and Discovery Map's display of relevant data available in Appendix B. Attendees cooperatively identified areas of concern where new study information is requested. The final study streams are shown in Appendix C. Additionally mitigation projects options, compliance issues, and ideas on how to improve the local flood risk communication programs were discussed during the meeting. See Appendix B for pertinent Discovery meeting information including sign-in sheets, meeting notes, presentation and other documentation.

Appendices

Appendix A: Community Information

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

Appendix B: Discovery Meeting

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

Appendix C: Panel Scheme

- Lower Leaf Watershed Proposed FIRM Panel Revisions

Appendix D: CNMS Analysis

- CNMS Summary Spreadsheet

Appendix E: Collected Discovery Data

- Hazard Mitigation Plans
- Grant Information
- CAV
- CRS

Appendix F: Quality Assurance/Quality Control Plan

- QA/QC Plan