

Discovery Report

Coldwater Watershed, 08030204

*Benton, Coahoma, Desoto, Marshall, Panola, Quitman, Tate, and Tunica
Counties*

*Town of Byhalia, Town of Coldwater, Town of Como, Town of Crenshaw, Town
of Falcon, City of Hernando, City of Holly Springs, City of Horn Lake,
Town of Lula, City of Marks, City of Olive Branch, City of Senatobia, Town
of Sledge, City of Southaven, Town of Tunica, Town of Walls*

Mississippi

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Acronyms and Abbreviations

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

1 General Information

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

The Coldwater 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 Coldwater Watershed (HUC # 08060204) 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 March 5, 2014, assists in the proper pre-planning to ensure that the Risk MAP goals and objectives are met. With Risk MAP's focus on watersheds at a HUC-8 level it is important that the most is made of this phase in the potential projects within the watershed.

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

- Kristen Martinenza, Region IV PM Representative, FEMA Region IV, Lead Engineer
- Henrietta Williams, Region IV Outreach Representative, FEMA Region IV, Outreach Lead for Mississippi
- Jason Hunter, Region IV FM&I Representative, FEMA Region IV, Floodplain Management
- Cathy Strickland, Region IV HMA Representative, FEMA Region IV, HMA Specialist for Mississippi
- Cynthia Bailey, Region IV HMA Representative, FEMA Region IV, Mitigation Plans for Mississippi

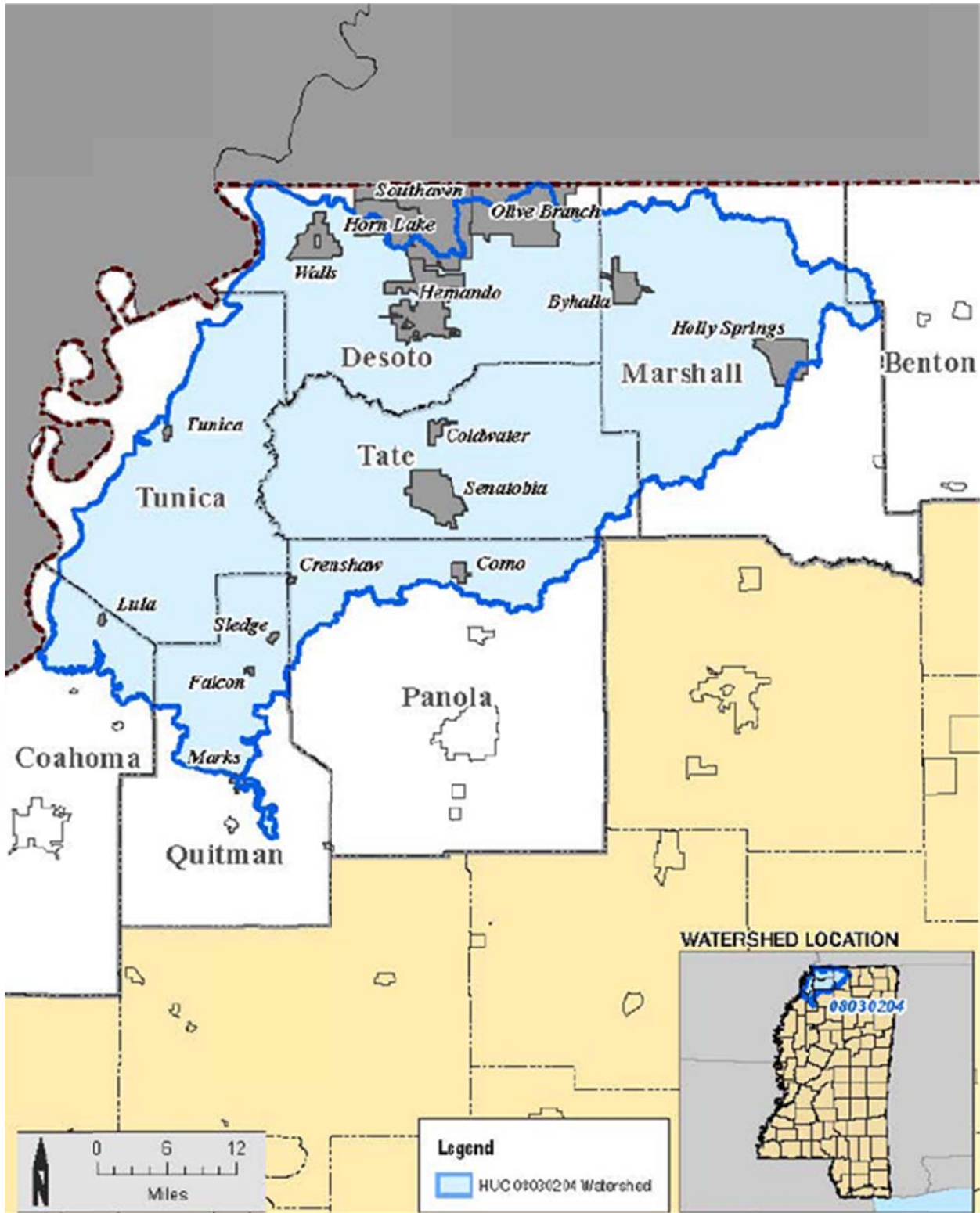
- Richard S. Flood, Region IV HMA Representative, FEMA Region IV, HMA Program Lead
- Danon Lucas, Region IV External Affairs Representative, FEMA Region IV
- Stacey Ricks, Mississippi NFIP Coordinator, MEMA Floodplain Management Bureau
- Jana Henderson, Mississippi Hazard Mitigation Officer, MEMA Office of Mitigation
- Steve Champlin, Mississippi CTP PM, Project Manager for the Coldwater 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
- Michael Hawkins, Mississippi Geographic Information, LLC, Project Engineer

The Coldwater Watershed is located in northwest Mississippi. The watershed is approximately 75 miles long and about 30 miles wide and is aligned generally in a northeast to southwest orientation. The watershed is diverse from a physiographic perspective. Around 40 percent of the watershed falls within the Loess Bluff or Brown Load Hills physiographic region. About 30 percent is in the North Central Hills physiographic region, while the remaining 30 percent is in the Delta 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 8 counties: Benton, Coahoma, DeSoto, Marshall, Panola, Quitman, Tate, and Tunica.

The Coldwater River rises in Benton County and flows 220 miles south/southwest passing through Arkabutla Lake and ends in Marks, MS where it meets the Tallahatchie River. The Coldwater River watershed is a headwaters basin. The river flows mostly east to west to Arkabutla Lake, then takes a more north to south route through the Delta region. The lower portion within the Delta is levied to reduce overbank flooding. The river channel forms a portion of the boundaries between DeSoto, Tate, and Tunica counties. Some of the larger tributaries of the Coldwater River include Pigeon Roost Creek, Camp Creek, Hickahala Creek, Lake Cormorant Bayou, and Arkabutla Creek.

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

Figure 1: Watershed Location



Most of the communities in the Coldwater 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
Benton County	Small western portion	DFIRM	October 2, 2008
Byhalia, Town of	all	DFIRM	July 4, 2011
Coahoma County	Northeastern portion	DFIRM	February 2, 2012
Coldwater, Town of	all	DFIRM	October 2, 2013
Como, Town of	all	-	Not mapped
Crenshaw, Town of	all	FIRM	September 28, 1979
Desoto County	Central and southern portions	DFIRM	June 4, 2007 May 5, 2014
Falcon, Town of	all	FIRM	August 19, 1985
Hernando, City of	all	DFIRM	May 5, 2014
Holly Springs, City of	Northern and western portions	DFIRM	July 4, 2011
Horn Lake, City of	Southern portion	DFIRM	May 5, 2014
Lula, Town of	All	DFIRM	February 2, 2012
Marks, City of	Northern and eastern portions	FIRM	September 4, 1985
Marshall County	Central and western portions	DFIRM	July 4, 2011
Olive Branch, City of	Southern portion	DFIRM	May 5, 2014
Panola County	Northern portion	FIRM	June 4, 1980
Quitman County	Northern portion	FIRM	September 4, 1985
Senatobia, City of	all	DFIRM	October 2, 2013
Sledge, Town of	all	FIRM	September 4, 1985
Southaven, City of	Southern and eastern portions	DFIRM	May 5, 2014
Tate Country	All except small southeastern portion	DFIRM	January 2, 2009 October 2, 2013
Tunica, Town of	all	DFIRM	October 16, 2008
Tunica County	Southern and eastern portions	DFIRM	October 16, 2008
Walls, Town of	all	DFIRM	June 4, 2007

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

Table 2: Statistical Information

Name of Community	CID	Area (square miles)	Percent Area of the watershed	Pop Growth (2000 - 2010)	Mitigation Plan Current?	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Losses
Benton County	280064	406.62	9.55%	8.76%	Y	Y	8	\$1,220,300	\$0	0
Byhalia, Town of	280112	2.86	0.07%	-4.34%	Y	Y	4	\$862,500	\$0	0
Coahoma County	280038	552.44	12.98%	-14.6%	Y	Y	133	\$25,546,900	\$2,998,400	41
Coldwater, Town of	280265	2.38	0.06%	0.18%	Y	Y	6	\$2,370,900	\$0	0
Como, Town of	280254	1.9	0.04%	-2.37%	Y	N	N/A	N/A	N/A	N/A
Crenshaw, Town of	280127	0.41	0.01%	-3.38%	Y	Y	24	\$1,483,000	\$0	0
Desoto County	280050	476.15	11.18%	50.42%	Y	Y	200	\$51,492,000	\$620,342	1
Falcon, Town of	280138	0.39	0.01%	-47.32%	Y	Y	0	\$0	\$0	0
Hernando, City of	280292	25.73	0.6%	76.24%	Y	Y	25	\$6,278,700	\$131,098	0
Holly Springs, City of	280113	12.78	0.3%	-3.24%	Y	Y	9	\$2,425,500	\$0	0
Horn Lake, City of	280051	16.02	0.38%	31.26%	Y	Y	217	\$33,921,100	\$324,566	4
Lula, Town of	280042	0.42	0.01%	-19.46%	Y	Y	0	\$0	\$0	0
Marks, City of	280140	1.03	0.02%	1.11%	Y	Y	31	\$4,949,900	\$542,682.09	8
Marshall County	280274	706.19	16.59%	6.15%	Y	Y	31	\$6,879,200	\$49,797.78	0
Olive Branch, City of	280286	36.7	0.86%	58.23%	Y	Y	143	\$39,762,100	\$352,061.29	1
Panola County	280125	685.14	16.09%	1.26%	Y	Y	59	\$7,540,700	\$299,859.78	4
Quitman County	280207	405.01	9.51%	18.72%	Y	Y	101	\$11,745,300	\$1,238,0255	13
Senatobia, City of	280171	15.56	0.37%	19.02%	Y	Y	33	\$6,366,800	\$23,194	1
Sledge, Town of	280141	0.52	0.01%	3.02%	Y	Y	4	\$204,000	\$7,147	0
Southaven, City of	280331	41.25	0.97%	56.51%	Y	Y	290	\$59,463,600	\$453,472	4
Tate Country	280235	404.76	9.51%	13.86%	Y	Y	32	\$5,929,000	\$630,225	4
Tunica, Town of	280196	0.71	0.02%	-9.01%	Y	Y	25	\$6,487,000	\$170,724	3
Tunica County	280236	454.67	10.68%	16.81%	Y	Y	112	\$32,197,600	\$4,701,117	81
Walls, Town of	280232	7.83	0.18%	168.98%	Y	Y	13	\$1,873,500	\$0	0

Meetings and 44 CFR Part 66 Compliance:

Initial contact with the communities began in January 2014. 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 March 26, 2014 from 1:30 – 3:30 pm at the Gale Center, 2601 Elm Street, Hernando, 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 47 people were in attendance at the meeting, including representatives of Coahoma, DeSoto, Quitman, and Tunica counties, and several municipalities. Additional partners and stakeholders were also in attendance and FEMA staff participated remotely via the webinar. The discussion was stimulated using the effective FIRM and Discovery Map’s display of relevant data available in Appendix B. Attendees cooperatively identified areas of concern where new study information is requested. The final study streams are shown in Appendix C. See Appendix B for pertinent Discovery meeting information including sign-in sheets, meeting notes, presentation and other documentation.

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

Part 66 compliance:

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

National Flood Insurance Program (NFIP) Compliance:

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

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

1.2 Project Summary

The Coordinated Needs Management Strategy (CNMS) analysis revealed only one detailed study stream within the watershed that is non-NVUE compliant. This is White Oak Bayou Tributary in the Town of Tunica, which does not pass Critical Element 3. A portion of Senatobia Creek near Senatobia was previously believed to be non-NVUE compliant, but upon further examination, this was found to be an error.

Because nearly all of the Zone AE streams are NVUE client, this project focuses on upgrading Zone A streams that are unverified due to the lack of a hydraulic model, and correcting some Special Flood Hazard Area discontinuities, some of which are quite significant, across county boundaries. Most of the upgraded Zone A studies are located in Marshall County, where development pressure from Memphis and DeSoto County is mounting. Most of the revised Zone A study is aimed at resolving edge-matching along the county boundaries between Tunica, Coahoma, Quitman and Panola counties in the very flat Delta portion described in Section 1.1.

No new studies of currently unstudied streams are proposed at this time. Also, because DeSoto and Tate counties received significant mapping updates as part of the Fiscal Year 2009 program, it was decided that mapping needs in the other counties of the watershed would receive priority for this project. A portion of Byhalia Creek and four tributaries of Nunnally Creek are specific community requests from Town of Byhalia and City of Holly Springs, respectively. The Discovery Map titled “Mapping Needs: Coldwater Watershed”, within Appendix B, identifies those stream reaches that are either NVUE compliant, need to be assessed, or are to be studied.

Table 3: List of Study Streams shows which streams have been identified for further study and to what detail the streams will be studied.

Table 3: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
Broad Bayou	A	From confluence with Coldwater River to upstream limits	2.9	Revised Approximate	Resolve gross SFHA discrepancy between Coahoma and Quitman Counties
Broad Bayou Tributary 1	A	From confluence with Broad Bayou to upstream limits	2.6	Revised Approximate	Resolve gross SFHA discrepancy between Coahoma and Quitman Counties
Broad Bayou Tributary 2	A	From confluence with Broad Bayou Tributary 1 to upstream limits	1.4	Revised Approximate	Resolve gross SFHA discrepancy between Coahoma and Quitman Counties
Byhalia Creek	A	From DeSoto/Marshall County boundary to 0.9 miles upstream of County boundary.	0.9	Limited Detailed	Eliminate Zone A gap between two Zone AE reaches
Byhalia Creek	AE	From existing downstream LoDS to existing upstream LoDS at	5.4	Revised Detailed	City of Byhalia request, improved

Table 3: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
		Battle Road			topo
Coldwater River	A	From DeSoto/Marshall County boundary to 22.0 miles upstream of County boundary.	22.0	Limited Detailed	Unverified, developing area, wide floodplain, improved topo
Coldwater River	A	From Coahoma/Quitman County boundary to Tunica/Quitman County boundary.	31.1	Revised Approximate	Resolve gross SFHA discrepancy between Coahoma, Tunica and Quitman Counties
Coldwater River	A	Along Tunica/Panola County boundary	1.4	Redelineation	Resolve gross SFHA discrepancy between Tunica and Panola Counties
Coldwater River Tributary 1	A	From confluence with Coldwater River to upstream limits of SFHA	3.4	Limited Detailed	Unverified, developing area, improved topo
Fowler Creek	A	From Dump Road to Crenshaw City limits	1.1	Revised Approximate	Resolve gross SFHA discrepancy between Quitman and Panola Counties
Little Coldwater Creek	A	From confluence with Coldwater River to Memphis Avenue	8.2	Limited Detailed	Unverified, developing area, wide floodplain, improved topo
Little Coldwater Creek Tributary	A	From confluence with Little Coldwater Creek to upstream limits of SFHA	1.1	Limited Detailed	Unverified, developing area, wide floodplain, improved topo
Muddy Bayou	A	From confluence with Coldwater River to about 0.3 miles downstream of Flea Harbor Road	4.6	Revised Approximate	Resolve gross SFHA discrepancy between Coahoma and Tunica Counties
Muddy Bayou Tributary	A	From confluence with Muddy Bayou to about Chance Road	0.8	Revised Approximate	Resolve gross SFHA discrepancy between Coahoma and Tunica Counties
Nunnally Creek Tributary 1	A	From 0.1 miles downstream of Peyton Road to upstream limits of SFHA	2.4	Limited Detailed	Developing area, community request improved topo
Nunnally Creek Tributary 2	A	From 0.4 miles downstream of U.S. Hwy 78 to upstream limits of SFHA	2.3	Limited Detailed	Unverified, community request improved topo
Nunnally Creek Tributary 1-1	A	From confluence with Nunnally Creek Tributary 1 to upstream limits of SFHA	1.1	Limited Detailed	Unverified, community request improved topo
Nunnally Creek Tributary 1-2	A	From confluence with Nunnally Creek Tributary 1-1 to upstream	0.5	Limited Detailed	Unverified, community request

Table 3: List of Study Streams

Flooding Source	Effective Flood Zone	Study Limits	Stream Length (miles)	Proposed Activity	Technical Justification
		limits of SFHA			improved topo
Pigeon Roost Creek	A	From DeSoto/Tate County boundary to confluence with Nunnally Creek	7.4	Limited Detailed	Unverified, developing area, wide floodplain, improved topo
Red Banks Creek	A	From DeSoto/Marshall County boundary to upstream limits of SFHA	5.8	Limited Detailed	Unverified, developing area, wide floodplain, improved topo
White Oak Bayou Tributary	AE	From confluence with White Oak Bayou to upstream limits of detailed study	2.7	Updated Detailed	Unverified, developed area, improved topo
Yazoo Pass	A	From confluence with Coldwater River to about 0.3 miles downstream of Flea Harbor Road	5.2	Revised Approximate	Resolve gross SFHA discrepancy between Coahoma and Quitman Counties
Yellow Lake Bayou	A	From 0.3 miles upstream of Armstead Jones Road to 0.3 miles upstream of County Line Road	2.4	Revised Approximate	Resolve gross SFHA discrepancy between Quitman and Panola Counties
Yellow Lake Bayou Tributary	A	From confluence with Yellow Lake Bayou to 2.0 miles upstream of confluence	2.0	Revised Approximate	Resolve gross SFHA discrepancy between Quitman and Panola Counties

Table 4 provides a mileage count of streams in the watershed based on Type of Study.

Table 4: Total Stream Mile Counts by Type of Study

	Detailed (Enhanced Level 1)	Limited Detailed (Enhanced Level 2)	Approximate (Base Level Study)	Redelineation (Zone AE with Floodway)	Verified Digital Conversion
Effective Flood Insurance Study	59.3	245.5	1506.2		
Updated Effective Studies	8.1	55.1	54.7	0.0	0.0
New Studies Identified	0.0	0.0	0.0		

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

Table 5: Proposed FIRM Panel updates

County	Effective FIS Date	Firm Panels	Panel Scale	Number of Updated Panels
Coahoma	February 2, 2012	28027C0100D	24000	3
		28027C0180D	12000	
		28027C0200D	24000	
Marshall	July 4, 2011	28093C0005C	12000	9
		28093C0010C	12000	
		28093C0015C	12000	
		28093C0020C	12000	
		28093C0050C	24000	
		28093C0105C	12000	
		28093C0110C	12000	
		28093C0125C	24000	
		28093C0165C	12000	
Panola	2016 projected	28107C0015D	12000	2
		28107C0150D	24000	
Quitman	2016 projected	28119C0020D	12000	8
		28119C0070D	12000	
		28119C0085D	12000	
		28119C0090D	12000	
		28119C0095D	12000	
		28119C0104D	6000	
		28119C0105D	12000	
		28119C0150D	24000	
Tate	January 2, 2009	28137C0100C	24000	2
		28137C0125C	24000	
Tunica	October 16, 2008	28143C0290D	12000	4
		28143C0295D	12000	
		28143C0375D	24000	
		28143C0400D	24000	

Several counties in Mississippi and the State have entered into a joint agreement for orthophoto acquisition and processing. Two counties, DeSoto and Tunica, made up the 2013 leaf-off acquisition project. The pixel resolution for both counties is 6-inch. 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 **Error! Reference source not found.6**.

2 Watershed Stakeholder Coordination

The population in the Coldwater Watershed is distributed between 16 autonomous jurisdictions. Many of these jurisdictions have only a portion of their geographic extents within the watershed, including the cities of Southaven, Horn Lake, Olive Branch, Holly Springs, and the town of Marks. Most of the population in the watershed resides in Desoto 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 Coldwater 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 Benton, Coahoma, Desoto, Marshall, Panola, Quitman, Tate, and Tunica 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 6. Of these 24 communities, only 12 communities attended. Follow up with communities that did not attend was attempted by letter dated April 11, 2014. An example of the letter is included in Appendix A.

Table 6: Communities in the Coldwater Watershed

County	Community	Municipality Type
Benton	Benton County	County
Coahoma	Coahoma County	County
Coahoma	Lula	Town
Desoto	Desoto County	County
Desoto	Hernando	City
Desoto	Horn Lake	City
Desoto	Olive Branch	City
Desoto	Southaven	City
Desoto	Walls	Town
Marshall	Byhalia	Town
Marshall	Holly Springs	City

County	Community	Municipality Type
Marshall	Marshall County	County
Panola	Crenshaw	Town
Panola	Como	Town
Panola	Panola County	County
Quitman	Falcon	Town
Quitman	Marks	City
Quitman	Quitman County	County
Quitman	Sledge	Town
Tate	Coldwater	Town
Tate	Senatobia	City
Tate	Tate County	County
Tunica	Tunica	Town
Tunica	Tunica 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 Coldwater 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 Coldwater watershed. The LiDAR was acquired by Aeroquest under contract to USACE—Vicksburg District during the 2009-10 flying season. This data is made available by the Mississippi Digital Earth Model—Geospatial Clearinghouse. The accuracy reported for the DEM product is 0.365 feet for open terrain and 0.431 feet for vegetated terrain, tested at 95 percent confidence level. The horizontal error tolerance, based on the LiDAR sensor and flight height, is 1.64 feet. The data was captured at average 1-meter post spacing.

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

3.1.3 Average Annualized Loss (AAL) / HAZUS

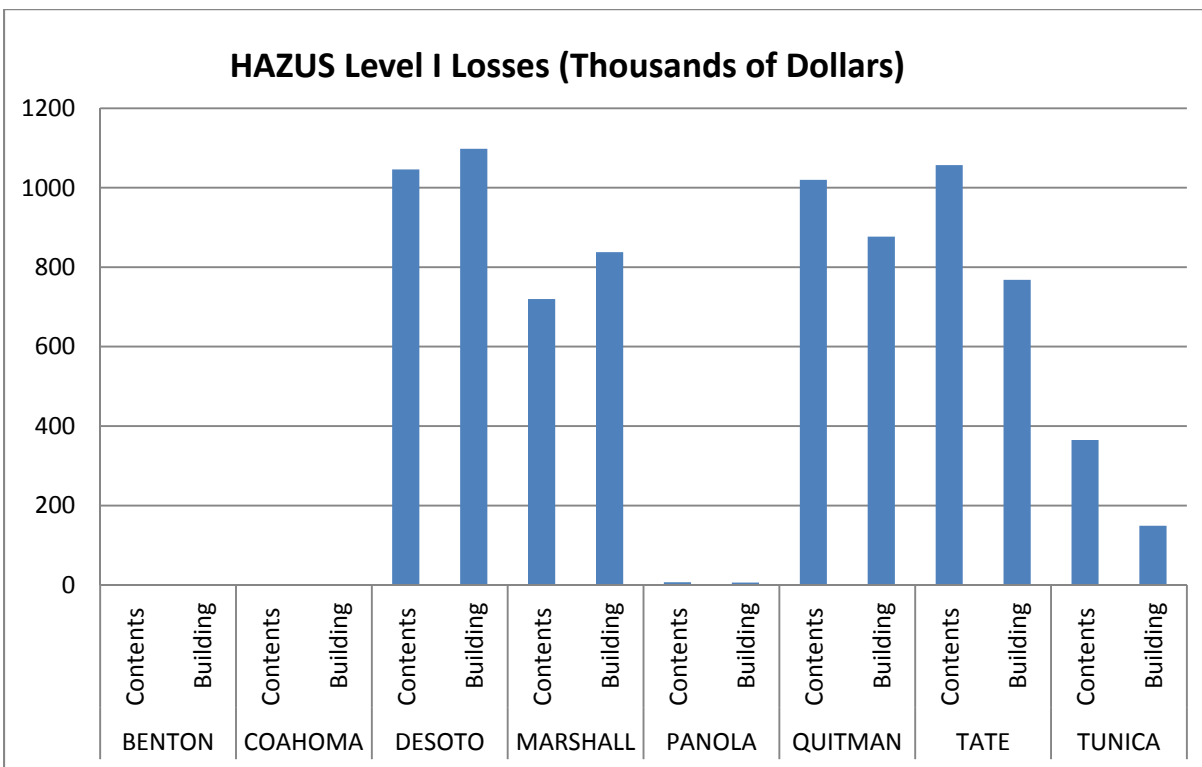
The Hazards U.S. Multi-Hazard (Hanus-MH) tool was used to develop Level I AAL data collected for this Watershed. Hanus-MH is a nationally applicable standardized risk assessment methodology that helps estimate and analyze potential losses from earthquakes, hurricane winds, and floods. Level I uses the default data that is embedded in Hanus-MH and does a basic analysis. 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 Hanus-MH analysis is based on approximate flood boundaries and national datasets. The calculation is based on flood elevation estimates using the 30-meter United State Geologic Survey (USGS) Digital Elevation Model (DEM) and flow rates based on rural regression equations. Only rivers with drainage areas of at least 10 square miles are considered in the

analysis. Figure 2 shows the distribution of AAL losses within the Coldwater 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 Coldwater 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 7: GIS Data Layers Available summarizes the GIS information collected. With regard to the Hydrography listed, there is high-resolution waterlines/waterbodies data produced for the Coldwater watershed that subsequent Risk MAP data development activities will be able to capitalize on. This data was accepted into the National Map in 2012. Figure 3 also displays recent county orthoimagery collections, coordinated at the State level that can be used to support data development. Desoto and Tunica counties have flown imagery within the last 2 years.

Table 7: 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	Regulatory

				System (CNMS)	
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

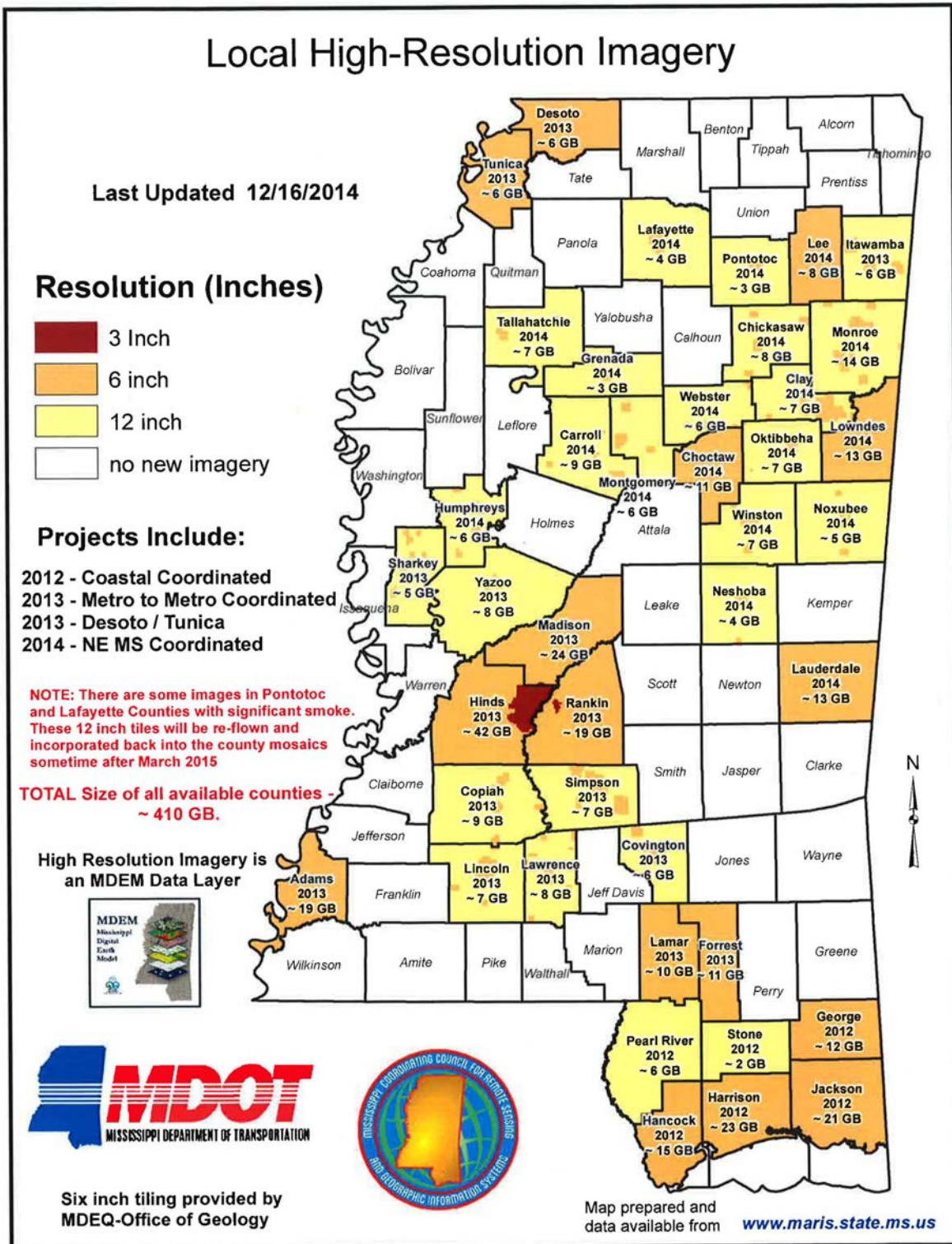
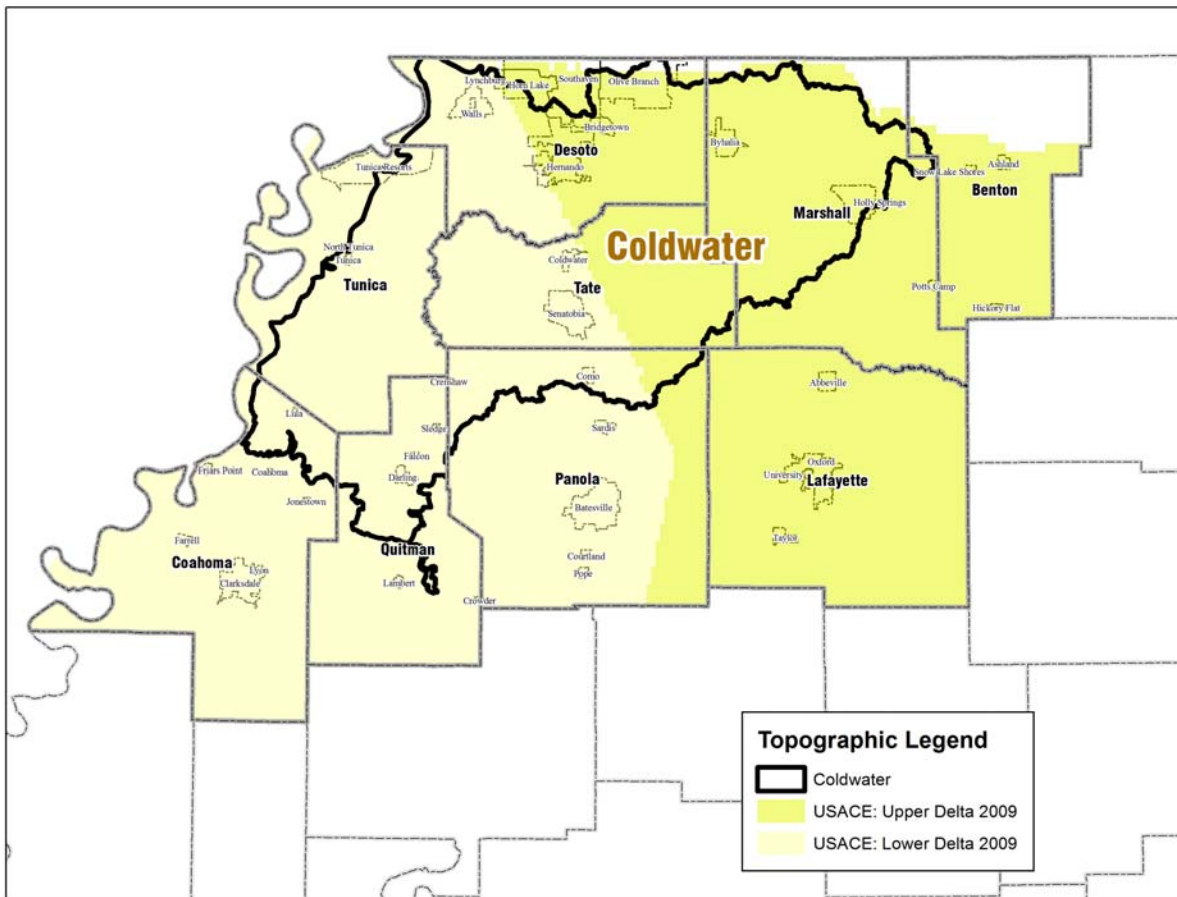


Figure 4 provides a map of the various elevation data sources that are known to exist for the Coldwater watershed. Most of the watershed will be able to capitalize on LiDAR coverage by FEMA.

Figure 4—Topographic data sources for Coldwater watershed.



3.2.1 Mitigation Plans/Status and Mitigation Projects

A Hazard Mitigation Plan is a document that assesses the potential hazards which could occur within communities and it typically includes a detailed list of “Mitigation Actions” that could be taken to prepare the communities for these possible hazards. The Plan must be updated every 5 years and it includes detailed descriptions of mitigation goals and project implementation. The status of current hazard mitigation plans is shown in Table 8.

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 Coldwater watershed, Coahoma, DeSoto, Panola, Quitman, Tate, and Tunica Counties and their respective municipalities are covered under a regional plan. Benton and Marshall Counties, along with their respective municipalities, are also included in a regional plan.

Table 8: Status of Hazard Mitigation Plans

Community	Hazard Mitigation Plan Status	Plan Developer	Plan Type
Benton County	Effective until Feb. 2018	Northeast Mississippi Planning and Development District	Multi-Jurisdictional (MJ)
Coahoma County	Effective until Mar. 2018	North Delta Planning & Development District	MJ
Desoto County	Effective until May 2017	North Delta Planning & Development District	MJ
Marshall County	Effective until Feb. 2018	Northeast Mississippi Planning and Development District	MJ
Panola County	Effective until Apr. 2017	North Delta Planning & Development District	MJ
Quitman County	Effective until Feb. 2017	North Delta Planning & Development District	MJ
Tate County	Effective until Jul. 2017	North Delta Planning & Development District	MJ
Tunica County	Effective until Dec. 2017	North Delta Planning & Development District	MJ
Benton County	Effective until Feb. 2018	Northeast Mississippi Planning and Development District	Multi-Jurisdictional (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 9 summarizes draft results of the validation analysis obtained from CNMS.

Table 9: Current Status in CNMS

County	Approximate			Detailed		Total Stream miles
	Valid	Unverified	Unknown	Valid	Unverified	
Benton	152	0	0	0	0	152
Coahoma	6	0	413	75	0	494
DeSoto	10	0	21	250	19	300
Marshall	25	284	0	13	6	328
Panola	40	0	0	86	28	154
Quitman	1	0	1115	1	0	1117
Tate	38	0	13	132	0	183
Tunica	87	0	285	68	3	443

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 play 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 60% percent of the watershed population is located within the cities of Southaven, Olive Branch, Horn Lake, and Hernando. Of the unincorporated areas, Desoto County has the highest percentage of total population for the watershed (67%). None of the other counties comprise more than 14% percent of the total watershed population. Generally, population density outside the municipalities is quite low. Specific population breakdown of the watershed is given in Table 10.

Table 10: Population Statistics in the Coldwater Watershed

County	FIPS Code ¹	CID ²	Community Name	2010 Watershed Population ³	% of Total Population within Watershed
Benton	28009	280064	Benton County	113	0.06%
Coahoma	28027	280038	Coahoma County	2542	1.25%
Coahoma	28027	280042	Lula, Town of	298	0.15%
Desoto	28033	280050	Desoto County	135,159	66.67%
Desoto	28033	280292	Hernando, City of	14,090	6.95%
Desoto	28033	280051	Horn Lake, City of	5,981	2.95%
Desoto	28033	280286	Olive Branch, City of	24,846	12.26%
Desoto	28033	280331	Southaven, City of	13,499	6.66%
Desoto	28033	280232	Walls, Town of	1,162	0.57%
Marshall	28093	280112	Byhalia, Town of	1,302	0.64%
Marshall	28093	280113	Holly Springs, City of	6,926	3.42%
Marshall	28093	280274	Marshall County	19,575	9.66%
Panola	28107	280127	Crenshaw, Town of	885	0.44%
Panola	28107	280254	Como, Town of	1279	0.63%
Panola	28107	280125	Panola County	6,645	3.28%
Quitman	28119	280138	Falcon, Town of	167	0.08%
Quitman	28119	280140	Marks, Town of	958	0.47%
Quitman	28119	280207	Quitman County	2,780	1.37%
Quitman	28119	280141	Sledge, Town of	545	0.27%
Tate	28137	280265	Coldwater, Town of	1677	0.83%
Tate	28137	280171	Senatobia, City of	8165	4.03%
Tate	28137	280235	Tate County	28,360	13.99%
Tunica	28143	280196	Tunica, Town of	1330	0.66%
Tunica	28143	280236	Tunica County	7565	3.73%
TOTAL				202,739	100%

Source: U.S. Census Bureau, 2010a

¹ FIPS = Federal Information Processing Standard

² CID = Community Identification (Number)

³ Denotes estimated population of the community within the Coldwater Watershed

Table 11 lists the median and mean incomes in counties within the watershed. All of these counties' family income levels are well below the state average of \$39,031.

Table 11: Income Statistics in the Coldwater Watershed

County	Median Family Income (dollars)	Mean Family Income (dollars)
Benton	42,436	54,403
Coahoma	31,078	46,986
Desoto	64,822	76,072
Marshall	41,319	54,659
Panola	41,849	56,780
Quitman	28,171	40,233
Tate	51,887	66,277
Tunica	34,946	46,103

The percent of employment by industry in the Coldwater Watershed counties is listed in Table 12. As can be seen, more than half of the working population in the watershed is employed in Desoto County. 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 10.

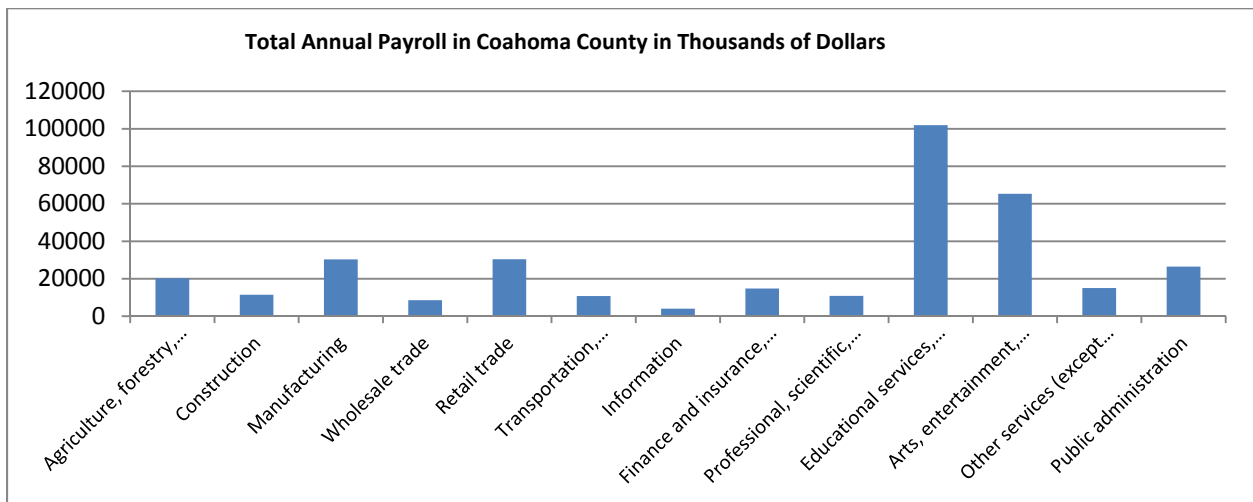
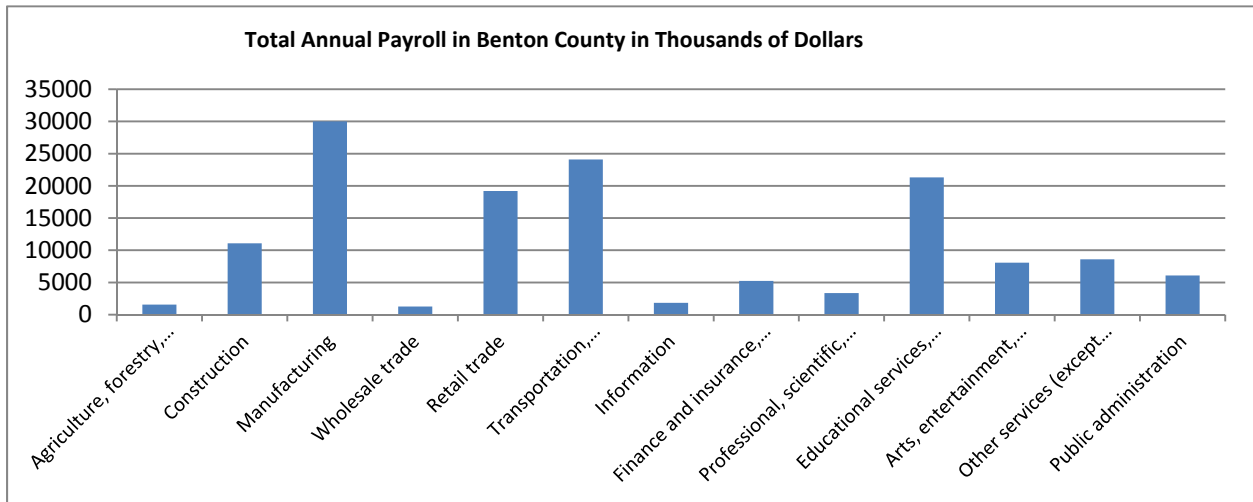
Table 12: Percentage of Employment in the Watershed by Industry

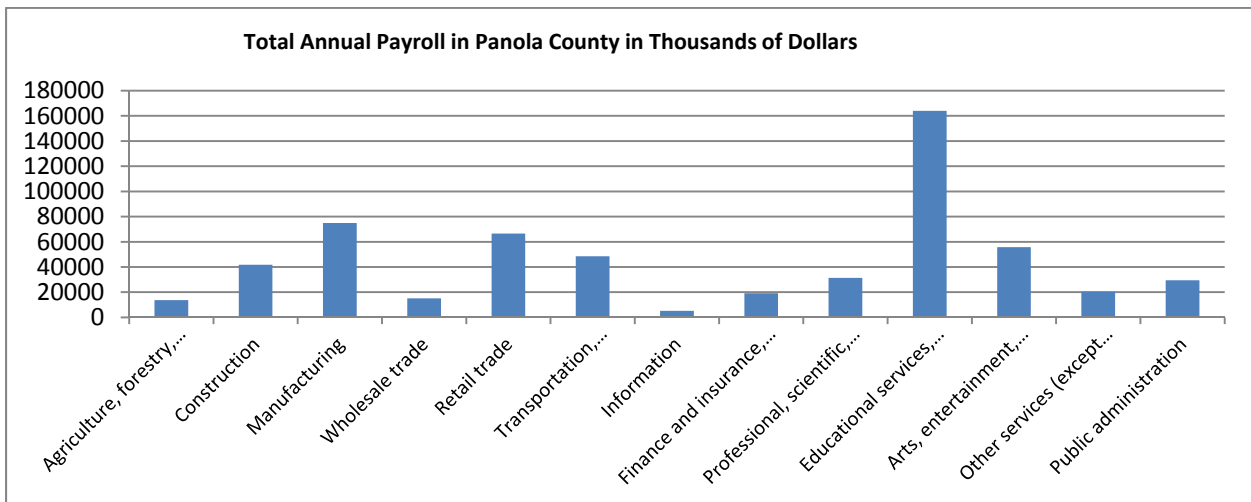
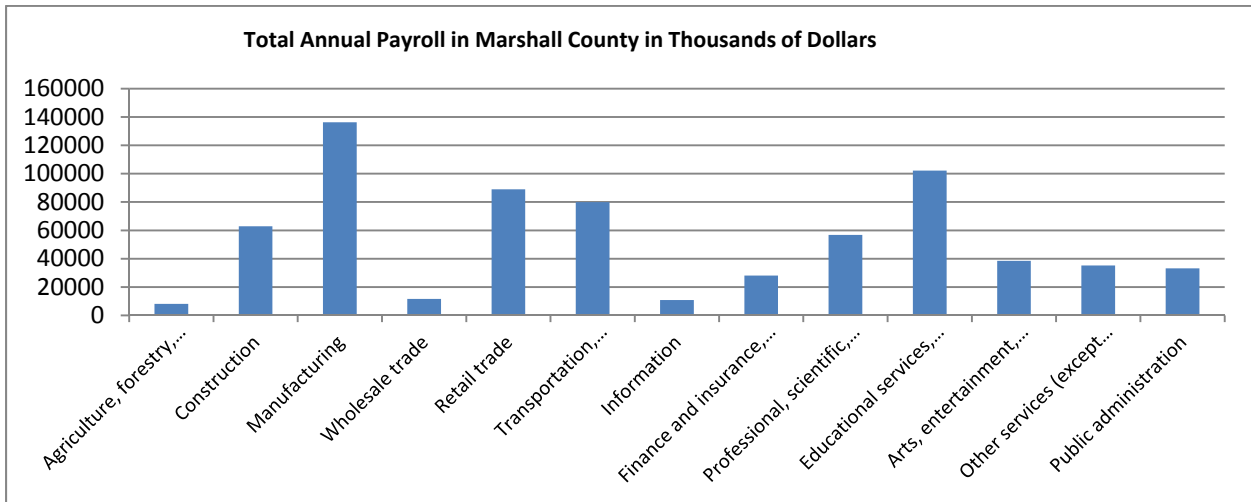
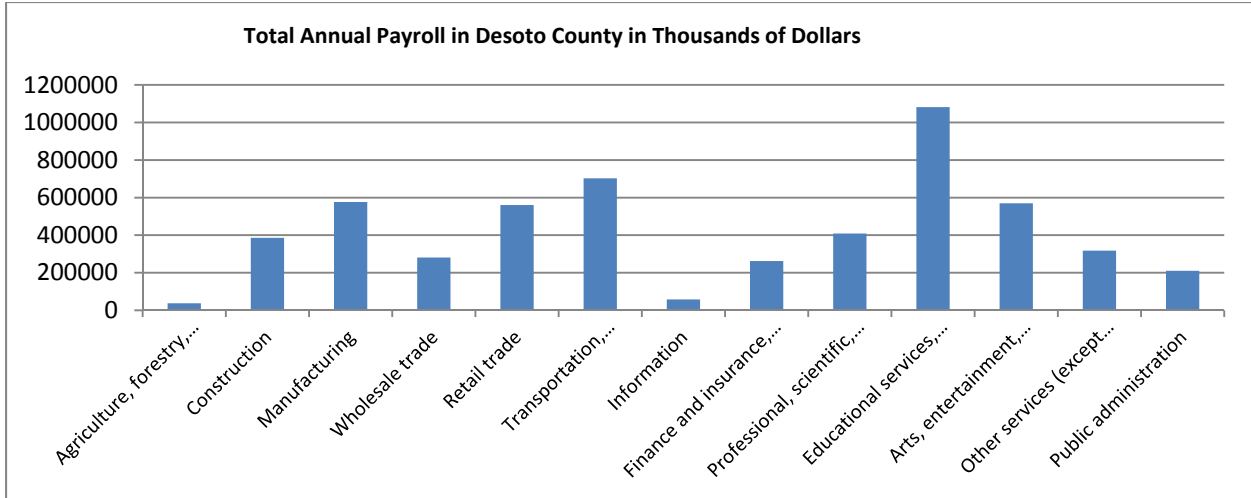
Industry Employment Groups	Benton County	Coahoma County	Desoto County	Marshall County	Panola County	Quitman County	Tate County	Tunica County	Combined All Counties
Agriculture, forestry, fishing and hunting, and mining	1.10%	5.79%	0.69%	1.17%	2.34%	10.83%	3.29%	4.66%	1.76%
Construction	7.82%	3.28%	7.07%	9.08%	7.13%	3.22%	6.62%	2.01%	6.79%
Manufacturing	21.17%	8.65%	10.57%	19.68%	12.79%	6.52%	9.41%	6.62%	11.54%
Wholesale trade	0.90%	2.46%	5.16%	1.68%	2.57%	1.40%	4.68%	0.68%	4.04%
Retail trade	13.55%	8.68%	10.29%	12.85%	11.35%	7.81%	11.06%	10.61%	10.65%
Transportation, warehousing, and utilities	17.01%	3.09%	12.89%	11.54%	8.28%	4.85%	10.33%	4.71%	11.18%
Information	1.30%	1.14%	1.05%	1.56%	0.89%	0.27%	1.15%	0.68%	1.08%

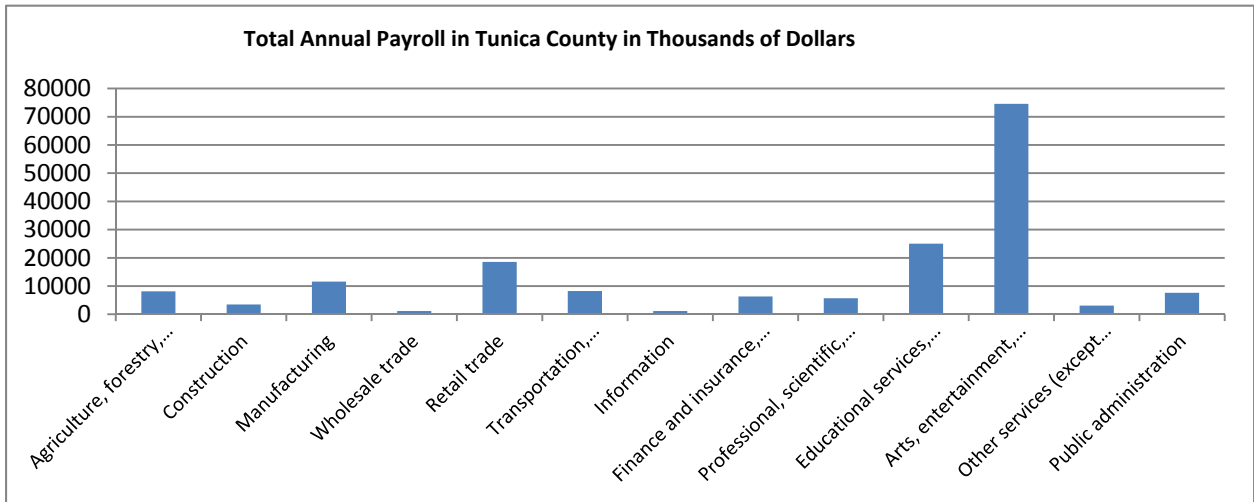
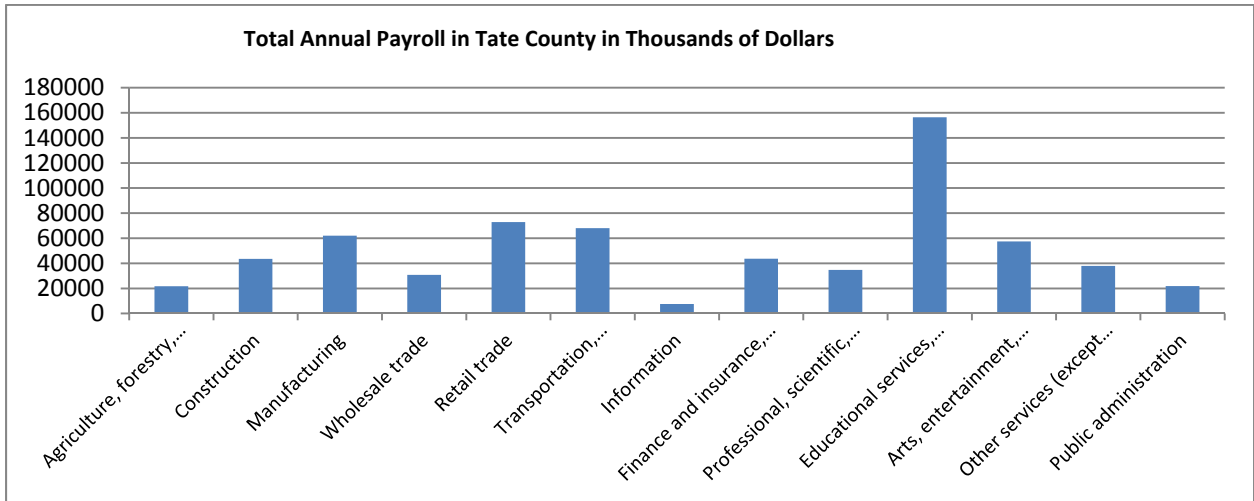
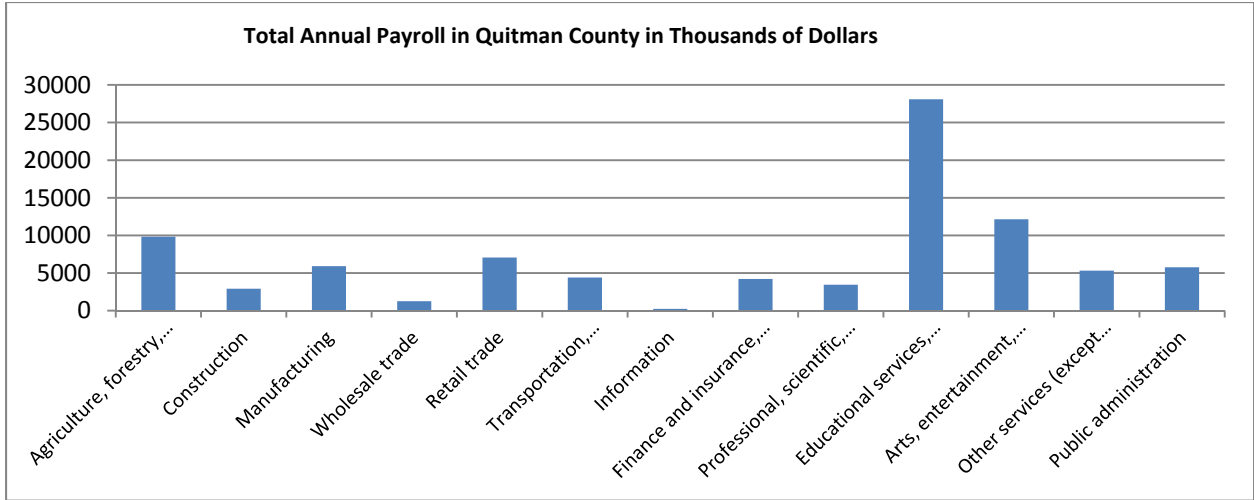
Industry Employment Groups	Benton County	Coahoma County	Desoto County	Marshall County	Panola County	Quitman County	Tate County	Tunica County	Combined All Counties
Finance and insurance, and real estate and rental and leasing	3.70%	4.23%	4.81%	4.07%	3.26%	4.66%	6.63%	3.63%	4.64%
Professional, scientific, and administrative and waste management services	2.36%	3.10%	7.50%	8.19%	5.36%	3.81%	5.28%	3.27%	6.59%
Educational services, health care and social assistance	15.05%	29.08%	19.85%	14.75%	27.99%	30.99%	23.74%	14.33%	20.87%
Arts, entertainment, recreation, and accommodation and food services	5.69%	18.65%	10.45%	5.55%	9.52%	13.40%	8.72%	42.68%	11.22%
Other services (except public administration)	6.06%	4.29%	5.83%	5.09%	3.48%	5.86%	5.76%	1.78%	5.31%
Public administration	4.29%	7.56%	3.86%	4.79%	5.03%	6.37%	3.32%	4.35%	4.32%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

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

Figure 5: Total Annual Payroll in Coldwater 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 Coldwater Watershed. In many cases, employers were not required to report payroll data to the Census if only a small number of employers exist within a given industry or occupational field.

3.2.4 Community Rating System (CRS)/NFIP

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

All communities within the Watershed except Town of Como participate in the NFIP. Of these 23 participants, only Hernando and Panola County are listed in the CRS Program as of May, 2014. The City of Hernando is rated 9 and Panola Count is rated 8. During the Discovery meeting, participation in the CRS and NFIP was encouraged and brochures with additional information on the CRS and NFIP were provided.

3.2.5 Levees/Dams

The Coldwater watershed includes three known levee systems. These are the Mississippi River mainline levee, which actually forms much of the watershed’s western boundary, and the Coldwater River east and west bank levees. Certification of the Mississippi River levee is expected later this year. The Coldwater River levees were previously not certified due to geotechnical issues, but repairs have been made and the USACE—Vicksburg District recently issued certification for them, although the certification does not extend to Quitman County due to the lower ends of the levees not tying into high ground. FEMA is currently reviewing those reports. A list of known levee systems in the Coldwater watershed is given below in Table 13.

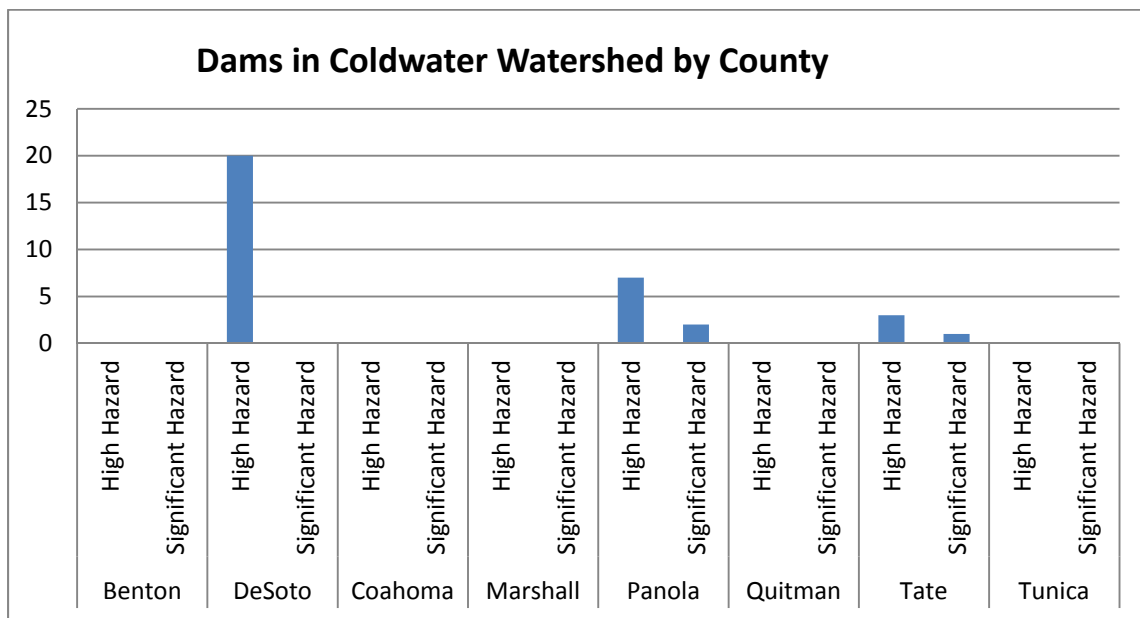
Table 13: Levees in the Coldwater watershed

LEVEE NAME	COUNTIES	CERTIFICATION ISSUES	COMMENTS
Mississippi River	Coahoma, Desoto, Tunica	Not certified	Certification expected later in 2015 by USACE
Coldwater River—West Bank	Quitman, Tunica	Certified	Certification not granted for Quitman County
Coldwater River – East Bank	Panola, Quitman, Tunica	Certified	Certification not granted for Quitman County

The inventory of regulated dams, as well as the inventory of dams with permits are available from the MDEQ Division of Dam Safety. According to records, there are 3 dams in the

Coldwater watershed classified as significant hazard, and 30 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 Coldwater 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 Coldwater Watershed



As of the drafting of this report, 14 of the 30 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. Two of those 14 had Emergency Response Plans, which do not include a full breach analysis but includes basic data and a conservative estimate of breach impacted area, in order to better protect the downstream public. The dams with neither type of plan available include: Megan Drive Lake Dam, Mason Lake Dam, J.E. Lyon Pond Dam, R.N. Van Vulpen Pond Dam, Arkabutla Dam, M.J. Simmons Pond Dam, Hilderbrant Lake Dam, Short Fork Pond Dam and McInvale Dam in DeSoto County; Indian Creek WS Structure Y-9A-14 in Panola County; and Simpson Lake Dam and I.C. Keeper Pond Dam in Tate County. The

MDEQ Division of Dam Safety will be consulted throughout the project to keep updated on the status of these plans.

3.2.6 Stream Gage Information

The U.S. Army Corp of Engineers provides real-time data for select stream gage locations. Table 14 shows the gage identification number, location, and county. Nine gages are located within the Coldwater Watershed, however many of these is temporarily out of service. All but one (Coldwater River @ Olive Branch, MS) are managed by the Vicksburg District USACE. The stage gages on the Coldwater River would be very useful for model calibrations of proposed new or updated study along the Coldwater River.

Table 14: Stream gages in the Coldwater Watershed

Period of Record	Gage Location	County	Latitude	Longitude
1942-2015	Coldwater River @ Arkabutla Dam (Outlet)	DeSoto/Tate	34.7583	-90.1264
1942-2015	Coldwater River @ Arkabutla Dam (Intake)	Desoto/Tate	34.7572	-90.1244
1960-2010	Coldwater River @ Lewisburg, MS	DeSoto	34.8408	-89.8256
2012-2015	Coldwater River @ Olive Branch, MS	DeSoto	34.9075	-89.7533
1960-2015	Coldwater River @ Sarah, MS	Tunica	34.5756	-90.2244
1955-2015	Coldwater River @ Marks, MS	Quitman	34.2608	-90.2665
2001-2015	Coldwater River @ Darling, MS	Quitman	34.3625	-90.2903
2000-2015	Old Coldwater River @ Birdie, MS	Quitman	34.4138	-90.3886
2000-2015	Coldwater River @ Coldwater, MS	Tate	34.7211	-89.9886

3.2.7 High Water Marks and Historic Flooding

Most of the gages presented in the previous section have a historical high measurement that can be gleaned from the record. For the USACE stage gages, the record stage is listed for most stations, and a number of the sites along the Coldwater are associated with one of the May 1991, January 1946, November 1973, or March 2011 flood events.

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

3.2.7.1 Benton County Historic flooding

The Benton County FIS identifies Benton County as being located in north central Mississippi and has an area of 409 square miles. Issues with flooding are existent at many road crossing along the Wolf River and in Michigan City. There are no significant flood events listed in the FIS.

3.2.7.2 Coahoma County Historic flooding

The Coahoma County FIS states that only minor damage occurs in the area due to flooding of the Big Sunflower River and its tributaries. The main flood problems in Coahoma County are a result of the flat Delta terrain. Shallow flooding occurs close to the city of Clarksdale because of inadequate drainage infrastructure.

Channel improvements and regulation of flow through reservoirs has decreased flooding from the Mississippi River. The Flood Control Act of 1944 introduced drainage improvements and channel work on the Big Sunflower River led to reduced duration of overbank flooding. Storm sewer maintenance in Clarksdale during 1973-1974 reduced shallow flooding cases within the city. Other channel improvement projects by the SCS and levee construction reduced flooding in Coahoma County.

3.2.7.3 DeSoto County Historic flooding

The DeSoto County FIS identifies intense thunderstorms as a major cause of localized flooding in the county. Relatively flat overbanks cause flooding along several creeks, and silt deposits along with river backwater are the main cause of flooding on the Coldwater River. Significant floods in DeSoto County occurred in 1973 and 1975. Currently an area of continued flooding is the Horn Lake Creek Basin, which is experiencing vast development and rapid growth that has led to the flooding of streets and roads particularly Highway 51 and Goodman Road. Note: The Horn Lake Creek Basin is outside of the Coldwater watershed. Flood protection measures such as creek cleaning, widening, and channel improvements have been exercised in order to combat flooding in the area.

3.2.7.4 Marshall County Historic flooding

The Marshall County FIS report indicates that flood problems in the county are mostly due to overflow of Nonconnah Creek Lateral B caused by runoff from intense rainfall. These floods are more common during the winter and spring. Flood protection measures such as the channelization of Byhalia creek have been taken, but no structural measures exist within the county.

3.2.7.5 Panola County Historic flooding

The Panola County FIS indicates that the County has suffered flooding due to several sources. Floods in the county are generally associated with periods of high water on the Little Tallahatchie River and its tributaries. Significant floods were recorded in 1973, one of which caused highway wash outs and homes to be evacuated on State Highway 315 between the town of Sardis and Sardis Lake. Significant flooding also occurred in November of 2001 within the

Tallahatchie River Basin that resulted from five to nine inches or rainfall and damaged many homes and businesses. Similar heavy rainfall caused flash flooding in the Batesville area in 2007 and 2008.

The Indian Creek basin has also experienced periods of flooding via Fowler Creek. A levee built in 1953 has failed many times, the latest occurrence in 1973, and caused severe flooding damage in the downtown business are of Crenshaw.

Flood protection measures on the Little Tallahatchie River include Sardis Reservoir, canals, and drainage improvement projects on the lower Tallahatchie River watershed. Sardis Reservoir, a USACE project, was constructed between 1938 and 1940 and protects the lower delta region of the Yazoo River basin from 1,545 square miles of hill country. The Soil Conservation Service also implemented four floodwater retarding structures and stream channel improvements on Hotophia Creek. The Lower Tallahatchie River Watershed Drainage Project included the installation of seven retarding structures and five stabilization and sediment control structures on tributaries of the Little Tallahatchie River. Other projects such as the McIvor Canal, and the Panola-Quitman Floodway have improved Panola county's flood prevention measures for the Little Tallahatchie. Enid Reservoir is located 26 miles north of Grenada, MS and is the main flood protection on the Yocona River. While most of the reservoir is contained in Yalobusha County, a portion falls in Panola county. In addition to the retarding structures installed by the SCS in Fowler Creek near Crenshaw, MS, the Indian Creek Basin is also home to a few flood protection facilities built between 1973 to 1975 in a drainage improvement project. The goal of this project was to control runoff from the hills in Panola County. A levee was built on the north bank of Fowler Creek to protect Crenshaw, MS, and rebuilt in 1974 as a result of flooding in 1973. While most of the reservoir is contained in Yalobusha County, a portion falls in Panola County.

3.2.7.6 Quitman County Historic flooding

Quitman County experienced considerable flooding in December 2001 resulting in several roads being under water. Flooding occurred again in October 2002 and several homes in Marks, MS had to be evacuated. Yet another flood the following May resulted in 50 damaged homes with damages of around \$50,000.

Flood protection measures in Quitman County include the Panola-Quitman floodway which protects the eastern portion of the county runoff from the hill portions of the Little Tallahatchie and Yocona Rivers.

3.2.7.7 Tate County Historic flooding

The Tate County FIS gives the gives the main flood sources of this county to be the Coldwater River and Senatobia Creek experiencing backwater flooding of low-lying areas. The town of Coldwater is occasionally affected by flooding of Arkabutla Reservoir. This reservoir was finished in 1943 and intended to reduce flood damage in the Yazoo River Basin.

3.2.7.8 Tunica County Historic flooding

The main sources of flooding in Tunica County according to the FIS include the Mississippi River, Coldwater River, Jerry’s Bayou, White Oak Bayou and tributaries, and Buck Island Bayou and tributaries. The largest recorded flood in this county occurred in March 1973 as a result of a Coldwater River crest of 32 feet. A recent flood in 2001 occurred in the Buck Island Bayou. Backwater flooding is the main issue in Tunica County.

Tunica County is protected from the Mississippi River and Coldwater River by USACE program levees. The Arkabutla Reservoir also influences the 1-percent annual discharges on the Coldwater River in this area.

3.2.8 Declared Disasters

The major disaster declarations for the areas within the Coldwater Watershed that included a flooding component are listed in Table 15. FEMA’s disaster declaration for Mississippi Disaster history can be viewed at: <http://www.fema.gov/disaster/>

Table 15: Disaster Declarations in the Coldwater Watershed

Date	Disaster Type	Affected County	Incident Begin Date	Incident End Date
1971	Severe Storms, Tornadoes	Benton County	2/22/1971	2/22/1971
1973	Tornadoes, Flooding	Coahoma, DeSoto, Marshall, Panola, Quitman, Tate, Tunica	3/27/1973	3/27/1973
1977	Drought, Freezing	Benton, DeSoto, Marshall, Panola, Tate, Tunica	2/22/1977	2/22/1977
1984	Tornadoes	Panola	3/28/1984	3/29/1984
1990	Flooding, Tornadoes	Benton, Coahoma, Marshall, Panola, Quitman	1/24/1990	3/15/1990
1991	Flooding, Severe Storm	Coahoma, Panola, Quitman	2/17/1991	3/21/1991
1991	Severe Storms, Tornado	Benton, Coahoma, Marshall, Panola, Quitman, Tate	4/26/1991	5/31/1991
1994	Severe Storm, Freezing Rain and Sleet	Benton, Coahoma, DeSoto, Marshall, Panola, Quitman, Tate, Tunica	2/9/1994	2/14/1994
1997	Flooding	Tunica	2/28/1997	4/21/1997
2001	Tornadoes and Severe Storms	Coahoma, Panola, Quitman, Tate	2/16/2001	3/15/2001
2001	Severe Storms, Tornadoes	Coahoma, DeSoto, Panola, Quitman, Tate, Tunica	11/24/2001	12/17/2001
2008	Hurricane Gustav	Benton, Coahoma, DeSoto, Marshall,	8/28/2008	9/8/2008

Date	Disaster Type	Affected County	Incident Begin Date	Incident End Date
		Panola, Quitman, Tate, Tunica		
2010	Severe Storms, Tornadoes, Flooding	Benton	5/1/2010	5/2/2010
2011	Severe Storms, Tornadoes, Straight-Line Winds, Flooding	Coahoma, DeSoto, Marshall, Panola, Quitman, Tunica	4/15/2011	4/28/2011
2011	Flooding	Coahoma, DeSoto, Tunica	4/27/2011	6/27/2011
2011	Flooding	Coahoma, Tunica	5/3/2011	6/17/2011

3.2.9 Floodplain Management CAV and CAC

Statewide Community Assistance Contacts (CAC) and Community Assistance Visits (CAV) serve as an evaluation and review process between FEMA/MEMA and local officials to ensure that each community adequately enforces local floodplain management regulations to remain in compliance with NFIP requirements. CAVs are also a way to provide technical assistance to communities. Table 16: CAVs Performed within the Watershed lists the most recent CAVs performed within the Watershed.

Several CAV reports revealed serious programmatic issues, although for many of these communities this was their first time receiving program oversight. Most communities have improved their programs now that they have a better understanding of floodplain management obligations.

Table 16: CAVs Performed within the Watershed

Community	Reviewer	CAV Date	Notes
Benton County	MEMA	4/13/2015	No violations discovered during last CAV
City of Hernando	MEMA	10/21/2014	No violations discovered during last CAV
City of Holly Springs	MEMA	4/15/15	Minor issue identified related to administration/enforcement
City of Marks	MEMA	5/22/2007	Minor issues identified Corrective action submitted for compliance. (CAV scheduled 2015)
City of Olive Branch	MEMA	10/22/2014	No violations discovered during last CAV
City of Senatobia	MEMA	2/12/2008	Minor issues identified. Corrective action submitted for compliance (CAV scheduled 2015)
Coahoma County	FEMA	8/10/2010	Serious issues identified. CAV submitted to FEMA for follow up
Marshall County	MEMA	4/14/2015	No violations discovered during last CAV

Community	Reviewer	CAV Date	Notes
Panola County	MEMA	9/30/2014	Minor issues identified. Corrective action submitted for compliance
Quitman County	MEMA	9/27/2013	Minor issues identified. Corrective action taken
Tate County	MEMA	2/23/2011	Minor issues identified. Corrective action submitted for compliance
Town of Coldwater	MEMA	2/13/2008	Minor issues identified. Corrective action submitted for compliance
Town of Como	MEMA	N/A	None
Town of Falcon	MEMA	2/17/2010	Minor issues identified. Corrective action submitted for compliance
Town of Lula	MEMA	N/A	None
Town of Tunica	MEMA	5/27/2014	No violations discovered during last CAV
Town of Walls	MEMA	N/A	None
Tunica County	MEMA	10/21/2013	Serious issues identified. Corrective actions taken

3.2.10 Effective Regulatory Mapping and LOMC

All counties in the Coldwater watershed except Panola and Quitman have effective, modernized FIRMs and FIS. Digital databases are readily available for all of these particular counties. The Map Modernization process for Panola and Quitman counties has been delayed due to unaccredited levees. It is expected that the preliminary DFIRMs will be allowed to go effective in early to mid-2016. The effective dates for the current FIRMs for these communities are listed in Table 17.

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

County	Community Name	Product Types	FIRM Effective Date
Benton County	All Jurisdictions	FIS & FIRM	10/2/2008
Coahoma County	All Jurisdictions	FIS & FIRM	2/2/2012
Desoto County	All Jurisdictions*	FIS & FIRM	5/5/2014
Marshall County	All Jurisdictions	FIS & FIRM	7/4/2011
Panola County	Unincorporated Areas	FIS & FIRM	6/4/1980
Panola County	Town of Crenshaw	FIS & FIRM	9/28/1979
Quitman County	Unincorporated Areas	FIS & FIRM	9/4/1985
Quitman County	Town of Falcon	FIRM	8/19/1985
Quitman County	Town of Marks	FIRM	9/4/1985
Quitman County	Town of Sledge	FIRM	9/4/1985
Tate County	All Jurisdictions	FIS & FIRM	10/2/2013
Tunica County	All Jurisdictions	FIS & FIRM	10/16/2008

*Town of Walls Effective Date: 6/4/2007

A Letter of Map Change (LOMC) is a letter that reflects an official revision to an effective NFIP map. LOMCs are issued in place of the physical revision and republication of the effective FIRM. LOMCs in the Watershed were identified and Table 18 lists the number of LOMCs in each county within the watershed. This LOMC count includes Letters of Map Amendments (LOMA), Letters of Map Revisions (LOMR), Letters of Map Revision based on Fill (LOMR-F), and Conditional LOMR. No Conditional LOMAs or Conditional LOMR-Fs were included. Clusters of LOMCs indicate a need for updated maps.

Table 18: Letters of Map Change Identified in the Watershed

County	Community Name	LOMC Type	Number of Cases
Benton	Benton County	LOMA	2
Marshall	Byhalia, Town of	LOMR	1
Coahoma	Coahoma County	LOMA, LOMR-F, LOMR	9
Tate	Coldwater, Town of	LOMR-F	1
DeSoto	Desoto County	LOMA, LOMR-F, LOMR, CLOMR-F, CLOMR, LOMR	92
DeSoto	Hernando, City of	CLOMR-F, LOMR-F, CLOMR	4
Marshall	Holly Springs, City of	LOMA	2
Desoto	Horn Lake, City of	LOMA, LOMR-F, CLOMR, CLOMR-F	57
Quitman	Marks,, City of	LOMA	4
Marshall	Marshall County	LOMA	8
DeSoto	Olive Branch, City of	CLOMR, LOMR-F, LOMA, LOMR-FW, LOMR, CLOMR-F	81
Panola	Panola County	LOMA	1
Quitman	Quitman County	LOMA	14
Tate	Senatobia, City of	LOMA, LOMR-F, LOMR-FW, CLOMR-F	11
DeSoto	Southaven, City of	LOMR-F, CLOMR, LOMA	115
Tate	Tate County	LOMA, LOMR-F	7
Tunica	Tunica County	LOMA, LOMR-F	7
Tunica	Tunica, Town of	LOMA	1
DeSoto	Walls, Town of	LOMA, LOMR, LOMR-F	3

3.2.11 Ordinances

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

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

3.2.12 Flood Insurance Policies and Repetitive Loss

This Discovery project also gathered data regarding the flood insurance policies and repetitive losses in the Watershed through the NFIP. Table 19: NFIP Statistics in the Coldwater Watershed lists the details of the number of flood policies, total coverage amount and the total cost of repetitive losses within the Coldwater Watershed communities. It should be noted that all data entries except repetitive loss properties are based on the full geographical extents of the community, not just the portion within the watershed.

Table 19: NFIP Statistics in the Coldwater Watershed

Name of Community	CID	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Loss Properties
Benton County	280064	Y	8	\$1,162,700	\$0	0
City of Hernando	280292	Y	25	\$6,278,700	\$131,097.82	0
City of Holly Springs	280113	Y	9	\$2,425,500	\$0	0
City of Marks	280140	Y	31	\$4,949,900	\$542,682.09	8
City of Olive Branch	280286	Y	143	\$39,762,100	\$352,061.29	1
City of Senatobia	280171	Y	33	\$6,366,800	\$23,183.73	1
Coahoma County	280038	Y	133	\$25,546,900	\$2,998,400.85	41
Panola County	280125	Y	59	\$7,540,700	\$299,859.78	4
Desoto County	280050	Y	200	\$51,492,000	\$620,342.15	1
Marshall County	280274	Y	31	\$6,879,200	\$49,797.78	0
Quitman County	280207	Y	101	\$11,745,300	\$1,238,024.85	13
Tate County	280235	Y	32	\$5,929,000	\$630,224.50	4
Town of Coldwater	280265	Y	6	\$2,370,900	\$0	0
Town of Como	280254	N	N/A	N/A	N/A	N/A
Town of Falcon	280138	Y	0	\$0	\$0	0

Name of Community	CID	NFIP (Y/N)	Policies	Coverage	Claims	Repetitive Loss Properties
Town of Lula	280042	N	0	\$0	\$0	0
Town of Tunica	280196	Y	25	\$6,487,000	\$170,723.70	3
Town of Walls	280232	Y	13	\$1,873,500	\$0	0
Tunica County	280236	Y	112	\$32,197,600	\$4,701,116.78	81

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.

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

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

Desoto County: The county's plan, dated July, 2004, states as GOAL 25: An environment secure from flooding, water pollution and soil erosion. Specific policies underlying this plan include:

POLICY 25-1.2 All new developments shall be closely examined in terms of storm water drainage prior to approval, because they tend to create drainage problems.

POLICY 25-1.3 Developers shall be required to address storm water retention on all new developments of 5 acres or more.

POLICY 25-2.1 Limit the percent of impermeable surface allowed in a development

POLICY 25-2.2 Continue participation in the National Flood Insurance Program

POLICY 25-2.3 Coordinate park/open space exactions with wetlands protection; use storm water management as possible amenities and wetlands replacement.

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

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

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

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

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

4 Risk MAP Products for the Coldwater Watershed

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

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

4.1 Proposed Enhanced Products

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

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

Separate datasets will reside within the Flood Risk Database including:

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

4.1.1 Changes since Last FIRM

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

4.1.2 Flood Depth and Analysis Grids

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

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

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

4.1.3 Flood Risk Assessment

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

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

4.1.4 Areas of Mitigation Interest

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

AoMI may include information such as:

- Key emergency routes overtopped during frequent flood events,
- Past claims “hot spots,” including flood claims and properties on the FEMA Repetitive Loss/Severe Repetitive Loss lists, and Individual Assistance/Public Assistance data,

- Areas of significant riverine erosion,
- Locations of at-risk essential facilities and vulnerable locations.
- Areas of mitigation success, or
- Other flood risk areas not identified on the FIRM.

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

Property Protection Measures

- Buy outs
- Flood proofing
- Relocation
- Structure elevation

Education and Outreach Measures

- Brochures
- Booths at fairs and festival
- Annual meetings

Prevention Measures

- Flood ordinance,
- Stormwater programs
- Building codes

Natural Resource Protection Measures

- Wetland and stream restoration
- Riparian buffer ordinances

Structural Project Measures

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

Emergency Services Measures

- Reverse 911
- Swift water rescue equipment

The flood risk report and flood risk maps will be created prior to the issuance of preliminary maps. A fact sheet at the end of the report will summarize the results of the risk assessment process rolled up to the watershed level. Risk maps will contain all the visual data that was created as part of the Flood Risk Assessment stage, which will help to visualize the risk and promote risk awareness. All the above mentioned new products aim to identify mitigation actions and to reduce vulnerability.

5 Discovery Meeting

A watershed-wide Discovery Meeting was held on March 26, 2014 from 1:30 – 3:30 pm at the Gale Center, 2601 Elm Street, Hernando, 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 47 people were in attendance at the meeting including representatives of Tunica County, Town of Walls, City of Southaven, Desoto County, City of Holly Springs, Town of Byhalia, Quitman County, City of Marks, Coahoma County, and City of Senatobia. Additional partners and stakeholders were also in attendance including Planning and Development District staff and representatives of Senator Cochran and Representative Nunnelee’s offices. FEMA staff participated remotely via the webinar. The discussion was stimulated using the effective FIRM and Discovery Map’s display of relevant data available in Appendix B. Attendees cooperatively identified areas of concern where new study information is requested. The final study streams are shown in Appendix C. Additionally mitigation projects options, compliance issues, and ideas on how to improve the local flood risk communication programs were discussed during the meeting. See Appendix B for pertinent Discovery meeting information including sign-in sheets, meeting notes, presentation and other documentation.

Appendices

Appendix A: Community Information

- Community Contact List
- Community Discovery Data Questionnaire
- Community Correspondence
- LOMC Analysis
- 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

- Coldwater 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