Discovery Report

Cache River Watershed, 07140108
Alexander, Johnson, Pulaski, and Union Counties,
Illinois

12/21/2012

FEMA

Project Area Community List

Community Name
Alexander County
Village of Tamms
Johnson County
Village of Belknap
Pulaski County
Village of Karnak
Village of New Grand Chain
Village of Pulaski
Village of Ullin
Union County
Village of Anna
Village of Dongola
Village of Mill Creek

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I. General Information

This Discovery project covers the Cache River watershed, HUC #07140108 (Figure 1), which is located in extreme southern Illinois just north of the confluence of the Ohio and Mississippi Rivers. The Cache River watershed has a drainage area that encompasses approximately 360 square miles (233,600 acres).

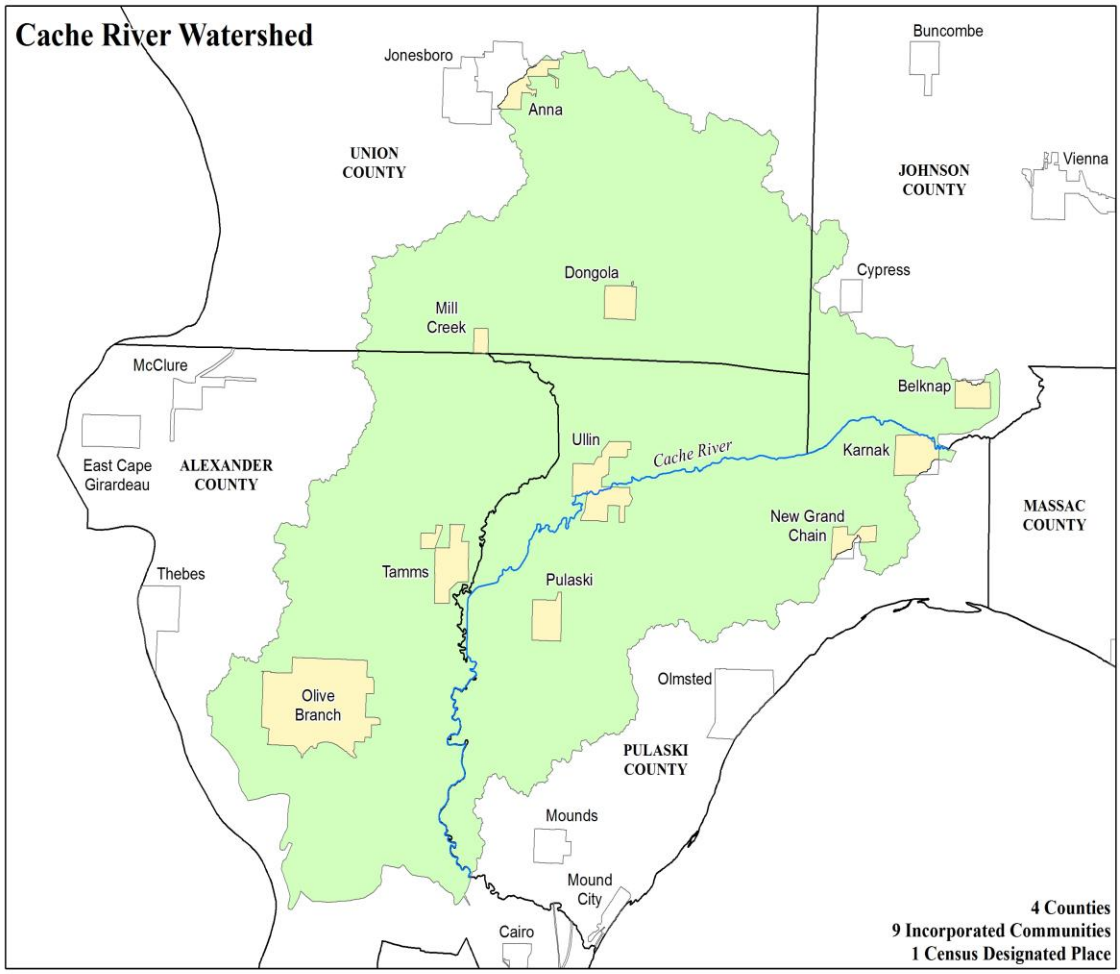

Figure 1. Cache River Watershed, HUC #07140108

The watershed includes significant portions of Alexander, Pulaski, and Union Counties, and a small portion of Johnson County. There are a total of nine villages within the Cache watershed. The Village of Anna (Union County), population 4,442, is the largest community located on the northern edge of the watershed. The next four largest villages within the watershed are Dongola (Union County), Tamms (Alexander County), Karnak, and Ullin (Pulaski County) with 2010 populations of 726, 632, 499, and 463, respectively. According to U.S. Census Bureau figures, all Cache watershed communities decreased in

population from 2000 to 2010. Table 1 shows the National Flood Insurance Program (NFIP) participation status of the Cache watershed counties and communities.

Table 1. NFIP Participation Status

Community	Participating?
Alexander County	Yes
Tamms, Village of	Yes
Johnson County	Yes
Belknap, Village of	No
Pulaski County	Yes
Karnak, Village of	Yes
New Grand Chain, Village of	No
Pulaski, Village of	Yes
Ullin, Village of	Yes
Union County	Yes
Anna, Village of	No
Dongola, Village of	Yes
Mill Creek, Village of	Yes

II. Watershed Stakeholder Coordination

The Discovery phase of this Federal Emergency Management Agency (FEMA) Risk MAP project included an investigation of existing terrain, flood hazard data, and flood risk data; broad data mining for development of an initial Discovery map; and detailed data collection to refine the Discovery map, which was prepared by the Illinois State Water Survey (ISWS). Watershed coordination meetings were held with community, state, and federal officials to share information concerning the watershed and its stakeholders.

Approximately six weeks prior to the Discovery Meeting, FEMA Region V conducted a project team conference call with ISWS and appropriate state and federal officials. During the State/Federal project team call, ISWS staff provided an overview of the Risk MAP program and the Discovery process. Information concerning the Cache River and its tributaries as well as current watershed projects and mitigation efforts was exchanged between ISWS staff and officials. Pre-Discovery materials are available in Appendix A.

Following this initial contact, ISWS staff updated a contacts database using available websites and made phone calls to the communities. These calls included an overview of the Risk MAP program and Discovery process. An invitation list for the Discovery meeting was compiled from the information gathered during the phone conversations. Approximately four weeks prior to the meetings, ISWS mailed letters to stakeholders providing a background of the Risk MAP program and an invitation to attend a Discovery meeting. The contact information and invitations are available in Appendix B.

The Cache River Watershed Discovery meeting was held at the following place, date, and time.

Thursday, September 13, 2012 / 6:00 – 8:00 PM
Shawnee Community College, River Room
8364 Shawnee College Road
Ullin, IL 62992

The Discovery meeting was approximately two hours in length and consisted of introductory presentations followed by a break-out session in which stakeholders could review the Discovery map, ask questions, and provide comments and revisions.

Presentations were given describing Risk MAP program goals and objectives, flood characteristics and damages in the watershed, hazard mitigation projects, and the Discovery meeting goals and objectives. The meeting materials are available in Appendix C.

For the break-out session, Discovery maps were available for review at approximately six to eight stations, and each station was staffed by ISWS personnel. After reviewing the maps and clarifying any questions, stakeholders completed comment forms that included their contact information and recommended revisions or general feedback. The meeting summary, attendance, and comments are available in Appendix D. The Discovery Maps are available in Appendix E.

As part of the ongoing outreach process, meeting participants received a community communications assessment seeking their feedback on the best way to correspond with their community throughout the Cache Watershed Risk MAP project. The assessment results and summary report are available in Appendix F.

III. Data Collection

A list of the data collected, the deliverable or product in which the data are included, the source of the data, and any pertinent comments are provided in Table 2. Table 2 data can be used for flood risk products and additional information to benefit the project.

Table 2. Data Collection for Cache Watershed

Data Types	Description	Source	Deliverable
Average Annualized Loss	FEMA Nationwide Level 1 Hazus estimated Average Annualized Loss analysis	FEMA Region 5	Discovery Map; Geodatabase
Coordinated Needs Management Strategy (CNMS) Streams	Streams categorized by study validity	FEMA Region 5 Coordinated Needs Management Strategy Inventory	Geodatabase
Community Boundaries	Location of community boundaries	U.S. Census 2010	Discovery Map; Geodatabase
County Boundaries	Location of county boundaries	USGS Topographic Maps	Discovery Map; Geodatabase
Dams	Location of dams	Hazus (based on the 1999 National Inventory of Dams database, from the U.S. Army Corps of Engineers)	Discovery Map; Geodatabase
EPA 303(d) Streams	Streams included in the EPA 303(d) list of impaired streams	U.S. EPA Office of Water	Geodatabase
Essential Facilities	Police, Fire, School, Medical, and Emergency Operation Center Facilities	Southern Illinois University	Discovery Map; Geodatabase
FEMA Public Assistance (PA) Grant Program	Locations of PA disbursements	FEMA Region 5	Discovery Map; Geodatabase
Federal Land	Location of Federally owned or administered lands	National Atlas of the United States	Discovery Map; Geodatabase
Key Emergency Routes Overtopped	Roads that are at risk of or have a history of flooding	Discovery Meeting Comments	Discovery Map; Geodatabase

Letters of Map Change	Locations of letters of map change	FEMA Mapping Information Platform Database	Discovery Map; Geodatabase
Levees	Location of levees considered for accreditation status by FEMA	FEMA Midterm Levee Inventory	Discovery Map; Geodatabase
Major Roads	Location of interstates and major highways	Illinois Department of Transportation, 2010	Discovery Map; Geodatabase
Non-Accredited Levees	Location of levees that are not FEMA Accredited	Discovery Meeting Comments	Discovery Map; Geodatabase
Other Flood Risk Areas	Areas of identified flooding that are located outside of the Special Flood Hazard Areas delineation	Discovery Meeting Comments	Discovery Map; Geodatabase
Special Flood Hazard Areas	Location of special flood hazard areas	FEMA Flood Insurance Rate Maps	Discovery Map; Geodatabase
HUC 8, 10, & 12 Watersheds	Hydrologic Unit Code 8, 10, & 12 scale watershed boundaries	USGS National Hydrography Dataset	Discovery Map; Geodatabase
Significant Non-Levee Embankments	Location of Non-Levee embankments	Discovery Meeting Comments	Discovery Map; Geodatabase
State Boundaries	Location of state boundaries	U.S. Census 2010	Discovery Map; Geodatabase
Stream Flow Constrictions	Locations of stream flow constrictions	Multi-Hazard Mitigation plans for Alexander and Johnson Counties and Discovery Meeting Comments	Discovery Map; Geodatabase
Stream Gages	Locations of stream gages operated by multiple agencies	United States Geological Survey (USGS)	Discovery Map; Geodatabase
Streams of Concern	Streams categorized by level of concern determined by Illinois State Water Survey (ISWS) in-house process	Region V Coordinated Needs Management Strategy Inventory \ ISWS	Discovery Map; Geodatabase
Study Requests	Study Requests collected through Discovery process and CNMS.	Illinois State Water Survey	Discovery Map; Geodatabase
Wetlands	Location and type of wetlands and deep water habitats	U.S. Fish and Wildlife Service National Wetlands Inventory	Discovery Map; Geodatabase

i. Data that can be used for Flood Risk Products

Topographic and Imagery Data

LiDAR data acquisition for the Cache River watershed, consisting of portions of Union, Alexander, Johnson, and Pulaski Counties, is being performed by various agencies including the U.S. Geological Survey (USGS), U.S. Army Corps of Engineers (USACE), Illinois Department of Transportation (IDOT), and the Illinois Height Modernization Program. Data for Alexander and Union Counties have been acquired and are scheduled for distribution in early 2013. Pulaski and Johnson Counties' LiDAR data have been acquired but are not yet processed.

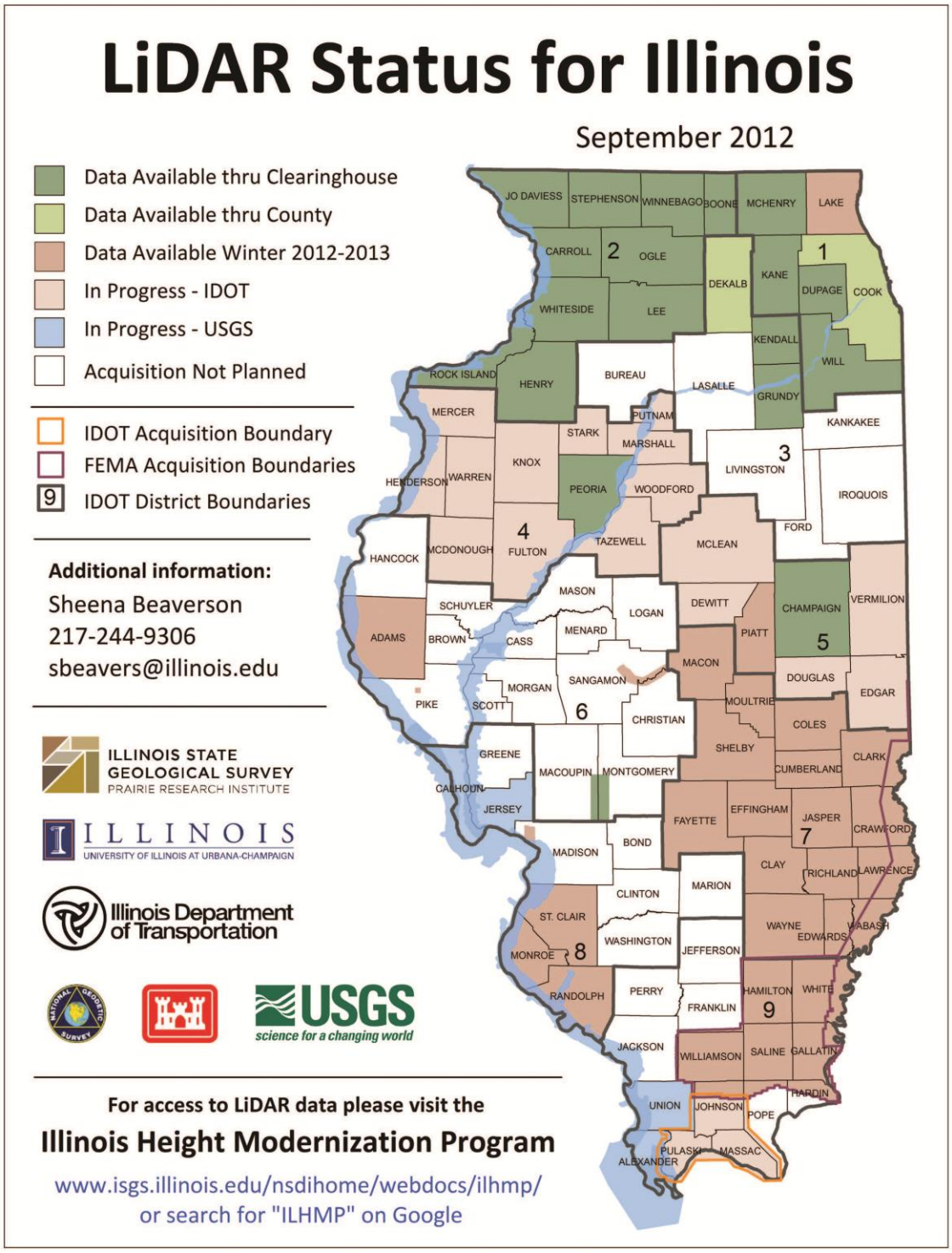

Figure 2. LiDAR Status for Illinois

USGS Gages

The project team identified USGS stream gages in the watershed. The locations of the gages are shown on the Discovery map and listed in Table 3.

Table 3. USGS Stream Gages

Gage Number	Station Name and Location	Years of Record (Peaks)
03612000	Cache River at Forman, IL	88
05600000	Big Creek near Wetaug, IL	69

ii. Other Data and Information

Mitigation Plans/Status, Mitigation Projects

Multi-Hazard Mitigation Plans (MHMPs) are prepared for unincorporated and incorporated communities to help communities reduce long-term risk to life and property from natural hazards. The plans include comprehensive mitigation strategies intended to promote flood-resilient communities. The project team reviewed the mitigation strategies in available MHMPs to determine which, if any, were relevant for the Discovery process. Table 4 lists the MHMPs, their status, and their availability for review.

Table 4. MHMPs: Status and Availability

County	MHMP	Hazus	Issue Date	Expiration Date	Available for Review
Alexander	Y	Y	03/19/2010	03/19/2015	Y
Johnson	Y	Y	02/15/2010	02/15/2015	Y
Pulaski	Y	Y	02/15/2010	02/15/2015	Y
Union	Y	Y	03/19/2010	03/19/2015	Y

CNMS and NFIP Mapping Study Needs

ISWS applied geospatial technologies to coordinate the management of mapping needs. The Coordinated Needs Management Strategy (CNMS) contains data for stream reaches to support existing and proposed flood mapping activities. An update and analyses of the CNMS data for the Cache watershed are complete. Analyzed studies have been identified in Illinois as “VALID,” “UNVERIFIED,” “UNKNOWN,” and “ASSESSED.”

A methodology was determined to rank streams based on several criteria to provide a basis for prioritizing mapping needs in the watershed. There are a number of flooding issues in the Cache River HUC8 watershed. ISWS identified streams of concern by performing a spatial analysis of the data to determine where there are combinations of potentially unverified engineering data, high risk, and community concerns. Three sources of information were used for this initial screening task. The CNMS Phase III data are

organized in a geospatial database of stream reaches attributed with an assessment of the engineering analyses as valid, unverified, assessed, or unknown. The FEMA National Flood Risk Analysis HUC Risk Data spatial data were used to provide a relative risk ranking. The FEMA National Flood Risk Analysis HUC Risk Data are formed in a Census Block Group GIS layer that contains aggregated flood claims data along with 10 weighted parameters used to compute relative national risk (1 to 10 with 1 being highest risk) by Census Block Group. Study requests contained in the CNMS as well as local mapping concerns collected at the Discovery meeting were used to identify areas of known flooding issues.

A subset of stream segments was created by combining those stream segments identified as having engineering analyses that may no longer be valid (CNMS unverified) and any stream segment for which comments collected indicate that the Special Flood Hazard Area (SFHA) mapping is inaccurate or inadequate. This subset of stream segments was then intersected with the HUC Risk Data and separated into two categories: high concern for those segments which flow through Census Block Groups with Risk Rankings between 1 and 5; medium concern for those segments which flow through Census Block Groups with Risk Rankings between 6 and 10. Stream segments outside the combined set were categorized as low concern. The entire list of categorized stream segments, including stream names, floodplain zones, stream lengths, and categories of concern, are provided in Appendix G. The stream segment categories are stored in the Discovery geodatabase as well as a GIS feature class derived from the CNMS. The feature class name is Streams of Concern.

Table 4. Streams of Concern Categorization

Level of Concern	CNMS Status	Study Request	FEMA Risk Decile
High	Unverified	Yes/No	1-5
	Unknown & Assessed	Yes	1-5
Medium	Unverified	Yes/No	6-10
	Unknown & Assessed	Yes	6-10
	Valid	Yes	1-10
Low	Valid	No	n/a
	Unknown & Assessed	No	n/a

Community Rating System (CRS)

There are no communities in the Cache watershed that participate in CRS.

Flood Insurance Data

Flood insurance data for the participating communities are listed below in Table 6. These data were retrieved from the FEMA Community Information System database. Policies in Force and Insurance in Force are for the year 2012. The remaining columns, Number of

Paid Losses, Total Losses Paid, and Substantial Damage Claims are the number of claims that have occurred since 1978.

Table 5. Community Flood Insurance Data

Community	Policies In Force- 2012	Insurance Coverage in Force- 2012	No. of Paid Losses since 1978	Total Losses Paid since 1978	Substantial Damage Claims since 1978
Alexander County	133	$10,126,300.00	139	$1,530,051.01	8
Tamms, Village	23	$1,980,000.00	4	137,737.67	1
Johnson County	10	$1,620,000.00	3	$10,051.95	1
Belknap, Village	NA	NA	NA	NA	NA
Pulaski County	27	$5,728,800.00	10	$45,949.26	2
Karnak, Village	7	$742,000.00	2	$13,012.44	3
New Grand Chain, Village	NA	NA	NA	NA	NA
Pulaski, Village	2	$310,000.00	0	0	0
Ullin, Village	2	$392,000.00	2	$9,698.18	0
Union County	133	$9,925,800.00	71	$276,027.68	2
Anna, Village	NA	NA	NA	NA	NA
Dongola, Village	2	$67,000.00	0	0	0
Mill Creek, Village	0	0	2	$6,164.12	0

(FEMA, July 13, 2012)

Levees

Several levees exist in the study area to provide the county with some degree of protection against flooding. However, no levee systems are accredited by FEMA as providing protection from the 1% annual-chance flood.

Karnak Levee (also known as Cache River Levee), along the western bank of Post Creek Cutoff near Karnak, separates the Upper and Lower Cache River watersheds. This levee was built in 1952 across the old Cache River channel and forces drainage from the Upper Cache River to flow directly to the Ohio River through the Post Creek Cutoff. It also was designed to prevent any flood from the Upper Cache and Ohio Rivers from backing into the Lower Cache River. Karnak Levee was designed with two 48-inch gated culverts to allow local drainage along the west side of the levee to flow to Post Creek Cutoff.

Drainage from the Lower Cache River watershed was assumed to flow west into the Mississippi River. However, during flood events, some drainage from the Lower Cache River flowed east to Post Creek Cutoff through the culverts in the Karnak Levee. (Demissie, Keefer, Lian, Yue & Larson, 2008)

At present, however, the Karnak Levee has been breached and the culverts washed away. It is now possible for major floods from the Upper Cache and Ohio Rivers to back into and flood the Lower Cache River floodplain and for flood waters from the Lower Cache River to flow to the Post Creek Cutoff without any control. (Demissie et al., 2008)

Floodplain Management/Community Assistance Visits (CAVs)

Community Assistance Contacts (CACs) and Community Assistance Visits (CAVs) are two key methods FEMA uses to identify community floodplain management program deficiencies and violations and to provide technical assistance to resolve these issues. As the state coordinating agency for the National Flood Insurance Program, the Illinois Department of Natural Resources, Office of Water Resources, conducts CACs and CAVs as part of their floodplain management programs. A CAV typically consists of a tour of the floodplain to assess any recent construction activities, a review of the local permitting process, and evaluation of the local floodplain ordinance. A meeting with the local floodplain official is held to discuss the National Flood Insurance Program (NFIP), the local permitting process, any recent flood events, training opportunities, and any program deficiencies.

A CAC can be conducted by a telephone call to the community or a brief visit. The CAC provides a means to establish or re-establish contact with an NFIP community for the purpose of determining any existing problems or issues and to offer assistance if necessary. Table 6 lists the communities in the watershed and the date of their latest CAV or CAC.

Table 6. Recent CAV/CACs

Community	CAV	CAC
Alexander County	01/13/2005	N/A
Village of Tamms	01/13/2005	03/24/1998
Johnson County	06/25/2004	08/16/1996
Pulaski County	05/18/2006	06/16/1997
Village of Karnak	05/18/2006	08/27/1993
Village of Pulaski	05/17/2006	08/18/1997
Village of Ullin	05/17/2006	N/A
Union County	08/12/2003	12/05/2006

Village of Mill Creek	N/A	08/27/1993

Regulatory Mapping

As part of FEMA's Map Modernization program, ISWS has recently updated several of the countywide Flood Insurance Rate Maps (FIRMs) throughout the state of Illinois. Many of these maps are effective or in the final stages of map adoption. These maps are in a digital format, yet they do not necessarily reflect newer hydrologic or hydraulic study information and therefore may not be the most accurate representation of flood risk within the watershed. Table 7 lists the Map Modernization activity in the Cache watershed.

Table 7. Digital Flood Insurance Rate Map (DFIRM) Status

Community	Status	Effective DFIRM Date
Alexander County	Effective	May 4, 2009
Johnson County	Not Funded	N/A
Pulaski County	Not Funded	N/A
Union County	Effective	May 2, 2008

IV. Risk MAP Needs and Recommendations

The project team presented the Discovery map and discussed the results of the data collection and analysis in detail with the watershed stakeholders during the Discovery meetings. This section addresses the areas of concern and interest within the Cache watershed that could be addressed with Risk MAP projects.

i. Funded Projects in Cache HUC 8

In addition to this Discovery Project, FEMA has funded several projects in the Cache HUC 8. Currently, the ISWS is contracted by FEMA to develop a Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Pulaski County, Illinois, incorporating new hydrologic and hydraulic data. Special Flood Hazard Areas that are shown as Zone A on the effective FIRMs will be re-delineated using basic modeling techniques. An existing study of the Cache River will be incorporated. The study was prepared for the Illinois Nature Preserves Commission and the Cache River Wetland Joint Venture Partnership. (*Hydrologic and Hydraulic Modeling for Evaluating Alternatives for Managed Connection of the Upper and Lower Cache Rivers*, Demissie et al., ISWS CR 2010-06.) This model will be validated with information collected during the 2011 flooding.

New hydraulic data and mapping will be prepared for a portion of the Ohio River near Cairo, Illinois as part of a levee de-accreditation study by Strategic Alliance for Risk

Reduction (STARR), contracted by FEMA Region 5. These results will be incorporated in the Pulaski County FIRM prepared by ISWS.

The ISWS is also contracted by FEMA to prepare the Flood Risk Report, map, and database for the Cache River HUC 8 to fully deploy Risk MAP.

ii. Floodplain Study Needs

ISWS has completed a number of Digital Flood Insurance Rate Map (DFIRM) projects as part of the Map Modernization program. With input from community stakeholders, ISWS has identified several areas in which new or updated studies are recommended. The proposed new study areas and current study types (detailed or approximate) are listed in Table 8. Mapping needs listed in Table 8 include streams categorized as "High" or "Medium" from the Streams of Concern analysis. There were no streams ranked as "High" concern in the Lower Cache Watershed.

The goal of the floodplain mapping program is to have a high quality, model-based floodplain mapped for all streams that drain greater than 1 square mile. While the mapping needs listed in the following table are the highest priority stream reaches for modeling, there are other mapping needs that also need to be included in any project proposed for this basin. These needs are fully documented in CNMS. Appendix G lists the additional mapping needs required to meet this goal.

Table 8. Mapping Needs

Flooding Source	Study Length (Miles)	Current Study Type
Cache River	18.88	Approximate
Cache River	7.33	Approximate
Diversion Channel	1.19	None
Limekiln Slough	3.10	Approximate
Pigeon Roost Creek	3.33	Detailed
Pigeon Roost Creek	1.95	Approximate
unnamed	1.35	None
unnamed	0.92	None
unnamed	0.84	Approximate

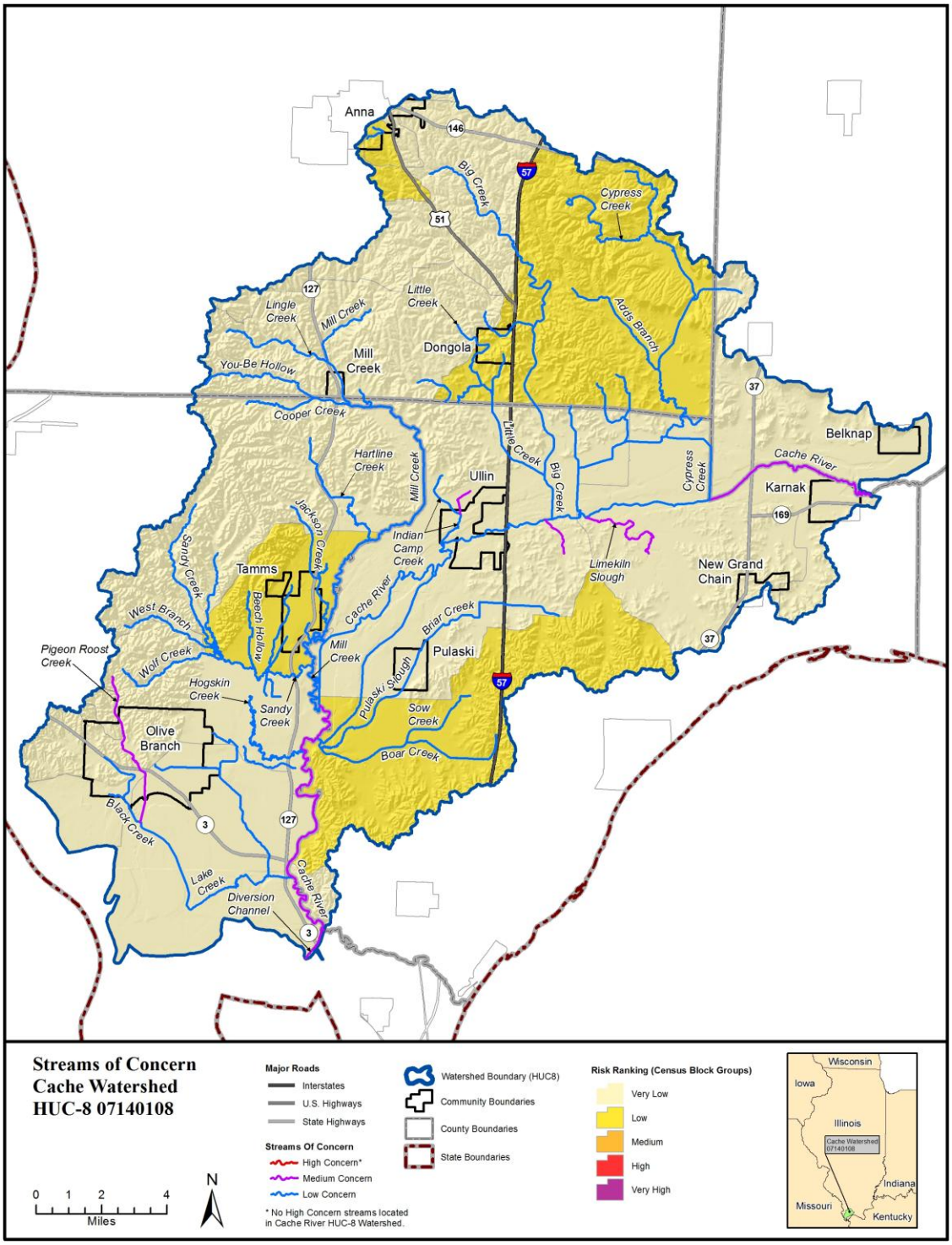

Figure 3. Streams of Concern

iii. Mitigation Projects

In the Discovery meetings, community stakeholders identified several locations in which mitigation projects could reduce the impacts of flooding. Topics of mitigation interest included levees, roads that frequently flood, significant riverine erosion, at-risk essential facilities, streamflow constriction, and recent and/or future development. The following mitigation projects were identified during the Discovery meeting.

Table 9. Mitigation Projects

Community	Subject(s)	Project	Status	Comment Number
Karnak, IL	Levee Breach	Repair Karnak Levee	Incomplete	32aa
Pulaski County	Overtopped Roads	Raise Perks and Groner Roads	Incomplete	81b
Johnson County	Overtopped Road	Raise Belknap blacktop road	Incomplete	5
Pulaski County	Streamflow Constriction	Remove flow obstructions from the Cache River	Incomplete	7

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