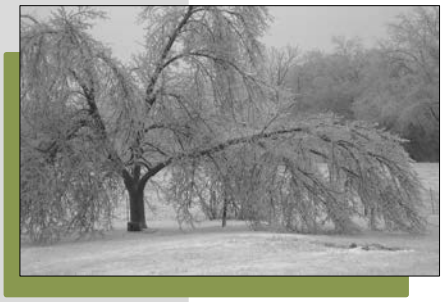
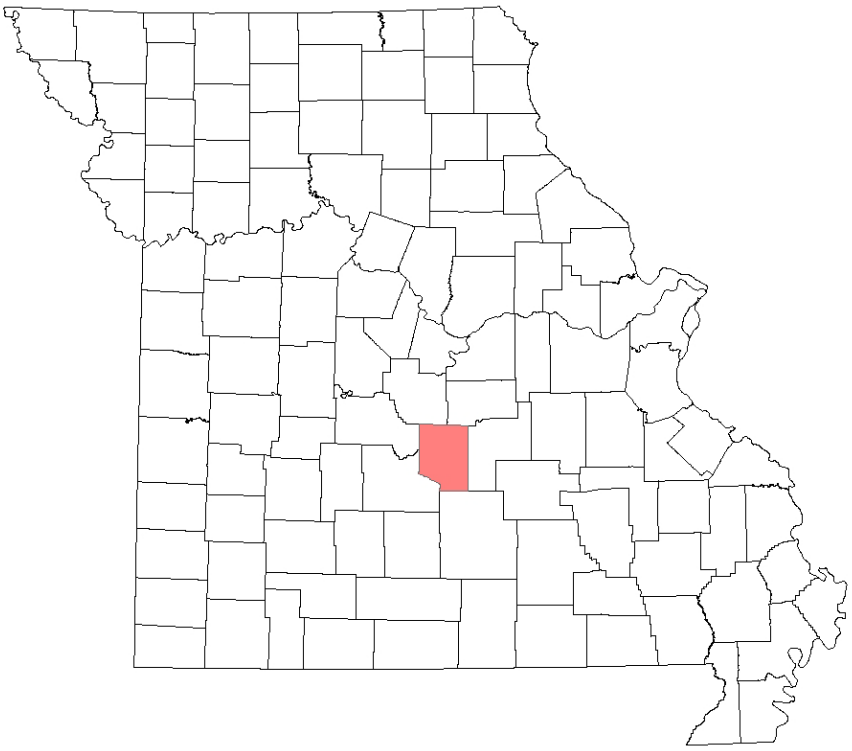


Pulaski County Multi-Jurisdiction Natural Hazard Mitigation Plan



Meramec Regional Planning Commission ● December 2015

4 Industrial Drive,
St. James, MO 65559

Phone: (573) 265-2993

Fax: (573) 265-3550

CONTRIBUTORS

Pulaski County Hazard Mitigation Planning Committee

The individuals invited to participate in the Pulaski County hazard mitigation planning committee are as follows:

Jurisdictional Representatives

Name	Title	Department	Jurisdiction/Agency/Organization
Opal Gibbs	City Clerk	City Admin.	City of Crocker
James Morgan	Mayor	City Admin.	City of Crocker
Jeff Clark	Mayor	City Admin.	City of Dixon
Greg Stratman	City Administrator	City Admin.	City of Richland
Debbie Adkins	City Clerk	City Admin.	City of St. Robert
George Sanders	Mayor	City Admin.	City of St. Robert
Luge Hardman	Mayor	City Admin.	City of Waynesville
Brent Bassett	County Clerk	County Admin.	Pulaski County
Gene Newkirk	Presiding Commissioner	County Admin.	Pulaski County
Lynn Sharp	Associate Commissioner	County Admin.	Pulaski County
Rick Zweerink	Associate Commissioner	County Admin.	Pulaski County
Carol Welch	City Clerk	City Admin.	City of Waynesville
Dr. Gary Doerhoff	Superintendent	District Admin.	Crocker R-II School District
Duane Doyle	Superintendent	District Admin.	Dixon R-I School District
Dr. Randy Caffey	Superintendent	District Admin.	Laquey R-V School District
Tony Hermann	Superintendent	District Admin.	Richland R-IV School District
Doug Jacobson	Superintendent	District Admin.	Swedeborg R-III Elementary
Dr. Brian Henry	Superintendent	District Admin.	Waynesville R-VI School District
Anita Ivey	City Administrator	City Admin.	City of St. Robert
Bruce Harrill	City Administrator	City Admin.	City of Waynesville
Gary Bates	Police Chief	Police Dept.	City of Richland
Rick Hobbs	Fire Chief	Fire Dept.	City of Richland
James LaChance		Police Dept.	City of Dixon
Scott Crider		Fire Dept.	City of St. Robert
Chris Berger		District Admin.	Waynesville R-VI School District
Jim Humphrey		City Admin.	City of St. Robert
Jessica Butteris		Road & Bridge	Pulaski County
Lucy Rector		Road & Bridge	Pulaski County
Steve Street		Road & Bridge	Pulaski County
Donnie Ray		Road & Bridge	Pulaski County
Ricky Zweeriwk			Pulaski County
Lynn Sharp			Pulaski County

*Sign in sheets from planning meetings are included in Appendix B.

The individuals invited to represent stakeholders on the Pulaski County hazard mitigation planning committee are as follows:

Stakeholder Representatives

Name	Title	Department	Agency/Organization
Byron Dudley	Manager of Communications & PR		Laclede Electric Cooperative
Aaron Bradshaw	General Manager		Intercounty Electric Cooperative
Carmen Hartwell	General Manager		Gascosage Electric Cooperative
Gene Williams			Pulaski County Public Water Supply District #1
Mark Tallent			Pulaski County Public Water Supply District #2
William Crawford			Pulaski County Public Water Supply District #3
	Manager		Rosewood Manor Assisted Living
Deborah Baker	Health Director		Pulaski County Health Department
	General Manager		Dixon Family Practice, Dixon, MO
Dr. Charles Stephen Harriman, MD	Physician		Mercy Clinic Family Medicine, St. Robert, MO
Dr. Curt Morrison, MD	Physician		Pulaski Medical Clinic Waynesville, MO
Dr. Emily Mebruer, MD	Physician		St. John's Clinic Richland, MO
Sue Buhr	Administrator		Sunset Village of the Ozarks, Inc., St. Robert, MO
Renee Ridling	Executive Director		Life Care Center of Waynesville, MO
	Executive Director		Dixon Nursing & Rehab Dixon, MO
	Executive Director		Richland Care Center Richland, MO

TABLE OF CONTENTS

Executive Summary ..... **i**
Table of Contents iii
Prerequisites viii
1 Introduction and Planning Process **1.1**
1.1 Purpose 1.1
1.2 Background and Scope 1.2
1.3 Plan Organization 1.2
1.4 Planning Process 1.3
1.4.1 Multi-Jurisdictional Participation 1.7
1.4.2 The Planning Steps 1.9
2 Planning Area Profile and Capabilities **2.1**
2.1 Pulaski County Planning Area Profile 2.2
2.1.2 Geography, Geology, and Topography 2.4
2.1.3 Climate 2.8
2.1.4 Population/Demographics 2.8
2.1.5 History 2.11
2.1.6 Occupations 2.13
2.1.7 Agriculture 2.13
2.1.8 FEMA Hazard Mitigation Assistance Grants in Planning Area 2.14
3 Risk Assessment **3.1**
3.1 Hazard Identification 3.4
3.1.1 Review of Existing Mitigation Plans 3.4
3.1.2 Review Disaster Declaration History 3.5
3.1.3 Research Additional Sources 3.7
3.1.4 Hazards Identified 3.9
3.1.5 Multi-Jurisdictional Risk Assessment 3.12

3.2 Assets at Risk....3.12
3.2.1 Total Exposure of Population and Structures....3.12
3.2.2 Critical and Essential Facilities and Infrastructure....3.15
3.2.3 Other Assets....3.18
3.3 Future Land Use and Development....3.21
3.4 Hazard Profiles, Vulnerability, and Problem Statements....3.24
3.4.1 Dam Failure....3.27
3.4.2 Drought....3.35
3.4.3 Earthquakes....3.48
3.4.4 Extreme Heat....3.61
3.4.5 Fires (Urban/Structural and Wild)....3.68
3.4.6 Flooding (Flash and River)....3.76
3.4.7 Land Subsidence/Sinkholes....3.102
3.4.8 Thunderstorm/High Winds/Lightning/Hail....3.109
3.4.9 Tornado....3.125
3.4.10 Winter Weather/Snow/Ice/Severe Cold....3.138
4 Mitigation Strategy....4.1
4.1 Goals....4.1
4.2 Identification and Analysis of Mitigation Actions....4.2
4.3 Implementation of Mitigation Actions....4.3
5 Plan Maintenance Process....5.1
5.1 Monitoring, Evaluating, and Updating the Plan....5.1
5.1.1 Responsibility for Plan Maintenance....5.1
5.1.2 Plan Maintenance Schedule....5.2
5.1.3 Plan Maintenance Process....5.2
5.2 Incorporation into Existing Planning Mechanisms....5.3
5.3 Continued Public Involvement....5.5

6 Appendix 6.1

A: References.....6.2

B: Planning Process 6.6

C: Completed/Deleted Mitigation Actions.....6.34

D: Adoption Resolutions 6.39

E: Critical/Essential Facilities.....6.51

EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Pulaski County and participating cities and school districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses to the County and its communities and schools resulting from hazard events. The plan is an update of a plan that was approved on April 1, 2011. The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 and to achieve eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant Programs.

The County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following 11 jurisdictions that participated in the planning process:

- Pulaski County
- City of Crocker
- City of Dixon
- City of Richland
- City of St. Robert
- City of Waynesville
- Dixon R-I School District
- Crocker R-II School District
- Swedeborg R-III School District
- Richland R-IV School District
- Laquey R-V School District
- Waynesville R-VI School District

Pulaski County and the jurisdictions listed above developed a multi-jurisdictional Hazard Mitigation Plan that was approved by FEMA on April 1, 2011 (expiration April 1, 2016). This current planning effort serves as an update (hereafter referred to as the 2016 Hazard Mitigation Plan).

The plan update process followed a methodology prescribed by FEMA, which began with the formation of a Mitigation Planning Committee (MPC) comprised of representative from Pulaski County and participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to Pulaski County and analyzed the vulnerability to these hazards. The MPC also examined the capabilities in place to mitigate them, with emphasis on changes that have occurred since the previously approved plan was adopted. The MPC determined that the planning area is vulnerable to several hazards that are identified, profiled and analyzed in this plan. Riverine and flash flooding, winter storms, severe thunderstorms/hail/ lightening/high winds and tornadoes are among the hazards that historically have had a significant impact.

Based upon the risk assessment, the MCP reviewed goals for reducing risk from hazards. The goals are listed below:

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Goal 3: Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Goal 5: Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefit of special interests.

Goal 6: Secure resources for investment in hazard mitigation.

To meet the identified goals, the MPC developed recommended mitigation actions, which are detailed in Chapter 4 of this plan. The MPC developed an implementation plan for each action, which identifies priority level, responsible agency, timeline, cost estimate, potential funding sources and progress to date.

PREREQUISITES

44 CFR requirement 201.6(c)(5): The local hazard mitigation plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

This plan has been reviewed by and adopted with resolutions or other documentation of adoption by all participating jurisdictions and schools districts. The documentation of adoptions is included in Appendix D.

The following jurisdictions participated in the development of this plan and have adopted the multi-jurisdictional plan.

- Pulaski County
- City of Crocker
- City of Dixon
- City of Richland
- City of St. Robert
- City of Waynesville
- Dixon R-I School District
- Crocker R-II School District
- Swedeborg R-III School District
- Richland R-IV School District
- Laquey R-V School District
- Waynesville R-VI School District

Model Resolution

Resolution # _____

Adopting the Pulaski County Multi-Jurisdictional Local Hazard Mitigation Plan

Whereas, the (Name of Government/District) _____ recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments; and

Whereas, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, the (Name of Government/District) _____ fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, the Missouri State Emergency Management Agency and the Federal Emergency Management Agency Region VII officials will review the "Pulaski County Multi-Jurisdictional Local Hazard Mitigation Plan," and approved it as to form and content; and

Whereas, the (Name of Government/District) _____ desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdictional Local Hazard Mitigation Plan; and

Whereas, adoption by the governing body for the (Name of Government/District) _____ demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi- Jurisdictional Local Hazard Mitigation Plan; and

Whereas, adoption of this legitimizes the plan and authorizes responsible agencies to carry out responsibilities under the plan;

Now, therefore, be it resolved, that the (Name of Government/District) _____ has adopted the "Pulaski County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan.

.

Date: _____

Certifying Official: _____

1 Introduction and Planning Process

1 Introduction and Planning Process **1.1**

1.1 Purpose *1.1*

1.2 Background and Scope *1.2*

1.3 Plan Organization *1.2*

1.4 Planning Process *1.3*

1.4.1 Multi-Jurisdictional Participation 1.7

1.4.2 The Planning Steps 1.9

1.1 Purpose

Pulaski County and eleven other jurisdictions prepared this local hazard mitigation plan to guide hazard mitigation planning for the purpose of better protecting the people and property of the County from the effects of natural hazard events. Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set and appropriate strategies to lessen impacts are determined, prioritized and implemented.

The mission of the Pulaski County Hazard Mitigation Plan is to substantially and permanently reduce the county's vulnerability to natural hazards. This plan demonstrates the communities' commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources for the next five years. The plan is intended to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property and the natural environment. This can be achieved by increasing public awareness, documenting resources for risk reduction and loss prevention and identifying activities to guide the community towards the development of a safer, more sustainable community.

This plan was also developed to make Pulaski County and participating cities and school districts eligible for certain federal disaster assistance as required by the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Those programs include the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program and Flood Mitigation Assistance Program. The plan has been prepared in accordance with the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and developed and organized within the rules and regulations established under 44 CFR 201.6 published in the *Federal Register* on February 26, 2002 and finalized in October 31, 2007. Those jurisdictions within Pulaski County that do not adopt the 2015 plan will not be eligible for funding through these grant programs.

1.2 Background and Scope

The 2016 Pulaski Hazard Mitigation Plan is an update of the original plan developed and approved on April 1, 2011. The revised document will be valid for five years from approval by FEMA. It is a multi-jurisdictional plan that covers the participating jurisdictions within the County's borders, all of whom adopted both the 2011 and 2016 plan, including the following:

- Pulaski County
- City of Crocker
- City of Dixon
- City of Richland
- City of St. Robert
- City of Waynesville
- Dixon R-I School District
- Crocker R-II School District
- Swedeborg R-III School District
- Richland R-IV School District
- Laquey R-V School District
- Waynesville R-VI School District

Some of the participating jurisdictions cross county borders. Those include the City of Richland, with incorporated city limits in Pulaski, Laclede and Camden counties; the Richland R-IV school district, which serves portions of Pulaski, Laclede and Camden counties; and the Dixon R-I School District, which serves portions of Pulaski, Maries and Phelps counties. Each of these jurisdictions has chosen to participate in the Pulaski County Multi-Hazard Mitigation plan. Only those assets located within Pulaski County's borders are included in this document.

The information and guidance in this plan document will be used to help guide and coordinate mitigation activities and decisions for local jurisdictions and organizations. Proactive mitigation planning will help reduce the cost of disaster response and recover to local communities and residents by protecting critical infrastructure, reducing liability exposure and minimizing overall community impacts and disruptions. Pulaski County has been affected by natural disasters in the past and participating jurisdictions and organizations are committed to reducing the impacts of future incidents and becoming eligible for hazard mitigation-related funding opportunities.

1.3 Plan Organization

The plan contains a mitigation action listing, a discussion of the purpose and methodology used to develop the plan, a profile on Pulaski County, as well as the hazard identification and vulnerability assessment of natural hazards. In addition, the plan offers a discussion of the community's current capability to implement the goals, objectives and strategies identified through the planning process.

The plan is organized as follows:

- Executive Summary
- Chapter 1: Introduction and Planning Process
- Chapter 2: Planning Area Profile and Capabilities
- Chapter 3: Risk Assessment

- Chapter 4: Mitigation Strategy
- Chapter 5: Plan Implementation and Maintenance
- Appendices

To assist in the explanation of the above identified contents, there are several appendices included which provide more detail on specific subjects. This plan is intended to improve the ability of Pulaski County and the jurisdictions within to handle disasters and will document valuable local knowledge on the most efficient and effective ways to reduce loss.

Table 1.1 Summary of 2016 Revisions to Plan

Chapter	Summary of Revisions
Chapter 1 Introduction and Planning Process	Updated with 2015 information and reformatted to follow the model outline. Provided information on how the planning process followed the *Local Mitigation Planning Guidance (March 2013),* the *Local Mitigation Plan Review Guide (October 1, 2011),* and *Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials (March 1, 2013).* Added information on RiskMAP
Chapter 2 Planning Area Profile and Capabilities	Updated with 2015 data and reformatted to follow the model outline.
Chapter 3 Risk Assessment	Updated with 2015 data and reformatted to follow the model outline.
Chapter 4 Mitigation Strategy	Updated with 2014 data and reformatted to follow the model outline, including substituting action item worksheets for the narrative used in the previous plan to provide required information for each action item.
Chapter 5 Plan Implementation and Maintenance	Updated with 2015 data and reformatted to follow the model outline.
Appendices	Updated with 2015 data and reformatted to follow the model outline.

1.4 Planning Process

44 CFR Requirement 201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

The Pulaski County Hazard Mitigation Planning Committee first organized in 2008 when the Missouri State Emergency Management Agency (SEMA) agreed to complete a plan for the county. The county also contracted with the Meramec Regional Planning Commission (MRPC) to assist with organizing the planning committee, conducting the local planning meetings and forwarding the results of those planning meetings to SEMA planners for inclusion into the plan. MRPC is a council of local governments in south central Missouri serving Crawford, Dent, Gasconade, Maries, Osage, Phelps, Pulaski and Washington counties.

Due to staff turnovers and multiple disaster declarations, SEMA was not able to complete the plan on behalf of Pulaski County. At the request of the county, SEMA submitted a grant request to FEMA and was able to secure funding in May 2009 for MRPC to complete the planning process. The initial plan was completed and approved in April 2011.

MRPC's role in developing and updating the Pulaski County Hazard Mitigation plan included assisting in the formation of the MPC and facilitating the planning meetings; soliciting public input; and producing the draft and final plan for review by the MPC, SEMA and FEMA. Staff carried out the research and documentation necessary for the planning process. In addition, MRPC compiled and presented the data for the plan, helped the MPC with the prioritization process and insured that the final document met the DMA requirements established by federal regulations and the most current planning guidance.

In 2014, SEMA secured a grant to review and update the Pulaski County Multi-Hazard Mitigation Plan and contracted with MRPC to facilitate the planning process for the plan update. MRPC staff has followed the most current planning guidance provided by FEMA for the purpose of insuring that the updated plan meets all of the requirements of the Disaster Mitigation Act as established by federal regulations.

The Pulaski County Multi-Hazard Mitigation Plan was developed as the result of a collaborative effort among Pulaski County, the cities of Crocker, Dixon, Richland, St. Robert and Waynesville, Dixon R-I School District, Crocker R-II School District, Swedeborg R-III School District, Richland R-IV School District, Laquey R-V School District, Waynesville R-VI School District, Laclede Electric Cooperative, Intercounty Electric Cooperative, Gascosage Electric Cooperative, Pulaski County Sewer District, Pulaski County Public Water Supply District #1 (Waynesville), Pulaski County Public Water Supply District #2 (St. Robert) and Pulaski County Public Water Supply District #3 (Crocker), public agencies, non-profit organizations, the private sector as well as regional, state and federal agencies. MRPC contacted and asked for volunteers to serve on the planning committee from the county and local city governments, school districts, the county health department, local businesses and utility companies. The mailing list is included in Appendix B: Planning Process. This cross-section of local representatives was chosen for their experience and expertise in emergency planning and community planning in Pulaski County. Staff worked with the Pulaski County MPC to collect and analyze information on hazards and disasters that have impacted the County as well as document mitigation activities that have occurred during the past five years.

Due to time and duty constraints, not all the jurisdictions that were invited to participate in the MPC were able to attend meetings. However, all of the jurisdictions provided information to update the document, reviewed the plan and provided input. Interviews were conducted with stakeholders from the community and several planning meetings were conducted during the plan review and update.

The 2015 planning process began with a meeting held in conjunction with the Pulaski County Commission meeting on March 5, 2015. MRPC staff provided an overview of the planning process and review of the existing hazard mitigation plan. The group reviewed and discussed hazard mitigation goals and what progress had been made on hazard mitigation action items over the past four years. The second meeting was held on April 23, 2015. The MPC reviewed and updated the list of action items, making note of those that had been accomplished, those that were no longer applicable and adding a number of projects to the list. The group then reviewed the action items, applying the STAPLEE method (Social; Technical; Administrative; Political; Legal; Economic; Environmental) and applying cost benefit analysis to best determine priorities. A full description of the prioritization process is included in Chapter 4.

Staff met with county road and bridge staff on March 31st. County associate commissioners and staff provided a comprehensive list of completed mitigation projects as well as proposed new

projects to be included in the plan update. Staff incorporated these action items and completed projects into the planning materials reviewed and prioritized by the MPC in April.

The final list of prioritized action items were mailed out to all jurisdictions and entities that had been invited to participate on the MPC. Recipients were asked to review and provide feedback if they had concerns about how any of the projects were ranked. The draft plan was made available on-line and MPC members were notified on where to find the document and asked to review and provide feedback.

All planning committee members were provided drafts of sections of the plan as they became available. Members of the planning committee reviewed the draft chapters and provided valuable input to MRPC staff. Additionally, through public committee meetings, press releases and draft plan posting on MRPC's website, ample opportunity was provided for public participation. Jurisdictions in surrounding counties were also notified of where to view the revised plan and encouraged to provide input. Any comments, questions and discussions resulting from these activities were given strong consideration in the development of this plan.

Pulaski County further assisted in the planning process by issuing public notice of the planning meetings as well as by providing meeting facilities at the courthouse. County officials attended and participated in meetings.

The MPC contributed to the planning process by:

- Attending and participating in meetings;
- Collecting data for the plan;
- Making decisions on plan content;
- Reviewing drafts of the plan document;
- Developing a list of needs:
- Prioritizing needs and potential mitigation projects; and
- Assisting with public participation and plan adoption

The MPC did not formally meet on a regular basis as recommended in the plan. However, mitigation has become a regular topic of discussion among the majority of jurisdictions included in the plan. A number of mitigation projects have been completed in the county and hazard mitigation concepts are being incorporated into other planning projects.

Table 1.2 provides information on who actively participated in the planning process and who they represented:

Table 1.2 Jurisdictional Representatives Pulaski County Mitigation Planning Committee

Name	Title	Department	Jurisdiction/Agency/ Organization	Direct Participation	Indirect Participation
Bruce Harrill	City Administrator		City of Waynesville	X	
Gary Bates		Police Department	City of Richland	X	
Rick Hobbs		Tri-County Fire Dept.	City of Richland	X	
Gary Doerhoff	Superintendent		Crocker R-II School District	X	
James Morgan	Mayor		City of Crocker	X	
Mark Tallant			Pulaski County Water District No. 2	X	
James LaChance		Dixon Police Dept.	City of Dixon	X	
Scott Crider		St. Robert Fire Dept.	City of St. Robert	X	
Chris Berger	Asst. Superintendent	Operational Services	Waynesville R-VI School District	X	
Gene Newkirk	Presiding Commissioner		Pulaski County	X	
Darrell Todd Marina			Pulaski County Daily News	X	
Jim Humphrey			City of St. Robert	X	
Jessica Lucas			Pulaski County COAD & Waynesville R-VI School District	X	
Jessica Butteris		Road & Bridge	Pulaski County	X	
Lucy Rector		Road & Bridge	Pulaski County	X	
Steve Street		Road & Bridge	Pulaski County	X	
Donnie Ray		Road & Bridge	Pulaski County	X	
Laurie Laughlin			Mercy Medical Clinic	X	
Ricky Zweerink	Associate Commissioner		Pulaski County	X	
Lynn Sharp	Associate Commissioner		Pulaski County	X	
Chris Pigg	City Clerk		City of St. Robert		X
Duane Doyle	Superintendent		Dixon R- I School District	X	
Angel Allen	Project Bid Specialist	Operation Services Dept.	Waynesville R-VI	X	
Betty Godfrey	Payroll Clerk		City of Richland	X	

Name	Title	Department	Jurisdiction/Agency/ Organization	Direct Participation	Indirect Participation
Nathan Carmon	Building Official		City of Waynesville	X	
Roderick Mosely	Building and Land Use		City of St. Robert	X	
Randy Caffey	Superintendent		Laquey R-V	X	
Robert Furthman			City of Dixon	X	
Tony Hermann	Superintendent		Richland R-IV	X	
Christy Foster	Assistant Administrator		Swedeborg R-III	X	

1.5 Multi-Jurisdictional Participation

44 CFR Requirement **§201.6(a)(3)**: Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.

Pulaski County invited incorporated cities, school districts, utility companies, medical facilities, nursing facilities, county health department, and not-for-profits to participate in the hazard mitigation planning process. Letters and/or emails were sent to each of the following:

- Pulaski County
- City of Crocker
- City of Dixon
- City of Richland
- City of St. Robert
- City of Waynesville
- Pulaski County Health Department
- Dixon R-I School District
- Crocker R-II School District
- Swedeborg R-III School District
- Richland R-IV School District
- Laquey R-V School District
- Waynesville R-VI School District
- Gascosage Electric Cooperative
- Laclede Electric Cooperative
- Intercounty Electric Cooperative
- Pulaski County Sewer District
- Pulaski County Public Water Supply District #1 (Waynesville)
- Pulaski County Public Water Supply District #1 (St. Robert)
- Pulaski County Public Water Supply District #3 (Crocker)
- Dixon Family Practice
- Mercy Clinic Family Practice
- Pulaski Medical Clinic

- St. John's Clinic
- Sunset Village of the Ozarks Inc.
- Life Care Center of Waynesville
- Dixon Nursing & Rehab
- Richland Care Center Inc.

A copy of the mailing list and invitation letters are included in Appendix B: Planning Process.

The Disaster Mitigation Act requires that each jurisdiction must participate in the planning process and formally adopt the plan. There were a number of criteria established for participation. In order to be considered participating in the planning process, jurisdictions needed to do at least one of the following as well as adopt the plan:

- Providing a representative to serve on the planning committee;
- Participating in at least one or more meetings of the planning committee;
- Providing data for plan development through surveys and/or interviews;
- Provide information on existing mitigation actions from the previous plan and/or provide additional mitigation actions for the plan;
- Remove actions from the previous plan that were not implemented because they were impractical, inappropriate, not cost effective or were otherwise not feasible;
- Identify goals and mitigation actions for the plan;
- Prioritize mitigation actions/projects for the plan;
- Review and comment on the draft plan document;
- Informing the public, local officials and other interested parties about the planning process and providing opportunities for them to comment on the plan;
- Provide in-kind match documentation; and
- Formally adopt the plan prior to submittal of the final draft to SEMA and FEMA for final approval.

Not all jurisdictions were able to attend the MPC meetings. Most communities and school districts in Pulaski County are small and understaffed. It was not always feasible for representatives to travel to the meetings. However, all jurisdictions met at least one of the participation criteria. The jurisdictions that participated in the process, as well as their level of participation in the process are shown in Table 1.3. Documentation of meetings, including sign-in sheets are included in Appendix B: Planning Process.

Table 1.3 Jurisdictional Participation in the Planning Process

Jurisdiction	Meeting #1	Meeting #2	Interviews	Data Collection Survey/Call	Update/Develop/ Prioritize Mitigation Actions	Review/ Comment on Plan
Pulaski Co.	X	X	X	X	X	X
Crocker	X	X		X	X	X
Dixon	X			X	X	X
Richland	X			X	X	X
St. Robert	X	X		X	X	X
Waynesville	X			X	X	X
Dixon R-I				X		X
Crocker R-II	X	X		X	X	X
Swedeborg R-III				X		X
Richland R-IV				X		X
Laquey R-V				X		X
Waynesville R-VI		X		X	X	X

1.6 The Planning Steps

Pulaski County and MRPC worked together to develop the plan and based the planning process in FEMA's *Local Mitigation Planning Guidance (March 2013),* the *Local Mitigation Plan Review Guide (October 1, 2011),* and *Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials (March 1, 2013).* The planning guides used for the initial plan development are no longer current and were not used in the update. The planning process has included organizing the county's resources, assessing the risks to the county, developing the mitigation plan and implementing the plan and monitoring the progress of plan implementation.

The planning committee based their activities on the 10-step planning process adapted from FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. By following the 10-step planning process, the plan met funding eligibility requirements of the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, Community Rating System and Flood Mitigation Assistance Program.

Table 1.4 Pulaski County Plan Update Process

Community Rating System (CRS) Planning Steps (Activity 510)	Local Mitigation Planning Handbook Tasks (44 CFR Part 201)
Step 1: Organize	Task 1: Determine the Planning Area and Resources Task 2: Build the Planning Team 44 CFR 201.6(c)(1)
Step 2: Involve the public	Task 3: Create an Outreach Strategy 44 CFR 201.6(b)(2) & (3)
Step 3: Coordinate	Task 4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)
Step 4: Assess the hazard	Task 5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)
Step 5: Assess the problem	
Step 6: Set goals	Task 6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(iii)
Step 7: Review possible activities	
Step 8: Draft an action plan	
Step 9: Adopt the plan	Task 8: Review and Adopt the Plan
Step 10: Implement, evaluate, revise	Task 7: Keep the Plan Current Task 9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)

Step 1: Organize the Planning Team (Handbook Tasks 1 & 2)

The planning area was determined by the boundaries of Pulaski County. Some jurisdictions, including the city of Richland and the Dixon R-I School District, extend beyond the county's boundaries. These two jurisdictions elected to participate in the Pulaski County plan as the majority of their critical facilities and service areas lie within Pulaski County.

MRPC staff provided general information on the hazard mitigation plan review process at regular MRPC board meetings – providing both written and oral reports on the review process, schedules for the various plans; which ones had been funded; described match requirements; and asked mayors and commissioners to think about who should be included on the planning committees for each respective county.
The planning team was selected by contacting the leadership of each jurisdiction, explaining the process, and asking them to send appropriate representation to the planning meetings. In addition they were asked to provide input on who they wanted to include on the planning committee. Stakeholders such as electric cooperatives and sewer districts were also contacted and invited. In addition, it was suggested that representatives of some of the local critical facilities be included on the planning committee, such as medical clinics and nursing homes. All meetings were also publicized to allow additional interested parties to attend and participate. Pulaski County offered to host the meetings in conjunction with the regular commission meetings and two meeting dates were selected – March 5, 2015 and April 23, 2015.

At the first meeting on March 5, 2014, MRPC staff made introductions and provided an overview of hazard mitigation planning and the Pulaski County Hazard Mitigation plan. The group reviewed and discussed the goals and objectives. A good deal of the meeting was spent sharing information on what progress had been made in five years and discussing current and future needs and adding new mitigation actions to the existing list. Staff wrapped up the meeting by explaining the process that would be used to prioritize the action items at the next meeting – using both the STAPLEE method and analyzing the cost benefit.

On March 31, 2015, staff met with Pulaski County Road & Bridge staff to go over county mitigation projects and action items in detail. The complete list of action items provided by the

county was incorporated into the list developed at the March 5th meeting. The MPC reviewed and prioritized all of the action items at their April 23, 2015 meeting.

At the second meeting on April 23, 2015, the group reviewed the complete list of action items developed at both the March 5, 2015 meeting and the meeting held with the Pulaski County Road & Bridge staff. MRPC provided an explanation of the prioritization process using both STAPLEE and cost benefit scoring. The MCP then provided input on prioritizing all of the action items. Staff took those recommendations and developed a matrix of the action items with the STAPLEE and cost benefit scores. This matrix was mailed out to all of the individuals and organizations on the mailing list for the MPC with a request for feedback. The group also reviewed the list of critical facilities in the plan and provided feedback on any changes or additions to that list. It was decided at this meeting that staff would mail out data collection surveys to each of the jurisdictions and begin working on the plan. Plan chapters would be shared with the MPC via mail, email and website. If necessary the group would meet again but no date was set.

Documentation of the planning process can be found in Appendix B: Planning Process.

Table 1.5 Schedule of MPC Meetings

Meeting	Topics	Date
Planning Meeting #1	Overview of mitigation planning & Pulaski County plan; Discussion of goals & objectives; Discussion of changes to goals and action items; Discussion of natural hazard events of the last five years, any new data and any changes in mitigation needs	March 5, 2015
Planning Meeting #2	Review of action items & prioritization process; discussion and identification of critical facilities	April 23, 2015
Meeting with Road & Bridge staff	Road & Bridge staff came prepared with a list of mitigation projects that they wanted included in the plan document as well as a list of mitigation projects completed by the road department over the past five years for inclusion in the plan.	March 31, 2015

Step 2: Plan for Public Involvement (Handbook Task 3)

44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

The MPC followed the same process for public involvement and input as was followed during the initial planning process. All MPC meetings were held at the Pulaski County Courthouse and

were held in conjunction with the weekly commission meeting. Public notices were placed at the courthouse and press releases were done prior to the meeting to make the public aware. Meetings were also posted on the MRPC webpage. The public was notified each time the plan or sections of the plan was presented for review and discussion. MPC members and public officials within the county as well as in surrounding counties were contacted, directed to the MRPC website (www.meramecregion.org) where a copy of the draft plan could be viewed or downloaded. The document was made available on the website on November 20, 2015. Hard copies of the final draft were placed at the Pulaski County Courthouse and city hall buildings for Crocker, Dixon, Richland, St. Robert and Waynesville. A hard copy of the draft could be obtained directly from MRPC by request. Members of the local media, both radio, newspaper and on-line were invited to attend planning meetings. Information was shared by these media outlets with the public on the planning process and where to find draft copies of the plan. Copies of public notices and press release are included in Appendix A: Planning Process.

No comments were received from the public.

Step 3: Coordinate with Other Departments and Agencies and Incorporate Existing Information (Handbook Task 3)

44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process. (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Every effort was made to encourage input from organizations whose goals and interests interface with hazard mitigation in Pulaski County. Jurisdictional representatives on the MPC were asked to share and solicit information from within and outside of their jurisdictions. A broad spectrum of entities other than the jurisdictions named in the plan, were invited to participate in the planning process.

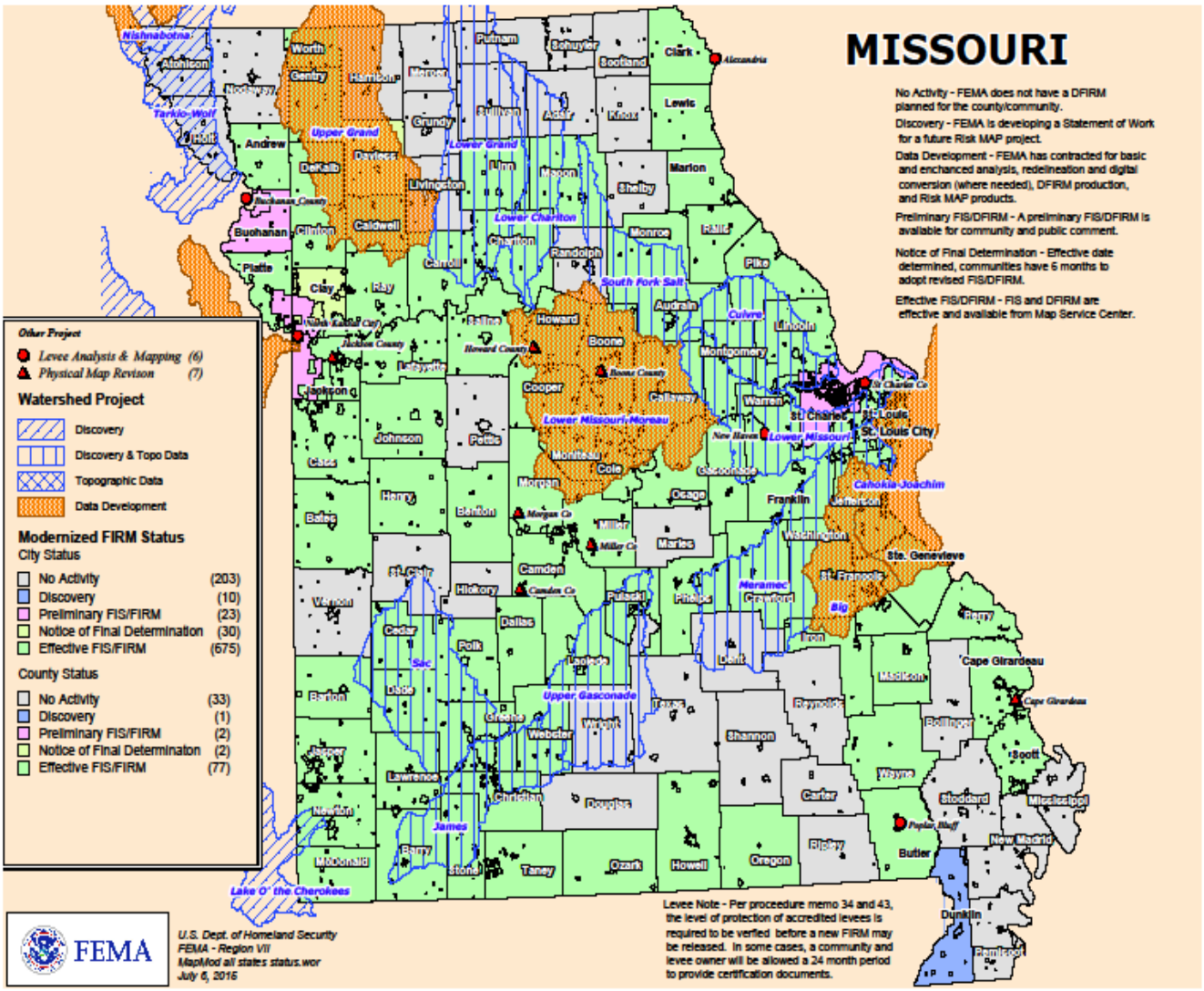
The survey provided to every jurisdiction asked how mitigation actions were being incorporated into other planning documents. The county road and bridge department had done a good job of incorporating mitigation projects into their regular maintenance program. Those projects have been incorporated into the updated plan document. Hazard mitigation goals and action items have also be incorporated, where applicable, in the Community Economic Development Strategy (CEDS).

Coordination with FEMA Risk MAP Project

Pulaski County is currently in the Discovery and Topo Data phase of the Risk MAP project. Once completed, Risk MAP will provide mitigation planning support in a variety of ways including helping in the assessment of risks and identifying action items to reduce vulnerability. In addition, this project will provide tools to improve the understanding of risk by local officials and the general public.

Figure 1.1 illustrates the current status of Missouri counties in regards to RiskMap projects.

Figure 1.1. Map of RiskMAP projects



Integration of Other Data, Reports, Studies and Plans

The MPC researched available plans, studies, reports and technical information during development of the Update. The intent was to identify existing data and information, shared objectives and past and ongoing activities that would add to the Update. The goal was to identify the existing capabilities and planning mechanisms to implement the mitigation strategy. Pulaski County is a rural area with the largest community's population approximately 5,100. Not all of the participating communities have planning or zoning, subdivision regulations or other mechanisms for controlling the development of land. Some of the jurisdictions do have ordinances and planning documents. Following is a list of the documents that were reviewed:

- Local planning and zoning ordinances
- EOPs for the County and cities
- Crisis Plans for four of the five school districts
- Enacted building codes
- Stormwater management ordinances
- Comprehensive plans
- Economic development plans
- Capital improvement plans
- Infrastructure plans
- Floodplain management ordinances and flood Insurance Risk Maps (FIRMs)

In addition to information available from local jurisdictions, a number of data sources, reports, studies and plans were used in updating the plan. Every attempt was made to gather the best available data to develop the vulnerability assessment and identify assets in the county. The Missouri State Hazard Mitigation Plan (2010) was reviewed and referenced throughout the document. Other data sources included dam information from the Missouri Department of Natural Resources and National Inventory of Dams (NID); fire reports from state agencies; Wildland/Urban Interface and Intermix data from the SILVIS Lab – Department of Forest Ecology and Management – University of Wisconsin; the Community Economic Development Strategy (CEDS); capital improvement plans from the participating jurisdictions; historic weather data and damage estimates from the National Oceanic and Atmospheric Administration; the critical facilities inventory conducted by MRPC; and road and bridge department plans/budgets.

All documents were reviewed so that the MPC would have a broad foundation of data upon which to base the planning area's risk assessment. Information from these documents and data sources are incorporated into the plan update as indicated throughout the update document.

Step 4: Assess the Hazard: Identify and Profile Hazards (Handbook Task 5)

The MPC reviewed the hazards that affected Pulaski County at the first planning meeting on March 5, 2015 including discussions of any hazard events that occurred during the last five years and all of the hazards included in the Missouri Hazard Mitigation plan. A variety of sources were used to identify and profile hazards. These included U.S. Census data, GIS data, HAZUS, the Missouri Spatial Data Information Service (MSDIS), statewide datasets compiled by state and federal agencies, existing plans and reports, personal interviews with MPC members and the survey completed by each jurisdiction. Data was compiled and compared to the original plan document and updates made in the 2016 revision. Every effort was made to use the most current and best data available. Additional information on the risk assessment and the conclusions drawn from the available data can be found in Chapter 3.

Step 5: Assess the Problem: Identify Assets and Estimate Losses

Assets for each jurisdiction were identified based on responses to the data collection survey distributed to all jurisdictions, interviews with MPC members and the critical facilities inventory conducted by MRPC. Additional sources included U.S. census, GIS data, MSDIS and HAZUS.

Losses were calculated using HAZUS data and the most recent U.S. census data available. Values reflected in the update are on structures only and do not include land values.

Jurisdictions provided information on their regulatory, personnel, fiscal and technical abilities by completing the data collection survey. The vulnerability assessment was completed using estimates from the 2010 State plan. For more information on planning area profiles and capabilities, please see Chapter 2.

Step 6: Set Goals (Handbook Task 6)

The goals from the initial hazard mitigation plan were reviewed at the first planning meeting on March 5, 2015. Those goals are as follows:

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Goal 3: Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Goal 5: Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefit of special interests.

Goal 6: Secure resources for investment in hazard mitigation.

The group indicated that the original goals were still applicable and met the needs of the jurisdictions and determined that there would be no changes to the goals.

Step 7: Review Possible Mitigation Actions and Activities

Mitigation strategy and specific action items were discussed at both MPC meetings as well as at the meeting with the Pulaski County Road and Bridge staff. At the first MPC meeting the group reviewed the list in the existing plan and decided which actions could be eliminated; what needed to remain on the list; and what needed to be added. It was emphasized that any mitigation actions in the current plan that were not likely to be accomplished, due to cost factors or that did not address the risks identified in the risk assessment, should be removed from the list.

Discussions also included mitigation activities that had been completed or were in process that had not been in the original plan document. Each jurisdiction and stakeholder group was asked to provide information about mitigation activities that were needed as well as those that had been accomplished over the past five years. Meeting facilitators offered to share ideas for mitigation projects from the FEMA publication *Mitigation Ideas: As Resource for Reducing Risk to Natural Hazards (January 2013)* to help stimulate ideas and discussion.

Staff met separately with the Road and Bridge representatives on March 31, 2015 to thoroughly review their list of mitigation projects that had been completed as well as the list of projects that remained to be addressed.

As RiskMAP is still in the discovery phase in Pulaski County, no projects have been identified through that process at this time.

In order to prioritize action items, the MPC was asked to use the STAPLEE method as well as assign a cost benefit to each activity. This allowed the group to consider a broad range of issues in order to decide which actions should be considered high, moderate or low priority. The prioritization process used by the MPC is explained as follows:

STAPLEE stands for the following:

- **Social:** Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- **Technical:** is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- **Administrative:** Are there adequate staffing, funding and maintenance capabilities to implement the project?
- **Political:** Will there be adequate political and public support for the project?
- **Legal:** Does your jurisdiction have the legal authority to implement the action?
- **Economic:** is the action cost-beneficial? Is there funding available: Will the action contribute to the local economy?
- **Environmental:** Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

Each question was scored based on a 0 to 3 point value system:

3 = Definitely YES
2 = Maybe YES
1 = Probably NO
0 = Definitely NO

For the Benefit/Cost Review portion of the prioritization process, these two aspects were scored as follows:

Benefit – two (2) points were added for each of the following avoided damages (8 points maximum = highest benefit)

- Injuries and/or casualties
- Property damages
- Loss-of-function/displacement impacts
- Emergency management costs/community costs

Cost – points were subtracted according to the following cost scale (-5 points maximum = highest cost)

- (-1) = Minimal – little cost to the jurisdiction involved
- (-3) = Moderate – definite cost involved but could likely be worked into operating budget
- (-5) = Significant – cost above and beyond most operating budgets; would require extra appropriations to finance or to meet matching funds for a grant

Note: For the Benefit/Cost Review, the benefit and cost of actions which used the word "encourage" were evaluated as if the action or strategy being encouraged was actually to be carried out.

Total Score – The scores for the STAPLEE Review and Benefit/Cost Review were added to determine a Total Score for each action.

Priority Scale – To achieve an understanding of how a Total Score might be translated into a Priority Rating, a sample matrix was filled out for the possible range of ratings an action might receive on both the STAPLEE and Benefit/Cost Review. The possible ratings tested ranged between:

- A hypothetical action with "Half probably NO and half maybe YES" answers on STAPLEE (i.e. poor STAPLEE score) and Low Benefit/High Cost: Total Score = 7
- A hypothetical action with "All definitely YES" on STAPLEE and High Benefit/Little Cost: Total Score = 28

An inspection of the possible scores within this range led to the development of the following Priority Scale based on the Total Score in the STAPLEE- Benefit/Cost Review process:

20 – 28 points = High Priority
14-19 points = Medium Priority
13 points and below = Low Priority

The benefit portion of the prioritization process helped the MPC focus on long-term mitigation solutions that demonstrated the future cost savings that could be realized by completing mitigation projects that safeguard lives and protect property.

Step 8: Draft an Action Plan

The MPC reviewed the final list of action items at the April 23, 2015 meeting and completed the prioritization process. The final list was then mailed out to all jurisdictions and members of the MPC for review and approval as everyone was not able to attend the meeting. Staff were directed by the MPC to take the finalized list after allowing time for comments, remove all action items that scored a 13 or below, and draft an action plan.

Step 9: Adopt the Plan (Handbook Task 8)

When the first draft of the plan was completed, staff posted the document on the MRPC website and provided a hard copy to the county courthouse. All MPC members, jurisdictions and surrounding jurisdictions were notified on where to find a copy of the plan to review. If requested, additional hard copies of the plan document were provided. After allowing time for comments, a letter was mailed out to all jurisdictions asking them to formally adopt the plan and

providing a sample adoption resolution. A deadline was provided in order to insure receipt of adoption resolutions prior to submitting a final draft to FEMA for approval.

Step 10: Implement, Evaluate, and Revise the Plan (Handbook Tasks 7 & 9)

At both planning meetings (March 5, 2015 and April 23, 2015) MRPC staff advised the MPC and participating jurisdictions of the importance of continuing to meet periodically to discuss implementation of the plan as well as monitoring and maintaining the plan into the future. Chapter 5 provides details on Pulaski County's strategy for implementation, evaluation and revising the plan.

2 PLANNING AREA PROFILE AND CAPABILITIES

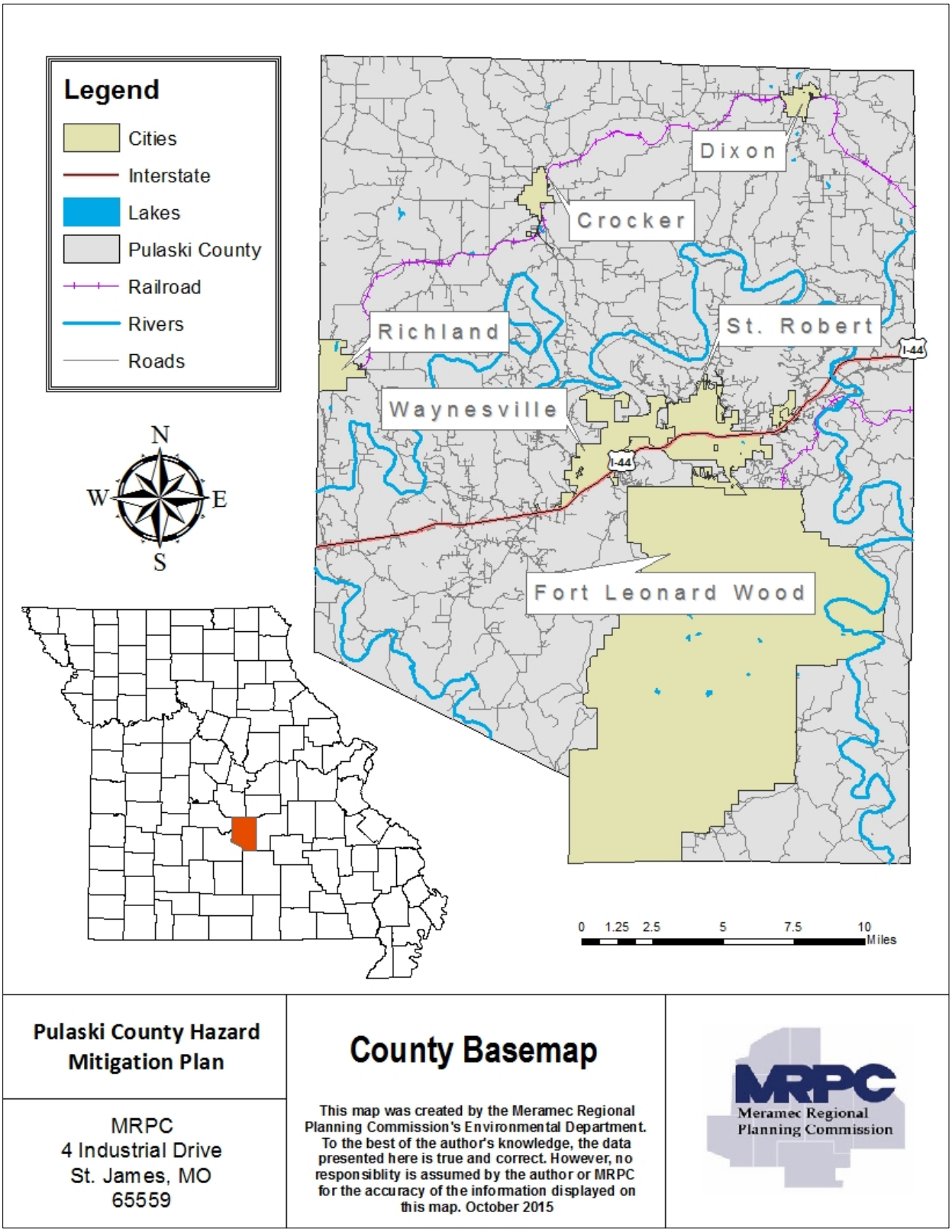
2 PLANNING AREA PROFILE AND CAPABILITIES..... 2.1

2.1 *Pulaski County Planning Area Profile..... 2.2*
2.1.2 Geography, Geology and Topography..... 2.4
2.1.3 Climate..... 2.8
2.1.4 Population/Demographics..... 2.8
2.1.5 History..... 2.12
2.1.6 Occupations..... 2.14
2.1.7 Agriculture..... 2.14
2.1.8 FEMA Hazard Mitigation Assistance Grants in Planning Area..... 2.15

2.2 *Jurisdictional Profiles and Mitigation Capabilities..... 2.15*
2.2.1 Unincorporated Pulaski County..... 2.15
2.2.2 City of Crocker..... 2.19
2.2.3 City of Dixon..... 2.23
2.2.4 City of Richland..... 2.27
2.2.5 City of St. Robert..... 2.31
2.2.6 City of Waynesville..... 2.35
2.2.7 Public School District Profiles and Mitigation Capabilities..... 2.46
2.2.8 Critical Facilities..... 2.51

2.1 Pulaski County Planning Area Profile

Figure 2.1. Map of Pulaski County



Pulaski County has a population of approximately 53,436 according to the most recent census data[1]. **Table 2.1** illustrates the percentage population growth since 2000 as compared to the statewide and national population growth. The median household income and percentage growth since 2000, as compared to statewide and national figures can be found in **Table 2.2.** Furthermore**,** median house value percentage growth for Pulaski County, Missouri, and the United States is provided in **Table 2.3**

Table 2.1. Percent Population Growth for County, State, and Nation 2000 - 2014

	Total Population		Change Over Period	
Demographic Region	**2000**	**2014**	**Change**	**Percent**
Pulaski County	41,957	53,436	11,479	27.36
Missouri	5,607,285	6,063,589	456,304	8.14
United States	282,162,411	318,857,056	36,694,645	13.00

Source: Missouri Census Data Center, Population Trend Report Sept. 2015

Table 2.2. Median Household Income and Percentage Growth for County, State, and Nation 1999 – 2013

	Median Household Income (USD)		Change Over Period	
Demographic Region	**1999**	**2013**	**Change**	**Percent**
United States	$41,994	$53,046	$11,052	26.31
Missouri	$37,934	$47,380	$9,446	24.9
Pulaski County	$34,247	$49,820	$15,573	45.47

Source: U.S. Census Bureau, Census 2000 Summary File 3
U.S. Census Bureau, 2009-2013 5-Year American Community Survey

Table 2.3. Median House Value Percentage Growth for County, State, and Nation 2000 - 2013

	Median House Value (USD)		Change Over Period	
Demographic Region	**2000**	**2013**	**Change**	**Percent**
United States	$119,600	$194,300	$74,700	62.49
Missouri	$89,900	$147,400	$57,500	63.96
Pulaski County	$70,900	$139,300	$68,400	96.47

Source: U.S. Census Bureau, Census 2000 Summary File 3
U.S. Census Bureau, 2009-2013 5-Year American Community Survey

[1] American FactFinder, U.S. Dept. of Commerce, United States Census Bureau

2.1.2 Geography, Geology and Topography

Pulaski County has a total land area of 547 square miles. Additionally, the County is comprised of 4.38 square miles of total water area.

Pulaski County is located in south central Missouri, approximately 75 miles southwest of the state capital of Jefferson City, approximately 70 miles east and slightly north of Springfield, Mo. and approximately 130 miles southwest of St. Louis, Mo. The county is bordered on the north by Miller County and Maries County. On the east side the county is bordered by Phelps County. To the south the county shares a boundary with Texas County. Laclede and Camden counties border Pulaski to the west.

The jurisdictions within the County include Crocker, Dixon, Richland, St. Robert, and Waynesville. School Districts include Dixon R-I School District, Crocker R-II School District, Swedeborg R-III School District, Richland R-IV School District, Laquey R-V School District and Waynesville R-VI School District. Additionally, Fort Leonard Wood, a U.S. Military base is located within the County.

The bulk of land cover in the county is woodlands and the region can be described as rugged limestone hills with rocky ridges and bluffs, and deep, narrow valleys. The area has karst terrain, which is characterized by springs, caves, losing streams and sinkholes. The County is predominately rural.

Physiographic features, such as river basins and watersheds, play an important role in the development of any given area. Practical planning and engineering methods take advantage of the topography in planning and designing sewer and water facilities. The individual watersheds should form the basis for sewer and water districts, while several contiguous watersheds within the same drainage basin may be combined to form a sewer or water district.

A drainage basin is the total area drained by a river and all of its tributaries. A watershed is the area drained by a single stream. During the last 100 years, stream channels in the Ozarks have become wider and shallower, and deep-water fish habitat has been lost. Historical data indicate that channel disturbances have resulted most directly from clearing of vegetation along stream channels, which decreases bank strength. Historical and stratigraphic data show that after 1830, Ozarks streams responded to land-use changes by depositing more gravel and less muddy sediment, compared to pre-settlement conditions. Because less muddy sediment is being deposited on flood plains, many stream banks now lack cohesive sediments, and, therefore, no longer support steep banks. Land use statistics indicate that the present trend in the rural Ozarks is toward increased populations of cattle and increased grazing density; this trend has the potential to continue the historical stream-channel disturbance by increasing storm-water runoff and sediment supply[2].

There are two significant rivers running through Pulaski County, the Gasconade and the Big Piney, with the Gasconade being the largest and the watershed that drains the county. The Big Piney flows into the Gasconade. Both rivers flow from south to north and the Gasconade eventually drains into the Missouri in Gasconade County. There are also eighteen springs located within Pulaski County, including Roubidoux Spring, which flows into the Big Piney River and Boiling Spring which is located in the Gasconade River. The Gasconade River watershed is

[2] U.S. Geological Survey Fact Sheet FS-027-96

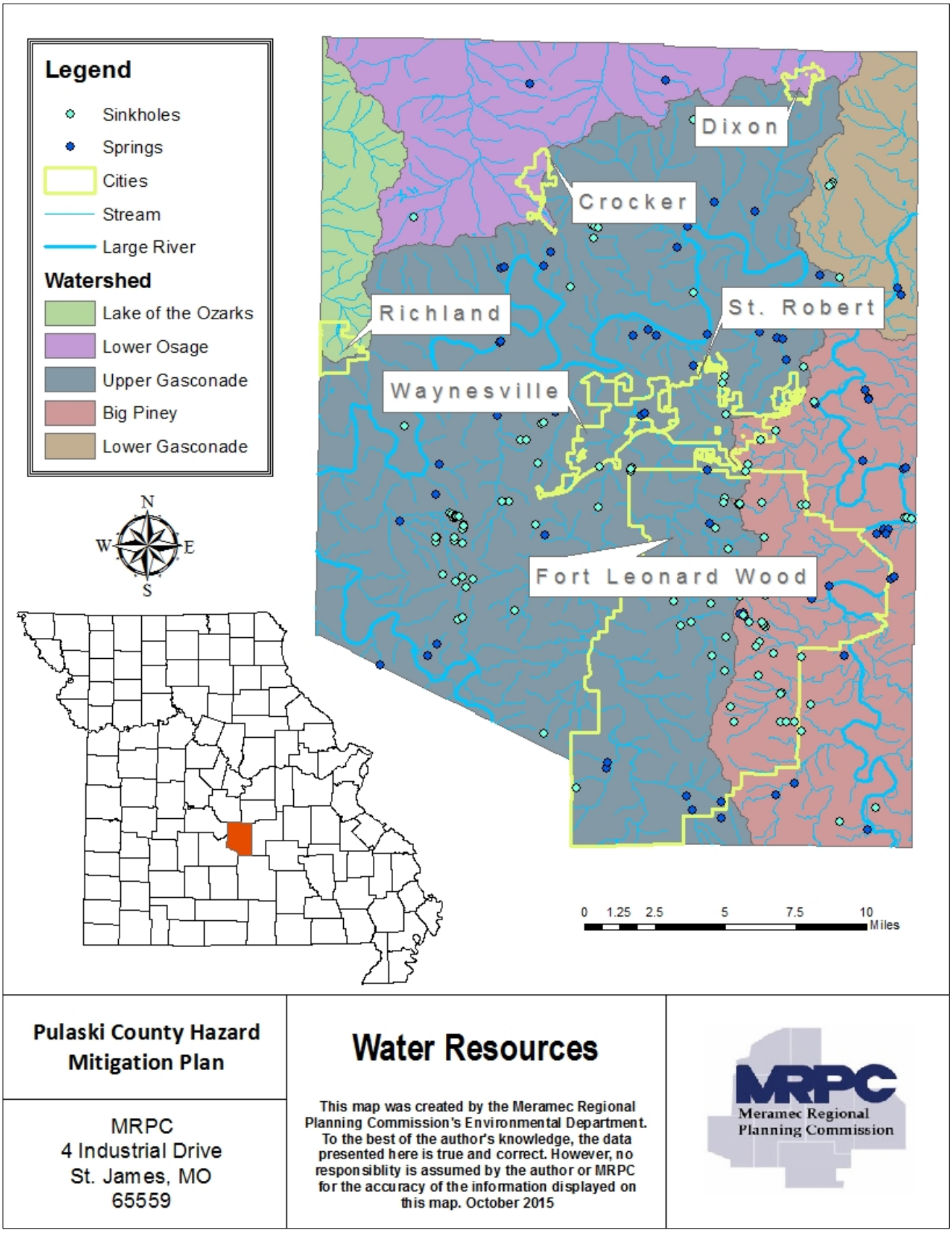
located within the Ozark Plateau of the Interior Ozark Highlands. The river meanders north to northeast through Webster, Texas, Laclede, Pulaski, Dent, Maries, Osage, Phelps, and Gasconade counties to join the Missouri River. The Gasconade River is 271 miles long from mouth to headwaters with 263 miles having permanent flow. The Upper and Lower Gasconade River watersheds drain 2,806 square miles. The Upper Gasconade River watershed has an average gradient of 27.6 feet/mile, and the Lower Gasconade River watershed has an average of 3.9 feet/mile. A number of springs within the middle Gasconade River portions are due to the karst geology of the Roubidoux and Gasconade Dolomite Formation and losing stream segments. The karst topography causes losing portions in the Osage Fork, Roubidoux, North Cobb, Little Piney, Spring, and Mill creeks, and Gasconade River. The entire Gasconade River watershed is reported to have 76 springs and the largest concentration of big springs in the state.

As a whole, the Gasconade River watershed is rural with low population density and high farmland density. The most populated areas are Pulaski and Phelps counties, which are experiencing land development from growth surrounding Fort Leonard Wood and the City of Rolla. Lower watershed areas of Maries, Osage, and Gasconade counties have low population density. The Upper and Lower Gasconade River watersheds have 49% and 33%, respectively, grassland and cropland as land use. A general trend in the rural Gasconade River watershed toward increased cattle numbers per pastured acre has continued to the present. Forest comprises approximately 46% of the land cover within the Upper Gasconade River watershed and 66% within the Lower Gasconade River watershed. Forests are in good health and have sustainable forest production. Forest land is largely under private ownership with federally-owned forest having the second largest holdings, followed by state-owned lands having a smaller percentage. Public land is 12% or 221,040 acres within the entire watershed. To provide water-based recreational opportunities, 23 public stream accesses have been developed in the watershed.

Gasconade River watershed annual precipitation ranges from 40.35 to 42.67 inches with an annual mean of 41.66 inches. This precipitation and the local geology provide good base flow conditions and lower variability in stream flow throughout major portions of the watershed.
Average runoff had greater extremes from the late 1970s to the present than during the 1960s to the late 1970s[3]. **Figure 2.2** depicts Pulaski County's watershed and water resources.

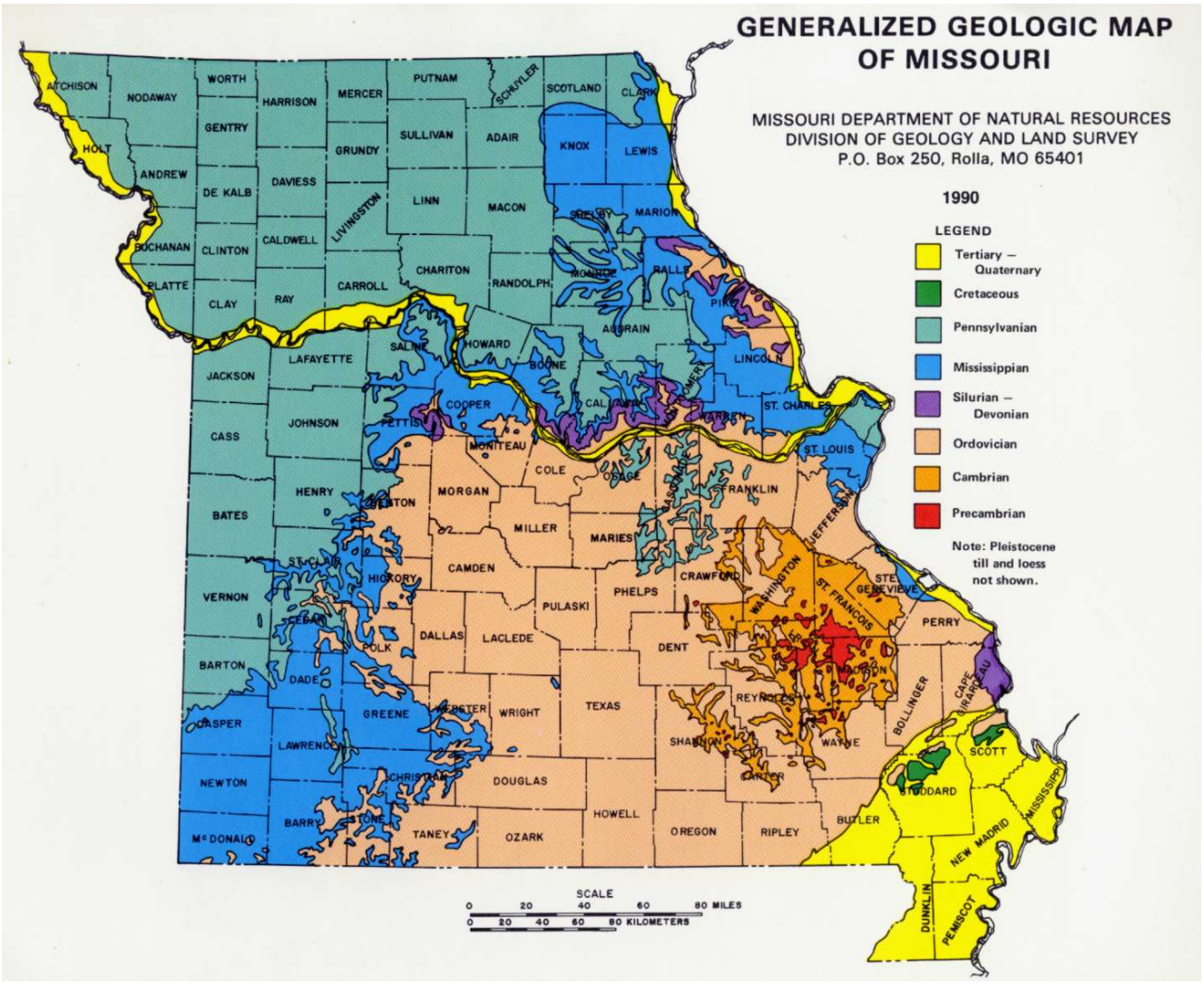
[3] http://www.conservation.state.mo.us/fish/watershed/gascon/contents/130cotxt.htm

Figure 2.2. Pulaski County Water Resources



The County is located in the Ozark Plateau – the largest outcrop area of Ordovician-age rocks in the United States[4]. This rock is 505 to 441 million years old and made up primarily of carbonates and thin shales with three distinctive sandstone layers: the Gunter at the base of the column, the red and white Roubidoux which is often used as a building stone and the St. Peter glass sand. This stone is the result of a time period when Missouri was covered by a shallow sea and the stone frequently produces aquatic fossils from that time period[5]. Portions of this formation contain rock that dissolves and fractures over time from rainwater, thus resulting in the karst features found throughout the Ozarks. **Figure 2.3** depicts a generalized geologic map of Missouri and its counties.

Figure 2.3. Generalized Geologic Map of Missouri



[4] http://geology.about.com/library/bl/maps/blmissourimap.htm

[5] http://members.socket.net/~joschaper/ordo.html

2.1.3 Climate

Snow occurs between November and April, both inclusive, but most of the snow falls in December, January and February. An average of about 13 inches of snow occurs annually in the Meramec Region. It is unusual for snow to stay on the ground for more than a week or two before it melts. Winter precipitation usually is in the form of rain, snow or both. Conditions sometimes borderline rain and snow, and in these situations freezing drizzle or freezing rain occurs. Spring, summer and early fall precipitation comes largely in the form of showers or thunderstorms. Thunderstorms are most frequent from April to July. Measurable precipitation occurs on the average of less than 100 days per year. About half of these will be days with thunderstorms. Most of the precipitation is absorbed by the soil and plants; however, a portion of the precipitation forms runoff and is returned to streams and other bodies of water.

Because of its inland location, Missouri and Pulaski County are subject to frequent changes in temperature. The average annual temperature is 55.35°F. The average annual high temperature is 66.4°F, with the average annual low at 43°F. The average high and low in January is 42.4°F and 19.5°F, respectively. In July the average high and low are 87.5°F and 64.9°F, respectively. A high temperature of 113°F degrees has been observed in the region.

While winters are cold and summers are hot, prolonged periods of very hot weather are unusual. Occasional periods of mild, above freezing temperatures are noted almost every winter. Conversely, during the peak of the summer season occasional periods of dry, cool weather break up stretches of hot, humid weather. About half of the days in July and August will have temperatures of 90 degrees or above, but it is not unusual for the temperature to drop into the 50s by the evening. In winter, there is an average of about 100 days with temperatures below 32 degrees. Temperatures below zero are infrequent with only about three days per year reaching this low temperature. On average, the first frost occurs in mid-October, and the last frost occurs about mid-April[6].

2.1.4 Population/Demographics

Table 2.4 provides population/demographic data for Pulaski County between 2000 and 2013 by jurisdiction. The unincorporated area of Pulaski County was determined by subtracting the populations of the incorporated areas from the overall County population. Additionally, jurisdictions that straddle the County line are not completely accurate due to the overlap of incorporated areas adjacent to the County.

[6] National Oceanic and Atmospheric Administration, www.noaa.gov

Table 2.4. Pulaski County Population 2000-2013 by Jurisdiction

Jurisdiction	2000 Population	2013 Population	2000-2010 # Change	2000-2010 % Change
Unincorporated Pulaski County	31,469	[a] 41,325	[a] 9,856	[a] 31.32
Crocker	1,033	1,113	80	7.74
Dixon	1,570 1618	1,412	-158	-10.06
Richland	*1,805	*1,756	-50	-2.77
St. Robert	2,760	4,569	1,809	65.54
Waynesville	3,507	5,017	1,510	43.06

Source: U.S. Bureau of the Census, Decennial Census, U.S. Census Bureau, Population Division, U.S. Census of Population 1940 – 2010, U.S. Census Bureau, 2009-2013 5-Year American Community Survey, and Missouri Census Data Center, Population Trend Report Sept. 2015
*population includes the portions of these cities in adjacent counties, [a] population for 2014

Table 2.5 provides information in regards to the percent of individuals under the age of 5, and over 65 for the County, State, and Nation. In addition, average household size is illustrated in **Table 2.6** including figures for Pulaski County, Missouri, and the U.S. In 2013 there were an estimated 15,747 households within the County[7].

Table 2.5. Percent of Individuals Under the Age of 5, and Over 65 for County, State, and Nation (2014)

Location	% Under Age of 5	% Over Age of 65
Pulaski County	7.25	7.63
Missouri	6.17	15.37
United States	6.23	14.5

Source: U.S. Census Bureau, Population Division

Table 2.6. 2013 Average Household Size for County, State, and Nation

Location	Average Household Size
Pulaski County	*2.64
Missouri	2.47
United States	2.63

Source: *U.S. Census Bureau, 2010 Census
U.S. Census Bureau, 2009-2013, 5-Year American Community Survey

[7] U.S. Census Bureau, 2009-2013 5-Year American Community Survey

Social Vulnerability Index (SoVI ®)

The University of South Carolina developed an index to evaluate and rank the ability to respond to, cope with, recover from, and adapt to disasters. The index synthesizes 30 socioeconomic variables which research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. SoVI ® data sources include primarily those from the United States Census Bureau. **Table 2.7** depicts the Social Vulnerability Index for Pulaski County along with its national percentile.

Table 2.7. Social Vulnerability Index (SoVI ®)

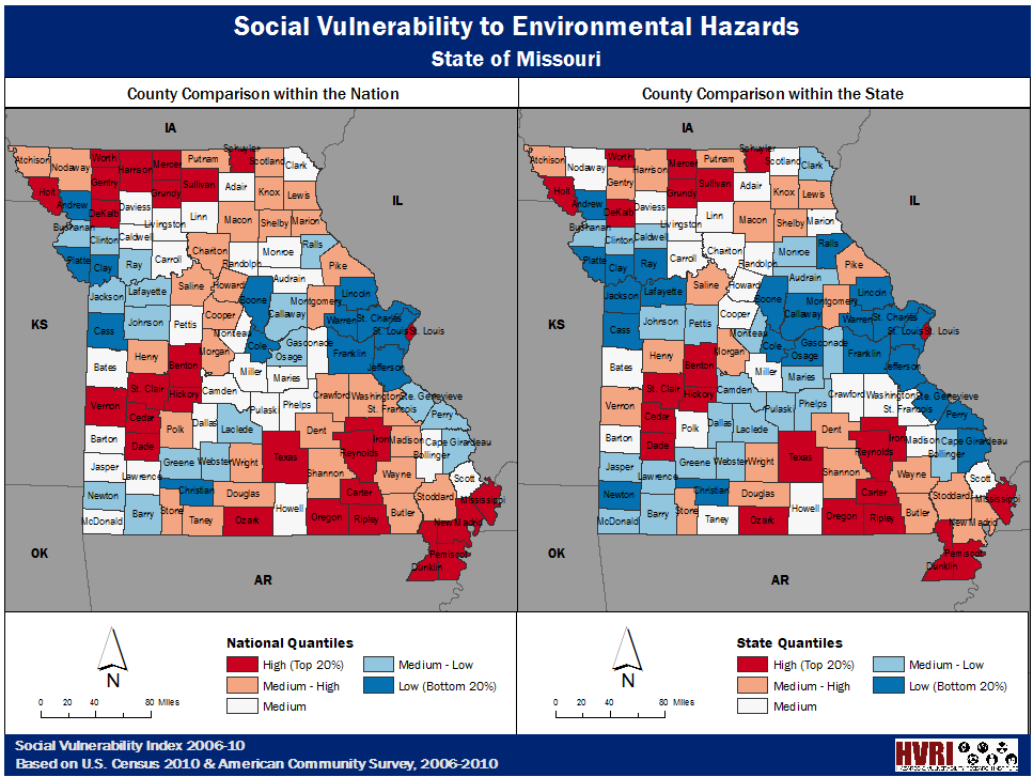
State	County	SoVI Score (06 - 10)	National Percentile (06 - 10)
Missouri	Pulaski County	-0.655303	39.23%

Source: http://webra.cas.sc.edu/hvri/products/sovi2010_data.aspx

The analysis of 30 socioeconomic variables includes the standardization of data, and reduction of variables into a condensed set of statistically optimized components; positive component loadings (+) are linked with amplified vulnerability, and negative component loadings (-) are linked with diminished vulnerability. To simplify the metrics of the SoVI ® Score, a low number illustrates a county's resiliency to hazard events, and a high number illustrates a decrease in resiliency[8]. **Figure 2.4** depicts Missouri's SoVI ® to environmental hazards between 2006 and 2010. Furthermore, **Figure 2.5** depicts the Nation's SoVI ® to environmental hazards between 2006 and 2010.

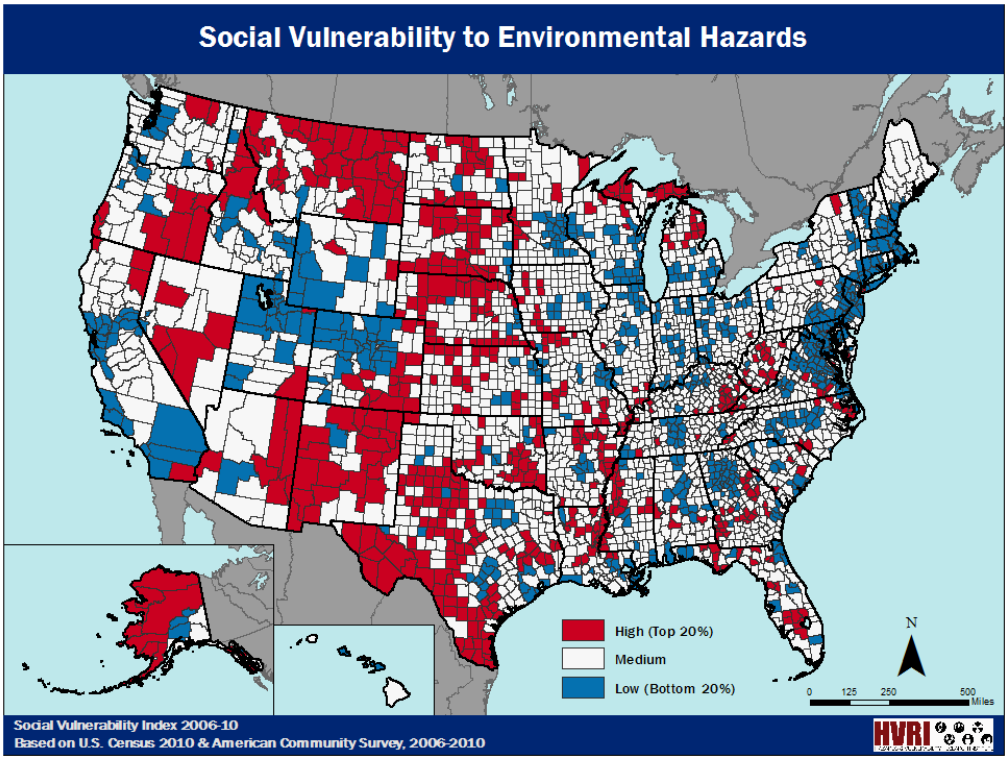
[8] http://webra.cas.sc.edu/hvri/products/sovifaq.aspx

Figure 2.4. 2006 – 2010 Missouri Social Vulnerability to Environmental Hazards (SoVI ®)



Source: http://webra.cas.sc.edu/hvri/products/sovi2010_maps.aspx

Figure 2.5. 2006 – 2010 U.S. Social Vulnerability to Environmental Hazards (SoVI ®)



Source: http://artsandsciences.sc.edu/geog/hvri/sovi-1

Table 2.8 provides additional demographic and economic indicators for Pulaski County.

Table 2.8. 2013 Unemployment, Poverty, Education, and Language Percentage Demographics, Pulaski County, Missouri

Jurisdiction	Total in Labor Force	% of Population Unemployed	% of Families Below the Poverty Level	% of Population (High School graduate ages 18 and over)	% of Population (Bachelor's degree or higher ages 18 and over)	% of population (spoken language other than English
Pulaski County	30,909	11.1	11.1	80.3	24.6	12.3
Crocker	514	11.4	26.6	96.6	23.6	0.3
Dixon	525	7	12.9	55.1	15.7	8.7
Richland	728	12.4	25.8	88.7	13.9	6.6
St. Robert	2,370	14.6	23.7	62.5	43.2	23.3
Waynesville	2,467	18.1	7.2	44.6	51.2	10.1

Source: U.S. Census Bureau, 2009 – 2013 American Community Survey, 5-Year American Community Survey

2.1.5 History

Pulaski County is named after the American Revolutionary hero, Polish General Casimir Pulaski and is part of a portion of land ceded by the Osage Indians in 1808. The area was first settled by southern pioneers, drawn by the springs, woodlands, caves and Gasconade and Big Piney Rivers. The founders of the first settlement are now known only as Johnson, Cullen and Duffe, immigrants from Mississippi. They located near the Gasconade River at the "Nitre Cave," about five miles west of Waynesville. These early settlers found a superior quality of saltpeter and began manufacturing gunpowder, supplying local hunters and trappers. After the death of Mr. Cullen, Johnson and Duffe moved upriver to a large spring running into the Gasconade River. They built a large mill, later known as Bartlett Springs Mill.

Pulaski County was organized in Missouri by the Territorial Legislature on December 15, 1818. The boundaries of the county were not specified at that time and were not fully defined until 1859. The original boundaries included no part of present day Pulaski County. Instead the original boundaries encompassed much of what is currently Gasconade County. The county went through a number of boundary changes between 1818 and 1859 when its current boundaries were finally established. The county was formally recognized and established by the state legislature in 1832[9]. In 1843, the Legislature passed an act locating the county seat in Waynesville[10]. The first courts met in local private homes. In 1837, William Moore donated an acre of land and a two story log cabin was erected to serve as the courthouse. Three years later it was replaced by a two-story brick courthouse[11].

The Waynesville area was the site of some action during the civil war. Many local residents immigrated from Kentucky, Tennessee and North Carolina and had strong sympathies for the Southern Cause.

[9] Meramec Regional Planning Commission Comprehensive Economic Development Strategy, 2007

[10] Pulaski County History, Pulaski County Tourism Bureau.

[11] Genealogy/Historical Society of Pulaski County.

Colonel Sigel was the brother of General Franz Sigel, who occupied the nearby city of Rolla during the war. Although the Pulaski County courthouse was badly damaged during the Civil War by shot and shells, the courthouse continued to be used until 1872 when it was deemed beyond repair and unsafe for the storage of public records. In 1872-73 another two-story, brick building was constructed on part of the original courthouse foundation. Fire destroyed this building along with most of the county's records on June 13, 1903. The courthouse was rebuilt in March 1904 and this building was designated as a state historic site in 1979[12].

Waynesville, named after another Revolutionary War hero, "Mad Anthony" Wayne, was established in 1843 when William Moore deeded 25 acres of land for the establishment of the county seat. The town was located on the St. Louis-Springfield Road and a regular stop on the stagecoach route. The Old Stagecoach Stop is listed on the National Register of Historical Places and is located on the city square, adjacent to the courthouse. When the railroads were constructed further north, other communities sprang up along the new transportation route and challenged Waynesville as the county's center of commerce. But Waynesville's fortunes improved again with the construction of Route 66, the development of Fort Leonard Wood and eventually the building of Interstate 44[13].

Several communities in the region were developed in conjunction with the building of the railroad across northern Pulaski County. The City of Crocker formed around a railroad depot built by the St. Louis-San Francisco Railway Company in the late 1860's. The cities of Richland and Dixon were both laid out by a railroad surveyor by the name of Milton Santee on property owned by the railroad. A railroad depot was constructed in Richland and in 1870; a private academy called the Richland Institute was established in that community[14].

The youngest community in Pulaski County is St. Robert, which was established after the development of Fort Leonard Wood. The area now occupied by St. Robert was long known as Gospel Ridge until the city was incorporated in 1953 and named after the local Catholic Church – Saint Robert Bellarmine. St. Robert started out as a business community that provided entertainment and services for troops stationed at Fort Leonard Wood. It has since grown into a progressive, thriving community[15].

Fort Leonard Wood is not only a military installation, but a driving economic force in Pulaski and surrounding counties. The base was established in December 1940 as a training camp. The construction of the base brought 32,000 construction workers into the area. More than 600 buildings, 300 miles of road and a 14 mile railroad spur were built in six months. More than 300,000 soldiers were trained at the base between 1941 and 1946. The fort was deactivated at the close of the war in 1946 and lay dormant for four years until the Korean conflict revived the need for military training bases. The fort was reactivated in August 1950. Over the years the training focus of the base has shifted from time to time. Currently the fort provides basic training as well as advanced engineer training, specialist training, leadership school, chemical warfare training and military police training. A good portion of the commerce in the area is directed to supporting the military base and the soldiers who are stationed there. There is also a sizeable population of military retirees in the area[16].

[12] Pulaski County History, Pulaski County Tourism Bureau.
[13] Ibid
[14] Ibid
[15] Ibid
[16] http://nasas-home.org/lake/lw_history.html

2.1.6 Occupations

Table 2.9 provides occupation statistics for the incorporated jurisdictions and County as a whole.

Table 2.9. Occupation Statistics, Pulaski County, Missouri

Place	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Occupations	Production, Transportation, and Material Moving Occupations
Pulaski County	33.9%	22.7%	20.8%	11.0%	11.5%
Crocker	28.7%	21.9%	27.2%	12.4%	9.9%
Dixon	27.8%	21.1%	22.2%	13.8%	15.1%
Richland	24.6%	18.2%	30.9%	5.9%	20.4%
St. Robert	38.3%	34.1%	16.9%	8.7%	2.1%
Waynesville	48.2%	18.5%	15.5%	4.3%	13.6%

Source: U.S. Census, 2009 – 2013 5-Year American Community Survey.

2.1.7 Agriculture

Due to the rural nature of the area, agriculture and timber are significant factors in the local economy. According to the 2002 Census of Agriculture, the number of farms in the County was 573 encompassing 141,649 total acres[17]. In addition, the average farm was 247 acres. According to the 2012 Census of Agriculture, Pulaski County had fallen to 520 farms encompassing 112,495 acres, with an average farm size of 216 acres[18]. Furthermore, there are only approximately 8 farms with 1,000 or more acres in the County. Due to the rugged nature of the region, row crop farming is for the most part limited to the river valleys. In 2012, 17,489 acres of cropland were harvested, with forage (hay, haylage, grass silage, and greenchop) being the top crop in the County. Moreover, 15,706 cattle and calves were raised[19]. The average sale per farm was $24,751. Lastly, the total number of hired workers in the County was 213[20] individuals comprising 1.11%[21] of the total workforce.

The Ozarks region of Missouri is the focal point of several converging ranges of plant associations. Eastern hardwoods, southern pines and western prairies and the wildlife each supports, all reach the outward limits of their range in this area. As a result, various types of forest lands and animal habitats co-exist within a limited area. Several sawmills operate in the area and the large amount of National Forest Lands in the region also contribute to the importance of timber production and logging to the local economy.

[17] 2002 Census of Agriculture, USDA, National Agriculture Statistics Service
[18] Source: 2012 Census of Agriculture – County Data, USDA, National Agriculture Statistics Service
[19] 2012 Census of Agriculture, Missouri Farm Commodity Sales, USDA, National Agriculture Statistics Service
[20] http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Missouri/st29_2_007_007.pdf
[21] U.S. Census Bureau, 2008-2012 American Community Survey

2.1.8 FEMA Hazard Mitigation Assistance Grants in Planning Area

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for mitigation activities which have the potential to reduce disaster losses and protect life and property from future disaster damages[22]. Previous FEMA HMA Grants issued in the planning area can be found in **Table 2.10**.

Table 2.10. FEMA HMA Grants in County from 1993-2013

Project Type	Sub applicant	Award Date	Project Total ($)
200.1: Acquisition of Property	Waynesville	12/01/1993	505,225
600.1: Warning System	SHO-ME Power Corp.	02/06/2002	57,576
206.2: Safe room	Crocker R-II School District	05/09/2011	951,807
206.2	Waynesville R-VI School District	05/09/2011	2,051,608
402.1: Infrastructure Protective Measures	Waynesville	09/06/2013	279,740
206.2:	Waynesville R-VI School District	09/06/2013	1,525,000
Total			5,370,956

Source: Missouri State Emergency Management Agency, https:/www.fema.gov/openfema-dataset-hazard-mitigation-grants-v1

2.2 Jurisdictional Profiles and Mitigation Capabilities

This section will include individual profiles for each participating jurisdiction. It will also include a discussion of previous mitigation initiatives in the planning area. There will be a summary table indicating specific capabilities of each jurisdiction that relate to their ability to implement mitigation opportunities. The unincorporated county is profiled first, followed by the incorporated communities, the special districts, and the public school districts.

2.2.1 Unincorporated Pulaski County

Overview

The jurisdiction of Pulaski County includes all unincorporated areas within the county boundaries. Pulaski County is governed by a three-member County Commission. The Commission is composed of a presiding commissioner, representing all of the county's population who is elected for a four-year term. Two associate commissioners representing roughly half the county's population each, are elected for four-year terms. The commission

[22] https://www.fema.gov/media-library/assets/documents/103279

meets Monday and Thursday of each week.

The county government has the authority to administer county structures, infrastructure and finances as well as floodplain regulations. Third class counties do not have the authority to enforce building regulations. Other elected county officials include the county clerk, assessor, circuit clerk and recorder, collector, treasurer, prosecuting attorney, sheriff, county surveyor, public administrator, and coroner.

Pulaski County has staff resources in floodplain management, emergency management and GIS. The county surveyor serves as the floodplain manager for the county. The county has a part-time emergency management director. The Assessor's office has GIS capabilities. The county has a 9-1-1 central dispatch center that includes enhanced 9-1-1.

The county is also served by an Air Ambulance service stationed at the St. Johns Clinic in St. Robert which also serves Phelps, Miller, Maries, Texas and Laclede counties.

Existing Plans and Policies

Pulaski County participates in the National Flood Insurance Program. The County Surveyor serves as the Floodplain Manager. Construction occurring in the floodplain in unincorporated areas of the county is required to obtain a permit from the County. The unincorporated areas of the County do not have building codes. The county has a local emergency operations plan (LEOP) that is administered and maintained by the Pulaski County Office of Emergency Management. Lastly, the county does have an Economic Development Plan.

Other Mitigation Activities

The Office of Emergency Management, local fire departments, Sheriff's Department and the Pulaski County Health Department have conducted public education campaigns to raise awareness and increase preparedness among the county's population. Those programs have included Ready-In-3 emergency preparedness, fire safety, storm preparedness, and heat wave preparedness. There are currently no warning sirens or systems for Pulaski County.

Table 2.11 provides data in regards to demographic and structure risk parameters for unincorporated Pulaski County. This data is essential as these parameters my alter risks in the event of a disaster. In addition, **Table 2.12** provides information in regard to Pulaski County's mitigation capabilities. Data for the mitigation capabilities was acquired from Data Questionnaires distributed to each jurisdiction.

Table 2.11. Demographic and Structure Risk Parameters For Unincorporated Pulaski County

Jurisdiction	Handicapped Citizens	Non-English Speaking Populations	% People Below Poverty Level	Population Under 5 Yrs	Population 65 Yrs and Over	% of Residences Built Prior to 1939	# of Mobile Homes
Unincorporated Pulaski County	3,759	559	12.8	2,638	2,358	4.2	1,711

Source: Source: U.S. Census Bureau, 2009-2013 5-Years American Community Survey, Note: % data includes Incorporated Pulaski County

Table 2.12. Unincorporated Pulaski County Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	N/A
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	October, 2010
Local Mitigation Plan (PDM)	-
County Mitigation Plan (PDM)	-
Economic Development Plan	Yes
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	N/A
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	4/19/2010
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant - Nondelegated	04/17/1985
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	-

Capabilities	Status Including Date of Document or Policy
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	Yes
Flood Insurance Maps	-
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	No
Critical Facilities Inventory	Yes
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	Yes
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Planning Consultant	-
Regional Planning Agencies	Yes
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	Yes
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes

Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	No
Capabilities	**Status Including Date of Document or Policy**
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	No
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Ability to withhold spending in hazard prone areas	Yes

Source: Data Collection Questionnaire, 2015

2.2.2 City of Crocker

Overview

Crocker is located in the north central portion of Pulaski County. The area was established as a community in 1869, named in 1875 and was incorporated as a village on March 18, 1911. Crocker was incorporated as a fourth class city in November of 1912[23]. The community has a strong railroad history and has a museum - the Frisco Depot Museum - dedicated to that history. State highways 17 and 133 intersect in Crocker. According to the 2013 U.S. Census, the community has a population of 1,113. Crocker is incorporated as a fourth class city with a four member board of aldermen and a mayor. City personnel include a city clerk, city court/utility clerk, city attorney, fire chief, city superintendent (utilities/infrastructure), municipal judge and emergency management director. Other staff employed by the city includes engineer, public works official, and emergency management coordinator. Note, some staff are responsible for multiple roles.

Technical and Fiscal Resources

Crocker does not currently participate in the National Flood Insurance Program. The City of Crocker has a police chief with a staff of one full-time officer, three part-time officers and one reserve officer. Ambulance service is provided by the Pulaski County Ambulance District. There is an ambulance base located in Crocker. There is also a volunteer fire department within the community. The community has enhanced 9-1-1 through the Pulaski County 9-1-1 system. The city has two warning sirens which are controlled by CodeRED.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvements Project funding, levied taxes for specific purposes, fees for water, sewer, gas or electric services, impact fees for new development, and ability to incur debt through general obligation bonds.

Existing Plans and Policies

Crocker does not have building codes. The fire department's ISO rating is four. The city is included in the county LEOP.

[23] http://www.crockermo.com/

Other Mitigation Activities

The local fire department provides education/awareness programs and materials on a variety of subjects including Fire Awareness Week and emergency preparedness. Crocker does have a community designated public tornado shelter constructed in accordance to FEMA standards. This is the Crocker School which was built in 2004.

Table 2.13 provides data in regards to demographic and structure risk parameters for Crocker. Following, **Table 2.14** includes data based on the Data Collection Questionnaire distributed to each jurisdiction.

Table 2.13. Demographic and Structure Risk Parameters For Crocker

Jurisdiction	Handicapped Citizens	Non-English Speaking Populations	% People Below Poverty Level	Population Under 5 Yrs	Population 65 Yrs and Over	% of Residences Built Prior to 1939	# of Mobile Homes
Crocker	220	0	27.8	115	179	15.2	59

Source: Source: U.S. Census Bureau, 2009-2013 5-Years American Community Survey

Table 2.14. Crocker Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	1990
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	2008
County Emergency Operations Plan	2008
Local Recovery Plan	2008
County Recovery Plan	2008
City Mitigation Plan	2008
County Mitigation Plan	October, 2010
Local Mitigation Plan (PDM)	-
County Mitigation Plan (PDM)	-
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	-
Critical Facilities Plan (Mitigation/Response/Recovery)	No

Policies/Ordinance	Status Including Date of Document or Policy
Zoning Ordinance	N/A
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	No
Drainage Ordinance	No
Capability	**Status Including Date of Document or Policy**
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	**Status Including Date of Document or Policy**
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant - Nondelegated	N/A
NFIP Community Rating System (CRS) Participating Community	N/A
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	2002
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	4
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	4
Studies/Reports/Maps	**Status Including Date of Document or Policy**
Hazard Analysis/Risk Assessment (Local)	Yes
Hazard Analysis/Risk Assessment (County)	Yes
Flood Insurance Maps	-
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No

Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	Yes
Staff/Department	**Status Including Date of Document or Policy**
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	Yes
Development Planner	No
Public Works Official	Yes
Emergency Management Coordinator	Yes
NFIP Floodplain Administrator	No
Bomb and/or Arson Squad	No
Emergency Response Team	Yes
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	Yes
Sanitation Department	Yes
Transportation Department	No
Economic Development Department	No
Housing Department	No
Planning Consultant	-
Regional Planning Agencies	Yes
Historic Preservation	No
Non-Governmental Organizations (NGOs)	**Status Including Date of Document or Policy**
American Red Cross	Yes
Salvation Army	Yes
Capability	**Status Including Date of Document or Policy**
Veterans Groups	Yes
Environmental Organization	Yes
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	No
Local Funding Availability	**Status Including Date of Document or Policy**
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes

Ability to incur debt through special tax bonds	No
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2015

2.2.3 City of Dixon

Overview

Dixon is located in the north east portion of Pulaski County. Like Crocker, the City of Dixon was laid out by a railroad surveyor on property owned by the railroad in the late 1860's. State highways 133 and 28 converge near Dixon. According to the 2013 U.S. Census, the community has a population of 1,412. Dixon is incorporated as a fourth class city with six aldermen and the mayor who make decisions regarding city issues. Other city personnel include a city clerk, city attorney, city marshal, fire chief, emergency management director, municipal judge, sewer superintendent, building inspector engineer, development planner, and public works official.

Technical and Fiscal Resources

Dixon does not currently participate in the National Flood Insurance Program. Law enforcement in the community is provided by a city marshal. A volunteer fire department provides fire protection. The Dixon Ambulance District provides emergency medical services. The community has enhanced 9-1-1 through the Pulaski County 9-1-1 system. The city has one warning siren which is controlled by the 9-1-1 systems in Pulaski and Maries counties.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvements Project funding, authority to levy taxes for specific purposes, fees for water, sewer, gas or electric services, impact fees for new development, ability to incur debt through general obligation bonds and debt through special tax bonds, ability to incur debt through private activities, and ability to withhold spending in hazard prone areas.

Existing Plans and Policies

Dixon does not have a building code. The fire department's ISO rating is six. The city is included in the county LEOP.

Other Mitigation Activities

The local fire department provides education/awareness programs and materials on a variety of subjects including Fire Safety Week, emergency preparedness and fire and safety for seniors twice a year. Dixon has three designated tornado shelters, but they are not within FEMA standards.

Other Mitigation Activities

Table 2.15 provides data in regards to demographic and structure risk parameters for Dixon. In addition, **Table 2.16** provides information from the Data Questionnaire distributed to each jurisdiction.

Table 2.15. Demographic and Structure Risk Parameters For Dixon

Jurisdiction	Handicapped Citizens	Non-English Speaking Populations	% People Below Poverty Level	Population Under 5 Yrs	Population 65 Yrs and Over	% of Residences Built Prior to 1939	# of Mobile Homes
Dixon	218	56	17.6	83	254	14.4	37

Source: Source: U.S. Census Bureau, 2009-2013 5-Years American Community Survey

Table 2.16. Dixon Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	October, 2010
Local Mitigation Plan (PDM)	-
County Mitigation Plan (PDM)	-
Economic Development Plan	No
Transportation Plan	No
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	-
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	**Status Including Date of Document or Policy**
Zoning Ordinance	No
Building Code	N/A
Floodplain Ordinance	N/A
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No

Capability	Status Including Date of Document or Policy
Capability	**Status Including Date of Document or Policy**
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	Yes
Wetlands and Riparian Areas Conservation Plan	-
Debris Management Plan	No
Program	**Status Including Date of Document or Policy**
Zoning/Land Use Restrictions	No
Codes Building Site/Design	Yes
National Flood Insurance Program (NFIP) Participant - Nondelegated	No
NFIP Community Rating System (CRS) Participating Community	N/A
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	Yes
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	No
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	No
Studies/Reports/Maps	**Status Including Date of Document or Policy**
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	No
Flood Insurance Maps	-
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	**Status Including Date of Document or Policy**
Building Code Official	N/A
Building Inspector	Yes
Mapping Specialist (GIS)	No

Capability	Status Including Date of Document or Policy
Engineer	Yes
Development Planner	Yes
Public Works Official	Yes
Emergency Management Coordinator	Yes
NFIP Floodplain Administrator	N/A
Bomb and/or Arson Squad	Yes
Emergency Response Team	Yes
Hazardous Materials Expert	No
Local Emergency Planning Committee	No
County Emergency Management Commission	N/A
Sanitation Department	Yes
Transportation Department	Yes
Economic Development Department	No
Housing Department	No
Planning Consultant	-
Regional Planning Agencies	Yes
Historic Preservation	No
Non-Governmental Organizations (NGOs)	**Status Including Date of Document or Policy**
American Red Cross	No
Salvation Army	No
Capability	**Status Including Date of Document or Policy**
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	**Status Including Date of Document or Policy**
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Ability to withhold spending in hazard prone areas	Yes

Source: Data Collection Questionnaire, 2015

2.2.4 City of Richland

Overview

Richland is located in the west central portion of Pulaski County on the border with Laclede and Camden counties. Like Crocker and Dixon, it is a community that was developed by the railroad in the 1860's. Richland's historic City Hall building was built in the 1940's as part of the WPA projects. State highways 7 and 133 converge in Richland. According to the 2013 U.S. Census, the community has a population of 1,756. Richland is incorporated as a fourth class city and has a six member board of aldermen and a mayor. The city also has a four member utility board, and a nine member park board. The city employs a full-time city administrator. Other city personnel include a city clerk, chief of police, utility board, planning and zoning commission, city attorney, municipal judge, building inspector, development planner, public works official, emergency management coordinator, and NFIP floodplain administrator. Granted some personal may be tasked with more than one position/job. The city provides municipal services for water, sewage treatment, natural gas and electricity. The city is served by Pulaski County's Enhanced 9-1-1 system. The community has a municipal airport with a hard surface runway 3,000 feet in length. The City contracts Tri-County Fire and Rescue for fire protection. Central Ozarks Medical Center and St. Johns Medical System both have medical facilities in Richland[24].

Technical and Fiscal Resources

Richland participates in the National Flood Insurance Program. Law enforcement in the community is provided by a police department. The city contracts with Tri-County Fire Protection District, a volunteer fire department, to provide fire protection services for the community. The fire department's ISO rating is seven. The Pulaski County Ambulance District provides emergency medical services and has a base in Richland. The community has enhanced 9-1-1 through the Pulaski County 9-1-1 system. The city has four warning sirens which are controlled by the city police department and Pulaski County 9-1-1 dispatch.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvements Project funding, taxes for specific purposes, fees for water, sewer, gas or electric services, impact fees for new development, and ability to incur debt through general obligation bonds.

Existing Plans and Policies

Richland has floodplain ordinances in place, as well as building and electric codes which are enforced by city Building Department staff. The city is also part of the county LEOP.

Other Mitigation Activities

The local fire department provides education/awareness programs and materials on a variety of subjects including Fire Safety Week and emergency preparedness.

Other Mitigation Activities

Table 2.17 provides data in regards to demographic and structure risk parameters for Richland. In addition, **Table 2.18** provides information from the Data Questionnaire distributed to each jurisdiction.

[24] www.richlandmo.net

Table 2.17. Demographic and Structure Risk Parameters For Richland

Jurisdiction	Handicapped Citizens	Non-English Speaking Populations	% People Below Poverty Level	Population Under 5 Yrs	Population 65 Yrs and Over	% of Residences Built Prior to 1939	# of Mobile Homes
Richland	392	103	29.1	193	383	13.8	55

Source: Source: U.S. Census Bureau, 2009-2013 5-Years American Community Survey

Table 2.18. Richland Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes
Builder's Plan	No
Capital Improvement Plan	Yes
City Emergency Operations Plan	No
County Emergency Operations Plan	Yes (Use Pulaski, Camden & Laclede Counties)
Local Recovery Plan	No
County Recovery Plan	Yes (Use Pulaski, Camden & Laclede Counties)
City Mitigation Plan	No
County Mitigation Plan	October, 2010 (Use Pulaski, Camden & Laclede Counties)
Local Mitigation Plan (PDM)	-
County Mitigation Plan (PDM)	-
Economic Development Plan	Yes
Transportation Plan	Yes
Land-use Plan	Yes
Flood Mitigation Assistance (FMA) Plan	Yes
Watershed Plan	N/A
Firewise or other fire mitigation plan	N/A
School Mitigation Plan	-
Critical Facilities Plan (Mitigation/Response/Recovery)	N/A
Policies/Ordinance	**Status Including Date of Document or Policy**
Zoning Ordinance	Yes
Building Code	BOCA 1999
Floodplain Ordinance	Yes
Subdivision Ordinance	Yes
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes
Drainage Ordinance	Yes
Capability	**Status Including Date of Document or Policy**

Capability	Status Including Date of Document or Policy
Site Plan Review Requirements	N/A
Historic Preservation Ordinance	No
Landscape Ordinance	No
Wetlands and Riparian Areas Conservation Plan	-
Debris Management Plan	No
Program	**Status Including Date of Document or Policy**
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
National Flood Insurance Program (NFIP) Participant – Non-delegated	Yes
NFIP Community Rating System (CRS) Participating Community	N/A
Hazard Awareness Program	No
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	5
Economic Development Program	Yes
Land Use Program	Yes
Public Education/Awareness	Yes
Property Acquisition	No
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	Yes
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	**Status Including Date of Document or Policy**
Hazard Analysis/Risk Assessment (Local)	Yes
Hazard Analysis/Risk Assessment (County)	Yes (use Pulaski, Camden & Laclede Counties)
Flood Insurance Maps	-
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	N/A
Critical Facilities Inventory	N/A
Vulnerable Population Inventory	N/A
Land Use Map	Yes
Staff/Department	**Status Including Date of Document or Policy**
Building Code Official	No
Building Inspector	Yes
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	Yes

Capability	Status Including Date of Document or Policy
Public Works Official	Yes
Emergency Management Coordinator	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	No
County Emergency Management Commission	N/A
Sanitation Department	No
Transportation Department	Yes
Economic Development Department	No
Housing Department	No
Planning Consultant	-
Regional Planning Agencies	Yes
Historic Preservation	No
Non-Governmental Organizations (NGOs)	**Status Including Date of Document or Policy**
American Red Cross	No
Salvation Army	No
Capability	**Status Including Date of Document or Policy**
Veterans Groups	Yes
Environmental Organization	Yes
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	**Status Including Date of Document or Policy**
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2015

2.2.5 City of St. Robert

Overview

St. Robert is located on the Interstate 44 corridor, adjacent to Fort Leonard Wood in the center of the county. St. Robert is incorporated as a fourth class city. St. Robert is the youngest incorporated community in Pulaski County, and developed when Fort Leonard Wood was established in the mid-twentieth century. According to the 2013 US Census, the city has a population of 4,569. There is an eight member board of aldermen and a mayor. The city employs a full-time city administrator, city clerk, city attorney, finance officer, city collector, municipal judge, police chief, fire chief, public works director and a public works foreman. In addition, a mapping specialist, engineer, emergency management coordinator, and NFIP floodplain administrator are also employed by the city. The city provides municipal services for water, sewage treatment, natural gas and electricity. The city is served by Pulaski County 9-1-1 and has its own police department and fire department.

Technical and Fiscal Resources

St. Robert participates in the National Flood Insurance Program. The city zoning inspector also serves as the city floodplain manager. The city has a floodplain ordinance #1308, adopted on September 23, 2002. St. Robert has a fully staffed Building Department that administers and enforces all 2006 ICC codes and the 2005 National Electric Code. The city has three ICC certified inspectors on staff, including the city building official, city zoning inspector and the city administrator. All residential and non-residential construction – both new and renovations – require a building permit and inspections by the city.

The city has four severe weather sirens that are activated by the city police dispatch center with coordination from the city fire chief. In addition to being served by Pulaski County 9-1-1, the city has dispatch capability through the city police dispatch. Additional warning is provided through the local radio station, KJPW-KFBD-KIIK Radio and the local Channel 12 cable television station.

The City EOC is located at the St. Robert Municipal Center, with the St. Robert Community Center serving as a backup location. The community and city government has high speed broadband internet capabilities at all city facilities.

The city is served by the St. Robert Fire Department which has an ISO rating of five, as well as an ambulance district and an air evacuation service through St. Johns Clinic.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvements Project funding, ability to levy taxes for specific purposes, fees for water, sewer, gas or electric services, incur debt through general obligation bonds, and ability to incur debt through special tax bonds.

Existing Plans and Policies

St. Robert has floodplain ordinances in place, as well as building, electric, property maintenance, fire, plumbing, mechanical and fuel gas codes(IPMC, IBC, IRC, IFC, IPC, IMC, IFGC, NEC). All codes which are enforced by city Building Department staff. The city also has a Snow and Ice Route Priority Plan, Infrastructure Development Regulations, City Comprehensive Plan, Economic Growth Strategy, land Development Regulations, Stormwater Management Regulations and Floodplain Management Regulations. The city is also part of the county LEOP.

Other Mitigation Activities

The fire department provides a number of education/outreach programs in the community and school district, including flood awareness and safety, hazardous weather awareness and preparedness, Fire Safety Week, H1N1 Flu Mitigation, outdoor burning and home smoke detectors. Other public education programs include Household Hazardous Waste, tornado and fire 811 notifications, car seat program, and smoke and carbon monoxide detection.

The community has a designated public tornado shelters that are constructed in accordance with FEMA standards. This shelter is located at East Elementary School and the St. Robert City Hall.

Table 2.19 provides data in regards to demographic and structure risk parameters for St. Robert.

Table 2.20 provides information from the Data Questionnaire distributed to each jurisdiction.

Table 2.19. Demographic and Structure Risk Parameters For St. Robert

Jurisdiction	Handicapped Citizens	Non-English Speaking Populations	% People Below Poverty Level	Population Under 5 Yrs	Population 65 Yrs and Over	% of Residences Built Prior to 1939	# of Mobile Homes
St. Robert	615	826	24.3	535	155	0.9	304

Source: Source: U.S. Census Bureau, 2009-2013 5-Years American Community Survey

Table 2.20. St. Robert Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	05/2003
Builder's Plan	Yes
Capital Improvement Plan	-
City Emergency Operations Plan	03/07/1994
County Emergency Operations Plan	Yes
Local Recovery Plan	-
County Recovery Plan	-
City Mitigation Plan	-
County Mitigation Plan	October, 2010
Local Mitigation Plan (PDM)	-
County Mitigation Plan (PDM)	-
Economic Development Plan	Yes
Transportation Plan	05/05/2008
Land-use Plan	08/07/1989
Flood Mitigation Assistance (FMA) Plan	04/19/2010

Capability	Status Including Date of Document or Policy
Watershed Plan	-
Firewise or other fire mitigation plan	-
School Mitigation Plan	-
Critical Facilities Plan (Mitigation/Response/Recovery)	-
Policies/Ordinance	**Status Including Date of Document or Policy**
Zoning Ordinance	Yes
Building Code	ICC 2006
Floodplain Ordinance	4/19/2010
Subdivision Ordinance	Yes
Tree Trimming Ordinance	Yes
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes
Drainage Ordinance	Yes
Capability	**Status Including Date of Document or Policy**
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	Yes
Wetlands and Riparian Areas Conservation Plan	-
Debris Management Plan	-
Program	**Status Including Date of Document or Policy**
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
National Flood Insurance Program (NFIP) Participant – Non-delegated	-
NFIP Community Rating System (CRS) Participating Community	-
Hazard Awareness Program	Yes
National Weather Service (NWS) Storm Ready	-
Building Code Effectiveness Grading (BCEGs)	-
ISO Fire Rating	5
Economic Development Program	-
Land Use Program	Yes
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	Yes

Capability	Status Including Date of Document or Policy
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	**Status Including Date of Document or Policy**
Hazard Analysis/Risk Assessment (Local)	-
Hazard Analysis/Risk Assessment (County)	-
Flood Insurance Maps	-
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	Yes
Staff/Department	**Status Including Date of Document or Policy**
Building Code Official	Yes
Building Inspector	Yes
Mapping Specialist (GIS)	Yes
Engineer	Yes
Development Planner	No
Public Works Official	Yes
Emergency Management Coordinator	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	Yes
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes
County Emergency Management Commission	Yes
Sanitation Department	Yes
Transportation Department	No
Economic Development Department	No
Housing Department	No
Planning Consultant	-
Regional Planning Agencies	Yes
Historic Preservation	No

Capability	Status Including Date of Document or Policy
Non-Governmental Organizations (NGOs)	**Status Including Date of Document or Policy**
American Red Cross	Yes
Salvation Army	Yes
Capability	**Status Including Date of Document or Policy**
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	**Status Including Date of Document or Policy**
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2015

2.2.6 City of Waynesville

Overview

The City of Waynesville was declared the county seat in 1843 and was named after a Revolutionary War hero, “Mad Anthony” Wayne. The town was located on the St. Louis-Springfield Road and a regular stop on the stagecoach route. The Old Stagecoach Stop is listed on the National Register of Historical Places and is located on the city square, adjacent to the courthouse. Other communities, built along the railroads which crossed Pulaski County further north than the Waynesville area, challenged the community for a time in the late 1800’s as the county’s center of commerce. But Waynesville’s fortunes improved again with the construction of Route 66, the development of Fort Leonard Wood and eventually the building of Interstate 44.

According to the 2013 US Census, the city has a population of 5,017. Waynesville is a fourth class city with an eight member city council and a mayor. The city also employs a full-time city administrator as well as a city clerk, city attorney, city court judge, city court clerk, city collector, police chief, water superintendent, electric superintendent, gas superintendent, street superintendent, and parks superintendent. Additional City personnel include building code official, building inspector, engineer, public works official, and NFIP floodplain administrator. The city provides municipal services for water, sewage treatment, electric and natural gas. The city is served by Pulaski County's enhanced 9-1-1 system and has its own police department.

Technical and Fiscal Resources

Waynesville participates in the National Flood Insurance Program. The Building Inspector serves as the city's floodplain administrator. The city has a floodplain ordinance and also issues building permits. The city has building codes and uses the International Residential Code (IRC and IBC 2006). Waynesville has a Building Department that administers and enforces codes and permits. All residential and non-residential construction, both new and renovations require a building permit and inspections by the city.

The city has five severe weather sirens that are activated the Chief of Police. In addition to being served by Pulaski County 9-1-1, CodeRED is utilized to keep residents informed. Additional warning is provided through the local radio station, KJPW-KFBD-KIIK Radio and the local Channel 12 cable television station.

The City EOC is located at the Pulaski County 9-1-1 Communications Center located at 1500 Ousley Rd, Waynesville, Missouri, with the Waynesville City Hall serving as a backup location. The community and city government has high speed broadband internet capabilities at all critical city facilities.

The city is served by the Waynesville Rural Fire Department and the Pulaski County Ambulance District. The fire department has an ISO rating of 6. In addition, the community is served by an air evacuation service at St. Johns Clinic.

Fiscal tools or resources that the City could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvement funding, authority to levy taxes for special purposes, fees for water, sewer, gas or electric services, impact fees for new development, ability to incur debt through general obligations bonds, special tax bonds, and ability to withhold spending in hazard prone areas.

Existing Plans and Policies

Waynesville has floodplain ordinances in place as well as building and electric codes which are enforced by the Building Department. The city has a comprehensive plan, capital improvement plan, city and county emergency operations plan, city mitigation plan, economic development plan, transportation plan, and land-use plan.

Other Mitigation Activities

The local fire department provides education/awareness programs and materials on a variety of subjects including Fire Safety Week and emergency preparedness.

The city has a designated public tornado shelter that was constructed in accordance with FEMA standards. This shelter is located at Waynesville East Elementary School.

Other past or ongoing projects or programs designed to reduce disaster losses include Mitchel Creek, Dyer Street Bridge, Public Works Building, ball park, shower house, and removed lift station.

Table 2.21 provides data in regards to demographic and structure risk parameters for Waynesville. **Table 2.22** provides information from the Data Questionnaire distributed to each jurisdiction.

Table 2.21. Demographic and Structure Risk Parameters For Waynesville

Jurisdiction	Handicapped Citizens	Non-English Speaking Populations	% People Below Poverty Level	Population Under 5 Yrs	Population 65 Yrs and Over	% of Residences Built Prior to 1939	# of Mobile Homes
Waynesville	615	826	24.3	535	155	0.9	304

Source: Source: U.S. Census Bureau, 2009-2013 5-Years American Community Survey

Table 2.22. Waynesville Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes
Builder's Plan	N/A
Capital Improvement Plan	Yes
City Emergency Operations Plan	Yes
County Emergency Operations Plan	Yes
Local Recovery Plan	N/A
County Recovery Plan	N/A
City Mitigation Plan	Yes
County Mitigation Plan	Yes
Local Mitigation Plan (PDM)	-
County Mitigation Plan (PDM)	-
Economic Development Plan	Yes
Transportation Plan	Yes
Land-use Plan	Yes
Flood Mitigation Assistance (FMA) Plan	Yes
Watershed Plan	Yes
Firewise or other fire mitigation plan	N/A
School Mitigation Plan	-
Critical Facilities Plan (Mitigation/Response/Recovery)	N/A
Policies/Ordinance	**Status Including Date of Document or Policy**
Zoning Ordinance	Yes
Building Code	2006 ICC
Floodplain Ordinance	1/21/2010

Capability	Status Including Date of Document or Policy
Subdivision Ordinance	Yes
Tree Trimming Ordinance	Yes
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes
Drainage Ordinance	Yes
Capability	**Status Including Date of Document or Policy**
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	N/A
Landscape Ordinance	Yes
Wetlands and Riparian Areas Conservation Plan	-
Debris Management Plan	N/A
Program	**Status Including Date of Document or Policy**
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
National Flood Insurance Program (NFIP) Participant – Non-delegated	Yes
NFIP Community Rating System (CRS) Participating Community	-
Hazard Awareness Program	N/A
National Weather Service (NWS) Storm Ready	No
Building Code Effectiveness Grading (BCEGs)	-
ISO Fire Rating	N/A
Economic Development Program	Yes
Land Use Program	Yes
Public Education/Awareness	N/A
Property Acquisition	N/A
Planning/Zoning Boards	Yes
Stream Maintenance Program	N/A
Tree Trimming Program	N/A
Engineering Studies for Streams (Local/County/Regional)	Yes
Mutual Aid Agreements	Yes
Studies/Reports/Maps	**Status Including Date of Document or Policy**
Hazard Analysis/Risk Assessment (Local)	-
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	-
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	-

Capability	Status Including Date of Document or Policy
Critical Facilities Inventory	N/A
Vulnerable Population Inventory	N/A
Land Use Map	Yes
Staff/Department	**Status Including Date of Document or Policy**
Building Code Official	Yes
Building Inspector	Yes
Mapping Specialist (GIS)	No
Engineer	Yes
Development Planner	No
Public Works Official	Yes
Emergency Management Coordinator	No
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	Yes
Emergency Response Team	Yes
Hazardous Materials Expert	No
Local Emergency Planning Committee	No
County Emergency Management Commission	Yes
Sanitation Department	N/A
Transportation Department	Yes
Economic Development Department	N/A
Housing Department	N/A
Planning Consultant	-
Regional Planning Agencies	Yes
Historic Preservation	N/A
Non-Governmental Organizations (NGOs)	**Status Including Date of Document or Policy**
American Red Cross	Yes
Salvation Army	Yes
Capability	**Status Including Date of Document or Policy**
Veterans Groups	Yes
Environmental Organization	Yes
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes
Local Funding Availability	**Status Including Date of Document or Policy**
Ability to apply for Community Development Block Grants	Yes

Capability	Status Including Date of Document or Policy
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	Yes

Source: Data Collection Questionnaire, 2015

Table 2.23 summarizes the mitigation capabilities of Pulaski County and its jurisdictions.

Table 2.23. Mitigation Capabilities Summary Table

CAPABILITIES	Uninc. Pulaski County	Crocker	Dixon	Richland	St. Robert	Waynesville
Planning Capabilities						
Comprehensive Plan	No	1990	No	Yes	05/2003	Yes
Builder's Plan	No	No	No	No	Yes	N/A
Capital Improvement Plan	No	No	No	Yes	-	Yes
City Emergency Operations Plan	-	2008	No	No	03/07/1994	Yes
County Emergency Operations Plan	Yes	2008	Yes	Yes	Yes	Yes
Local Recovery Plan	No	2008	No	No	-	N/A
County Recovery Plan	No	2008	No	Yes	-	N/A
City Mitigation Plan	No	2008	No	No	-	Yes
County Mitigation Plan	October, 2010	October, 2010	October, 2010	October, 2010	October, 2010	October, 2010
Local Mitigation Plan (PDM)	-	-	-	-	-	-
County Mitigation Plan (PDM)	-	-	-	-	-	-
Debris Management Plan	No	No	No	No	-	N/A
Economic Development Plan	Yes	No	No	Yes	Yes	Yes
Transportation Plan	No	No	No	Yes	05/05/2008	Yes
Land-use Plan	No	No	No	Yes	08/07/1989	Yes
Flood Mitigation Assistance (FMA) Plan	No	No	No	Yes	04/19/2010	Yes
Watershed Plan	No	No	No	N/A	-	Yes
Firewise or other fire mitigation plan	No	No	No	N/A	-	N/A
School Mitigation Plan	-	-	-	-	-	-
Critical Facilities Plan (Mitigation/Response/Recovery)	No	No	No	N/A	-	N/A

CAPABILITIES	Uninc. Pulaski County	Crocker	Dixon	Richland	St. Robert	Waynesville
Policies/Ordinance						
Zoning Ordinance	No	N/A	No	Yes	Yes	Yes
Building Code	No	No	N/A	BOCA 1999	ICC 2006	2006 ICC
Floodplain Ordinance	4/19/2010	No	N/A	Yes	4/19/2010	1/21/2010
Subdivision Ordinance	No	No	No	Yes	Yes	Yes
Tree Trimming Ordinance	No	No	No	No	Yes	Yes
Nuisance Ordinance	No	No	Yes	Yes	Yes	Yes
Storm Water Ordinance	No	No	No	Yes	Yes	Yes
Drainage Ordinance	No	No	No	Yes	Yes	Yes
Site Plan Review Requirements	No	No	No	N/A	Yes	Yes
Historic Preservation Ordinance	No	No	No	No	No	N/A
Landscape Ordinance	No	No	Yes	No	Yes	Yes
Wetlands and Riparian Areas Conservation Plan	-	-	-	-	-	-
Program						
Zoning/Land Use Restrictions	No	No	No	Yes	Yes	Yes
Codes Building Site/Design	No	No	Yes	Yes	Yes	Yes
National Flood Insurance Program (NFIP) Participant - Nondelegated	04/17/1985	N/A	No	Yes	-	Yes
NFIP Participant - Delegated	-	-	-	-	-	-
NFIP Community Rating System (CRS) Participating Community	No	N/A	N/A	N/A	-	-
Hazard Awareness Program	No	No	No	No	Yes	N/A
National Weather Service (NWS) Storm Ready	No	2002	Yes	No	-	No
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	-	-
ISO Fire Rating	-	4	No	5	5	N/A
Economic Development Program	No	No	No	Yes	-	Yes

CAPABILITIES	Uninc. Pulaski County	Crocker	Dixon	Richland	St. Robert	Waynesville
Land Use Program	No	No	No	Yes	Yes	Yes
Public Education/Awareness	No	No	No	Yes	No	N/A
Property Acquisition	No	No	No	No	No	N/A
Planning/Zoning Boards	No	No	No	Yes	Yes	Yes
Stream Maintenance Program	No	No	No	No	No	N/A
Tree Trimming Program	No	No	No	Yes	No	N/A
Engineering Studies for Streams (Local/County/Regional)	No	No	No	No	No	Yes
Mutual Aid Agreements	Yes	4	No	Yes	Yes	Yes
Studies/Reports/Maps						
Hazard Analysis/Risk Assessment (Local)	No	Yes	No	Yes	-	-
Hazard Analysis/Risk Assessment (County)	Yes	Yes	Yes	Yes	Yes	Yes
Flood Insurance Maps	-	-	-	-	-	-
FEMA Flood Insurance Study (Detailed)	Yes	No	No	Yes	No	Yes
Evacuation Route Map	No	No	No	N/A	No	-
Critical Facilities Inventory	Yes	No	No	N/A	No	N/A
Vulnerable Population Inventory	No	No	No	N/A	No	N/A
Land Use Map	No	Yes	No	N/A	Yes	Yes
Staff/Department						
Building Code Official	No	No	N/A	No	Yes	Yes
Building Inspector	No	No	Yes	Yes	Yes	Yes
Mapping Specialist (GIS)	Yes	No	No	No	Yes	No
Engineer	No	Yes	Yes	No	Yes	Yes
Development Planner	No	No	Yes	Yes	No	No
Public Works Official	No	Yes	Yes	Yes	Yes	Yes
Emergency Management Coordinator	Yes	Yes	Yes	Yes	Yes	No

CAPABILITIES	Uninc. Pulaski County	Crocker	Dixon	Richland	St. Robert	Waynesville
NFIP Floodplain Administrator	Yes	No	N/A	Yes	Yes	Yes
Bomb and/or Arson Squad	No	No	Yes	No	No	Yes
Emergency Response Team	No	Yes	Yes	No	Yes	Yes
Hazardous Materials Expert	No	No	No	No	No	No
Local Emergency Planning Committee	Yes	Yes	No	No	Yes	No
County Emergency Management Commission	Yes	Yes	Yes	Yes	Yes	Yes
Sanitation Department	No	Yes	Yes	No	Yes	N/A
Transportation Department	No	No	Yes	Yes	No	Yes
Economic Development Department	No	No	No	No	No	N/A
Housing Department	No	No	No	No	No	N/A
Planning Consultant	-	-	-	-	-	-
Regional Planning Agencies	Yes	Yes	Yes	Yes	Yes	Yes
Historic Preservation	No	No	No	No	No	N/A
Non-Governmental Organizations (NGOs)						
American Red Cross	No	Yes	No	No	Yes	Yes
Salvation Army	Yes	Yes	No	No	Yes	Yes
Veterans Groups	Yes	Yes	Yes	Yes	Yes	Yes
Environmental Organization	No	Yes	No	Yes	No	Yes
Homeowner Associations	Yes	No	No	No	No	Yes
Neighborhood Associations	Yes	No	No	No	No	Yes
Chamber of Commerce	Yes	Yes	Yes	Yes	Yes	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes	No	Yes	Yes	Yes	Yes
Financial Resources						
Apply for Community Development Block Grants	Yes	Yes	Yes	Yes	Yes	Yes

CAPABILITIES	Uninc. Pulaski County	Crocker	Dixon	Richland	St. Robert	Waynesville
Fund projects through Capital Improvements funding	No	Yes	Yes	Yes	Yes	Yes
Authority to levy taxes for specific purposes	Yes	Yes	Yes	Yes	Yes	Yes
Fees for water, sewer, gas, or electric services	Yes	Yes	Yes	Yes	Yes	Yes
Impact fees for new development	No	No	Yes	No	No	Yes
Incur dept through general obligation bonds	Yes	Yes	Yes	Yes	Yes	Yes
Incur debt through special tax bonds	Yes	No	Yes	Yes	Yes	Yes
Incur debt through private activities	Yes	No	Yes	No	No	No
Withhold spending in hazard prone areas	Yes	No	Yes	No	No	Yes

Source: Data Collection Questionnaires, date

2.2.7 Public School District Profiles and Mitigation Capabilities

The following school districts are participating jurisdictions in this plan: Crocker R-II, Dixon R-I, Laquey R-V, Richland R-IV, Swedeborg R-III, and Waynesville R-VI. As public institutions responsible for the care and education of the county's children, these school districts share an interest with Pulaski County in public safety and hazard mitigation planning. **Figure 2.6** provides the boundaries of the school districts participating in this planning process. **Table 2.24** shows the school enrollment for 2015.

Technical and Fiscal Resources

The school districts in Pulaski County all have the authority to levy taxes for special purposes related to education and student safety and/or incur debt through general obligation or special tax bonds. However, Dixon R-I and Laquey R-V were the only districts that are utilizing general obligation bonds. Also, Richland R-IV is the only district with a current tax levy.

All schools, except Waynesville R-VI, reported the use of NOAA weather radios. In addition, each school has fire alarms and a public address system capable of providing specific instructions in the event of an emergency. All of the Pulaski County school districts all have automated text/voice message systems used to contact parents for normal school announcements. These automated phone message systems could also be utilized to provide emergency information regarding the schools.

All of the schools in the County have a full-time building official. Most of the school districts do not have a dedicated grant writer on staff. Existing staff work on grants when necessary. Superintendent and principles also share the duties of Emergency Manager and Public Information Officer.

In addition, three of the six districts employ campus police. Some of the smaller districts are patrolled daily by the local police departments.

Existing Plans and Policies

In regards to the planning elements of each school district, each district has at least one plan or policy in place, ranging from Capital Improvement Plans to Weapons Policies. All school districts, except for Crocker R-II, have a current School Emergency Plan.

Other Mitigation Activities

All schools participating in the plan conduct regular fire, earthquake and tornado drills and tornado drills on a quarterly basis or semi-annual basis. Although all the schools have designated safe areas for tornados, only two (Waynesville R-VI East Elementary School and Crocker Junior/Senior High) have FEMA certified safe rooms.

Figure 2.6. Pulaski County Schools and School Districts

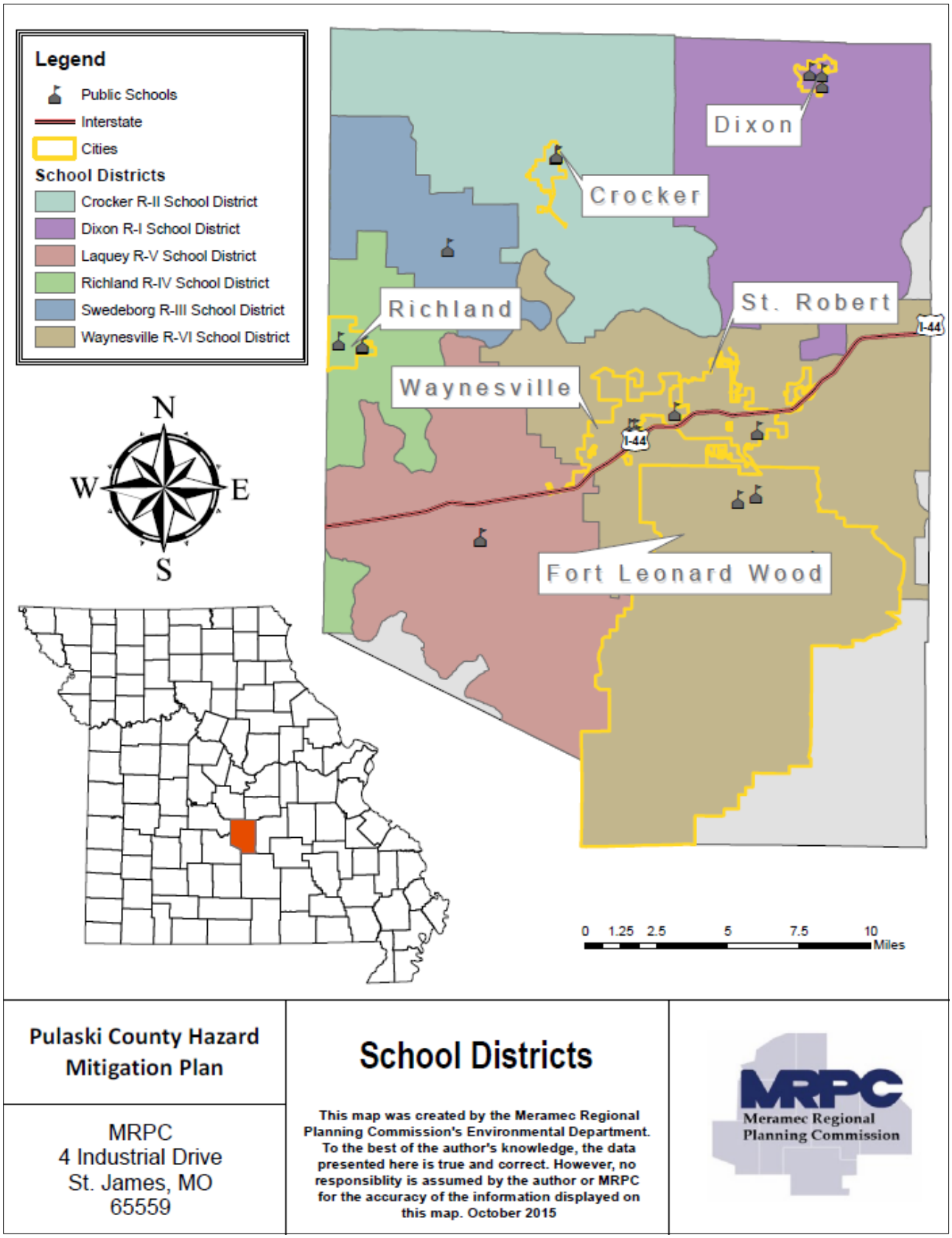


Table 2.24. School District Buildings and Enrollment Data, 2015

District Name	Building Name	Building Enrolment
Dixon R-I		
	Dixon High School (K-5)	304
	Dixon Middle School (6-8)	228
	Dixon Elem. School (9-12)	515
Crocker R-II		
	Crocker Junior/Senior High School (7-12)	254
	Crocker Elem. School (K-6)	43
Swedeborg R-III		
	Swedeborg Elementary School (K-8)	66
Richland R-IV		
	Richland High School (8-12)	210
	Richland Jr. High School (7-8)	81
	Richland Elem. School (K-6)	338
Laquey R-V		
	Laquey High School (9-12)	216
	Laquey Middle School (5-8)	156
	Laquey Elem. School (K-6)	336
Waynesville R-VI		
	Waynesville Career Center (9-12)	693
	Piney Ridge Center (K-12)	81
	Waynesville Senior High School (9-12)	1,651
	Waynesville Middle School (7-8)	839
	Wood Elem. School (K-6)	448
	6th Grade Center (6)	434
	Thayer Elem. School (K-5)	216
	Freedom Elem. School (3-6)	873
	Partridge Elem. School (K-5)	407
	Waynesville East Elem. School (K-2)	1,213

http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx

Table 2.25 provides a summary of mitigation capabilities for all six school districts.

Table 2.25. Summary of Mitigation Capabilities- Crocker R-II, Dixon R-I, Laquey R-V, Richland R-IV, Swedeborg R-III, and Waynesville R-VI

Capability	Crocker R-II	Dixon R-I	Laquey R-V	Richland R-IV	Swedeborg R-III	Waynesville R-VI
Planning Elements						
Master Plan/Date	No	No	July, 2006	Yes	No	No
Capital Improvement	No	Annually	Annually	Yes	No	Annually
School Emergency Plan/Date	No	Annually	July, 2006	Yes	Annually	Yes
Weapons Policy/Date	Yes	2013	August, 2010	Yes	Yes	1/25/1999
Personnel Resources						
Full-Time Building Official (Principle)	Yes	Yes	3	Yes	Yes	Yes
Emergency Manager	Principle	Building Admin.	Yes	Yes	Building Admin.	Yes
Grant Writer	No	No	N/A	No	Yes	Yes
Public Information Officer	Principle	Yes	Yes	Yes	No	Yes
Financial Resources						
Capital Improvements Project Funding	No	Yes	Yes	No	Yes	Yes
Local Funds	Yes	Yes	Yes	No	Yes	Yes
General Obligation	No	Yes	$625,000	No	No	No
Special Tax Bonds	No	No	No	$.30 tax levy	No	No
Private Activities/Donations	No	Yes	No	No	No	Yes
State and Federal Funds/Grants	Yes	Yes	Yes	No	Yes	Yes
Other						
Public Education Programs	No	No	N/A	No	Yes	Yes (Adult Ed.)
Privately or Self-Insured?	Private	Self-Insured	Privately	Private	Private	Self-insured Music

Capability	Crocker R-II	Dixon R-I	Laquey R-V	Richland R-IV	Swedeborg R-III	Waynesville R-VI
Fire Evacuation Training	Yes	Yes	Yes	Yes	Yes	Yes
Tornado Sheltering Exercises	Yes	Yes	Yes	Yes	Yes	Yes
Public Address/Emergency Alert System	Sirens, Fire alarms, automated text and voice messaging	Automated text, voice, and email messaging	Yes	Fire alarms, automated text and voice messaging	No	Fire alarms, automated text and voice messaging
NOAA Weather Radios	Yes	Yes	Yes	Yes	Yes	-
Lock-Down Security Training	Yes	Yes	Yes	Yes	Yes	Yes
Mitigation Programs	Shelter Designated	No	Yes	No	Mo Propane Emergency Plan	Yes
Tornado Shelter/Safe-room	Yes	No	Yes	No	Yes	East Elm. School
Campus Police	Yes	No	1 SRO	No	No	High School and Middle

Data Collection Questionnaires, [10/2015]

2.2.8 Critical Facilities

The table below (**Table 2.26**) provides information for critical facilities in the planning area. Specific information includes a Hazus ID if applicable, jurisdiction, building name/owner, and address. Furthermore, **Table 2.27** provides information in regards to colleges/universities located in the planning area.

Table 2.26. Pulaski County Critical Facilities by Type and Jurisdiction

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
Fire Department Facilities						
MO000551	Crocker	Crocker Fire Protection Dist. Bldg. 1	201 Keeth Rd	Crocker	MO	65452
	Crocker	Crocker Fire Protection Dist. Bldg. 2	111 10th St	Crocker	MO	65452
	Crocker	Crocker Fire Protection Dist. Bldg. 3	17180 Hwy T	Swedeborg	MO	65572
	Crocker	Crocker Fire Protection Dist. Bldg. 4	13572 Hwy BB	Crocker	MO	65452
MO000552	Dixon	Dixon Rural Fire Protection Dist.	203 S Walnut St	Dixon	MO	65459
MO000557	Richland	Tri-County Fire & Rescue Association	111 W Washington Ave	Richland	MO	65556
MO000553	St. Robert	Waynesville Rural Fire Prot. Dist. #3	20965 Hwy 28	St. Robert	MO	65584
MO000554	St. Robert	St. Robert City Fire & Rescue Bldg. 1	117 Plattner Ave	St. Robert	MO	65584
	St. Robert	St. Robert City Fire & Rescue Bldg. 2	116 Foxworth St	St. Robert	MO	65584
MO000556	Waynesville	Waynesville Rural Fire Prot. Dist. #1	1501 Ousley Rd	Waynesville	MO	65583
MO000558	Waynesville	Waynesville Rural Fire Prot. Dist. #2	25730 Red Oak Rd	Waynesville	MO	65583
	Waynesville	Waynesville Rural Fire Prot. Bldg. 4	20854 Hwy T	Waynesville	MO	65583
Law Enforcement Facilities						
MO000088	Crocker	Crocker Police Dept.	108 S Commercial St	Crocker	MO	65452
MO000385	Dixon	Dixon Police Dept.	303 S Elm St.	Dixon	MO	65459
MO000254	Richland	Richland Police Dept.	201 S Chestnut	Richland	MO	65556
MO000140	St. Robert	St. Robert Police Dept.	194 Eastlawn Ave	St. Robert	MO	65584
MO000225	Waynesville	Waynesville Police Dept.	201 North St	Waynesville	MO	65583
MO000368	Pulaski County	Pulaski County Sheriff	301 Historic 66 E	Waynesville	MO	65583
School Facilities						
MO002225	Crocker	Crocker Elem	601 N Commercial	Crocker	MO	65452
MO002226	Crocker	Crocker High	601 N Commercial	Crocker	MO	65452

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
School Facilities						
MO002227	Dixon	Dixon Elem	N Pine & W Sixth	Dixon	MO	65459
MO002228	Dixon	Dixon Middle	Hwy 28 East	Dixon	MO	65459
MO002229	Dixon	Dixon High	High School Dr	Dixon	MO	65459
MO002230	Laquey	Laquey R-V Elem.	27600 Hwy AA	Laquey	MO	65534
MO002231	Laquey	Laquey R-V High	27601 Hwy AA	Laquey	MO	65534
MO002232	Laquey	Laquey R-V Middle	27602 Hwy AA	Laquey	MO	65534
MO000913	Richland	Richland Elem.	714 E Jefferson	Richland	MO	65556
MO000914	Richland	Richland High/Jr. High	715 E Jefferson	Richland	MO	65556
MO000916	Richland	Swedeborg Elem.	17507 Hwy T	Richland	MO	65556
	St. Robert	Freedom Elem.	286 Eastlawn Ave.	St. Robert	MO	65584
MO001142	Waynesville	Waynesville East Elem.	1501 State Rd F	Waynesville	MO	65583
MO001143	Waynesville	Waynesville Sr. High	200 GW Lane	Waynesville	MO	65583
MO001144	Waynesville	Waynesville Sixth Grade Center	810 Roosevelt St	Waynesville	MO	65583
MO001145	Waynesville	Waynesville Middle	1001 Historic 66 W	Waynesville	MO	65583
	Waynesville	Waynesville Career Center	400 GW Lane	Waynesville	MO	65583
Medical Facilities						
	Crocker	Pulaski County Health Dept.	101 12 St	Crocker	MO	65452
	Dixon	Rural Health Clinic	206 West Second	Dixon	MO	65459
	Richland	Central Ozarks Medical Center	304 W Washington St	Richland	MO	65556
	Richland	St. John's Clinic Richland	904 S Pine St	Richland	MO	65556
	St. Robert	St. John's Clinic St. Robert	608 City Route 66	St. Robert	MO	65584
	Waynesville	Pulaski Medical Clinic	107 Ichord Ave	Waynesville	MO	65583
Childcare Facilities						
	Crocker	Crocker Academy Inc.	324 S Commercial St.	Crocker	MO	65452
	Crocker	Proctor, Florence Marie	13895 Belle Rd	Crocker	MO	65452
	Dixon	Henson, Karen	301 N High St	Dixon	MO	65459
	Dixon	Dixon Head Start Center	306 N Lang	Dixon	MO	65459
	Dixon	Yoakum, Shelly	309 N Elm St	Dixon	MO	65459
	Richland	Richland Head Start Center	306 S Pine	Richland	MO	65556
	Richland	The Training Station Learning Center LLC	111 E Camden St	Richland	MO	65556

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
Childcare Facilities						
	St. Robert	Sampay, Connie	24356 Tanglewood Rd	St. Robert	MO	65584
	St. Robert	Candyland	106 Bosa	St. Robert	MO	65584
	St. Robert	Victorious Ministries Christian Academy	219 E Lawn	St. Robert	MO	65584
	St. Robert	Williams, Teresa	108 Meadow Ln	St. Robert	MO	65584
	St. Robert	Wee Wonders Child Devel. Center of St. Robert	605 Y Hwy	St. Robert	MO	65584
	St. Robert	McGaughy, Cindi Ellen	21065 Hemingway Ln	St. Robert	MO	65584
	St. Robert	Bright and Morning Star Childcare	21325 Hwy Y	St. Robert	MO	65584
	Waynesville	Precious Jewels Christian Childcare LLC	704 W Historic Rte. 66	Waynesville	MO	65583
	Waynesville	Westside Baptist Preschool	801 Historic Rte. 66 W	Waynesville	MO	65583
	Waynesville	Wee Wonders Child Devel. Center of Waynesville	1702 Long Dr	Waynesville	MO	65583
	Waynesville	Munchkinland	1809-A Historic Rte. 66 W	Waynesville	MO	65583
	Waynesville	Waynesville Head Start	19778 Sackett Ln	Waynesville	MO	65583
	Waynesville	Storie, Melissa Ann	20305 Sedalia Rd	Waynesville	MO	65583
	Waynesville	Hill, Latoya	22989 Reward	Waynesville	MO	65583
	Waynesville	O'Donnell, Jennifer	20950 Hwy T	Waynesville	MO	65583
Nursing Homes						
	Dixon	Dixon Nursing & Rehab	403 E 10th St	Dixon	MO	65459
	Richland	Richland Care Center, Inc.	400 Tri-County Lane	Richland	MO	65556
	St. Robert	Sunset Village of The Ozarks, INC	14275 Hwy Z	St. Robert	MO	65584
	Waynesville	Pulaski County Adult Daycare	704 Historic Route 66, Suite 102	Waynesville	MO	65583
	Waynesville	Life Care Center of Waynesville	700 Birch Lane	Waynesville	MO	65583

Source: 2014 Meramec Region Community Data Mining for Hazard Mitigation Planning, ArcGIS: Streets,

Table 2.27. Pulaski County Colleges/Universities

College/University	Location	Description
Columbia College	Truman Education Center 4904 Constitution St, Fort Leonard Wood, MO 65473	Main campus: Columba, MO Associates and Bachelor degrees
Central Texas College	6002 Colorado Ave. Bldg. 733 E, Fort Leonard Wood, MO 65473	Main campus: Fort Hood, TX Associate degrees
Drury University	194 Eastlawn Ave, Suite C, St. Robert, MO 65584	Main campus: Springfield, MO Bachelor degrees
Ozarks Technical Community College	600 GW Ln, Waynesville, MO 65583	Main Campus in Springfield, MO Associate degrees
Webster University	6002 Constitution Ave, Fort Leonard Wood, MO 65473	Main campus: St. Louis Bachelor and Masters degrees
Park University	Bldg. 733, Unite B, Suite 113, 6002 Colorado Ave, Fort Leonard Wood, MO 65473	Main Campus: Parkville, MO Bachelor and Master's degree
Lincoln University	Truman Education Center, 268 Constitution St. Suite 5, Fort Leonard Wood, MO 65473	Main Campus: Jefferson City, MO Bachelor and Master's degree

3 RISK ASSESSMENT

3.1 Hazard Identification 3.4
3.1.1 *Review of Existing Mitigation Plans* 3.4
3.1.2 *Review Disaster Declaration History* 3.5
3.1.3 *Research Additional Sources* 3.7
3.1.4 *Hazards Identified* 3.9
3.1.5 *Multi-Jurisdictional Risk Assessment* 3.12
3.2 Assets at Risk 3.12
3.2.1 *Total Exposure of Population and Structures* 3.12
Unincorporated County and Incorporated Cities 3.12
3.2.2 *Critical and Essential Facilities and Infrastructure* 3.15
3.2.3 *Other Assets* 3.18
3.3 Future Land Use and Development 3.21
3.4 Hazard Profiles, Vulnerability, and Problem Statements 3.24
Hazard Profiles 3.24
Vulnerability Assessments 3.25
Problem Statements 3.26
3.4.1 *Dam Failure* 3.27
Hazard Profile 3.27
Vulnerability 3.33
Problem Statement 3.34
3.4.2 *Drought* 3.35
Hazard Profile 3.35
Vulnerability 3.43
Problem Statement 3.47
3.4.3 *Earthquakes* 3.48
Hazard Profile 3.48
Vulnerability 3.54
Problem Statement 3.60
3.4.4 *Extreme Heat* 3.61
Hazard Profile 3.61
Vulnerability 3.65
Problem Statement 3.67
3.4.5 *Fires (Urban/Structural and Wild)* 3.68
Hazard Profile 3.68
Vulnerability 3.73
Problem Statement 3.75
3.4.6 *Flooding (Flash and River)* 3.76
Profile 3.76
Vulnerability 3.93

Problem Statement 3.101

3.4.7 Land Subsidence/Sinkholes 3.102

Hazard Profile 3.102

Due to the lack of data for previous sinkhole events in Pulaski County, a probability could not be calculated. 3.106

Vulnerability 3.106

Problem Statement 3.107

3.4.8 Thunderstorm/High Winds/Lightning/Hail 3.109

Hazard Profile 3.109

Vulnerability 3.117

Problem Statement 3.124

3.4.9 Tornado 3.125

HazardProfile 3.125

Vulnerability 3.131

Problem Statement 3.137

3.4.10 Winter Weather/Snow/Ice/Severe Cold 3.138

Hazard Profile 3.138

Vulnerability 3.143

Problem Statement 3.148

44 CFR Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

The goal of the risk assessment is to estimate the potential loss in the planning area, including loss of life, personal injury, property damage, and economic loss, from a hazard event. The risk assessment process allows communities and school/special districts in the planning area to better understand their potential risk to the identified hazards. It will provide a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This chapter is divided into four main parts:

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and provides a factual basis for elimination of hazards from further consideration;
- **Section 3.2 Assets at Risk** provides the planning area's total exposure to natural hazards, considering critical facilities and other community assets at risk;
- **Section 3.3 Future Land Use and Development** discusses areas of planned future development
- **Section 3.4 Hazard Profiles and Vulnerability Analysis** provides more detailed information about the hazards impacting the planning area. For each hazard, there are three sections: 1) Hazard Profile provides a general description and discusses the threat to the planning area, the geographic location at risk, potential severity/magnitude/extent, previous occurrences of hazard events, probability of future occurrence, risk summary by jurisdiction, impact of future development on the risk; 2) Vulnerability Assessment further defines and quantifies populations, buildings, critical facilities, and other community/school or special district assets at risk to natural hazards; and 3) Problem Statement briefly summarizes the problem and develops possible solutions.

3.1 Hazard Identification

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

The primary phase in the development of a hazard mitigation plan is to identify specific hazards which may impact the planning area. To initiate this process, the Hazard Mitigation Planning Committee (HMPC) reviewed a list of natural hazards provided by the Federal Emergency Management Agency (FEMA). From that list, the HMPC selected pertinent natural hazards of concern that have the potential to impact Pulaski County. These selected natural hazards are further profiled and analyzed in this plan.

3.1.1 Review of Existing Mitigation Plans

Within the State of Missouri, local hazard mitigation plans customarily include only natural hazards, as only natural hazards are required by federal regulations. Nevertheless, there is an opportunity to include man made or technical hazards within the plan. However, it was decided that only natural hazards were appropriate for the purpose of this plan. Based on past history and future probability, the Hazard Mitigation Planning Committee (HMPC) determined that the following potential hazards would be included in the Pulaski County Hazard Mitigation Plan:

- Dam Failure
- Drought
- Earthquake
- Extreme Heat
- Fires (Urban/Structural and Wild)
- Flooding
- Land Subsidence/Sinkholes
- Thunderstorm/High Winds/Lightning/Hail
- Tornado
- Severe Winter Weather

Hazards not occurring in the planning area, or considered insignificant were eliminated from this plan. **Table 3.1** outlines the hazards eliminated from the plan and the reasons for doing so. Additionally, some hazards were combined in the Pulaski County Plan to match the hazards listed in the Missouri State Hazard Mitigation Plan. The hazards covered in the previous Pulaski County Hazard Mitigation Plan vary slightly from this plan. Urban/structural fires were included with wildfires, landslides were left out of this plan following the guidance of the 2013 Missouri State Plan, and tornadoes are a separate hazard while lightning was added to thunderstorms.

Table 3.1. Table 3.1 Hazards Not Profiled in the Plan

Hazard	Reason for Omission
Avalanche	No mountains in the planning area.
Coastal Erosion	Planning area is located in the Midwest, not on any coast.
Coastal Storm	Planning area is located in the Midwest, not on any coast.
Debris Flow	There are no mountainous areas in the planning area where this type of event occurs.
Expansive Soils	There are no areas of expansive soils in the planning area.
Hurricane	Planning area is located in the Midwest, not on any coast.
Levee Failure	According to the US Army Corps of Engineers' National Levee Database[1], and local officials, there are no levees located in the planning area.
Volcano	There are no volcanic areas in the county.

3.1.2 Review Disaster Declaration History

In order to assess risk, it was logical to review the disaster declaration history for the State of Missouri and specifically for Pulaski County. Federal and State disaster declarations are granted when the severity and magnitude of a hazard event surpasses the ability of local government to respond and recover. Disaster assistance is initiated when the local government's response and recovery capabilities have been exhausted. In this type of situation, the state may declare a disaster and provide resources from the state level. If the disaster is so great that state resources are also overwhelmed, a federal disaster may be declared in order to allow for federal assistance.

There are three agencies through which a federal disaster declaration can be issued – FEMA, the U.S. Department of Agriculture (USDA) and/or the Small Business Administration. A federally declared disaster generally includes long-term federal recovery programs. The type of declaration is determined by the type of damage sustained during a disaster and what types of institutions or industries are affected.

A declaration issued by USDA indicates that the affected area has suffered at least a 30 percent loss in one or more crops or livestock industries. This type of declaration provides those farmers affected with access to low-interest loans and other programs to assist with disaster recovery and mitigation.

Missouri has been especially hard hit by natural disasters in the recent past. The state has had 66 federally declared disasters since 1957. Of those, 36 have occurred between 2000 and 2015. All of these disasters have been weather related – severe wind and rain storms, tornadoes, flooding, hail, ice storms and winter storms. **Table 3.2** lists the federal disaster declarations for Missouri that included Pulaski County from 1990 through 2015.

[1] http://nld.usace.army.mil/egis/f?p=471:1:

Table 3.2. FEMA Disaster Declarations that included Pulaski County, Missouri, 1990-Present

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA)
DR-995	Flooding, Severe Storm	Declaration Date: July 9, 1993 Incident Period: June 10, 1993 to October 25, 1993	IA, PA
DR-1006	Flooding, Severe Storm, Tornadoes	Declaration Date: December 1, 1993 Incident Period: November 13, 1993 to November 19, 1993	IA
DR-1023	Severe Storm, Flooding, Tornadoes	Declaration Date: April 21, 1994 Incident Period: April 9, 1994 to May 5, 1994	IA
DR-1412	Severe Storms, Tornadoes	Declaration Date: May 6, 2002 Incident Period: April 24, 2002 to June 10, 2002	PA
DR-1463	Severe Storms, Tornadoes, Flooding	Declaration Date: May 6, 2003 Incident Period: May 4, 2003 to May 30, 2003	IA, PA
EM-3232	Hurricane Katrina Evacuation	Declaration Date: September 10, 2005 Incident Period: August 29, 2005 to October 1, 2005	PA
DR-1676	Severe Winter Storms, Flooding	Declaration Date: January 15, 2007 Incident Period: January 12, 2007 to January 22, 2007	PA
EM-3281	Severe Winter Storms	Declaration Date: December 15, 2007 Incident Period: December 8, 2007 to December 15, 2007	PA
DR-1749	Severe Storms, Flooding	Declaration Date: March 19, 2008 Incident Period: March 17, 2008 to May 9, 2008	IA, PA
EM-3303	Severe Winter Storm	Declaration Date: January 30, 2009 Incident Period: January 26, 2009 to January 28, 2009	PA
DR-1847	Severe Storms, Tornadoes, Flooding	Declaration Date: June 19, 2009 Incident Period: May 8, 2009 to May 16, 2009	PA
EM-3317	Severe Winter Storm	Declaration Date: February 3, 2011 Incident Period: January 31, 2011 to February 5, 2011	PA

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA)
DR-1961	Severe Winter Storm, Snowstorm	Declaration Date: March 23, 2011 Incident Period: January 31, 2011 to February 5, 2011	PA
DR-1980	Severe Storms, Tornadoes, Flooding	Declaration Date: May 9, 2011 Incident Period: April 19, 2011 to June 6, 2011	IA
DR-4144	Severe Storms, Straight-line Winds, Flooding	Declaration Date: September 6, 2013 Incident Period: August 2, 2013 to August 14, 2013	PA

Source: Federal Emergency Management Agency: http://www.fema.gov/disasters

3.1.3 Research Additional Sources

The following list includes additional sources of data on locations and past impacts of hazards in the planning area:

- Missouri Hazard Mitigation Plans (2010 and 2013)
- Previously approved planning area Hazard Mitigation Plan (date)
- Federal Emergency Management Agency (FEMA)
- Missouri Department of Natural Resources (MDNR)
- National Drought Mitigation Center Drought Reporter
- US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics
- National Agricultural Statistics Service (Agriculture production/losses)
- Data Collection Questionnaires completed by each jurisdiction
- State of Missouri GIS data
- Environmental Protection Agency
- Flood Insurance Administration
- Hazards US (HAZUS)
- Missouri Department of Transportation
- Missouri Division of Fire Marshal Safety
- Missouri Public Service Commission
- National Fire Incident Reporting System (NFIRS)
- National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC);
- Pipeline and Hazardous Materials Safety Administration
- County and local comprehensive plans to the extent available
- County Emergency Management
- County Flood Insurance Rate Map, FEMA
- Flood Insurance Study, FEMA
- SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin

- U.S. Army Corps of Engineers
- U.S. Department of Transportation
- United States Geological Survey (USGS)
- Various articles and publications available on the internet (sources are cited in the body of the Plan)

Remarkably, the only centralized source of data for many of the weather-related hazards is the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC). Although it is usually the best and most current source, there are limitations to the data which should be noted. The NCDC documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some information appearing in the NCDC may be provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. An effort is made to use the best available information but because of time and resource constraints, information from these sources may be unverified by the NWS. Those using information from NCDC should be cautious as the NWS does not guarantee the accuracy or validity of the information.

The NCDC damage amounts are estimates received from a variety of sources, including those listed above in the Data Sources section. For damage amounts, the NWS makes a best guess using all available data at the time of the publication. Property and crop damage figures should be considered as a broad estimate. Damages reported are in dollar values as they existed at the time of the storm event. They do not represent current dollar values.

The database currently contains data from January 1950 to March 2014, as entered by the NWS. Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures.

1. Tornado: From 1950 through 1954, only tornado events were recorded.
2. Tornado, Thunderstorm Wind and Hail: From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.
3. All Event Types (48 from Directive 10-1605): From 1996 to present, 48 event types are recorded as defined in NWS Directive 10-1605.

Injuries and deaths caused by a storm event are reported on an area-wide basis. When reviewing a table resulting from an NCDC search by county, the death or injury listed in connection with that county search did not necessarily occur in that county.

3.1.4 Hazards Identified

Table 3.3 lists the hazards that significantly impact each jurisdiction within the planning area and were chosen for further analysis in alphabetical order. However, not all hazards impact every jurisdiction such as dam failure. “X” indicates the jurisdiction is impacted by the hazard, and a "-" indicates the hazard is not applicable to that jurisdiction. As Pulaski County is predominately rural, limited variations occur across the County. However, jurisdictions with a high percentage of housing comprised of mobile homes, for example, could be more at risk to damages from a tornado. **Table 3.4** depicts a summary of natural hazard probabilities and severity ratings by participating jurisdictions.

Table 3.3. Hazards Identified for Each Jurisdiction

Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Heat	Fires (Urban/Structural and Wild)	Flooding (River and Flash)	Land Subsidence/Sinkholes	Thunderstorms/High Winds/Lightning/Hail	Tornado	Severe Winter Weather
Pulaski County	-	x	x	x	x	x	x	x	x	x
Crocker	-	x	x	x	x	x	x	x	x	x
Dixon	-	x	x	x	x	x	x	x	x	x
Richland	-	x	x	x	x	x	x	x	x	x
St. Robert	-	x	x	x	x	x	x	x	x	x
Waynesville	-	x	x	x	x	x	x	x	x	x
School Districts										
Dixon R-I	-	x	x	x	x	x	x	x	x	x
Crocker R-II	-	x	x	x	x	x	x	x	x	x
Swedeborg-RIII	-	x	x	x	x	x	x	x	x	x
Richland R-IV	-	x	x	x	x	x	x	x	x	x
Laquey R-V	-	x	x	x	x	x	x	x	x	x
Waynesville R-VI	-	x	x	x	x	x	x	x	x	x

Table 3.4. Natural Hazard Probability (P) and Vulnerability Ratings (V) by Participating Jurisdiction

		Pulaski County	Crocker	Dixon	Richland	St. Robert	Waynesville	Dixon R-I	Crocker R-II	Swedeborg-RIII	Richland R-IV	Laquey R-V	Waynesville R-VI
Dam Failure	P	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Drought	P	19.17%	19.17%	19.17%	19.17%	19.17%	19.17%	19.17%	19.17%	19.17%	19.17%	19.17%	19.17%
	V	L	L	L	L	L	L	L	L	L	L	L	L
Earthquake	P	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
	V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Extreme Heat	P	69.23%	69.23%	69.23%	69.23%	69.23%	69.23%	69.23%	69.23%	69.23%	69.23%	69.23%	69.23%
	V	L	L	L	L	L	L	L	L	L	L	L	L
Fires (Urban/Structural and Wild)	P	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	V	M-H	M-H	M-H	M-H	M-H	M-H	M-H	M-H	M-H	M-H	M-H	M-H
Flooding	P	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
	V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Land Subsidence/Sinkholes	P	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Thunderstorm- *Heavy rain/High Winds/Lightning/Hail	P	63.63%	63.63%	63.63%	63.63%	63.63%	63.63%	63.63%	63.63%	63.63%	63.63%	63.63%	63.63%
	V	M	M	M	M	M	M	M	M	M	M	M	M

		Pulaski County	Crocker	Dixon	Richland	St. Robert	Waynesville	Dixon R-I	Crocker R-II	Swedeborg-RIII	Richland R-IV	Laquey R-V	Waynesville R-VI
	P	31.82%	31.82%	31.82%	31.82%	31.82%	31.82%	31.82%	31.82%	31.82%	31.82%	31.82%	31.82%
Tornado	V	H	H	H	H	H	H	H	H	H	H	H	H
*Severe Winter Weather/Snow/Ice/Severe Cold	P	81.82%	81.82%	81.82%	81.82%	81.82%	81.82%	81.82%	81.82%	81.82%	81.82%	81.82%	81.82%
	V	L	L	L	L	L	L	L	L	L	L	L	L

Vulnerability Rating Key: L = Low, L-M = Low-Medium, M = Medium, M-H = Medium – High, H = High, n/a = Not Applicable – not enough data to determine probability/vulnerability ratings.
*indicates hazard utilized for probability.

3.1.5 Multi-Jurisdictional Risk Assessment

For this multi-jurisdictional hazard mitigation plan, each hazard is profiled in which the risks are assessed on a planning area wide basis. Some hazards, such as dam failure, vary in risk across the County. If variations exist within the planning area, discussion is included in each profile. Pulaski County is uniform across the County in terms of climate, topography, and building construction characteristics. Weather-related hazards will impact the entire County in much the same fashion, as do topographical/geological related hazards such as earthquake. Sinkholes are widespread in the county, but more localized in their effects. Areas of urbanization include Crocker, Dixon, Richland, St. Robert, and Waynesville. These urbanized areas have more assets at a greater density, and therefore have greater vulnerability to weather-related hazards. Rural areas include agricultural assets (livestock/crops) that are also vulnerable to damages. Differences among jurisdictions for each hazard will be discussed in greater detail in the vulnerability section of each hazard.

3.2 Assets at Risk

This section assesses the planning area's population, structures, critical facilities, infrastructure, and other important assets that may be at risk to hazards.

3.2.1 Total Exposure of Population and Structures

Unincorporated County and Incorporated Cities

In the following three tables, population data is based on 2010 Census Bureau data. Building counts and building exposure values are based on parcel data provided by the State of Missouri Geographic Information Systems (GIS) database which can be found at the following website, http://sema.dps.mo.gov/programs/mitigation_management.php. Contents exposure values were calculated by factoring a multiplier to the building exposure values based on usage type. The multipliers were derived from the HAZUS MH 2.1 and are defined below in **Table 3.5.** Land values have been purposely excluded from consideration because land remains following disasters, and subsequent market devaluations are frequently short term and difficult to quantify. Another reason for excluding land values is that state and federal disaster assistance programs generally do not address loss of land (other than crop insurance). It should be noted that the total valuation of buildings is based on county assessors' data which may not be current. In addition, government-owned properties are usually taxed differently or not at all, and so may not be an accurate representation of true value. Note that public school district assets and special districts assets are included in the total exposure tables assets by community and county.

Table 3.5 shows the total population, building count, estimated value of buildings, estimated value of contents and estimated total exposure to parcels for the unincorporated county and each incorporated city. For multi-county communities, the population and building data may include data on assets located outside the planning area. **Table 3.6** that follows provides the building value exposures for the county and each city in the planning area broken down by usage type. Lastly, **Table 3.7**, provides the building count total for the county and each city in the planning area broken out by building usage types (residential, commercial, industrial, and agricultural).

Table 3.5. Maximum Population and Building Exposure by Jurisdiction

Jurisdiction	2013 Population	Building Count	Building Exposure	Contents Exposure	Total Exposure ($)
Crocker	1,113	620	-	-	-
Dixon	1,412	1,078	-	-	-
Richland	*1,756	887	-	-	-
St. Robert	4,569	1,587	-	-	-
Waynesville	5,017	1,832	-	-	-
Unincorporated Pulaski County	[a]41,325	10,804	1,989,585,000	-	-
Totals	55,192	16,808	-	-	-

Source: U.S. Bureau of the Census, Decennial Census, U.S. Census Bureau, Population Division, U.S. Census of Population 1940 – 2010, U.S. Census Bureau, 2009-2013 5-Year American Community Survey, and Missouri Census Data Center, Population Trend Report Sept. 2015, FEMA HAZUS

*population includes the portions of these cities in adjacent counties,

[a] population for 2014

Note: Contents Exposure derived by applying multiplier to Building Exposure based on HAZUS MH 2.1 standard contents multipliers per usage type as follows: Residential (50%), Commercial (100%), Industrial (150%), Agricultural (100%). For purposes of these calculations, government, school, and utility were calculated at the commercial contents rate.

Table 3.6. Building Values/Exposure by Usage Type

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Total
Crocker	-	-	-	-	-
Dixon	-	-	-	-	-
Richland	-	-	-	-	-
St. Robert	-	-	-	-	-
Waynesville	-	-	-	-	-
Unincorporated Pulaski County	1,745,373,000	216,994,000	22,790,000	4,428,000	1,989,585,000
Totals	-	-	-	-	-

Source: FEMA HAZUS

Table 3.7. Building Counts by Usage Type

Jurisdiction	Residential Counts	Commercial Counts	Industrial Counts	Agricultural Counts	Total
Crocker	586	26	4	0	616
Dixon	995	55	8	6	1064
Richland	834	35	7	2	878
St. Robert	1,468	92	16	1	1577
Waynesville	1,661	115	21	6	1803
Unincorporated Pulaski County	10,301	281	88	45	10715
Totals	15845	604	144	60	

Source: FEMA HAZUS

Even though schools and special districts' total assets are included in the tables above, additional discussion is needed, based on the data that is available from the districts' completion of the Data Collection Questionnaire and district maintained websites. The number of enrolled students at the participating public school districts is provided in **Table 3.8** below. Additional information includes the number of buildings, building values (building exposure) and contents value (contents exposure). These numbers will represent the total enrollment and building count for the public school districts regardless of the county in which they are located.

Table 3.8. Population and Building Exposure by Jurisdiction-Public School Districts

Public School District	Enrollment	Building Count	Building Exposure ($)	Contents Exposure ($)	Total Exposure ($)
Dixon R-I	1,047	12	-	-	23,498,989
Crocker R-II	597	7	13,062,738	3,817,963	16,880,701
Swedeborg-RIII	66	3	-	-	1,150,000
Richland R-IV	629	9	-	-	15,566,646
Laquey R-V	708	3	17,502,661	2,645,836	20,148,497
Waynesville R-VI	6,081	28	200,107,935	22,670,936	222,778,871

Source: http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx., The Building Exposure, Contents Exposure, and Total Exposure amounts come from the completed Data Collection Questionnaires from Public School Districts.

3.2.2 Critical and Essential Facilities and Infrastructure

This section will include information from a Data Collection Questionnaire and other sources concerning the vulnerability of participating jurisdictions' critical, essential, high potential loss, and transportation/lifeline facilities to identified hazards. Definitions of each of these types of facilities are provided below.

- Critical Facility: Those facilities essential in providing utility or direction either during the response to an emergency or during the recovery operation.
- Essential Facility: Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.
- High Potential Loss Facilities: Those facilities that would have a high loss or impact on the community.
- Transportation and lifeline facilities: Those facilities and infrastructure critical to transportation, communications, and necessary utilities.

Table 3.9 includes a summary of the inventory of critical and essential facilities and infrastructure in the planning area. The list was compiled from a Data Collection Questionnaire as well as the following sources:

- 2010 Pulaski County Hazard Mitigation Plan

Table 3.9. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction

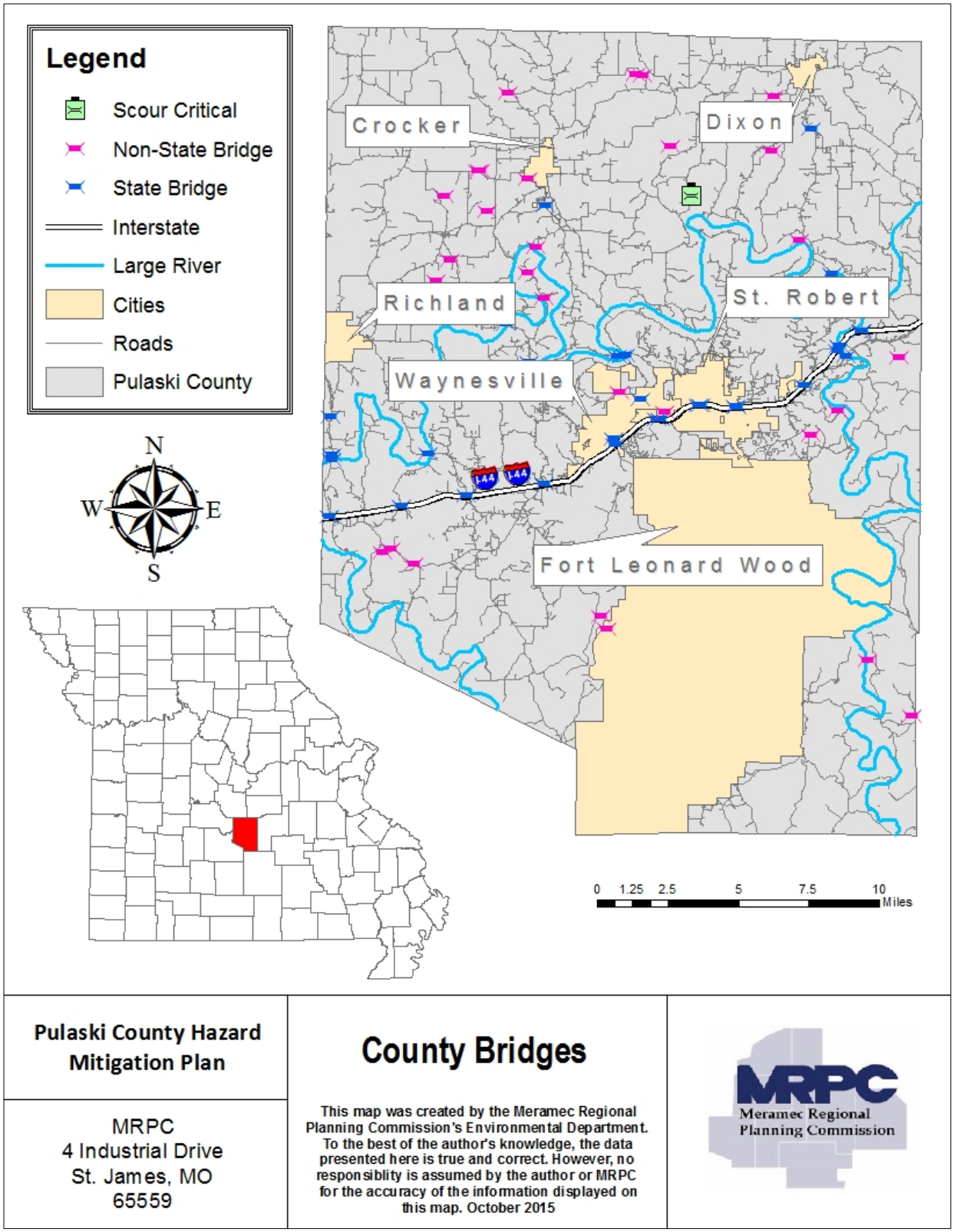
Jurisdiction	Airport Facility	Bus Facility	Childcare Facility	Communications Centers (911)	Electric Power Facility	Emergency Operations	Fire Service	Government Facilities	Housing	Emergency Shelters	Highway Bridge	Hospital/Health Care	Military	Natural Gas Facility	Nursing Homes	Police Station	Public Wells	Rail	Sanitary Pump Stations	School Facilities	Stormwater Pump Stations	Tier II Chemical Facility	Wastewater Facility	Total
Pulaski County	-	-	2	1	-	1	2	3	10,301	-	39	-	-	-	-	1	-	2	-	4	-	-	5	10,361
Crocker	-	-	2	-	-	-	1	2	586	1	-	2	-	-	-	1	2	1	-	2	-	-	1	601
Dixon	-	-	3	-	-	-	1	2	995	3	-	2	-	-	1	1	2	1	-	3	-	-	1	1,015
Richland	2	-	2	1	-	1	1	3	834	5	-	2	-	-	1	1	3	-	-	3	-	-	1	858
St. Robert	-	-	8	-	-	1	1	3	1,468	3	2	1	-	-	1	1	5	-	-	1	-	-	3	1,498
Waynesville	1	-	9	1	-	-		2	1,661	4	2	1	-	-	2	1	6	-	-	4	-	-	2	1,695
Totals	3		26	3	-	3	6	15	15,845	16	43	8	-	-	5	6	18	4	-	17	-	-	13	16,028

Source: FEMA HAZUS.

According to the National Bridge Inventory there are a total of 101 bridges in Pulaski County[2]. **Figure 3.1** shows the locations of State regulated bridges and non-State bridges in the planning area along with scour critical bridges. Scour Critical refers to one of the database elements in the National Bridge Inventory. This element is quantified using a "scour index", which is a number indicating the vulnerability of a bridge to scour during a flood. Bridges with a scour index between 1 and 3 are considered "scour critical", or a bridge with a foundation determined to be unstable for the observed or evaluated scour condition. Nonetheless, there is one bridge (No. 0370002 and Fed ID 13380) within the County that is scour critical. This bridge can be found on Bunker Road at the Middle Creek Intersection. Furthermore, the bridge was constructed in 1982. The bridge has a scour rate of 3, and is classified as a non-state bridge.

[2] http://www.fhwa.dot.gov/bridge/nbi/no10/county.cfm

Figure 3.1. Pulaski County Bridges



Source: ArcGIS Online

3.2.3 Other Assets

Assessing the vulnerability of the planning area to disaster also requires data on the natural, historic, cultural, and economic assets of the area. This information is important for many reasons.

- These types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- Knowing about these resources in advance allows for consideration immediately following a hazard event, which is when the potential for damages is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- The presence of natural resources can reduce the impacts of future natural hazards, such as wetlands and riparian habitats which help absorb floodwaters.
- Losses to economic assets like these (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

Threatened and Endangered Species: **Table 3.10** depicts Federally Threatened, Endangered, Proposed, and Candidate Species in the County.

Table 3.10. Threatened and Endangered Species in Pulaski County

Common Name	Scientific Name	Status
Fish		
Crystal Darter	*Crystallaria asprella*	Endangered (S)
Mammal		
Gray bat	*Myotis grisescens*	Endangered (F) (S)
Indiana bat	*Myotis sodalist*	Endangered (F) (S)
Northern long-eared bat	*Myotis septentrionalis*	Threatened (F)
Plains Spotted Skunk	*Spilogale putorius interrupta*	Endangered (S)
Mollusk		
Scaleshell	*Leptodea leptodon*	Endangered (F)
Spectaclecase	*Cumberlandia monodonta*	Endangered (F)
Plant		
Elephantear	*Elliptio crassidens*	Endangered (S)

Note: S = State, F = Federal
Source: U.S. Fish and Wildlife Service, http://www.fws.gov/midwest/Endangered/lists/missouri-cty.html;
MDC Missouri Natural Heritage Program Search

Natural Resources: The Missouri Department of Conservation (MDC) provides a database of lands owned, leased, or managed for public use. **Table 3.11** provides the names and locations of parks and conservation areas in Pulaski County.

Table 3.11. Parks in Pulaski County

Area Name	Address	City
Dixon Towersite	From Dixon, take Hwy. 133 W. 3 miles	Near Dixon
Fort Leonard Wood (Bloodland Lake)	I-44, take exit 161, then S. on Business 44 to front gate at Ft. Leonard Wood. Obtain map and ask for directions.	Fort Leonard Wood
Fort Leonard Wood Towersite	St. Robert, take the S. outer road of I-44 E. 1 mile.	Fort Leonard Wood
Gasconade Hills CA	Dixon, take Hwy 28 S. 10 miles, then Co. Rd. 28-462 W.	Near Dixon
Mitschele Access	Richland, take Hwy 7 S. about 5 miles	Near Richland
Riddle Bridge Access	St. Robert, take Route Y N. 6 miles	Near St. Robert
Ross Access	Duke, take Route K W. to Western Rd. then Windsor Lane N. 0.5 mile	Near Duke
Roubidoux Creek CA	Waynesville, take Hwy. 17 N. 1 mile	Near Waynesville
Ryden Cave CA	Duke, take Route K W. 1.5 miles	Near Duke
Schlicht Springs Access	Crocker, take Hwy. 133 S.W. for 5 miles, then Resort Road S. (left) 1.25 miles, then Riverside Road E. (left) 1 mile to access	Near Crocker
Waynesville (Laughlin/Roubidoux Parks)	The park is downstream from the Roubidoux Spring near the Hwy. 17 bridge over Roubidoux Creek	Waynesville

Source: http://mdc4.mdc.mo.gov/applications/moatlas/AreaList.aspx?txtUserID=guest&txtAreaNm=s

Table 3.12 provides information pertaining to community owned/operated parks within Pulaski County.

Table 3.12. Community Owned Parks

Park Name	Address	City
Dixon City Park	Hwy. 133	Dixon
Crocker Park	Off Hwy. 17	Crocker
Waynesville Community Park	North Street	Waynesville
Saint Robert Skate Park	J.H. Williamson Drive	St. Robert
George M. Reed Roadside Park	Historic Route 66	St. Robert
Laughlin/Roubidoux Park	205 Historic Route 66	Waynesville
Trail of Tears Memorial	Laughlin Park, Rte. 66 E.	Waynesville

Source: http://visitpulaskicounty.org

Historic Resources: The National Register of Historic Places is the official list of registered cultural resources worthy of preservation. It was authorized under the National Historic Preservation Act of 1966 as part of a national program. The purpose of the program is to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures and objects that are significant in American history, architecture, archeology, engineering, and culture. **Table 3.13** provides information in regards to properties on the National Register of Historic Places in Pulaski County.

Table 3.13. Pulaski County Properties on the National Register of Historic Places

Property	Address	City	Date Listed
Decker Cave Archeological Site	Restricted	Buckhorn	February 12, 1971
Calloway Manes Homestead	NW of Richland	Richland	June 6, 1980
Old Stagecoach Stop	Linn St., Courthouse Sq.	Waynesville	November 24, 1980
Onyx Cave	14705 Private Drive 8541	Newburg	May 21, 1999
Pulaski County Courthouse	Pulaski County Courthouse	Waynesville	July 17, 1979

Source: Missouri Department of Natural Resources – Missouri National Register Listings by County, http://dnr.mo.gov/shpo/mnrlist.htm

Economic Resources: **Table 3.14** provides major non-government employers in the planning area.

Table 3.14. Major Non-Government Employers in Pulaski County

Employer Name	Employees	Phone No. (573)
City of Dixon	30	759-6115
City of St. Robert	86	451-2000
City of Waynesville	44	774-6171
Dept. of Defense Civilian	3,843	-
Piney Ridge	135	-
Wal-Mart	397	-
Waynesville RIV School District	700	-

Source: Meramec Regional Planning Commission Survey, January 2006, http://pulaskicountymo.com/workforce.html

3.3 Future Land Use and Development

Table 3.15 provides population growth statistics for Pulaski County.

Table 3.15. County Population Growth, 2000-2010

Jurisdiction	Total Population 2010	Total population 2000	2000-2010 # Change	2000-2010 % Change
Pulaski County	52,795	41,165	11,630	28.25
Crocker	1,113	1,033	80	7.74
Dixon	1,412	1,570	-158	-10.06
Richland	1,756	1,805	-49	-2.71
St. Robert	4,569	2,760	1,809	65.54
Waynesville	5,017	3,507	1,510	43.06

Source: U.S. Bureau of the Census, Decennial Census; Population Statistics are for entire incorporated areas as reported by the Census bureau

Typically population growth or decline is generally accompanied by increases or decreases in the number of housing units. **Table 3.16** provides the change in numbers of housing units in the planning area from 2000 to 2013.

Table 3.16. Change in Housing Units, 2000-2013

Jurisdiction	Housing Units 2013	Housing Units 2000	2000-2013 # Change	2000-2013 % change
Pulaski County	17,937	15,408	2,529	16.41
Crocker	505	517	-12	-0.23
Dixon	654	751	-97	-12.92
Richland	828	932	-104	-11.16
St. Robert	2,003	1,408	595	42.26
Waynesville	2,092	1,591	501	31.49

Source: U.S. Bureau of the Census, Decennial Census; Population Statistics are for entire incorporated areas as reported by the U.S. Census Bureau, U.S. Census Bureau 2009-2013 5-Year American Community Survey Universe: Housing Units Census 2000 Summary File, 100-percent data

Since the last update of the Pulaski County Hazard Mitigation Plan (2010), jurisdictions reported residential, commercial, and industrial developments. 601 N. Commercial was developed in Crocker, and a Dollar General was built in Dixon. St. Robert had numerous developments including hotels, a Toyota dealership, Taco Bell, Colton's Steak House, Culvers, Café Korea, Liberty Commons Shopping Center, Liberty Park Gated Housing, Brush Creek Subdivision, and Woodridge phase 7. Richland did not report new development within the past 5 years.

New development can impact a jurisdiction's vulnerability to natural hazards. As the number of buildings, critical facilities, and assets increase, vulnerability increases as well. For example, real estate development can increase storm water runoff, which often increases localized flooding. However, some development such as infrastructure improvements can help reduce vulnerability risks. Unfortunately, quantitative data is not available to further examine each jurisdictions new development and its correlation to natural hazard vulnerabilities.

In addition, jurisdictions also reported anticipated future developments within the next 5 years (2015-2020). Dixon anticipates the development of a sewer and water distribution infrastructure. Richland is expected to upgrade its electrical infrastructure and sewer system. St. Robert anticipates development for the City's Fire Department, public works facility, parks & recreation projects, and the Waynesville/St. Robert joint airport project. Lastly, Waynesville anticipates new development at Dyer Street (bridge), Feeder line #4, and at the Industrial Park.

The University of Missouri Extension developed a Social and Economic Profile for Pulaski County. Population trend data suggests that Pulaski County will decline by approximately 6,275 individuals within the next 5 to 15 years[3]. However, Fort Leonard Wood's estimated economic impact to the surrounding area in military spending and job employment is $2 billion annually[4]. Furthermore, business incentives are available in the County including the Enhanced Enterprise Zone Program; which provides tax credits to new or expanding businesses within the Enterprise Zone[5]. **Figure 3.2** depicts a demographic profile for Waynesville, St. Robert, Fort Leonard Wood, and Pulaski County.

[3] UM Extension Social and Economic Profile, http://mcdc2.missouri.edu/cgi-bin/broker?_PROGRAM=websas.cntypage.sas&_SERVICE=appdev&_debug=0&county=29169
[4] http://www.waynesville-strobertchamber.com/forms/demographics2014.pdf
[5] Pulaski County Growth Alliance, http://pulaskicountymo.com/

Figure 3.2. Waynesville/St. Robert/Fort Leonard Wood/Pulaski County, Missouri Demographic Profile

Property Tax Rates

	Rate
City	
Waynesville	0.5370
St. Robert	0.3327
Schools	
R-VI	2.7500
State	
Missouri	0.0300

Property Tax Comparisons

Tax for Select Missouri Locations

Waynesville	$3.741Rural
Waynesville	$4.278 City
St. Robert	$3.741 Rural
St. Robert	$4.0737City
St. Louis	$6.9187 City
Springfield	$4.9454 City

Real Property Tax: Property is appraised at 32% for Commercial 19% for Residential, 12% Agriculture, per $100 of appraised value. A $0.49 surcharge is added to commercial property. Source: Pulaski County Assessor Office

Incentives & Information

For Development Planning

1. Enhanced Enterprise Zone
2. Utilize TIF, TDD, & CID
3. Missouri Works
4. Work Ready Community
5. Airport Development Plan
6. Targeted Industry Study
7. Economic Development Organization

Source: Pulaski County Growth Alliance

Transportation

Waynesville-St. Robert Regional Airport

Commercial Airline Carrier; Cape Air
Flights daily to and from St. Louis, Missouri
Primary Runway: W, 150 ft.; L, 6,038 ft., ILS
General Aviation facilities Available

Highways

Interstate 44
Through Waynesville and St. Robert
Parallel to Historic Rt. 66
State Highways -- 7, 17, 28, 133

Bus Services

Star Shuttle, USA Express, and Greyhound Bus Lines

Railroad

Burlington Northern

Parcel Service

UPS, Fed Ex, DHL, US Postal Service

Top Area Employers

Military	19,135
Federal Civilian Employees	3,200
Government Contractors	2,010
Tourism Industry * MDT Annual Report	2,524
Waynesville R-VI School District	784
Army & Air Force Exchange	431
Wal-Mart	357
Cities of Waynesville and St. Robert	176
Piney Ridge Center	177
Lowe's	130
Ehrhardt Properties	115
Pulaski County	96
Cord Moving & Storage	75

Total Retail Sales

Year	Pulaski County
2013	365,953,501
2012	372,777,876
2011	363,066,578
2010	$363,096,890
2009	$362,657,330

Source: Missouri Department of Revenue

Cost of Living

Community	Cost of Living Index	Median Housing Value (2012)
Pulaski County	101.4	$122,000
State of Illinois	95.5	$190,800
State of Kansas	91.3	$127,400
Kansas City	100.3	$136,100
St. Louis	93.4	$121,700
State of Missouri	93.7	$138,400

Source: MERIC & USA.COM

Education

Waynesville R-VI School District

- ◊ Enrollment 5,930
- ◊ Graduation Rate: 89.49%
  - ⇒Missouri 87%
  - ⇒National 80%
- ◊ Vocational Enrollment: 936

Fort Leonard Wood Area Higher Education

- ♦ Eight Colleges and Universities
- ♦ Offering: Special Certifications, Associates, Bachelor and Master Degrees
- ♦ Combined Enrollment 8,769

Health Care

Source: http://www.waynesville-strobertchamber.com/forms/demographics2014.pdf

3.4 Hazard Profiles, Vulnerability, and Problem Statements

Each hazard that has been determined to be a potential risk to Pulaski County is profiled individually in this section of the plan document. The profile will consist of a general hazard description, location, severity/magnitude/extent, previous events, future probability, a discussion of risk variations between jurisdictions, and how anticipated development could impact risk. At the end of each hazard profile will be a vulnerability assessment, followed by a summary problem statement.

Hazard Profiles

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Each hazard identified in Section **3.1.4** will be profiled individually in this section in alphabetical order. The level of information presented in the profiles will vary by hazard based on the information available. With each update of this plan, new information will be incorporated to provide better evaluation and prioritization of the hazards that affect the planning area. Detailed profiles for each of the identified hazards include information categorized as follows:

Hazard Description: This section consists of a general description of the hazard and the types of impacts it may have on a community or school/special district.

Geographic Location: This section describes the geographic location of the hazard in the planning area. Where available, use maps to indicate the specific locations of the planning area that are vulnerable to the subject hazard. For some hazards, the entire planning area is at risk.

Severity/Magnitude/Extent: This includes information about the severity, magnitude, and extent of a hazard. For some hazards, this is accomplished with description of a value on an established scientific scale or measurement system, such as an EF2 tornado on the Enhanced Fujita Scale. Severity, magnitude, and extent can also include the speed of onset and the duration of hazard events. Describing the severity/magnitude/extent of a hazard is not the same as describing its potential impacts on a community. Severity/magnitude/extent defines the characteristics of the hazard regardless of the people and property it affects.

Previous Occurrences: This section includes available information on historic incidents and their impacts. Historic event records form a solid basis for probability calculations.

Probability of Future Occurrence: The frequency of recorded past events is used to estimate the likelihood of future occurrences. Probability was determined by dividing the number of recorded events by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. For events occurring more than once annually, the probability will be reported 100% in any given year, with a statement of the average number of events annually.

Vulnerability Assessments

Requirement §201.6(c)(2)(ii) :[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement §201.6(c)(2)(ii)(A) :The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.6(c)(2)(ii)(B) :[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Requirement §201.6(c)(2)(ii): (As of October 1, 2008) [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged in floods.

Following the hazard profile for each hazard will be the vulnerability assessment. The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to damages from natural hazards. The vulnerability assessments will be based on the best available county-level data, which is in the Missouri Hazard Mitigation Plan (2013). The county-level assessments in the State Plan were based on the following sources:

- Statewide GIS data sets compiled by state and federal agencies; and
- FEMA's HAZUS-MH loss estimation software.

The vulnerability assessments in the Pulaski County plan will also be based on:

- Written descriptions of assets and risks provided by participating jurisdictions;
- Existing plans and reports;
- Personal interviews with planning committee members and other stakeholders; and
- Other sources as cited.

Within the Vulnerability Assessment, the following sub-headings will be addressed:

Vulnerability Overview: This section will include a brief review of the vulnerability of each hazard.

Potential Losses to Existing Development: (including types and numbers, of buildings, critical facilities, etc.)

Future Development: This section will include information on anticipated future development in the county, and how that would impact hazard risk in the planning area.

Hazard Summary by Jurisdiction: For hazard risks that vary by jurisdiction, this section will provide an overview of the variation and the factual basis for that variation.

Problem Statements

Each hazard analysis will conclude with a brief summary of the problems created by the hazard in the planning area, and possible ways to resolve those problems. Additionally, variations in risk between geographic areas will be included.

3.4.1 Dam Failure

Some specific sources for this hazard are:

- Missouri Department of Natural Resources, Dam and Reservoir Safety, http://dnr.mo.gov/env/wrc/dam-safety/statemap.htm
- Stanford University's National Performance of Dams Program; http://npdp.stanford.edu/index.html
- National Inventory of Dams, http://geo.usace.army.mil/
- MO DNR Dam & Reservoir Safety Program;
- National Resources Conservation Service http://www.nrcs.usda.gov
- DamSafetyAction.org, http://www.damsafetyaction.org/MO/

Hazard Profile

Hazard Description

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, affecting both life and property. Dam failure can be caused by any of the following:

1. Overtopping - inadequate spillway design, debris blockage of spillways or settlement of the dam crest.
2. Piping: internal erosion caused by embankment leakage, foundation leakage and deterioration of pertinent structures appended to the dam.
3. Erosion: inadequate spillway capacity causing overtopping of the dam, flow erosion, and inadequate slope protection.
4. Structural Failure: caused by an earthquake, slope instability or faulty construction.

Information in regard to dam classification systems under both the Missouri Department of Natural Resources (MDNR) and the National Inventory of Dams (NID), which differ, are provided in **Table 3.17** and **Table 3.18**, respectively.

Table 3.17. MDNR Dam Hazard Classification Definitions

Hazard Class	Definitions
Class I	Contains 10 or more permanent dwellings or any public building
Class II	Contains 1 to 9 permanent dwellings or 1 or more campgrounds with permanent water, sewer, and electrical services or 1 or more industrial buildings
Class III	Everything else

Source: Missouri Department of Natural Resources, http://dnr.mo.gov/env/wrc/docs/rules_reg_94.pdf

Table 3.18. NID Dam Hazard Classification Definitions

Hazard Class	Definition
Low Hazard	A dam located in an area where failure could damage only farm or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low volume roads that meet the requirements for low hazard dams.
Significant Hazard	A dam located in an area where failure could endanger a few lives, damage an isolated home, damage traffic on moderate volume roads that meet certain requirements, damage low-volume railroad tracks, interrupt the use or service of a utility serving a small number of customers, or inundate recreation facilities, including campground areas intermittently used for sleeping and serving a relatively small number of persons.
High Hazard	A dam located in an area where failure could result in any of the following: extensive loss of life, damage to more than one home, damage to industrial or commercial facilities, interruption of a public utility serving a large number of customers, damage to traffic on high-volume roads that meet the requirements for hazard class C dams or a high-volume railroad line, inundation of a frequently used recreation facility serving a relatively large number of persons, or two or more individual hazards described for significant hazard dams.

Source: National Inventory of Dams

Geographic Location

Dams in Planning Area

According to the Missouri Department of Natural Resources, there are 15 dams located in Pulaski County. Each dam within the County is considered as a low hazard dam (**Table 3.19**). None of the dams are owned and operated by the United States Army Corps of Engineers (USACE). Some are privately owned while others are publicly owned, such as the Penn's Pond Dam located on Fort Leonard Wood. **Table 3.20** provides the names, locations, and other pertinent information for all dams in the planning area. There are three dams 20 feet or less in height; one dam 22 feet or less in height; one 24 feet or less in height; six that are 25 feet or less in height; one dam 27 feet or less in height; one dam 30 feet or less in height; one dam 34 feet or less in height and one dam, Roberts Dam, that is 90 feet or less in height.

The majority of these lakes are small farm lakes and not a serious threat. The Missouri State Hazard Mitigation Plan states that all of the dams located in Pulaski County are low hazard dams. No dams are located within the city limits of any of the communities, or close to any critical facilities.

Table 3.19. Pulaski County Dams Hazard Risk

Name of Dam	Hazard Risk
Alexander Farms Dam	Low
Armistead Dam	Low
Bloodland Quad No. 1 Dam	Low
Bloodland Quad No. 2 Dam	Low
Bloodland Quad No. 3 Dam	Low
Bloodland Quad No. 4 Dam	Low
Cardin Lake Dam	Low
Mononame No. 138	Low
Mononame No. 834	Low
Mononame No. 835	Low
Penn's Pond Dam	Low
Roberts Dam	Low
Schultz Lake Dam	Low
WE Wilton Dam	Low
Wooldridge Lake Dam	Low

Source: Missouri Department of Natural Resources, Water Resources Program

Table 3.20. Descriptions of Dams in Pulaski County

Dam Name	Dam Height (Ft)	Normal Storage (Acre-Ft)	Last Inspection Date	River	Nearest Downstream City	Distance To Nearest City (Miles)	Dam Owner
Alexander Farms Dam	20	9	-	TR-TAVERN CREEK	N/A	4	Alexander Farms
Armistead Dam	25	4	-	TR-Duck Creek	N/A	1	Dr. Wayne Armistead
Bloodland Quad No.1 Dam	25	6	-	-	N/A	8	Fort Leonard Wood
Bloodland Quad No.2 Dam	25	3	-	TRIB-Roubidoux Creek	N/A	7	DOD USA
Bloodland Quad No.3 Dam	25	45	-	TRIB-ROUBIDOUX	N/A	7	DOD USA
Bloodland Quad No.4 Dam	25	133	-		N/A	8.5	Fort Leonard Wood
Cardin Lake Dam	20	12	-	TR-GASCONADE RIVER	N/A	3	James & Doral Cardin
Mononame 138	20	4	-	-	N/A	1	-
Mononame 834 (Federal)	30	5	-	-	N/A	6	-
Mononame 835 (Federal)	27	12	-	-	N/A	7	-
Penn's Pond Dam (Federal)	24	8	6/9/2010	ROUBIDOUX-HURD HOLLOW TR	N/A	9	Fort Leonard Wood
Roberts Dam	90	3	11/1/2005	-	N/A	1	-

Dam Name	Dam Height (Ft)	Normal Storage (Acre-Ft)	Last Inspection Date	River	Nearest Downstream City	Distance To Nearest City (Miles)	Dam Owner
Schultz Lake Dam	34	3	-	TR-GASCONADE	N/A	4	Paul Schultz
W E Wilton Dam	22	2	-	-	N/A	5	-
Wooldridge Lake Dam	25	4	-	TR-TAVERN CREEK	N/A	2.5	Merle Wooldridge

Sources: Missouri Department of Natural Resources, http://dnr.mo.gov/env/wrc/dam-safety/statemap.htm and National Inventory of Dams, http://nid.usace.army.mil/cm_apex/f?p=838:12. By the end of 2015, the Missouri DNR anticipates having Emergency Action Plans, including inundation maps for all state-regulated Class 1 and Class 2 dams.

Figure 3.3 provides the locations of NID high hazard dams located in the planning area. If a dam failure were to occur in Pulaski County, the severity would likely be limited since very few, if any people or critical facilities would be affected by the failure of one of the county's dams. None of the dams are located within an incorporated area and no critical facilities are located in the path of a possible dam failure.

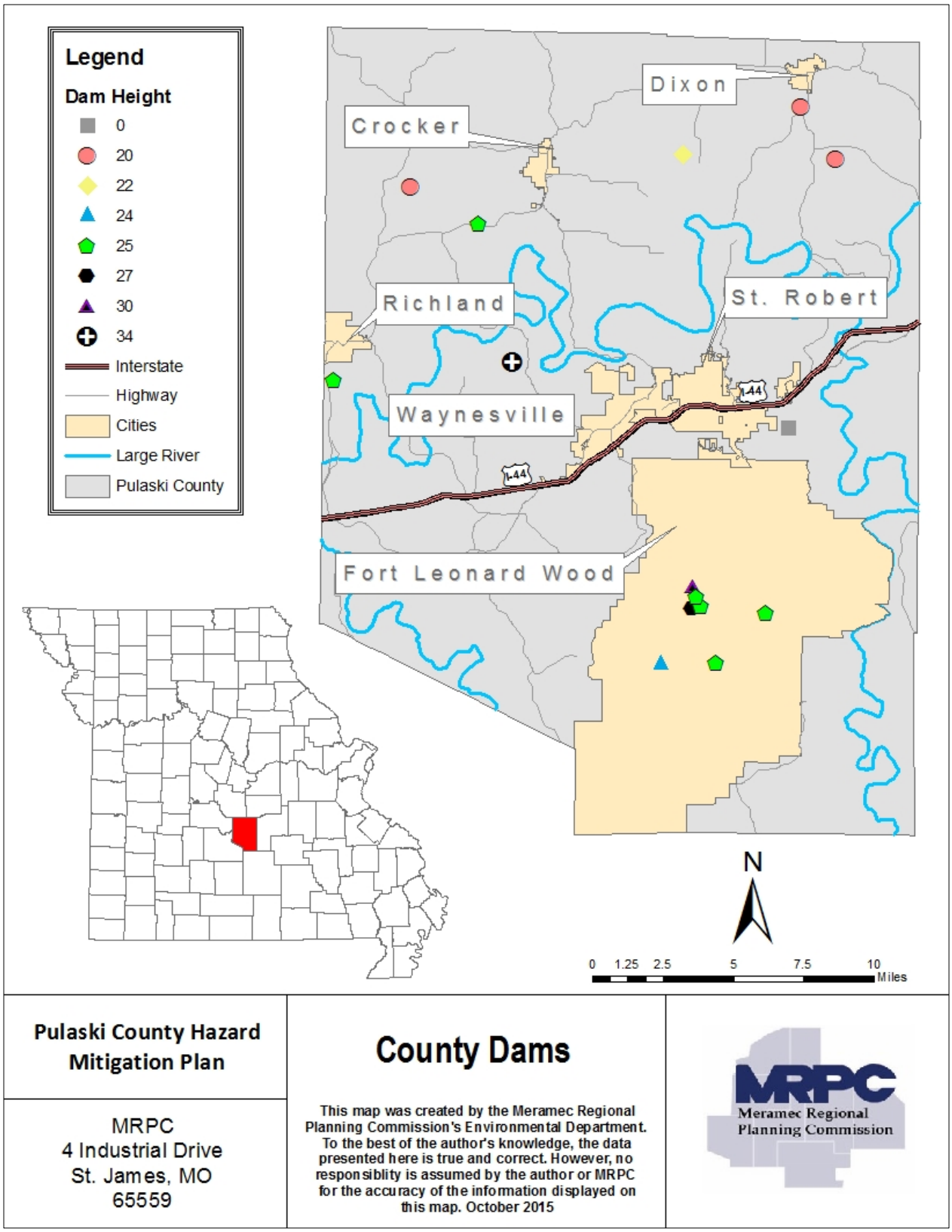
Upstream Dams Outside the Planning Area

From the data available there are no upstream dams outside of the planning area that would impact Pulaski County in the event of failure.

Severity/Magnitude/Extent

The severity/magnitude of dam failure would be similar in some cases to the impacts associated with flood events (see the flood hazard vulnerability analysis and discussion). Based on the hazard class definitions, failure of any of the High Hazard/Class I dams could result in a serious threat of loss of human life, serious damage to residential, industrial or commercial areas, public utilities, public buildings, or major transportation facilities. Catastrophic failure of any high hazard dams has the potential to result in greater destruction due to the potential speed of onset and greater depth, extent, and velocity of flooding. For this reason, dam failures could flood areas outside of mapped flood hazards. However, review of the flow of water, should a breach occur, indicated that damage would be limited mainly to the dam owner's properties. Based on the locations, and probable flow of water should a breach occur, dams located in Pulaski County pose little or no risk to all jurisdictions.

Figure 3.3. High Hazard Dam Locations Pulaski County and Areas Impacted in the Event of a Breach.



Source: MSDIS

Previous Occurrences

There have been at least 27 recorded dam failures in 20 Missouri counties in the last 100 years. Fortunately, only one drowning has been associated with a dam failure in the state[6]. The problem of unsafe dams in Missouri was underscored by dam failures at Lawrenceton in 1968, Washington County in 1975, Fredricktown in 1977, and a near failure in Franklin County in 1979. A severe rainstorm and flash flooding in October 1998 compromised about a dozen small, unregulated dams in the Kansas City area. But perhaps the most spectacular and widely publicized dam failure in recent years was the failure of the Taum Sauk Hydroelectric Power Plant Reservoir atop Profitt Mountain in Reynolds County, Mo.

In the early morning hours of December 14, 2005, a combination of human and mechanical error in the pump station resulted in the reservoir being overfilled. The manmade dam around the reservoir failed and dumped over a billion gallons of water down the side of Profitt Mountain, into and through Johnson's Shut-Ins State Park and into the East Fork of the Black River. The massive wall of water scoured a channel down the side of the mountain that was over 600 feet wide and 7,000 feet long that carried a mix of trees, rebar, concrete, boulders and sand downhill and into the park[7]. The deluge destroyed Johnson's Shut-Ins State Park facilities—including the campground—and deposited sediment, boulders and debris into the park. The flood of debris diverted the East Fork of the Black River into an older channel and turned the river chocolate brown. Fortunately the breach occurred in mid-winter. Five people were injured when the park superintendent's home was swept away by the flood, but all were rescued and eventually recovered. Had it been summer, and the campground filled with park visitors, the death toll could have been very high[8]. This catastrophe has focused the public's attention on the dangers of dam failures and the need to adequately monitor dams to protect the vulnerable.

Despite the significance of the immediate damage done by the Taum Sauk Reservoir dam failure, the incident also highlights the long-term environmental and economic impacts of an event of this magnitude. Four years later, the toll of the flooding and sediment on aquatic life in the park and Black River is still being investigated. Even after the removal of thousands of dump truck loads of debris and mud, the river is still being affected by several feet of sediment left in the park. The local economy, heavily reliant upon the tourism from the park and Black River, has also been hit hard[9].

Overall, many of Missouri's smaller dams are becoming a greater hazard as they continue to age and deteriorate. While hundreds of them need to be rehabilitated, lack of available funding and often questions of ownership loom as obstacles difficult to overcome[10].

Probability of Future Occurrence

Calculation in regards to probability of dam failure is not possible at this time due to lack of data.

[6] United States Geological Survey Fact Sheet 131-02. October 2002
[7] United States Geological Survey. Damage Evaluation of the Taum Sauk Reservoir Failure using LiDAR. http://mcgsc.usgs.gov/publications/t_sauk_failure.pdf
[8] The Alert. Spring 2006. After the Deluge…What's Ahead for Taum Sauk? By Dan Sherburne.
[9] The Alert. Spring 2006. After the Deluge…What's Ahead for Taum Sauk? By Dan Sherburne.
[10] United States Geological Survey Fact Sheet 131-02. October 2002

Vulnerability

Vulnerability Overview

Data was obtained from the 2013 Missouri State Hazard Mitigation Plan for the vulnerability analysis of dam failure for Pulaski County. All dams located within the County are described as low hazard dams. There are also data limitations in regards to dams unregulated by the State of Missouri due to height requirements. These limitations hinder vulnerability analysis. Furthermore, there are currently no inundation area maps available for the County. **Table 3.21** provides vulnerability analysis data for the failure of state-regulated dams in Missouri.

Table 3.21. Vulnerability Analysis for Failure of State-regulated Dams in Missouri

County	Class 1	Class 2	Class 3	Total	Estimated # of Buildings Vulnerable	Average Exposure Value per Structure ($)	Estimated Total Potential Building Exposure ($)	Estimated Total Population Exposure	Estimated Building Losses ($)
Pulaski	0	0	0	0	0	120,886	0	0	0

Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development: (including types and numbers, of buildings, critical facilities, etc.)

Due to the locations of dams in Pulaski County, a dam failure would have little to no impact on the existing development of the County. Families living near the dam may experience washed out roadways, or property damage. There are no dams in Pulaski County that are economically significant enough to have an adverse economic impact on jurisdictions.

Impact of Future Development

Anticipated future development in the County is not foreseeable to impact the amount of damages caused by a dam failure. Since the planning area is rural in nature, and most dams are privately owned, little to no development is expected.

Hazard Summary by Jurisdiction

There are no variations in vulnerability across the planning area.

Problem Statement

In summary, the hazard risk for dam failure in Pulaski County is very low. If a dam does fail, the expected impacts are miniscule, and would be restricted to properties of private land owners. It is recommended to encourage land use management practices to decrease the potential for damage from a dam collapse, including the discouragement of development in areas with the potential for sustaining damage from a dam failure. Install public education programs to inform the public of dam safety measures and preparedness activities. Offer training programs for dam owners to encourage them to inspect their dams and so that they may learn how to develop and exercise emergency action plans.

3.4.2 Drought

Some specific sources for this hazard are:

- Maps of effects of drought, National Drought Mitigation Center (NDMC) located at the University of Nebraska in Lincoln; http://www.drought.unl.edu/.
- Historical drought impacts, National Drought Mitigation Center (NDMC) located at the University of Nebraska in Lincoln; at http://droughtreporter.unl.edu/ .
- Recorded low precipitation, NOAA Regional Climate Center, (http://www.hprcc.unl.edu).
- Water shortages, Missouri's Drought Response Plan, Missouri Department of Natural Resources, http://dnr.mo.gov/pubs/WR69.pdf
- Populations served by groundwater by county, USGS-NWIS, http://maps.waterdata.usgs.gov/mapper/index.html
- Census of Agriculture, http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Missouri/ and http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Missouri/
- USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm
- Natural Resources Defense Council, http://www.nrdc.org/globalWarming/watersustainability/

Hazard Profile

Hazard Description

Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. A drought period can last for months, years, or even decades. There are four types of drought conditions relevant to Missouri, according to the 2013 Missouri State Hazard Mitigation Plan, which are as follows.

- Meteorological drought is defined in terms of the basis of the degree of dryness (in comparison to some "normal" or average amount) and the duration of the dry period. A meteorological drought must be considered as region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.

- Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (e.g., streamflow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts also are out of phase with impacts in other economic sectors.

- Agricultural drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.

- Socioeconomic drought refers to when physical water shortage begins to affect people[11]

Geographic Location

All areas and jurisdictions in Pulaski County are susceptible to drought, but particularly cities where thousands of residents are served by the same source of water. These cities use deep hard rock wells that are 1,100 to 1,800 feet deep and can experience drought when recharge of these wells is low. However, rural residences with individual wells will likely also be affected. Approximately 31.9% of the surface land in the County is utilized for agricultural purposes. Furthermore, livestock sales comprise 84% of the market of agricultural products sold in Pulaski County. A drought would directly impact livestock production and the agriculture economy in Pulaski County.

Severity/Magnitude/Extent

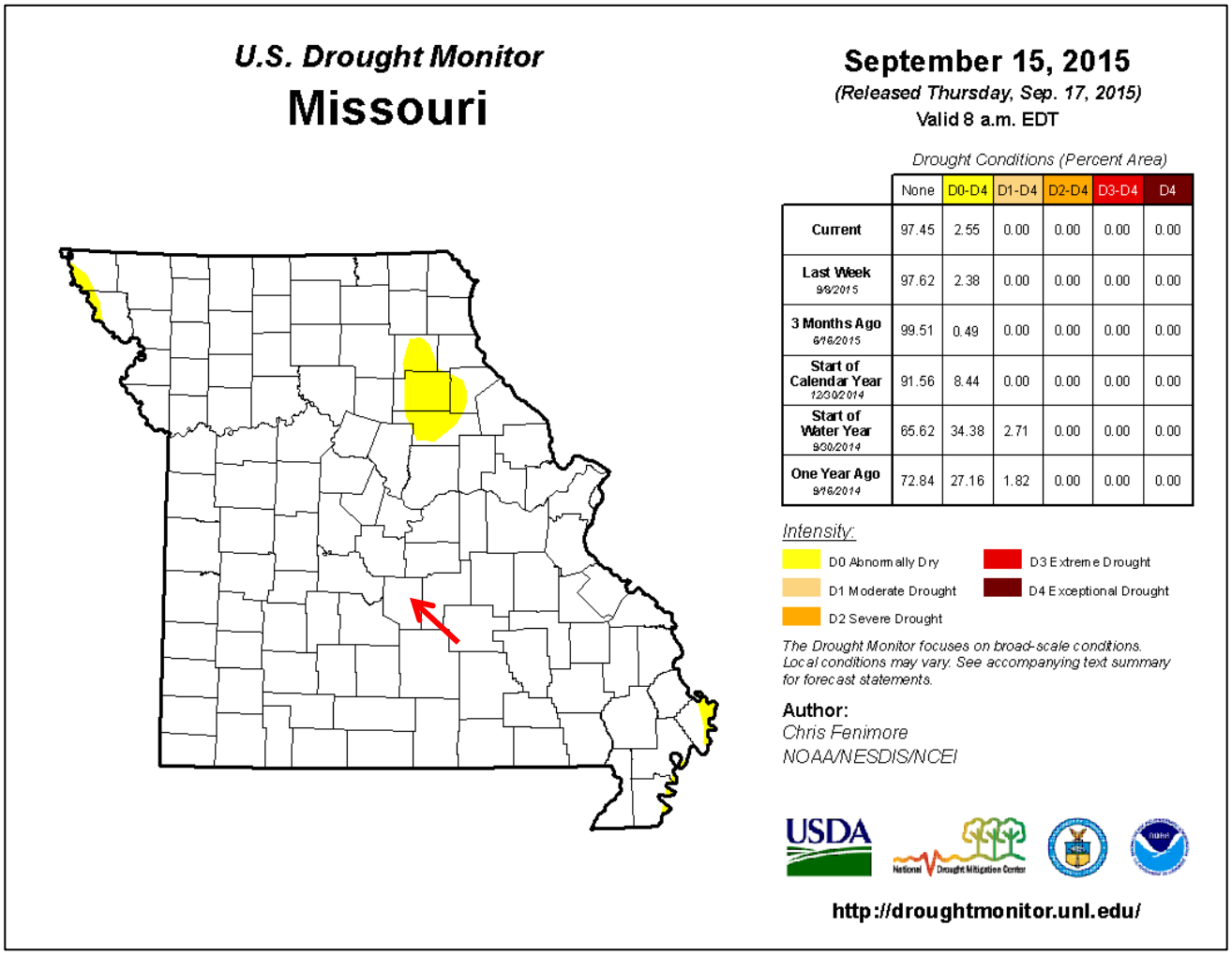
The National Drought Monitor Center at the University of Nebraska at Lincoln summarized the potential severity of drought as follows. Drought can create economic impacts on agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface water supplies. In addition to losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and disease to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn place both human and wildlife populations at higher levels of risk. Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Finally, while drought is rarely a direct cause of death, the associated heat, dust and stress can all contribute to increased mortality[12].

Figure 3.4 depicts a U.S. Drought Monitor map of Missouri on September 15, 2015. This map illustrates the planning area, which could be in drought at any given moment in time. A red arrow indicates the location of the planning area (Pulaski County).

[11] http://www.drought.unl.edu/ http://droughtreporter.unl.edu/

[12] Ibid

Figure 3.4. U.S. Drought Monitor Map of Missouri on September 15, 2015



Source: U.S. Drought Monitor, http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?MO

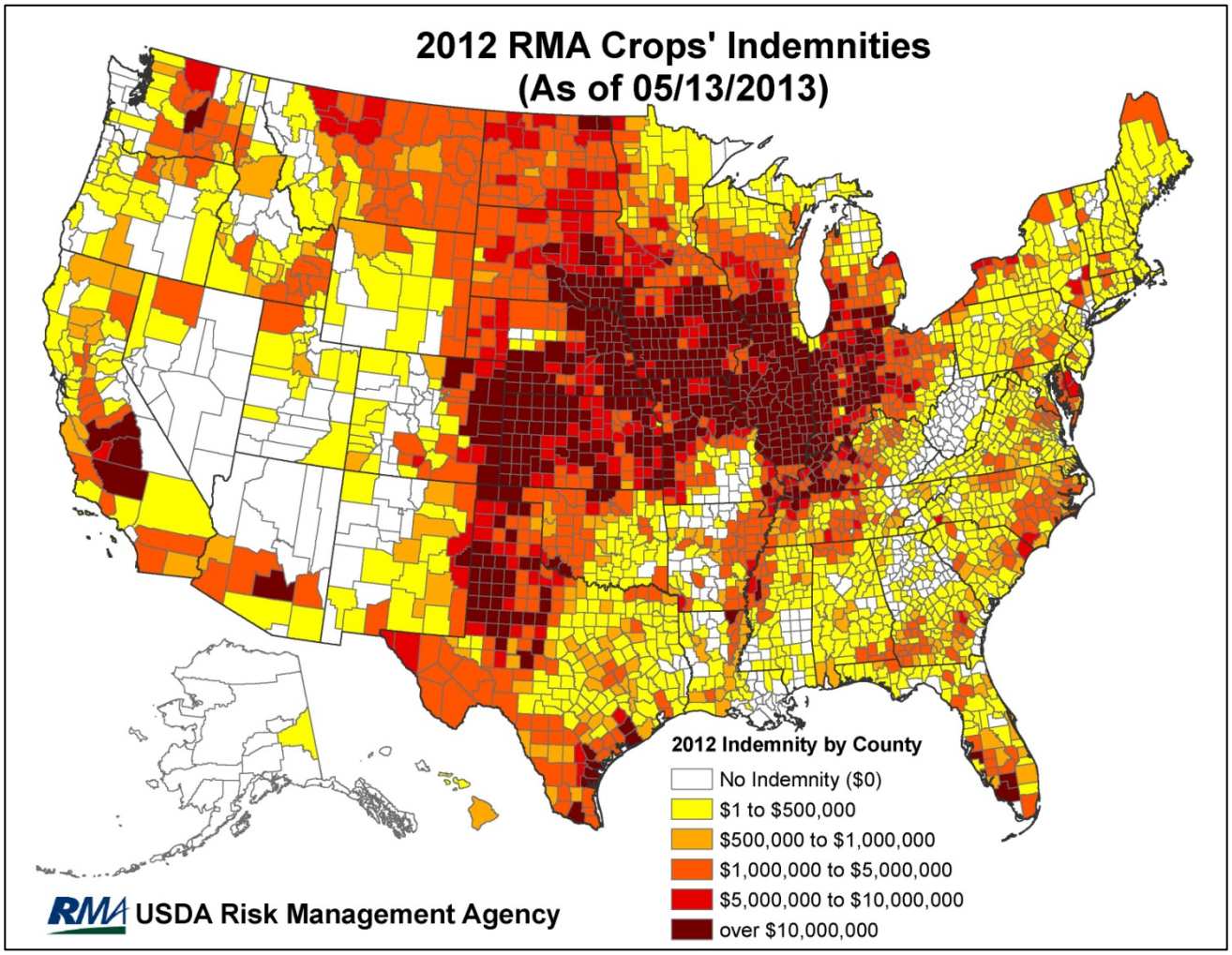
Table 3.22 details crop losses between 1998 and 2012 for Pulaski County. Additionally, **Figure 3.5** illustrates RMA crop indemnities for 2012 across the United States. Pulaski County fell in the range of $1 to $500,000 in crop indemnities.

Table 3.22. Pulaski County Crop Losses 1998 – 2012 (USDA Risk Management Agency)

Total Crop Insurance Paid for Drought Damage 1998-2012	Crop Claims Ratio Rating	Annualized Crop Insurance Claims/Drought Damage	Crop Exposure (2007 Census of Agriculture)	Annual Crop Claims Ration	Crop Loss Ratio Rating
$140,664	1	$9,378	$948,000	0.99%	1

Source: 2013 Missouri State Hazard Mitigation Plan, USDA Risk Management Agency and USDA crop exposure

Figure 3.5. 2012 RMA Crop Indemnities for the United States



Source: http://www.rma.usda.gov/data/indemnity/2012/

Table 3.23 provides data pertaining to crop insurance payments between 1995 and 2014 for Pulaski County. Only in 1999 and 2012 were insurance payments made to crop owners within the County.

Table 3.23. Pulaski County Crop Insurance Payments, 1995 - 2014

Year	Crop Name	Cause of Loss	Indemnity Amount
1999	All other crops	Drought	1,222
2012	All other crops	Drought	73,550

Source: http://www.rma.usda.gov/data/cause.html

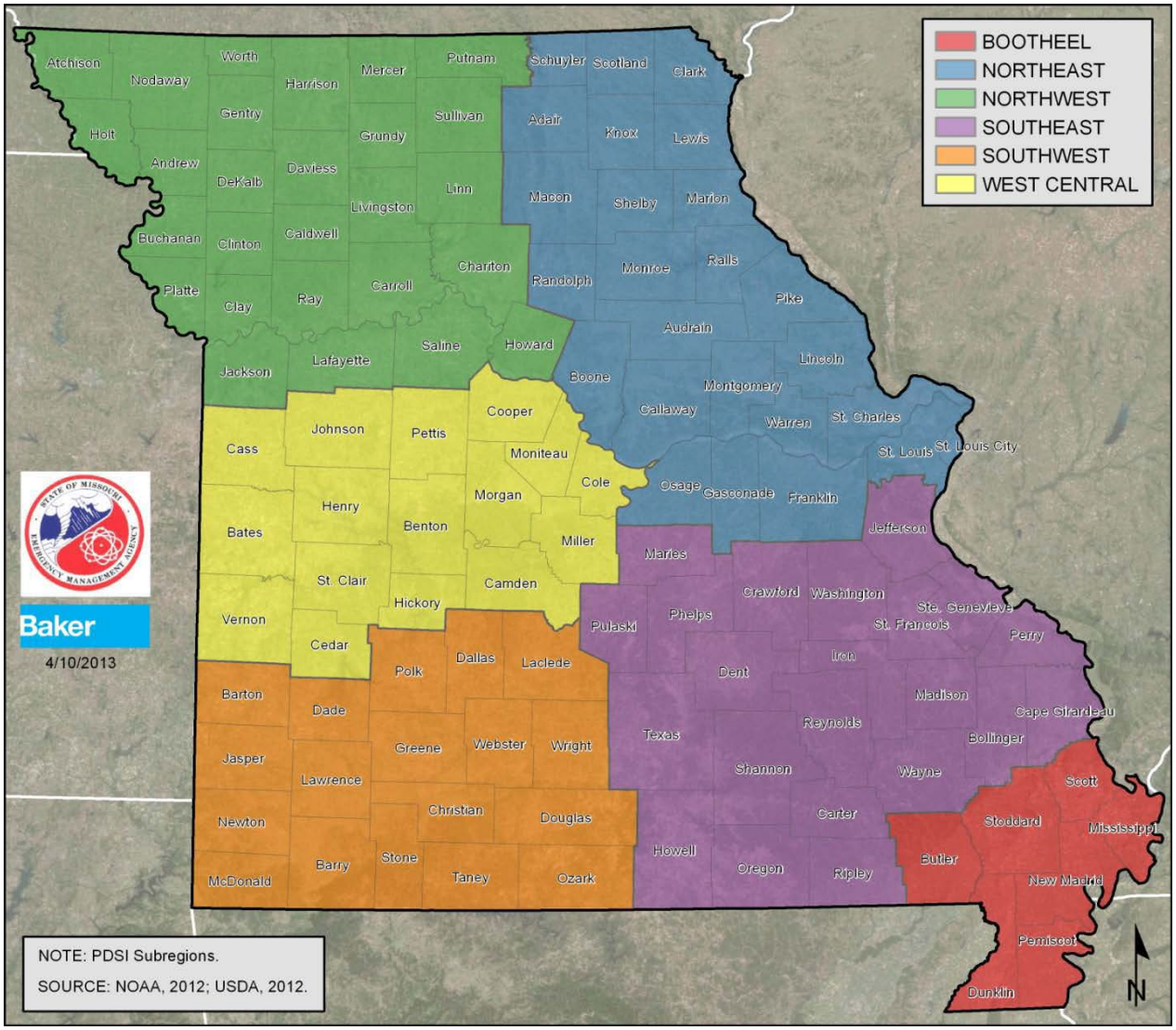
The Palmer Drought Indices measure dryness based on recent precipitation and temperature. The indices are based on a "supply-and-demand model" of soil moisture. Calculation of supply is relatively straightforward, using temperature and the amount of moisture in the soil. However demand is more complicated as it depends on a variety of factors, such as evapotranspiration and recharge rates. These rates are harder to calculate. Palmer tried to overcome these difficulties by developing an algorithm that approximated these rates, and based the algorithm on the most readily available data — precipitation and temperature.

The Palmer Index has proven most effective in identifying long-term drought of more than several months. However, the Palmer Index has been less effective in determining conditions over a matter of weeks. It uses a "0" as normal, and drought is shown in terms of negative numbers; for example, negative 2 is moderate drought, negative 3 is severe drought, and negative 4 is extreme drought. Palmer's algorithm also is used to describe wet spells, using corresponding positive numbers.

Palmer also developed a formula for standardizing drought calculations for each individual location based on the variability of precipitation and temperature at that location. The Palmer index can therefore be applied to any site for which sufficient precipitation and temperature data is available.

Figure 3.6 illustrates the Palmer Drought Severity Index sub-regions of Missouri. Pulaski County is categorized under the Southeast sub-region.

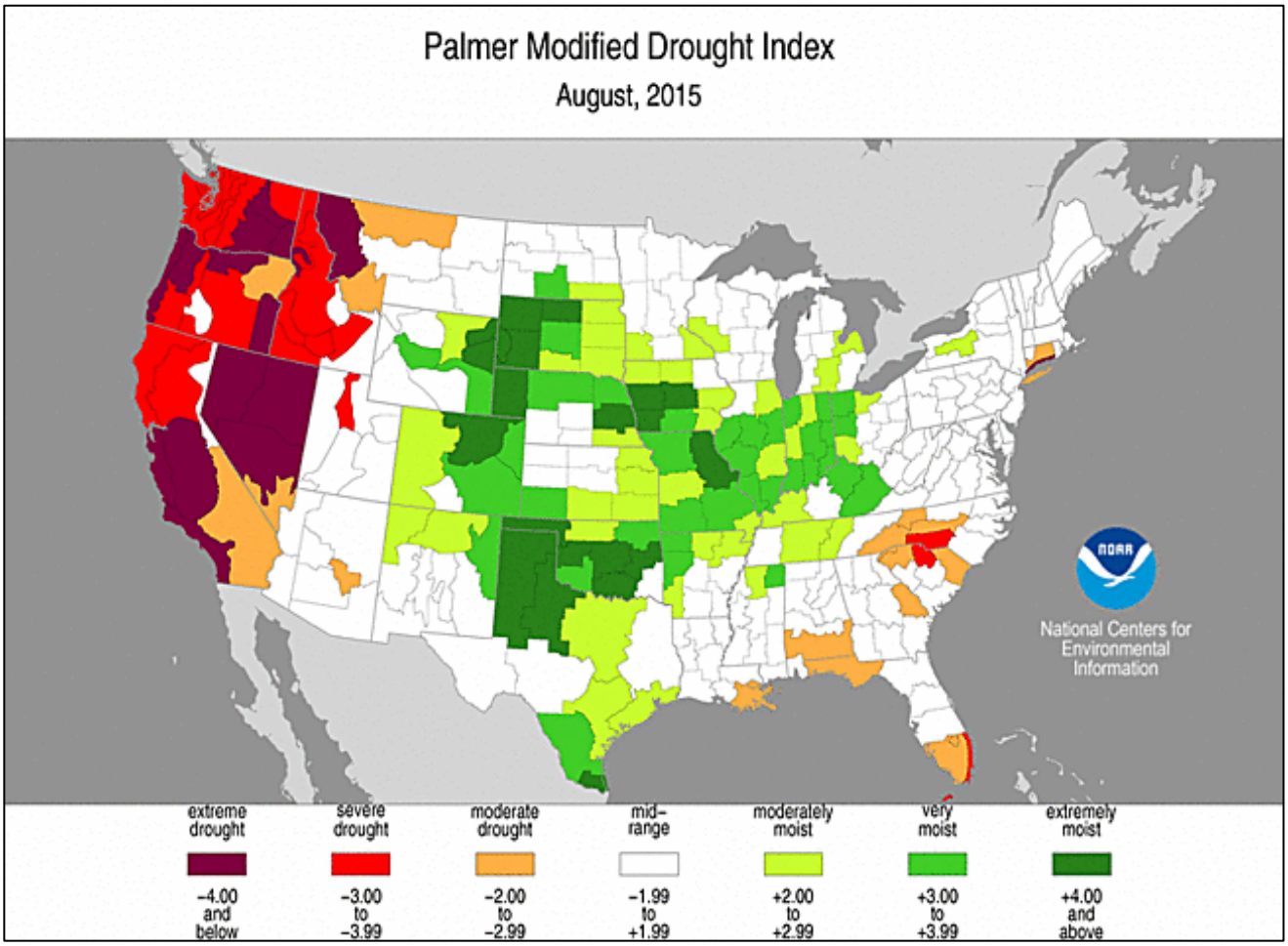
Figure 3.6. Palmer Drought Severity Index: Missouri Sub-regions



Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.7 is an example of the Palmer Modified Drought Index for the United States on August, 2015.

Figure 3.7. Palmer Modified Drought Index National Map August, 2015



Source: U.S. Drought Portal, www.drought.gov

Each of the participating communities within Pulaski County utilizes well water as the primary source of water. These communities could experience hardship in the event of a long term drought. Data was obtained from the Missouri Department of Natural Resources (2015 Census of Missouri Public Water Systems). **Table 3.24** provides information in regards to the percent of source that is groundwater for each jurisdiction in the County.

Table 3.24. **2015 Pulaski County City Water Systems**

Jurisdiction	% of source that is groundwater
Crocker	100
Dixon	100
Richland	100
St. Robert	100
Waynesville	100

Source: Missouri Dept. of Natural Resources, 2015 Census of Missouri Public Water Systems

Previous Occurrences

Table 3.25 offers Palmer Z Index short-term data for Pulaski County between 2010 and 2015. This information exemplifies drought conditions on a monthly basis for each sub-region within the United States.

Table 3.25. Palmer Z Index Short-Term Conditions for Pulaski County, MO 2010 – 2015

	Year					
Month	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
January	x	Moderate Drought	x	Moderately Moist	Mid-region	Mid-range
February	Mid-range	Moderately Moist	Mid-range	Moderately Moist	Moderate Drought	Mid-range
March	Mid-range	Mid-range	Mid-range	Mid-range	Moderate Drought	Moderately Moist
April	Severe Drought	Extremely Moist	Moderate Drought	Moderately Moist	Moderately Moist	Mid-range
May	Mid-range	Very Moist	Moderate Drought	Mid-range	Mid-range	Moderately Moist
June	Severe Drought	Mid-range	Extreme Drought	Mid-range	Moderately Moist	Moderately Moist
July	Moderately Moist	Moderate Drought	Severe Drought	Mid-range	Mid-range	Extremely Moist
August	Severe Drought	Mid-range	Moderate Drought	Very Moist	Mid-range	Moderately Moist
September	Moderately Moist	Mid-range	Severe Drought	Mid-range	Mid-range	x
October	Severe Drought	Moderate Drought	Moderately Moist	Mid-range	Moderately Moist	x
November	Mid-range	Moderately Moist	Mid-range	Mid-range	Mid-range	x
December	Severe Drought	Moderately Moist	Moderate Drought	Moderately Moist	Mid-range	x

Source: www.ncdc.noaa.gov/sotc/drought/201301

Probability of Future Occurrence

To calculate the probability of future occurrence of drought in Pulaski County, historical climate data was analyzed. There were 46 months of recorded drought over a 20 year span (September, 1994 to August, 2015). The number of months in drought (46) was divided by the total number of months (240) and multiplied by 100 for the annual average percentage probability of drought. Although drought is not predictable, long-range outlooks and predicted impacts of climate change could indicate an increased chance of drought.

Table 3.26. Annual Average Percentage Probability of Drought in Pulaski County, MO

Location	Annual Avg. % P of Drought
Pulaski County	19.17%

Source: NOAA National Centers for Environmental Information, Historical Palmer Drought Indices
*P = probability; see page 3.24 for definition.

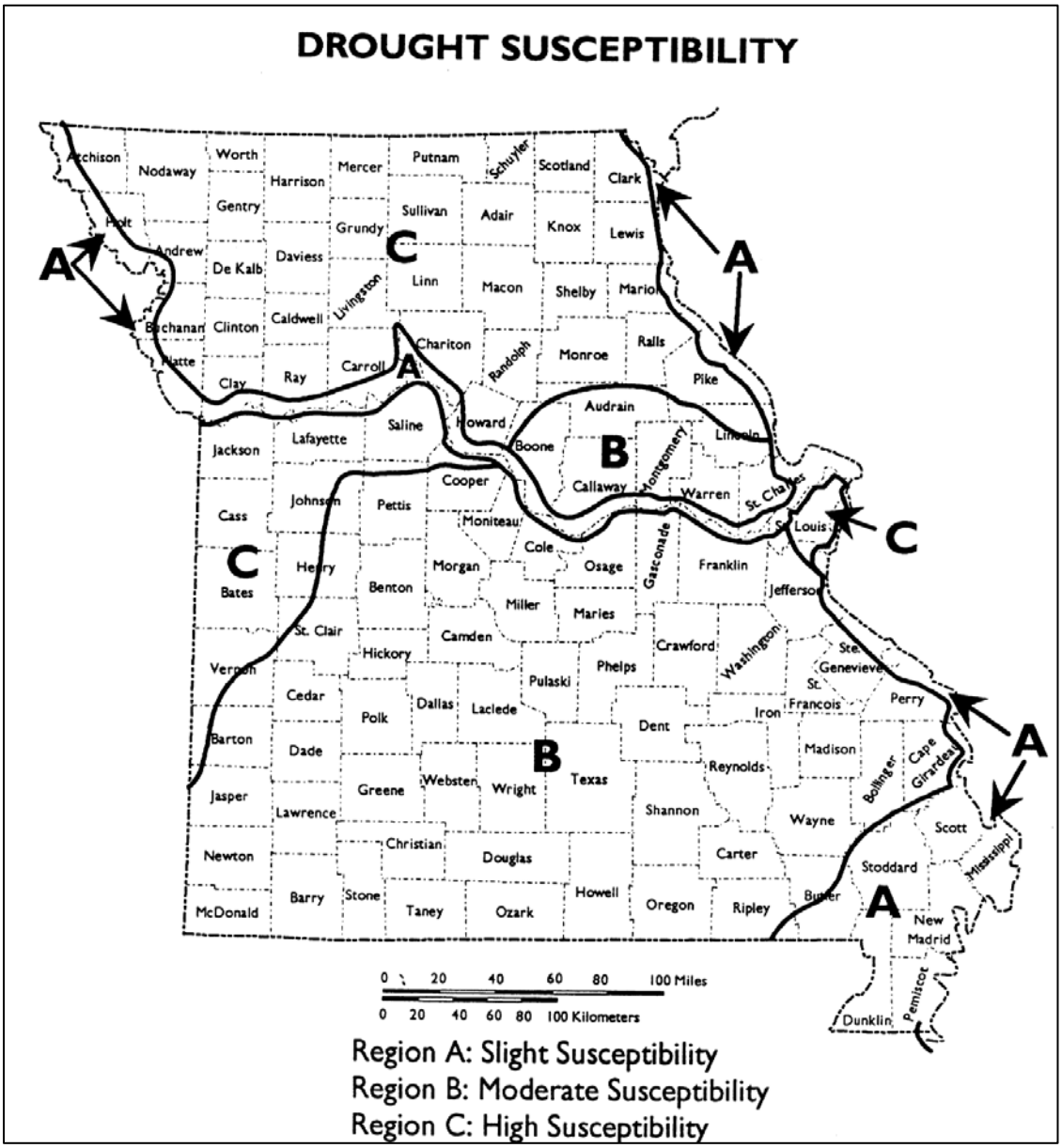
Vulnerability

Vulnerability Overview

Data was obtained from the 2013 Missouri State Hazard Mitigation Plan for the drought vulnerability analysis. **Table 3.27** depicts the ranges for drought vulnerability factor ratings created by SEMA. The array ranges between 1 (low) and 5 (high). The factors considered include crop loss ratio rating and annualized crop claims paid. These two factors were utilized as agricultural losses data is readily available; thus making them the best factors to determine drought vulnerability throughout the State. Pulaski County is determined as having a low vulnerability to crop loss (**Table 3.28**) as a result of a drought. Additionally, SEMA has divided the State into 3 regions in regards to drought susceptibility (**Figure 3.8**). Pulaski County is included in Region B (Moderate Susceptibility). Region B is described as having groundwater sources that are suitable in meeting domestic and municipal water needs, but due to required well depths, irrigation wells are very expensive. Also, the topography is commonly unsuitable for row-crop irrigation[13].

[13] 2013 Missouri State Hazard Mitigation Plan

Figure 3.8. Drought Susceptibility in Missouri



Source: 2013 Missouri State Hazard Mitigation Plan

Table 3.27. Ranges for Drought Vulnerability Factor Ratings

Factors Considered	Low (1)	Medium-low (2)	Medium (3)	Medium-high (4)	High (5)
Crop Loss Ratio Rating	0 – 2%	2 – 4%	4 – 6%	6 – 8%	>8%
Annualized Claims Paid	<$500,000	$500,000-$1.5 M	$1.5M-$2.5 M	$2.5 M-$3.5 M	>$3.5 M

Source: 2013 Missouri State Hazard Mitigation Plan

Table 3.28. Vulnerability of Pulaski County to Drought

County	Total Crop Insurance Paid for Drought Damage 1998 - 2012	Crop Claims Ratio Rating	Annualized Crop Insurance Claims/Drought Damage	Crop Exposure (2007 Census of Agriculture)	Annual Crop Claims Ratio	Crop Loss Ratio Rating
Pulaski	$140,664	1	$9,378	$948,000	0.99%	1

Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

Drought is not limited to a hazard that affects just agriculture, but can extend to encompass the nation's whole economy. Its impact can adversely affect a small town's water supply, the corner grocery store, commodity markets, or tourism. Additionally, extreme droughts have the ability to damage roads, water mains, and building foundations. Some areas of the state, predominately consisting of clay soils, can experience the expansion and contraction of soil which can impact structural movement, settlement, and breaks. On average, drought costs the U.S. economy about $7 billion to $9 billion a year, according to the National Drought Mitigation Center. Moreover, drought prone regions are also prone to increased fire hazards[14].

Impact of Future Development

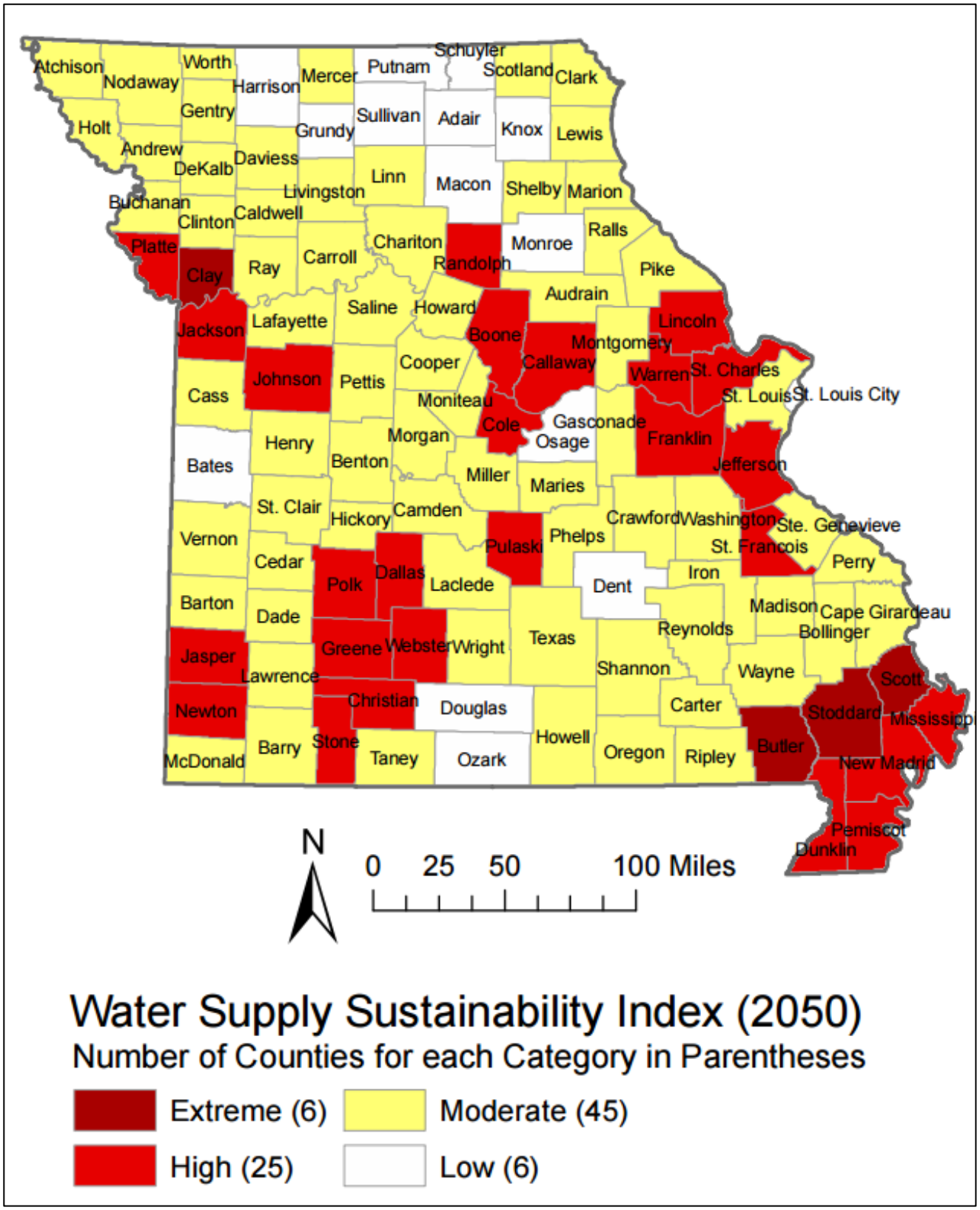
Impacts of drought on future development within Pulaski County would be negligible. Population trend analysis from the University of Missouri Extension suggests that Pulaski County will decline by approximately 6,275 individuals within the next 5 to 15 years[15]. Moreover, with a decreasing population, water use and demand would be expected to decrease as well. Nonetheless, there could potentially be strains on the water supply systems. Dixon is anticipated to develop new sewer and water distribution infrastructures within the next 5 years. Also, Richland anticipates a citywide upgrade of its sewer infrastructure. Long term drought could expose vulnerabilities during construction/upgrades of water distribution and sewer infrastructures. Furthermore, row crops are not suitable for the topography within the County. The major agricultural commodity for the County is livestock. Future increase in livestock production within the County may be adversely impacted in the event of a severe or long term drought.

Impact of Climate Change

A new analysis, performed for the Natural Resources Defense Council, examined the effects of climate change on water supply and demand in the contiguous United States. The study found that more than 1,100 counties will face higher risks of water shortages by mid-century as a result of climate change. Two of the principal reasons for the projected water constraints are shifts in precipitation and potential evapotranspiration (PET). Climate models project decreases in precipitation in many regions of the U.S., including areas that may currently be described as experiencing water shortages of some degree. Pulaski County is predicted to experience high water shortages as a result of global warming (**Figure 3.9**) by the year 2050.

[14] 2015 Boone County Hazard Mitigation Plan
[15] http://mcdc2.missouri.edu/cgi-bin/broker?_PROGRAM=websas.cntypage.sas&_SERVICE=appdev&_debug=0&county=29169

Figure 3.9. Water Supply Sustainability Index (2050) with Climate Change Impacts



Source: Natural Resources Defense Council (NRDC), Climate Change, Water, and Risk

Hazard Summary by Jurisdiction

The variations between jurisdictions are non-existent to minimal. All jurisdictions within Pulaski County utilize ground/well water as their municipal water source. In cities, the drought conditions would be the same as those experienced in rural areas, but the magnitude would be different with only lawns and local gardens impacted. Long term drought, spanning months at a time, could negatively impact the amount of potable drinking water available to the various jurisdictions within the county. In an event of long term drought various jurisdictions may be required to impose restrictions on water use.

Problem Statement

In summary, drought within Pulaski County is considered low risk, as of now. However, climate change predictions suggest increased risks by the year 2050. Pulaski County does not have a strong agricultural economy compared to other counties throughout Missouri. However, drought would impact commodities, specifically livestock. Potential impacts to local economies and infrastructures are foreseeable in the event of a long term drought.

All cities and the county commission should adopt water conservation ordinances that limit the amount of water that residents may use during a period of drought. The county and its jurisdictions should develop water monitoring plans as an early warning system. Each sector should inventory and review their reservoir operation plans. A water conservation awareness program should be presented to the public either through pamphlets, workshops or a drought information center. Voluntary water conservation should be encouraged to the public. The county and its jurisdictions should continually look for and fund water system improvements, new systems and new wells.

3.4.3 Earthquakes

Some specific sources for this hazard are:

- U.S. Seismic Hazard Map, United States Geological Survey, http://earthquake.usgs.gov/hazards/products/conterminous/2014/HazardMap2014_lg.jpg;
- 6.5 Richter Magnitude Earthquake Scenario, New Madrid Fault Zone map, http://www.igsb.uiowa.edu/Browse/quakes/quakes.htm;
- Probability of magnitude 5.0 or greater within 100 Years, United States Geological Survey, https://geohazards.usgs.gov/eqprob/2009/index.php

Hazard Profile

Hazard Description

An earthquake is a sudden motion or trembling that is caused by a release of energy accumulated within or along the edge of the earth's tectonic plates. Earthquakes occur primarily along fault zones and tears in the earth's crust. Along these faults and tears in the crust, stresses can build until one side of the fault slips, generating compressive and shear energy that produces the shaking and damage to the built environment. Heaviest damage generally occurs nearest the earthquake epicenter, which is that point on the earth's surface directly above the point of fault movement. The composition of geologic materials between these points is a major factor in transmitting the energy to buildings and other structures on the earth's surface.

The closest fault to Pulaski County is the New Madrid Seismic Zone (NMSZ). The NMSZ is the most active seismic area in the United States east of the Rocky Mountains. Unfortunately, the faults in the NMSZ are poorly understood due to concealment by alluvium deposits. Moreover, the NMSZ is estimated to be 30 years overdue for a 6.3 magnitude earthquake[16].

Geographic Location

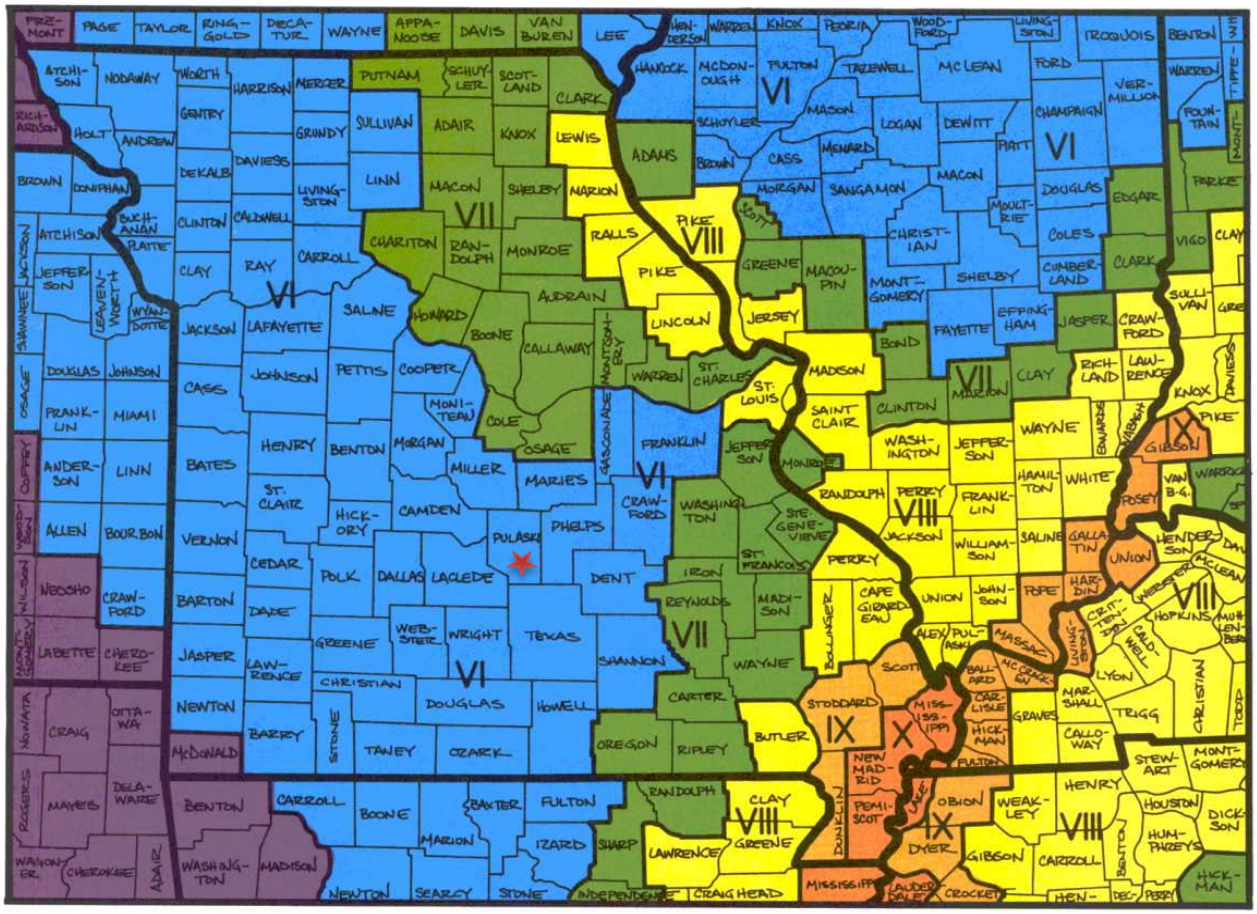
There are eight earthquake source zones in the Central United States, two of which are located within the state of Missouri—the New Madrid Fault and the Nemaha Uplift. Other seismic zones, because of their close proximity, also affect Missourians. These are the Wabash Valley Fault, Illinois Basin, and the Nemaha Uplift. The most active zone is the New Madrid Fault, which runs from Northern Arkansas through Southeast Missouri and Western Tennessee and Kentucky to the Illinois side of the Ohio River Valley. The Nemaha Uplift is of concern to Missourians because it runs parallel to the Missouri/Kansas border from Lincoln, NE to Oklahoma City, OK. Its earthquakes are not as severe as the historic New Madrid fault zone, but there have been several earthquakes that have affected the Missouri side of the line[17].

Figure 3.10 depicts impact zones for a magnitude 7.6 earthquake along the New Madrid Fault along with associated Modified Mercalli Intensities. Pulaski County is indicated by a red star. Furthermore, the Modified Mercalli Intensities for potential 6.7 and 8.6 magnitude earthquakes are illustrated. In the event of a 6.7 magnitude earthquake, Pulaski County would experience a Modified Mercalli Intensity of V (**Figure 3.11**). This intensity is categorized as being almost felt by everyone. Most people are awakened. Doors swing open or closed. Dishes are broken. Pictures on the wall move. Windows crack in some cases. Small objects move or are turned over. Liquids might spill out of open containers. Additionally, in the occurrence of 7.6 and 8.6 magnitude earthquakes; the County would

[16] Missouri Department of Natural Resources, Facts about the New Madrid Seismic Zone
[17] Missouri Hazard Analysis, State Emergency Management Agency, August 1999.

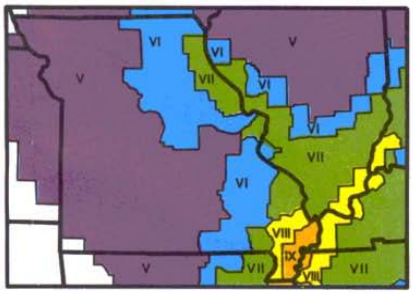
experience Modified Mercalli Intensities of VI and VII respectively. Earthquake intensities will not vary across the planning area, which is the case for most Missouri counties.

Figure 3.10. Impact Zones for Earthquake Along the New Madrid Fault



This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

6.7

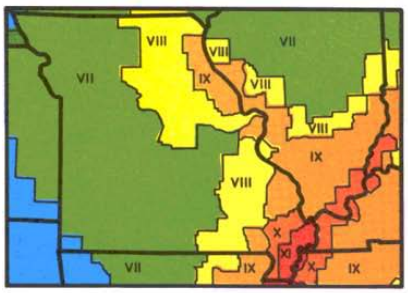


This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 6.7 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

7.6

This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 8.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

8.6



Source:http://sema.dps.mo.gov/docs/programs/Planning,%20Disaster%20&%20Recovery/State%20of%20Missouri%20Hazard%20Analysis/2012-State-Hazard-Analysis/Annex_F_Earthquakes.pdf

Figure 3.11. Projected Earthquake Intensities

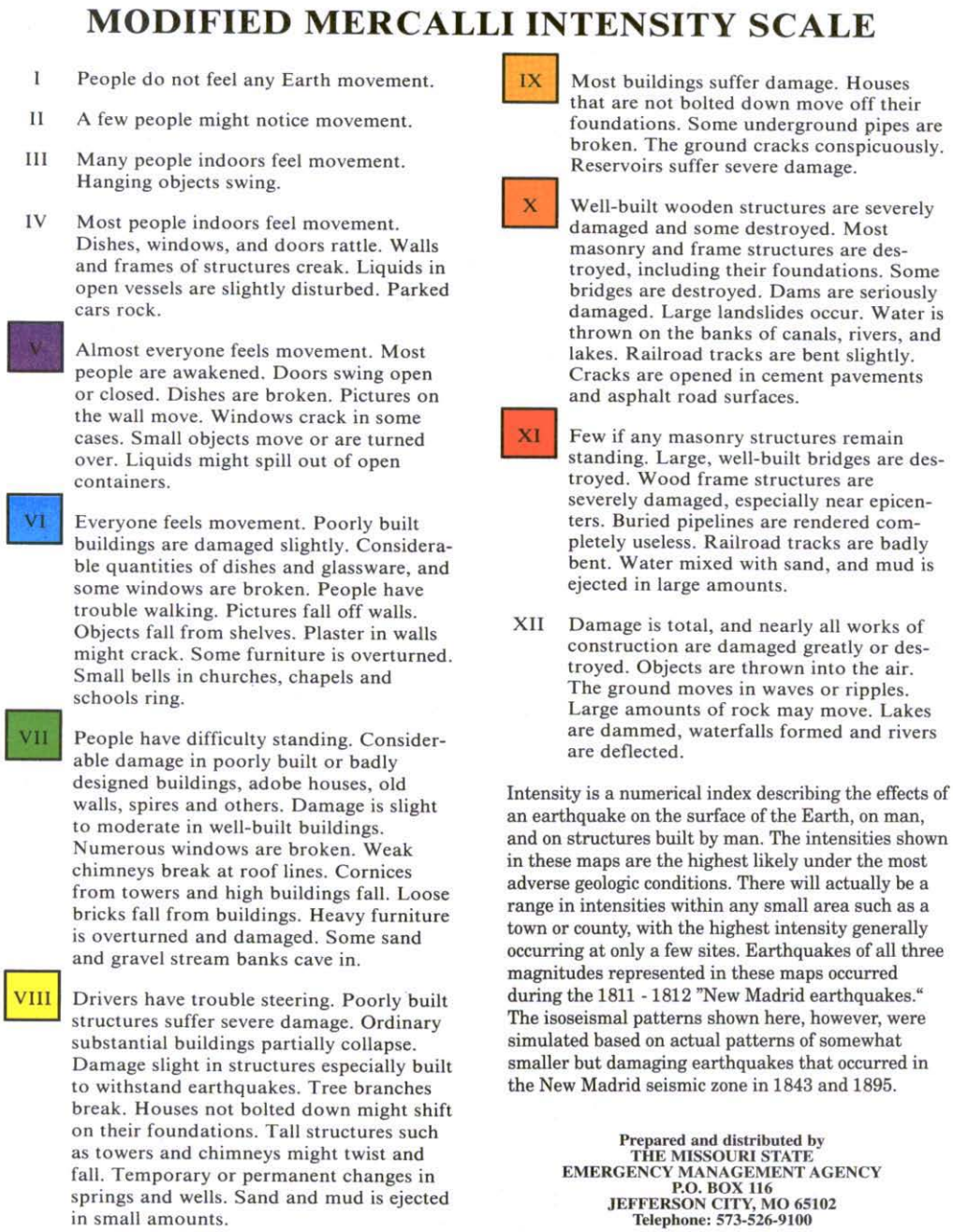
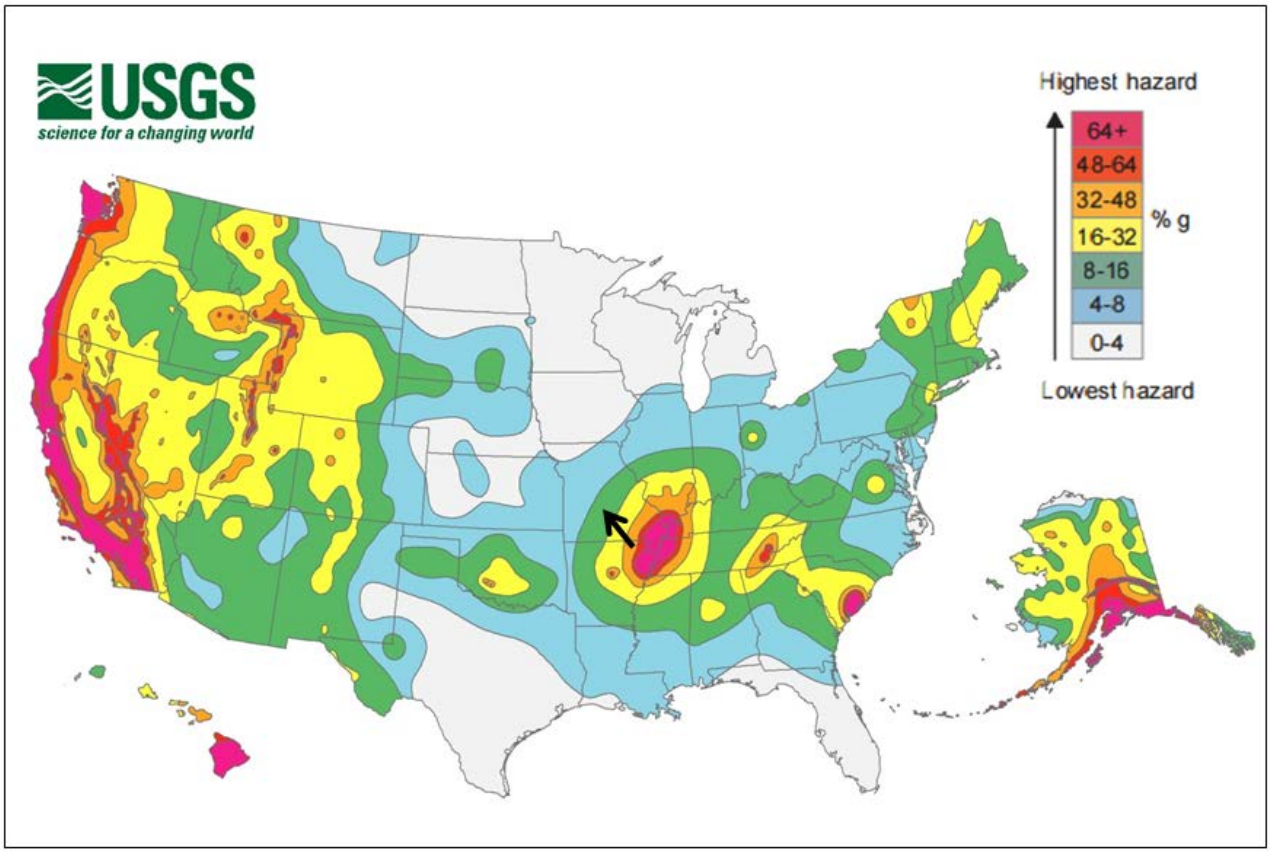


Figure 3.12 illustrates the seismicity in the United States. A black arrow indicates the location of Pulaski County. The seismic hazard map displays earthquake peak ground acceleration (PGA) that has a 2% chance of being exceeded in 50 years; which has a value between 8-16 % g.

Figure 3.12. United States Seismic Hazard Map



Source: United States Geological Survey
at http://earthquake.usgs.gov/hazards/products/conterminous/2014/HazardMap2014_lg.jpg

Severity/Magnitude/Extent

The extent or severity of earthquakes is generally measured in two ways: 1) the Richter Magnitude Scale is a measure of earthquake magnitude; and 2) the Modified Mercalli Intensity Scale is a measure of earthquake severity. The two scales are defined a follows.

Richter Magnitude Scale

The Richter Magnitude Scale was developed in 1935 as a device to compare the size of earthquakes. The magnitude of an earthquake is measured using a logarithm of the maximum extent of waves recorded by seismographs. Adjustments are made to reflect the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. Each whole number increase in magnitude represents a tenfold increase in measured amplitude; an estimate of energy. For example, comparing a 5.3 and a 6.3 earthquake shows that a 6.3 earthquake is ten times bigger than a magnitude 5.3 earthquake on a seismogram, but is 31.622 times stronger (energy release)[18].

[18] Measuring the Size of an Earthquake, http://earthquake.usgs.gov/learn/topics/measure.php

Modified Mercalli Intensity Scale

The intensity of an earthquake is measured by the effect of the earthquake on the earth's surface. The intensity scale is based on the responses to the quake, such as people awakening, movement of furniture, damage to chimneys, etc. The intensity scale currently used in the United States is the Modified Mercalli (MM) Intensity Scale. It was developed in 1931 and is composed of 12 increasing levels of intensity. They range from imperceptible shaking to catastrophic destruction, and each of the twelve levels is denoted by a Roman numeral. The scale does not have a mathematical basis, but is based on observed effects. Its use gives the laymen a more meaningful idea of the severity.

Previous Occurrences

Most of Missouri's earthquake activity has been concentrated in the southeast corner of the state, which lies within the New Madrid seismic zone. The written record of earthquakes in Missouri prior to the nineteenth century is virtually nonexistent; however, there is geologic evidence that the New Madrid seismic zone has had a long history of activity. The first written account of an earthquake in the region was by a French missionary on a voyage down the Mississippi River. He reported feeling a distinct tremor on Christmas Day 1699 while camped in the area of what is now Memphis, TN.

Whatever the seismic history of the region may have been before the first Europeans arrived, after Dec. 16, 1811, there could be no doubt about the area's potential to generate severe earthquakes. On that date, shortly after 2 a.m., the first tremor of the most violent series of earthquakes in the United States history struck southeast Missouri. In the small town of New Madrid, about 290 kilometers south of St. Louis, residents were aroused from their sleep by the rocking of their cabins, the cracking of timbers, the clatter of breaking dishes and tumbling furniture, the rattling of falling chimneys, and the crashing of falling trees. A terrifying roaring noise was created as the earthquake waves swept across the ground. Large fissures suddenly opened and swallowed large quantities of river and marsh water. As the fissures closed again, great volumes of mud and sand were ejected along with the water.

The earthquake generated great waves on the Mississippi River that overwhelmed many boats and washed others high upon the shore. The waves broke off thousands of trees and carried them into the river. High river banks caved in, sand bars gave way, and entire islands disappeared. The violence of the earthquake was manifested by great topographic changes that affected an area of 78,000 to 130,000 square kilometers.

On Jan. 23, 1812, a second major shock, seemingly more violent than the first, occurred. A third great earthquake, perhaps the most severe of the series, struck on Feb. 7, 1812.

The three main shocks probably reached intensity XII, the maximum on the Modified Mercalli scale, although it is difficult to assign intensities, due to the scarcity of settlements at the time. Aftershocks continued to be felt for several years after the initial tremor. Later evidence indicates that the epicenter of the first earthquake (Dec. 16, 1811) was probably in northeast Arkansas. Based on historical accounts, the epicenter of the Feb. 7, 1812, shocks was probably close to the town of New Madrid.

Although the death toll from the 1811-12 series of earthquakes has never been tabulated, the loss of life was very slight. It is likely that if at the time of the earthquakes the New Madrid area had been as heavily populated as at present, thousands of persons would have perished. The main shocks were felt over an area covering at least 5,180,000 square kilometers. Chimneys were knocked down in Cincinnati, Ohio, and bricks were reported to have fallen from chimneys in Georgia and South Carolina. The first shock was felt distinctly in Washington, D.C., 700 miles away, and people there

were frightened badly. Other points that reported feeling this earthquake included New Orleans, 804 kilometers away; Detroit, 965 kilometers away; and Boston, 1,769 kilometers away.

The New Madrid seismic zone has experienced numerous earthquakes since the 1811-12 series, and at least 35 shocks of intensity V or greater have been recorded in Missouri since 1811. Numerous earthquakes originating outside of the state's boundaries have also affected Missouri. Five of the strongest earthquakes that have affected Missouri since the 1811-12 series are described below.

On Jan. 4, 1843, a severe earthquake in the New Madrid area cracked chimneys and walls at Memphis, Tennessee. One building reportedly collapsed. The earth sank at some places near New Madrid; there was an unverified report that two hunters were drowned during the formation of a lake. The total felt area included at least 1,036,000 square kilometers.

The Oct. 31, 1895, earthquake near Charleston, MO probably ranks second in intensity to the 1811-12 series. Every building in the commercial area of Charleston was damaged. Cairo, Illinois, and Memphis, Tennessee, also suffered significant damage. Four acres of ground sank near Charleston and a lake was formed. The shock was felt over all or portions of 23 states and at some places in Canada.

A moderate earthquake on April 9, 1917, in the Ste. Genevieve/St. Mary's area was reportedly felt over a 518,000 square kilometer area from Kansas to Ohio and Wisconsin to Mississippi. In the epicentral area people ran into the street, windows were broken, and plaster cracked. A second shock of lesser intensity was felt in the southern part of the area.

The small railroad town of Rodney, MO experienced a strong earthquake on Aug. 19, 1934. At nearby Charleston, windows were broken, chimneys were overthrown or damaged, and articles were knocked from shelves. Similar effects were observed at Cairo Mounds and Mound City, IL, and at Wickliff, KY. The area of destructive intensity included more than 596 square kilometers.

The Nov. 9, 1968, earthquake centered in southern Illinois was the strongest in the central United States since 1895. The magnitude 5.5 shock caused moderate damage to chimneys and walls at Hermann, St. Charles, St. Louis, and Sikeston, Missouri. The felt areas include all or portions of 23 states.[i]

Several area residents observed a small seismic occurrence during the early morning hours of July 8, 2003, near Rolla, located in Phelps County, which is adjacent to Pulaski County. According to information from the USGS, a micro-earthquake happened about 20 miles northeast of Rolla and measured 2.9 on the Richter scale. The earthquake originated at a depth of about 3.1 miles beneath the earth's surface. In southern parts of Missouri, earthquakes of this magnitude happen frequently, but are an unusual event in Pulaski County. The nearest faults are the Leasburg Fault and the Cuba Fault.

Small earthquakes continue to occur frequently in Missouri. Averages of 200 earthquakes are detected every year in the New Madrid Seismic Zone alone. Most are detectable only with sensitive instruments, but on an average of every 18 months, southeast Missouri experiences an earthquake strong enough to crack plaster in buildings[19].

[19] Missouri State Hazard Mitigation Plan May 2007

Probability of Future Occurrence

Pulaski County has reported a total of zero earthquakes since 1931. The County, located in south central Missouri, a good distance from the southeast corner of the state that has the potential for moderate damage should a significant earthquake occur.

In 2002, the University of Memphis estimated a 25% to 40% chance for one occurrence of a 6.0 magnitude earthquake in the next fifty years (by year's end 2052) in the New Madrid Seismic Zone. Ideally, if an occurrence is to happen within the next 50 years, it would occur at the midway point (25 years) year 2027. Given this hypothetical situation, there would be one chance in twenty-five (1/25 .04 or 4%) of an occurrence, and it represents an annualized percentage since the divisor (25) is the number of years; estimating that the earthquake will happen at the end of the 25th year over the intervening period. The 4% number becomes the "object of interest" (objective) and it has an estimated chance of happening.

The University of Memphis has fundamentally estimated this 4% objective has a 25% to 40% chance of occurrence. If we apply these percentages to the annualized figure of 4%, the result is the overall annualized percentages. At the 25% level, the likelihood of an earthquake happening in a given year is 1.0% (4% x 25%). At the 40% level, the likelihood of an earthquake happening in a given year is 1.6% (4% x 40%)[20]. For the purpose of this plan, the 1.0% probability of an earthquake occurring in a given year will be utilized.

Vulnerability

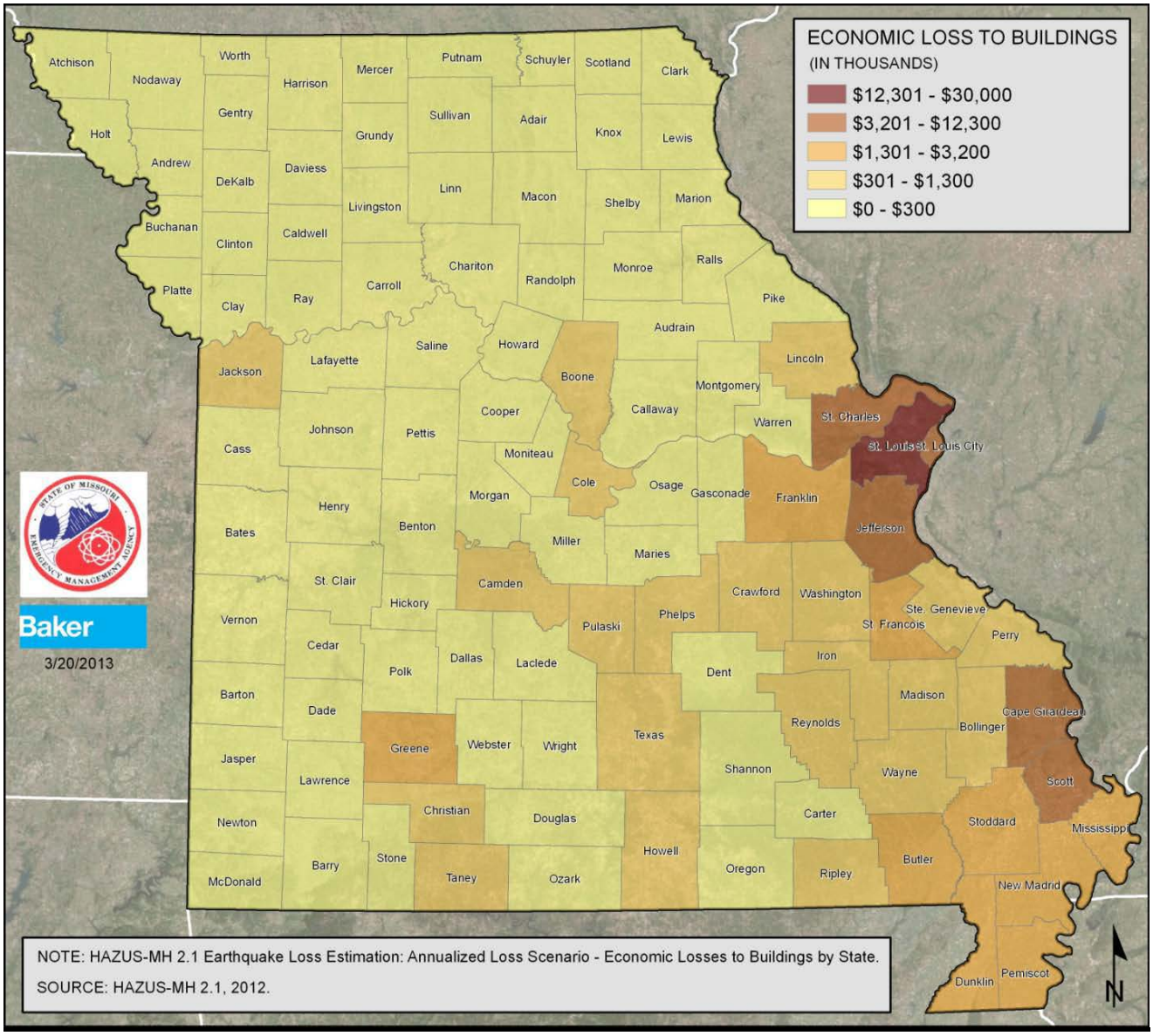
Vulnerability Overview

SEMA utilized Hazus 2.1 to analyze vulnerability and estimate losses to earthquakes. Hazus is a program developed by FEMA which is a nationally applicable standardized methodology that encompasses models for assessing potential losses from earthquakes, floods, and hurricanes. Geographic Information Systems (GIS) is utilized to assess physical, economic, and social impacts of disasters[21]. For the vulnerability analysis an annualized loss scenario for each county was analyzed. Secondly, statistics from an event with a 2% probability of exceedance in 50 years was analyzed, suggesting outcomes of a worst case scenario.

Annualized loss is the maximum potential annual dollar loss resulting from eight return periods (100, 200, 500, 750, 1,000, 1,500, 2,000, and 2,500 years) averaged on a 'per year' basis[22]. The Hazus earthquake loss estimation is depicted in **Figure 3.13** and **Table 3.29**. Pulaski County's buildings are suggested to lose between $301 and $1,300 in any one year; thus ranking the County as having the 31st highest expected loss in the state. This loss ratio indicates impacts on local economies in the event of an earthquake, and the difficulty for jurisdictions to recover from said event.

[20] SEMA
[21] www.fema.gov/hazus
[22] 2013 Missouri State Hazard Mitigation Plan

Figure 3.13. Hazus Earthquake Loss Estimation: Annualized Loss Scenario –Total Economic Losses to Buildings.



Source: 2013 Missouri State Hazard Mitigation Plan

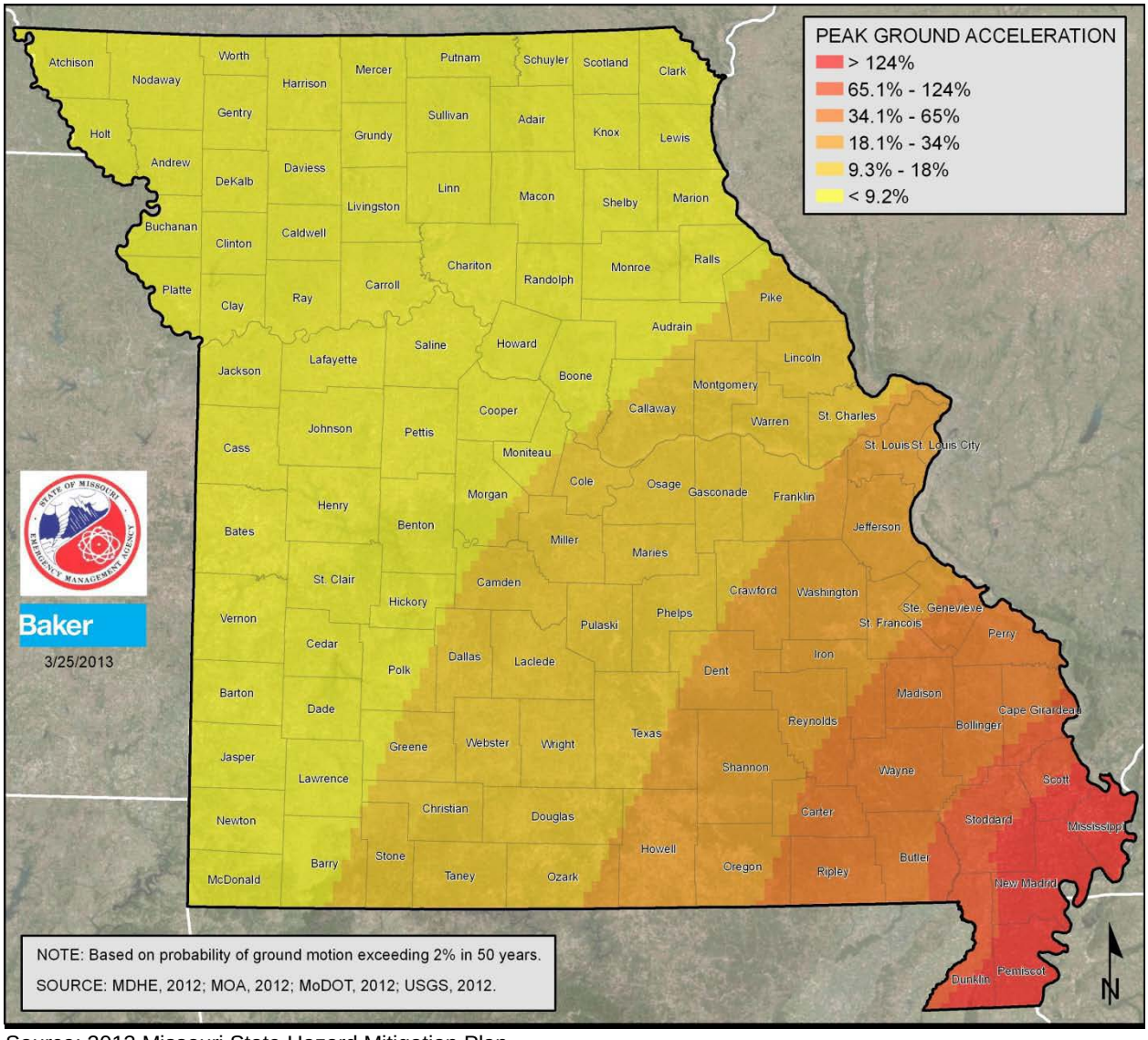
Table 3.29. Hazus Earthquake Loss Estimation: Annualized Loss Scenario

Location	Building Loss Total ($)*	Loss Ratio %**	Income Loss Total ($)*	Total Economic Loss to Buildings ($)*	Loss Ratio Rank
Pulaski	332	0.01	87	419	31

Source: Hazus 2.1
*All $values are in thousands
**Loss ratio is the sum of structural and nonstructural damage divided by the entire building inventory value within a county

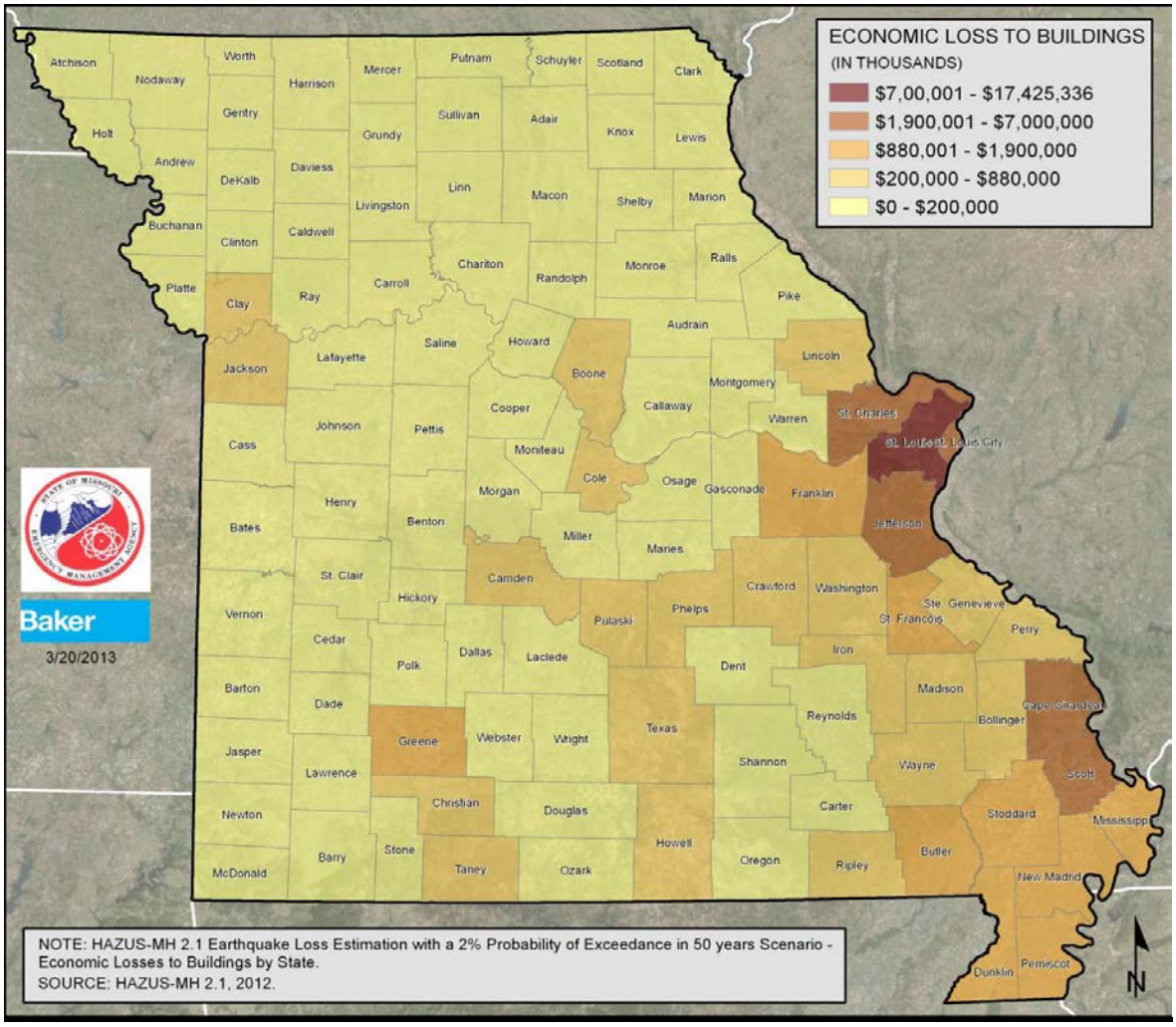
Likewise, SEMA developed a second scenario which incorporated a 2% probability of exceedance in 50 years. This model was to demonstrate a worst case scenario. **Figure 3.14** provides estimates of peak ground acceleration and spectral acceleration (ground shaking potential) at intervals of 0.3 and 1.0 seconds, respectively. These acceleration events have a 2% probability of exceedance in the next 50 years. A 7.7 magnitude earthquake was utilized in this scenario, which is typically utilized for New Madrid fault planning scenarios in Missouri. Pulaski County is estimated to have peak ground acceleration between 9.3 and 18%. Furthermore, **Figure 3.15** illustrates total economic loss to buildings including content and inventory loss, and wage/income loss in the event of the modeled earthquake. Pulaski County is anticipated to lose between $200,000 and $880,000 in a 50 year scenario. Moreover, in the same event the County is estimated to experience between 3.1% and 7% loss (damage) of the total building inventory (**Figure 3.16). Table 3.30** further exemplifies the County's loss ratio.

Figure 3.14. Hazus Earthquake 2% Probability of Exceedance in 50 Years – Ground Shaking Potential



Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.15. Hazus Earthquake Loss Estimation with a 2% Probability of Exceedance in 50 Years Scenario – Total Economic Loss to Buildings



Source: 2013 Missouri State Hazard Mitigation Plan

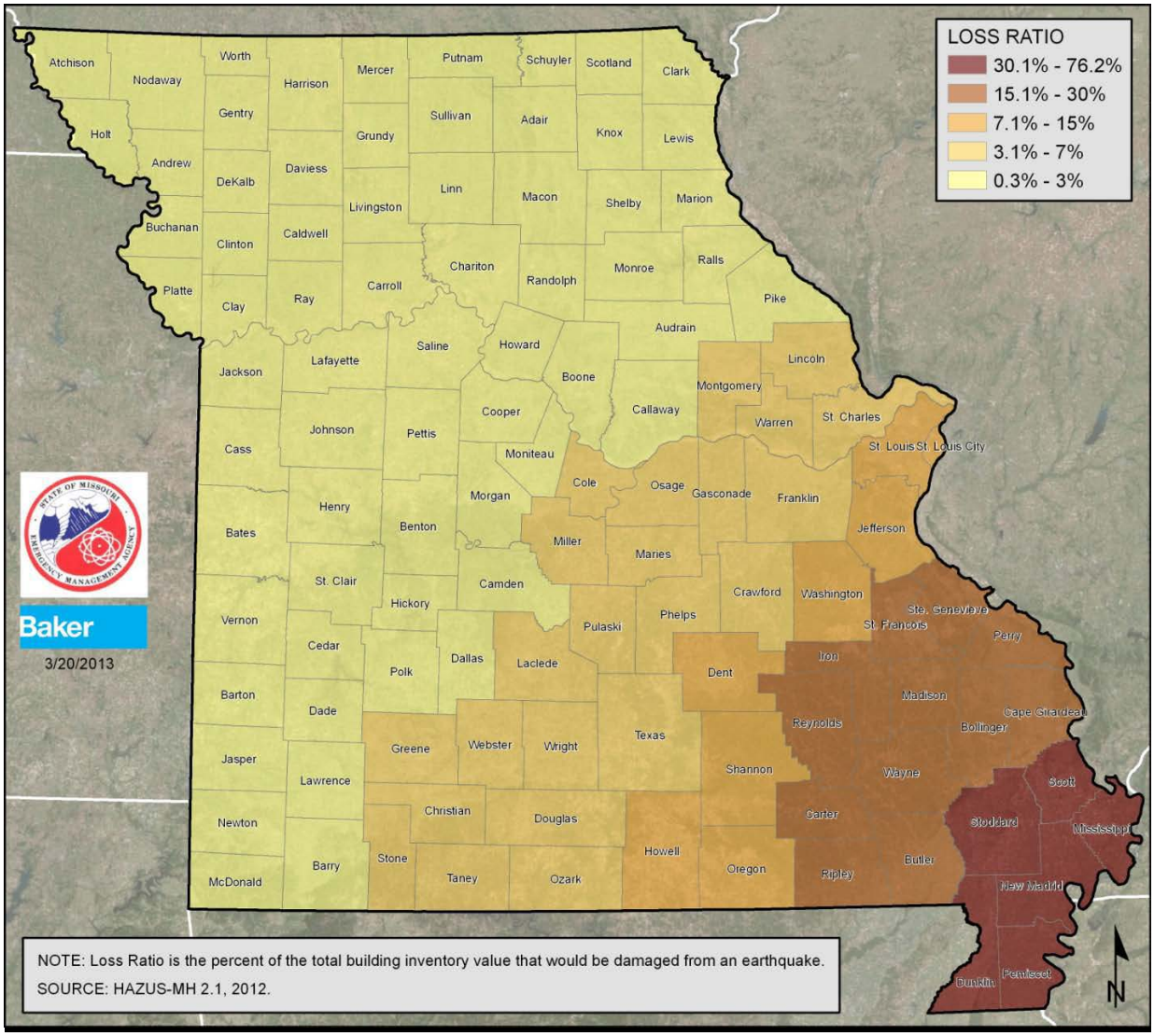
Table 3.30. Hazus-MH Earthquake Loss Estimation: 2% Probability of Exceedance in 50 Years Scenario Results Building Impacts by County, Ranked by Highest Building Losses

County	Structural Damage ($)*	Non-Structural Damage ($)*	Contents Damage and Inventory Loss ($) *	Loss Ratio (%) **	Income Loss ($)*	Total Economic Loss to Buildings ($)*,***	Loss Ratio Rank
Pulaski	44,123	134,547	41,864	4.76	56,906	277,440	35

Source: 2013 Missouri State Hazard Mitigation Plan, Hazus 2.1

*All $ values are in thousands
**Loss ratio is the sum of structural and nonstructural damage divided by the entire building inventory value within a county
***Total economic loss to buildings includes inventory loss, relocation loss, capital-related loss, wages loss, and rental income loss
****Note: Total loss numbers provide an estimate of total losses and due to rounding, these numbers may differ slightly from the global summary report outputs from HAZUS

Figure 3.16. Hazus Earthquake Loss Estimation with a 2% Probability of Exceedance in 50 Years Scenario – Loss Ratio



Source: 2013 Missouri State Hazard Mitigation Plan

In terms of social impacts for the same earthquake event, **Table 3.31** defines casualty severity, displaced households, and short-term shelter needs that are utilized in **Table 3.32.** During this scenario, Pulaski County is estimated to have 83 injuries requiring medical attention without hospitalization, 17 injuries requiring hospitalization, 2 life threatening injuries, and 4 deaths. Moreover, 143 individuals are expected to become displaced from their homes, along with 145 individuals requiring short-term shelter needs.

Table 3.31. Casualty Severity, Displaced Households, and Short-Term Shelter Needs

Casualty Severity Level 1	Injuries will require medical attention but hospitalization is not needed
Casualty Severity Level 2	Injuries will require hospitalization but are not considered life-threatening
Casualty Severity Level 3	Injuries will require hospitalization and can become life threatening if not promptly treated
Casualty Severity Level 4	Victims are killed by the earthquake
Displaced Households	The number of households that are expected to be displaced from their homes due to the earthquake
Short-Term Shelter Needs	The number of displace people that will require accommodations in temporary public shelters

Source: Hazus 2.1

Table 3.32. Social Impact Estimates by County from the 2% Probability of Exceedance in 50 Years Scenario 2 a.m. Time of Occurrence

County	MMI Zone	Level 1	Level 2	Level 3	Level 4	Total	Displaced Households	Short-Term Shelter Needs
Pulaski	VII	83	17	2	4	106	143	145

Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

Economic loss to buildings in the event of an earthquake can be found in the Vulnerability Overview. Infrastructures across the planning area would also be expected to experience losses. Additional losses expected would be environmental and economic.

Impact of Future Development

Future development will not increase the risk of an earthquake, rather contributing to the overall exposure of damaged property. As new development arises, minimum standards of building codes should be established in all jurisdictions to decrease the potential damage/loss should an earthquake occur.

The Revised Statutes of MO, Section 160.451 require that: The governing body of each school district which can be expected to experience an intensity of ground shaking equivalent to a Modified Mercalli Intensity of VII or above from an earthquake occurring along the New Madrid Fault with a potential magnitude of 7.6 on the Richter Scale shall establish an earthquake emergency procedure system in every school building under its jurisdiction[23].

Hazard Summary by Jurisdiction

Since earthquake intensity is not likely to vary greatly throughout the planning area, the risk will be the same throughout. Pulaski County is not near the New Madrid Shock Zone, but it will most likely endure mild secondary effects from the earthquake, such as fire, structure damage, utility disruption, environmental impacts and economic disruptions/losses. However, damages could differ if there are structural variations in the planning area's built environment. For example, if one community has a

[23] 2015 Boone County Hazard Mitigation Plan

higher percentage of residences built prior to 1939 than the other participants, that community is likely to experience higher damages. **Table 3.33** depicts the percent of residences built prior to 1939 in Pulaski County. Crocker (15.2%) and Dixon (14.4%) have the most residences susceptible to damage in the event of an earthquake. If a major earthquake should occur, Pulaski County would likely be deeply impacted by the number of refugees traveling through the area seeking safety and assistance.

Table 3.33. Percent of Pulaski County Residences Built Prior to 1939

Jurisdiction	% of Residences built prior to 1939
Crocker	15.2
Dixon	14.4
Richland	13.8
St. Robert	0.9
Waynesville	2.3
Unincorporated Pulaski	4.2

Source: U.S. Census Bureau, 2009 – 2013 5 – Year American Community Survey

Problem Statement

In the event of a 7.7 magnitude earthquake (worst case scenario), Pulaski County is estimated to have 83 injuries requiring medical attention without hospitalization, 17 injuries requiring hospitalization, 2 life threatening injuries, and 4 deaths. Moreover, 143 individuals are expected to become displaced from their homes, along with 145 individuals requiring short-term shelter needs. Additionally, the County is expected to encounter $200,000 to $800,000 in total economic losses to buildings. Moreover, Crocker, Dixon, and Richland are particularly at risk due to the percent of residences built prior to 1939.

Jurisdictions should encourage purchase of earthquake hazard insurance. As well as establishing structurally sound emergency shelters in several parts of the county. In addition, stringent minimum standards of building codes should be established. Lastly, outreach and education should be utilized more frequently to prepare citizens for the next occurrence.

3.4.4 Extreme Heat

Hazard Profile

Some specific sources for this hazard are:

- National Climatic Data Center, Storm Events Database, http://www.ncdc.noaa.gov/stormevents/
- Heat Index Chart & typical health impacts from heat, National Weather Service; National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml ;
- Daily temperatures averages and extremes, High Plains Regional Climate Summary, http://www.hprcc.unl.edu/data/historical/index.php?state=ia&action=select_state&submit=Select+State;
- Hyperthermia mortality, Missouri; Missouri Department of Health and Senior Service, http://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/hyper1.pdf;
- Hyperthermia mortality by Geographic area, Missouri Department of Health and Senior Services,
- http://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/hyper2.pdf;

Hazard Description

Extreme temperature events, both hot and cold, can impact human health and mortality, natural ecosystems, agriculture and other economic sectors. The remainder of this section profiles extreme heat. Extreme cold events are profiled in combination with Winter Storm in **Section 3.4.10.** According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. These high temperatures generally occur from June through September, but are most prevalent in the months of July and August. Regional reports indicate all of Missouri is subject to heat wave during the summer months. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index chart shown in **Figure 3.17** uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

High humidity, a common factor in Missouri, can magnify the effects of extreme heat. While heat-related illness and death can occur from exposure to intense heat in just one afternoon, heat stress on the body has a cumulative effect. The persistence of a heat wave increases the threat to public health.

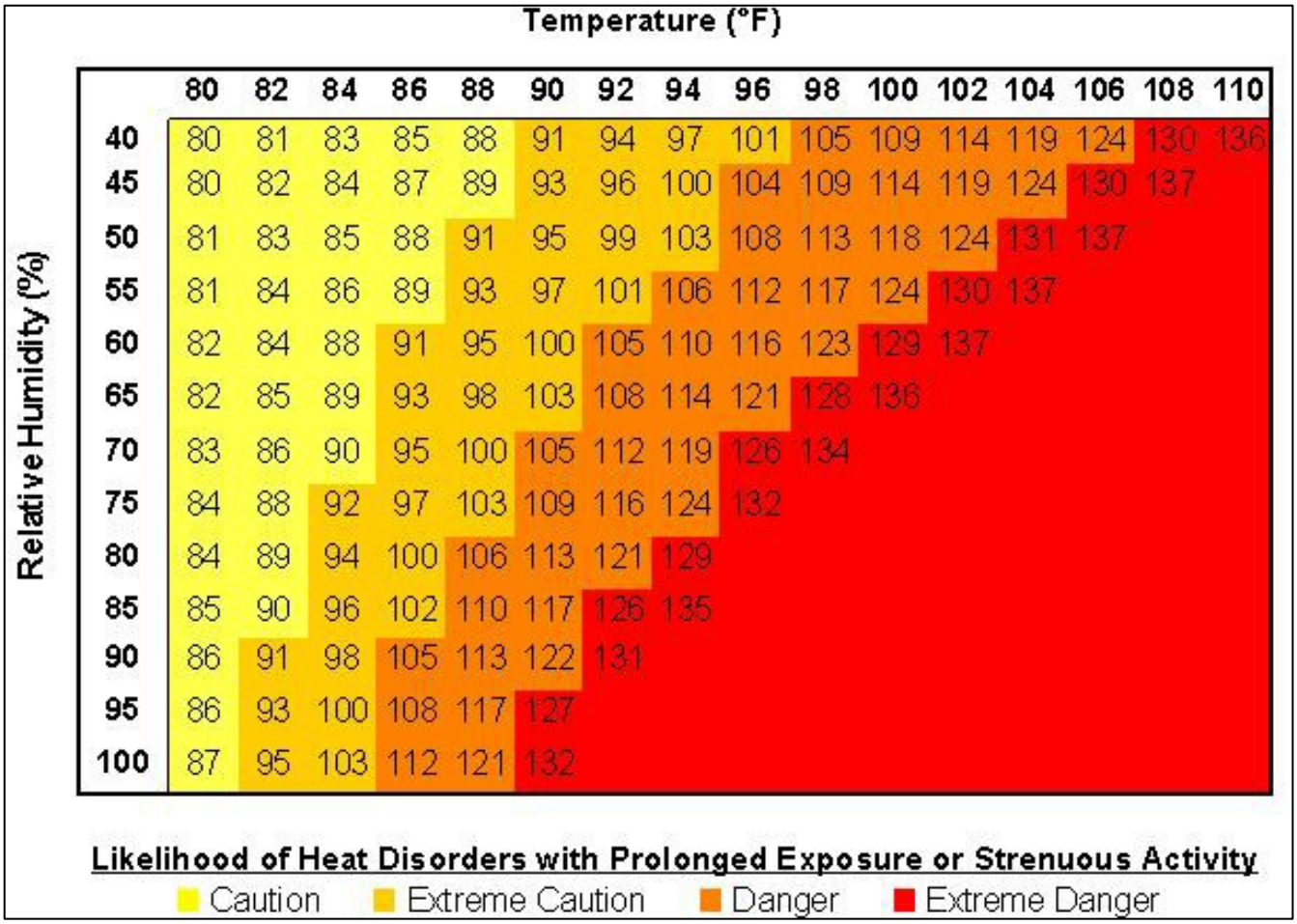
Geographic Location

Extreme heat is considered to be an area-wide hazard event. In such a case, the chance of variation in temperatures across Pulaski County is minimal to nonexistent.

Severity/Magnitude/Extent

Extreme heat can cause stress to crops and animals. According to USDA Risk Management Agency, losses to insurable crops during the 10-year time period from 1998 to 2012 were $140,664. Extreme heat can also strain electricity delivery infrastructure overloaded during peak use of air conditioning during extreme heat events. Another type of infrastructure damage from extreme heat is road damage. When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt-paved roads, driveways, and parking lots.

Figure 3.17. Heat Index (HI) Chart



Source: National Weather Service (NWS)
Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

From 1988-2011, there were 3,496 fatalities in the U.S. attributed to summer heat. This translates to an annual national average of 146 deaths. During the same period, 2000 and 2013, 0 deaths were recorded in the planning area, according to the Bureau of Environmental Epidemiology. The National Weather Service stated that among natural hazards, no other natural disaster—not lightning, hurricanes, tornadoes, floods, or earthquakes—causes more deaths.

Those at greatest risk for heat-related illness include infants and children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. In agricultural areas, the exposure of farm workers, as well as livestock, to extreme temperatures is a major concern.

Table 3.34 lists typical symptoms and health impacts due to exposure to extreme heat.

Table 3.34. Typical Health Impacts of Extreme Heat

Heat Index (HI)	Disorder
80-90° F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105° F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

The National Weather Service has an alert system in place (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when for two or more consecutive days: (1) when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F); and the night time minimum Heat Index is 80°F or above. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

Previous Occurrences

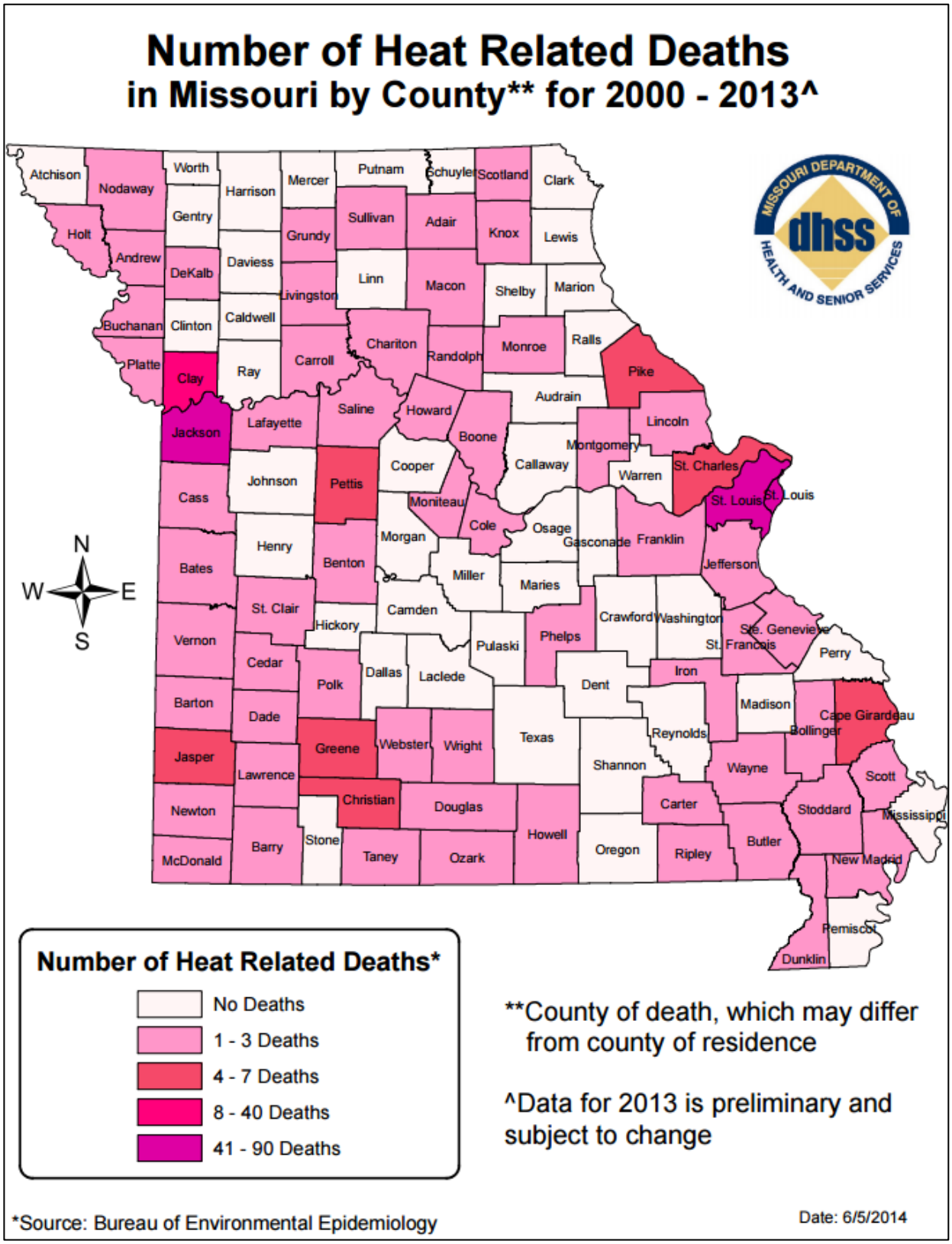
Table 3.35 provides data in relation to record heat events between 1999 and 2012 in Pulaski County. Maximum heat index values and temperatures are shown for each extreme temperature event. Fortunately, there were zero recorded injuries and fatalities during this time. In addition, **Figure 3.18** illustrates heat related deaths by county in Missouri between 2000 and 2013.

Table 3.35. Pulaski County Recorded Heat Events 1999 – 2012

Month, Year	# of Event Days	Consecutive Days	Fatalities	Injuries	Temperature (F°)	Heat Index Values (F°)	Max Temperature (F°)
July, 1999	9	x	0	0	95+	105 - 115	115
August, 1999	18	x	0	0	95+	100+	100+
August, 2000	5	x	0	0	100+	100 - 110	110
September, 2000	3	x	0	0	100+	x	x
July, 2001	15	2+	0	0	90-100	100 - 110	110
August, 2001	9	9	0	0	x	100 - 110	110
June, 2012	30	x	0	0	90+	x	101
July, 2012	31	x	0	0	90+	x	106
August, 2012	31	x	0	0	90+	x	106
Total	**151**	**11+**	**0**	**0**	**-**	**-**	**-**

Source: http://www.ncdc.noaa.gov/stormevents/

Figure 3.18. Heat Related Deaths in Missouri 2000 - 2013



Probability of Future Occurrence

Table 3.36 illustrates the annual average percent probability of extreme heat in Pulaski County. The County's likelihood of enduring an extreme heat event per year is 69.23% (9 events/13 years x 100 = 69.23%). Extreme heat events can be found in **Table 3.35.**

Table 3.36. Annual Average % Probability of Extreme Heat in Pulaski County

Location	Annual Avg. % P of Extreme Heat
Pulaski County	69.23%

*P = probability; see page 3.24 for definition.

Vulnerability

Vulnerability Overview

Pulaski County, along with the rest of the state of Missouri is vulnerable to extreme heat. However, those jurisdictions with higher percentages of individuals below the age of 5, and above the age of 65 tend to be more at risk (**Table 3.37**). **Figure 3.19** depicts the distribution of the elderly population across Missouri. In 2010, 7.2 to 12.5% of the County was comprised of individuals ages 65 and up.

Potential Losses to Existing Development

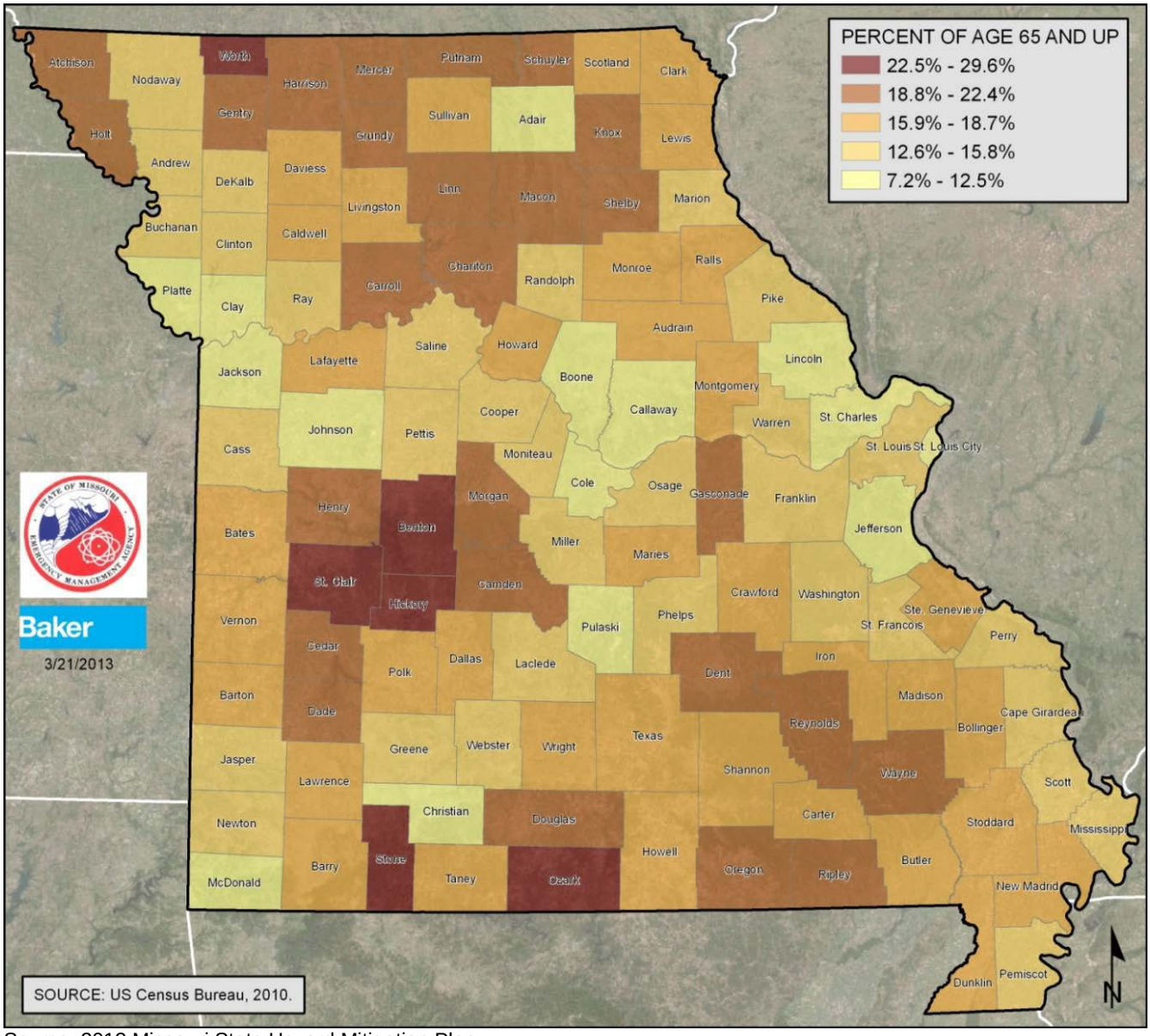
During extreme heat events structural, road, and electrical infrastructure are vulnerable to damages. Depending upon temperatures and duration of extreme heat, losses will vary.

Between the 1995 and 2014 there were 2 recorded crop insurance payments in Pulaski County due to extreme heat events. These events occurred in 2011 and 2012, with $2,769.10 and $4,907.00 being payed respectively. The average annual loss for extreme heat is $383.80.

Impact of Future Development

Population trends from 2000 to 2013 for Pulaski County and various jurisdictions indicate that 4 out of 6 jurisdictions were growing. These jurisdictions include Unincorporated Pulaski County, Crocker, St. Robert, and Waynesville. Population growth can result in increased age groups that are more susceptible to extreme heat. Additionally, as populations increase, so does the strain on each jurisdiction's electricity infrastructure. Richland anticipates citywide electrical upgrades within the next 5 years. Local government and the City Emergency Management Director should take extreme heat in consideration while electrical upgrades are underway.

Figure 3.19. Distribution of Elderly Population



Source: 2013 Missouri State Hazard Mitigation Plan

Hazard Summary by Jurisdiction

Those at greatest risk for heat-related illness and deaths include children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. To determine jurisdictions within the planning area with populations more vulnerable to extreme heat, demographic data was obtained from the 2013 census on population percentages in each jurisdiction comprised of those under age 5 and over age 65. Data was not available for overweight individuals and those on medications vulnerable to extreme heat. **Table 3.37** below summarizes vulnerable populations in the participating jurisdictions. Note that school and special districts are not included in the table because students and those working for the special districts are not customarily in these age groups.

Table 3.37. County Population Under Age 5 and Over Age 65, 2013 Census Data

Jurisdiction	Population Under 5 Years	Population 65 Years and over
Unincorporated Pulaski County	2,638	2,358
Crocker	115	179
Dixon	83	254
Richland	193	383
St. Robert	535	155
Waynesville	396	421
Total	**3,960**	**3,750**

Source: U.S. Census Bureau, 2009-2013 5-Years American Community Survey

Due to lack of data, strategic buildings that lack air-conditioning could not be analyzed for this report. Additionally, school policy data in regards to extreme heat were not available.

Problem Statement

In summary, the risks of extreme heat can impact the health/lives of citizens within the County, specifically the young and elderly. Three jurisdictions are more vulnerable to extreme heat due to their demographics. Moreover, the County only recorded 2 extreme heat events where crop insurance payments were made.

Many people do not realize how deadly a heat wave can be. Extreme heat is a natural disaster that is not as dramatic as floods or tornadoes. Working with the Pulaski County Health Department and EMD, local governments should encourage residents to reduce the level of physical activity, wear lightweight clothing, eat fewer protein-rich foods, drink plenty of water, minimize their exposure to the sun, and spend more time in air-conditioned places. People who work outdoors should be educated about the dangers and warning signs of heat disorders. Buildings, ranging from homes (particularly those of the elderly) to factories, should be equipped with properly installed, working air conditioning units, or have fans that can be used to generate adequate ventilation. Charitable organizations and the health department should work together to provide fans to at-risk residents during times of critical heat.

3.4.5 Fires (Urban/Structural and Wild)

The specific sources for this hazard are:

- Missouri Department of Conversation Wildfire Data Search at http://mdc4.mdc.mo.gov/applications/FireReporting/Report.aspx
- Statistics, Missouri Division of Fire Safety;
- National Statistics, US Fire Administration;
- Fire/Rescue Mutual Aid Regions in Missouri;
- Forestry Division of the Missouri Department of Conservation;
- National Fire Incident Reporting System (NFIRS), http://www.dfs.dps.mo.gov/programs/resources/fire-incident-reporting-system.asp
- Firewise Missouri, http://www.firewisemissouri.org/wildfire-in-missouri.html
- University of Wisconsin Silvis Lab, http://silvis.forest.wisc.edu/maps/wui_main

Hazard Profile

Hazard Description

The incident types considered for urban/structural fire include all fires in the following categories: 1) general fires, 2) structure fire, 3) fire in mobile property used as a fixed structure, and 4) mobile property (vehicle) fire. The fire incident types for wildfires include: 1) natural vegetation fire, 2) outside rubbish fire, 3) special outside fire, and 4) cultivated vegetation, crop fire.

The Missouri Division of Fire Safety (MDFS) indicates that approximately 80 percent of the fire departments in Missouri are staffed with volunteers. Whether paid or volunteer, these departments are often limited by lack of resources and financial assistance. The impact of a fire to a single-story building in a small community may be as great as that of a larger fire to a multi-story building in a large city.

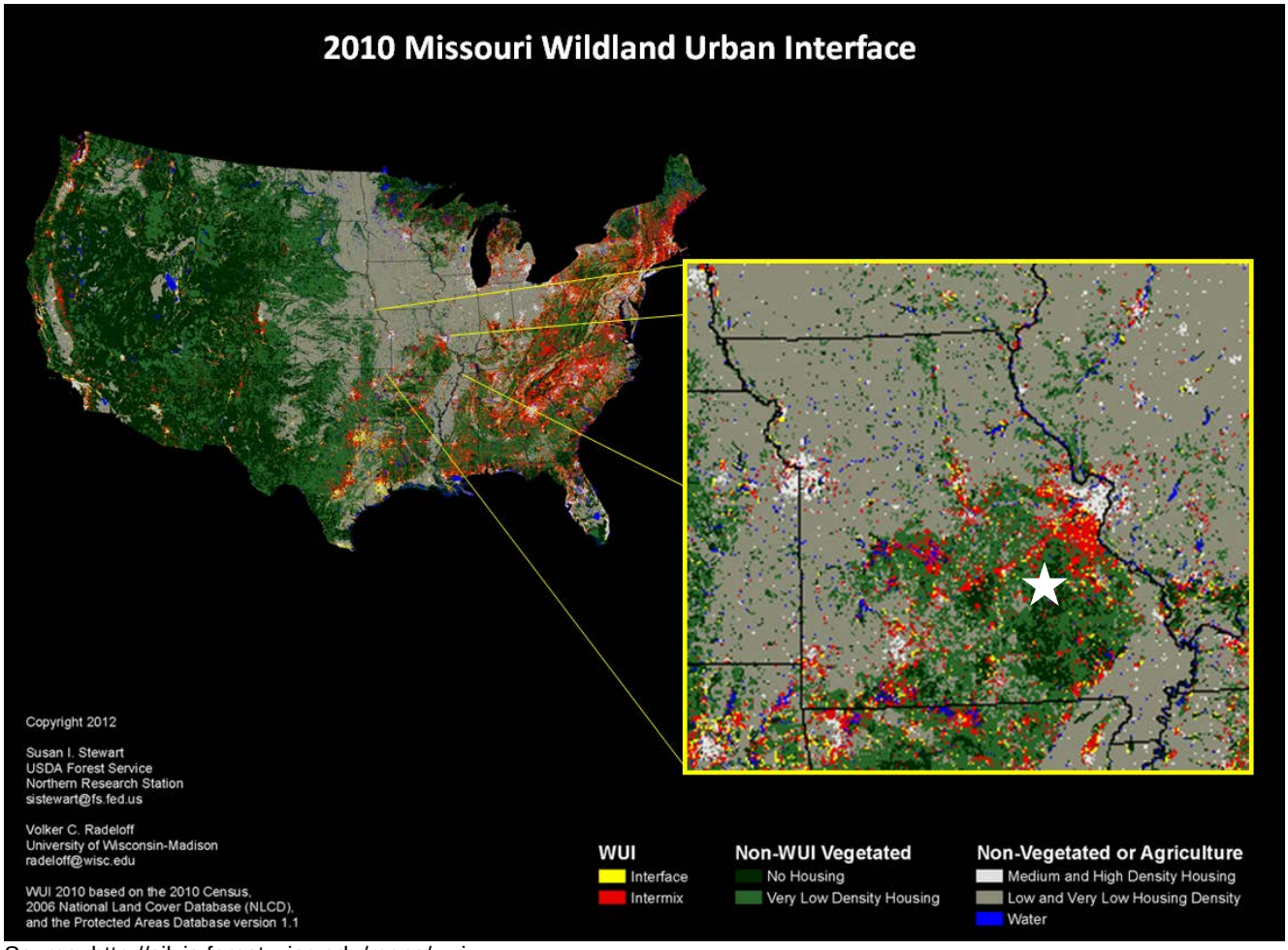
The Forestry Division of the Missouri Department of Conservation (MDC) is responsible for protecting privately owned and state-owned forests and grasslands from wildfires. To accomplish this task, eight forestry regions have been established in Missouri for fire suppression. The Forestry Division works closely with volunteer fire departments and federal partners to assist with fire suppression activities. Currently, more than 900 rural fire departments in Missouri have mutual aid agreements with the Forestry Division to obtain assistance in wildfire protection if needed.

Most of Missouri fires occur during the spring season between February and May. The length and severity of both structural and wildland fires depend largely on weather conditions. Spring in Missouri is usually characterized by low humidity and high winds. These conditions result in higher fire danger. In addition, due to the recent lack of moisture throughout many areas of the state, conditions are likely to increase the risk of wildfires. Drought conditions can also hamper firefighting efforts, as decreasing water supplies may not prove adequate for firefighting. It is common for rural residents burn their garden spots, brush piles, and other areas in the spring. Some landowners also believe it is necessary to burn their forests in the spring to promote grass growth, kill ticks, and reduce brush. Therefore, spring months are the most dangerous for wildfires. The second most critical period of the year is fall. Depending on the weather conditions, a sizeable number of fires may occur between mid-October and late November.

Geographic Location

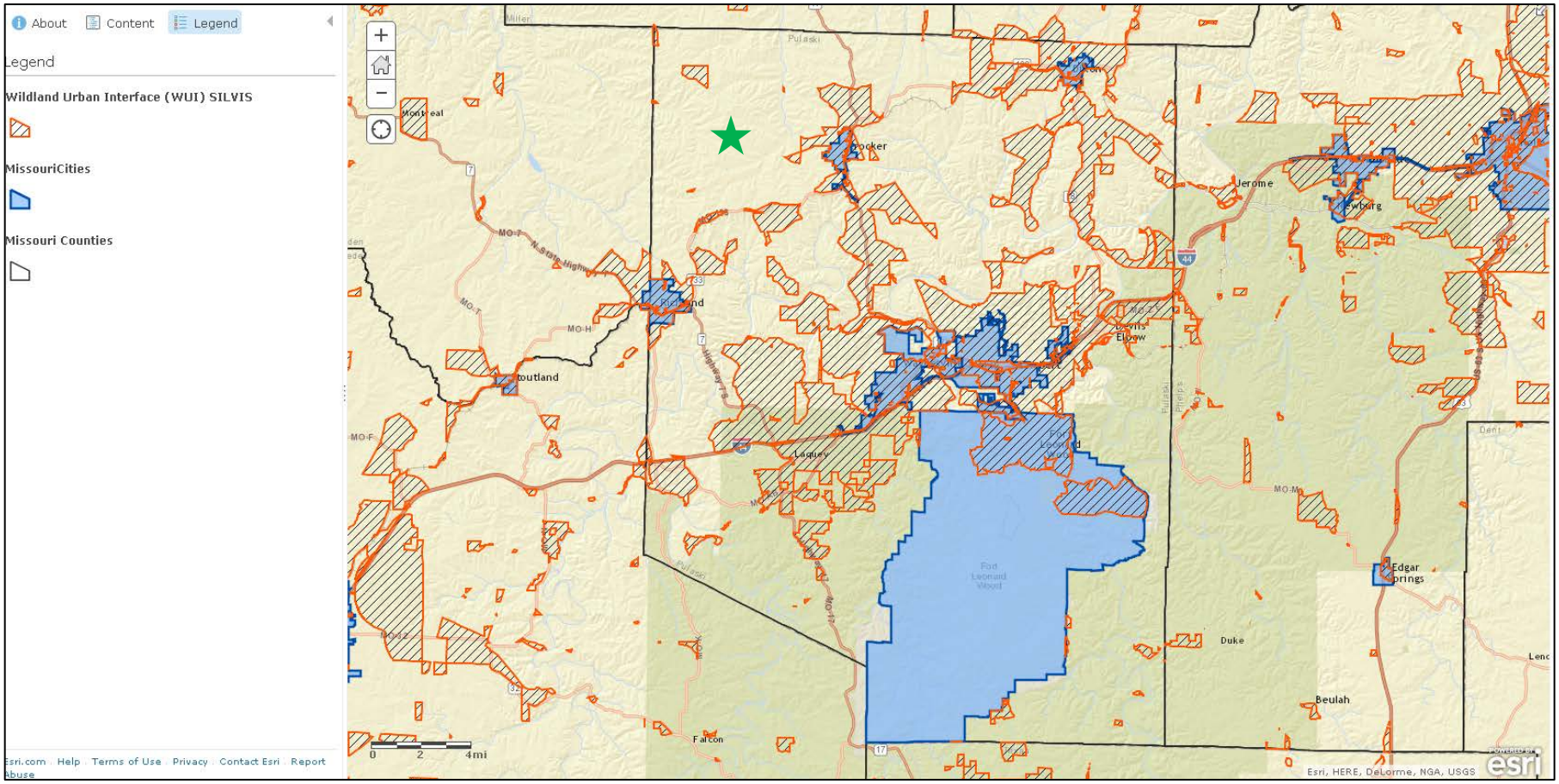
The risk of structural fire does not vary widely across the planning area. However, damages due to wildfires are expected to be higher in communities with more wildland–urban interface (WUI) areas. WUI refers to the zone of transition between unoccupied land and human development and needs to be defined in the plan. Within the WUI, there are two specific areas identified: 1) Interface and 2) Intermix. The interface areas are those areas that abut wildland vegetation and the Intermix areas are those areas that intermingle with wildland areas (**Figure 3.20**). To determine specific WUI areas and variations, data was obtain from ArcGIS, Streets and SILVIS (**Figure 3.21**). According to the WUI area map of Pulaski County, each jurisdiction resides in a WUI area.

Figure 3.20. 2010 Missouri Wildland Urban Interface (WUI)



Source: http://silvis.forest.wisc.edu/maps/wui
Note: White star roughly estimates Pulaski County's location

Figure 3.21. Pulaski County Wildlife Urban Interface



Source: ArcGIS, Streets
Note: A green star resides within Pulaski County's boundaries

Severity/Magnitude/Extent

Structural and urban fires are a daily occurrence throughout the State. Statewide, approximately 100 fatalities occur annually, as well as numerous injuries affecting the lives of the victims, their families, and many others—especially those involved in fire and medical services. Unlike other disasters, structural fires can be caused by human criminal activity: arson. All citizens pay the costs of arson whether through increased insurance rates, higher costs to maintain fire and medical services, or the costs of supporting the criminal justice system.

Wildfires damage the environment, killing some plants and occasionally animals. Firefighters have been injured or killed, and structures can be damaged or destroyed. The loss of plants can heighten the risk of soil erosion and landslides. Although Missouri wildfires are not the size and intensity of those in the Western United States, they could impact recreation and tourism in and near the fires.

Wildland fires in Missouri have been mostly a result of human activity rather than lightning or some other natural event. Wildfires in Missouri are usually surface fires, burning the dead leaves on the ground or dried grasses. They do sometimes "torch" or "crown" out in certain dense evergreen stands like eastern red cedar and shortleaf pine. However, Missouri does not have the extensive stands of evergreens found in the western US that fuel the large fire storms seen on television news stories.

While very unusual, crown fires can and do occur in Missouri native hardwood forests during prolonged periods of drought combined with extreme heat, low relative humidity, and high wind. Tornadoes, high winds, wet snow and ice storms in recent years have placed a large amount of woody material on the forest floor that causes wildfires to burn hotter and longer. These conditions also make it more difficult for fire fighters suppress fires safely.

Often wildfires in Missouri go unnoticed by the general public because the sensational fire behavior that captures the attention of television viewers is rare in the state. Yet, from the standpoint of destroying homes and other property, Missouri wildfires can be quite destructive.

No information in regards to the severity of damages from structural fires is available for Pulaski County.

Previous Occurrences

Between 2004 and 2008 there was an estimated 185 annual average of urban/structural fires in Pulaski County. Additionally, the average annual property loss was $426,824. Total deaths and injuries reported totaled 15 and 115, respectively[24].

Between 2002 and 2015, wildfires consumed 3,784.70 acres in Pulaski County. **Table 3.38** provides data in regards to general damage reports for wildfires in Pulaski County between during the same timeline.

[24] 2013 Missouri State Hazard Mitigation Plan

Table 3.38. 2002 – 2015 Wildfire General Damage Report

Building Type	Damaged	Threatened	Destroyed
Residential	3	101	0
Out Buildings	4	56	7
Commercial	1	10	0

Source:http://mdc4.mdc.mo.gov/applications/FireReporting/Report.aspx

Records for school and special districts are not available at this time.

Probability of Future Occurrence

From the data obtained from the Missouri Department of Conservation, 439 wildfire events occurred in Pulaski County between 2002 and 2015. This information was utilized to determine the annual average percent probabilities of wildfires. Since multiple occurrences are anticipated per year (439 events/13 years), the probability of wildfires per year is 100% with an average of 33.77 events per year (**Table 3.39**).

Based on information available, an educated guess in regards to the probability of future structural fires occurrence was made. The probability of structural/urban fires in Pulaski County per year is 100% with an average of 185 structural fires annually[25] (**Table 3.40**).

Table 3.39. Annual Average Percentage Probability of Wildfires in Pulaski County

Location	Annual Avg. % P	Avg. Number of Events
Pulaski County	100%	33.77

*P = probability; see page 3.24 for definition.

Table 3.40. Annual Average Percentage Probability of Structural/Urban Fires in Pulaski County

Location	Annual Avg. % P	Avg. Number of Events
Pulaski County	100%	185

*P = probability; see page 3.24 for definition.

[25] 2013 Missouri State Hazard Mitigation Plan

Vulnerability

Vulnerability Overview

Data was collected from the National Fire Incident Reporting System (NFIRS) between 2009 and 2012. The data was analyzed to delineate overall statewide vulnerability for urban/structural fires in Pulaski County. Unfortunately, 61 percent of fire departments in the State of Missouri reported occurrences to NFIRS. **Table 3.41** depicts the ranges for urban/structure fire vulnerability ratings. Furthermore, **Table 3.42** illustrates vulnerability analysis utilizing statistical data for urban/structural fires for Pulaski County between 2004 and 2008[26].

Table 3.41. Ranges for Urban/Structure Fire Vulnerability Factor Ratings

Factors Considered	Low (1)	Medium-Low (2)	Medium (3)	Medium-High (4)	High (5)
Housing Density (3 per sq. mile)	<50	50 to 99	100 to 199	200 to 499	>500
Urban Fire Likelihood (# of events/ yrs. Of data)	0 to 49	50 to 99	100 to 299	300 to 499	500+
Building Exposure ($)	<$0.5B	$0.5B to $0.9B	$1B to $1.9B	$2B to $5.9B	>$6B
Annualized Property Loss Ratio Rating (annual Property loss/exposure)	0-.000099	.0001 to .000299	.0003 to .000599	.0006 to .000999	.001+
Death/Injury Rating (2x # of deaths + # of injuries)	0 to 4	5 to 9	10 to 19	20 to 49	50+
Death/Injury/Number of events Rating (Death Injury Rating factor/ # of events)	0 to 0.1	0.1 to 0.2	0.2 to 0.3	0.3 to 0.4	0.4+
Overall Vulnerability Rating (Average of all ratings)	1 to 1.67	1.67 to 2.35	2.36 to 3.03	3.04 to 3.71	3.72 to 4.4

Source: 2013 Missouri State Hazard Mitigation Plan

[26] Ibid

Table 3.42. Statistical Data and Factor Ratings for Urban/Structure Fire Vulnerability (2004 to 2008)

County	Housing Units /sq. mi.	Housing Density Rating	Annual # Average	Likelihood Rating	Total Building Exposure ($)	Building Exposure Rating	Average Annual Property Loss ($)	Annual Property Loss Ratio	Property Loss Ratio Rating	Total Deaths/Injuries		Death/Injury Factor	Death/Injury Factor Rating	Death/Injury/# of Fires Factor	Death/Injury/# of Fires Factor Rating	Average of Factors	Overall Vulnerability Rating
Pulaski	32.7	1	185	3	3,755,326,00	4	426,824	0.000114	2	15	115	145	5	0.79	5	3.4	4

Source: 2013 Missouri State Hazard Mitigation Plan, US Census, 2010

For wildfires, data was obtained from the Missouri Department of Conservation (MDC). **Table 3.43** depicts the ranges for wildfire vulnerability factor ratings, including the two factors considered; likelihood and annualized acres burned. **Table 3.44** illustrates the statistical data and factor ratings for wildfire vulnerability. The data collected from MDC included wildfire reported between 2004 and 2012. The overall vulnerability of wildfires in Pulaski County is medium (3).

Table 3.43. Ranges for Wildfire Vulnerability Factor Ratings

Factors Considered	Low (1) Level 1 Range	Medium-low (2) Level 2 Range	Medium (3) Level 3 Range	Medium-high (4) Level 4 Range	High (5) Level 5 Range
Likelihood Rating	<29.56	29.56 to 59.11	59.12 to 88.67	88.68 to 118.23	>118.23
Annualized Acres Burned Rating	<100	100 to 199	200 to 499	500 to 999	>999
Vulnerability (Average of values above)	0.0 to 1.0	1.0 to 2.0	2.0 to 3.0	3.0 to 4.0	4.0 to 5.0

Source: 2013 Missouri State Hazard Mitigation Plan

Table 3.44. Statistical Data and Factor Ratings for Wildfire Vulnerability

County	Wildfires 2004 -2012	Average Annual # of Wildfires	Likelihood Rating 1-5	Acres Burned	Average Annual Acres Burned	Average Acres Burned Rating	Total Buildings Damaged	Overall Vulnerability
Pulaski	266	29.6	2	2597.3	289	3	1	3

Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

Due to numerous variables, there is no reliable or accurate way to approximate costs associated with structural or wildfire events. Additionally, no information was available for historic losses, which would enable the estimation of future losses. However with annual average percent probabilities for structural/urban and wildfires at 100 percent, losses to existing developments are expected.

Impact of Future Development

Since Pulaski County is expected to lose approximately 6,000 individuals over the next 5 to 15 years, future development is hard to quantify. Additionally, as previously mentioned, each jurisdiction within the County resides in a WUI area. This increases the risk of fire hazards for future development.

Hazard Summary by Jurisdiction

As long as drought conditions are not seriously inflamed, future wildfires in Pulaski County should have a negligible adverse impact on the community, as it would affect a small percentage of the population. Nonetheless, homes and businesses located in unincorporated areas are at higher risk from wildfires due to proximity to woodland and distance from fire services. Variations in both structural/urban and wildfires are not able to be determined at this time due to lack of data. However, both fire types are expected to occur on an annual basis across the County.

Problem Statement

Both structural/urban fires and wildfires are expected to occur on an annual basis. To mitigate adverse impacts a comprehensive community awareness and educational campaign on wildfire danger should be designed and implemented. This campaign should include the development of capabilities, systems, and procedures for pre-deploying fire-fighting resources during times of high wildfire hazards; training of local fire departments for wildfire scenarios; encouraging the development and dissemination of maps relating to the fire hazards (WUI areas) to help educate and assist builders and homeowners in being engaged in wildfire mitigation activities; and guidance of emergency services during response.

3.4.6 Flooding (Flash and River)

Some specific sources for this hazard are:

- Watershed map, Environmental Protection Agency, http://cfpub.epa.gov/surf/county.cfm?fips_code=19169
- FEMA Map Service Center, Digital Flood Insurance Rate Maps (DFIRM) for all jurisdictions, if available, msc.fema.gov/portal
- NFIP Community Status Book, http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book
- NFIP claims status, BureauNet, http://bsa.nfipstat.fema.gov/reports/reports.html
- Flood Insurance Administration—Repetitive Loss List (this must be requested from the State Floodplain Management agency or FEMA)
- National Climatic Data Center, Storm Events Database, http://www.ncdc.noaa.gov/stormevents/
- USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm

Profile

Hazard Description

A flood is partial or complete inundation of normally dry land areas. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt, or ice. There are several types of riverine floods, including headwater, backwater, interior drainage, and flash flooding. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater during rapid runoff are called floodplains. A floodplain is defined as the lowland and relatively flat area adjoining a river or stream. The terms “base flood” and “100- year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin, which is defined as all the land drained by a river and its branches.

Flooding caused by dam failure is discussed in **Section 3.4.1.** It will not be addressed in this section.

A flash flood occurs when water levels rise at an extremely fast rate as a result of intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the National Flood Insurance Program (NFIP), and can also happen in areas not associated with floodplains.

Ice jam flooding is a form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow. This creates a natural dam, often causing flooding within minutes of the dam formation.

In some cases, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding, often referred to as sheet flooding, is becoming increasingly prevalent as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow.

Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with rainfall trends and rainfall extremes all demonstrate the high probability, yet generally unpredictable nature of flash flooding in the planning area.

Although flash floods are somewhat unpredictable, there are factors that can point to the likelihood of flash floods occurring. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. This, along with knowledge of the watershed characteristics, modeling techniques, monitoring, and advanced warning systems has increased the warning time for flash floods.

Geographic Location

Riverine flooding is most likely to occur in SFHAs. Below are SFHA's for all participating jurisdictions except unincorporated Pulaski County (**Figure 3.22** to **Figure 3.27**). Included in the maps are public schools within each jurisdiction. **Table 3.45** shows Pulaski County NCDC flood events by location between 1995 and 2015.

Figure 3.22. Pulaski County Hazus Flood Model

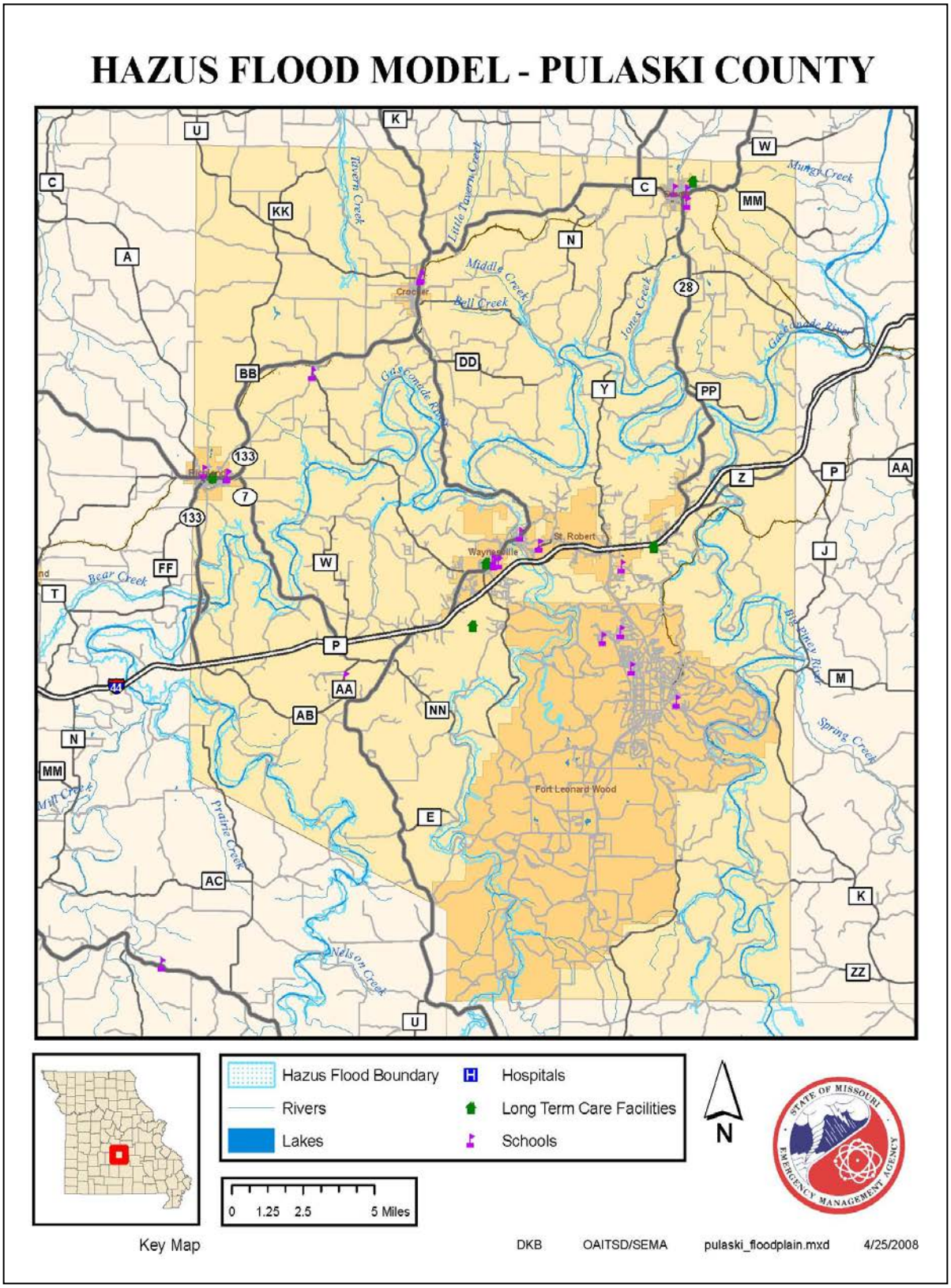
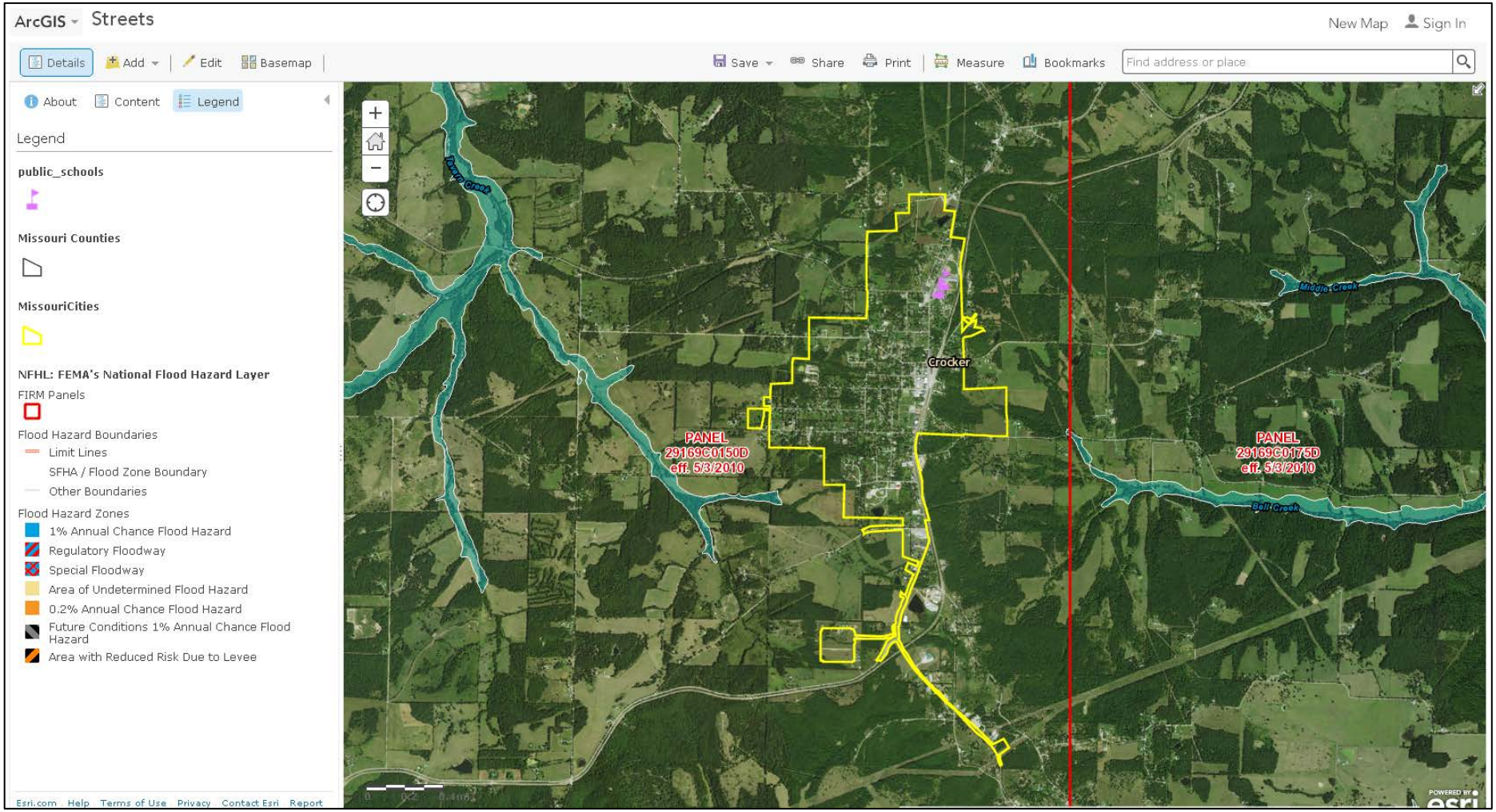
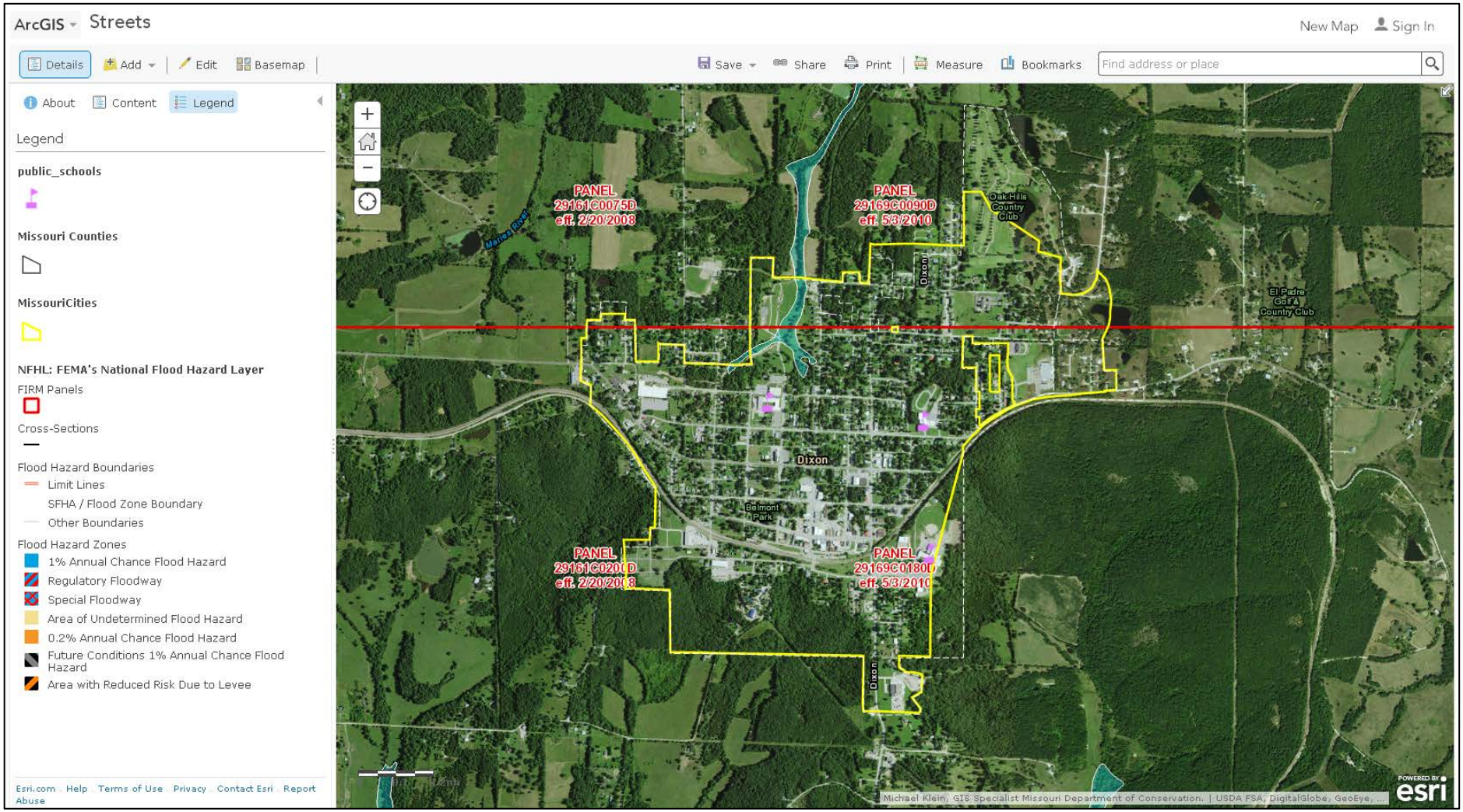


Figure 3.23. Crocker, Missouri Special Flood Hazard Areas (SFHAs)



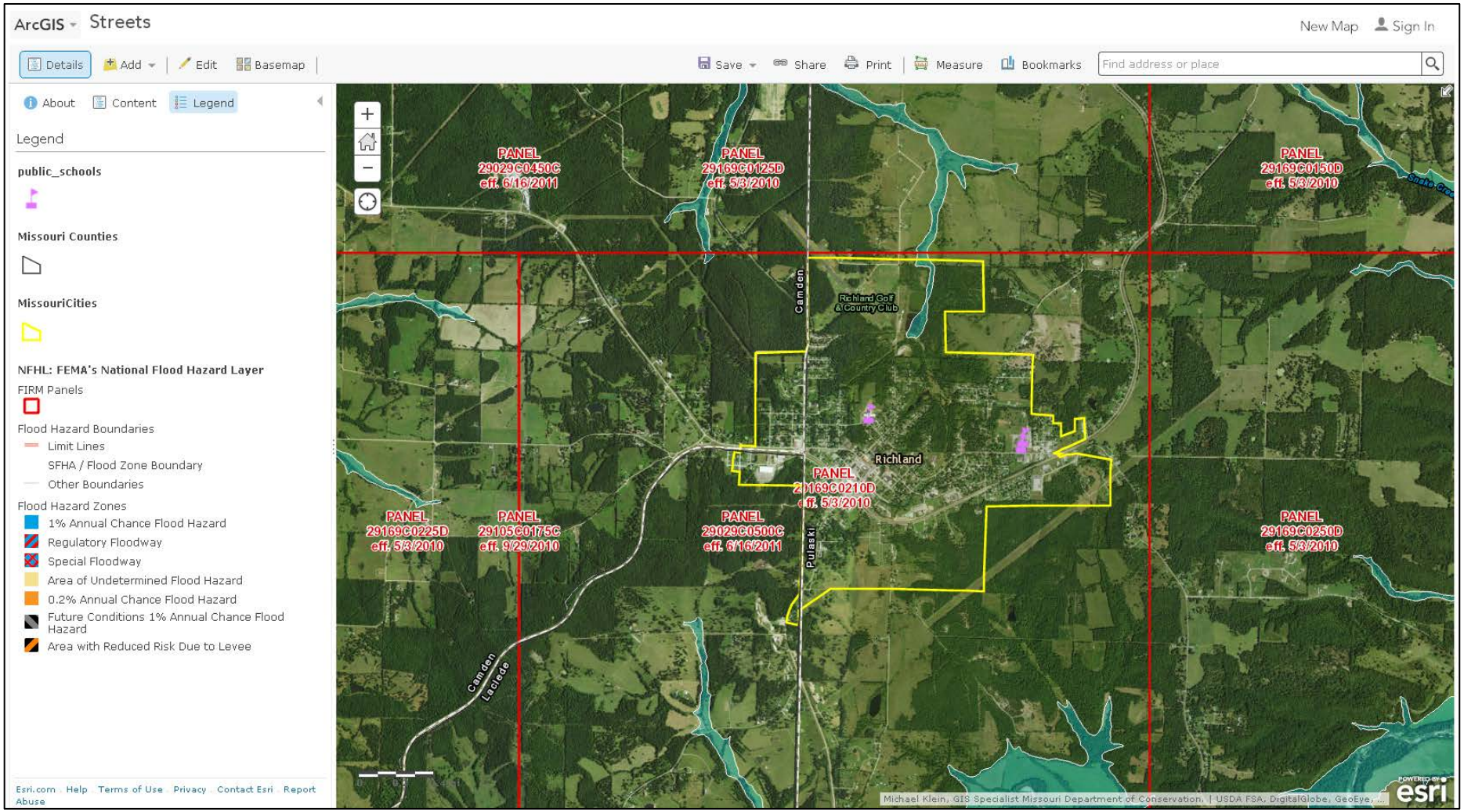
Source: ESRI's ArcGIS, Streets

Figure 3.24. Dixon, Missouri Special Flood Hazard Areas (SFHAs)



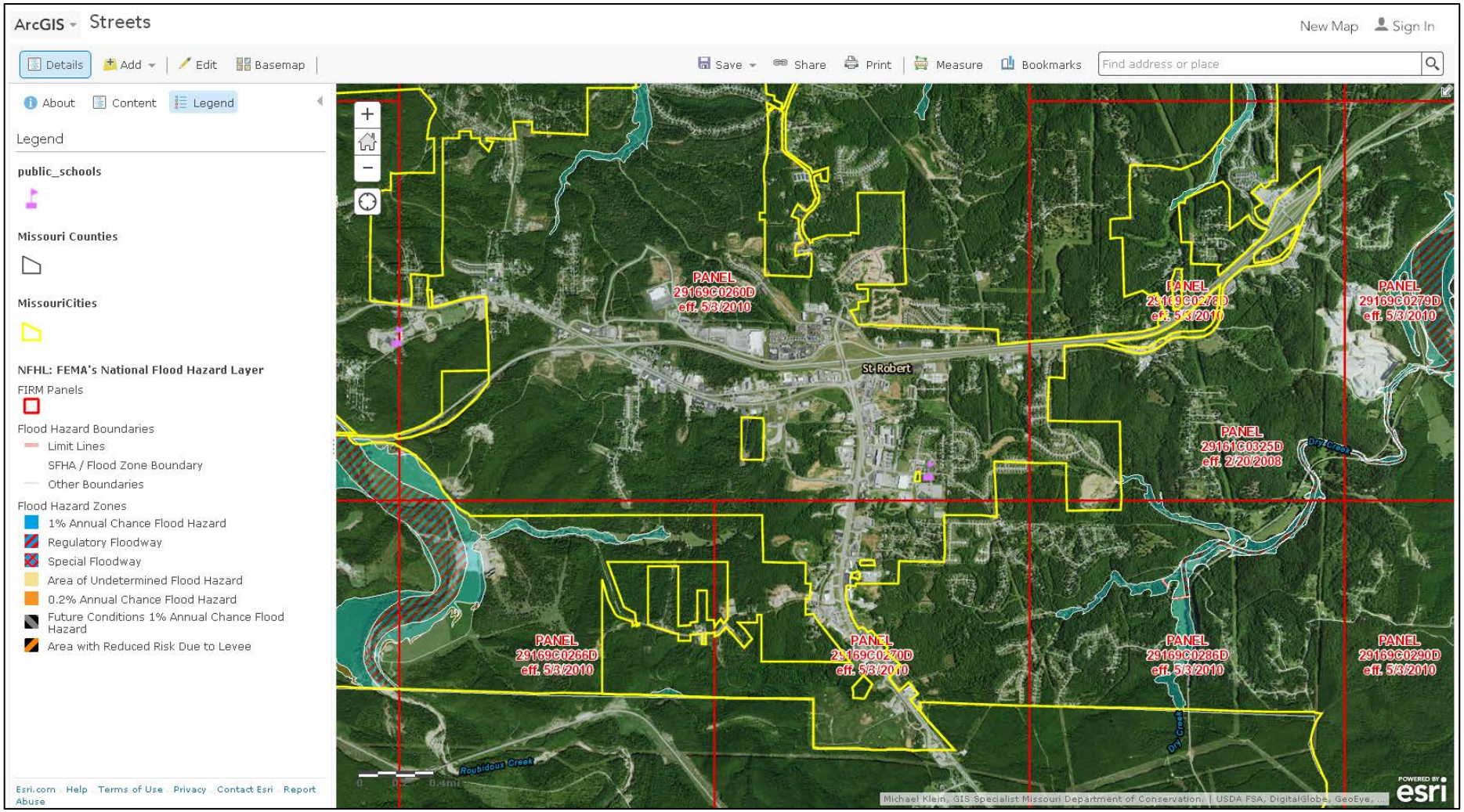
Source: ESRI's ArcGIS, Streets

Figure 3.25. Richland, Missouri Special Flood Hazard Areas (SFHAs)



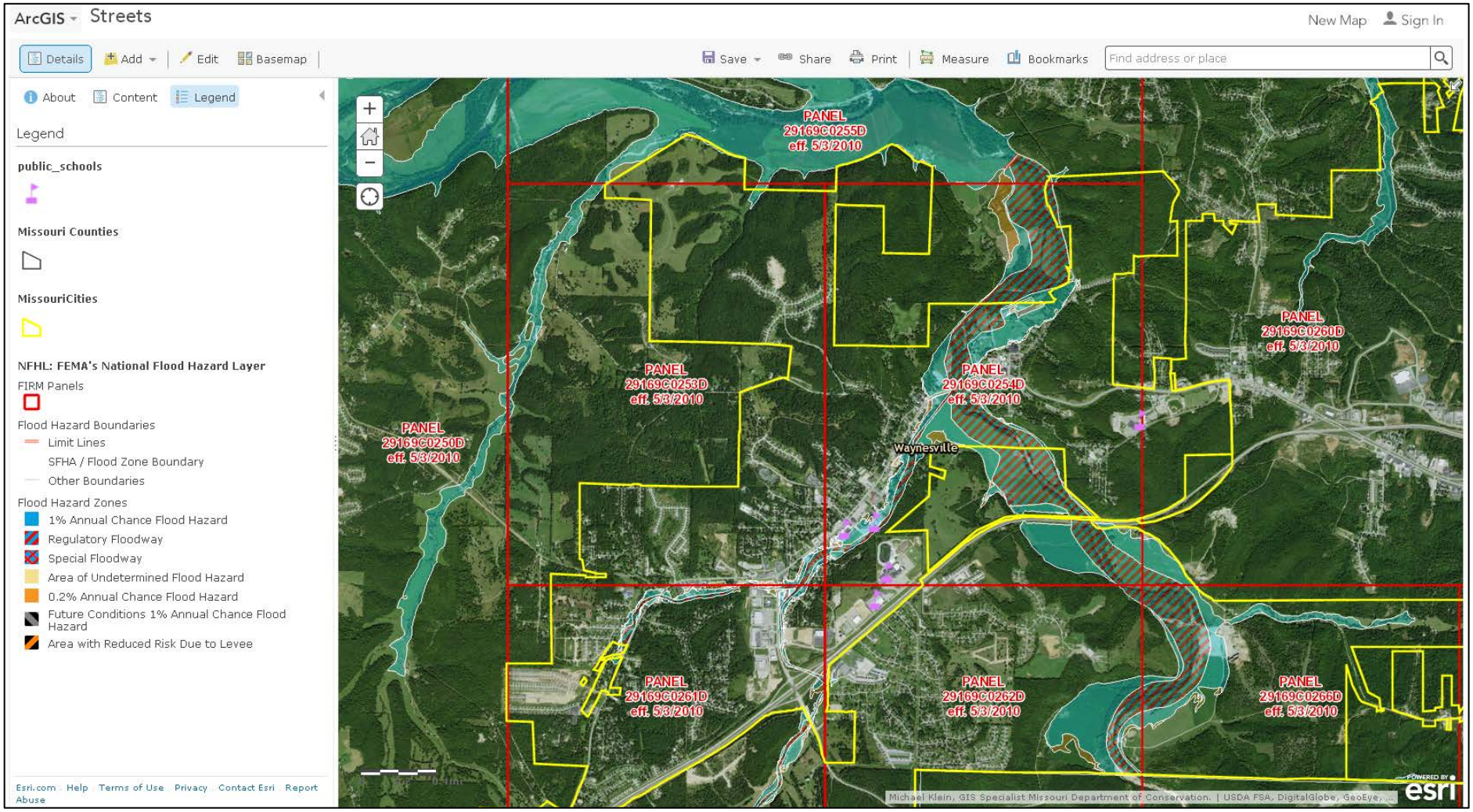
Source: ESRI's ArcGIS, Streets

Figure 3.26. St. Robert, Missouri Special Flood Hazard Areas (SFHAs)



Source: ESRI's ArcGIS, Streets

Figure 3.27. Waynesville, Missouri Special Flood Hazard Areas (SFHAs)



Source: ESRI's ArcGIS, Streets

Table 3.45. Pulaski County NCDC Flood Events by Location, 1995-2015

Location	# of Events
Unincorporated County	13
-Unincorporated County (unspecified)- 9 flood events	
-Unincorporated County (Helm)- 2 flood events	
-Unincorporated County (Gospel Ridge)- 2 flood events	
Crocker	1
-Crocker (unspecified)- 1 flood events	
Waynesville	1
-Waynesville (unspecified)- 1 flood events	

Source: National Climatic Data Center

Flash flooding occurs in SFHAs and locations in the planning area that are low-lying. They also occur in areas without adequate drainage to carry away the amount of water that falls during intense rainfall events. After review of NCDC data, Unincorporated Pulaski County and Waynesville are the most prone jurisdictions to flash flooding events. **Table 3.46** provides information in regards to flash flood events between 1995 and 2015.

Table 3.46. Pulaski County NCDC Flash Flood Events by Location, 1995-2015

Location	# of Events
Unincorporated County	19
-Unincorporated County (unspecified)- 2 flood events	
-Unincorporated County (Bloodland)-1 flood events	
-Unincorporated County (Buckhorn)- 1 flood events	
-Unincorporated County (Devils Elbow)- 1 flood events	
-Unincorporated County (Franks)- 2 flood events	
-Unincorporated County (Hanna)- 1 flood events	
-Unincorporated County (Hawkeye)- 2 flood events	
-Unincorporated County (Helm)- 4 flood events	
-Unincorporated County (Laquey)- 1 flood events	
-Unincorporated County (Robert)- 1 flood events	
-Unincorporated County (Turkey Ridge)- 3 flood events	
Crocker	5
-Crocker (unspecified)- 5 flood events	
Dixon	7
-Dixon (unspecified)- 7 flood events	
Richland	2
-Richland (unspecified)- 2 flood events	
St. Robert	2
-St. Robert (unspecified) – 2 flood events	
Waynesville	14
-Waynesville (unspecified) – 14 flood events	

Source: National Climatic Data Center

Severity/Magnitude/Extent

Missouri has a long and active history of flooding over the past century, according to the 2010 State Hazard Mitigation Plan. Flooding along Missouri's major rivers generally results in slow-moving disasters. River crest levels are forecast several days in advance, allowing communities downstream sufficient time to take protective measures, such as sandbagging and evacuations. Nevertheless, floods exact a heavy toll in terms of human suffering and losses to public and private property. By contrast, flash flood events in recent years have caused a higher number of deaths and major property damage in many areas of Missouri.

Flooding presents a danger to life and property, often resulting in injuries, and in some cases, fatalities. Floodwaters themselves can interact with hazardous materials. Hazardous materials stored in large containers could break loose or puncture as a result of flood activity. Examples are bulk propane tanks. When this happens, evacuation of citizens is necessary.

Public health concerns may result from flooding, requiring disease and injury surveillance. Community sanitation to evaluate flood-affected food supplies may also be necessary. Private water and sewage sanitation could be impacted, and vector control (for mosquitoes and other entomology concerns) may be necessary.

When roads and bridges are inundated by water, damage can occur as the water scours materials around bridge abutments and gravel roads. Floodwaters can also cause erosion undermining road beds. In some instances, steep slopes that are saturated with water may cause mud or rock slides onto roadways. These damages can cause costly repairs for state, county, and city road and bridge maintenance departments. When sewer back-up occurs, this can result in costly clean-up for home and business owners as well as present a health hazard. Further information regarding scour critical bridges can be found in **Section 3.2.2**.

National Flood Insurance Program (NFIP) Participation

Table 3.47 lists jurisdictions within the planning area that participate in NFIP. **Table 3.48** provides NFIP policy and claim statistics as of January, 1978 to July, 2015.

Table 3.47. NFIP Participation in Pulaski County

Community ID Number	Community Name	NFIP Participant (Y/N)	Current Effective Map Date	Regular-Emergency Program Entry Date
290826	Pulaski County	Y	05/03/10	04/17/1985
290656	City of Richland	Y	-	09/10/1984
290662	City of St. Robert	Y	05/03/10	11/30/2004
290300	City of Waynesville	Y	05/03/10	10/06/1976

Source: NFIP Community Status Book, 3/28/2016; BureauNet, http://www.fema.gov/national-flood-insurance-program/national- flood-insurance-program-community-status-book; M= No elevation determined – all Zone A, C, and X: NSFHA = No Special Flood Hazard Area; E=Emergency Program

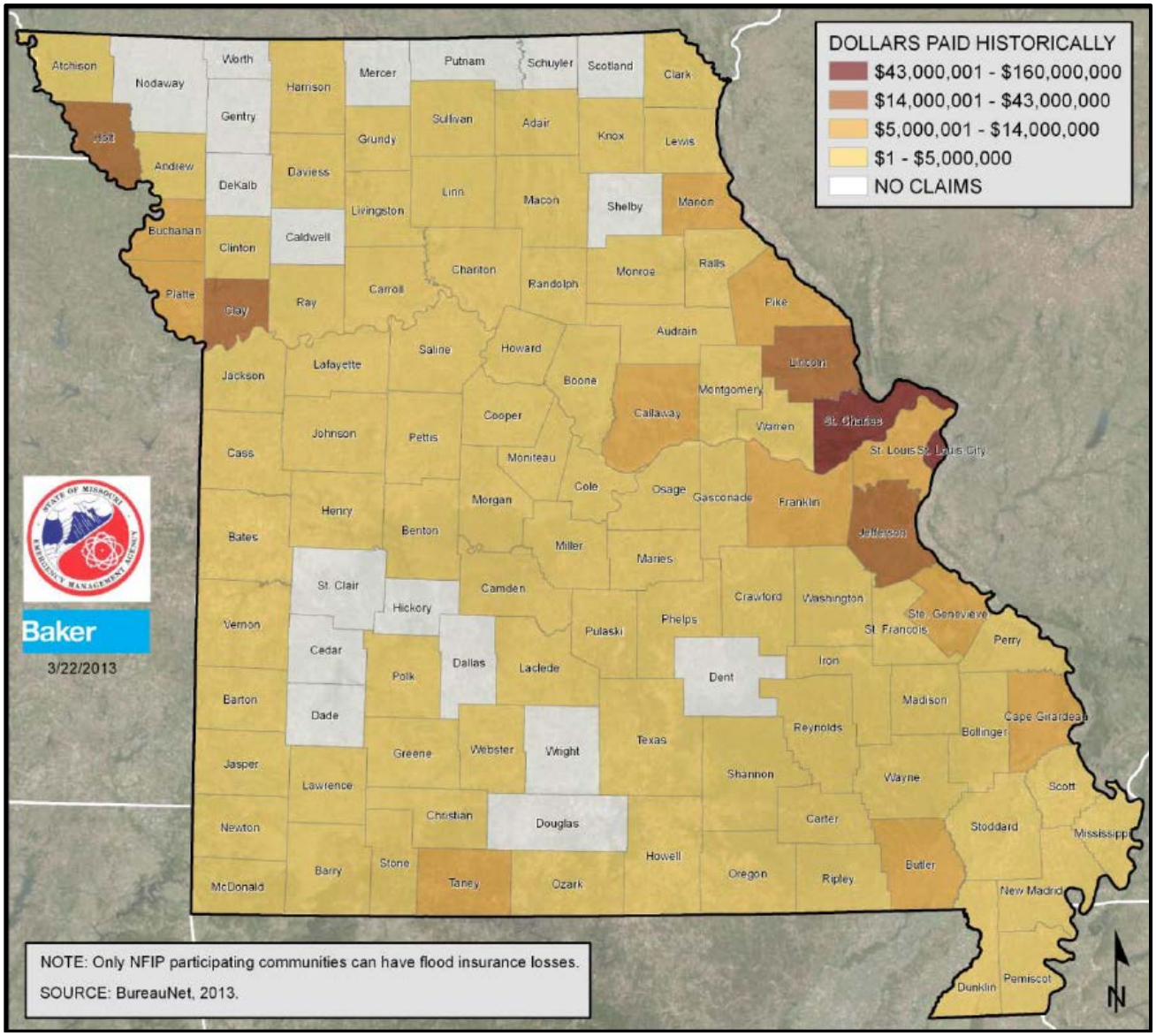
Table 3.48. NFIP Policy and Claim Statistics as of January, 1978 to July, 2015

Community Name	Closed Losses	Total Payments ($)
Pulaski County	75	$2,231,987.32
City of Waynesville	86	$1,435,041.28

Source: NFIP Community Status Book, [7/31/2015]; BureauNet, http://bsa.nfipstat.fema.gov/reports/reports.html;
*Closed Losses are those flood insurance claims that resulted in payment. Loss statistics are for the period from January 1, 1978 to August 31, 2015.

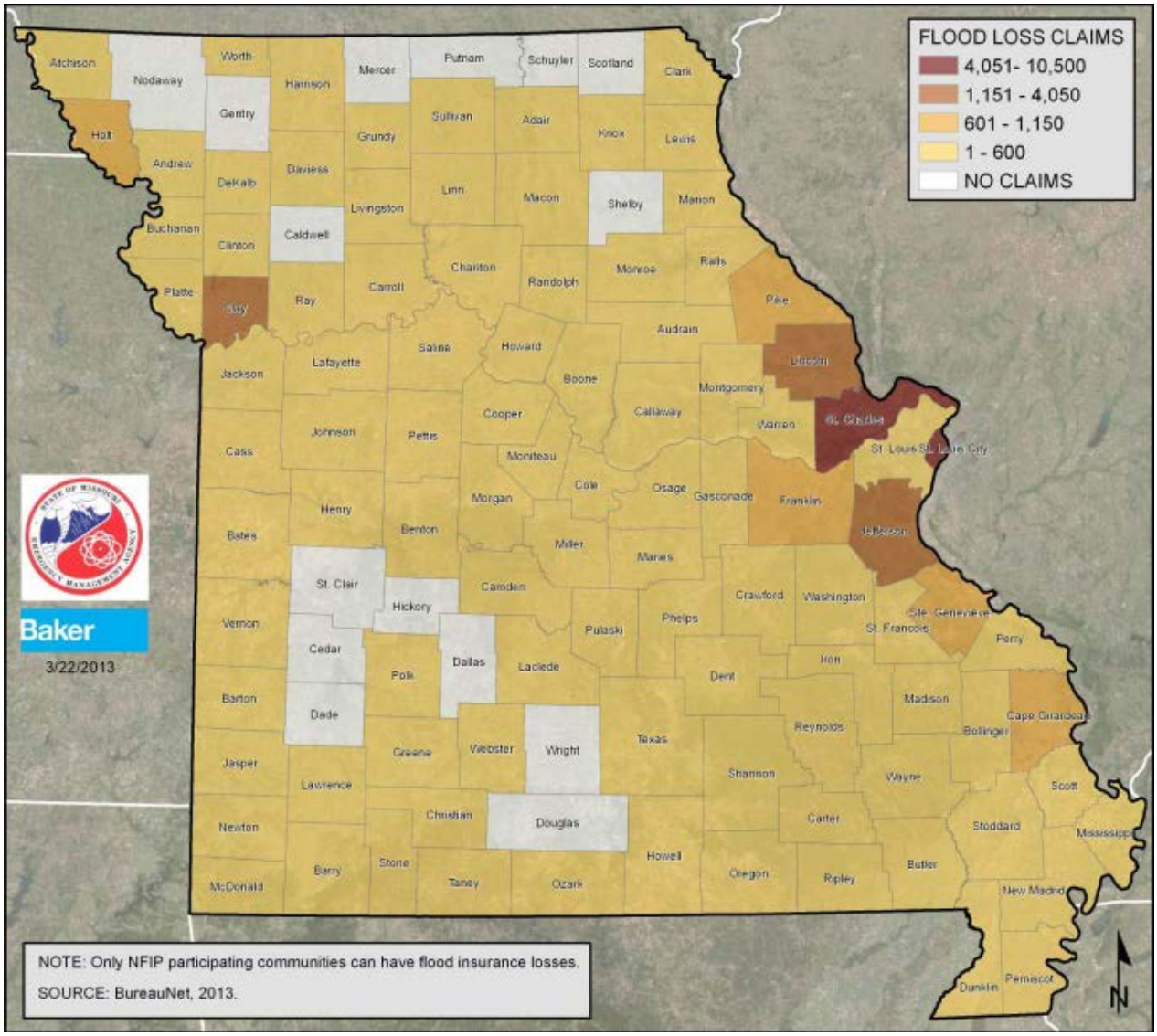
The following figures depict the dollars paid historically for flood insurance losses in Missouri by County from 1978 to Jan. 2013 (**Figure 3.28**), and historical flood loss claims in Missouri by County, 1979 to Jan. 2013 (**Figure 3.29**).

Figure 3.28. Dollars Paid Historically for Flood Insurance Losses in Missouri by County, 1978 to Jan. 2013



Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.29. Historical Flood Loss Claims in Missouri by County, 1978 to Jan. 2013



Source: 2013 Missouri State Hazard Mitigation Plan

Repetitive Loss/Severe Repetitive Loss Properties (data requested from SEMA)

Repetitive Loss Properties are those properties with at least two flood insurance payments of $5,000 or more in a 10-year period. According to the Flood Insurance Administration, jurisdictions included in the planning area have a combined total of 30 repetitive loss properties with 73 losses as of 2/29/16. Of those properties there are 28 Non-Mitigated properties with 67 losses, which 23 properties are residential and 5 commercial. There are two Mitigated properties with six losses and both properties are residential.

Total payments were $110,528.12 with building payments of $90,267.42, along with $20,260.70 in content payments. The average payment was $18,421.35. Non-mitigated properties included total payments of $2,065,862.07 with building payments of $1,838,112.45, along with $227,749.62 in content payments. The average payment was $29,311.32.

According to the FEMA Repetitive Loss list there are 6 properties and all are validated.
Severe Repetitive Loss (SRL): A SRL property is defined it as a single family property (consisting of one-to-four residences) that is covered under flood insurance by the NFIP; and has (1) incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage with the amount of each claim payment exceeding $5,000 and with cumulative amounts of such claims payments exceeding $20,000; or (2) for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property. According to FEMA there is one SRL property that is validated in Pulaski County.

Previous Occurrences

Table 3.49 provides information in regarding Presidential Flooding Disaster Declarations between 1993 and 2015 for Pulaski County.

Table 3.49. Pulaski County Presidential Flooding Disaster Declarations 1993 to 2015

Declaration No.	Date	Missouri	Incident Description
995	7/9/1993	Missouri	Flooding, Severe Storm
1006	12/1/1993	Missouri	Flooding, Severe Storms, Tornadoes
1023	4/21/1994	Missouri	Severe Storms, Tornadoes, Flooding
1463	5/6/2003	Missouri	Severe Storms, Tornadoes, Flooding
1676	1/15/2007	Missouri	Severe Winter Storms, Flooding
1749	03/19/2008	Missouri	Severe Storms, and Flooding
1847	06/19/2009	Missouri	Severe Storms, Tornadoes, and Flooding
1980	5/9/2011	Missouri	Severe Storm, Tornadoes, Flooding
4144	9/6/2013	Missouri	Severe Storms, Straight-line Winds, Flooding

FEMA, Disaster Declarations for Missouri, Flooding

Data was obtained from the NCDC in regards to flash and river flooding over the last 20 years. **Table 3.50** and **Table 3.51** provide this information. Additionally, narratives available for each event are included.

Table 3.50. NCDC Pulaski County Flash Flood Events Summary, 1995 to 2015

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
1997	1	0	0	0	0
1998	2	0	0	0	0
2002	3	0	0	500,000	0
2005	7	0	0	25,000	0
2006	1	0	0	0	0
2007	4	0	0	2,000	0
2008	7	0	0	1,000,000	0
2009	5	0	0	20,000	0
2010	1	0	0	0	0
2012	3	0	0	0	0
2013	14	2	0	5,100,000	0
2014	1	0	0	0	0

Source: NCDC, data accessed [10/14/2015]

Narratives on flood events:

1. **08/19/1997:** Flooding of low water crossings and low lying areas occurred in many areas of the county. Street flooding was reported in Waynesville.

2. **03/18/1998:** Heavy rain caused flooding along Tavern Creek, closing sections of Highway U.

3. **03/19/1998:** Heavy rain resulted in flooding of numerous low water crossings in the county. Highway 133 near Richland was closed.

4. **04/20/2005:** Numerous roads and low lying areas were inundated with flash flooding. Several areas were impassable to motorists.

5. **06/09/2005:** Heavy thunderstorms caused flash flooding in the community of Richland. Several homes and businesses were flooded.

6. **06/10/2005:** Heavy thunderstorms cause flash flooding in a few buildings in downtown Dixon.

7. **08/22/2005:** Thunderstorms with heavy rain cause flash flooding to occur over several sections of Missouri Avenue on the south side of St. Robert.

8. **05/29/2006:** Excessive rainfall caused flash flooding on several streets in the city of Waynesville.

9. **03/30/2007:** Heavy thunderstorms produce flooding rains in the Laquey area. A low water crossing on Red Oak Road was flooding and impassable. County road crews were called out to repair several roads that were washed out as a result of the heavy rainfall and flooding across the county.

10. **05/10/2007:** Excessive rainfall created flooding in areas of Pulaski County. Jones Creek was flooding over Highway O causing impassable conditions to motorists.

11. **08/20/2007:** The Gasconade River rapidly flooded areas near the Gasconade Hills Resort from excessive rainfall associated with Tropical Storm Erin. A section of Route H two miles south of Interstate 44 was affected.

12. **09/07/2007:** Thunderstorms with excessive rainfall caused creeks and streams near Dixon to experience minor flooding.

13. **01/07/2008:** Excessive rainfall caused Jones Creek to flood areas near the intersection of Highway O and Creek Road.

14. **03/18/2008:** Rainfall amounts ranged from five to nine inches over Pulaski County. Southern sections of the county experienced the greatest rainfall, though all areas that typically experiences flooding during periods of excessive rain were affected. Damage was reported on county roads and bridges.

15. **03/31/2008:** Saturated antecedent conditions existed prior to this period of excessive rainfall. Some regional locations experienced record rainfall totals from February and March. One to three inches of rain fell across the county causing widespread flash flooding of low water crossings, county roads, and low lying areas near creeks and rivers. Ultimately, all locations that typically flood during periods of excessive rainfall were flooded.

16. **04/10/2008:** One to two inches of rain fell over Pulaski County. All low areas that typically flood during periods of excessive rainfall were flooded. One specific location that flooded included a section of Highway O approximately one and a half miles west of Highway 28.

17. **05/07/2008:** A few roads across the county were flooded. The area that appeared to be impacted the greatest was near Fort Leonard Wood.

18. **05/25/2008:** The Roubidoux River flooded a section of Dyer Street.

19. **09/14/2008:** Three to five inches of rain fell over Pulaski County resulting in flooding of small streams, creeks, and two rivers. The Gasconade and Big Piney rivers appeared to be impacted the greatest as they flooded numerous roads and low lying areas. Low water crossings countywide were impassable to motorists. Also, a section of Highway 133 at Fox Crossing was closed due to flooding, while numerous city streets in Dixon were flooded. A section of Highway O at its intersection with Jones Creek was flooded.

20. **05/08/2009:** Two to four inches of rain caused flash flooding over sections of Fort Leonard Wood.

21. **06/10/2009:** Excessive rain caused flooding along a section of Smokey Road just south of its intersection with Highway AB. This stream that flooded was a tributary of the Gasconade River.

22. **06/15/2009:** Two to five inches of rain fell over central and northern Pulaski County. Flash flooding resulted over several locations including a section of Texas Road, a section of Highway O, and a section of Highway U. The section of Texas Road that flooded was completely washed out.

23. **06/16/2009:** Excessive rain caused Tavern Creek to flood a section of Highway U west of Crocker.

24. **10/29/2009:** Route O near Jones Creek was closed due to flooding.

25. **07/08/2010:** State Highway Y, near the intersection of Lydia Lane was water covered.

26. **03/15/2012:** A portion of Highway 28 south of Dixon was flooded.

27. **04/14/2012:** A foot of water was reported flowing over Highway O along Jones Creek.

28. **05/29/2012:** Two feet of water was reported over the road near the intersection of Highway O and Creek Road.

29. **08/06/2013:** Mitchell Creek flooded residential and business areas of Waynesville.
    a. Several roadways at Fort Leonard Wood were under water and impassable due to flash flooding.
    b. There were reports from social media of severe flooding near downtown Waynesville and water entering numerous homes.
    c. This storm report will be a summary of the total damage for the Waynesville area and Pulaski County for this flooding event. Approximately 90 percent of the roads in the county were damaged with 65 percent of the roads had major damage. There were 25 low water crossings that were totally washed out and numerous more needed repairs. There were up to 100 homes and businesses that were inundated by flood waters. Numerous cars were flooded or washed away. Most of the homes flooded were along Mitchell Creek and Roubidoux River near downtown Waynesville. Over 100 people were rescued from swift and high water. There were two flash flood fatalities which occurred near downtown Waynesville.
    d. A rescue boat with several personnel capsized in high water and was later rescued.
    e. Interstate 44 was closed due to high water.
    f. Highway 7 just north of Interstate 44 was closed due to high water.
    g. Route N near Springfield Road was closed due to high water.
    h. Route N near Stockton Road was closed due to high water.
    i. Two sheriff deputies were stranded near Highway 7 and the Gasconade River by high water.
    j. Route U near Tavern Creek was closed due to flooding.
    k. Pulaski County Sheriff reported at least 100 hundred homes and businesses were flooded.

30. **08/07/2013:** Widespread flooding was reported around the Dixon area from the Maries River. Several homes had water in them and numerous streets were impassable.
    a. Numerous roads were closed due to flood waters. Several water rescues were performed across the county. No injuries were reported from the water rescues. The Emergency Operations Center reported around three inches of rain during the overnight hours.

31. **04/03/2014:** Mitchel Creek overflowed with 2 feet of water over Dyer Road.

Table 3.51. NCDC Pulaski County Riverine Flood Events Summary, 1995 to 2015

Year	Number of Events	Number of Deaths	Number of Injuries	Property Damage	Crop Damages
1998	1	0	0	0	0
2002	6	0	0	200,000	0
2005	2	0	0	0	0
2008	2	0	0	0	0
2010	2	0	0	0	0
2011	2	0	0	500,000	0

Source: NCDC, data accessed [10/14/2015]

Narratives:

1. **1/31/2002:** Hardest hit areas were in Pulaski and Shannon Counties where Cave, Spring, and Creek roadways along the Big Piney River, and Highway H between 16 and 106, were closed for nearly 24 hours.

2. **05/08/2002:** After several inches of rain, residents of Waynesville along the Roubidoux River were evacuated because of high water. The high water also covered Spring Street and the RV Park which caused campers to evacuate to higher ground.

3. **01/05/2005:** Numerous roads and low lying areas were inundated and impassable by motorists countywide. Some locations that were affected by flooding include, Highway O near Dixon, areas near Jones Creek, a section of Texas Road, and a section of Cave Road near St. Robert.

4. **1/13/2005:** The primary areas that flooded were low water crossings and low lying areas.

5. **03/19/2008:** This flooding is a continuation of the flash flooding. Poor drainage areas continued to flood roadways and lowlands near rivers and creeks.

6. **09/03/2008:** A few locations within Pulaski County flooded from rainfall amounts that ranged from four to six inches. These locations included a section of Highway O at its intersection with Jones Creek, a section of Canyon Road at its intersection with Mill Creek, and a section of Highway O southwest of Dixon.
7. **04/02/2010:** A portion of State Route H was closed due to high water.

8. **05/15/2010:** Multiple low water crossings were closed due to flooding across the county.

9. **04/25/2011:** Numerous low water crossings and rural roads were flooded in the county. The most intense flooding was in the southern portion of the County. The total cost estimate for flooding damages for Pulaski County for this entire episode has been included. This includes roads, bridges, and structures which were affected.

10. **05/19/2011:** Route O was closed due to flooding.

Probability of Future Occurrence

From the data obtained from the NCDC[27], there were 15 riverine flooding events (**Table 3.511)** over a period of 20 years. This information was utilized to determine the annual average percent probability of riverine flooding (**Table 3.52**). The probability of riverine flooding in Pulaski County per year is 75% (15 events/20 years x 100 = 75%). Furthermore, data was obtained for flash flooding within the County. Pulaski County endured 49 flash flooding events (**Table 3.500**) over a 20 year period. Since multiple occurrences are anticipated per year (49 events/20 years) the probability of flash flooding is 100%, with an average of 2.45 events annually (**Table 3.53**).

Table 3.52. Annual Average % Probability of Riverine Flooding in Pulaski County

Location	Annual Avg. % P
Pulaski County	75%

*P = probability; see page 3.24 for definition.

Table 3.53. Annual Average % Probability of Flash Flooding in Pulaski County

Location	Annual Avg. % P	Avg. Number of Events
Pulaski County	100%	2.45

*P = probability; see page 3.24 for definition.

Vulnerability

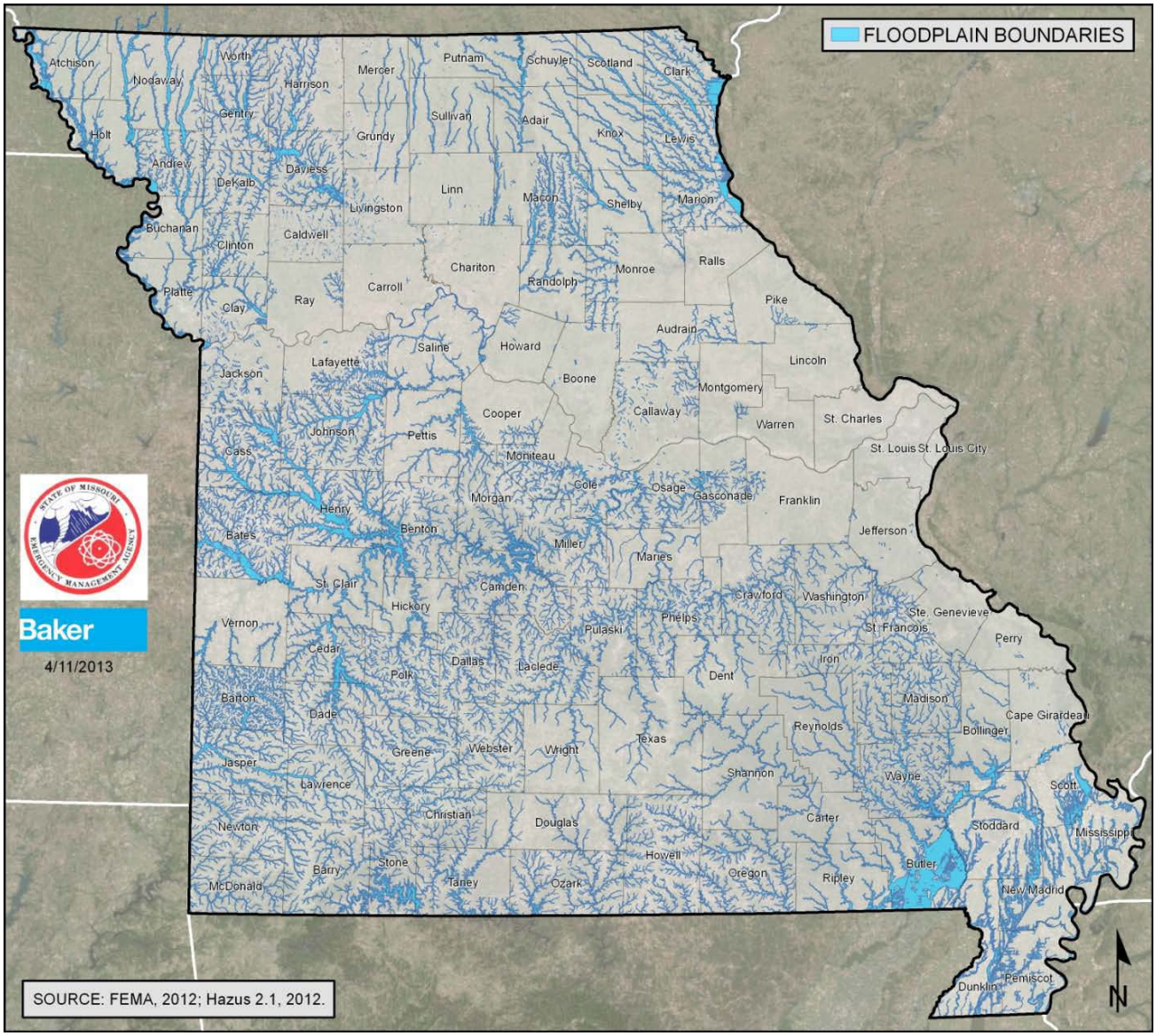
Vulnerability Overview

For the vulnerability analysis of riverine and flash flooding for Pulaski County, data was obtained from the 2013 Missouri State Hazard Mitigation Plan. The 2013 Plan was updated by enhancing the flood vulnerability assessment and loss estimation capabilities of Hazus by leveraging a number of improved local data inputs. This was achieved by integrating DFIRM depth grids for 51 additional counties. Furthermore, the State re-analyzed the previous 29 depth grids used in 2010, to utilize the latest enhancements available in Hazus 2.1; bringing the total number of regions analyzed using DFIRM depth grids to 80 jurisdictions. The subsequent set of improved data inputs included an enhanced building inventory database, which is an improvement over the standard Hazus 2.1 stock data. That data, coupled with the DFIRM depth grids, enabled Level 2 Hazus flood analysis for all 114 counties[28].

Figure 3.30 depicts the 100-year floodplain boundaries for all counties within Missouri. These DFIRM floodplains are comprised of streams based on a <1 sq. mile drainage area.

[27] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI
[28] 2013 Missouri State Hazard Mitigation Plan

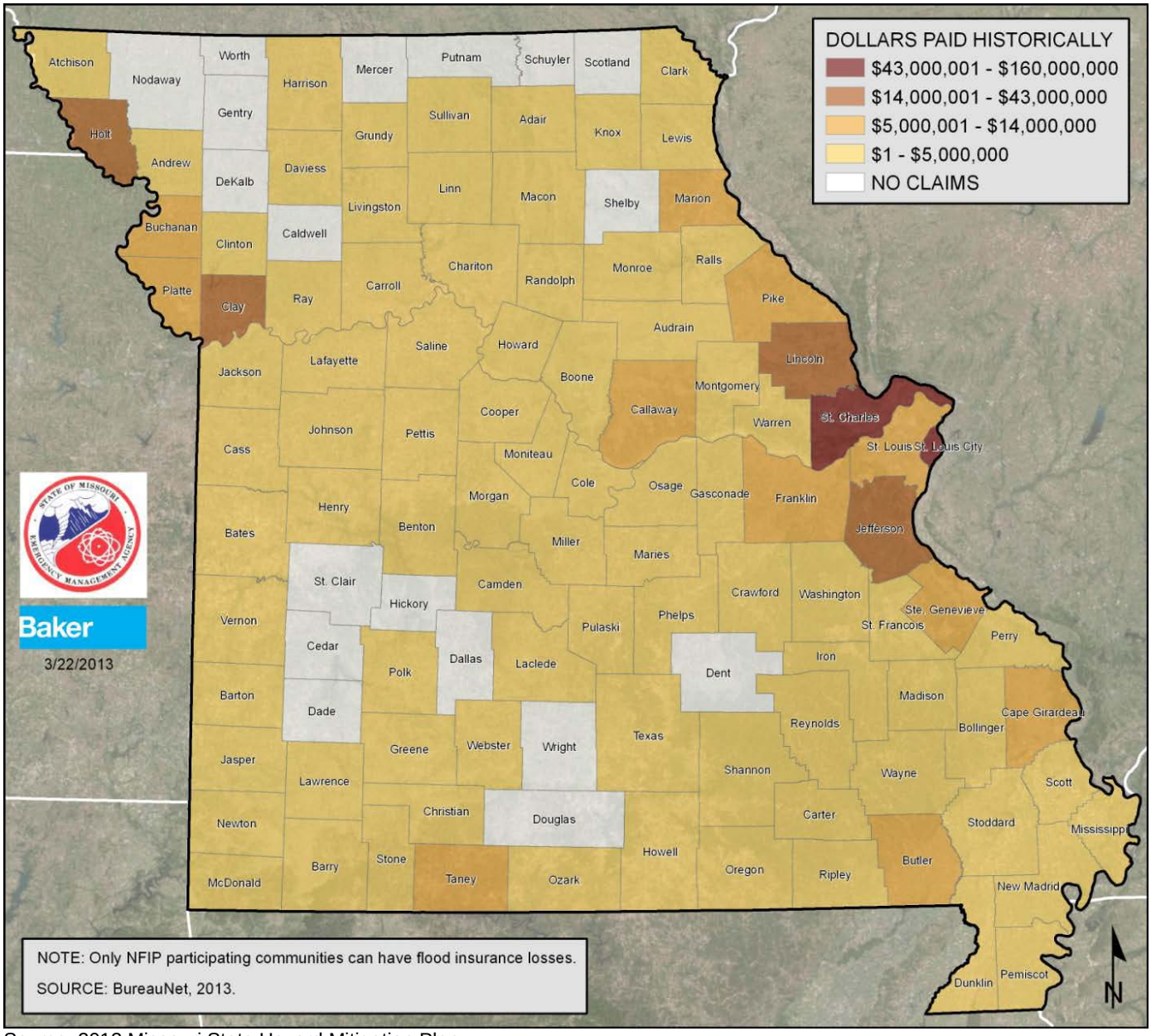
Figure 3.30. DFIRM and Hazus Countywide Base-Flood Scenarios: Modeled Floodplain Boundaries



Source: 2013 Missouri State Hazard Mitigation Plan

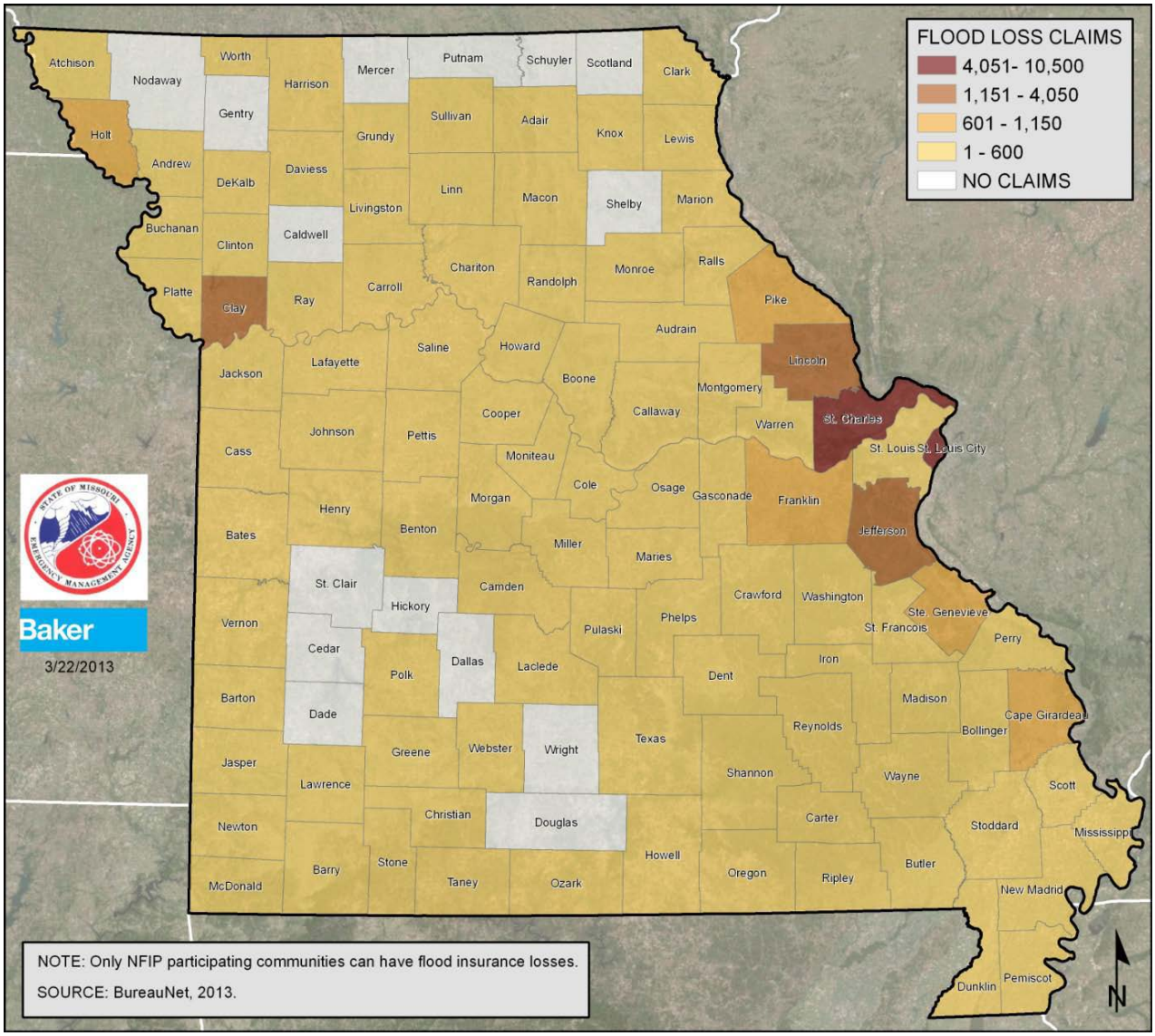
In addition, the state analyzed NFIP flood-loss data to establish areas in Missouri that are most at risk to flooding. **Figure 3.31** illustrates the dollars paid historically for flood insurance losses in Missouri by county from 1978 to 2013. Moreover, **Figure 3.32** depicts flood loss claims in Missouri during the same timeline.

Figure 3.31. Dollars Paid Historically for Flood Insurance Losses in Missouri by County, 1978 – Jan 2013



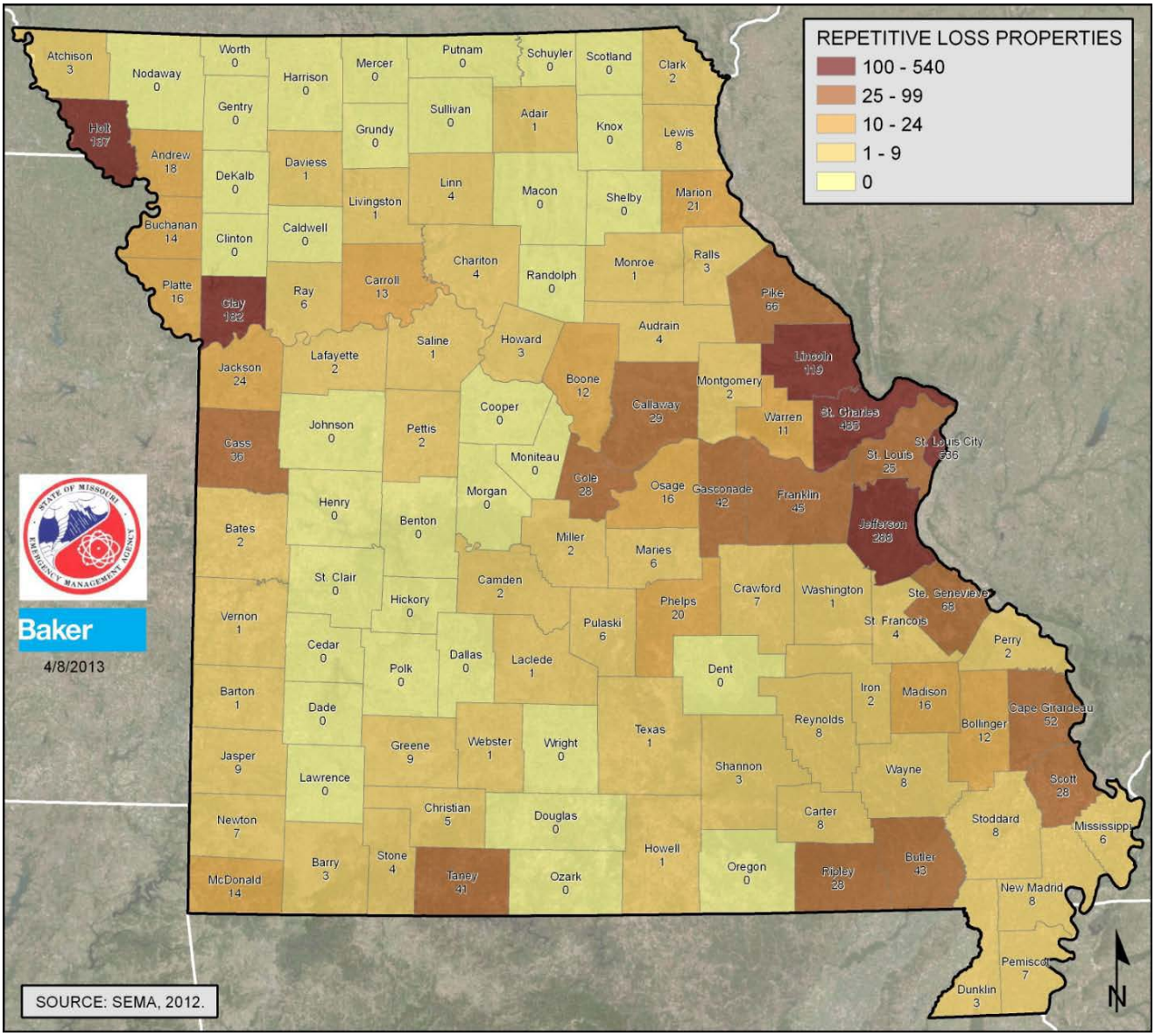
Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.32. Flood Loss Claims in Missouri by County, 1978 – Jan 2013



Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.33. Repetitive Flood Loss Properties by County, 1978 - 2013



Source: 2013 Missouri State Hazard Mitigation Plan

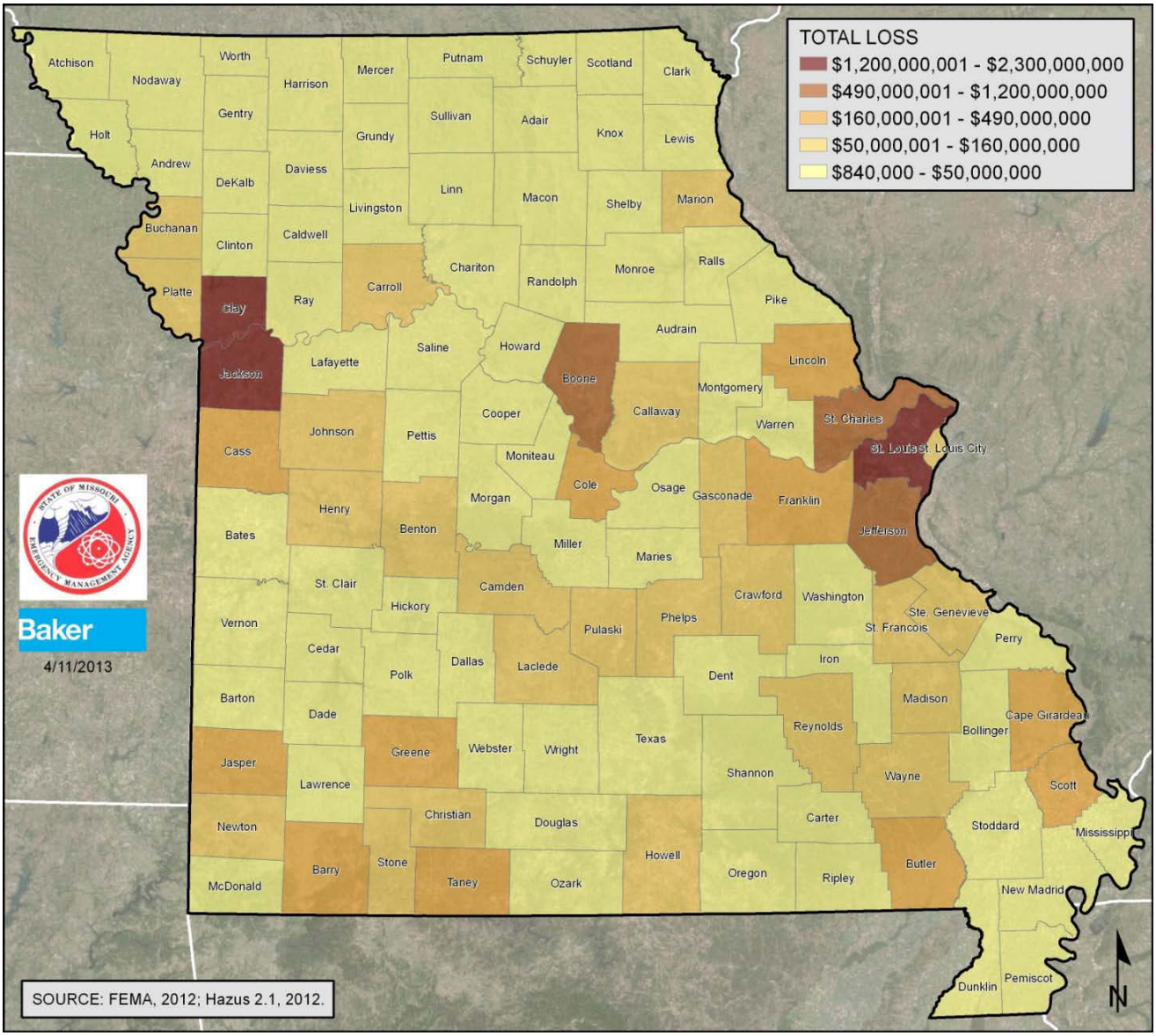
Furthermore, the state analyzed potential loss estimates to flooding. The purpose of the analysis is to determine where flood losses can occur and the degree of severity. These results were generated from DFIRM data and Hazus floodplain data. **Table 3.54** provides information in regard to total direct building loss and income loss to Pulaski County. In addition, **Figure 3.34** and **Figure 3.35** depict Hazus countywide base-flood (100 year) scenarios including building and income loss for total loss and loss ratio respectively.

Table 3.54. Total Direct Building Loss and Income Loss to Pulaski County

County	Structural Damage	Contents Damage	Inventory Loss	Total Direct Loss	Total Income Loss	Total Direct and Income Loss	Calc. Loss Ratio
Pulaski	$37,629,025	$43,977,986	$683,148	$82,290,159	$450,776	$82,740,936	3.8

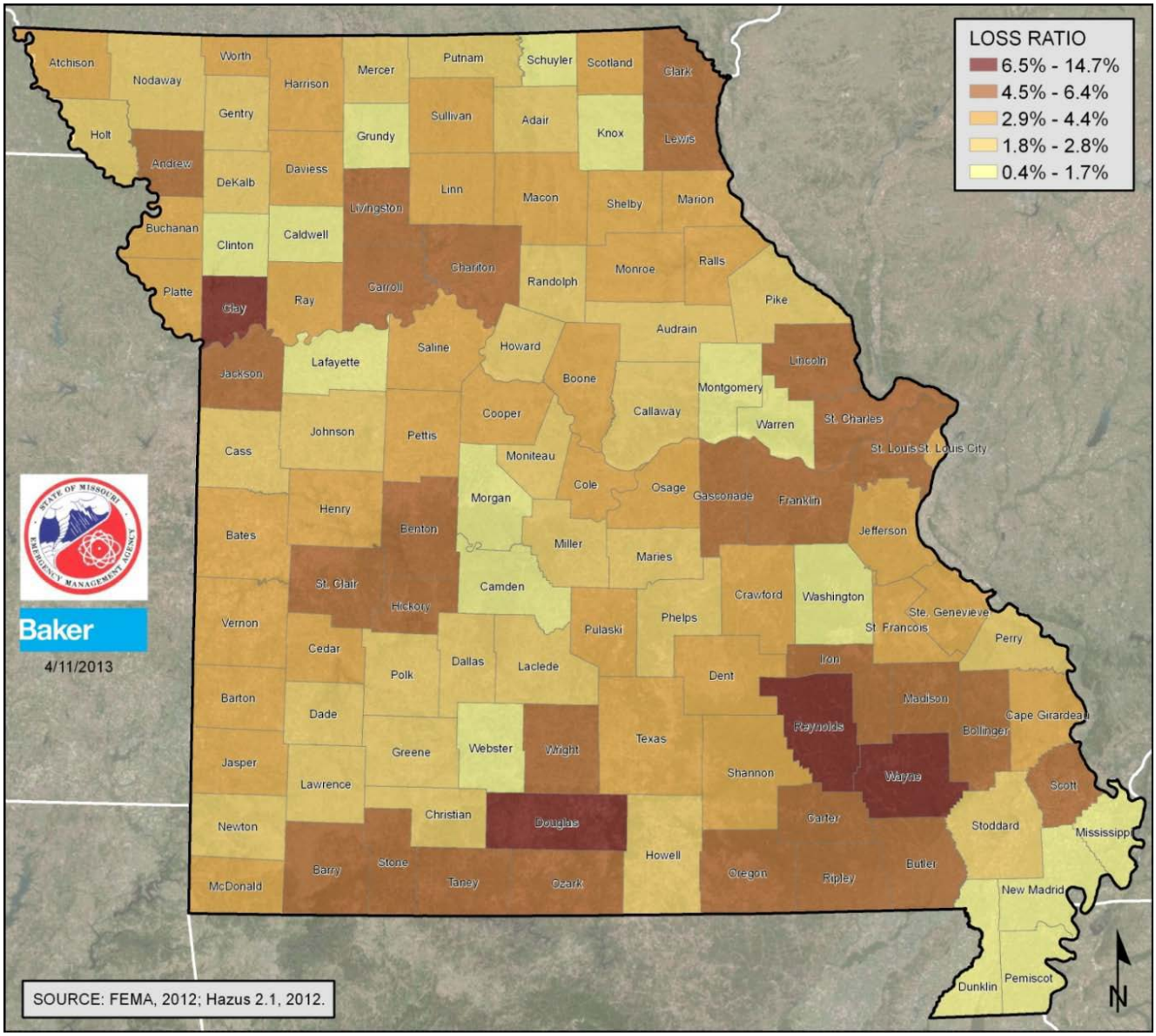
Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.34. Hazus Countywide Base-Flood Scenarios: Building and Income Loss



Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.35. Hazus Countywide Base-Flood Scenarios: Building Loss Ratio



Source: 2013 Missouri State Hazard Mitigation Plan

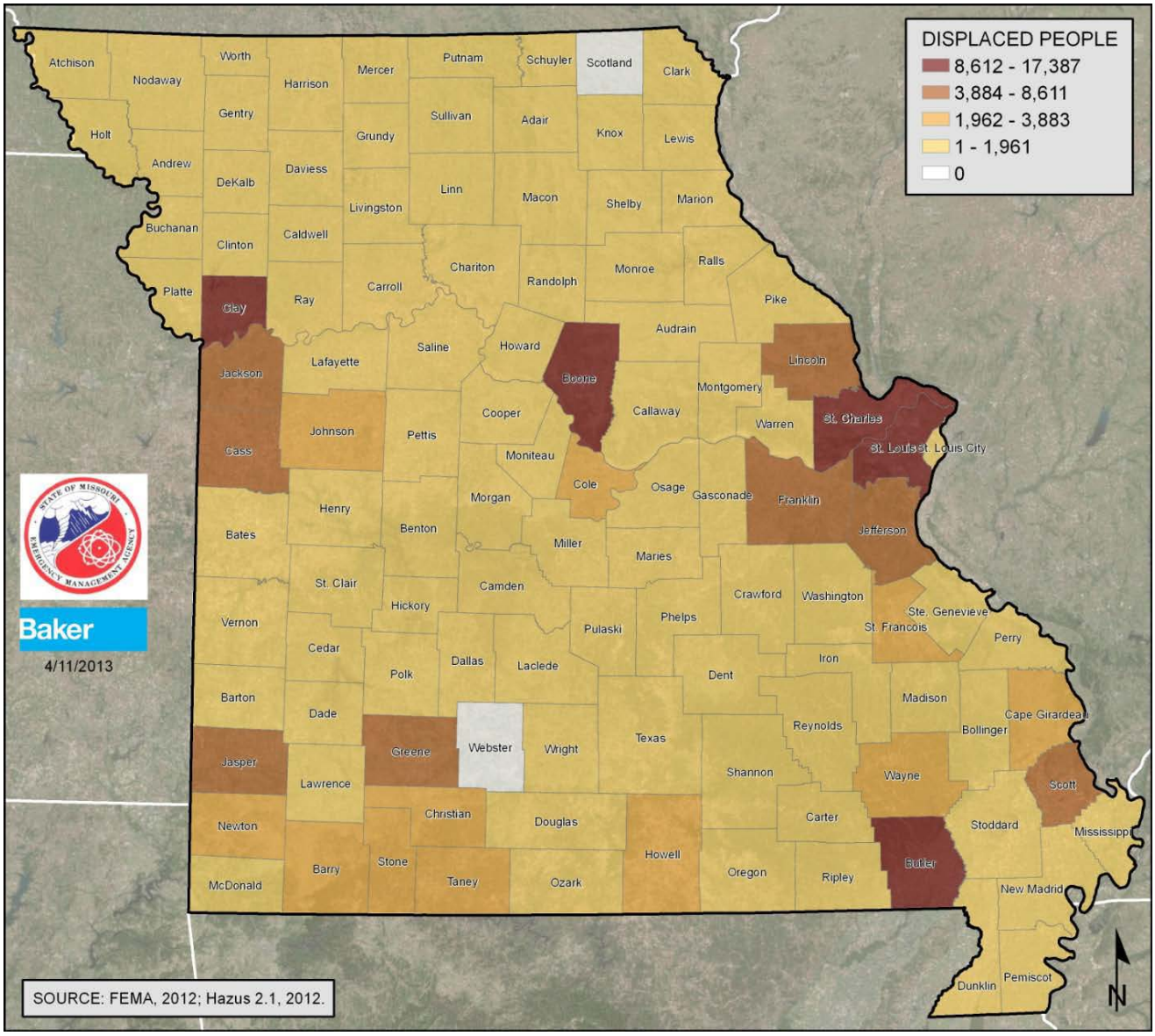
Lastly, the State determined the estimated number of displaced households and need for shelters within Pulaski County in the event of a 100 year flood. **Table 3.555** and **Figure 3.36** illustrate this information.

Table 3.55. Estimated Displaced households and Shelter Needs for Pulaski County

County	Displaced Households	Displaced Population Requiring Shelter
Pulaski	1,642	668

Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.36. Hazus Countywide Base-Flood Scenarios: Displaced People



Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

Although the Hazus model indicates that the next flash flood in Pulaski County will likely have minimal impact on the day-to-day activities of the county overall, the unprecedented flooding in 2013 suggests that future flood events could cause significant disruption in the county. The August 2013 flash flood caused significant damage to Waynesville and Pulaski County and resulted in two deaths. The following roads and low water crossings will be threatened in future floods and include Highway O, Highway U, Highway 133, Cave Road, Texas Road, Creek Road, Canyon Road, Smokey Road and Dyer Street in Waynesville. Sections of Waynesville lie on and near the Roubidoux River which increases the vulnerability to flooding. In addition, according to the Data Questionnaire, the Waynesville R-VI School District has two district facilities within the floodplain; 6th GC and the Middle School. Furthermore, Richland R-IV has district facilities in the floodplain, but was not specified. Although these two school districts may be affected during flooding, overall, few buildings lie in the floodplain. Several areas damaged during the August 2013 flooding have been mitigated, leaving fewer areas of potential destruction. Lastly, St. Robert's Wastewater Treatment Plant resides within the Gasconade's floodplain. During the event of a severe flood, disruption to St. Roberts's wastewater treatment is probable; resulting in sanitary and environmental issues.

Impact of Future Development

Impact of future development is correlated to floodplain management and regulations set forth by the county and jurisdictions[29]. Future development within low-lying areas near rivers and streams, or where interior drainage systems are not adequate to provide drainage during heavy rainfall events should be avoided. Additionally, future development would also increase impervious surface causing additional water run-off and drainage problems during heavy rainfall events.

Hazard Summary by Jurisdiction

Vulnerability to flooding slightly varies across the planning area. The jurisdictions most vulnerable to flooding include Unincorporated Pulaski County, Richland, and Waynesville. Other jurisdictions within the planning area are not as vulnerable; however some do have few properties within the floodplain.

Problem Statement

The county has already adopted a Floodplain Management Ordinance concerning construction in the floodplain. The county should consider buyouts of properties that are flood prone and have had repetitive losses to mitigate future disasters. Local governments should make a strong effort to further improve warning systems to insure that future deaths and injuries do not occur. Local governments should consider making improvements to roads and low water crossings that consistently flood by placing them on a hazard mitigation projects list, and actively seek funding to successful complete the projects.

[29] 2015 Boone County Hazard Mitigation Plan

3.4.7 Land Subsidence/Sinkholes

Some specific sources for this hazard are:

- http://www.dnr.mo.gov/geology/geosrv/envgeo/sinkholes.htm http://strangesounds.org/2013/07/us-sinkhole-map-these-maps-show-that-around-40-of-the-u-s-lies-in-areas-prone-to-sinkholes.html
- http://www.businessinsider.com/where-youll-be-swallowed-by-a-sinkhole-2013-3
- http://water.usgs.gov/edu/sinkholes.html
- http://pubs.usgs.gov/fs/2007/3060/

Hazard Profile

Hazard Description

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that naturally can be dissolved by ground water circulating through them. As the rock dissolves, spaces and caverns develop underground. The sudden collapse of the land surface above them can be dramatic and range in size from broad, regional lowering of the land surface to localized collapse. However, the primary causes of most subsidence are human activities: underground mining of coal, groundwater or petroleum withdrawal, and drainage of organic soils. In addition, sinkholes can develop as a result of subsurface void spaces created over time due to the erosion of subsurface limestone (karst).

Land subsidence occurs slowly and continuously over time, as a general rule. On occasion, it can occur abruptly, as in the sudden formation of sinkholes. Sinkhole formation can be aggravated by flooding.

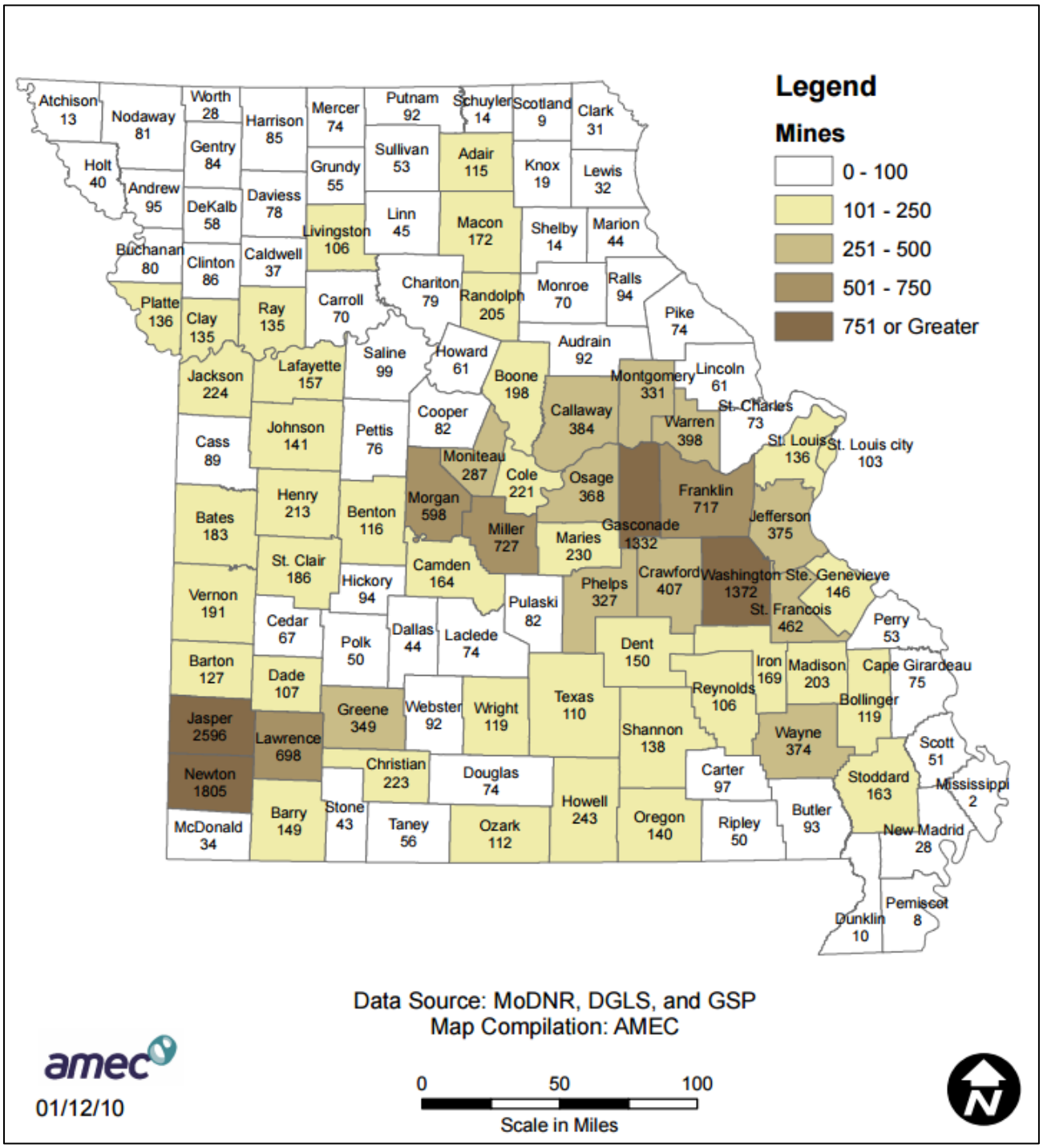
In the case of sinkholes, the rock below the surface is rock that has been dissolving by circulating groundwater. As the rock dissolves, spaces and caverns form, and ultimately the land above the spaces collapse. In Missouri, sinkhole problems are usually a result of surface materials above openings into bedrock caves eroding and collapsing into the cave opening. These collapses are called “cover collapses” and geologic information can be applied to predict the general regions where collapse will occur. Sinkholes range in size from several square yards to hundreds of acres and may be quite shallow or hundreds of feet deep.

According to the U.S. Geological Survey (USGS), the most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. Fifty-nine percent of Missouri is underlain by thick, carbonate rock that makes Missouri vulnerable to sinkholes. Sinkholes occur in Missouri on a fairly frequent basis. Most of Missouri‘s sinkholes occur naturally in the State‘s karst regions (areas with soluble bedrock). They are a common geologic hazard in southern Missouri, but also occur in the central and northeastern parts of the State. Missouri sinkholes have varied from a few feet to hundreds of acres and from less than one to more than 100 feet deep. The largest known sinkhole in Missouri encompasses about 700 acres in western Boone County southeast of where Interstate 70 crosses the Missouri River. Sinkholes can also vary in shape like shallow bowls or saucers whereas other have vertical walls. Some hold water and form natural ponds.

According to SEMA, there were approximately 82 mining activities in Pulaski County. The only

detailed information available in regards to current mining in Pulaski County emanates from the Missouri Department of Natural Resources. There is only one mine on recorded for Pulaski County; which produces iron. **Figure 3.37** depicts mines in Missouri by County.

Figure 3.37. Mines in Missouri by County

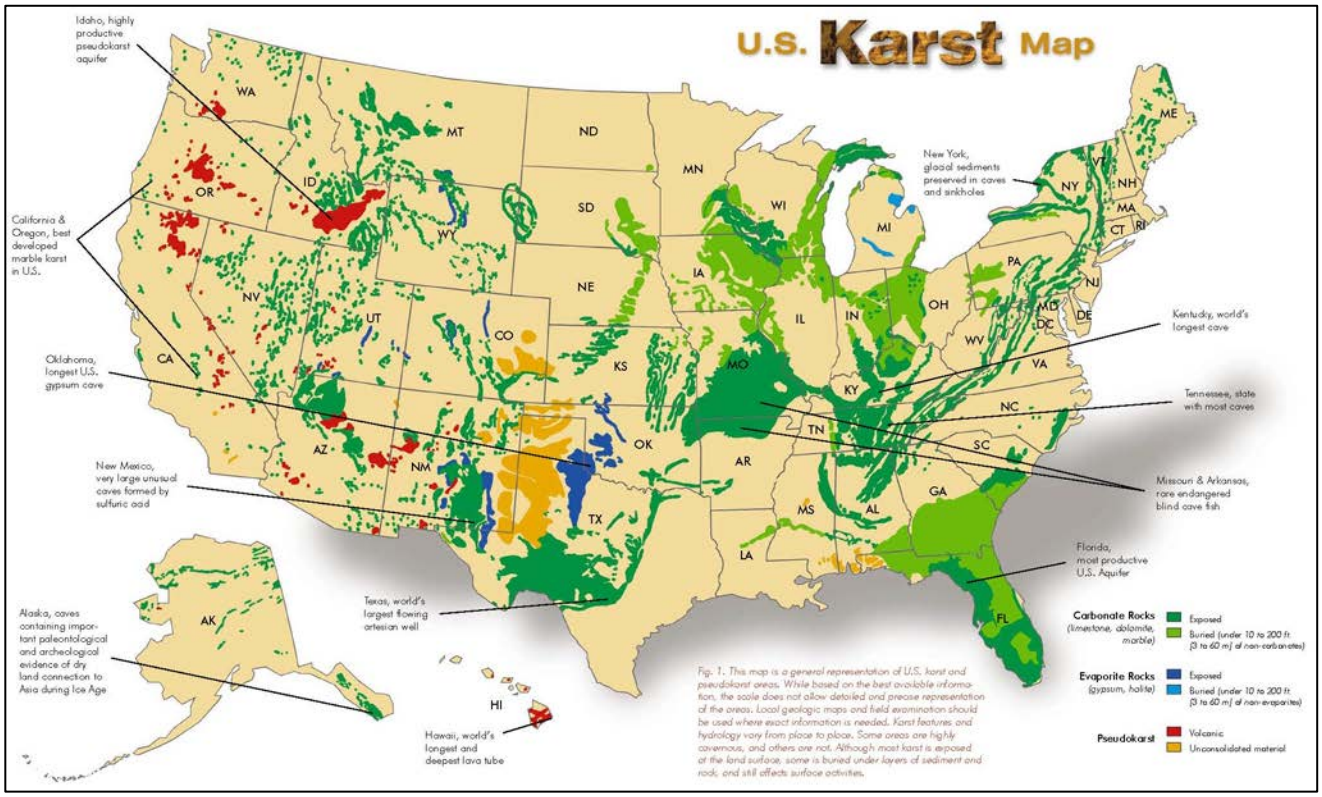


Source: http://sema.dps.mo.gov/programs/mitigation_management.php

Geographic Location

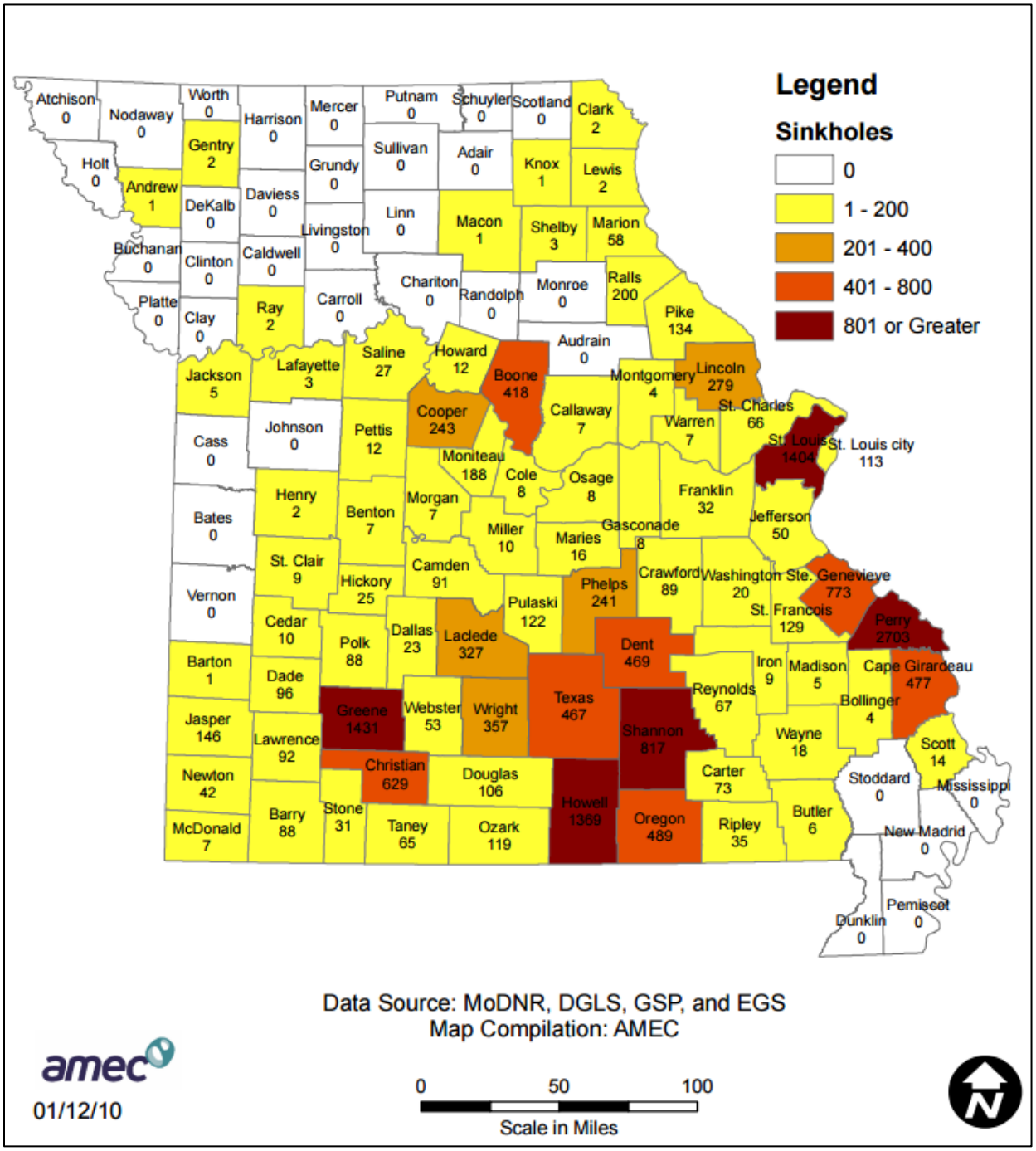
Figure 3.38 depicts karst topography across the United States. Missouri's kart topography is comprised of carbonate rocks such as limestone, dolomite, and marble. Variability in areas prone to sinkholes does not differ greatly across the County. There are approximately 122 sinkholes that have been recorded within Pulaski County (**Figure 3.39**).

Figure 3.38. U.S. Karst Map



Source: http://www.northeastern.edu/protect/wp-content/uploads/US_KarstMap.jpg

Figure 3.39. Sinkholes in Missouri



Source: http://sema.dps.mo.gov/programs/mitigation_management.php

Severity/Magnitude/Extent

Sinkholes vary in size and location, and these variances will determine the impact of the hazard. A sinkhole could result in the loss of a personal vehicle, a building collapse, or damage to infrastructure such as roads, water, or sewer lines. Groundwater contamination is also possible from a sinkhole. Because of the relationship of sinkholes to groundwater, pollutants captured or dumped in sinkholes could affect a community's groundwater system. Sinkhole collapse could be triggered by large earthquakes. Sinkholes located in floodplains can absorb floodwaters but make detailed flood hazard studies difficult to model.

The 2013 State Plan included only seven documented sinkhole "notable events". The plan stated that sinkholes are common to Missouri and the probability is high that they will occur in the future. To date, Missouri sinkholes have historically not had major impacts on development nor have they caused serious damage. Thus, the severity of future events is likely to be low.

Previous Occurrences

Although there are numerous sinkholes and sinkhole areas in Pulaski County, and incidents have occurred in other counties in southern Missouri, there has been one recorded incident of death due to sinkholes in the County. On Monday, September 16, 2013, while returning home from deer hunting, a 31-year old male fell into a 70-foot deep sinkhole and died. Based on the map of sinkholes in Pulaski County, some of the communities may be more vulnerable to this hazard than the unincorporated parts of the county due to population density and the likelihood of future development. St. Robert has sinkholes within its boundaries and there are several known sinkholes near, but not within the borders of Waynesville. Crocker, Dixon and Richland appear to lie further outside the zone of sinkhole occurrences.

Probability of Future Occurrence

Due to the lack of data for previous sinkhole events in Pulaski County, a probability could not be calculated.

Vulnerability

Vulnerability Overview

Unfortunately, no statistics are available for the number of subsurface locations that may potentially collapse in the future, forming a sinkhole. However, areas have been identified that have the greatest vulnerability for future sinkholes including Cape Girardeau, Dent, Greene, Howell, Laclede, Oregon, Perry, Shannon, St. Louis, and Texas Counties[30].

[30] 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

The most likely type of damage to occur in conjunction with a sinkhole collapse is property damage related to foundation disturbance. Signs include cracks in interior and exterior walls; doors and windows that no longer sit square or open and close properly; depressions forming in the yard; cracks in the street, sidewalk, foundation or driveway; and turbidity in local well water. All of these can be early indicators that a sinkhole is forming in the vicinity[31]. In the event of a sudden collapse, an open sinkhole can form in a matter of minutes and swallow lawn, automobiles and homes. This has occurred in some parts of Missouri, particularly in the southwest part of the state, but there have been no dramatic incidents like this in Pulaski County

Impact of Future Development

Future development over or near abandoned mines and in locations at risk of sinkhole formation will increase the hazard vulnerability. Information in regards to regulations limiting construction near sinkholes is very limited. The 2013 Missouri State Hazard Mitigation Plan only lists two counties that limit construction near mines or sinkholes including Greene and Christian Counties.

Hazard Summary by Jurisdiction

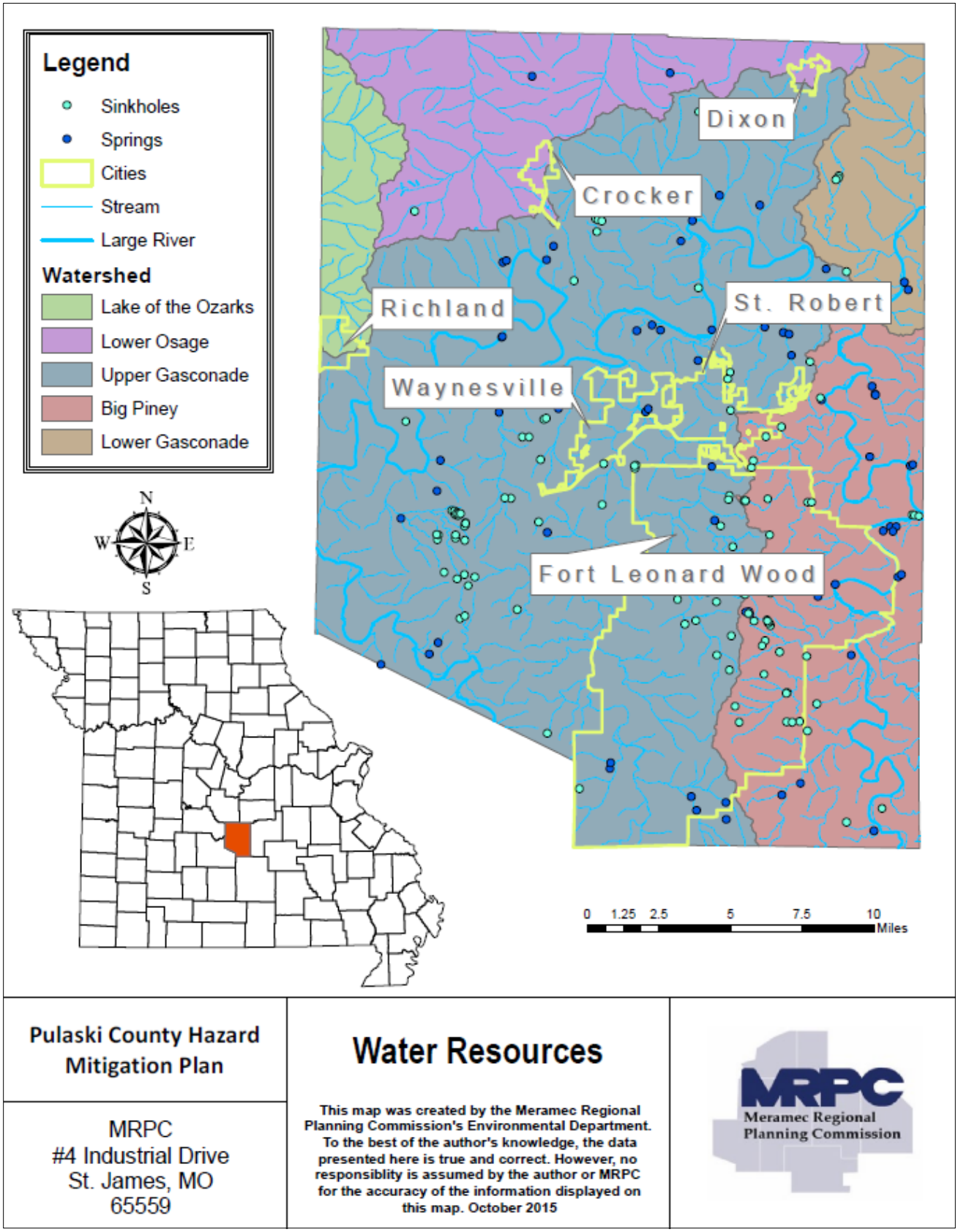
As is evidenced by Figure 3.40, there are a significant number of sinkholes in Pulaski County. The jurisdictions most likely to be impacted by sinkholes are St. Robert and Waynesville and the Waynesville R-VI School District. As evidenced by the map of sinkholes in Pulaski County, there is at least one known sinkhole in the city limits of St. Robert and several in close proximity to the city of Waynesville. There are also a number of sinkholes in the northern portion of Fort Leonard Wood where the housing areas and elementary schools are located. The other jurisdictions, both cities and school districts, are located in areas of the county where the concentration of sinkholes is much lower.

Problem Statement

Sinkholes and sinkhole areas are well documented by both the US Geological Survey and the Missouri Department of Natural Resources Geologic Resources Section. The risk of sinkhole collapse can be lessened by avoiding the construction of structures in these areas and avoiding those activities that significantly alter the local hydrology, such as drilling and mining. In addition, communities should avoid leaking water and sewer lines through appropriate maintenance and monitoring. Local residents should be educated on the risks associated with sinkholes and advised to avoid placing themselves and their property in danger by building in sinkhole areas. Communities with building codes should include prohibitions on building in known sinkhole areas.

[31] http://sinkhole.org/commonsigns.php

Figure 3.40. Pulaski County Watershed and Sinkholes



3.4.8 Thunderstorm/High Winds/Lightning/Hail

Some Specific Sources for this hazard are:

- FEMA 320, Taking Shelter from the Storm, 3rd edition, http://www.weather.gov/media/bis/FEMA_SafeRoom.pdf Lightning Map, National Weather Service, http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf National Weather Service, http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf
- Death and injury statistics from lightning strikes, National Weather Service.
- Wind Zones in the U.S. map, FEMA, http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm;
- Annual Windstorm Probability (65+knots) map U.S. 1980-1994, NSSL, http://www.nssl.noaa.gov/users/brooks/public_html/bigwind.gif
- Hailstorm intensity scale, The Tornado and Storm Research Organization (TORRO), http://www.torro.org.uk/site/hscale.php;
- NCDC data;
- USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm
- National Severe Storms Laboratory – hail map, http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif

Hazard Profile

Hazard Description

Thunderstorms

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When cold upper air sinks and warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, as well as in clusters or lines. The National Weather Service defines a thunderstorm as "severe" if it includes hail that is one inch or more, or wind gusts that are at 58 miles per hour or higher. At any given moment across the world, there are about 1,800 thunderstorms occurring. Severe thunderstorms most often occur in Missouri in the spring and summer, during the afternoon and evenings, but can occur at any time. Other hazards associated with thunderstorms are heavy rains resulting in flooding (Section 3.4.6) and tornadoes (Section 3.4.9)

High Winds

A severe thunderstorm can produce winds causing as much damage as a weak tornado. The damaging winds of thunderstorms include downbursts, microbursts, and straight-line winds. Downbursts are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground. Microbursts are minimized downbursts covering an area of less than 2.5 miles across. They include a strong wind shear (a rapid change in the direction of wind over a short distance) near the surface. Microbursts may or may not include precipitation and can produce winds at speeds of more than 150 miles per hour. Damaging straight-line winds are high winds across a wide area that can reach speeds of 140 miles per hour.

Lightning

All thunderstorms produce lightning which can strike outside of the area where it is raining and is has been known to fall more than 10 miles away from the rainfall area. Thunder is simply the sound that lightning makes. Lightning is a huge discharge of electricity that shoots through the air causing vibrations and creating the sound of thunder.

Hail

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when thunderstorm updrafts carry raindrops upward into extremely cold atmosphere causing them to freeze. The raindrops form into small frozen droplets. They continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow before it hits the earth.

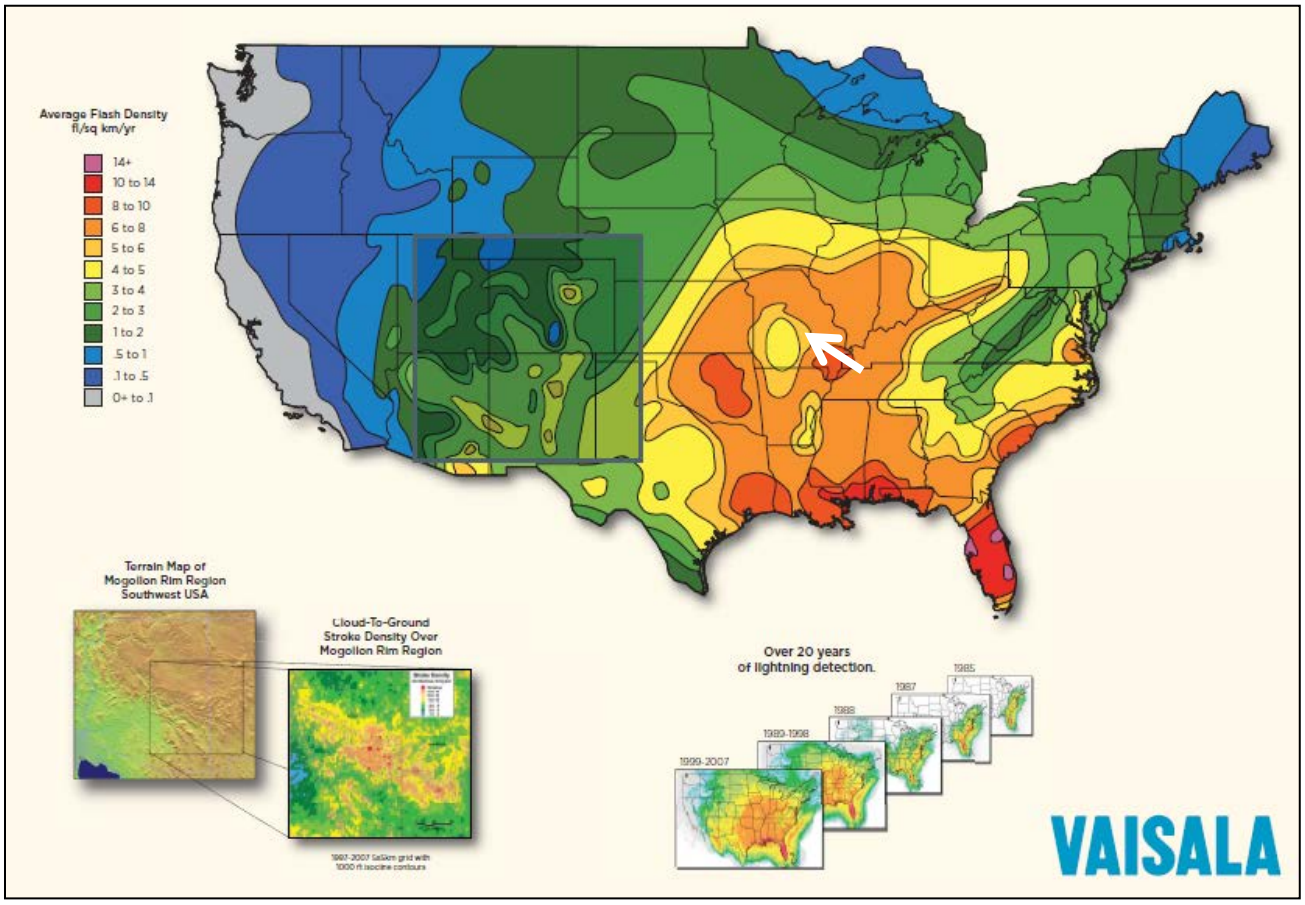
At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest hailstone in diameter recorded in the United States was found in Vivian, South Dakota on July 23, 2010. It was eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea-sized hail can cause damage.

Geographic Location

Thunderstorms, high winds, hail, and lightning events are an area-wide hazard that can take place anywhere across the United States. Furthermore, these events do not vary greatly across the planning area; they are more frequently reported in urbanized areas. Additionally, densely developed urban areas are more likely to experience damaging events.

Figure 3.41 depicts the location and frequency of lightning in Missouri. Additionally, the map indicates that the flash density of Pulaski County ranges between five and eight flashes per square kilometer per year.

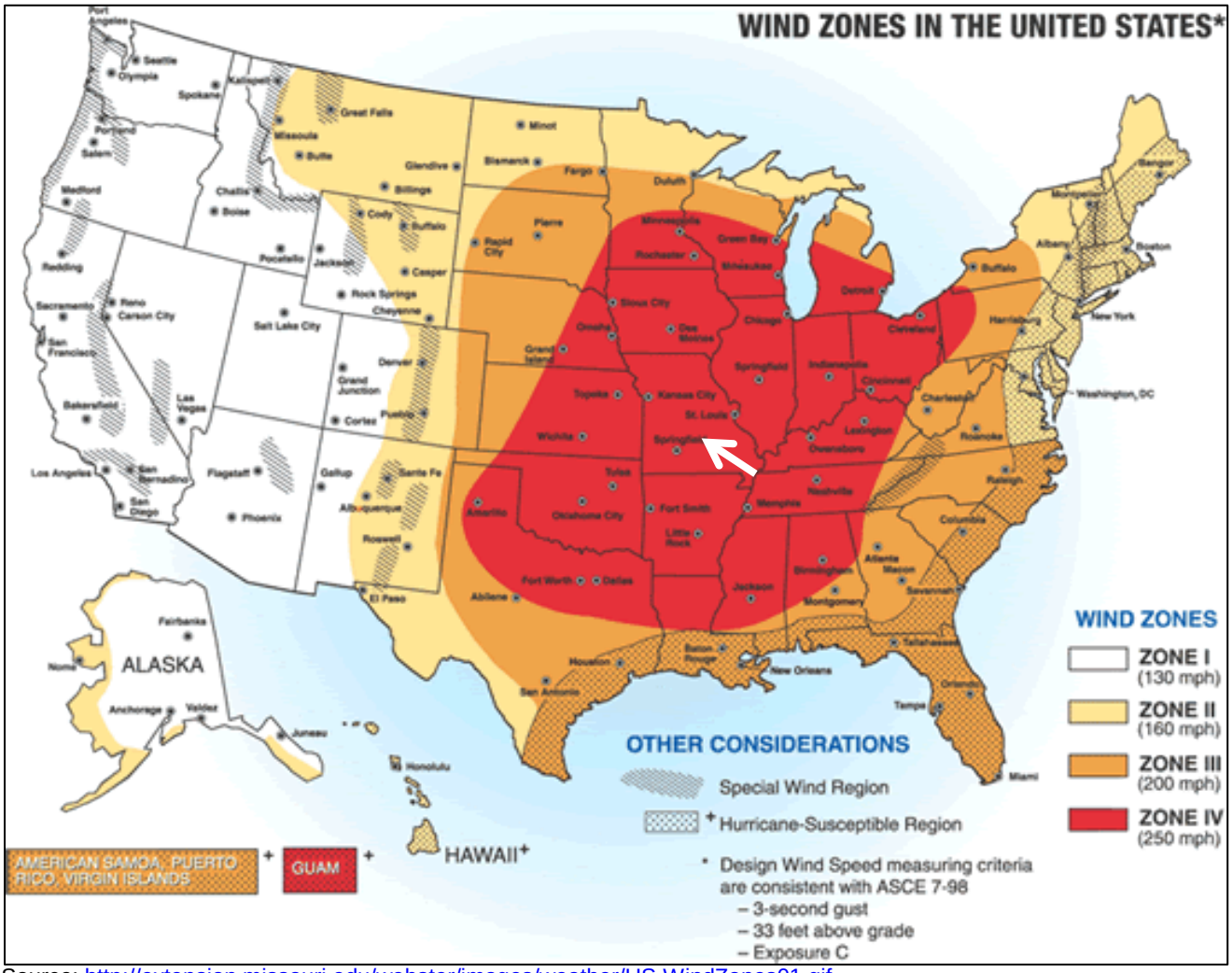
Figure 3.41. Location and Frequency of Lightning in Missouri



Source: National Weather Service, http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf.
Note: Pulaski County is indicated by a white arrow.

There are four wind zones that are characterized across the United States. These zones range from Zone I to Zone IV. All of Missouri as well as most of the Midwest fall within Zone IV. Within Zone IV, winds can reach up to 250 mph (**Figure 3.42**).

Figure 3.42. Wind Zones in the United States



Source: http://extension.missouri.edu/webster/images/weather/US-WindZones01.gif

Severity/Magnitude/Extent

Severe thunderstorm losses are usually attributed to the associated hazards of hail, downburst winds, lightning and heavy rains. Losses due to hail and high wind are typically insured losses that are localized and do not result in presidential disaster declarations. However, in some cases, impacts are severe and widespread and assistance outside state capabilities is necessary. Hail and wind also can have devastating impacts on crops. Severe thunderstorms/heavy rains that lead to flooding are discussed in the flooding hazard profile. Hailstorms cause damage to property, crops, and the environment, and can injure and even kill livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are also commonly damaged by hail. Hail has been known to cause injury to humans, occasionally fatal injury.

In general, assets in the County vulnerable to thunderstorms with lightning, high winds, and hail include people, crops, vehicles, and built structures. Although this hazard results in high annual losses, private property insurance and crop insurance usually cover the majority of losses. Considering insurance coverage as a recovery capability, the overall impact on jurisdictions is reduced.

Most lightning damages occur to electronic equipment located inside buildings. But structural damage can also occur when a lightning strike causes a building fire. In addition, lightning strikes can cause damages to crops if fields or forested lands are set on fire. Communications equipment and warning transmitters and receivers can also be knocked out by lightning strikes.

Based on information provided by the Tornado and Storm Research Organization (TORRO), **Table 3.566** below describes typical damage impacts of the various sizes of hail.

Table 3.56. Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5 - 9	0.2 - 0.4	Pea	No damage
Potentially Damaging	10 - 15	0.4 - 0.6	Mothball	Slight general damage to plants, crops
Significant	16 - 20	0.6 - 0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21 - 30	0.8 - 1.2	Walnut	Severe damage to fruit and crops, damage to glass, plastic structures, paint and wood scored
Severe	31 - 40	1.2 – 1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41 – 50	1.6 – 2.0	Golf ball > pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51 - 60	2.0 - 2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61 – 75	2.4 – 3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76 – 90	3.0 – 3.5	Large orange > soft ball	Severe damage to aircraft bodywork
Super Hailstorms	91 – 100	3.6 – 3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University
Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity. http://www.torro.org.uk/site/hscale.php

Straight-line winds are defined as any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 miles per hour, which represent the most common type of severe weather. They are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase.

Between 1995 and 2014, there were no recorded crop insurance claims for thunderstorms, high winds, lightening, or hail for Pulaski County.

The onset of thunderstorms with lightning, high wind, and hail is generally rapid. Duration is less than six hours and warning time is generally six to twelve hours. Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start structural and wildland fires, as well as damage electrical systems and equipment.

Previous Occurrences

Due to the lack of available parameters, heavy rain is utilized in the place of thunderstorms in **Table 3.57**. Moreover, NCDC data was obtained for high wind, lightning, and hail events between 2004 and 2015 (**Table 3.58**, **Table 3.59**, and **Table 3.60**). However, limitations to the use of NCDC reported lightning events include the fact that only lightning events that result in fatality, injury and/or property and crop damage are in the NCDC.

Table 3.57. NCDC Pulaski County Heavy Rain Events Summary, 2004 to 2015

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Rainfall (Inch)
2009	1	0	0	0	3.15
2011	1	0	0	0	2.74
2012	2	0	0	0	3.59
2013	3	0	0	0	6.00

Source: NCDC, data accessed [10/15/2015]

Table 3.58. NCDC Pulaski County High Wind Events Summary, 2004 to 2015

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Estimated Gust (kts.)
2004	3	0	0	50,000	65
2005	8	0	0	0	55
2006	2	0	0	0	55
2007	1	0	0	0	50
2008	11	0	0	15,000	61
2009	5	0	0	20,500	70
2010	10	0	0	14,000	56
2011	3	0	0	6,000	52
2012	8	0	0	11,000	52
2013	6	0	0	20,000	61
2014	4	0	0	5,000	52
2015	1	0	0	0	52

Source: NCDC, data accessed [10/15/2015]

Table 3.59. NCDC Pulaski County Lightning Events Summary, 2004 to 2015

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damage
2011	1	1	0	0	0

Source: NCDC, data accessed [10/15/2015]

Table 3.60. NCDC Pulaski County Hail Events Summary, 2004 to 2015

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Hail Size (inch)
2004	3	0	0	0	0.88
2005	11	0	0	0	0.88
2006	5	0	0	0	1.75
2007	7	0	0	0	1.5
2008	15	0	0	0	1.75
2009	2	0	0	0	1.25
2010	6	0	0	0	0.88
2011	8	0	0	0	1.75
2012	11	0	0	0	1.5
2013	2	0	0	0	1.75
2014	3	0	0	0	1
2015	1	0	0	0	.75

Source: NCDC, data accessed [10/15/2015]

Probability of Future Occurrence

From the data obtained from the NCDC[32], annual average percent probabilities were calculated for heavy rainfall, high winds, lightning, and hail. Heavy rainfall has a 63.63 percent annual average percent probability of occurrence (7 events/11 years x 100) (**Table 3.611**). Heavy rainfall events can be found in **Table 3.577**.

Since multiple high wind occurrences are anticipated each year (62 events/11 years), the probability of high winds is 100% with an average of 5.63 events per year (**Table 3.62).** High wind events can be found in **Table 3.588.**

In Pulaski County, 1 lightning event (**Table 3.59**) in 11 years was recorded. The annual average percent probability is 9.09% (1 event/11 years x 100) (**Table 3.63**).

Lastly, the annual average percent probability of hail occurrence is 100% (74 events/11 years) with an average of 6.72 events per year (**Table 3.64**). Hail events can be found in **Table 3.60**.

[32] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI

Table 3.61. Annual Average % Probability of Heavy Rain in Pulaski County

Location	Annual Avg. % P
Pulaski County	63.63%

*P = probability; see page 3.24 for definition.

Table 3.62. Annual Average % Probability of High Winds in Pulaski County

Location	Annual Avg. % P	Avg. # of Events
Pulaski County	100%	5.63

*P = probability; see page 3.24 for definition.

Table 3.63. Annual Average % Probability of Lightning in Pulaski County

Location	Annual Avg. % P
Pulaski County	9.09%

*P = probability; see page 3.24 for definition.

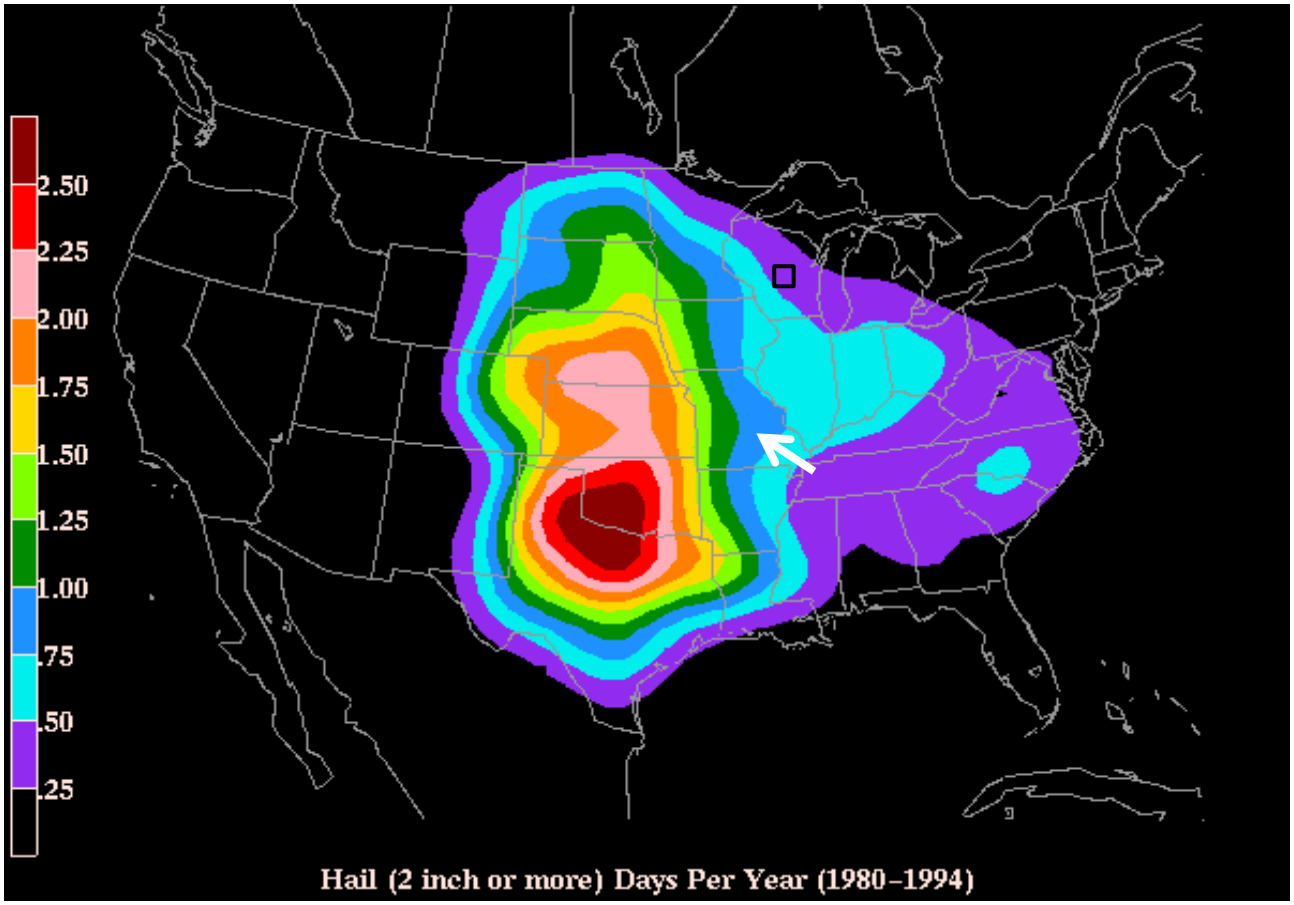
Table 3.64. Annual Average % Probability of Hail in Pulaski County

Location	Annual Avg. % P	Avg. # of Events
Pulaski County	100%	6.72

*P = probability; see page 3.24 for definition.

Figure 3.43 depicts a map based on hailstorm data from 1980-1994. It shows the probability of hailstorm occurrence (2" diameter or larger) based on number of days per year. The location of Pulaski County is identified with a white arrow.

Figure 3.43. Annual Hailstorm Probability (2'' diameter or larger), U 1980- 1994



Source: NSSL,http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif
Note: White arrow points to Pulaski County

Vulnerability

Vulnerability Overview

Data was obtained from the 2013 Missouri State Hazard Mitigation Plan for vulnerability overview and analysis. Since severe thunderstorms occur frequently throughout Missouri, specific parameters were analyzed for each hazard. These parameters include damaging winds in excess of 67 mph (58 kts.), hail in excess of 0.75 inches, and damaging lightning strikes. **Table 3.65** illustrates housing density, building exposure, and crop exposure for Pulaski County. Moreover, **Table 3.66** provides additional statistical data for the vulnerability analysis.

Table 3.65. Pulaski County Housing Density, Building Exposure and Crop Exposure

County	Housing Units/sq. mi.	Total Building Exposure ($)	Crop Exposure (2007 Census of Ag.)	Social Vulnerability Index
Pulaski	20.9	$3,755,326,000	$948,000	2

Source: 2013 Missouri State Hazard Mitigation Plan

Table 3.66. Additional Statistical Data Compiled for Vulnerability Analysis

County	Total Hail Incidences	Total hail Property Loss ($)	Total Crop Insurance Paid for Hail Damage ($)	Total Wind Incidence ($)	Total Wind Property Loss ($)	Total Crop Insurance Paid for wind Damage ($)	Total Lightning Incidences	Total Lightning Property Loss ($)
Pulaski	143	$94,000	$10,432	83	$290,500	$0	1	$0

Source: 2013 Missouri State Hazard Mitigation Plan

Five factors were utilized in the overall vulnerability analysis of lightning. These factors include housing density, likelihood of occurrence, building exposure, average annual property loss ratio, and social vulnerability. For hail and wind, crop exposure and average annual crop insurance claims were also utilized. To better analyze the vulnerability analysis of severe thunderstorms, rating values were established; low, medium-low, medium, medium-high, and high (**Table 3.67**).

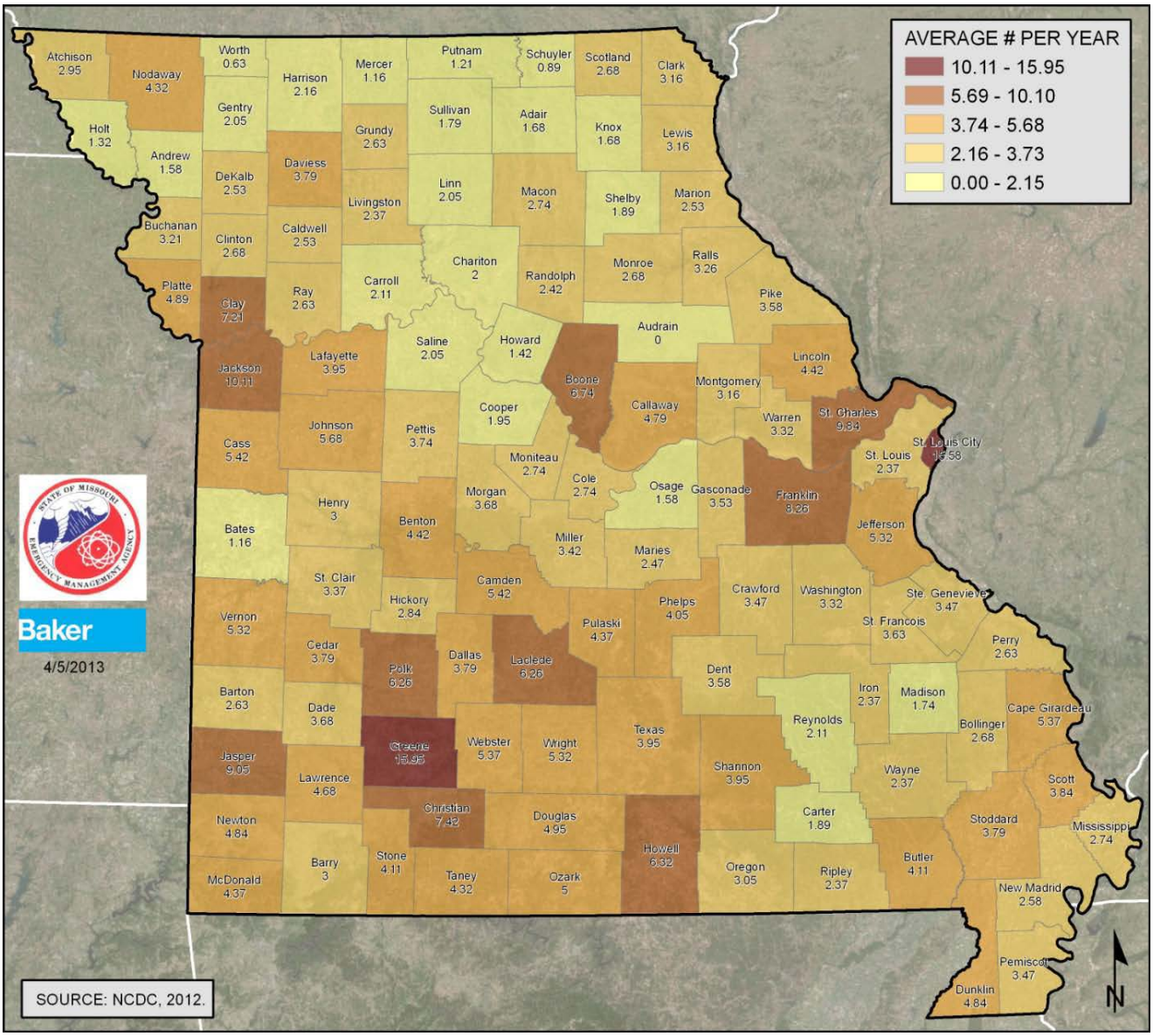
Table 3.67. Ranges for Severe Thunderstorm Vulnerability Factor Ratings

Factors considered	Low (1)	Medium-low (2)	Medium (3)	Medium-high (4)	High (5)
Common Factors					
Housing Density (# per sq. mile)	<50	50 to 99	100 to 299	300 to 499	>500
Crop Exposure ($ in millions) (hail and wind only)	<$10,000	$10,000 to $24,999	$25,000 to $49,999	$50,000 to $99,999	>$100,000
Social Vulnerability	1	2	3	4	5
Wind					
Likelihood of Occurrence (# of events/ yrs. Of data)	0 to 2.15	2.16 to 3.73	3.74 to 5.68	5.60 to 10.10	10.11 to 15.95
Average Annual Property Loss Ratio (annual property loss/exposure)	0.00 - 0.000027	0.000028 - 0.000092	0.000093 - 0.000231	0.000232 - 0.000489	0.000490 - 0.001273
Wind Crop Loss Ratio (annual crop claims/exposure)	0 - 0.000084	0.000085 - 0.000250	0.000251 - 0.000250	0.000715 - 0.001398	0.001399 - 0.003574
Hail					
Likelihood of Occurrence (# of events/ yrs. Of data)	0.78 to 3.10	3.11 to 5.26	5.27 to 7.89	7.90 to 12.10	12.11 to 18.48
Average Annual Property Loss Ratio (annual property loss/exposure)	0 - 0.000034	0.000035 - 0.000149	0.000280 - 0.000269	0.000280 - 0.000460	0.000461 - 0.001090
Hail Crop Loss Ratio (annual crop claims/exposure)	0 - 0.0000270	0.000271 - 0.000974	0.000975 - 0.000974	0.002305 - 0.003698	0.003699 - 0.007516
Lightning					
Likelihood of Occurrence (# of events/ yrs. Of data)	0 to 0.05	0.06 to 0.15	0.16 to 0.26	0.27 to 0.42	0.43 to 0.74
Average Annual Property Loss Ratio (annual property loss/exposure)	0 - 0.000001	0.000002 - 0.000003	0.000004 - 0.000006	0.000007 - 0.000015	0.000016 - 0.000037

Source: 2013 Missouri State Hazard Mitigation Plan

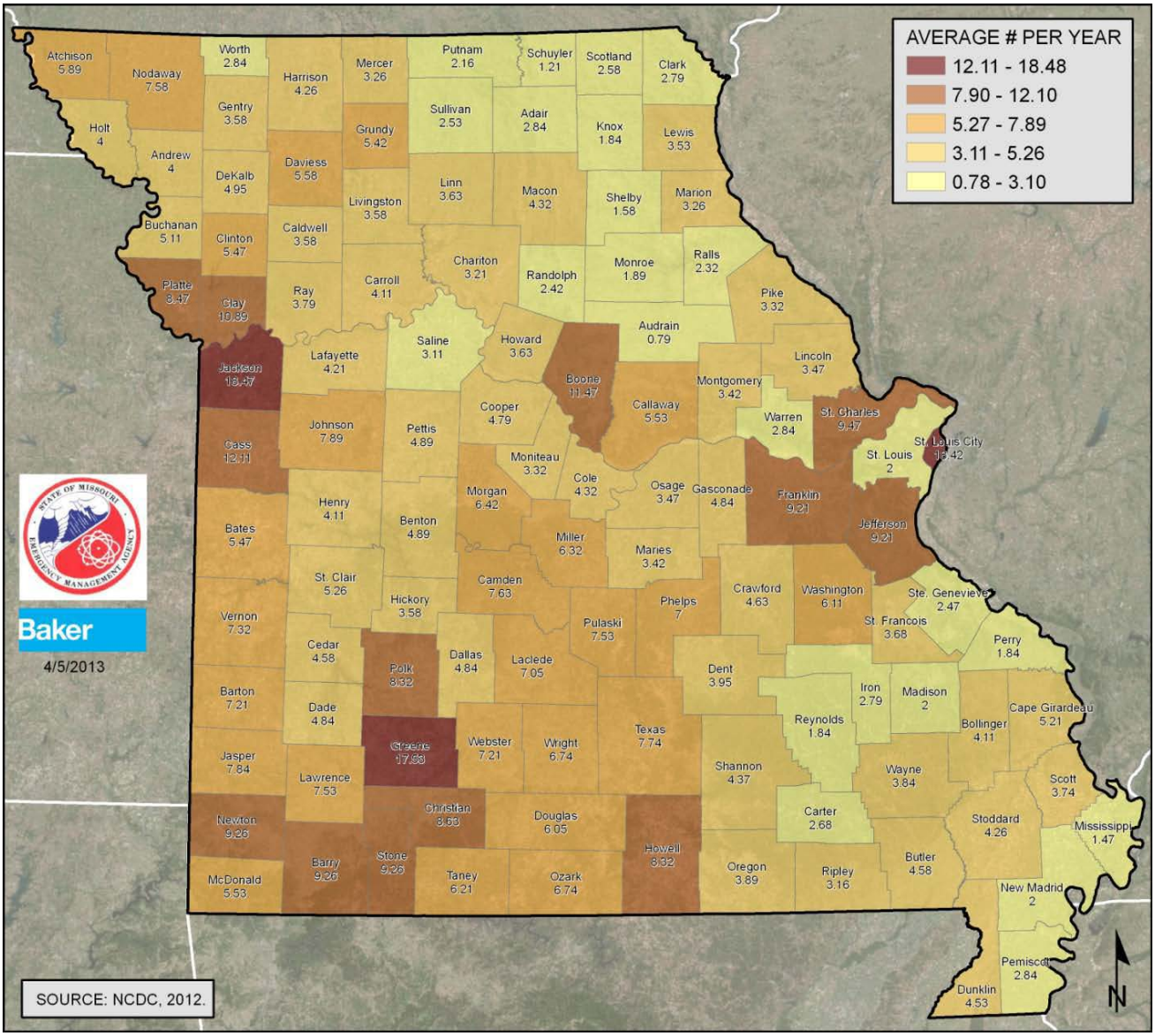
Figure 3.44 through **Figure 3.46** depicts the likelihood of occurrence of high winds, hail, and lightning events in Missouri.

Figure 3.44. Likelihood of Occurrence of High Wind Events (67 MPH and higher)



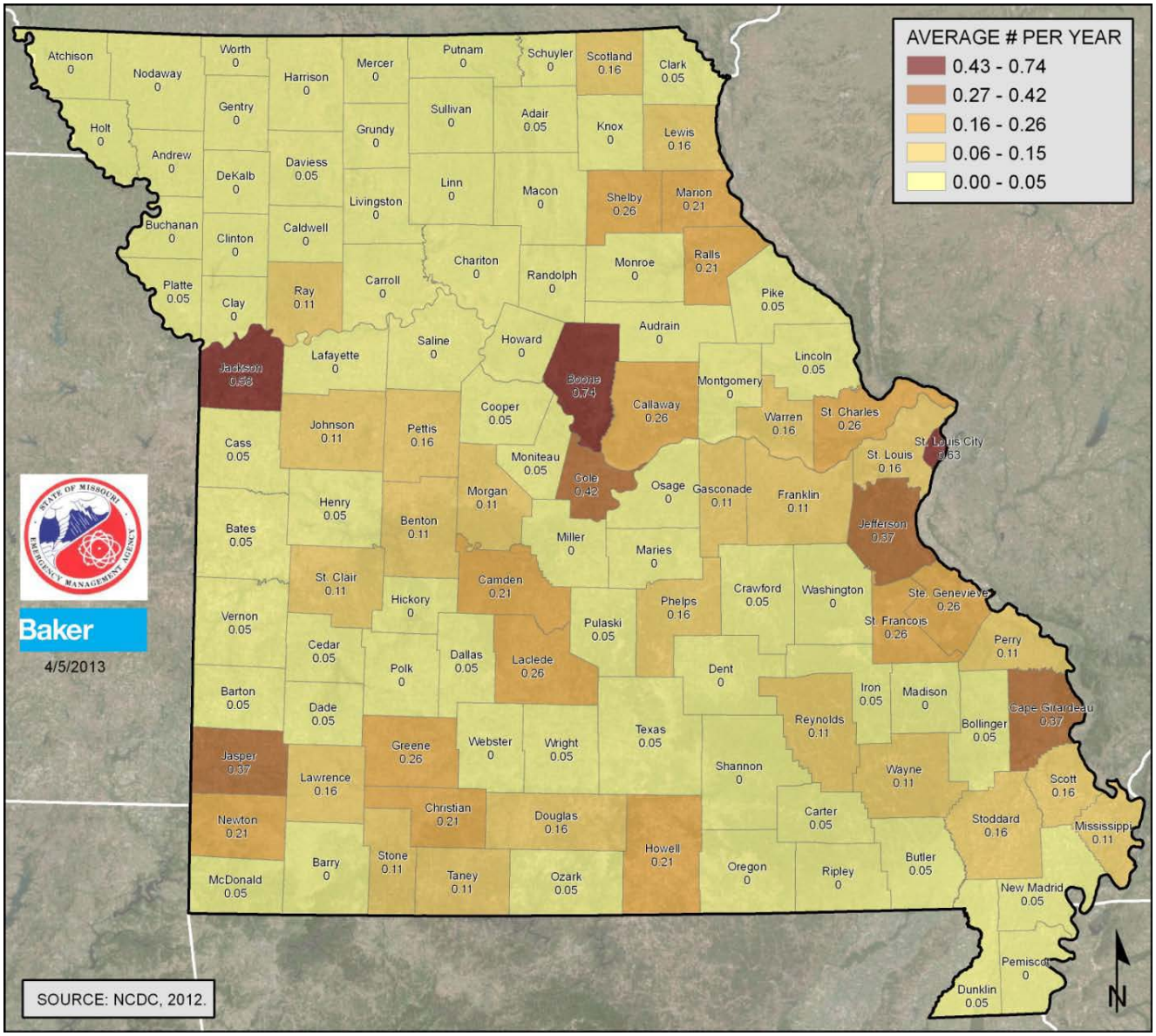
Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.45. Likelihood of Occurrence of Damaging Hail Events (.75 inches and larger)



Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.46. Likelihood of Occurrence of Damaging Lightning Events



Source: 2013 Missouri State Hazard Mitigation Plan

After ranges were applied to all factors in the analysis for wind, hail, and lightning, they were weighted equally and factored together to determine an overall vulnerability rating. Following, a combined vulnerability rating was calculated. The following data provides the calculated rages applied to determine overall vulnerability of Missouri counties to severe thunderstorms (**Table 3.68**). **Table 3.69** provides the calculated vulnerability rating for the severe thunderstorm hazard. **Figure 3.47** that follows provides the mapped results of this analysis by county[33].

[33] 2013 Missouri State Hazard Mitigation Plan

Table 3.68. Ranges for Severe Thunderstorm Combined Vulnerability Rating

	Low (1)	Medium-low (2)	Medium (3)	Medium-high (4)	High (5)
Severe Thunderstorm Combined Vulnerability	9 to 11	12 to 14	15 to 17	18 to 20	21 to 26

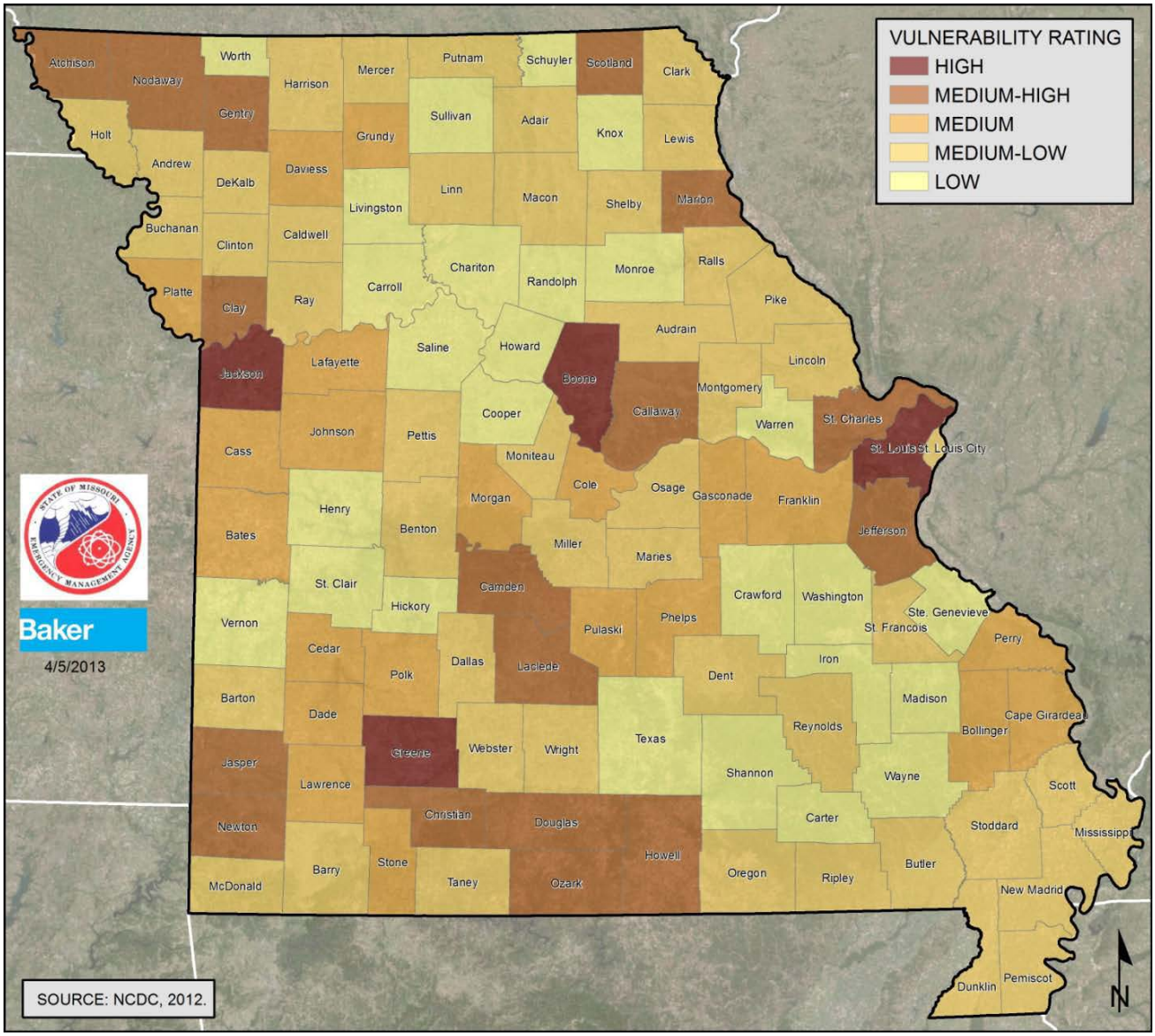
Source: 2013 Missouri State Hazard Mitigation Plan

Table 3.69. Severe Thunderstorm Combined Vulnerability Rating

County	Housing Density Ratio	Wind Likelihood Rating	Annualized Wind Property Loss	Annualized Wind Crop Loss	Hail Likelihood Rating	Annualized Hail Property Loss	Annualized Hail Crop Loss	Lightning Likelihood Rating	Annualized Lightning Property Loss	Total Thunderstorm Vulnerability	Combined Vulnerability
Pulaski	1	3	1	1	3	1	4	1	1	16	Medium

Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.47. Vulnerability Summary for Severe Thunderstorms



Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

According to the NCDC Pulaski County experienced approximately $514,500 in property damages from severe thunderstorms between 1995 and 2015. Most of the property damage cause from storms is covered by private insurance and data is not available. In addition, most damage from severe thunderstorms occurs to vehicles, roofs, siding and windows. However, there is a variety of impacts from severe thunderstorms. Moreover, secondary effects from hazards, falling trees and debris, can cause destruction within the planning area[34].

[34] 2015 Boone County Hazard Mitigation Plan

Future Development

As previously mentioned, the population within Pulaski County is expected to decrease by approximately 6,000 within the next 5 to 15 years. Therefore, it is difficult to determine future impacts. However, anticipated development such as water and wastewater facilities in Dixon and electrical upgrades in Richland will result in increased exposure. Likewise, increased development of households and businesses will increase jurisdiction's vulnerability to damages from severe thunderstorms/ high winds/lightning/hail.

Hazard Summary by Jurisdiction

Although thunderstorms/high winds/lightning/hail events are area-wide, there are demographics indicating higher losses in one jurisdiction as compared to another. Jurisdictions with high percentages of housing built before 1939 are more prone to damages from severe thunderstorms. The jurisdictions with the highest number of houses build before 1939 include Crocker, Dixon, and Richland. Additionally, Unincorporated Pulaski County and St. Robert have higher percentages of mobile homes and unsecured buildings, which are more prone to damages.

Problem Statement

Early warnings are possibly the best hope for residents when severe weather strikes. Cities that do not already possess warning systems should plan to purchase a system. Additional public awareness also includes coverage by local media sources. Storm shelters are another important means of mitigating the effects of severe thunderstorms. A community-wide shelter program should be adopted for residents who may not have adequate shelter in their homes. Residents should also be encouraged to build their own storm shelters to prepare for emergencies. Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather.

3.4.9 Tornado

Some specific sources for this hazard are:

- Enhanced F Scale for Tornado Damage, NWS, www.spc.noaa.gov/faq/tornado/ef-scale.html;
- Enhanced Fujita Scale's damage indicators and degrees of damage table, NOAA Storm Prediction Center, www.spc.noaa.gov/efscale/ef-scale.html;
- Tornado Activity in the U.S. map (1950-2006), FEMA 320, Taking Shelter from the Storm, 3rd edition;
- Tornado Alley in the U.S. map, http://www.tornadochaser.net/tornalley.html
- Enhanced Fujita Scale, www.spc.noaa.gov/efscale/ef-scale.html
- National Climatic Data Center, http://www.ncdc.noaa.gov/stormevents/
- Tornado History Project, map of tornado events, http://www.tornadohistoryproject.com/tornado/Missouri

HazardProfile

Hazard Description

The NWS defines a tornado as "a violently rotating column of air extending from a thunderstorm to the ground." It is usually spawned by a thunderstorm and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Often, vortices remain suspended in the atmosphere as funnel clouds. When the lower tip of a vortex touches the ground, it becomes a tornado.

High winds not associated with tornadoes are profiled separately in this document in **Section 3.4.8,** Thunderstorm/High Wind/Hail/Lightning.

Essentially, tornadoes are a vortex storm with two components of winds. The first is the rotational winds that can measure up to 500 miles per hour, and the second is an uplifting current of great strength. The dynamic strength of both these currents can cause vacuums that can overpressure structures from the inside.

Although tornadoes have been documented in all 50 states, most of them occur in the central United States due to its unique geography and presence of the jet stream. The jet stream is a high-velocity stream of air that separates the cold air of the north from the warm air of the south. During the winter, the jet stream flows west to east from Texas to the Carolina coast. As the sun moves north, so does the jet stream, which at summer solstice flows from Canada across Lake Superior to Maine. During its move northward in the spring and its recession south during the fall, the jet stream crosses Missouri, causing the large thunderstorms that breed tornadoes.

A typical tornado can be described as a funnel-shaped cloud in contact with the earth's surface that is "anchored" to a cloud, usually a cumulonimbus. This contact on average lasts 30 minutes and covers an average distance of 15 miles. The width of the tornado (and its path of destruction) is usually about 300 yards. However, tornadoes can stay on the ground for upward of 300 miles and can be up to a mile wide. The National Weather Service, in reviewing tornadoes occurring in Missouri between 1950 and 1996, calculated the mean path length at 2.27 miles and the mean path area at 0.14 square mile.

The average forward speed of a tornado is 30 miles per hour but may vary from nearly stationary to 70 miles per hour. The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Tornadoes are most likely to occur in the afternoon and evening, but have been known to occur at all hours of the day and night.

Geographic Location

In Missouri, tornadoes occur most frequently between April and June, with April and May usually producing the most tornadoes. However, tornadoes can arise at any time of the year. While tornadoes can happen at any time of the day or night, they are most likely to occur between 3 p.m. and 9 p.m. Furthermore, tornadoes can occur anywhere across the state of Missouri, including Pulaski County.

Severity/Magnitude/Extent

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. Tornadoes have been known to lift and move objects weighing more than 300 tons a distance of 30 feet, toss homes more than 300 feet from their foundations, and siphon millions of tons of water from water bodies. Tornadoes also can generate a tremendous amount of flying debris or "missiles," which often become airborne shrapnel that causes additional damage. If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, roofs, and walls. However, the less spectacular damage is much more common.

Tornado magnitude is classified according to the EF- Scale (or the Enhance Fujita Scale, based on the original Fujita Scale developed by Dr. Theodore Fujita, a renowned severe storm researcher). The EF- Scale (**Table 3.70**) attempts to rank tornadoes according to wind speed based on the damage caused. This update to the original F Scale was implemented in the U.S. on February 1, 2007.

Table 3.70. Enhanced F Scale for Tornado Damage

Fujita Scale			Derived EF Scale		Operational Scale	
F #	Fastest 1/4 - Mile (mph)	3 Second Gust (mph)	EF #	3 Second Gust (mph)	EF #	3 Second Gust (mph)
0	40 - 72	45 - 78	0	65 - 85	0	65 - 85
1	73 - 112	79 - 117	1	86 - 109	1	86 - 110
2	113 - 157	118 - 161	2	110 - 137	2	111 - 135
3	158 - 207	162 - 209	3	138 - 167	3	136 - 165
4	208 - 260	210 - 261	4	168 - 199	4	166 - 200
5	261 - 318	262 - 317	5	200 - 234	5	Over 200

Source: The National Weather Service, www.spc.noaa.gov/faq/tornado/ef-scale.html

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in **Table 3.71**. The damage descriptions are summaries. For the actual EF scale it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator.

Table 3.71. Enhanced Fujita Scale with Potential Damage

Enhanced Fujita Scale			
Scale	**Wind Speed (mph)**	**Relative Frequency**	**Potential Damage**
EF0	65-85	53.5%	Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0).
EF1	86-110	31.6%	Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	10.7%	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes complete destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4%	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely levelled; cars thrown and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses levelled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA Storm Prediction Center, http://www.spc.noaa.gov/efscale/ef-scale.html

Enhanced weather forecasting has provided the ability to predict severe weather likely to produce tornadoes days in advance. Tornado watches can be delivered to those in the path of these storms several hours in advance. Lead time for actual tornado warnings is about 30 minutes. Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground if they occur after sundown or due to blowing dust or driving rain and hail.

Previous Occurrences

Table 3.72 illustrates NCDC data reported for tornado events and damages since 1993 in the planning area. Prior to that date, only highly destructive tornadoes were recorded.

There are limitations to the use of NCDC tornado data that must be noted. For example, one tornado may contain multiple segments as it moves geographically. A tornado that crosses a county line or state line is considered a separate segment for the purposes of reporting to the NCDC. Also, a tornado that lifts off the ground for less than 5 minutes or 2.5 miles is considered a separate segment. If the tornado lifts off the ground for greater than 5 minutes or 2.5 miles, it is considered a separate tornado. Tornadoes reported in Storm Data and the Storm Events Database are in segments.

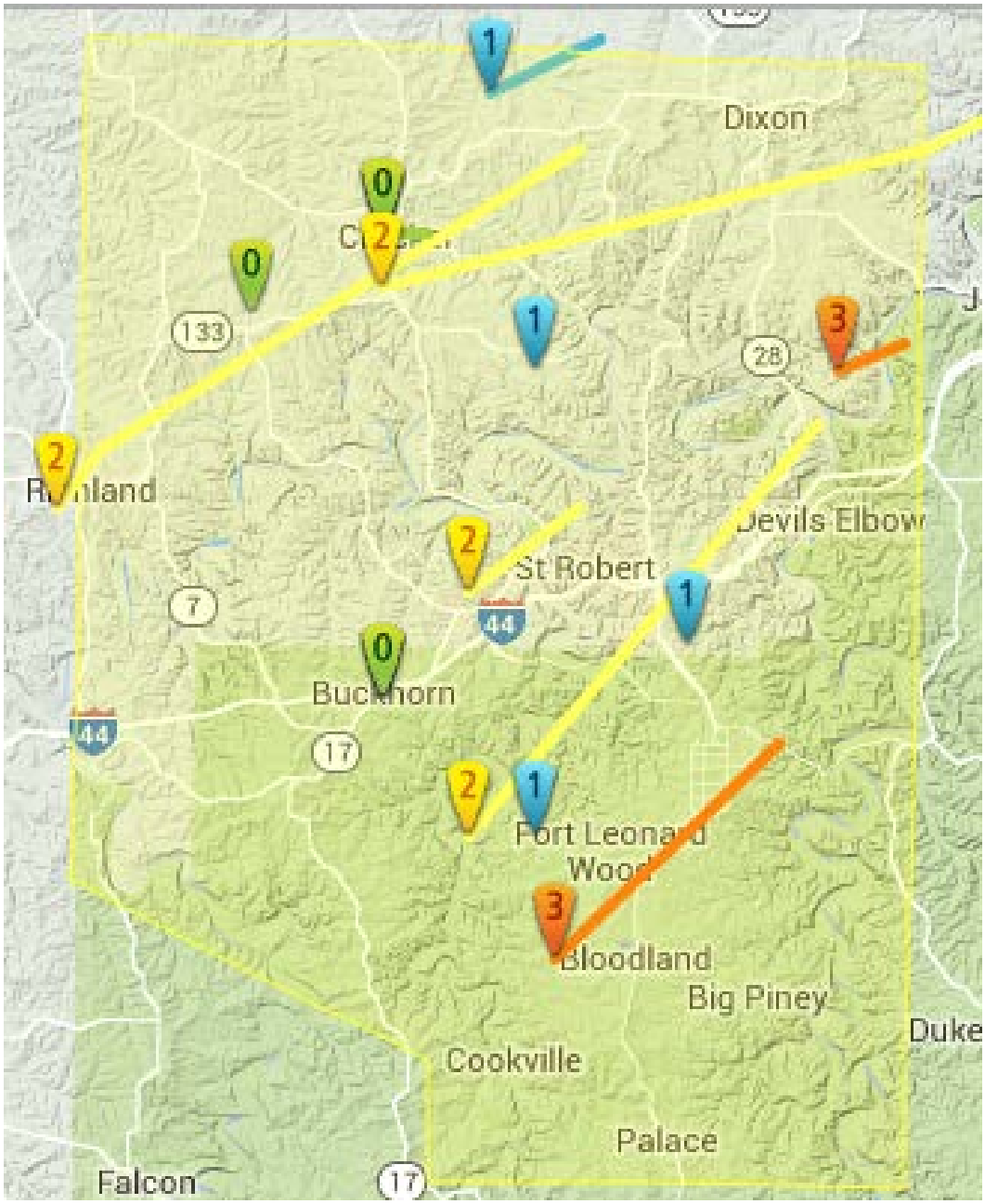
Table 3.72. Recorded Tornadoes in County A, 1993 – Present

Date	Beginning Location	Ending Location	Length (miles)	Width (yards)	F/EF Rating	Death	Injury	Property Damage	Crop Damages
04/15/1994	Buckhorn	-	.4	20	FO	0	0	$50,000	0
05/18/1995	6S Waynesville	-	1	100	F1	0	2	$30,000	0
10/23/2001	-	Crocker	.5	75	F0	0	0	0	0
05/04/2003	-	Swedeborg	.2	20	F0	0	0	0	0
05/06/2003	5N Waynesville	5N Waynesville	1	100	F1	0	0	$500,000	0
01/07/2008	2NNW Hooker	3SSE Franks	1.77	400	EF3	0	3	$1,000,000	0
12/31/2010	2W Bloodland	3ENE (TBN) Ft. Leonard Wood	7.5	500	EF3	0	4	$90,000,000	0
-	**Total**	-	11.37	1,215	-	0	9	$91,580,000	0

Source: National Climatic Data Center, http://www.ncdc.noaa.gov/stormevents/

Figure 3.48 depicts historic tornado paths across Pulaski County.

Figure 3.48. Pulaski County Map of Historic Tornado Paths



Source: Missouri Tornado History Project, http://www.tornadohistoryproject.com/tornado/Missouri

According to the USDA Risk Management Agency's record, there were no insurance payments in Pulaski County for crop damages as a result of tornadoes between 1995 and 2015.

Probability of Future Occurrence

From the data obtained from the NCDC[35], an annual average percent probability was calculated for tornadoes within Pulaski County (**Table 3.73).** There is a 31.82 percent annual average probability of a tornado occurrence (7 events/22 years x 100). Tornado events can be found in **Table 3.72**. In addition, **Figure 3.49,** obtained from the 2013 Missouri State Hazard Mitigation Plan, also illustrates tornado probabilities across the State.

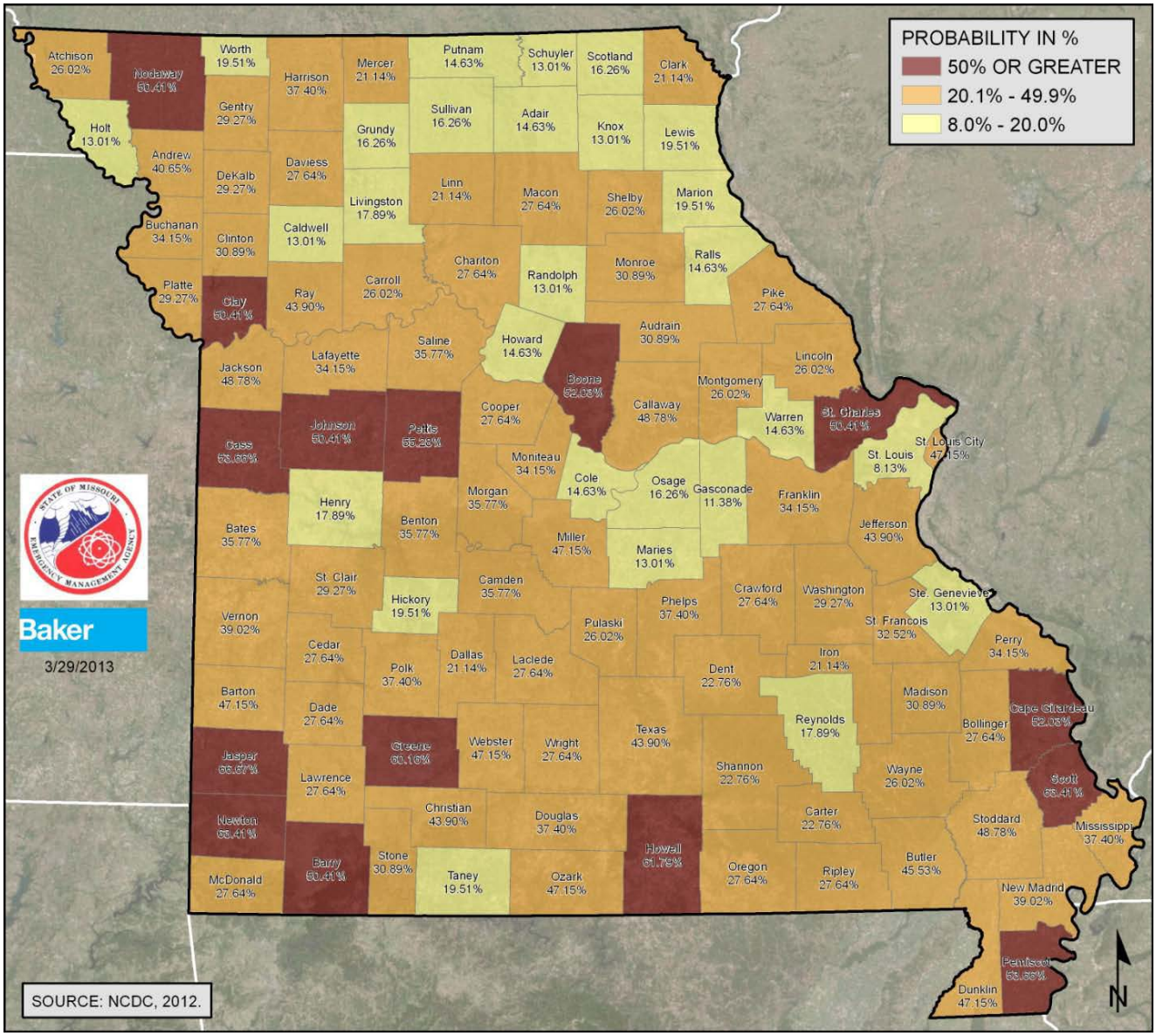
Table 3.73. Annual Average % Probability of Tornadoes in Pulaski County

Location	Annual Avg. % P
Pulaski County	31.82%

*P = probability; see page 3.24 for definition.

[35] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI

Figure 3.49. Missouri Tornado Probability



Source: 2013 Missouri State Hazard Mitigation Plan

Vulnerability

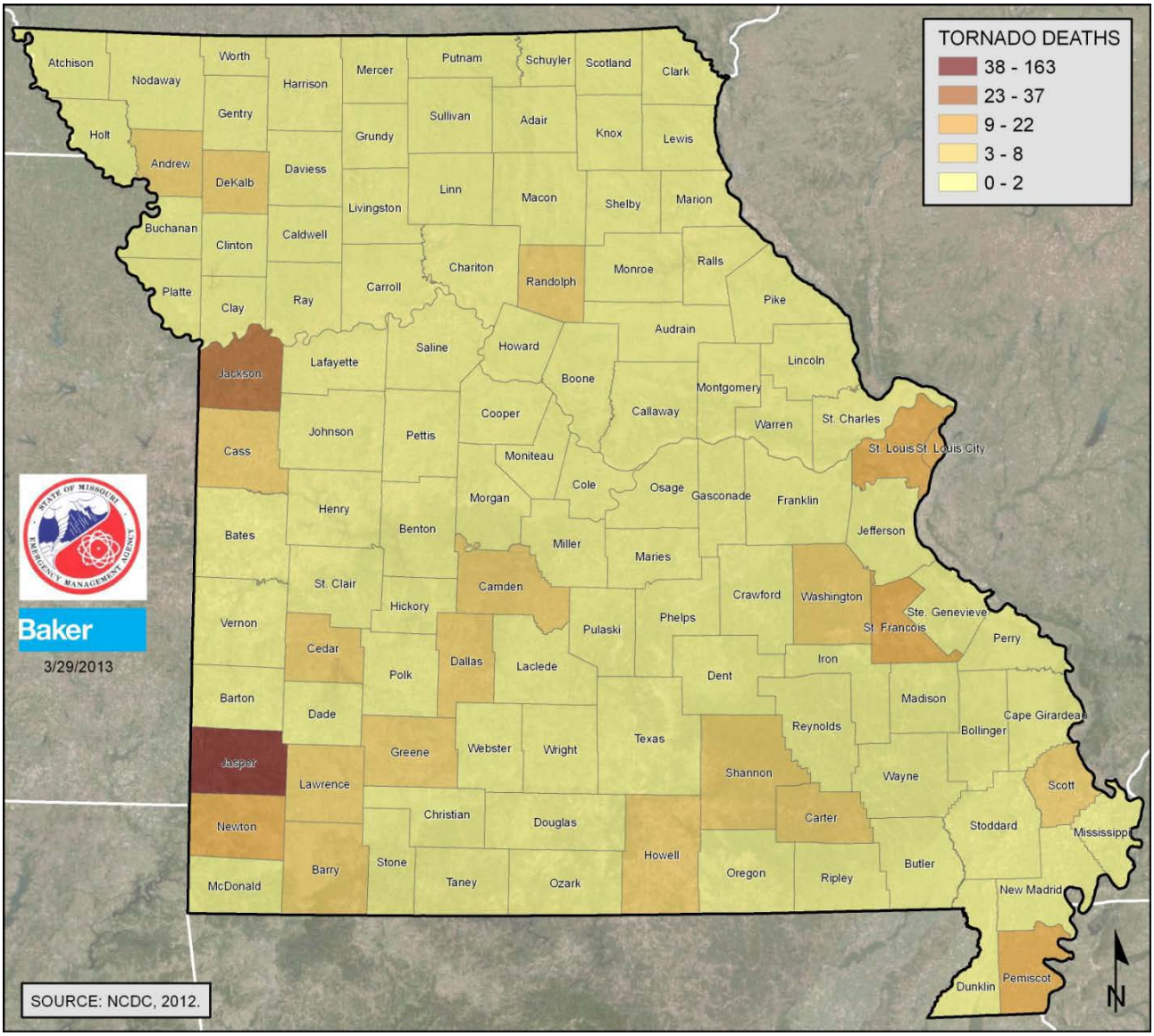
Vulnerability Overview

Pulaski County resides in a region of the United States that has a high frequency of dangerous and destructive tornadoes. This region seen in **Figure 3.50** is referred to as “Tornado Alley”. Furthermore, **Figure 3.51** illustrates areas where perilous tornadoes historically have occurred in Missouri.

Figure 3.50. Tornado Alley in the U.S.

Source: http://www.tornadochaser.net/tornalley.html

Figure 3.51. Missouri Tornado Deaths by county, 1950 – March 17, 2012



Source: 2013 Missouri State Hazard Mitigation Plan

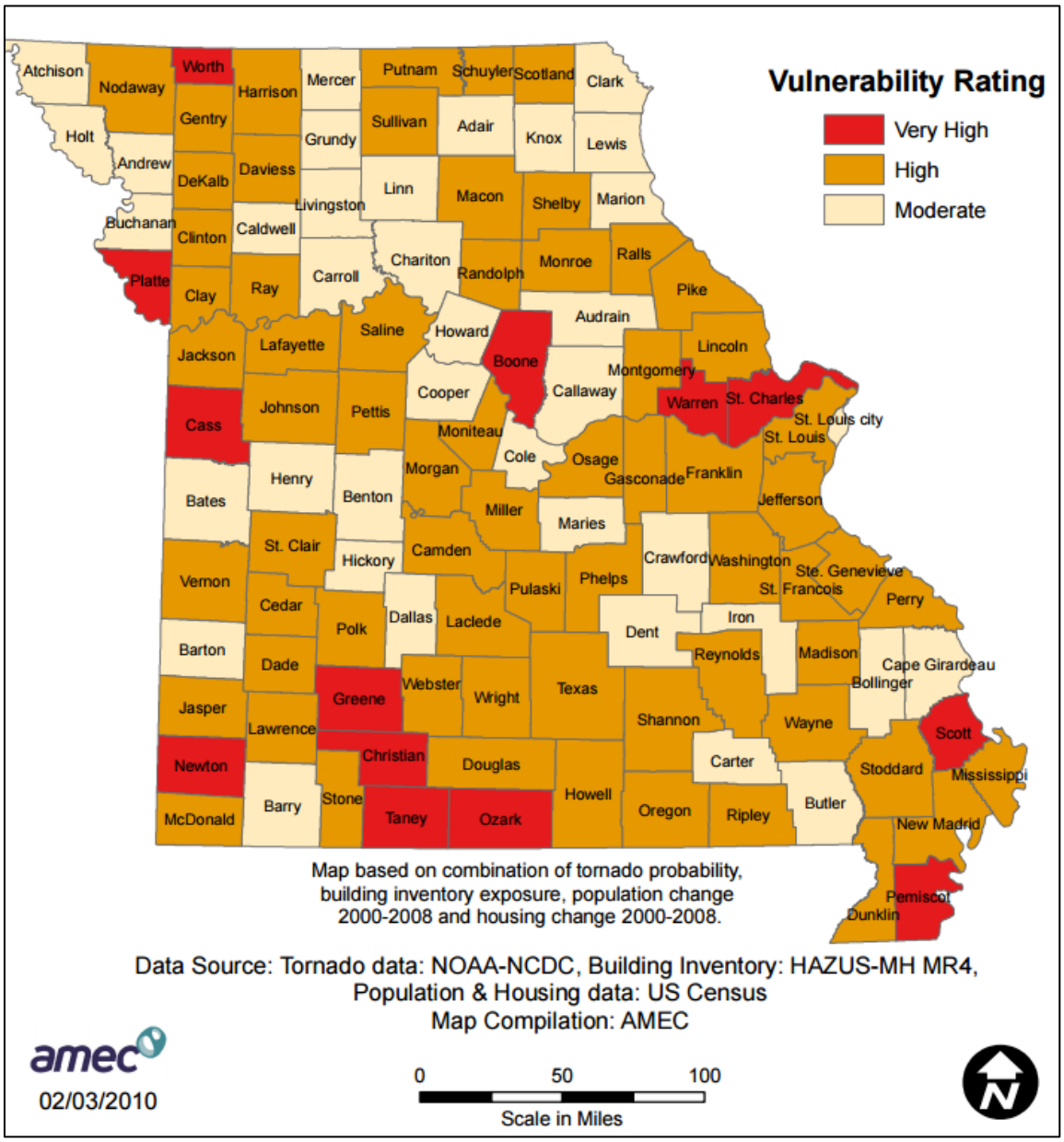
Data was obtained from the 2013 Missouri State Hazard Mitigation Plan for tornado vulnerability. The analysis depicts the likelihood of future tornado impacts, average annual property loss ratio, population change, and house change. Factors were ranked from 1 to 3; moderate, high, and very high, respectively. The factor scores are totaled to estimate Pulaski County's vulnerability to tornadoes (**Table 3.74**). Since tornadoes are probable to occur across the state, the lowest risk factor is still considered moderate. **Figure 3.52** depicts the vulnerability summary for tornadoes across Missouri by County.

Table 3.74. Factors and Ranges Considered in Tornado Vulnerability Analysis

Factors Considered	Moderate (1)	High (2)	Very High (3)
Likelihood of Occurrence (# of events/ yrs. Of data)	6 - 24	25 - 49	50 - 68
Loss Ratio %	0 - .113	0.114 -.226	0.227 - 0.340
Population % Change	Below 6	7 - 22	23 - 39
Housing % Change	Below 12	13 - 25	26 - 39
Overall Vulnerability Rating	4 and 5 Rating	6 and 7 Rating	3 and 9 Rating

Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.52. Vulnerability Summary for Tornadoes



Source: https://emgis.oa.mo.gov/dps/mitigation/MO_Tornado_Vulnerability.pdf

Table 3.75 provides information in regards to tornado probability, potential loss, and risk summary for Pulaski County. This table was calculated to determine 10 counties with the largest annualized historic tornado losses between 1950 and July 31, 2012 (**Table 3.76** and **Figure 3.53**). Pulaski County is one of the top counties with annualized historic losses; however, is not one of the top 13 counties with the greatest likelihood of being impacted by a tornado[36].

Table 3.75. Tornado Probability, Potential Loss, and Risk Summary

County	# of Tornadoes	Likelihood of Occurrence	Probability Rating	Total Exposure ($)	Annualized Historic Loss	Loss Ratio	Loss Ratio Rating	Population Growth % Change	Pop. Change Rating	House % Change	Housing Ratio Rating	Total Vulnerability
Pulaski	16	26.02%	2	$3,755,326,000	$1,876,552	0.05%	1	27.00%	3	19.14%	2	High

Source: 2013 Missouri State Hazard Mitigation Plan

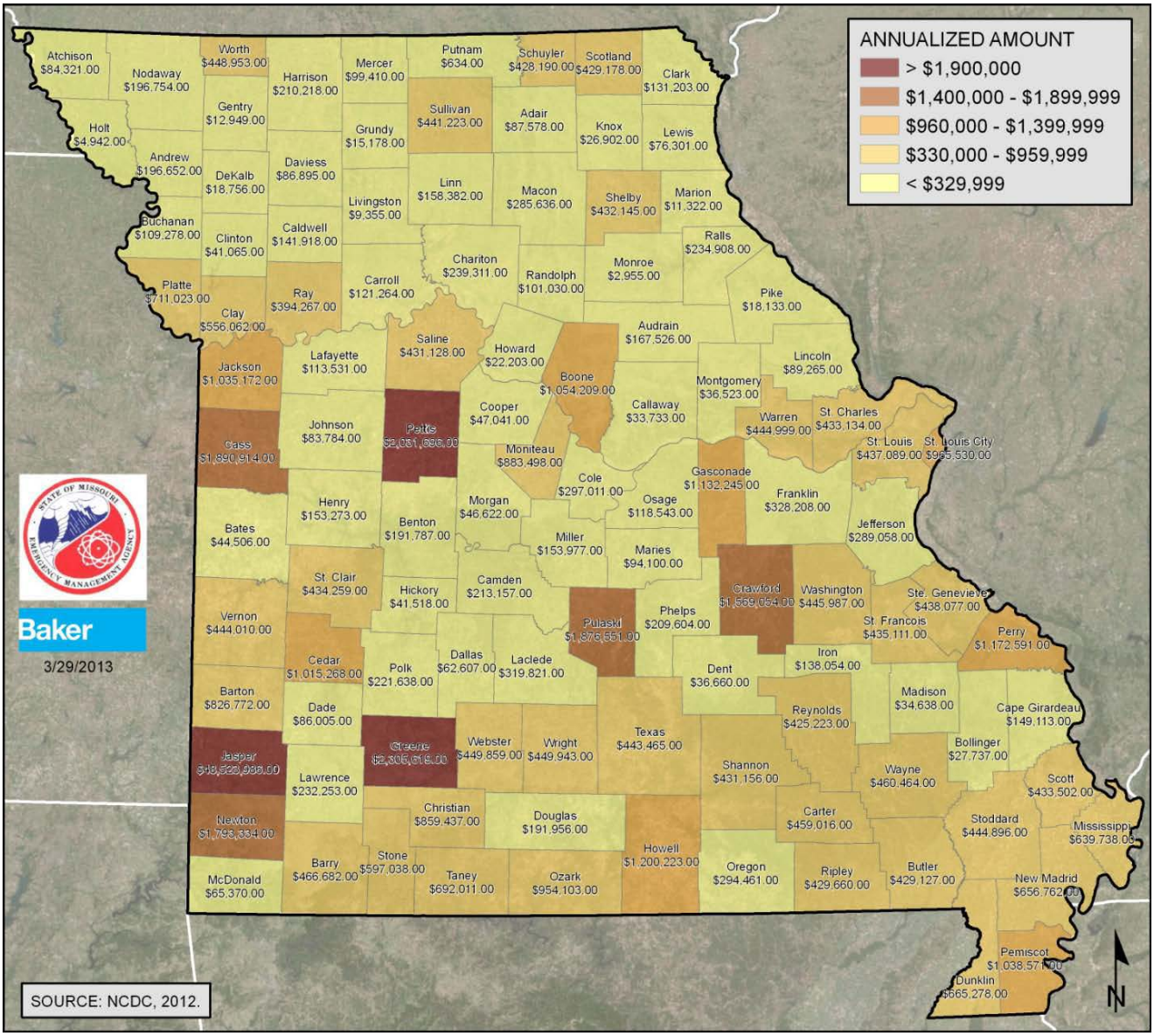
Table 3.76. Top 10 Counties Ranked by Annualized Historic Tornado Loss 1950 – July 2012

County	Annualized Historic Loss 1950 - July 31, 2012
Jasper	$48,523,987
Greene	$2,305,620
Pettis	$2,031,696
Cass	$1,890,914
Pulaski	**$1,876,552**
Newton	$1,793,334
Crawford	$1,569,054
Perry	$1,172,592
Howell	$1,200,223
Gasconade	$1,132,245

Source: 2013 Missouri State Hazard Mitigation Plan

[36] 2013 Missouri State Hazard Mitigation Plan

Figure 3.53. Annualized Tornado Damages



Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

The average annual loss for Pulaski County due to tornadoes is $30,266.97 (previous 62 years). With this information we can estimate that each year there will be approximately $30,266 in loss to existing development. Additionally, the largest recorded tornado in the planning area has been an EF-3. Utilizing this information we can infer that there is potential for another tornado of equivalence.

Future Development

As populations and development increases across the County, the vulnerability will increase as well. In order to protect jurisdictions from increased tornado vulnerabilities future analysis, training, and implementation should be considered at the planning, engineering, and architectural design stages.

Hazard Summary by Jurisdiction

As previously stated, a tornado event could occur anywhere in the planning area. However, some jurisdictions would suffer heavier damages because of the age of housing or high concentration of mobile homes. See **Table 3.33** for jurisdictions most vulnerable to damage due to the age of the structure. Furthermore, data was obtained from the U.S. Census Bureau for the number of mobile homes in Pulaski County. From the information provided in **Table 3.77,** St. Robert is most vulnerable to losses due to the number of mobile homes residing within the jurisdiction.

Table 3.77. Number of Mobile Homes in Pulaski County, 2009

County	Number of Mobile Homes
Pulaski County	2,230
Crocker	59
Dixon	37
Richland	55
St. Robert	304
Waynesville	64

Source: U.S. Census Bureau, 2009-2013 5-Year American Community Survey

Problem Statement

Early warnings are possibly the best hope for residents when severe weather strikes. While more than two hours warning is not possible for tornados, citizens must immediately be aware when a city will be facing a severe weather incident. Jurisdictions that do not already possess warning systems should plan to purchase a system. Storm shelters are another important means of mitigating the effects of tornados. Additional public awareness also includes coverage by local media sources. A community-wide shelter program should be adopted for residents who may not have adequate shelter in their homes. Residents should also be encouraged to build their own storm shelters to prepare for emergencies. Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather.

3.4.10 Winter Weather/Snow/Ice/Severe Cold

Some specific sources for this hazard are:

- Wind chill chart, National Weather Service, http://www.nws.noaa.gov/om/winter/windchill.shtml;
- Average Number of House per year with Freezing Rain, American Meteorological Society. "Freezing Rain Events in the United States." http://ams.confex.com/ams/pdfpapers/71872.pdf;
- USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm
- Any local Road Department data on the cost of winter storm response efforts.
- National Climatic Data Center, Storm Events Database, http://www.ncdc.noaa.gov/stormevents/

Hazard Profile

Hazard Description

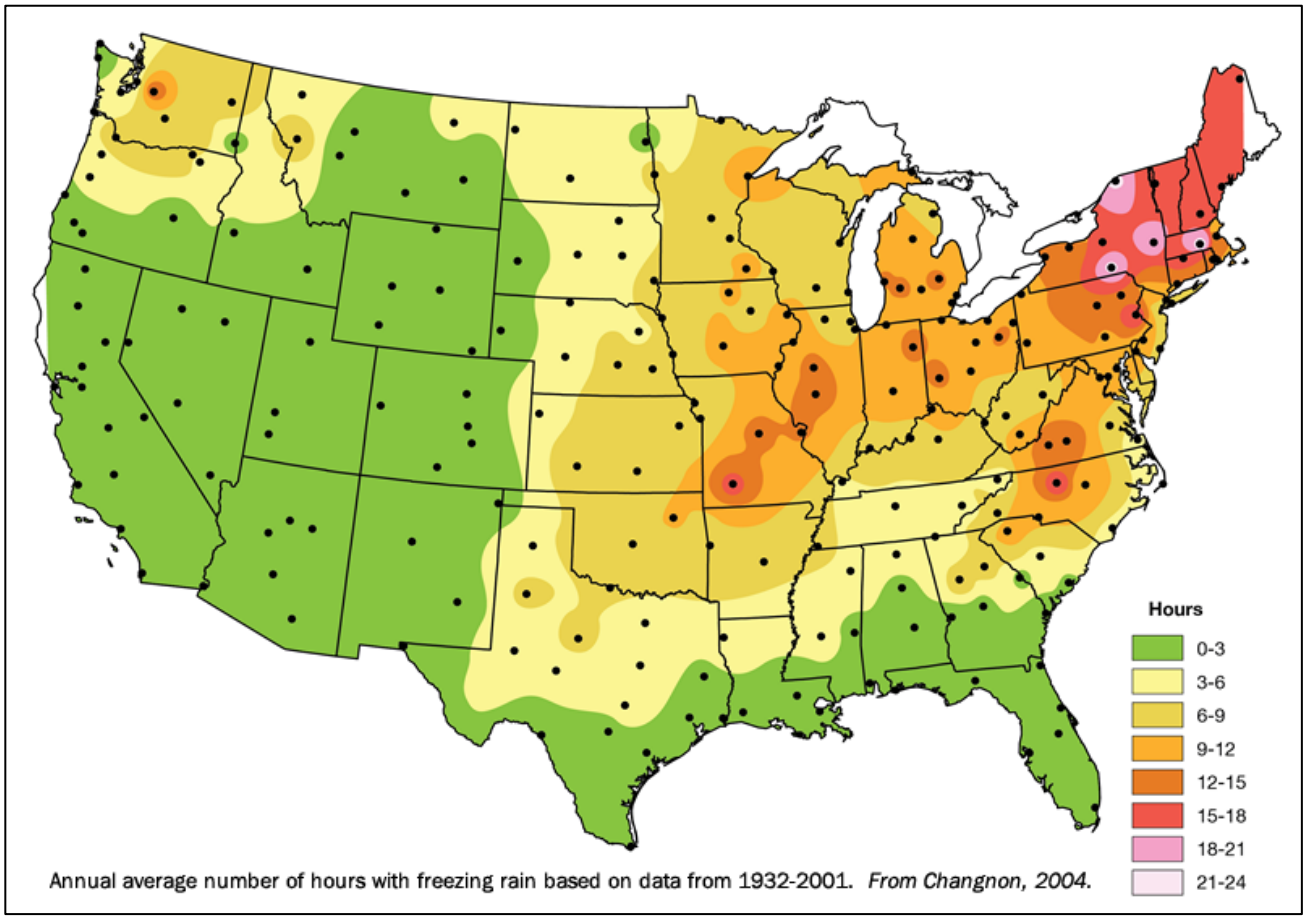
A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. The National Weather Service describes different types of winter storm events as follows.

- **Blizzard**—Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- **Snow Showers**—Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- **Freezing Rain**—Measurable rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing-rain events are short lived and occur near sunrise between the months of December and March.
- **Sleet**—Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects.

Geographic Location

Severe winter weather typically strikes Missouri more than once every year. Pulaski County receives winter weather events from heavy snows to freezing rain annually. Major snowstorms typically occur once each year, causing multiple school closings, as well as suspending business and government activity. Pulaski County is vulnerable to heavy snow, ice, extreme cold temperatures and freezing rain. **Figure 3.54** illustrates statewide average number of hours per year with freezing rain. Pulaski County receives approximately 9 to 12 hours.

Figure 3.54. NWS Statewide Average Number of Hours per Year with Freezing Rain



Source: Changon, 2004, http://mrcc.isws.illinois.edu/living_wx/icestorms/

Severity/Magnitude/Extent

Severe winter storms include extreme cold, heavy snowfall, ice, and strong winds which can push the wind chill well below zero degrees in the planning area. Heavy snow can bring a community to a standstill by inhibiting transportation (in whiteout conditions), weighing down utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant. Ice buildup can collapse utility lines and communication towers, as well as make transportation difficult and hazardous. Ice can also become a problem on roadways if the air temperature is high enough that precipitation falls as freezing rain rather than snow.

Extreme cold often accompanies severe winter storms and can lead to hypothermia and frostbite in people without adequate clothing protection. Cold can cause fuel to congeal in storage tanks and supply lines, stopping electric generators. Cold temperatures can also overpower a building's heating system and cause water and sewer pipes to freeze and rupture. Extreme cold also increases the likelihood for ice jams on flat rivers or streams. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is hazardous to health and safety.
The National Institute on Aging estimates that more than 2.5 million Americans are elderly and especially vulnerable to hypothermia, with the isolated elders being most at risk. About 10 percent of people over the age of 65 have some kind of bodily temperature-regulating defect, and 3-4 percent of all hospital patients over 65 are hypothermic.

Also at risk are those without shelter, those who are stranded, or who live in a home that is poorly insulated or without heat. Other impacts of extreme cold include asphyxiation (unconsciousness or death from a lack of oxygen) from toxic fumes from emergency heaters; household fires, which can be caused by fireplaces and emergency heaters; and frozen/burst pipes.

Buildings with overhanging tree limbs are more vulnerable to damage during winter storms when limbs fall. Businesses experience loss of income as a result of closure during power outages. In general heavy winter storms increase wear and tear on roadways though the cost of such damages is difficult to determine. Businesses can experience loss of income as a result of closure during winter storms.

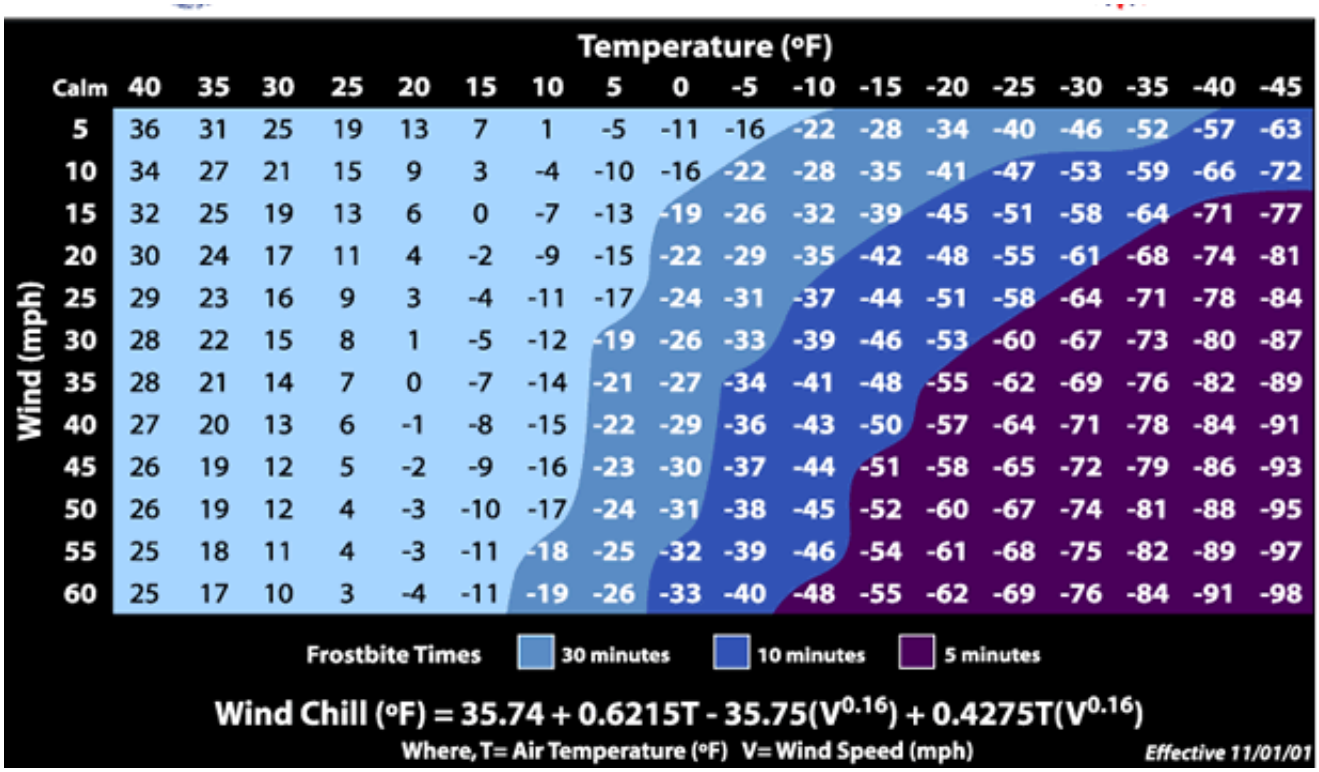
Overhead power lines and infrastructure are also vulnerable to damages from winter storms. In particular ice accumulation during winter storm events damage to power lines due to the ice weight on the lines and equipment. Damages also occur to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses could include cost of repair or replacement of damaged facilities, and lost economic opportunities for businesses.

Secondary effects from loss of power could include burst water pipes in homes without electricity during winter storms. Public safety hazards include risk of electrocution from downed power lines. Specific amounts of estimated losses are not available due to the complexity and multiple variables associated with this hazard. Standard values for loss of service for utilities reported in FEMA's 2009 BCA Reference Guide, the economic impact as a result of loss of power is $126 per person per day of lost service.

Wind can greatly amplify the impact of cold ambient air temperatures. Provided by the National Weather Service**, Figure 3.55** below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

Winter storms, cold, frost, and freeze all can influence or negatively impact crop production. However, data obtain from the USDA's Risk Management Agency for insured crop losses indicates that there were no claims paid in Pulaski County between 1995 and 2014 for severe winter weather.

Figure 3.55. Wind Chill Chart



Source: National Weather Service, http://www.nws.noaa.gov/om/winter/windchill.shtml

Previous Occurrences

Data was obtained from the NCDC for winter weather reported events and damages since 2004 **(Table 3.78**). This data includes variables such as blizzard, cold/wind chill, extreme cold/wind chill, heavy snow, ice storm, sleet, winter storm, and winter weather. Additionally, narratives for specific events are listed below.

Table 3.78. NCDC Pulaski County Winter Weather Events Summary, 2004 - Present

Type of Event	Inclusive Dates	Number of Injuries	Property Damages	Crop Damages
Winter Storm	11/30/2006	0	50,000	0
Winter Storm	01/20/2007	0	0	0
Winter Storm	02/28/2009	0	0	0
Blizzard	02/01/2011	0	0	0
Winter Storm	02/21/2013	0	0	0
Winter Storm	01/05/2014	0	0	0
Winter Storm	03/02/2014	0	0	0
Winter Storm	02/20/2015	0	0	0
Winter Storm	02/28/2015	0	0	0

Source: NCDC, data accessed [10/20/2015]

Narratives:

1. **02/28/2009:** Heavy snow with accumulations of four to eight inches

2. **02/01/2011:** A major winter storm produced heavy snow and blizzard conditions at times across southwest Missouri. Heavy snow accumulations of two to five inches were observed. Significant accumulations of sleet preceded the snow with accumulations up to three inches. Freezing rain accumulated up to one tenth of an inch. Northwest winds of 20 to 40 mph resulted in significant drifts and visibilities less than one quarter mile. Travel was extremely treacherous with some roads impassable.

3. **02/21/2013:** A winter storm brought a mix of freezing rain and sleet accompanied by thunder. Sleet accumulations ranged from one two inches with freezing rain accumulations ranging from a trace to one tenth of an inch.

4. **01/05/2014:** Heavy snow with accumulations of eight to 12 inches.

5. **03/02/2014:** Sleet accumulations around one half inch with snow accumulations of one to two inches.

6. **02/20/2015:** Winter storm brought significant amounts of freezing rain to portions of southern Missouri with ice accretion up to around one quarter of an inch.

7. **02/28/2015:** Winter storm brought significant snowfall with total snow accumulations of four to six inches.

Probability of Future Occurrence

From the data obtained from the NCDC[37], annual average percent probabilities were calculated for winter weather within Pulaski County (**Table 3.79)**. There were nine recorded events (**Table 3.78**) over an 11 year period. There is an 81.82 percent annual average probability of winter weather occurrence (9 events/11 years x 100)**.**

Table 3.79. Annual Average % Probability of Winter Weather in Pulaski County

Location	Annual Avg. % P
Pulaski County	81.82%

*P = probability; see page 3.24 for definition.

[37] http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI

Vulnerability

Vulnerability Overview

Data was obtained from the 2013 Missouri State Hazard Mitigation Plan for vulnerability information regarding Pulaski County. Various data sources were utilized for statistical analysis including the following:

- National Climatic Data Center (NCDC)
- FEMA's Public Assistance Funds
- Crop Insurance Claims data from the USDA's Risk Management Agency
- HAZUS-MR4
- U.S. Census Data
- USDA's Census of Agriculture

The following Table (**Table 3.80**) includes data elements for severe winter weather.

Table 3.80. Pulaski County Housing Density, Building Exposure, Crop Exposure, Social Vulnerability Index, Total incidents, Total Property Loss, and Total Crop Insurance Paid Data

County	Housing Units/sq. mi.	Total Building Exposure ($)	Crop Exposure (2007) ($)**	Total Incidences	Total $ Property Los ($)	Total Crop Insurance Paid ($)
Pulaski	32.7	$3,755,326,000	$948,000	23	$6,339,528	$0

Seven factors were utilized to determine overall severe winter storm vulnerability. These factors include housing density, likelihood of occurrence, building exposure, crop exposure, average annual property loss ratio, average annual crop insurance claims and social vulnerability. Furthermore, 5 rating values were developed for each factor. **Table 3.81** illustrates vulnerability analysis rating factors.

Table 3.81. Vulnerability Analysis Rating Factors

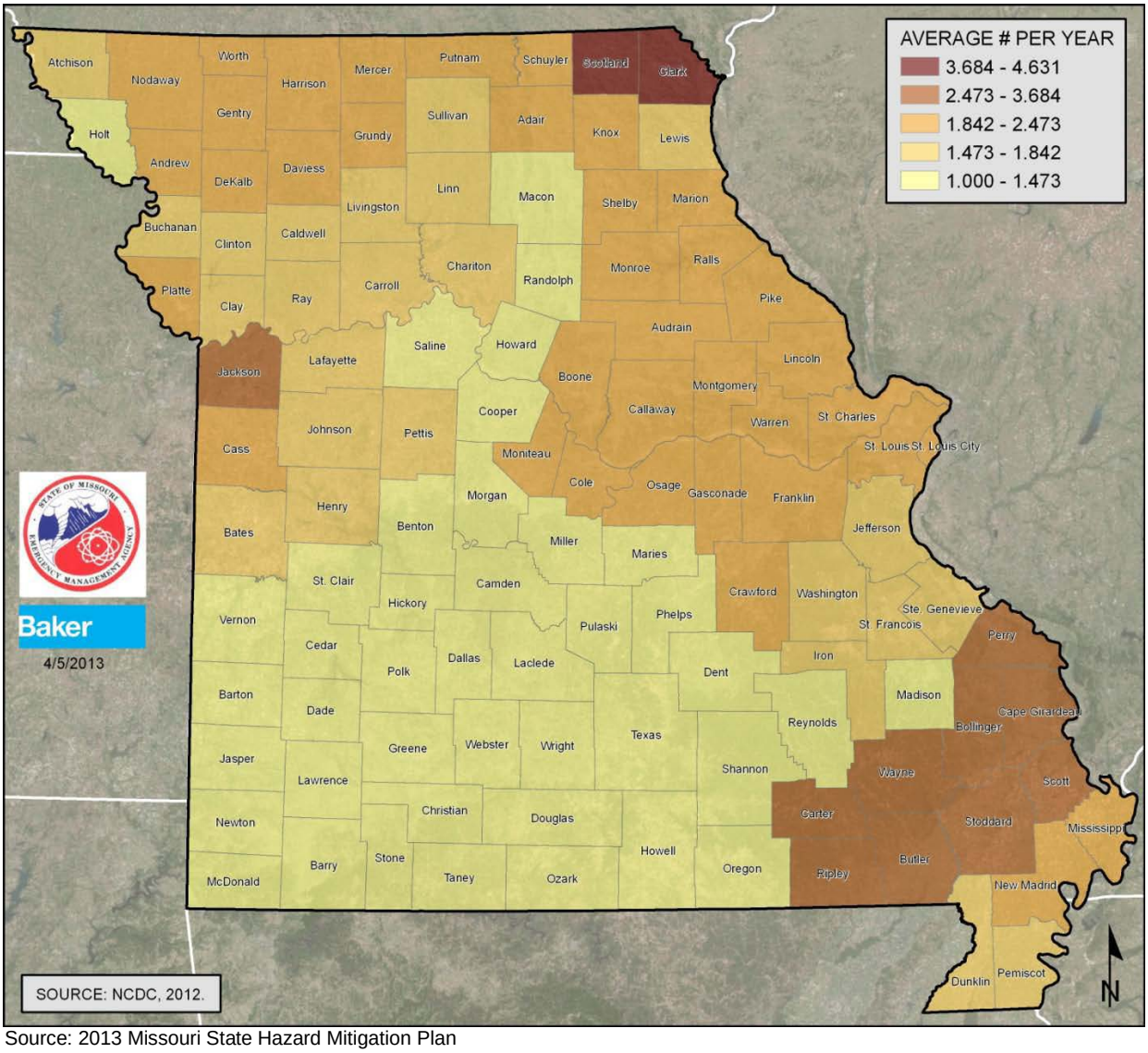
Factors considered	Low (1)	Medium-low (2)	Medium (3)	Medium-high (4)	High (5)
Housing Density (# per sq. mile)	<50	50 - 99	100 - 299	300 - 499	>500
Crop Exposure (4)	<$10M	$10M to $24M	$25M to $49M	$50M to $99M	>$100M
Social Vulnerability	1	2	3	4	5

Factors considered	Low (1)	Medium-low (2)	Medium (3)	Medium-high (4)	High (5)
Likelihood of Occurrence (# of events/ yrs. Of data)	1.000 - 1.473	1.473 - 1.842	1.842 - 2.473	2.473 - 3.684	3.684 - 4.631
Annualized Property Loss Ratio (annual property loss/exposure)	0.0 - 0.000110	0.000111 - 0.000274	0.000275 - 0.000636	0.000637 - 0.001397	0.001398 - 0.003270

Source: 2013 Missouri State Hazard Mitigation Plan

Figure 3.56 illustrates the likelihood of occurrence of severe winter weather across Missouri. Pulaski County was estimated to have an average of 1.000 to 1.473 severe winter weather events per year.

Figure 3.56. Likelihood of Occurrence of Severe Winter Weather



Source: 2013 Missouri State Hazard Mitigation Plan

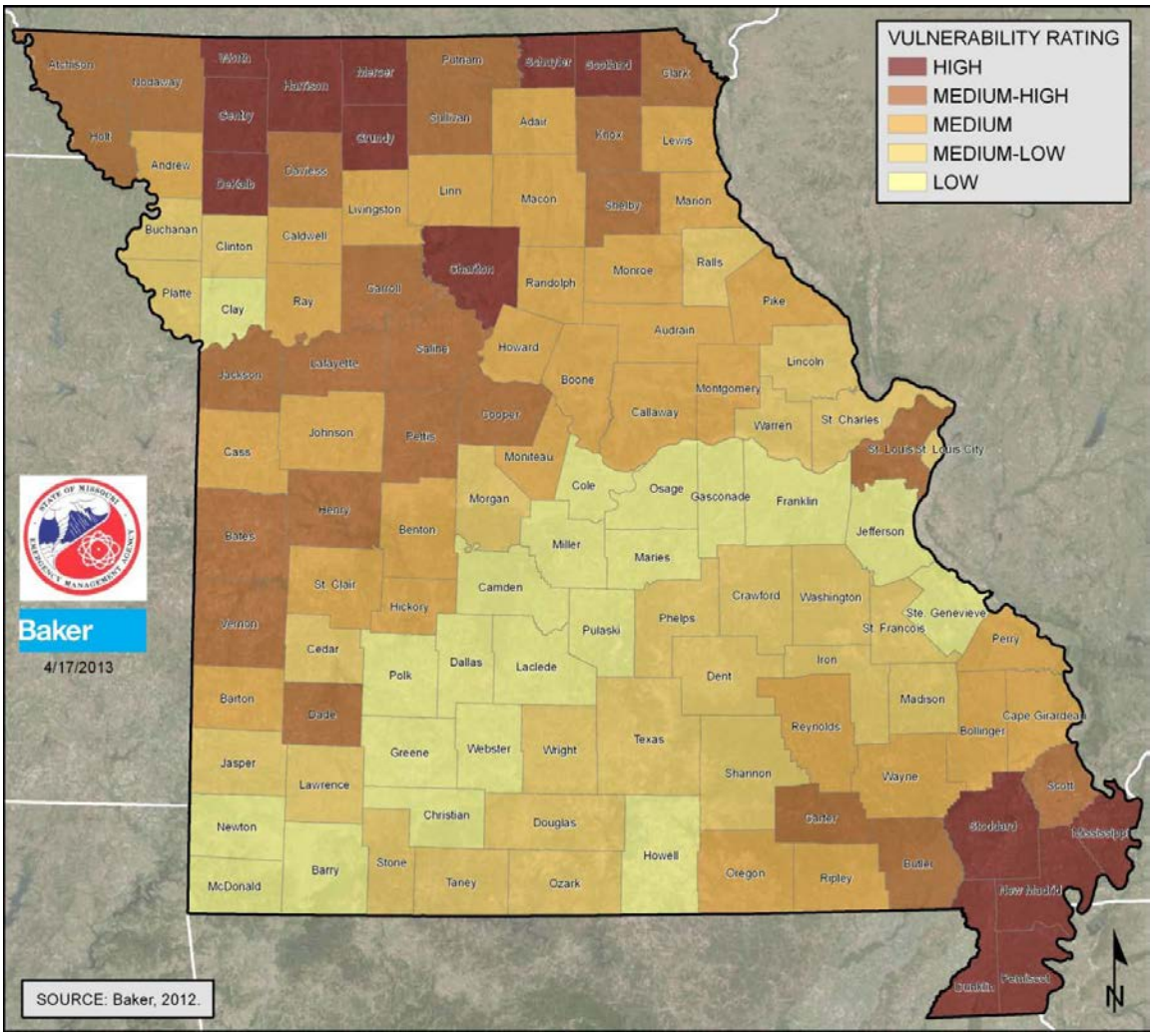
Table 3.82 depicts the calculated vulnerability rating for each factor considered in the vulnerability analysis for severe winter weather hazards. The overall vulnerability rating for severe winter weather in Pulaski County is Low. Moreover, **Figure 3.57** illustrates vulnerability ratings for each county within Missouri.

Table 3.82. Pulaski County Vulnerability Analysis for Severe Winter Weather

County	Housing Density Rating	Likelihood Rating	Property Loss Rating	Crop Exposure Rating	Crop Loss Ratio Rating	Social Vulnerability Index	Total Score and Vulnerability	Vulnerability Rating
Pulaski	1	1	1	1	1	3	8	Low

Source: 2013 Missouri State Hazard Mitigation Plan

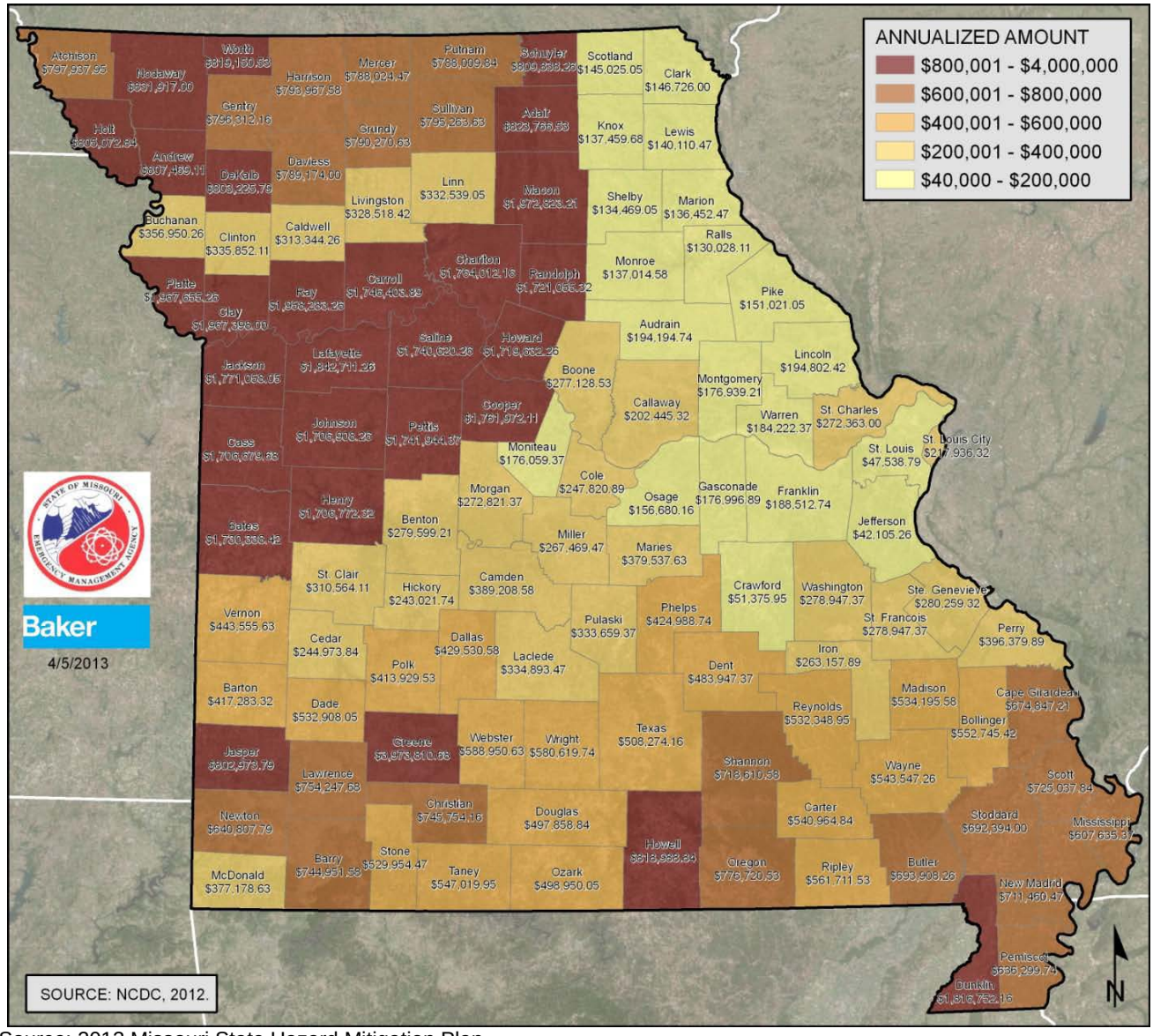
Figure 3.57. Vulnerability Summary for Severe Winter Storm



Source: 2013 Missouri State Hazard Mitigation Plan

Annualized severe winter weather damages were obtained from the 2013 Missouri State Hazard Mitigation Plan. Pulaski County is estimated as having $200,001 to $400,000 in damages per year due to severe winter weather (**Figure 3.58**).

Figure 3.58. Annualized Severe Winter Weather Damages



Source: 2013 Missouri State Hazard Mitigation Plan

Potential Losses to Existing Development

The next severe winter storm will most likely close schools and businesses for multiple days, and make roadways hazardous for travel. Heavy ice accumulation may damage power infrastructures, causing prolonged power outages for large portions of the region. In addition, freezing temperatures make water lines vulnerable to freeze/thaw. Fallen tree limbs also pose a threat to various structures/infrastructures across the county.

Future Development

Data for future development for the planning area is sparse. However, anticipated citywide electrical upgrades in Richland could increase the vulnerability to winter weather damages. In addition, the County's population is anticipated to decrease, which would decrease the number of individuals at risk during a winter weather event. Nevertheless, any future development and/or increase in populations will result in the increase of exposure to damage.

Hazard Summary by Jurisdiction

Variations in impacts are not anticipated for severe winter weather across the planning area. Yet, areas with high number of mobile homes tend to experience increased damages. Unincorporated Pulaski County and St. Robert have the highest abundance of mobile homes, making the area more prone to increase exposure to damage.

Problem Statement

In summary, Pulaski County is expected to experience at least one severe winter weather event annually; however the County has a low vulnerability rating. Since the County does not have a strong agricultural economy, crop losses are not anticipated in the future. Jurisdictions should enhance their weather monitoring to be better prepared for severe weather hazards. If the jurisdictions monitor winter weather, they can dispatch road crews to prepare for the hazard. County and city crews can also trim trees along power lines to minimize the potential for outages due to snow and ice. Citizens should also be educated about the benefits of being proactive to alleviate property damage as well.

4 MITIGATION STRATEGY 4.1

4.1 Goals 4.1

4.2 Identification and Analysis of Mitigation Actions 4.2

4.3 Implementation of Mitigation Actions 4.3

44 CFR Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section presents the mitigation strategy updated by the Mitigation Planning Committee (MPC) based on the updated risk assessment. The mitigation strategy was developed through a collaborative group process. The process included review of general goal statements to guide the jurisdictions in lessening disaster impacts as well as specific mitigation actions to directly reduce vulnerability to hazards and losses. The following definitions are taken from FEMA's *Local Hazard Mitigation Review Guide (October 1, 2012)*.

- **Mitigation Goals** are general guidelines that explain what you want to achieve. Goals are long-term policy statements and global visions that support the mitigation strategy. The goals address the risk of hazards identified in the plan.

- **Mitigation Actions** are specific actions, projects, activities, or processes taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals.

4.1 Goals

44 CFR Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

This planning effort is an update to Pulaski County's existing hazard mitigation plan approved by FEMA on April 1, 2011. Therefore, the goals from the 2011 Pulaski County Hazard Mitigation Plan were reviewed to see if they were still valid, feasible, practical, and applicable to the defined hazard impacts. The MPC conducted a discussion session during their first meeting to review and update the plan goals. To ensure that the goals developed for this update were comprehensive and supported State goals, the 2011 State Hazard Mitigation Plan goals were reviewed. As the existing goals were broad, still applicable, and supported the 2011 State Hazard Mitigation Plan goals, the MPC saw no reason to make any changes. The Pulaski County goals are as follows:

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Goal 3: Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Goal 5: Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefit of special interests.

Goal 6: Secure resources for investment in hazard mitigation.

4.2 Identification and Analysis of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

During the first MPC meeting, the committee discussed what needed to be updated in the risk assessment. Changes in risk since adoption of the previously approved plan were discussed. Since the last update, Pulaski County had one death due to falling into a sinkhole and two deaths due to flash flooding. Action items were reviewed and suggestions made for changes to address the changes in risk. Discussions from the actions from the previous plan included completed actions, on-going actions, and actions upon which progress had not been made. The MPC discussed SEMA's identified funding priorities and the types of mitigation actions generally recognized by FEMA.

The MPC determined to include problem statements in the plan update at the end of each hazard profile, which had not been done in the previously approved plan. The problem statements summarize the risk to the planning area presented by each hazard, and include possible methods to reduce that risk.

The focus of Meeting #2 was to review, prioritize and update the mitigation strategy. The MPC reviewed the list of actions proposed in the previous mitigation plan, proposed mitigation actions discussed at the first meeting, mitigation projects provided by the Pulaski County Road and Bridge Department as well as stakeholders such as the public water supply districts. Facilitators also provided suggestions for actions based on what some of the surrounding counties had included in their plans. Participants were also encouraged to refer to the current State Plan and provided a link to the FEMA's publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013).* This document was developed by FEMA as a resource for identification of a range of potential mitigation actions for reducing risk to natural hazards and disasters.

During the review of the plan document, MPC members were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction.

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted. Copies of the list of actions for each jurisdiction were provided to MPC members at planning meetings and were emailed out to all members. Action items were reviewed and the MPC provided updates on the status of action items during both planning meetings and the meeting with the road and bridge department. Each action item was reviewed and assigned one of the following:

- Completed, with a description of the progress,
- Not Started/Continue in Plan Update, with a discussion of the reasons for lack of progress,
- In Progress/Continue in Plan Update, with a description of the progress made to date or
- Deleted, with a discussion of the reasons for deletion.

Based on the status updates, there were zero completed actions, two deleted actions, and fifty two continuing actions.

Error! Reference source not found. provides a summary of the action statuses for each jurisdiction (See Appendix C:). Furthermore, **Table 4.2** provides a summary of the completed and deleted actions from the previous plan.

Table 4.1. Summary of Completed and Deleted Actions from the Previous Plan

Completed Actions	**Completion Details (date, amount, funding source)**
Deleted Actions	**Reason for Deletion**
5.1.3	Low Priority: Jurisdictions have addressed the issue or is not feasible.
5.3.1	Low Priority: Jurisdictions have addressed the issue or is not feasible.

Source: Previously approved County Hazard Mitigation Plan; MPC committee; data collection questionnaires

4.3 Implementation of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.

Jurisdictional MPC members were encouraged to meet with others in their community to discuss the actions to be included in the updated mitigation strategy. Throughout the MPC consideration and discussion, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act requires benefit-cost review as the primary method by which mitigation projects should be prioritized. The MPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the Missouri State Hazard Mitigation Plan. The benefit/cost review at the planning stage primarily consisted of a qualitative analysis, and was not the detailed process required grant funding application. For each action, the plan sets forth a narrative describing the types of benefits that could be realized from action implementation. The cost was estimated as closely as possible, with further refinement to be supplied as project development occurs.

FEMA's STAPLEE methodology was used to assess the costs and benefits, overall feasibility of mitigation actions, and other issues impacting project. During the prioritization process, the MPC worked together to review and assign scores. The process posed questions based on the STAPLEE elements as well as the potential mitigation effectiveness of each action. Scores were based on the responses to the questions as follows:

Definitely yes = 3 points
Maybe yes = 2 points
Probably no = 1

Definitely no = 0

The following questions were asked for each proposed action.

S: Is the action socially acceptable?
T: Is the action technically feasible and potentially successful?
A: Does the jurisdiction have the administrative capability to successfully implement this action?
P: Is the action politically acceptable?
L: Does the jurisdiction have the legal authority to implement the action?
E: Is the action economically beneficial?
E: Will the project have an environmental impact that is either beneficial or neutral? (score "3" if positive and "2" if neutral)

Will the implemented action result in lives saved?
Will the implanted action result in a reduction of disaster damage?

In addition to the STAPLEE process, each action item was also reviewed for Benefit/Cost. These two aspects of the prioritization process were scored as follows:

Benefit – two (2) points were added for each of the following avoided damages (8 points maximum = highest benefit)

- Injuries and/or casualties
- Property damages
- Loss-of-function/displacement impacts
- Emergency management costs/community costs

Cost – points were subtracted according to the following cost scale (-5 points maximum = highest cost)

- (-1) = Minimal – little cost to the jurisdiction involved
- (-3) = Moderate – definite cost involved but could likely be worked into operating budget
- (-5) = Significant – cost above and beyond most operating budgets; would require extra appropriations to finance or to meet matching funds for a grant

Note: For the Benefit/Cost Review, the benefit and cost of actions which used the word "encourage" were evaluated as if the action or strategy being encouraged was actually to be carried out.

In addition, the group considered the cost of mitigation versus the long-term savings in relation to potential lives saved and property damage avoided.

Total Score – The scores for the STAPLEE Review and Benefit/Cost Review were added to determine a Total Score for each action.

Priority Scale – To achieve an understanding of how a Total Score might be translated into a Priority Rating, a sample matrix was filled out for the possible range of ratings an action might receive on both the STAPLEE and Benefit/Cost Review. The possible ratings tested ranged between:

- A hypothetical action with "Half probably NO and half maybe YES" answers on STAPLEE (i.e. poor STAPLEE score) and Low Benefit/High Cost: Total Score = 7
- A hypothetical action with "All definitely YES" on STAPLEE and High Benefit/Little Cost: Total Score = 28

An inspection of the possible scores within this range led to the development of the following Priority Scale based on the Total Score in the STAPLEE- Benefit/Cost Review process:

20 – 28 points = High Priority
14-19 points = Medium Priority
13 points and below = Low Priority

The results of the STAPLEE process and Benefit/Cost analysis were then mailed out to all MPC members for feedback and consensus.

The final scores are listed below in the analysis of each action. Correspondence regarding the STAPLEE process is included in Appendix C: A spreadsheet with the action items and final scores is illustrated in Figure 4.1.

Jurisdictional Floodplain Management Programs

Every jurisdiction in Pulaski County regulates development in the floodplain by reviewing permit applications for all development including new and existing structures. Elevation certificates are required for all new construction, and existing structures with 50% or more damage following a flood are required to elevate. Floodplain maps are available in hard copy at each jurisdiction's courthouse or municipal building. Furthermore floodplain maps can be found online through FEMA's website https://msc.fema.gov/portal. Lastly, none of the jurisdictions currently participate in active monitoring activities within the floodplain.

Table 4.2. Jurisdictional Floodplain Ordinance Adoption Date

Community Name	Ordinance Adoption Date
Pulaski County	4/19/2010
City of Richland	5/18/2010
City of St. Robert	4/19/2010
City of Waynesville	1/21/2010

Source: Data Collection Questionnaires

Figure 4.1. Completed STAPLEE Benefit/Cost Spreadsheet		3 = Def YES 2 = Maybe YES			1 = Prob NO 0 = Def NO									
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
1.1.1	Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.2	Continue to educate residents about precautions that should be taken during threats of natural disasters such as heat waves and severe weather.	3	3	3	3	3	2	3	20	IC, LF, EMCC	6	-1	5	25	H
1.1.3	Provide information to citizens on individual mitigation activities such as building personal shelters and assuring that propane tanks are appropriately tied down.	3	3	2	3	3	2	3	19	IC, PD, LF EMCC	8	-1	7	26	H
1.1.4	Promote development of emergency plans by businesses and public entities.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.5	Educate school staff on natural hazards and make sure all staff are familiar with school emergency plan including evacuation and safety procedures.	3	3	3	3	3	3	3	21	IC, PD, LF EMCC	8	-1	7	28	H
1.1.6	Schools need to continue to conduct emergency preparedness exercises on a regular basis.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.7	Regularly review and update school emergency plans	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
1.1.8	Encourage the designation of storm shelters and the construction of tornado safe rooms in every school that does not have one.	3	3	3	3	3	1	3	19	IC, EMCC	4	-5	-1	18	M
1.2.1	Continue to encourage local governments to obtain early warning systems and improved communications systems.	3	3	2	3	3	1	3	18	IC, PD, LF, EMCC	8	-3	5	23	H
1.2.2	Continue to promote use of weather radios by local residents and schools to insure advanced warning about threatening weather.	3	3	3	3	3	3	3	21	IC,EMCC	4	-1	3	24	H
1.2.3	Continue to partner with local radio stations to ensure that appropriate warning of impending disasters is provided to all residents.	3	3	3	3	3	3	3	21	IC, EMCC	4	-1	3	24	H
1.2.4	Promote the installation of fire alarms/security systems in public buildings.	3	3	2	2	3	2	3	18	IC, PD, LF, EMCC	8	-3	5	23	H
1.2.5	Acquire generators to safeguard the availability of critical services such as electricity and water.	3	3	3	3	3	2	3	20	LF, EMCC	4	-1	3	23	H
1.2.6	Conduct a study of the Texas Road area to find mitigation solutions for flash flooding that has resulted in water rescues, damaged utilities and homes.	3	3	2	3	3	1	3	18	IC,PD, LF, EMCC	8	-5	3	21	H

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 1 = Prob NO 2 = Maybe YES 0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
1.2.7	Monitor developments in data availability concerning the impact of disasters such as dam failure, tornados, sinkholes, land subsidence and wildfire upon Pulaski County and all jurisdictions through local, state and federal agencies for use in hazard mitigation planning.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
1.3.1	Place water height gauges and signs near low water crossings	3	3	2	3	3	2	3	19	IC	2	-1	1	20	H
1.3.2	Continue to encourage tree trimming and dead tree removal programs by utility companies and local government.	3	3	3	3	3	2	2	19	IC, PD, LF, EMCC	8	-3	5	24	H
1.3.3	Continue to examine road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.	3	3	2	3	3	2	2	18	IC, PD, LF, EMCC	8	-1	7	25	H
1.3.4	Establish designated shelters for residents to be used during tornado threats, as cooling centers during extreme heat or power outages and/or as shelters during other disasters.	3	3	3	3	3	3	3	21	IC, LF, EMCC	6	-1	5	26	H
1.3.5	Continue to work to increase availability (if necessary construction) of storm shelters for individual families and large groups, including near large employment centers and schools.	3	3	3	3	3	1	3	19	IC, EMCC	4	-5	-1	18	M
1.3.6	Encourage establishing road signage that directs people on I-44 to local storm shelters during storm warnings.	3	3	2	3	3	3	3	20	IC, PD, EMCC	6	-1	5	25	H
2.1.1	Continue to encourage a self-inspection program at critical facilities to assure that building infrastructure is earthquake and tornado resistant.	3	2	2	3	3	1	3	17	IC, PD, LF, EMCC	8	-5	3	20	H
2.1.2	Encourage the adoption of minimum standard building codes by all communities	2	2	2	1	3	2	3	15	IC, PD, LF, EMCC	8	-3	5	20	H
2.1.3	Continue to encourage businesses and public entities to develop and implement emergency plans.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-3	5	26	H
2.1.4	Encourage the installation of backup generators for critical infrastructure such as water systems and emergency services.	3	3	3	3	3	2	3	20	LF, EMCC	4	-3	1	21	H
2.2.1	Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the NFIP.	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
2.2.2	Encourage development of storm water management plans in those jurisdictions that do not currently have them and in all new development.	3	2	2	2	3	2	3	18	IC, PD, LF, EMCC	8	-3	5	23	H

Figure 4.4 Prioritization of Hazard Mitigation Actions		3 = Def YES 1 = Prob NO 2 = Maybe YES 0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
2.2.3	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements in all existing and new development.	2	3	3	2	3	2	3	18	IC, PD, LF, EMCC	8	-3	5	23	H
2.3.1	Encourage local governments to develop and implement regulations for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.	2	2	2	2	3	3	3	17	IC, PD, LF, EMCC	8	-3	5	22	H
2.3.2	Monitor developments in data availability concerning the impact of dam failure, tornados, sinkholes, land subsidence and wildfire upon Washington County and all jurisdictions through local, state and federal agencies for use in hazard mitigation planning.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
2.3.3	Encourage the Mark Twain National Forest to levy stricter fines for persons causing fire hazards.	2	2	2	2	3	2	3	16	IC, PD, LF, EMCC	8	-1	7	23	H
3.1.1	Distribute SEMA brochures on natural disasters, preparedness and NFIP at public facilities and events.	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
3.1.2	Distribute regular press releases from county and city EMD offices concerning hazards, where they strike, frequency, preparedness and how to mitigate.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
3.2.1	Encourage local residents to purchase weather radios through press releases and brochures.	3	3	3	3	3	2	3	20	IC, EMCC	4	-1	3	23	H
3.2.2	Encourage meetings of EMD, city/county officials & SEMA to familiarize officials with mitigation planning, implementation & budgeting for mitigation projects.	3	3	3	2	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
3.3.1	Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	3	2	2	2	3	1	3	16	IC, PD, LF, EMCC	8	-3	5	21	H
3.3.2	Distribute press releases by jurisdictions regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.	3	3	2	3	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
3.4.1	Encourage county health department and local Red Cross Chapter to use publicity campaigns that make residents aware of proper measures to take during times of threatening conditions (e.g. drought, heat wave)	3	3	2	3	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
3.4.2	Publicize county or citywide drills.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H

Figure 4.4 Prioritization of Hazard Mitigation Actions		3 = Def YES 1 = Prob NO 2 = Maybe YES 0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
3.4.3	Encourage the development of a county-wide CERT, COAD, and/or VOAD program and educate the public on how they can benefit from these types of programs.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
4.1.1	Continue to encourage joint meetings of different organizations/agencies for mitigation related planning.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
4.1.2	Continue to encourage joint training (and drills) between agencies, public and private entities (including schools/businesses).	3	2	2	3	3	2	3	18	IC, PD, LF, EMCC	8	-1	7	25	H
4.1.3	Pool different agency resources to achieve widespread mitigation planning results.	3	2	2	2	3	2	3	17	IC, PD, LF, EMCC	8	-1	7	24	H
4.1.4	Maintain updated mutual aid agreements between emergency response agencies inside and outside the region.	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
4.2.1	Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	3	2	2	2	3	1	3	16	IC, PD, LF, EMCC	8	-3	5	21	H
4.2.2	Encourage meetings between EMD, city/county and SEMA to familiarize officials with mitigation planning and implementation and budgeting for mitigation projects.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	26	H
5.1.1	Incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	29	H
5.1.2	Encourage communities to budget for enhanced warning systems.	3	2	2	3	3	2	3	18	IC, LF EMCC	6	-3	3	21	H
5.1.3	Encourage all communities to develop stormwater management plans.	2	2	1	1	3	1	3	13	PD	2	-5	-3	10	L
5.1.4	Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	3	2	2	2	3	1	3	16	IC, PD, LF, EMCC	8	-3	5	21	H
5.1.5	Encourage cities to require contractor storm water management plans in all new development –both residential and commercial properties.	2	2	2	2	3	2	3	16	PD	2	-3	-1	15	M
5.2.1	Encourage the construction of storm shelters, especially tornado safe rooms near schools and large employment centers that currently do not have access to safe rooms.	3	3	3	3	3	1	2	18	IC, PD, EMCC	6	-5	1	19	M

Figure 4.4 Prioritization of Hazard Mitigation Actions		3 = Def YES 1 = Prob NO 2 = Maybe YES 0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
5.2.2	Encourage the designation of public buildings as safe shelters and develop accessibility plans for the public during times of need.	3	3	2	3	3	2	3	18	IC, EMCC	4	-1	3	21	H
5.3.1	Encourage local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.	1	2	2	1	2	1	3	12	PD, EMCC	4	-5	-1	11	L
5.3.2	Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.	2	2	2	1	2	1	3	13	PD, EMCC	4	-1	3	16	M
6.1.1	Work with SEMA Region I coordinator to learn about new mitigation funding opportunities.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
6.1.2	Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are also met.	3	2	2	2	3	2	3	17	IC, PD, LF, EMCC	8	-1	7	24	H
6.1.3	Work with state/local/federal agencies to include mitigation in all economic and community development projects.	3	2	2	2	3	2	2	16	IC, PD, LF, EMCC	8	-1	7	23	H
6.1.4	Encourage local jurisdictions to budget for mitigation projects.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-5	3	23	H
6.2.1	Encourage cities and counties to implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.	2	1	1	1	2	2	2	11	IC, PD, LF, EMCC	8	-5	3	14	M
6.2.2	Implement public awareness program about the benefits of hazard mitigation projects, both public and private through press releases and brochures.	3	3	2	3	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
6.3.1	Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property.	3	3	2	2	3	2	3	18	IC, PD, LF, EMCC	8	-1	7	25	H

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, cities of Crocker, Dixon, Richland, St. Robert and Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Residents are not always prepared to manage on their own for up to 72 hours following an event – especially an event that results in power outage or loss of utilities. This action item will improve the preparedness of individual households.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will promote Ready in 3 and other personal preparedness education programs through the distribution of brochures, press releases and presentations. The Pulaski County COAD will provide training opportunities on preparedness, response and recovery to residents.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.
Estimated Cost:	$500 -$3,500 estimated cost
Benefits:	In respect to avoided losses, this action will reduce the costs associated with providing shelter and assistance to residents affected by disasters. If residents are able to manage on their own for two to three days, this allows additional time for response and recovery activities to be established and power to be restored and allows emergency responders to focus on critical issues such as search and rescue, fire suppression, etc.
Plan for Implementation	
Responsible Organization/Department:	County and city EMDs, Pulaski County COAD.
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods or services
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Continuing in progress
Report of Progress	Activity has occurred in this area as most emergency response agencies, health departments and EMDs promote individual preparedness and provide *Ready in 3* brochures. SEMA distributes press releases periodically on personal preparedness. The Pulaski County COAD was formed in 2013 and has been working toward providing more education and awareness on disasters and preparedness. A more focused and coordinated effort would help to achieve comprehensive coverage for all the jurisdictions.

Action 1.1.2: Continue to educate residents about precautions that should be taken during threats of natural disasters such as heat waves and severe weather.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, cities of Crocker, Dixon, Richland, St. Robert and Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Residents are not always aware of the precautions that should be taken during threats of natural disasters such as heat waves and severe weather. Providing reminders through press releases and public announcements helps raise awareness and encourages residents to take the necessary precautions to stay safe.
Hazard(s) Addressed:	Severe heat and severe weather (lightening, wind, ice, cold)
Action or Project	
Action/Project Number:	1.1.2
Name of Action or Project:	Personal Precautions Awareness Program for Severe Heat and Severe Weather
Action or Project Description:	Provide education/awareness of personal safety precautions to follow during heat waves and severe weather through press releases during seasons when these hazards are of concern.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.
Estimated Cost:	$1,500 - $2,000
Benefits:	This project will reduce the number of injuries and deaths attributed to heat related and severe weather such as lightening or severe cold weather.
Plan for Implementation	
Responsible Organization/Department:	County and city EMDs; county health department
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods or services
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Activity has occurred in this area as most health departments and EMDs promote individual preparedness and provide Ready in 3 brochures. SEMA distributes press releases periodically on personal preparedness. A more focused and coordinated effort would help to achieve comprehensive coverage for all the jurisdictions.

Action 1.1.3: Provide information to citizens on individual mitigation activities such as building personal shelters and assuring that propane tanks are appropriately tied down.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert and Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of public knowledge on individual mitigation activities.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Individual mitigation activities education/awareness program.
Action or Project Description:	Provide information to citizens on individual mitigation activities such as building personal shelters and assuring that propane tanks are appropriately tied down.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$1,500 - $2,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	EMDs, floodplain managers
Action/Project Priority:	26 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Planning and zoning ordinances, building codes and development plans could be revised to include requirements for some mitigation actions in new development. For example – requiring storm water control measures, fire suppression or fuel tank tie downs in all new construction.
Progress Report	
Action Status	Continuing in progress.
Report of Progress	Local county and city floodplain ordinances provide guidance on building requirements in floodplain areas and are overseen by local floodplain coordinators. Additional efforts could be made by local EMDs to make people aware of actions they can take to make themselves and their property less vulnerable to disasters, such as building tornado shelters; securing fuel tanks; or sharing information on the Fire Wise Program to make homes less vulnerable to wild fires.

Action 1.1.4: Promote development of emergency plans by businesses and public entities.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, cities of Crocker, Dixon, Richland, St. Robert and Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Absence of emergency plans by businesses and public entities.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	1.1.4
Name of Action or Project:	Promoting the development of emergency plans by businesses and public entities.
Action or Project Description:	Promote development of emergency plans by businesses and public entities.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$4,500 - $5,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	EMDs
Action/Project Priority:	27 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Continuing not started
Report of Progress	Progress has been restricted due to lack of funding to develop a program to encourage and assist businesses and public entities in developing emergency plans. EMDs are encouraged to share resources available through SEMA and FEMA on emergency planning for businesses and public entities.

Action 1.1.5: Educate school staff on natural hazards and make sure all staff are familiar with school emergency plan including evacuation and safety procedures.

Action Worksheet	
Name of Jurisdiction:	Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge of school staff in regards to natural hazards and emergency plans.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Natural hazards and safety education program for school staff
Action or Project Description:	Educate school staff on natural hazards and make sure all staff are familiar with school emergency plan including evacuation and safety procedures.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$2,500 – $3,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School superintendents for all school districts
Action/Project Priority:	28 - H
Timeline for Completion:	On-going
Potential Fund Sources:	General training/revenue funds of school districts
Local Planning Mechanisms to be Used in Implementation, if any:	Action should be included in the school crisis plan as well as the regular staff training program.
Progress Report	
Action Status	New
Report of Progress	New action item added in 2016 update.

Action 1.1.6: Schools need to continue to conduct emergency preparedness exercises on a regular basis.

Action Worksheet	
Name of Jurisdiction:	Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	School districts must continuously exercise, train and practice for emergencies in order to insure that all staff are trained and students are prepared for incidents that may occur in order to reduce the potential for injuries or deaths.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	1.1.6
Name of Action or Project:	School exercise/emergency training program
Action or Project Description:	Regularly conduct emergency preparedness exercises.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$1,000 - $5,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendents
Action/Project Priority:	27 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	School crisis plans should include references to exercises and exercise schedules.
Progress Report	
Action Status	New
Report of Progress	

Action 1.1.7: Regularly review and update school emergency plans.

Action Worksheet	
Name of Jurisdiction:	Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient emergency school emergency plans
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	1.1.7
Name of Action or Project:	Regular review and update of school emergency plans.
Action or Project Description:	Regularly review and update school emergency plans.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$2,500 - $10,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendents
Action/Project Priority:	28 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Ongoing review and updating of emergency plans should be part of the existing plan document.
Progress Report	
Action Status	New
Report of Progress	

Action 1.1.8: Encourage the designation of storm shelters and the construction of tornado safe rooms in every school that does not have one.

Action Worksheet	
Name of Jurisdiction:	Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI, Pulaski County, cities of Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient storm shelters and tornado safe rooms in schools that do not have them.
Hazard(s) Addressed:	Tornado, Severe Weather
Action or Project	
Action/Project Number:	1.1.8
Name of Action or Project:	Expansion of storm shelter availability and construction of certified tornado safe rooms.
Action or Project Description:	Encourage the designation of storm shelters and the construction of tornado safe rooms in every school that does not have one.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables $2,500 - ?
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	EMDs for storm shelters School Superintendents for school certified tornado safe rooms
Action/Project Priority:	18 - M
Timeline for Completion:	5 years to increase the number of storm shelters in the county. 10 years to construct certified tornado safe rooms in each school district.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs for county and cities. School capital improvement plans and emergency plans.
Progress Report	
Action Status	Continuing in progress
Report of Progress	Tornado safe rooms have been constructed at Crocker R-II and at East Elementary in the Waynesville R-VI District. Lack of financial resources for construction continues to be the main obstacle, however, other school districts are interested in building safe rooms if funding can be secured.

Action 1.2.1: Continue to encourage local governments to obtain early warning systems and improved communications systems.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communication systems.
Hazard(s) Addressed:	Tornado, Severe Weather
Action or Project	
Action/Project Number:	1.2.1
Name of Action or Project:	Improving early warning and communications systems
Action or Project Description:	Continue to encourage local governments to obtain early warning systems and improved communication systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables $2,500 to ?
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, EMDs, city councils for Crocker, Dixon, Richland, St. Robert and Waynesville
Action/Project Priority:	23 - H
Timeline for Completion:	5 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs would have to be updated with any changes in early warning systems.
Progress Report	
Action Status	Continuing in progress and expanded to include Pulaski
Report of Progress	The cities of Crocker, St. Robert and Waynesville are all now participating in the CodeRED Weather Warning system which automatically delivers voice calls, text messages and emails to subscribed users within the direct path of any storms as soon as an alert is issued by the National Weather Service.

Action 1.2.2: Continue to promote use of weather radios by local residents and schools to insure advanced warning about threatening weather.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of communication/advanced warnings for threatening weather.
Hazard(s) Addressed:	Severe Weather, Flash Flood
Action or Project	
Action/Project Number:	1.2.2
Name of Action or Project:	Weather radio promotion
Action or Project Description:	Continue to promote use of weather radios by local residents and schools to insure advanced warning about threatening weather.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$1,500 - $2,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD
Action/Project Priority:	24 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Continuing in progress
Report of Progress	Some promotion of the use of weather radios by residents has been carried out over the past five years, but not in a sustained, organized fashion. All school districts have weather radios. This program would benefit from an annual press release targeting those residents who are not part of the enhanced warning system and encouraging them to purchase weather radios.

Action 1.2.3: Continue to partner with local radio stations to ensure that appropriate warning of impending disasters is provided to all residents.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of communication/advanced warnings of impending disasters for residents
Hazard(s) Addressed:	Tornado, Severe Weather, Flash Flood
Action or Project	
Action/Project Number:	1.2.3
Name of Action or Project:	Emergency coordination with local radio stations
Action or Project Description:	Continue to partner with local radio stations to ensure that appropriate warning of impending disasters is provided to all residents.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs
Action/Project Priority:	24 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs
Progress Report	
Action Status	Continuing in progress
Report of Progress	EMDs and elected officials indicate that they have excellent working relationships with local radio stations and media outlets including internet based media. However, these are relationships that must be continued and maintained on an on-going basis. So this action item is classified as “continuing.”

Action 1.2.4: Promote the installation of fire alarms/security systems in public buildings.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with fire and inadequate alarms/security systems in public buildings.
Hazard(s) Addressed:	Fire
Action or Project	
Action/Project Number:	1.2.4
Name of Action or Project:	Improving fire alarms and security systems in public buildings.
Action or Project Description:	Promote the installation of fire alarms/security systems in public buildings.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Building codes inspectors, Pulaski County Commission, city councils of Crocker and Dixon
Action/Project Priority:	23 - H
Timeline for Completion:	Ten years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Adoption of building codes would be required.
Progress Report	
Action Status	Continuing Not Started
Report of Progress	The cities of Richland, St. Robert and Waynesville have building codes in place that require fire alarms in public buildings. As a third class county, Pulaski County does not have the authority to enact building codes, nor do they have the resources to enforce building codes. The cities of Crocker and Dixon do not have the resources to enact building codes or enforce them.

Action 1.2.5: Acquire generators to safeguard the availability of critical services such as electricity and water.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with electrical and water services failure during a disaster
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.2.5
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Acquire generators to safeguard the availability of critical services such as electricity and water.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$25,000 to $80,000 per generator unit
Benefits:	Losses avoided by implementing this action include loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, City councils of Crocker, Dixon, Richland, St. Robert and Waynesville
Action/Project Priority:	23 - H
Timeline for Completion:	10 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Capital improvement plans, LEOPs, comprehensive plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Back up portable generators have been acquired by Waynesville for wells and lift stations and two fixed generators have been acquired for sewer treatment. St. Robert has two portable generators and five fixed generators. Crocker has one portable generator and one fixed generator. Crocker schools have one generator. The Pulaski County health department has a fixed generator. The Crocker fire department has a generator. Richland has one generator for their wastewater treatment plant. Pulaski County has three fixed generators located at the courthouse and two county sheds and one portable generator. All FEMA designated shelters in the county have back-up generators.

Action 1.2.6: Conduct a study of the Texas Road area to find mitigation solutions for flash flooding that has resulted in water rescues, damaged utilities and homes.

Action Worksheet	
Name of Jurisdiction:	Pulaski County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of data/mitigation solutions for the Texas Road area
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	1.2.6
Name of Action or Project:	Texas Road Mitigation Study
Action or Project Description:	Texas Road area is prone to flash flooding that has resulted in water rescues, damaged utilities, and homes. Need to study area and find mitigation solutions.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$5,000 - $25,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission and EMD
Action/Project Priority:	21 - H
Timeline for Completion:	5 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	New
Report of Progress	

Action 1.2.7: Monitor developments in data availability concerning the impact of disasters such as dam failure, tornados, sinkholes, land subsidence and wildfire upon Pulaski County and all jurisdictions through local, state and federal agencies for use in hazard mitigation planning.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Crocker, Dixon R-I, Crocker R-II, Swedeborg R-III, Richland R-IV, Laquey R-V, Waynesville R-VI.
Risk / Vulnerability	
Problem being Mitigated:	Lack of data concerning the impact of natural disasters upon the County
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.2.7
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Monitor developments in data availability concerning the impact of disasters such as dam failure, tornadoes, sinkholes, land subsidence, and wildfire upon Pulaski County and all jurisdictions through local, state, and federal agencies for use in hazard mitigation planning.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$2,500 - ?
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County and city EMDs, Pulaski County Commission, city councils of Crocker, Dixon, Richland, St. Robert, Waynesville and school boards of all school districts.
Action/Project Priority:	28 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, LEOPs, floodplain ordinances
Progress Report	
Action Status	New
Report of Progress	

Action 1.3.1: Place water height gauges and signs near low water crossings.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of signage and monitoring tools near low water crossings
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	1.3.1
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Place water height gauges and signs near low water crossings.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$2,500 - $3,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties and property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County Road and Bridge Department, Waynesville street superintendent
Action/Project Priority:	20 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Capital improvements plan, hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Pulaski County currently maintains water height gauges on county maintained roads and low water crossings. The City of Waynesville has one low water crossing that the city maintains signage on and the city plans to convert to a bridge when funding becomes available.

Action 1.3.2: Continue to encourage tree trimming and dead tree removal programs by utility companies and local government.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated power outages from trees interfering with power lines and/or blocking roads.
Hazard(s) Addressed:	Severe Wind Storm, Severe Winter Storm, Tornado
Action or Project	
Action/Project Number:	1.3.2
Name of Action or Project:	Tree trimming and dead tree removal
Action or Project Description:	Continue to encourage tree trimming and dead tree removal programs by utility companies and local government.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Road & Bridge Department, Public Works/Utility Departments for cities, Local electric cooperatives serving Pulaski County
Action/Project Priority:	24 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Pulaski County recently purchased additional brush-cutter equipment to keep trees and brush trimmed away from roadways. Waynesville and Richland have aggressive tree trimming programs. Gascosage Electric Cooperative does tree trimming for the city of Crocker. All jurisdictions indicated that they have increased their efforts on tree trimming and dead tree removal over the past five years.

Action 1.3.3: Continue to examine road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and inadequate road/bridge structures and impacts on residents and their property.
Hazard(s) Addressed:	Flood, Earthquake
Action or Project	
Action/Project Number:	1.3.3
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Continue to examine road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Road and Bridge Department, Waynesville Street Superintendent
Action/Project Priority:	25 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Pulaski County has building specifications for subdivision builders to follow if they want the county to take over the subdivision roads.
Progress Report	
Action Status	Continuing in Progress
Report of Progress	The city of Waynesville is working toward replacing a low water crossing with a bridge as funding becomes available. Pulaski County has completed the following projects: installed a larger culvert on Redwing Road and raised the road bed to improve drainage; replacing and mitigating Basin Road by raising it 3-4 feet and adding culverts; replaced low water crossings with box culverts on Buffalo Road and South Bend Road; installed a low water slab with a culvert on Bismark Road; widened and eliminated wash out and erosion issues on Bristol Road. In addition, due to flood damage in 2013, FEMA is replacing and mitigating a total of 23 sites on roads in the county. The county's policy is to go up a size any time they replace a culvert in order to improve drainage. The county replaces an average of 55 culverts per year.

Action 1.3.4: Establish designated shelters for residents to be used during tornado threats, as cooling centers during extreme heat or power outages, and/or as shelters during other disasters.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with nonexistent/inadequate shelters for residents during disasters
Hazard(s) Addressed:	Severe Weather, Severe Winter Storm, Tornado, Extreme Heat
Action or Project	
Action/Project Number:	1.3.4
Name of Action or Project:	Establishing shelters
Action or Project Description:	Establish designated shelters for residents to be used during tornado threats, as cooling centers during extreme heat or power outages and/or as shelters during other disasters.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$1,500 - $3,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, city councils of all cities, EMDs, County Health Dept., Red Cross
Action/Project Priority:	26 - H
Timeline for Completion:	5 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Shelters have been established in each community but as needs change it may be necessary to adjust the list of shelters or increase the number of facilities that can be used for sheltering.

Action 1.3.5: Continue to work to increase availability (if necessary construction) of storm shelters for individual families and large groups, including near large employment centers and schools.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with nonexistent/unavailable storm shelters for individual families and large groups
Hazard(s) Addressed:	Severe Weather, Tornado
Action or Project	
Action/Project Number:	1.3.5
Name of Action or Project:	Increase the availability of storm shelters.
Action or Project Description:	Continue to work to increase availability (if necessary construction) of storm shelters for individual families and large groups, including near large employment centers and schools.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, EMDs, city councils of cities, school boards
Action/Project Priority:	18 - M
Timeline for Completion:	5 – 10 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP
Progress Report	
Action Status	Continuing in Progress
Report of Progress	FEMA certified tornado shelters have been constructed at the Crocker R-II schools and East Elementary in the Waynesville R-VI schools.

Action 1.3.6: Encourage establishing road signage that directs people on I-44 to local storm shelters during storm warnings.

Action Worksheet	
Name of Jurisdiction:	Pulaski County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated lack of signage to direct I-44 travelers to storm shelters during storm warnings
Hazard(s) Addressed:	Severe Weather, Tornado
Action or Project	
Action/Project Number:	1.3.6
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Encourage establishing road signage that directs people on I-44 to local storm shelters during storm warnings.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	$500 - $2,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayors of Waynesville and St. Robert, EMDs
Action/Project Priority:	25 - H
Timeline for Completion:	3 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	New
Report of Progress	

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Action 2.1.1: Continue to encourage a self-inspection program at critical facilities to assure that building infrastructure is earthquake and tornado resistant.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities to critical facilities during the occurrence of an earthquake or tornado.
Hazard(s) Addressed:	Tornado, Earthquake
Action or Project	
Action/Project Number:	2.1.1
Name of Action or Project:	Critical facilities self-inspection
Action or Project Description:	Continue to encourage a self-inspection program at critical facilities to assure that building infrastructure is earthquake and tornado resistant.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$2,500 - $5,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County Commission, Mayors of each city, school superintendents for each school district,
Action/Project Priority:	20 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, LEOP
Progress Report	
Action Status	Continuing Not Started
Report of Progress	The largest barrier to this action is the lack of expertise at the local level to carry out the inspections, as well as lack of funding to hire experts.

Action 2.1.2: Encourage the adoption of minimum standard building codes by all communities that do not currently have them.

Action Worksheet	
Name of Jurisdiction:	Crocker, Dixon
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities to property and communities in the event of a natural disaster due to substandard construction.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	2.1.2
Name of Action or Project:	Property & Infrastructure Protection
Action or Project Description:	Encourage the adoption of minimum standard building codes by all communities that do not currently have them.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$3,000 - $10,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Crocker and Dixon city councils
Action/Project Priority:	20 - H
Timeline for Completion:	5 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	City ordinances
Progress Report	
Action Status	Continuing Not Started
Report of Progress	There has been no progress in this area due to the communities not having the resources to enforce building codes.

Action 2.1.3: Continue to encourage businesses and public entities to develop and implement emergency plans.

Action Worksheet	
Name of Jurisdiction:	Dixon, Richland, Waynesville, St. Robert, Crocker R-II School District
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities of natural hazard damages to businesses and public resources.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	2.1.3
Name of Action or Project:	Property & Infrastructure Protection
Action or Project Description:	Continue to encourage businesses and public entities to develop and implement emergency plans.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$5,000 - $10,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	City EMDs, city councils, Crocker R-II Superintendent
Action/Project Priority:	26 - H
Timeline for Completion:	5 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP
Progress Report	
Action Status	Continuing – Revised to include Public Entities - Not Started
Report of Progress	The listed jurisdictions have not had the resources available to complete emergency plans for their individual jurisdiction. In some cases they fall under the county plan.

Action 2.1.4: Encourage the installation of backup generators for critical infrastructure such as water systems and emergency services.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	2.1.4
Name of Action or Project:	Encourage backup generators for critical infrastructure.
Action or Project Description:	Encourage the installation of backup generators for critical infrastructure such as water systems and emergency services
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$25,000 - $80,000 per generator unit
Benefits:	Losses avoided by implementing this action include loss-of-function/displacement impacts and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	EMDs, Local Government
Action/Project Priority:	21 - H
Timeline for Completion:	10 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Capital improvement plans, LEOPs, comprehensive plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Back up portable generators have been acquired by Waynesville for wells and lift stations and two fixed generators have been acquired for sewer treatment. St. Robert has two portable generators and five fixed generators. Crocker has one portable generator and one fixed generator. Crocker schools have one generator. The Pulaski County health department has a fixed generator. The Crocker fire department has a generator. Richland has one generator for their wastewater treatment plant. Pulaski County has three fixed generators located at the courthouse and two county sheds and one portable generator. All FEMA designated shelters in the county have back-up generators.

Action 2.2.1: Promote the local floodplain program, educate residents, realtors and contractors about the dangers of floodplain development, floodplain building requirements and the benefits of the NFIP.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities of properties in the floodplain during a flood event.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	2.2.1
Name of Action or Project:	Floodplain education/awareness
Action or Project Description:	Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the NFIP
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$5,000 - $6,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Floodplain Managers, Pulaski County Commission, Mayors of Richland, St. Robert and Waynesville
Action/Project Priority:	27 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain management ordinances, LEOP, economic development plan, capital improvement plans, comprehensive plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Information, brochures, etc. on floodplain development and the NFIP is available through floodplain managers for the county and participating cities. St. Robert has floodplain information available on-line. The program could benefit from direct mailings to realtors, contractors and residents with property located in the floodplain. This is a program that requires on-going activity as people move in and out of the county/cities.

Action 2.2.2: Encourage development of storm water management plans/ordinances in those jurisdictions that do not currently have them and in all new development including unincorporated areas.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flood events in areas that do not possess adequate storm water management plans
Hazard(s) Addressed:	Flood, Severe Weather
Action or Project	
Action/Project Number:	2.2.2
Name of Action or Project:	Encourage development of storm water management plans/ordinances
Action or Project Description:	Encourage development of storm water management plans in those jurisdictions that do not currently have them and in all new developments. and encourage the county to review and strengthen any subdivision ordinances to incorporate mitigation measures such as storm water management.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$5,000 - $25,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, city councils of cities, City Engineers, Public Works Directors
Action/Project Priority:	23 - H
Timeline for Completion:	10 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Capital Improvement plans, builders plans, comprehensive plans, transportation plans, land-use plans, flood mitigation assistance plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	The city of Waynesville has storm water ordinances and a storm water plan. The city of Richland has stormwater and drainage ordinances. The city of St. Robert has storm water and drainage ordinances.

Action 2.2.3: Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and unregulated floodplain development.
Hazard(s) Addressed:	Flood, Severe Weather
Action or Project	
Action/Project Number:	2.2.3
Name of Action or Project:	Floodplain management compliance enforcement.
Action or Project Description:	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$4,000 - $10,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Floodplain managers, Pulaski County Commission, city councils of Richland, St. Robert, Waynesville
Action/Project Priority:	23 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain ordinances, builder's plans, comprehensive plans, capital improvement plans,
Progress Report	
Action Status	Continuing in Progress
Report of Progress	All jurisdictions that are members of NFIP are working to insure compliance with their respective floodplain ordinances. This is an on-going endeavor and could benefit from additional inspections of floodplain areas and additional education/awareness activities for builders and residents.

Action 2.3.1: Encourage local governments to develop and implement regulations for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.

Action Worksheet	
Name of Jurisdiction:	Crocker, Dixon, Richland, St. Robert, Waynesville, Pulaski County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with unsecured hazardous materials, tanks, and mobile homes during flood, severe weather, or tornado events.
Hazard(s) Addressed:	Flood, Severe Weather, Tornado
Action or Project	
Action/Project Number:	2.3.1
Name of Action or Project:	Encourage the development of regulations or ordinances for securing materials tanks and mobile homes to reduce hazards during storms and flooding.
Action or Project Description:	Encourage local governments to develop and implement regulations and/or ordinances for securing hazardous materials, tanks, and mobile homes to reduce hazards during storms, flooding, and high winds.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$3,000 - $10,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Pulaski County Commission, city councils of all cities
Action/Project Priority:	22 - H
Timeline for Completion:	10 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, and services
Local Planning Mechanisms to be Used in Implementation, if any:	City and county ordinances, builders plans, comprehensive plans, LEOP, building codes, floodplain ordinances
Progress Report	
Action Status	Continuing Not Started
Report of Progress	Local governments indicated they do not have the expertise or resources to complete this action item at this time.

Action 2.3.2: Monitor developments in data availability concerning the impact of dam failure, tornados, sinkholes, land subsidence and wildfire upon Pulaski County and all jurisdictions through local, state and federal agencies for use in hazard mitigation planning.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I School District, Crocker R-II School District, Swedeborg R-III School District, Pulaski County R-IV School District, Laquey R-V School District, Waynesville R-VI School District
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with absence of data concerning natural disasters.
Hazard(s) Addressed:	Dam failure, tornadoes, sinkholes, land subsidence, and wildfire
Action or Project	
Action/Project Number:	2.3.2
Name of Action or Project:	Monitor developments in data availability for the purpose of improving hazard mitigation planning.
Action or Project Description:	Monitor developments in data availability concerning the impact of dam failure, tornadoes, sinkholes, land subsidence, and wildfire upon Pulaski County and all jurisdictions through local, state, and federal agencies for use in hazard mitigation planning.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$1,000 – $7,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	EMDs
Action/Project Priority:	28 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, and services
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	New
Report of Progress	

Action 2.3.3: Encourage the Mark Twain National Forest to levy stricter fines for persons causing fire hazards.

Action Worksheet	
Name of Jurisdiction:	Pulaski County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with individuals causing fire hazards and damage exposures
Hazard(s) Addressed:	Wildfire, Structural Fires
Action or Project	
Action/Project Number:	2.3.3
Name of Action or Project:	Enforcement of Fire Safety on Public Lands
Action or Project Description:	Encourage the Mark Twain National Forest to levy stricter fines for persons causing fire hazards.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	$500 - $1,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, Pulaski County Commission
Action/Project Priority:	23 - H
Timeline for Completion:	5 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, and services
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	New
Report of Progress	

Goal 3: Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.

Action 3.1.1: Distribute SEMA brochures on natural disasters, preparedness and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters, preparedness and NFIP at public facilities and events.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs
Action/Project Priority:	27 - H
Timeline for Completion:	Ongoing
Potential Fund Sources:	Local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Outreach and education activities are an on-going activity. The city of Crocker maintains SEMA brochures and information at city hall. The county health department maintains brochures and information at the courthouse.

Action 3.1.2: Distribute regular press releases from county and city EMD offices concerning hazards, where they strike, frequency, preparedness and how to mitigate.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning hazards, where they occur, frequency, preparedness, and how to mitigate.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Press releases on hazards, preparedness and how to mitigate
Action or Project Description:	Distribute regular press releases from county and city EMD offices concerning hazards, where they strike, frequency, preparedness, and how to mitigate.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Pulaski County health department
Action/Project Priority:	27 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Local general revenue funds, private donations of services
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs
Progress Report	
Action Status	Continuing in Progress
Report of Progress	This is an on-going activity. Press releases on hazards, preparedness and/or mitigation are issued on a regular basis by SEMA, the county health department, EMDs and city government.

Action 3.2.1: Encourage local residents to purchase weather radios through press releases and brochures.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of emergency communications/warnings for residents who do not have access to sirens and/or other early warning systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.2.1
Name of Action or Project:	Weather radio promotion
Action or Project Description:	Encourage local residents to purchase weather radios through press releases and brochures.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs
Action/Project Priority:	23 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Some promotion of weather radios has occurred over the past five years but this action item would benefit from renewed focus and efforts to spread the word to those residents who do not have access to other early warning systems.

Action 3.2.2: Encourage meetings of EMD, city/county officials and SEMA to familiarize officials with mitigation planning, implementation and budgeting for mitigation projects.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge/information of officials in regards to mitigation planning, implementation, and budgeting for mitigation projects.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.2.2
Name of Action or Project:	Mitigation awareness/education meetings with local officials and SEMA
Action or Project Description:	Encourage meetings of EMD, city/county officials & SEMA to familiarize officials with mitigation planning, implementation & budgeting for mitigation projects.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$0
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Elected Officials
Action/Project Priority:	26 - H
Timeline for Completion:	On-going
Potential Fund Sources:	N/A
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	The Region I SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Pulaski County and its jurisdictions.

Action 3.3.1: Reevaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I School District, Crocker R-II School District, Swedeborg R-III School District, Pulaski County R-IV School District, Laquey R-V School District, Waynesville R-VI School District
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.3.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operation plans and procedures.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$3,500 – $4,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Planners, City Administrators, MPC
Action/Project Priority:	21 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, hazard mitigation plan, school crisis management plans, comprehensive plans, builder's plans, capital improvement plan, economic development plan, transportation plan, land-use plan, floodplain ordinances, stormwater ordinances
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. The Pulaski County Road & Bridge Dept. has incorporated mitigation activities into their regular maintenance program. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 3.3.2: Distribute press releases by jurisdictions regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I School District, Crocker R-II School District, Swedeborg R-III School District, Pulaski County R-IV School District, Laquey R-V School District, Waynesville R-VI School District
Risk / Vulnerability	
Problem being Mitigated:	Community lack of knowledge regarding adopted mitigation measures
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.3.2
Name of Action or Project:	Outreach & education on completed mitigation measures
Action or Project Description:	Distribute press releases by all jurisdictions regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$700 – $1,700
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Governments, school superintendents
Action/Project Priority:	26 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Local general revenue funds
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Jurisdictions share information on implemented mitigation measures with local media to make residents aware. Examples of projects shared include the certified tornado safe room at Crocker schools and numerous road and bridge improvements made in the county.

Action 3.4.1: Encourage county health department and local Red Cross Chapter to use publicity campaigns that make residents aware of proper measures to take during times of threatening conditions (e.g. drought, heat wave)

Action Worksheet	
Name of Jurisdiction:	Pulaski County
Risk / Vulnerability	
Problem being Mitigated:	Public lack of knowledge of proper measures to take during times of threatening conditions.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.4.1
Name of Action or Project:	Public awareness campaign for the public to understand threats and protective measures to take to protect themselves.
Action or Project Description:	Encourage county health department and local Red Cross Chapter to use publicity campaigns that make residents aware of proper measures to take during times of threatening conditions (e.g. drought, heat wave)
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$2,000 – $4,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Governments, county health department director, Local Red Cross Chapter leadership
Action/Project Priority:	21 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs
Progress Report	
Action Status	Continuing in Progress
Report of Progress	The county health department and local Red Cross Chapter currently work to increase awareness of the proper measures to take during times of threatening conditions such as heat waves. This is an on-going activity.

Action 3.4.2: Publicize county or citywide drills.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the lack of knowledge in regards to the proper measures to take during hazard events.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.4.2
Name of Action or Project:	Publicizing drills.
Action or Project Description:	Publicize county or citywide drills to make the general public aware of training/exercises being conducted locally and raise awareness of emergency preparedness and what measures should be taken.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs
Action/Project Priority:	28 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs
Progress Report	
Action Status	Continuing in Progress
Report of Progress	This is an on-going activity. Local governments make the public aware of drills/trainings/exercises through press releases to the media and follow up articles on drills. SEMA also publicizes drills that are being done on a regional or statewide level.

Action 3.4.3: Encourage the development of a county-wide CERT and/or COAD/VOAD program and educate the public on how theye can benefit from these types of programs.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of information on and need for CERT and/or COAD/VOAD programs to help communities prepare for and plan for disasters
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	3.4.2
Name of Action or Project:	Promote the development of CERT, COAD, VOAD
Action or Project Description:	Encourage the development of a county-wide CERT and/or COAD/VOAD program and educate the public on how they can benefit from these types of programs.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$1,500 - $5,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs
Action/Project Priority:	28 - H
Timeline for Completion:	5 years to form CERT/VOAD/COAD, awareness – on-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs
Progress Report	
Action Status	Continuing in Progress
Report of Progress	CERT training was held in Pulaski County in 2010. The county has formed a COAD which meets on a regular basis.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Continue to encourage joint meetings of different organizations/agencies for mitigation related planning.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication among organizations/agencies for mitigation related planning.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Encourage joint meetings of different organizations/agencies and continued communication on mitigation
Action or Project Description:	Continue to encourage joint meetings of different organizations/agencies for mitigation related planning.
Applicable Goal Statement:	Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Pulaski COAD
Action/Project Priority:	28 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOPs
Progress Report	
Action Status	Continuing in Progress
Report of Progress	This is an on-going activity. The Pulaski County COAD meets on a regular basis as well as following a disaster event. Local government holds joint meetings concerning disasters. The school districts participate in an annual interagency meeting.

Action 4.1.2: Continue to encourage joint training (and drills) between agencies, public and private entities (including schools/businesses).

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI,
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination among agencies, public, and private entities on disaster training and emergency drills/exercises.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	4.1.2
Name of Action or Project:	Encourage joint training/drills/exercises among all jurisdictions and local businesses.
Action or Project Description:	Continue to encourage joint training (and drills) between agencies, public and private entities (including schools/businesses).
Applicable Goal Statement:	Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.
Estimated Cost:	$1,000 - $10,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Emergency Response Agencies, School superintendents
Action/Project Priority:	25 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, School crisis plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Jurisdictions, EMDs and emergency response agencies within Pulaski County cooperate on training and drills on a regular basis. Fire and police departments regularly train with local school districts. The county fire chief's association meets regularly and do joint training. The Region I SEMA area coordinator works with local entities throughout the six-county area to do at least one exercise each year that is either regional or state-wide.

Action 4.1.3: Pool different agency resources to achieve widespread mitigation planning results.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski County R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Lack of resources among agencies which hinder mitigation results.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	4.1.3
Name of Action or Project:	Pooling resources for mitigation activities
Action or Project Description:	Pool different agency resources to achieve widespread mitigation planning results.
Applicable Goal Statement:	Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.
Estimated Cost:	$1,000 - $4,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, city councils of Crocker, Dixon, Richland, St. Robert and Waynesville, School boards of Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski County R-IV, Laquey R-V, Waynesville R-VI
Action/Project Priority:	24 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation plan, LEOPs, Capital Improvement plans, Comprehensive plans, Strategic plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	All jurisdictions reported that they are interested in finding ways to pool resources to accomplish mitigation projects. There has been interest in thinking outside the box on funding upgrades to low water crossing projects and tapping into different funding sources (Missouri Department of Conservation funds to protect endangered species and open streams to allow free movement of fish.)

Action 4.1.4: Maintain updated mutual aid agreements between emergency response agencies inside and outside the region.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of communication/coordination among emergency response agencies and securing mutual aid agreements.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	4.1.4
Name of Action or Project:	Maintenance and improvement of mutual aid agreements.
Action or Project Description:	Maintain updated mutual aid agreements between emergency response agencies inside and outside the region.
Applicable Goal Statement:	Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.
Estimated Cost:	$750 - $1,750
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Fire chiefs, ambulance district directors, police chiefs, sheriff
Action/Project Priority:	27 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, mutual aid agreements
Progress Report	
Action Status	Continuing in Progress
Report of Progress	In the past few years, SEMA has made fire mutual aid agreements a priority and assigned a mutual aid coordinator for the region. Fire mutual aid agreements are in place. All jurisdictions indicated that all mutual aid agreements between various emergency response agencies are in good shape at the current time. This is, however, an on-going activity and mutual aid agreements will require periodic review to insure that the documents continue to meet the needs of the agencies involved.

Action 4.2.1: Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy with the hazard mitigation plan, community plans, hazard mitigation activities, and emergency operation plan/procedures.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	4.2.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operation plans and procedures.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$3,500 – $4,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Planners, City Administrators, MPC
Action/Project Priority:	21 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, hazard mitigation plan, school crisis management plans, comprehensive plans, builder's plans, capital improvement plan, economic development plan, transportation plan, land-use plan, floodplain ordinances, storm water ordinances
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. The Pulaski County Road & Bridge Dept. has incorporated mitigation activities into their regular maintenance program. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 4.2.2: Encourage meetings between EMD, city/county and SEMA to familiarize officials with mitigation planning and implementation and budgeting for mitigation projects.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge/information of officials in regards to mitigation planning, implementation, and budgeting for mitigation projects.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	4.2.2
Name of Action or Project:	Mitigation awareness/education meetings with local officials and SEMA
Action or Project Description:	Encourage meetings of EMD, city/county officials & SEMA to familiarize officials with mitigation planning, implementation & budgeting for mitigation projects.
Applicable Goal Statement:	Promote education, outreach, research, and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.
Estimated Cost:	$0
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Elected Officials
Action/Project Priority:	26 - H
Timeline for Completion:	On-going
Potential Fund Sources:	N/A
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	The Region I SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Pulaski County and its jurisdictions.

Goal 5: Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.

Action 5.1.1: Incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Lack of incorporating hazard mitigation in the long term planning and development of activities by each jurisdiction.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	5.1.1
Name of Action or Project:	Incorporating hazard mitigation into all long-range planning and development activities.
Action or Project Description:	Incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$2,500 - ?
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Planners, City Administrators, MPC
Action/Project Priority:	29 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, hazard mitigation plan, school crisis management plans, comprehensive plans, builder's plans, capital improvement plan, economic development plan, transportation plan, land-use plan, floodplain ordinances, storm water ordinances
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. The Pulaski County Road & Bridge Dept. has incorporated mitigation activities into their regular maintenance program. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 5.1.2: Encourage communities to budget for enhanced warning systems.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities due to inadequate warning systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	5.1.2
Name of Action or Project:	Encourage budgeting for enhanced warning systems
Action or Project Description:	Encourage communities to budget for enhanced warning systems.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$1,500 - ?
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMD, Pulaski County Commission, city councils of Crocker, Dixon, Richland, St. Robert, Waynesville
Action/Project Priority:	21 - H
Timeline for Completion:	10 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, capital improvement plans, hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	The cities of Crocker, St. Robert and Waynesville are all now participating in the CodeRED Weather Warning system which automatically delivers voice calls, text messages and emails to subscribed users within the direct path of any storms as soon as an alert is issued by the National Weather Service.

Action 5.1.3: Encourage all communities to develop storm water management plans.

Action Worksheet	
Name of Jurisdiction:	Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with non-existent storm water management plans
Hazard(s) Addressed:	Flood, Severe Weather
Action or Project	
Action/Project Number:	5.1.3
Name of Action or Project:	Encourage all communities to develop storm water management plans.
Action or Project Description:	Encourage all communities/jurisdictions to develop storm water management plans.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$800 - $1,800
Benefits:	Losses avoided by implementing this action include property damages.
Plan for Implementation	
Responsible Organization/Department:	Local Planners, Local Governments
Action/Project Priority:	10 - L
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Deleted. Three of five communities have storm water ordinances in place. Crocker and Dixon do not currently have the resources to institute or enforce storm water ordinances or plans and this action received a "Low" priority rating.
Report of Progress	Richland, St. Robert and Waynesville have storm water ordinances in place.

Action 5.1.4: Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/integration of hazard mitigation activities with emergency operations plans and procedures.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	5.1.4
Name of Action or Project:	Coordination and integration of hazard mitigation activities into emergency operations plans and procedures.
Action or Project Description:	Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMD
Action/Project Priority:	19 - M
Timeline for Completion:	5 years
Potential Fund Sources:	Local general revenue funds
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, Hazard Mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Mitigation actions are becoming part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 5.1.5: Encourage cities to require contractor storm water management plans in all new development – both residential and commercial properties.

Action Worksheet	
Name of Jurisdiction:	Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the lack of storm water management plans and new development that results in flash flooding and other drainage issues.
Hazard(s) Addressed:	Flood, Severe Weather
Action or Project	
Action/Project Number:	5.1.5
Name of Action or Project:	Encourage contractor storm water management plan requirements in all communities.
Action or Project Description:	Encourage cities to require contractor storm water management plans in all new development – both residential and commercial properties.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$2,500 - $12,500
Benefits:	Losses avoided by implementing this action includes property damages
Plan for Implementation	
Responsible Organization/Department:	City EMDs, Local Planners, city councils of Crocker, Dixon, Richland, St. Robert and Waynesville
Action/Project Priority:	15 - M
Timeline for Completion:	10 years
Potential Fund Sources:	Local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	City ordinances, capital improvement plans, comprehensive plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	The city of Waynesville currently requires storm water plans from contractors. The cities of St. Robert and Crocker have storm water ordinances.

Action 5.2.1: Encourage the construction of storm shelters, especially tornado safe rooms, near schools and large employment centers that currently do not have access to safe rooms.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the lack storm shelters/tornado safe rooms near schools and large employment centers.
Hazard(s) Addressed:	Severe Weather, Tornadoes
Action or Project	
Action/Project Number:	5.2.1
Name of Action or Project:	Encourage the construction of storm shelters and tornado safe rooms
Action or Project Description:	Encourage the construction of storm shelters, especially tornado safe rooms near schools and large employment centers that currently do not have access to safe rooms.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$1,500 - $2,500 (cost of tornado safe rooms is unknown)
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, city councils of Crocker, Dixon, Richland, St. Robert and Waynesville, school boards of Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI, city and county EMDs
Action/Project Priority:	19 - M
Timeline for Completion:	10 to 20 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs, Hazard Mitigation plan, capital improvement plans, building plans, comprehensive plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Tornado safe rooms have been constructed at Crocker R-II and at East Elementary in the Waynesville R-VI District. Lack of financial resources for construction continues to be the main obstacle, however, other school districts and communities are interested in building safe rooms if funding can be secured.

Action 5.2.2: Encourage the designation of public buildings as safe shelters and develop accessibility plans for the public during times of need.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the lack of storm shelter accessibility/plans for the public
Hazard(s) Addressed:	Severe Weather, Tornadoes
Action or Project	
Action/Project Number:	5.2.2
Name of Action or Project:	Designation of public buildings as safe shelters
Action or Project Description:	Encourage the designation of public buildings as safe shelters and develop accessibility plans for the public during times of need.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$3,500 - $4,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	All EMDs, Pulaski County Commission, mayors of Crocker, Dixon, Richland, St. Robert, Waynesville, County Health Dept.
Action/Project Priority:	21 - H
Timeline for Completion:	5 years
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOPs
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Each community has at least one shelter designated. However, this is an area that would benefit from a more focused approach to sheltering to insure that at least 10 percent of the population can be sheltered during severe weather or tornado events.

Action 5.3.1: Encourage local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.3.1
Name of Action or Project:	Government purchase of properties in the floodplain
Action or Project Description:	Encourage local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include property damage, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Local Government, County & City EMDs, Floodplain Managers
Action/Project Priority:	11 - L
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Deleted. This action received a “Low” priority rating and was removed from the list of actions.
Report of Progress	N/A

Action 5.3.2: Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.

Action Worksheet	
Name of Jurisdiction:	Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with repetitive loss properties.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.3.2
Name of Action or Project:	Zoning repetitive loss properties as open space.
Action or Project Description:	Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$1,500 - $5,500
Benefits:	Losses avoided by implementing this action include property damage, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	City Government, Local Planners, City EMDs, Floodplain Managers
Action/Project Priority:	16 - M
Timeline for Completion:	5 to 10 years
Potential Fund Sources:	Local general revenue funds
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain ordinances, Hazard Mitigation plan, comprehensive plans, strategic plans
Progress Report	
Action Status	Continuing Not Started
Report of Progress	As this action was prioritized as medium, no action has been taken thus far.

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.1: Work with SEMA Region I coordinator to learn about new mitigation funding opportunities.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Lack of funding for natural hazard mitigation projects.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	6.1.1
Name of Action or Project:	Working with SEMA to learn about mitigation funding opportunities.
Action or Project Description:	Work with SEMA Region 1 coordinator to learn about new mitigation funding opportunities.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	$0 - $1,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County EMD, City EMDs, Local Governments
Action/Project Priority:	28 - H
Timeline for Completion:	On-going
Potential Fund Sources:	General revenue funds
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation plan, capital improvement plans, comprehensive plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Region I SEMA coordinator is available and meets regularly with local government and emergency response agencies on a variety of topics, including mitigation. SEMA also regularly notifies local governments and school districts about funding opportunities.

Action 6.1.2: Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are also met.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Roads/bridges in need of upgrades
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.2
Name of Action or Project:	Structuring grant proposals to meet mitigation needs.
Action or Project Description:	Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are also met.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	$3,500 - $4,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	City/County Engineers, Pulaski County Commission, city councils of Crocker, Dixon, Richland, St. Robert and Waynesville, Local Grant Writers
Action/Project Priority:	24 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation plan, capital improvement plans, comprehensive plans, strategic plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Pulaski County's policy is to incorporate upgrades in all road and bridge projects. Cities also strive to make mitigation improvements on all road and bridge projects. This is an activity that would benefit from raising awareness of mitigation concerns and remedies. As more local officials become aware of the importance of mitigation and realize that grant applications can provide opportunities for funding those actions, this activity will become more integrated into local planning.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	$2,500 - $9,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, Mayors of Crocker, Dixon, Richland, St. Robert, Waynesville, Local Planners, local economic developers, Community Development organizations, County and city EMDs
Action/Project Priority:	23 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation plan, capital improvement plans, comprehensive plans, economic development plans, CEDS, strategic plans, land-use plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.4: Encourage local jurisdictions to budget for mitigation projects.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville, Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Risk / Vulnerability	
Problem being Mitigated:	Lack of funding for mitigation projects among local jurisdictions
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	6.1.4
Name of Action or Project:	Budgeting for mitigation projects
Action or Project Description:	Encourage local jurisdictions to budget for mitigation projects
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	$500 - $1,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County & City EMDs, Pulaski County Commission, city councils of Crocker, Dixon, Richland, St. Robert, Waynesville, school boards of Dixon R-I, Crocker R-II, Swedeborg R-III, Pulaski Co R-IV, Laquey R-V, Waynesville R-VI
Action/Project Priority:	23 - H
Timeline for Completion:	On-going
Potential Fund Sources:	Local general revenue funds
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, capital improvements plans, comprehensive plans, CEDS, strategic plans, LEOPs
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Pulaski County currently budgets to upgrade all culvert replacements. Waynesville is working to find funding to mitigate roads and bridges affected by the 2013 flood. As awareness of the importance of mitigation grows, more local jurisdictions are seeing the long-term benefits and working toward budgeting for mitigation activities.

Action 6.2.1: Encourage cities and counties to implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigations projects.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	6.2.1
Name of Action or Project:	Encourage local mitigation cost-share programs
Action or Project Description:	Encourage cities and counties to implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	$ unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Pulaski County Commission, city councils of Crocker, Dixon, Richland, St. Robert, Waynesville
Action/Project Priority:	14 - M
Timeline for Completion:	5 -10 years to implement and then on-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, capital improvement plans, comprehensive plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Some of the communities will work with developers to cost-share projects that deal with storm water run-off. In some situations a community or the county will install a culvert if the individual pays for the culvert to insure that installation is done correctly and the culvert is sized appropriately. This is a program that could benefit from more organized guidelines and focused efforts if additional funding could be secured.

Action 6.2.2: Implement public awareness program about the benefits of hazard mitigation projects, both public and private through press releases and brochures.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of public knowledge of the importance/benefit of hazard mitigation projects.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	6.2.2
Name of Action or Project:	Public awareness program on benefits of public and private hazard mitigation projects.
Action or Project Description:	Implement public awareness program about the benefits of hazard mitigation projects, both public and private through press releases and brochures.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	$750 - $1,750
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County and City EMDS, Pulaski County commission, mayors of Crocker, Dixon, Richland, St. Robert, Waynesville
Action/Project Priority:	26 - H
Timeline for Completion:	5 years to implement and then on-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, comprehensive plans, capital improvements plans, strategic plans
Progress Report	
Action Status	Continuing in Progress
Report of Progress	There has been some progress on this activity. Press releases on the hazard mitigation plan raise awareness. Press releases and activities following the 2013 flood raised awareness of mitigation and activities that local governments as well as private citizens can do to reduce their vulnerabilities to disasters. This activity would benefit from the development and distribution or posting of brochures on hazard mitigation.

Action 6.3.1: Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Crocker, Dixon, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Lack of organization/priority of mitigation projects based on cost-effectiveness, and severity in regards to threat to life, health, and property.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	6.3.1
Name of Action or Project:	Prioritizing mitigation projects
Action or Project Description:	Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	$1,500 - $4,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County and City EMDs, Local Governments, Local Planners, City/County Engineers, MPC
Action/Project Priority:	25 - H
Timeline for Completion:	On-going – should be periodically reviewed and updated
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan
Progress Report	
Action Status	Continuing in Progress
Report of Progress	Hazard mitigation projects were prioritized in the initial plan. The MPC reviewed and updated that list of prioritized items, including considering the greatest threat to life, health and property. This is an on-going activity. The list of prioritized action items should be reviewed at a minimum of every five years and following any major disaster events in the county.

5 PLAN MAINTENANCE PROCESS

5 PLAN MAINTENANCE PROCESS 5.1

5.1 Monitoring, Evaluating, and Updating the Plan 5.1
5.1.1 Responsibility for Plan Maintenance 5.1
5.1.2 Plan Maintenance Schedule 5.2
5.1.3 Plan Maintenance Process 5.2

5.2 Incorporation into Existing Planning Mechanisms 5.3

5.3 Continued Public Involvement 5.5

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

5.1.1 Responsibility for Plan Maintenance

Periodic revisions and updates of the Plan are required by Missouri SEMA to ensure that the goals and objectives for Pulaski County are kept current. More importantly, revisions may be necessary to ensure the plan is in full compliance with Federal regulations and state statutes. This portion of the plan outlines the procedures for completing such revisions and updates.

A key component of the ongoing plan monitoring, evaluating and updating will be the Pulaski County Hazard Mitigation Planning Committee (MPC). In order to carry out the activities necessary for maintaining the plan, the MPC will need to remain in place and meet periodically. The coordination of this group, as indicated in the mitigation strategy, should be a responsibility of the county EMD. On-going activities of the MPC are:

- Meet annually, and after a disaster event, to monitor and evaluate the implementation of the plan;
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;

- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the County Board of Supervisors and governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The MPC (or other designated responsible entity) is an advisory body and can only make recommendations to county, city, town, or district elected officials. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

5.1.2 Plan Maintenance Schedule

The MPC (or other designated responsible entity) agrees to meet annually and after a state or federally declared hazard event, as appropriate, to monitor progress and update the mitigation strategy. The Pulaski County Emergency Management Director will be responsible for initiating the plan reviews and will invite members of the MPC (or other designated responsible entity) to the meeting.

In coordination with all participating jurisdictions, a five-year written update of the plan will be submitted to the Missouri State Emergency Management Agency (SEMA) and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

5.1.3 Plan Maintenance Process

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. The MPC (or other designated responsible entity) during the annual meeting should review changes in vulnerability identified as follows:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions;
- Increased vulnerability due to hazard events; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Future 5-year updates to this plan will include the following activities:

- Consideration of changes in vulnerability due to action implementation;
- Documentation of success stories where mitigation efforts have proven effective;
- Documentation of unsuccessful mitigation actions and why the actions were not effective;
- Documentation of previously overlooked hazard events that may have occurred since the previous plan approval;
- Incorporation of new data or studies with information on hazard risks;
- Incorporation of new capabilities or changes in capabilities;

- Incorporation of growth data and changes to inventories; and
- Incorporation of ideas for new actions and changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will adopt the following process:

- Each proposed action in the plan identified an individual, office, or agency responsible for action implementation. This entity will track and report on an annual basis to the jurisdictional MPC (or designated responsible entity) member on action status. The entity will provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing risk.
- If the action does not meet identified objectives, the jurisdictional MPC (or designated responsible entity) member will determine necessary remedial action, making any required modifications to the plan.

Changes will be made to the plan to remedy actions that have failed or are not considered feasible. Feasibility will be determined after a review of action consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring of this plan. Updating of the plan will be accomplished by written changes and submissions, as the MPC (or designated responsible entity) deems appropriate and necessary. Changes will be approved by the Pulaski County Hazard Mitigation Planning Committee and the governing boards of the other participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. Additionally, as jurisdictions review and update existing planning mechanisms, relevant action items and data from the HMP will be integrated. Those existing plans and programs were described in Section 2.2 of this plan. Based on the capability assessments of the participating jurisdictions, communities in Pulaski County will continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans:

- Regional Comprehensive Economic Development Strategy (CEDS) document
- General or master plans of participating jurisdictions;
- Ordinances of participating jurisdictions;
- Pulaski County Local Emergency Operations Plan (LEOP);
- Capital improvement plans and budgets;
- Other community plans within the County, such as water conservation plans, storm water management plans, and parks and recreation plans;
- School and Special District Plans and budgets; and
- Other plans and policies outlined in the capability assessment sections for each jurisdiction in Chapter 2 of this plan.

The MPC (or designated responsible entity) members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The MPC (or designated responsible entity) is also responsible for monitoring this integration and incorporation of the appropriate information into the five-year update of the multi-jurisdictional hazard mitigation plan.

Additionally, after the annual review of the Hazard Mitigation Plan, the Pulaski County Emergency Management Director (EMD) will provide the updated Mitigation Strategy with current status of each mitigation action to the County (Boards of Supervisors or Commissions) as well as all Mayors, City Clerks, and School District Superintendents. The EMD will request that the mitigation strategy be incorporated, where appropriate, in other planning mechanisms.

Table 1.1 below lists the planning mechanisms by jurisdiction into which the Hazard Mitigation Plan will be integrated.

Table 1.1. Planning Mechanisms Identified for Integration of Hazard Mitigation Plan

Jurisdiction	Planning Mechanisms
Unincorporated Pulaski County	Local Emergency Operations Plan (LEOP) Subdivision Road Specifications Economic Development Plan
Crocker	Comprehensive Plan County LEOP Local Recovery Plan County Recovery Plan City Mitigation Plan
Dixon	County LEOP
Richland	Comprehensive Plan Capital Improvement Plan County LEOP County Recovery Plan Economic Development Plan Transportation Plan Land-use Plan Flood Mitigation Assistance (FMA) Plan
St. Robert	Comprehensive Plan Builder's Plan City Emergency Operations Plan County LEOP Economic Development Plan Transportation Plan Land-Use Plan Flood Mitigation Assistance (FMA) Plan Subdivision Ordinance Tree Trimming Ordinance Storm Water Ordinance Drainage Ordinance
Waynesville	Comprehensive Plan

Jurisdiction	Planning Mechanisms
	Capital Improvement Plan City Emergency Operations Plan County LEOP City Mitigation Plan County Mitigation Plan Economic Development Plan Transportation Plan Land-Use Plan Flood Mitigation Assistance (FMA) Plan Watershed Plan Subdivision Ordinance Tree Trimming Ordinance Storm Water Ordinance Drainage Ordinance
Dixon R-I	Capital Improvement Plan School Emergency Plan
Crocker R-II	None
Swedeborg R-III	School Emergency Plan
Richland R-IV	Master Plan Capital Improvement Plan School Emergency Plan
Laquey R-V	Master Plan Capital Improvement Plan School Emergency Plan
Waynesville R-VI	Capital Improvement Plan School Emergency Plan

Source: Jurisdiction surveys 2015

5.3 Continued Public Involvement

44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The hazard mitigation plan update process provides an opportunity to publicize success stories resulting from the plan's implementation and seek additional public comment. Information about the annual reviews will be posted in the local newspaper as well as on the Meramec Regional Planning Commission's website following each annual review of the mitigation plan. When the MPC reconvenes for the five-year update, it will coordinate with all stakeholders participating in the planning process. Included in this group will be those who joined the MPC after the initial effort to update and revise the plan. Public notice will be posted and public participation will be actively solicited, at a minimum, through available website postings and press releases to local media outlets, primarily newspapers.

6 Appendix

A: References 6.2

B: Planning Process 6.6

C: Completed/Deleted Mitigation Actions 6.34

D: Adoption Resolutions 6.39

E: Critical/Essential Facilities 6.51

A: References

1. American FactFinder, U.S. Dept. of Commerce, United States Census Bureau
2. Missouri Department of Natural Resources, Dam and Reservoir Safety, http://dnr.mo.gov/env/wrc/dam-safety/statemap.htm
3. Stanford University's National Performance of Dams Program, http://npdp.stanford.edu/index.html
4. National Inventory of Dams, http://geo.usace.army.mil/
5. MO DNR Dam & Reservoir Safety Program
6. National Resources Conservation Service, http://www.nrcs.usda.gov
7. DamSafetyAction.org, http://www.damsafetyaction.org/MO/
8. Maps of effects of drought, National Drought Mitigation Center (NDMC) located at the University of Nebraska in Lincoln, http://www.drought.unl.edu/
9. Historical drought impacts, National Drought Mitigation Center (NDMC) located at the University of Nebraska in Lincoln, http://droughtreporter.unl.edu/
10. Recorded low precipitation, NOAA Regional Climate Center, http://www.hprcc.unl.edu
11. Water shortages, Missouri's Drought Response Plan, Missouri Department of Natural Resources, http://dnr.mo.gov/pubs/WR69.pdf
12. Populations served by groundwater by county, USGS-NWIS, http://maps.waterdata.usgs.gov/mapper/index.html
13. Census of Agriculture, http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Missouri/ & http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Missouri/
14. USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm
15. Natural Resources Defense Council, http://www.nrdc.org/globalWarming/watersustainability/
16. U.S. Seismic Hazard Map, United States Geological Survey, http://earthquake.usgs.gov/hazards/products/conterminous/2014/HazardMap2014_lg.jpg

17. 6.5 Richter Magnitude Earthquake Scenario, New Madrid Fault Zone map, http://www.igsb.uiowa.edu/Browse/quakes/quakes.htm

18. Probability of magnitude 5.0 or greater within 100 Years, United States Geological Survey, https://geohazards.usgs.gov/eqprob/2009/index.php

19. National Climatic Data Center, Storm Events Database, http://www.ncdc.noaa.gov/stormevents/

20. Heat Index Chart & typical health impacts from heat, National Weather Service; National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

21. Daily temperatures averages and extremes, High Plains Regional Climate Summary, http://www.hprcc.unl.edu/data/historical/index.php?state=ia&action=select_state&submit=Select+State

22. Hyperthermia mortality, Missouri; Missouri Department of Health and Senior Service, http://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/hyper1.pdf

23. Hyperthermia mortality by Geographic area, Missouri Department of Health and Senior Services, http://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/hyper2.pdf

24. Missouri Department of Conversation Wildfire Data Search, http://mdc4.mdc.mo.gov/applications/FireReporting/Report.aspx

25. Statistics, Missouri Division of Fire Safety

26. National Statistics, US Fire Administration

27. Fire/Rescue Mutual Aid Regions in Missouri

28. Forestry Division of the Missouri Department of Conservation

29. National Fire Incident Reporting System (NFIRS), http://www.dfs.dps.mo.gov/programs/resources/fire-incident-reporting-system.asp

30. Firewise Missouri, http://www.firewisemissouri.org/wildfire-in-missouri.html

31. University of Wisconsin Silvis Lab, http://silvis.forest.wisc.edu/maps/wui_main

32. Watershed map, Environmental Protection Agency, http://cfpub.epa.gov/surf/county.cfm?fips_code=19169

33. FEMA Map Service Center, Digital Flood Insurance Rate Maps (DFIRM) for all jurisdictions, if available, http://msc.fema.gov/portal

34. NFIP Community Status Book, http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book

35. NFIP claims status, BureauNet, http://bsa.nfipstat.fema.gov/reports/reports.html

36. Flood Insurance Administration—Repetitive Loss List

37. National Climatic Data Center, Storm Events Database, http://www.ncdc.noaa.gov/stormevents/

38. USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm

39. Missouri Department of Natural Resources, http://www.dnr.mo.gov/geology/geosrv/envgeo/sinkholes.htm & http://strangesounds.org/2013/07/us-sinkhole-map-these-maps-show-that-around-40-of-the-u-s-lies-in-areas-prone-to-sinkholes.html

40. http://www.businessinsider.com/where-youll-be-swallowed-by-a-sinkhole-2013-3

41. http://water.usgs.gov/edu/sinkholes.html

42. http://pubs.usgs.gov/fs/2007/3060/

43. FEMA 320, Taking Shelter from the Storm, 3rd edition, http://www.weather.gov/media/bis/FEMA_SafeRoom.pdf

44. Lightning Map, National Weather Service, http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf

45. Death and injury statistics from lightning strikes, National Weather Service.

46. Wind Zones in the U.S. map, FEMA, http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm

47. Annual Windstorm Probability (65+knots) map U.S. 1980-1994, NSSL, http://www.nssl.noaa.gov/users/brooks/public_html/bigwind.gif

48. Hailstorm intensity scale, The Tornado and Storm Research Organization (TORRO), http://www.torro.org.uk/site/hscale.php

49. NCDC data

50. USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm

51. National Severe Storms Laboratory – hail map, http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif

52. Enhanced F Scale for Tornado Damage, NWS, www.spc.noaa.gov/faq/tornado/ef-scale.html

53. Enhanced Fujita Scale's damage indicators and degrees of damage table, NOAA Storm Prediction Center, www.spc.noaa.gov/efscale/ef-scale.html

54. Tornado Activity in the U.S. map (1950-2006), FEMA 320, Taking Shelter from the Storm, 3rd edition;

55. Tornado Alley in the U.S. map, http://www.tornadochaser.net/tornalley.html

56. Enhanced Fujita Scale, www.spc.noaa.gov/efscale/ef-scale.html

57. National Climatic Data Center, http://www.ncdc.noaa.gov/stormevents/

58. Tornado History Project, map of tornado events, http://www.tornadohistoryproject.com/tornado/Missouri

59. Wind chill chart, National Weather Service, http://www.nws.noaa.gov/om/winter/windchill.shtml

60. Average Number of House per year with Freezing Rain, American Meteorological Society. "Freezing Rain Events in the United States." http://ams.confex.com/ams/pdfpapers/71872.pdf

61. USDA Risk Management Agency, Insurance Claims, http://www.rma.usda.gov/data/cause.htm

62. National Climatic Data Center, Storm Events Database, http://www.ncdc.noaa.gov/stormevents/

B: Planning Process

HMPC Mailing list

Mr. Byron Dudley
Laclede Electric
PO Box M
Lebanon, MO 65536

Gene Williams
PULASKI CO PWSD #1
PO BOX 207
LAQUEY, MO 65534

Opal Gibbs, Clerk
City of Crocker
PO Box 116
Crocker, MO 65452

Manager
Rosewood Manor Assisted Living
Attn: Manager
103 East Pulaski Avenue
Richland. MO 65556

George Sanders, Mayor
City of St. Robert
194 Eastlawn Ave, #A
St. Robert, MO 65584

Presiding Commissioner
Gene Newkirk
Pulaski County Courthouse
301 Historic 66 East, Suite 101
Waynesville. MO 65583

Mr. Duane Doyle, Superintendent
Dixon R-I
P.O. Box A
Dixon, MO 65459

Mr. Doug Jacobson, Superintendent
Swedeborg R-III Elementary
17507 Hwy. T
Richland, MO 65556

Pulaski County Health Department
101 12th Street
Crocker, MO 65452

Aaron Bradshaw
InterCounty Electric
PO Box 209
Licking, MO 65542

Mr. Mark Tallent
PULASKI CO PWSD #2
PO BOX 4100
WAYNESVILLE, MO 65583

James Morgan, Mayor
City of Crocker
PO Box 116
Crocker, MO 65452

Greg Stratman, City Administrator
City of Richland
PO Box 798
Richland, MO 65556

Luge Hardman, Mayor
City of Waynesville
601 Historic 66 West
Waynesville, MO 65583

Carol Welch, Clerk
City of Waynesville
601 Historic Rte. 66 West
Waynesville, MO 65583

Dr. Randy Caffey, Superintendent
Laquey R-V
P.O. Box 130
Laquey, MO 65534

Dr. Brian Henry, Superintendent
Waynesville R-VI
200 Fleetwood Dr.
Waynesville, MO 65583

Dixon Family Practice
PO Box 9900, 206 West Second
Dixon, MO 65459

Carmen Hartwell
GascOsage Electric
Drawer G
Dixon, MO 65459

William Crawford
PULASKI CO PWSD #3
16650 RIPPLE RD
CROCKER, MO 65452

Jeff Clark, Mayor
City of Dixon
PO Box 177
Dixon, MO 65459

Debbie Adkins, Clerk
City of St. Robert
194 Eastlawn Ave, #A
St. Robert, MO 65584

Brent Bassett, County Clerk
Pulaski County Courthouse
301 Historic 66 East, Suite 101
Waynesville, MO 65583

Dr. Gary Doerhoff, Superintendent
Crocker R-II
P.O. Box 488
Crocker, MO 65452

Mr. Tony A. Hermann, Superintendent
Richland R-IV
714 E. Jefferson
Richland, MO 65556

Anita Ivey, City Administrator
City of St. Robert
194 Eastlawn Ave, #A
St. Robert, MO 65584

Mercy Clinic Family Medicine
PO Box 914 , 608 City Route 66
Saint Robert, MO 65584

Pulaski Medical Clinic
107 Ichord Avenue
Waynesville, MO 65583

St. John's Clinic - Richland
904 South Pine
Richland, MO 65556

Manager
Sunset Village of the Ozarks INC
14275 Highway Z
Saint Robert, MO 65584

Manager
Life Care Center of Waynesville
700 Birch Lane
Waynesville, MO 65583

Manager
Dixon Nursing & Rehab
403 East 10th Street
Dixon, MO 65459

Manager
Richland Care Center Inc.
PO Box 756, 400 Tri-County
Richland, MO 65556

Donnie Ray
Pulaski County Courthouse
301 Historic 66 East, Suite 101
Waynesville, MO 65583

Steve Street
Pulaski County Courthouse
301 Historic 66 East, Suite 101
Waynesville, MO 65583

Jessica Butteris
Pulaski County Courthouse
301 Historic 66 East, Suite 101
Waynesville, MO 65583

Lynn Sharp
Pulaski County Courthouse
301 Historic 66 East, Suite 101
Waynesville, MO 65583

Dan Cordova
Waynesville Police Department
201 N. Street
Waynesville, MO 65583

Bruce Harrill
City of Waynesville
601 Historic 66 West
Waynesville, MO 65583

Chris Berger
Waynesville R-VI
200 Fleetwood Dr.
Waynesville, MO 65583

Darrell Todd Maurina
P.O. Box 720
Saint Robert, MO 65584-0720

Scott Crider
St. Robert Fire Department
194 Eastlawn Ave, #A
St. Robert, MO 65584

Gary Bates
204 W. Washington
Richland, MO 65556

Rick Hobbs
204 W. Washington
Richland, MO 65556

James O. LaChance
P.O. Box 177
Dixon, MO 65459

MEMORANDUM

TO: Pulaski County Hazard Mitigation Planning Committee

FROM: Tammy Snodgrass, MRPC Environmental Programs Manager/Assistant Director

DATE: February 20, 2015

SUBJECT: Hazard mitigation planning meeting March 5, 2015

MRPC has been contracted by Pulaski County and the State Emergency Management Agency (SEMA) to review and update the multi-jurisdictional hazard mitigation plan for Pulaski County, its cities and school districts. The project is being funded by state and federal dollars with matching funds from Pulaski County. We need your help to successfully complete this project.

The county must submit an approved, updated hazard mitigation plan to SEMA and FEMA by the end of this year in order to continue to be eligible for some hazard mitigation grants, so it is in every jurisdiction's best interest to participate in the review and update of this plan. Hazard mitigation funds are used for such projects as floodplain buyouts, burying electrical lines, tornado shelters for schools, etc.

A meeting of the Pulaski County hazard mitigation planning committee is scheduled for Thursday, March 5 at 10:00 a.m. in the basement meeting room of the Pulaski County Courthouse in Waynesville. The focus of this meeting will be to review existing goals and action items and determine if any changes need to be made. In addition, the group will need to report on what action items have been accomplished and what mitigation activities have occurred since the plan was updated five years ago. This can include activities such as improvements to roads and bridges that were prone to flooding, new programs that have reduced risk to residents and/or businesses and new tornado shelters that have been constructed in the past five years

As the county, each city and school district will be asked to formally approve and adopt the Pulaski County Hazard Mitigation Plan, we strongly encourage you to participate in this committee or to send a representative who will convey your jurisdiction or department's needs for hazard mitigation as well as report on your hazard mitigation accomplishments. It is important to include representatives from emergency management offices, law enforcement, city/county officials, fire protection, local health services, disaster relief volunteer services and other appropriate groups.

Thank you for your assistance in addressing hazard mitigation for Pulaski County. If you have any questions, contact me at (573) 265-2993, or via e-mail: tsnodgrass@merameregion.org. I look forward to seeing you at the meeting.

TS

Advisory Committee Meeting
Pulaski County Hazard Mitigation Plan Update
AGENDA
10:00 a.m. ~ March 5, 2015
Pulaski County Courthouse ~ Basement Meeting Room

I. Welcome and Introductions – Tammy Snodgrass

II. Overview of Hazard Mitigation Planning and Pulaski County Hazard Mitigation Plan

Staff will provide an overview of the planning process and a brief review of the existing hazard mitigation plan

III. Discussion of Goals and Objectives and Progress Made in Five Years

Staff will lead the review of existing goals and a group discussion on what progress has been made in addressing hazard mitigation over the past five years.

IV. Discussion of Possible Changes to Goals and Action Items for Next Five Years

After reviewing the plan document and looking at what has been accomplished, the group will be asked to discuss if needs have changed and what, if any changes need to be made to goals and action items for the revised plan.

V. Setting of Date and Time for Next Meeting

VI. Adjourn

NOTICE OF PUBLIC MEETING

Date and time of posting: **March 3, 2:00 p.m.**
Notice is hereby given that the **Pulaski County Hazard Mitigation Planning Committee** will meet at 10:00 a.m. on **Thursday, March 5, 2015** at the Pulaski County Courthouse located in Waynesville, Mo.

The tentative agenda of this meeting includes:

- Welcome and Introductions
- Overview of Hazard Mitigation Planning and Pulaski County Hazard Mitigation Plan
- Discussion of Goals and Objectives and Progress Made in Past Five Years
- Discussion of Possible Changes to Goals and Action Items for Next Five Years
- Setting of Date and Time for Next Meeting
- Adjourn

Representatives of the news media may obtain copies of this notice by contacting:

Tammy Snodgrass
#4 Industrial Drive
St. James, MO 65559
(573) 265-2993
tsnodgrass@meramecregion.org

If you require any accommodations (i.e. qualified interpreter, large print, hearing assistance) in order to attend this meeting, please notify this office at 573-265-2993 no later than 48 hours prior to the scheduled commencement of the meeting.

March Mtg Public

Name	Representing	Email Address	Phone #	Address
Bruce Hamill	City of Waynesville	cadmin@waynesvillemo.org	(573) 774-6171	601 HISTORIC KI 44 cadmin WAYNESVILLE MO 65583
Gary Bates	City of Richland	gbates@richlandpolice.net	(573) 765-4144	104 E. Wash. Richland MO
Rick Hobbs	City of Richland and Tri County Fire	tricountyfire@Embarqmail	573-765-5640	204 E Washington ~~Richland MO. 65556~~
GARY DOERHOFF	CROCKER SCHOOLS	gdoerhoff@crocker schools.org	573-736-5000 EXT. 5	104 SCHOOL ST CROCKER, MO, 65452
JAMES MORGAN	CITY CROCKER	CROCKERCityhall@ YAHOO.COM	573 736-5727	PO BOX 116 CROCKER MO 65452
MARK TALLANT	WATER DIST. NO.2 PULASKI COUNTY	IPWSD2@embarqmail.com	573-336-5833	P.O. BOX 4100 WAYNESVILLE
James O. LaChance	Dixon Police	jameslachance_1@hotmail.com	573-759-6610	PO BOX 177 Dixon MO 65459
Scott Crider	St Robert Fire	scrider@saintrobert.com	573 451 2000	194 East Lawn Ave Suite A
Chris Berger	RVT	cberger@waynesvillemo.us	573-842-2065	200 Fleetwood
Gene Newkirk	Pulaski Co	GeneNewk@cablemo.net	573 774-4701	136 Cardinal
Darrell Maurina	Pulaski County Daily News	darrellmaurina@yahoo.com	573-433-6733	POBox 720 SR, MO 65584-0720

MEMORANDUM

TO: Pulaski County Hazard Mitigation Planning Committee

FROM: Tammy Snodgrass, MRPC Environmental Programs Manager/Assistant Director

DATE: April 9, 2015

SUBJECT: Hazard mitigation planning meeting April 23, 2015

MRPC has been contracted by Pulaski County and the State Emergency Management Agency (SEMA) to review and update the multi-jurisdictional hazard mitigation plan for Pulaski County, its cities and school districts. The project is being funded by state and federal dollars with matching funds from Pulaski County. We need your help to successfully complete this project.

The county must submit an approved, updated hazard mitigation plan to SEMA and FEMA by the end of this year in order to continue to be eligible for some hazard mitigation grants, so it is in every jurisdiction's best interest to participate in the review and update of this plan. Hazard mitigation funds are used for such projects as floodplain buyouts, burying electrical lines, tornado shelters for schools, etc.

A meeting of the Pulaski County hazard mitigation planning committee is scheduled for Thursday, April 23 at 10:00 a.m. in the basement meeting room of the Pulaski County Courthouse in Waynesville. The focus of this meeting will be to review and prioritize action items and determine if any changes need to be made. In addition, the group will need to continue to report on what action items have been accomplished and what mitigation activities have occurred since the plan was updated five years ago. This can include activities such as improvements to roads and bridges that were prone to flooding, new programs that have reduced risk to residents and/or businesses and new tornado shelters that have been constructed in the past five years. We will also be discussing the identification of critical facilities in the county.

As the county, each city and school district will be asked to formally approve and adopt the Pulaski County Hazard Mitigation Plan, we strongly encourage you to participate in this committee or to send a representative who will convey your jurisdiction or department's needs for hazard mitigation as well as report on your hazard mitigation accomplishments. It is important to include representatives from emergency management offices, law enforcement, city/county officials, fire protection, local health services, disaster relief volunteer services and other appropriate groups.

Thank you for your assistance in addressing hazard mitigation for Pulaski County. If you have any questions, contact me at (573) 265-2993, or via e-mail: tsnodgrass@merameregion.org. I look forward to seeing you at the meeting.

TS

NOTICE OF PUBLIC MEETING

Date and time of posting: **April 10, 2015, 2:00 p.m.**

Notice is hereby given that the **Pulaski County Hazard Mitigation Stakeholders** will conduct a public meeting at **10:00 a.m.** on **Thursday, April 23, 2015** at the Pulaski County Court House.

Pulaski County Hazard Mitigation Plan Update Stakeholders,

Our first meeting to gather action items for the County Hazard Mitigation Plan update was conducted on March 26. Our next meeting is scheduled for 10:00 a.m. on Thursday, April 23, 2015 in the County Court House meeting room. Please note this is a change from the original date of April 14th. We will be seeking additional input and prioritize action items. We urge those who represent the county government, municipalities, public works, emergency services, medical and residential care facilities, schools and all other organizations who are faced with the possibility of natural and manmade disasters to actively participate in this second meeting.

Please contact Tammy Snodgrass via email at tsnodgrass@meramecregion.org or (573)265-2993 if you need further information or have any questions regarding this planning process.

Representatives of the news media may obtain copies of this notice by contacting:

Lyle Thomas
4 Industrial Drive
St. James, MO 65559
573-265-2993

If you require any accommodations (i.e. qualified interpreter, large print, hearing assistance) in order to attend this meeting, please notify this office at 573-265-2993 no later than 48 hours prior to the scheduled commencement of the meeting.

Pulaski County Hazard Mitigation Plan Review Meeting
April 23, 2015 ~ 10:00 a.m.

Name	Representing	Email Address	Phone #	Address
Tammy Snodgrass	MRPC	tsnodgrass@meramecregion.org	573-265-2993	4 Industrial Dr. St. James MO 65559
James Morgan	City Crocker	CrockerCityHall@Yahoo.com	573 736-5327	PO Box 116 Crocker Mo 65452
Jim Humphrey	City of St. Robert	jhumphrey@saintrobert.com	573-451-2000 Ext 1104	194 Eastlawn Ave Ste A St Robert MO 65584
Jessica Lucas	Pulaski County COAD	jlucas@waynesville.k12.mo.us	573 433 5357	
Gary Doerhoff	Crocker Schools	gdoerhoff@crockerschools.org	573-736-5000 Ext 5	104 School St. Crocker, Mo. 65452
Jessica Butteris	Pulaski Co. R&B	butterisja@gmail.com	765-3219	
Lucy Rector	Pulaski Co R&B	Lucyrector2010@Yhoo.com	765-3219	
Steve Street	Pulaski Co. R&B		573-528-0531	
Donnie Ray	R&B Pulaski		573-528-0532	
Darrell Todd Maurina	Pulaski County Daily News	darrellmaurina@runbox.com	(573)433-6733	PO Box 720 St. Robert MO 65584-0720

Name	Representing	Email Address	Phone #	Address
Lori Laughlin	Mercy	Lori.Laughlin@mercy.net	Cell = 573-528-1167 Office 573-336-1106	PO Box 914 St Robert, MO 65584
Ricky Zweerink	Pulaski Co		Cell 573-512-0775	15924 Buffalo Rd Crocker MO
Lynn Sharp	Pulaski Co		Cell 573 528 5297	

Advisory Committee Meeting

Pulaski County Hazard Mitigation Plan Update

AGENDA

10:00 a.m. ~April 23, 2015

Pulaski County Courthouse ~ Basement Meeting Room

I. Welcome and Introductions – Tammy Snodgrass

II. Review of Action Items and Prioritization
The committee will be asked to review and prioritize identified action items and determine if any should be removed or added. Prioritization will include STAPLEE and discussion of cost benefit.

III. **Discussion of and Identification of Critical Facilities**
Staff will provide a list of critical facilities and ask the committee to review for accuracy and provide input on additions and/or deletions. Staff will also ask the group to assist in providing information on the value of critical infrastructure.

IV. Setting of Date and Time for Next Meeting

V. Adjourn

MEMORANDUM

TO: Pulaski County Hazard Mitigation Planning Committee

FROM: Tammy Snodgrass, Assistant Director/Environmental Programs Manager

DATE: May 19, 2015

SUBJECT: Review of Prioritization of Pulaski County Hazard Mitigation Action Items

Enclosed please find a copy of the prioritization of hazard mitigation action items that was developed by the Pulaski County Hazard Mitigation Planning Committee (HMPC). This list was presented to the HMPC at their April 23rd meeting. We are sharing the prioritized list to insure that all planning partners have an opportunity to review and provide input.

The attachment includes not only the action items, but a description of the methods used to prioritize the list. The State and Federal Emergency Management agencies (SEMA and FEMA) require that action items be prioritized by using both the STAPLEE method and Cost Benefit Analysis (CBA). The enclosed document includes the scoring criteria. The action items are listed in a table that includes the STAPLEE score, CBA score, numeric score and priority.

What we need planning partners to do is to look at the last two columns of the table. These show the final score and whether the action item is considered a High, Medium or Low priority. We would like you to provide feedback on whether or not you agree with how the action items were prioritized.

It is important that the plan meet the needs of the jurisdictions included in the plan. If you disagree with how one or more items scored, please contact myself or Lyle Thomas and share your thoughts. We can be reached via email at tsnodgrass@meramecregion.org or lthomas@meramecregion.org or by phone at (573) 265-2993.

Also enclosed is an in-kind match form. Any time you spend travelling to and from and attending meetings; reviewing materials; or collection information for the hazard mitigation plan update can be used to match the grant funding this planning effort. If we do not document enough in-kind match, the jurisdictions will have to provide additional cash match. Please complete the in-kind form and return it to us at your earliest convenience. Any information disclosed on the form will remain confidential.

Thank you for your time and participation and please let us know if you have any questions.

TS
Enclosures

STAPLEE stands for the following:

- **Social:** Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- **Technical:** is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- **Administrative:** Are there adequate staffing, funding and maintenance capabilities to implement the project?
- **Political:** Will there be adequate political and public support for the project?
- **Legal:** Does your jurisdiction have the legal authority to implement the action?
- **Economic:** is the action cost-beneficial? Is there funding available: Will the action contribute to the local economy?
- **Environmental:** Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

Each question was scored based on a 0 to 3 point value system:

3 = Definitely YES
2 = Maybe YES
1 = Probably NO
0 = Definitely NO

For the Benefit/Cost Review portion of the prioritization process, these two aspects were scored as follows:

Benefit – two (2) points were added for each of the following avoided damages (8 points maximum = highest benefit)

- Injuries and/or casualties
- Property damages
- Loss-of-function/displacement impacts
- Emergency management costs/community costs

Cost – points were subtracted according to the following cost scale (-5 points maximum = highest cost)

- (-1) = Minimal – little cost to the jurisdiction involved
- (-3) = Moderate – definite cost involved but could likely be worked into operating budget
- (-5) = Significant – cost above and beyond most operating budgets; would require extra appropriations to finance or to meet matching funds for a grant

Note: For the Benefit/Cost Review, the benefit and cost of actions which used the word "encourage" were evaluated as if the action or strategy being encouraged was actually to be carried out.

Total Score – The scores for the STAPLEE Review and Benefit/Cost Review were added to determine a Total Score for each action.

Priority Scale – To achieve an understanding of how a Total Score might be translated into a Priority Rating, a sample matrix was filled out for the possible range of ratings an action might receive on both the STAPLEE and Benefit/Cost Review. The possible ratings tested ranged between:

- A hypothetical action with "Half probably NO and half maybe YES" answers on STAPLEE (i.e. poor STAPLEE score) and Low Benefit/High Cost: Total Score = 7
- A hypothetical action with "All definitely YES" on STAPLEE and High Benefit/Little Cost: Total Score = 28

An inspection of the possible scores within this range led to the development of the following Priority Scale based on the Total Score in the STAPLEE- Benefit/Cost Review process:

20 – 28 points = High Priority
14-19 points = Medium Priority
13 points and below = Low Priority

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 2 = Maybe YES			1 = Prob NO 0 = Def NO										
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
1.1.1	Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.2	Continue to educate residents about precautions that should be taken during threats of natural disasters such as heat waves and severe weather.	3	3	3	3	3	2	3	20	IC, LF, EMCC	6	-1	5	25	H
1.1.3	Provide information to citizens on individual mitigation activities such as building personal shelters and assuring that propane tanks are appropriately tied down.	3	3	2	3	3	2	3	19	IC, PD, LF EMCC	8	-1	7	26	H
1.1.4	Promote development of emergency plans by businesses and public entities.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.5	Educate school staff on natural hazards and make sure all staff are familiar with school emergency plan including evacuation and safety procedures.	3	3	3	3	3	3	3	21	IC, PD, LF EMCC	8	-1	7	28	H
1.1.6	Schools need to continue to conduct emergency preparedness exercises on a regular basis.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.7	Regularly review and update school emergency plans	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
1.1.8	Encourage the designation of storm shelters and the construction of tornado safe rooms in every school that does not have one.	3	3	3	3	3	1	3	19	IC, EMCC	4	-5	-1	18	M
1.2.1	Continue to encourage cities to obtain early warning systems and improved communications systems.	3	3	2	3	3	1	3	18	IC, PD, LF, EMCC	8	-3	5	23	H
1.2.2	Continue to promote use of weather radios by local residents and schools to insure advanced warning about threatening weather.	3	3	3	3	3	3	3	21	IC,EMCC	4	-1	3	24	H
1.2.3	Continue to partner with local radio stations to ensure that appropriate warning of impending disasters is provided to all residents of impending disasters.	3	3	3	3	3	3	3	21	IC, EMCC	4	-1	3	24	H
1.2.4	Promote the installation of fire alarms/security systems in public buildings.	3	3	2	2	3	2	3	18	IC, PD, LF, EMCC	8	-3	5	23	H
1.2.5	Acquire generators to safeguard the availability of critical services such as electricity and water.	3	3	3	3	3	2	3	20	LF, EMCC	4	-1	3	23	H
1.2.6	Texas Road area is prone to flashflooding that has resulted in water rescues, damaged utilities and homes. Need to study area and find mitigation solutions.	3	3	2	3	3	1	3	18	IC,PD, LF, EMCC	8	-5	3	21	H

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 1 = Prob NO 2 = Maybe YES 0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
1.2.6	Monitor developments in data availability concerning the impact of disasters such as dam failure, tornados, sinkholes, land subsidence and wildfire upon Pulaski County and all jurisdictions through local, state and federal agencies for use in hazard mitigation planning.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
1.3.1	Place water height gauges and signs near low water crossings	3	3	2	3	3	2	3	19	IC	2	-1	1	20	H
1.3.2	Continue to encourage tree trimming and dead tree removal programs by utility companies and local government.	3	3	3	3	3	2	2	19	IC, PD, LF, EMCC	8	-3	5	24	H
1.3.3	Continue to examine road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.	3	3	2	3	3	2	2	18	IC, PD, LF, EMCC	8	-1	7	25	H
1.3.4	Establish designated shelters for residents to be used during tornado threats, as cooling centers during extreme heat or power outages and/or as shelters during other disasters.	3	3	3	3	3	3	3	21	IC, LF, EMCC	6	-1	5	26	H
1.3.5	Continue to work to increase availability (if necessary construction) of storm shelters for individual families and large groups, including near large employment centers and schools.	3	3	3	3	3	1	3	19	IC, EMCC	4	-5	-1	18	M
1.3.6	Encourage establishing road signage that directs people on I-44 to local storm shelters during storm warnings.	3	3	2	3	3	3	3	20	IC, PD, EMCC	6	-1	5	25	H
2.1.1	Continue to encourage a self-inspection program at critical facilities to assure that building infrastructure is earthquake and tornado resistant.	3	2	2	3	3	1	3	17	IC, PD, LF, EMCC	8	-5	3	20	H
2.1.2	Encourage the adoption of minimum standard building codes by all communities and encourage the county to review and strengthen any subdivision ordinances to incorporate mitigation measures such as storm water management.	2	2	2	1	3	2	3	15	IC, PD, LF, EMCC	8	-3	5	20	H
2.1.3	Continue to encourage businesses and public entities to develop and implement emergency plans.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-3	5	26	H
2.1.4	Encourage the installation of backup generators for critical infrastructure such as water systems and emergency services.	3	3	3	3	3	2	3	20	LF, EMCC	4	-3	1	21	H
2.2.1	Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the NFIP.	2	3	3	2	3	2	3	18	IC, PD, LF, EMCC	8	-1	7	25	H

Figure 4.4 Prioritization of Hazard Mitigation Actions		3 = Def YES 2 = Maybe YES			1 = Prob NO 0 = Def NO										
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
2.2.2	Encourage development of storm water management plans in those jurisdictions that do not currently have them and in all new development.	3	2	2	2	3	2	3	18	IC, PD, LF, EMCC	8	-3	5	23	H
2.2.3	Promote the local floodplain program and distribute information to inform builders and contractors of floodplain building requirements.	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
2.2.4	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.	2	3	3	2	3	2	3	18	IC, PD, LF, EMCC	8	-3	5	23	H
2.3.1	Encourage minimum standards for building codes in all cities.	2	3	2	2	3	3	3	18	IC, PD, LF, EMCC	8	-1	7	26	H
2.3.2	Encourage local governments to develop and implement regulations for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.	2	2	2	2	3	3	3	17	IC, PD, LF, EMCC	8	-3	5	22	H
2.3.3	Monitor developments in data availability concerning the impact of dam failure, tornados, sinkholes, land subsidence and wildfire upon Washington County and all jurisdictions through local, state and federal agencies for use in hazard mitigation planning.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
2.3.1	Encourage minimum standards for building codes in all cities.	2	2	2	2	3	1	2	14	PD, LF, EMCC	6	-3	3	17	M
2.3.2	Encourage local governments to develop and implement regulations for the securing of hazardous materials tanks and mobile homes to reduce hazards during flooding and high winds.	2	2	2	1	2	2	2	13	IC, PD	4	-1	3	16	M
2.3.3	Encourage the Mark Twain National Forest to levy stricter fines for persons causing fire hazards.	2	2	2	2	3	2	3	16	IC, PD, LF, EMCC	8	-1	7	23	H
3.1.1	Distribute SEMA brochures on natural disasters, preparedness and NFIP at public facilities and events.	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
3.1.2	Distribute regular press releases from county and city EMD offices concerning hazards, where they strike, frequency, preparedness and how to mitigate.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
3.2.1	Encourage local residents to purchase weather radios through press releases and brochures.	3	3	3	3	3	2	3	20	IC, EMCC	4	-1	3	23	H
3.2.2	Encourage meetings of EMD, city/county officials & SEMA to familiarize officials with mitigation planning, implementation & budgeting for mitigation projects.	3	3	3	2	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 1 = Prob NO 2 = Maybe YES 0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Loss Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
3.3.1	Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	3	2	2	2	3	1	3	16	IC, PD, LF, EMCC	8	-3	5	21	H
3.3.2	Distribute press releases by cities/county regarding regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.	3	3	2	3	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
3.4.1	Encourage county health department and local Red Cross Chapter to use publicity campaigns that make residents aware of proper measures to take during times of threatening conditions (e.g. drought, heat wave)	3	3	2	3	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
3.4.2	Publicize county or citywide drills.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
3.4.3	Encourage the development of a county-wide CERT and/or VOAD program and educate the public on how they can benefit from these types of programs.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
4.1.1	Continue to encourage joint meetings of different organizations/agencies for mitigation related planning.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
4.1.2	Continue to encourage joint training (and drills) between agencies, public and private entities (including schools/businesses).	3	2	2	3	3	2	3	18	IC, PD, LF, EMCC	8	-1	7	25	H
4.1.3	Pool different agency resources to achieve widespread mitigation planning results.	3	2	2	2	3	2	3	17	IC, PD, LF, EMCC	8	-1	7	24	H
4.1.4	Maintain updated mutual aid agreements between emergency response agencies inside and outside the region.	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
4.2.1	Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	3	2	2	2	3	1	3	16	IC, PD, LF, EMCC	8	-3	5	21	H
4.2.2	Encourage meetings between EMD, city/county and SEMA to familiarize officials with mitigation planning and implementation and budgeting for mitigation projects.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
5.1.1	Incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	29	H
5.1.2	Encourage communities to budget for enhanced warning systems.	3	2	2	3	3	2	3	18	IC, LF EMCC	6	-3	3	21	H

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 1 = Prob NO 2 = Maybe YES 0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Loss Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
5.1.3	Encourage all communities to develop stormwater management plans.	2	2	1	1	3	1	3	13	PD	2	-5	-3	10	L
5.1.4	Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	3	2	2	2	3	1	3	16	IC, PD, LF, EMCC	8	-3	5	21	H
5.1.5	Encourage cities to require contractor storm water management plans in all new development –both residential and commercial properties.	2	2	2	2	3	2	3	16	PD	2	-3	-1	15	M
5.2.1	Encourage the construction of storm shelters, especially tornado safe rooms near schools and large employment centers that currently do not have access to safe rooms.	3	3	3	3	3	1	2	18	IC, PD, EMCC	6	-5	1	19	M
5.2.2	Encourage the designation of public buildings as safe shelters and develop accessibility plans for the public during times of need.	3	3	2	3	3	2	3	18	IC, EMCC	4	-1	3	21	H
5.3.1	Encourage local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.	1	2	2	1	2	1	3	12	PD, EMCC	4	-5	-1	11	L
5.3.2	Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.	2	2	2	1	2	1	3	13	PD, EMCC	4	-1	3	16	M
6.1.1	Work with SEMA Region I coordinator to learn about new mitigation funding opportunities.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
6.1.2	Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are also met.	3	2	2	2	3	2	3	17	IC, PD, LF, EMCC	8	-1	7	24	H
6.1.3	Work with state/local/federal agencies to include mitigation in all economic and community development projects.	3	2	2	2	3	2	2	16	IC, PD, LF, EMCC	8	-1	7	23	H
6.1.4	Encourage local jurisdictions to budget for mitigation projects.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-5	3	23	H
6.2.1	Encourage cities and counties to implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.	2	1	1	1	2	2	2	11	IC, PD, LF, EMCC	8	-5	3	14	M
6.2.2	Implement public awareness program about the benefits of hazard mitigation projects, both public and private through press releases and brochures.	3	3	2	3	3	2	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
6.3.1	Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property.	3	3	2	2	3	2	3	18	IC, PD, LF, EMCC	8	-1	7	25	H

MEMORANDUM

TO: Pulaski County Hazard Mitigation Plan Jurisdictions

FROM: Tammy Snodgrass, Assistant Director/Environmental Programs Manager, MRPC

DATE: July 27, 2015

SUBJECT: Survey to update the Pulaski County Hazard Mitigation Plan

Enclosed please find a survey and in-kind match form. We are currently updating the Pulaski County Natural Hazards Mitigation Plan. The county, including cities and school districts, must maintain an up-to-date plan in order to be eligible for some hazard mitigation grants. These grants can be used to build certified tornado safe rooms as well as upgrade low water crossings or roadways to make them less vulnerable to flooding. The purpose of this plan is to help jurisdictions take steps before a disaster occurs to make their schools and communities less vulnerable to natural hazards such as tornadoes, flooding and winter storms.

It is very important that you complete the attached survey and return it to my office by August 7, 2015. We are operating on a tight schedule. A draft of the plan document must be submitted to SEMA in October. We need the information to complete that draft.

Jurisdictions involved in the plan and planning process include Pulaski County, the cities located within the county and the school districts. Each jurisdiction will be asked to review and adopt the plan once it is completed. Each jurisdiction is also required to participate in the planning process. Completing and returning this survey is one way that your jurisdiction can meet this requirement.

Also enclosed is an in-kind match form. The project is funded through a grant which requires in-kind match. Any time you spend reviewing the plan, gathering and submitting information or participating in planning meetings can be considered in-kind match. Please complete the form with the survey.

The documents can be faxed to (573) 265-3550; emailed to tsnodgrass@meramecregion.org or mailed to 4 Industrial Drive, St. James, Mo. 65559.

If you have any questions or concerns, please do not hesitate to contact me at (573) 265-2993 or via email at tsnodgrass@meramecregion.org. Your assistance is greatly appreciated.

TS

Enclosures

HAZARD MITIGATION JURISDICTION SURVEY
Pulaski County

_____ Jurisdiction

_____Name of Person Completing Survey

Please answer the following questions and submit the information to MRPC no later than August 7, 2015. We need this information to complete the review and update of the Pulaski County Hazard Mitigation plan. If you have questions or need assistance, please contact Tammy Snodgrass at (573) 265-2993 or via email at tsnodgrass@meramecregion.org. Also enclosed is an in-kind match form. The county must provide in-kind match for this project. Please track the time you spend on this survey, complete the in-kind match form and return it with your survey. Thank you for your assistance.

List of Buildings and wells with insurance replacement values (listed on property insurance documents):

_____
_____
_____
_____
_____
_____

Questions:

1. Participate in National Flood Insurance Program (NFIP)? ___ Yes ___ No
   a. What year did your community join? _____
   b. Floodplain management ordinance? ___ Yes ___ No
   c. Floodplain manager: _____
   d. Flood Insurance Study? ___ Yes ___ No
   e. Do you maintain Elevation Certificates? ___ Yes ___ No

2. Police Department? ___ Yes ___ No Located: _____
   a. Number of officers: _____
   b. DARE Officer? ___ Yes ___ No

   c. Central Communications Center? ___ Yes ___ No
      Located:_____
   d. Backup location?
      _____
   e. 9-1-1 capabilities?
      _____

   If no central communications – what does the jurisdiction use for emergency communications?_____
   _____

3. Warning sirens or system(s) in place? Please describe type(s) of systems, numbers of sirens, etc.:
   _____
   _____
   _____
   _____

   a. Who has authority to activate warning systems? _____

4. Ambulance service provided by: _____

5. Fire Department: City/Rural Volunteer/Fire Protection District ISO Rating: _____/_____
   a. Does fire department provide any education/awareness programs? ___ Yes ___ No
      If yes, what kinds of programs?
      _____
   b. Any other programs/training?
      _____

6. Building Codes? ___ Yes ___ No What year established? _____
   a. Who enforces/administers?
      _____
   b. Any certified inspectors on staff? ___ Yes ___ No How many?
      _____
   c. Other Codes?
      _____
   d. Building permits/inspections required? ___ Yes ___ No New and Renovations? ___Yes ___ No
   e. Site plan review requirements? ___ Yes ___ No

7. Planning and Zoning Ordinance(s)? ___ Yes ___ No Year established: _____

8. Stormwater Management Ordinance(s)? ___ Yes ___ No Year established: _____

9. What plans does the jurisdiction have in place?

Economic Development Plan? ___	Emergency Operations Plan? ___
Comprehensive Plan? ___	Infrastructure Plan? ___
Capital Improvements Plan? ____	Others: _____

10. Does the jurisdiction have any other plans, ordinances or programs not listed above that are related to emergency management, floodplain or hazard mitigation? Please describe:
    _____
    _____
    _____
    _____
    _____

_____
_____
_____
_____

Thank you for completing this survey. Part of the requirement for being a participating jurisdiction on the hazard mitigation plan is to actively participate in the planning process. Providing data and information fulfills the participation requirements.

An in-kind match form is also enclosed. Please track any time spent gathering data and completing this survey. Complete the in-kind match form and submit it with the survey to:

By mail: Tammy Snodgrass
MRPC
4 Industrial Drive
St. James, Mo. 65559
By FAX: (573) 265-3550
By email: tsnodgrass@meramecregion.org

HAZARD MITIGATION JURISDICTION SURVEY
_____ County

_____ School District

Please answer the following questions and submit the information to MRPC no later than _____. We need this information to complete the review and update of the _____ County Hazard Mitigation plan. If you have questions or need assistance, please contact Tammy Snodgrass at (573) 265-2993 or via email at tsnodgrass@meramecregion.org. Also enclosed is an in-kind match form. The county must provide in-kind match for this project. Please track the time you spend on this survey, complete the in-kind match form and return it with your survey. Thank you for your assistance.

List of Buildings with insurance replacement values (listed on property insurance documents):

_____
_____
_____
_____
_____
_____

Questions:

1. Are any district facilities located in the floodplain? ___ Yes ___ No
    a. Does the school carry flood insurance? ___ Yes ___ No

2. Does the school have a DARE officer or similar joint program with the local Police Department? ___ Yes ___ No Please describe:
    _____

3. What warning system(s) are in place? Sirens ___ Fire Alarms ___ Automated Phone Messages ___ Automated Text Messages ___ Public Address System ____ Please describe type(s) of system(s):
    _____
    _____
    _____
    _____
    a. Who has authority to activate warning systems?
    _____

4. What type of exercises/drills are done to prepare staff and students for emergencies? Please list and indicate frequency of drills:
    _____
    _____
    _____
    _____

_____
_____

5. What Fire Department serves the school district?
_____

   a. Does the Fire Department provide any education/awareness programs at the school?
   ___ Yes ___ No If "yes", please describe:
   _____
   _____
   _____
   _____

6. Does the district have a designated crisis planning committee responsible for reviewing and updating the emergency/crisis plan and/or coordinating drills/exercises? ___ Yes ___ No Please describe:
_____
_____
_____

7. Does the school have a designated grant writer? ___ Yes ___ No If so, who?
_____

8. Does the district have a crisis management plan in place? ___ Yes ___ No

9. Does the district participate in any state emergency planning programs such as ERIP or similar provided through the State Emergency Management Agency or Office of Homeland Security?
___ Yes ____ No If so, please list: _____

10. Does the district have *certified* tornado safe rooms? ___ Yes ___ No If yes, please list location(s):
_____
_____
_____
_____

    a. Does the district have sufficient certified tornado safe room capacity for all students and staff? ___ Yes ___ No

11. Any other programs/training relative to emergency response provided at or through the school district?
_____
_____
_____

_____
_____

12. Does the district have any other plans, policies or programs related to emergency/crisis management and/or hazard mitigation not listed above? Please describe:

_____
_____
_____
_____
_____
_____
_____

Thank you for completing this survey. Part of the requirement for being a participating jurisdiction on the hazard mitigation plan is to actively participate in the planning process. Providing data and information fulfills the participation requirements.

An in-kind match form is also enclosed. Please track any time spent gathering and/or reviewing data and completing this survey. Complete the in-kind match form and submit it with the survey to:

By mail: Tammy Snodgrass
MRPC
4 Industrial Drive
St. James, Mo. 65559
By FAX: (573) 265-3550
By email: tsnodgrass@meramecregion.org

SECOND REQUEST – PLEASE RETURN ASAP

MEMORANDUM

TO: Pulaski County Hazard Mitigation Plan Jurisdictions

FROM: Tammy Snodgrass, Assistant Director/Environmental Programs Manager, MRPC

DATE: September 4, 2015

SUBJECT: Survey to update the Pulaski County Hazard Mitigation Plan

This is a second request, the original survey was mailed in July with a return deadline of August 7, 2015. Enclosed please find a survey and in-kind match form. We are updating the Pulaski County Natural Hazards Mitigation Plan. The county, including cities and school districts, must maintain an up-to-date plan in order to be eligible for some hazard mitigation grants. These grants can be used to build certified tornado safe rooms as well as upgrade low water crossings or roadways to make them less vulnerable to flooding. The purpose of this plan is to help jurisdictions take steps before a disaster occurs to make their schools and communities less vulnerable to natural hazards such as tornadoes, flooding and winter storms.

It is very important that you complete the attached survey and return it to my office immediately. We are operating on a tight schedule. A draft of the plan document must be submitted to SEMA by October 1, 2015. We need the information to complete that draft.

Jurisdictions involved in the plan and planning process include Pulaski County, the cities located within the county and the school districts. Each jurisdiction will be asked to review and adopt the plan once it is completed. Each jurisdiction is also required to participate in the planning process. Completing and returning this survey is one way that your jurisdiction can meet this requirement.

Also enclosed is an in-kind match form. The project is funded through a grant which requires in-kind match. Any time you spend reviewing the plan, gathering and submitting information or participating in planning meetings can be considered in-kind match. Please complete the form with the survey.

The documents can be faxed to (573) 265-3550; emailed to tsnodgrass@meramecregion.org or mailed to 4 Industrial Drive, St. James, Mo. 65559. If you have any questions or concerns, please do not hesitate to contact me at (573) 265-2993 or via email at tsnodgrass@meramecregion.org. Your assistance is greatly appreciated.

TS

MEMORANDUM

TO: Pulaski County Hazard Mitigation Plan Jurisdictions

FROM: Ryan Dunwoody, Environmental Programs Specialist, MRPC

DATE: September 24, 2015

SUBJECT: Survey to update the Pulaski County Hazard Mitigation Plan

Enclosed please find a survey and in-kind match form. We are currently updating the Pulaski County Natural Hazards Mitigation Plan. The county, including cities and school districts, must maintain an up-to-date plan in order to be eligible for some hazard mitigation grants. These grants can be used to build certified tornado safe rooms as well as upgrade low water crossings or roadways to make them less vulnerable to flooding. The purpose of this plan is to help jurisdictions take steps before a disaster occurs to make their schools and communities less vulnerable to natural hazards such as tornadoes, flooding and winter storms.

It is very important that you complete the attached survey and return it to my office ASAP. We are operating on a tight schedule. A draft of the plan document must be submitted to SEMA in October. We need the information to complete that draft.

Jurisdictions involved in the plan and planning process include Pulaski County, the cities located within the county and the school districts. Each jurisdiction will be asked to review and adopt the plan once it is completed. Each jurisdiction is also required to participate in the planning process. Completing and returning this survey is one way that your jurisdiction can meet this requirement.

Also enclosed is an in-kind match form. The project is funded through a grant which requires in-kind match. Any time you spend reviewing the plan, gathering and submitting information or participating in planning meetings can be considered in-kind match. Please complete the form with the survey.

The documents can be faxed to (573) 265-3550; emailed to rdunwoody@meramecregion.org or mailed to 4 Industrial Drive, St. James, Mo. 65559.

If you have any questions or concerns, please do not hesitate to contact me at (573) 265-2993 or via email at rdunwoody@meramecregion.org. Your assistance is greatly appreciated.

Ryan Dunwoody

Enclosures

C: Completed/Deleted Mitigation Actions

Please note: Although none of the action items have been "completed", many of these activities are on-going and great strides have been made to make mitigation improvements in all of the jurisdictions.

Table 4.1 Action Status Summary

Jurisdiction	Completed Actions	Deleted Actions	Continuing Actions
Pulaski County			1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.8, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 2.1.1, 2.1.4, 2.2.1, 2.2.2, 2.2.3, 2.3.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 5.1.1, 5.1.2, 5.1.4, 5.2.1, 5.2.2, 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.1, 6.2.2, 6.3.1,
Crocker		5.1.3, 5.3.1	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.8, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.3.2, 1.3.4, 1.3.5, 2.1.1, 2.1.2, 2.1.4, 2.2.2, 2.2.3, 2.3.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.2, 3.4.3, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 5.1.1, 5.1.2, 5.1.4, 5.1.5, 5.2.1, 5.2.2, 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.1, 6.2.2, 6.3.1,
Dixon		5.1.3, 5.3.1	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.8, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.3.2, 1.3.4, 1.3.5, 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.2.2, 2.2.3, 2.3.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.2, 3.4.3, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 5.1.1, 5.1.2, 5.1.4, 5.1.5, 5.2.1, 5.2.2, 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.1, 6.2.2, 6.3.1,
Richland		5.1.3, 5.3.1	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.8, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.3.2, 1.3.4,

Jurisdiction	Completed Actions	Deleted Actions	Continuing Actions
			1.3.5, 2.1.1, 2.1.3, 2.1.4, 2.2.1, 2.2.2, 2.2.3, 2.3.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.2, 3.4.3, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 5.1.1, 5.1.2, 5.1.4, 5.1.5, 5.2.1, 5.2.2, 5.3.2, 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.1, 6.2.2, 6.3.1,
St. Robert		5.1.3, 5.3.1	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.8, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.3.2, 1.3.4, 1.3.5, 2.1.1, 2.1.3, 2.1.4, 2.2.1, 2.2.2, 2.2.3, 2.3.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.2, 3.4.3, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 5.1.1, 5.1.2, 5.1.4, 5.1.5, 5.2.1, 5.2.2, 5.3.2, 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.1, 6.2.2, 6.3.1,
Waynesville		5.1.3, 5.3.1	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.8, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 2.1.1, 2.1.3, 2.1.4, 2.2.1, 2.2.2, 2.2.3, 2.3.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.2, 3.4.3, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 5.1.1, 5.1.2, 5.1.4, 5.1.5, 5.2.1, 5.2.2, 5.3.2, 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.1, 6.2.2, 6.3.1,
Dixon R-I School District			1.1.8, 1.2.2, 1.3.5, 2.1.1, 3.3.1, 3.3.2, 4.1.1, 4.1.2, 4.1.3, 4.2.1, 5.2.1, 5.2.2, 6.1.1, 6.1.4,
Crocker R-II School District			1.1.8, 1.2.2, 1.3.5, 2.1.1, 2.1.3, 3.3.1, 3.3.2, 4.1.1, 4.1.2, 4.1.3, 4.2.1, 5.2.1, 5.2.2, 6.1.1, 6.1.4,
Swedeborg R-III School District			1.1.8, 1.2.2, 1.3.5, 2.1.1, 3.3.1, 3.3.2, 4.1.1, 4.1.2, 4.1.3, 4.2.1, 5.2.1, 5.2.2, 6.1.1, 6.1.4,
Richland R-IV School District			1.1.8, 1.2.2, 1.3.5, 2.1.1, 3.3.1, 3.3.2, 4.1.1, 4.1.2, 4.1.3, 4.2.1, 5.2.1, 5.2.2,

Jurisdiction	Completed Actions	Deleted Actions	Continuing Actions
			6.1.1, 6.1.4,
Laquey R-V School District			1.1.8, 1.2.2, 1.3.5, 2.1.1, 3.3.1, 3.3.2, 4.1.1, 4.1.2, 4.1.3, 4.2.1, 5.2.1, 5.2.2, 6.1.1, 6.1.4,
Waynesville R-VI School District			1.1.8, 1.2.2, 1.3.5, 2.1.1, 3.3.1, 3.3.2, 4.1.1, 4.1.2, 4.1.3, 4.2.1, 5.2.1, 5.2.2, 6.1.1, 6.1.4,

Action 5.1.3: Encourage all communities to develop storm water management plans.

Action Worksheet	
Name of Jurisdiction:	Crocker, Dixon, Richland, St. Robert, Waynesville,
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with non-existent storm water management plans
Hazard(s) Addressed:	Flood, Severe Weather
Action or Project	
Action/Project Number:	5.1.3
Name of Action or Project:	Encourage all communities to develop storm water management plans.
Action or Project Description:	Encourage all communities/jurisdictions to develop storm water management plans.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	$800 - $1,800
Benefits:	Losses avoided by implementing this action include property damages.
Plan for Implementation	
Responsible Organization/Department:	Local Planners, Local Governments
Action/Project Priority:	10 - L
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Deleted. Three of five communities have storm water ordinances in place. Crocker and Dixon do not currently have the resources to institute or enforce storm water ordinances or plans and this action received a "Low" priority rating.
Report of Progress	Richland, St. Robert and Waynesville have storm water ordinances in place.

Action 5.3.1: Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.

Action Worksheet	
Name of Jurisdiction:	Pulaski County, Richland, St. Robert, Waynesville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.3.1
Name of Action or Project:	Government purchase of properties in the floodplain
Action or Project Description:	Encourage local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include property damage, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Local Government, County & City EMDs, Floodplain Managers
Action/Project Priority:	11 - L
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	N/A
Progress Report	
Action Status	Deleted. This action received a “Low” priority rating and was removed from the list of actions.
Report of Progress	N/A

D: Adoption Resolutions

Adoption resolutions have been mailed out to the jurisdictions and will be included in the final draft submitted to FEMA.

RESOLUTION NO. 1-11-16

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, Pulaski County recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, Pulaski County fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the Pulaski County Commission desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body for Pulaski County demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the Pulaski County Commission adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Presiding Commissioner
Gene Newkirk — January 11, 2016
Date

Associate Commissioner
Lynn Sharp — January 11, 2016
Date

Associate Commissioner
Rick Zweerink — January 11, 2016
Date

RESOLUTION NO. 2015-1

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the City of Crocker recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the City of Crocker fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Crocker desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Crocker demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the City of Crocker Board of Aldermen adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Mayor — Date: 12-15-15

Witness — Date: 12-15-15

RESOLUTION NO. 548

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the City of Dixon recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the City of Dixon fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Dixon desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Dixon demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the City of Dixon Board of Aldermen adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Mayor — Date: 1-11-16

Witness — Date: 1-11-16

RESOLUTION 932

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the City of Richland recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

WHEREAS, the City of Richland fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Richland desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Richland demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW THEREFORE, BE IT RESOLVED, that the City of Richland Board of Aldermen adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

ADOPTED this 15th day of December, 2015 at the meeting of the City Council.

BY: _____ 12-15-15
Eldon Haun, Mayor — Date

ATTEST: Susan Alexander 12-15-15
Susan Alexander, City Clerk — Date

RESOLUTION NO. 16-001

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the City of St. Robert recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the City of St. Robert fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of St. Robert desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of St. Robert demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the City of St. Robert Board of Aldermen adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Mayor — Date: 1-5-16

Witness: Chris H. Pigg — Date: 1-5-16

RESOLUTION NO. 2015-008

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the City of Waynesville recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the City of Waynesville fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Waynesville desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Waynesville demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the City of Waynesville City Council adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Mayor Luge Hardman — Date 12-17-15

Witness Carol Welch City Clerk — Date 12-17-15

RESOLUTION NO. _____

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Crocker R-II School District recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the Crocker R-II School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the Crocker R-II School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the Crocker R-II School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the Crocker R-II Schools Board of Education adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Robert A. Goodwin — School Board President — Date 1/26/16

Stephanie J. Knudson — Witness — Date 1/26/16

RESOLUTION NO. 2015-01

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Dixon R-I School District recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the Dixon R-I School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the Dixon R-I School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the Dixon R-I School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the Dixon R-I Schools Board of Education adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Jay R Porter
School Board President

12-17-2015
Date

Witness

12-17-2015
Date

RESOLUTION NO. _____

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Laquey R-V School District recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the Laquey R-V School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the Laquey R-V School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the Laquey R-V School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the Laquey R-V Schools Board of Education adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Margaret Hays — School Board President — 12-15-15 — Date

Dr. Randy Coffey — Witness — 12-15-15 — Date

RESOLUTION NO. 2015-01

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Richland R-IV School District recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the Richland R-IV School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the Richland R-IV School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the Richland R-IV School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the Richland R-IV School Board of Education adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Jerry Pemberton
School Board President

12-21-15
Date

Rita York
Witness

12-21-15
Date

RESOLUTION NO. 2015-1

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Swedeborg R-III School District recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the Swedeborg R-III School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the Swedeborg R-III School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the Swedeborg R-III School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the Swedeborg R-III Schools Board of Education adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

School Board President — Date: 17 Dec 2015

Witness: Chris Black — Date: 12-17-15

RESOLUTION NO. 2015-01

A RESOLUTION TO ADOPT THE PULASKI COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Waynesville R-VI School District recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

WHEREAS, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

WHEREAS, the Waynesville R-VI School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the Waynesville R-VI School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Pulaski County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the Waynesville R-VI School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

WHEREAS, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

NOW, THEREFORE BE IT RESOLVED, that the Waynesville R-VI Schools Board of Education adopts the Pulaski County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

School Board President — Date: December 14, 2015

Witness — Date: 12-14-15

E: Critical/Essential Facilities

The table below (**Table 6.1**) provides information for critical facilities in the planning area. Specific information includes a Hazus ID if applicable, jurisdiction, building name/owner, and address.

Table 6.1 Pulaski County Critical Facilities by Type and Jurisdiction

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
Fire Department Facilities						
MO000551	Crocker	Crocker Fire Protection Dist. Bldg. 1	201 Keeth Rd	Crocker	MO	65452
	Crocker	Crocker Fire Protection Dist. Bldg. 2	111 10th St	Crocker	MO	65452
	Crocker	Crocker Fire Protection Dist. Bldg. 3	17180 Hwy T	Swedeborg	MO	65572
	Crocker	Crocker Fire Protection Dist. Bldg. 4	13572 Hwy BB	Crocker	MO	65452
MO000552	Dixon	Dixon Rural Fire Protection Dist.	203 S Walnut St	Dixon	MO	65459
MO000557	Richland	Tri-County Fire & Rescue Association	111 W Washington Ave	Richland	MO	65556
MO000553	St. Robert	Waynesville Rural Fire Prot. Dist. #3	20965 Hwy 28	St. Robert	MO	65584
MO000554	St. Robert	St. Robert City Fire & Rescue Bldg. 1	117 Plattner Ave	St. Robert	MO	65584
	St. Robert	St. Robert City Fire & Rescue Bldg. 2	116 Foxworth St	St. Robert	MO	65584
MO000556	Waynesville	Waynesville Rural Fire Prot. Dist. #1	1501 Ousley Rd	Waynesville	MO	65583
MO000558	Waynesville	Waynesville Rural Fire Prot. Dist. #2	25730 Red Oak Rd	Waynesville	MO	65583
	Waynesville	Waynesville Rural Fire Prot. Bldg. 4	20854 Hwy T	Waynesville	MO	65583
Law Enforcement Facilities						
MO000088	Crocker	Crocker Police Dept.	108 S Commercial St	Crocker	MO	65452
MO000385	Dixon	Dixon Police Dept.	303 S Elm St.	Dixon	MO	65459
MO000254	Richland	Richland Police Dept.	201 S Chestnut	Richland	MO	65556
MO000140	St. Robert	St. Robert Police Dept.	194 Eastlawn Ave	St. Robert	MO	65584
MO000225	Waynesville	Waynesville Police Dept.	201 North St	Waynesville	MO	65583
MO000368	Pulaski County	Pulaski County Sheriff	301 Historic 66 E	Waynesville	MO	65583

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
School Facilities						
MO002225	Crocker	Crocker Elem	601 N Commercial	Crocker	MO	65452
MO002226	Crocker	Crocker High	601 N Commercial	Crocker	MO	65452
MO002227	Dixon	Dixon Elem	N Pine & W Sixth	Dixon	MO	65459
MO002228	Dixon	Dixon Middle	Hwy 28 East	Dixon	MO	65459
MO002229	Dixon	Dixon High	High School Dr	Dixon	MO	65459
MO002230	Laquey	Laquey R-V Elem.	27600 Hwy AA	Laquey	MO	65534
MO002231	Laquey	Laquey R-V High	27601 Hwy AA	Laquey	MO	65534
MO002232	Laquey	Laquey R-V Middle	27602 Hwy AA	Laquey	MO	65534
MO000913	Richland	Richland Elem.	714 E Jefferson	Richland	MO	65556
MO000914	Richland	Richland High/Jr. High	715 E Jefferson	Richland	MO	65556
MO000916	Richland	Swedeborg Elem.	17507 Hwy T	Richland	MO	65556
	St. Robert	Freedom Elem.	286 Eastlawn Ave.	St. Robert	MO	65584
MO001142	Waynesville	Waynesville East Elem.	1501 State Rd F	Waynesville	MO	65583
MO001143	Waynesville	Waynesville Sr. High	200 GW Lane	Waynesville	MO	65583
MO001144	Waynesville	Waynesville Sixth Grade Center	810 Roosevelt St	Waynesville	MO	65583
MO001145	Waynesville	Waynesville Middle	1001 Historic 66 W	Waynesville	MO	65583
	Waynesville	Waynesville Career Center	400 GW Lane	Waynesville	MO	65583
Medical Facilities						
	Crocker	Pulaski County Health Dept.	101 12 St	Crocker	MO	65452
	Dixon	Rural Health Clinic	206 West Second	Dixon	MO	65459
	Richland	Central Ozarks Medical Center	304 W Washington St	Richland	MO	65556
	Richland	St. John's Clinic Richland	904 S Pine St	Richland	MO	65556
	St. Robert	St. John's Clinic St. Robert	608 City Route 66	St. Robert	MO	65584
	Waynesville	Pulaski Medical Clinic	107 Ichord Ave	Waynesville	MO	65583
Childcare Facilities						
	Crocker	Crocker Academy Inc.	324 S Commercial St.	Crocker	MO	65452
	Crocker	Proctor, Florence Marie	13895 Belle Rd	Crocker	MO	65452

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
Childcare Facilities						
	Dixon	Henson, Karen	301 N High St	Dixon	MO	65459
	Dixon	Dixon Head Start Center	306 N Lang	Dixon	MO	65459
	Dixon	Yoakum, Shelly	309 N Elm St	Dixon	MO	65459
	Richland	Richland Head Start Center	306 S Pine	Richland	MO	65556
	Richland	The Training Station Learning Center LLC	111 E Camden St	Richland	MO	65556
	St. Robert	Sampay, Connie	24356 Tanglewood Rd	St. Robert	MO	65584
	St. Robert	Candyland	106 Bosa	St. Robert	MO	65584
	St. Robert	Victorious Ministries Christian Academy	219 E Lawn	St. Robert	MO	65584
	St. Robert	Williams, Teresa	108 Meadow Ln	St. Robert	MO	65584
	St. Robert	Wee Wonders Child Devel. Center of St. Robert	605 Y Hwy	St. Robert	MO	65584
	St. Robert	McGaughy, Cindi Ellen	21065 Hemingway Ln	St. Robert	MO	65584
	St. Robert	Bright and Morning Star Childcare	21325 Hwy Y	St. Robert	MO	65584
	Waynesville	Precious Jewels Christian Childcare LLC	704 W Historic Rte. 66	Waynesville	MO	65583
	Waynesville	Westside Baptist Preschool	801 Historic Rte. 66 W	Waynesville	MO	65583
	Waynesville	Wee Wonders Child Devel. Center of Waynesville	1702 Long Dr	Waynesville	MO	65583
	Waynesville	Munchkinland	1809-A Historic Rte. 66 W	Waynesville	MO	65583
	Waynesville	Waynesville Head Start	19778 Sackett Ln	Waynesville	MO	65583
	Waynesville	Storie, Melissa Ann	20305 Sedalia Rd	Waynesville	MO	65583
	Waynesville	Hill, Latoya	22989 Reward	Waynesville	MO	65583
	Waynesville	O'Donnell, Jennifer	20950 Hwy T	Waynesville	MO	65583
Nursing Homes						
	Dixon	Dixon Nursing & Rehab	403 E 10th St	Dixon	MO	65459
	Richland	Richland Care Center, Inc.	400 Tri-County Lane	Richland	MO	65556
	St. Robert	Sunset Village of The Ozarks, INC	14275 Hwy Z	St. Robert	MO	65584
	Waynesville	Pulaski County Adult Daycare	704 Historic Route 66, Suite 102	Waynesville	MO	65583
	Waynesville	Life Care Center of Waynesville	700 Birch Lane	Waynesville	MO	65583

Source: 2014 Meramec Region Community Data Mining for Hazard Mitigation Planning, ArcGIS: Streets