2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan

Prepared by:

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CONTRIBUTORS

Benton County Hazard Mitigation Planning Committee

Jurisdictional Representatives

Name	Title	Department	Jurisdiction/Agency/ Organization
Steve Daleske	Presiding Commissioner	County Government	Benton County Commissioners
Scott Harms	Northern Commissioner	County Government	Benton County Commissioners
Larry Berry	Southern Commissioner	County Government	Benton County Commissioners
Mark Richerson	Emergency Management Director	Emergency Services	Benton County Emergency Management Agency
Randy Pogue	City Administrator & Planner	Government	City of Warsaw
William Smart	Mayor	Government	Village of Ionia
John King	Mayor	Government	City of Lincoln
Jeff Canfield	Police Chief	Emergency Services	City of Cole Camp
Steve Hubbard	Superintendent	Education	Cole Camp R-I School District
David Fajen	School Resource Officer	Education	Warsaw R-IX School District
Kevin Smith	Superintendent	Education	Lincoln R-II School District

Stakeholder Representatives

Name	Title	Department	Jurisdiction/Agency/Organization
Jo Ann Lane	Economic Developer	County Government	Benton County Economic Development/KBRPC
Dillon Harness	Disaster Recovery Coordinator	N/A	KBRPC
Ami Dieckman	City Clerk	Government	City of Cole Camp
Jessica Kendall	City Clerk	Government	City of Warsaw
Loyce Smart	Village Clerk	Government	Village of Ionia
Eddie Simons	Mayor	Government	City of Warsaw
Sean McCannon	Police Chief	Emergency Services	City of Warsaw
Scott Gardner	City Attorney	Government	City of Cole Camp
Amie Breshears	CES	MU Extension	University of Missouri Extension; Benton County

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EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Benton County and participating jurisdictions and school districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses from hazard events to the County and its communities and school districts. The new plan is an update of the previous hazard mitigation plan that was approved on 7 October 2016. The plan and the update were prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 and to ensure eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant Programs for specifically outlined projects that could be funded through this grant.

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

- **Unincorporated Benton County**
- **City of Cole Camp**
- **Village of Ionia**
- **City of Lincoln**
- **City of Warsaw**
- **Cole Camp R-I School District**
- **Lincoln R-II School District**
- **Warsaw R-IX School District**

Benton County and the entities listed above developed a Multi-Jurisdictional Hazard Mitigation Plan that was approved by FEMA on 7 October 2016 (hereafter referred to as the *2016 Hazard Mitigation Plan*). This current planning effort serves to update that previously approved plan.

The plan update process followed a methodology in accordance with FEMA guidance, which began with the formation of a Mitigation Planning Committee (MPC) comprised of representatives from Benton County and participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to Benton County and analyzed jurisdictional vulnerability to these hazards. The MPC also examined the capabilities in place to mitigate the hazard damages, 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/lightning/high winds, and tornadoes are among the hazards that historically have had a significant impact.

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

1. ***Protect the lives and livelihood of all citizens.***
2. ***Mitigate the effects of future natural hazards in the community.***
3. ***Reinforce communication and awareness to coordinate participation between public agencies, citizens, nonprofit organizations, business and industry.***
4. ***Update written policies and procedures for preparedness and mitigation responses to natural disasters.***

To advance the identified goals, the MPC developed recommended mitigation actions, as summarized in the table on the following pages. The MPC developed an implementation plan for each action, which identifies priority level, background information, ideas for implementation, responsible agency, timeline, cost estimate, potential funding sources, and more. These additional details are provided in Chapter 4.

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/special districts. The documentation of each adoption is included in **Appendix D**, and a model resolution is included on the following page.

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

- **City of Cole Camp**
- **Village of Ionia**
- **City of Lincoln**
- **City of Warsaw**
- **Cole Camp R-I School District**
- **Lincoln R-II School District**
- **Warsaw R-IX School District**
- **Unincorporated Benton County**

Model Resolution

(*LOCAL GOVERNING BODY/SCHOOL DISTRICT*), Missouri RESOLUTION NO. _____

A RESOLUTION OF THE (*LOCAL GOVERNING BODY /SCHOOL DISTRICT*) ADOPTING THE 2021 BENTON COUNTY NATURAL HAZARD MITIGATION PLAN

WHEREAS the (*local governing body/school district*) recognizes the threat that natural hazards pose to people and property within the (local governing body/school district); and

WHEREAS the (*local governing body/school district*) has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the 2021 Benton County Natural Hazard Mitigation Plan, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the *(local governing body/school district*) from the impacts of future hazards and disasters; and

WHEREAS the (*local governing body*) recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the (*local governing body/school district*) will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the (*local governing body/school district*) demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE (*LOCAL GOVERNMENT/SCHOOL DISTRICT*), in the State of Missouri, THAT:

In accordance with (*local rule for adopting resolutions*), the (*local governing body/school district*) adopts the final *FEMA-approved Plan*.

ADOPTED by a vote of _____ in favor and ___ against, and __ abstaining, this _____ day of _____, _____.

By (Sig): _____
Print name: _____

ATTEST:
By (Sig.): _____
Print name: _____

APPROVED AS TO FORM:
By (Sig.): _____
Print name: _____

1 INTRODUCTION AND PLANNING PROCESS

1.1 PURPOSE

Hazard mitigation is the meticulous process of preparing for and reducing the long-term risks of potential disasters and manmade events that may impact a given community. Mitigation may be implemented at any time, whether before, during or after a disaster event. The best mitigation actions are usually those that are composed into a long-term planning process developed before the next big disaster event.

The Benton County Natural Hazard Mitigation Plan is intended to be a key resource for the County, local governments, residents, planners, politicians and anyone else that has an interest in mitigation of natural hazards throughout Benton County. Participation in the planning process is mandatory in order to secure vital federal funding in the aftermath of a disaster. If a community chooses not to participate, they are at a loss for key funding to help prepare for the next disaster. School districts are also under this umbrella, and as long as they submit the necessary paperwork to participate, they will be eligible for FEMA funding should they apply. Participation opens up opportunities not only for basic hazard mitigation funding, but also HMGP-post Fire grants, Dam Rehabilitation grants, and the newly minted Building Resilient Infrastructure and Communities grant. Participation is also governed by one key piece of legislation, The Disaster Mitigation Act of 2000, but is also verified by the Interim Final Rule published in the *Federal Register* on 26 February 2002 (44 CFR §201.6) that was finalized on 31 October 2007. Policies governing local hazard mitigation plans is outlined more thoroughly in the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

1.2 BACKGROUND AND SCOPE

Under the initiative set forth by SEMA, the Missouri Association of Councils of Government (MACOG) agreed to meet the challenge of developing county and municipal plans throughout the state. The 19 Regional Planning Commissions of MACOG provide an effective way for local governments to work together to share technical staff and address common problems in need of an area-wide approach. They also can effectively deliver programs that might be beyond the resources of an individual county or municipal government.

The intent of the Regional Planning Commission in Missouri is to be of service to their member counties and municipalities and to be an organized approach to address a broad cross section of area-wide issues. They are also available to assist their member entities in coordinating the needs of the area with state and federal agencies or with private companies or other public bodies. SEMA's initiative further states that, due to time and funding limitations, the plans developed by Missouri's Regional Planning Commission should cover natural hazards only. Manmade, technological, or other hazards are not addressed by this plan, except in the context of cascading events.
As required by **44 CFR §201.6(d)(3)** a local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts and changes in priorities. It must be resubmitted every 5 years in order to continue to be eligible for mitigation grant funding projects. The 2021 Benton County Multi-Jurisdictional Natural Hazard Mitigation Plan, herein referred to the Benton County Natural Hazard Mitigation Plan, is an update to a previous plan, one originally approved on 7 October 2016 that was an update to a plan originally composed before that in 2010.

Through the scope of work outlined by SEMA, Benton County contracts with Kaysinger Basin Regional Planning Commission and participates fully in the preparation of the plan. Once the plan is approved, Benton County and communities within the county as well as school districts in the county as well. It will enable those key stakeholders to be eligible for FEMA mitigation assistance and carry out mitigation activities to reduce the impacts of disasters.

The Benton County Natural Hazard Mitigation Plan was prepared by Kaysinger Basin Regional Planning Commission (KBRPC). KBRPC is a member of MACOG and was created 14 October 1968 by then Governor of Missouri Warren E. Hearnes. KBRPC also serves six other counties including Bates, Cedar, Henry, Hickory, St. Clair and Vernon.

The Benton County Natural Hazard Mitigation Plan is a significant rewrite of the previously approved plan that was done in 2016. Commitment by local governments assists in mitigating the impacts of natural hazards. Below is a list of previously and currently participating jurisdictions/school districts.

2010 NHMP Update	2015 NHMP Update	2021 NHMP Update
Benton County Commissioners	Benton County Commissioners	Benton County Commissioners
City of Cole Camp	City of Cole Camp	City of Cole Camp
City of Lincoln	City of Lincoln	City of Lincoln
City of Warsaw	City of Warsaw	City of Warsaw
Village of Ionia **DID NOT PARTICIPATE**	Village of Ionia	Village of Ionia
Cole Camp R-I School District	Cole Camp R-I School District	Cole Camp R-I School District
Lincoln R-II School District	Lincoln R-II School District	Lincoln R-II School District
Warsaw R-IX School District	Warsaw R-IX School District	Warsaw R-IX School District

1.3 PLAN ORGANIZATION

This plan update is divided into six different sections, five main chapters plus appendices.

- 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

Table 1.1. Changes Made in Plan Update

Plan Section	Summary of Updates
Chapter 1 - Introduction and Planning Process	Updated members of the Mitigation Planning Committee (MPC) and participating jurisdictions formally adopted the MPC.
Chapter 2 - Planning Area Profile and Capabilities	Noted new GIS capabilities for participating jurisdictions.
Chapter 3 - Risk Assessment	Included the additional section of Pandemics to this section as this plan was written during a global pandemic.
Chapter 4 - Mitigation Strategy	Featured new projects in Benton County for each community or school district that could be funded through HMGP or local means
Chapter 5 - Plan Implementation and Maintenance	Updated MPC meetings for evaluating and updating the plan to quarterly.

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.

Kaysinger Basin Regional Planning Commission (KBRPC) in Clinton, Missouri was contracted to facilitate the plan development process. KBRPC staff met with the Jurisdictions in Benton County to develop area stakeholders and representatives for each jurisdiction to establish the Mitigation Planning Committee (MPC). Meeting locations and schedules and the most effective means to inform and include the public was determined.

The planning process includes a kick-off meeting, one MPC-only meeting, and meetings with each jurisdiction one-on-one. KBRPC was responsible for producing the draft and final plan update in a FEMA-approvable document, as well as coordinating with FEMA and SEMA.

Table 1.2 shows all the MPC members and the entities they represent, along with their titles[1(a) and 2(a)]. All participating jurisdictions of Benton County, including school districts, are represented on the MPC, whether it's by direct or indirect participation. If indirect participation is used, set forth the parameters established for ensuring that the jurisdiction represented is kept apprised of MPC events and milestones. Active participation in the plan development effort is of paramount importance. The Mitigation Planning Committee is currently pending; it must be approved before it can be formally recognized.

Table 1.2. Jurisdictional Representatives of Benton County Mitigation Planning Committee

Name	Title	Department	Jurisdiction/Agency /Organization
Steve Daleske	Presiding Commissioner	County Government	Benton County Board of Commissioners
Scott Harms	Northern Commissioner	County Government	Benton County Board of Commissioners
Larry Berry	Southern Commissioner	County Government	Benton County Board of Commissioners
Mark Richerson	Emergency Management Director	Emergency Services	Benton County Emergency Management Agency
Randy Pogue	City Administrator & Planner	Government	City of Warsaw
William Smart	Mayor	Government	Village of Ionia
John King	Mayor	Government	City of Lincoln
Jeff Canfield	Chief of Police	Emergency Services	City of Cole Camp
Steve Hubbard	Superintendent	Education	Cole Camp R-I School District
Kevin Smith	Superintendent	Education	Lincoln R-II School District
David Fajen	School Resource Officer	Education	Warsaw R-IX School District

Table 1.3. Capability with Six Mitigation Categories[1(b)]

Community Department/Office	Preventive Measures	Structure and Infrastructure Projects		Natural Resource Protection	Public Information	Emergency Services
		Property Protection	Structural Flood Control Projects			
Benton County EMA	X	X	X	X	X	X
Benton County ED	-	-	-	-	X	-
City of Warsaw	X	X	X	X	X	X
Village of Ionia	X	X	X	X	X	X
City of Cole Camp	X	X	X	X	X	X
City of Lincoln	X	X	X	X	X	X
Cole Camp R-I	-	-	-	-	X	-
Lincoln R-II	-	-	-	-	X	-
Warsaw R-IX	-	-	-	-	X	-

1.4.1 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.

The Benton County Hazard Mitigation Plan serves as a written document of the planning process. Active participation of local jurisdiction representatives and stakeholders in the Hazard Mitigation planning process is crucial for the plan to have worthiness. The Benton County Hazard Mitigation Plan was written to be a working document to guide participating jurisdictions in the county in the work of mitigating hazards and risks to their communities. In order to be eligible for mitigation funding, local governments must adopt the FEMA approved plan update. Participation is the most vital key to implementation of the plan and the governing bodies must adopt it in order to be considered a participant. KBRPC collaborated with the key stakeholders in Benton County, including local governments, school districts in the county to ensure that they would participate and adopt the newly minted FEMA-approved plan. In the event of drastic modifications are merited to the plan, then a re-adoption measure may be proposed by the jurisdiction.

Unfortunately, this plan update came during the time of a global pandemic, so full in-person meetings were not held for the entire county of Benton, so instead, virtual meetings and smaller individual meetings were held in order to meet the requirements for meetings. Further, during these meetings with stakeholders, the emphasis on the importance of participation was stressed, and an outline was provided for how to participate was elaborated on.

1) Provide information to support the plan update through the following methods:

    a) Completion of data collection questionnaires

    b) Attending countywide planning meeting

    c) Communicate with KBRPC with questions, comments, or concerns regarding participation in the plan update

2) Formal adoption of the plan update.

Table 1.4 provides a representation of those whom were at each meeting, whether they completed a data collection questionnaire and their status on updating or developing mitigation actions for their individual community.

Table 1.4. Jurisdictional Participation in Planning Process

Jurisdiction	Meeting with KBRPC	Data Collection Questionnaire Response	Countywide Meeting	Formal Adoption of FEMA Approved Plan
City of Cole Camp	✓	✓	X[1]	Yes
Cole Camp R-I School District	✓	✓	✓	Yes
Village of Ionia	✓	✓	✓	Yes
City of Lincoln	✓	✓	✓	Yes
Lincoln R-II School District	✓	✓	✓	Yes
City of Warsaw	✓	✓	✓	Yes
Warsaw R-IX School District	✓	✓	✓	Yes
Unincorporated Benton County	✓	✓	✓	Yes

[1] No one from Cole Camp, aside from the school, attended the May countywide meeting, however, a 1-on-1 meeting with a representative from Cole Camp was held after the Countywide meeting to ensure Cole Camp met all participation requirements by completing Action Worksheets and STAPLEEs.

1.4.2 The Planning Steps

Table 1.5. Benton County Mitigation 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)(1)
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)(ii); and 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, and 4)

During the meeting with the emergency management director for Benton County on February 18th, it was noted that there is a Local Emergency Planning Committee, or LEPC, already formed for the county. However, a proposed MPC was established to include the Benton County Board of Commissioners.

Table 1.6. Schedule of MPC Meetings

Meeting	Topic	Date
Informational Meeting	Met with the Emergency Management Director for Benton County, formal introductions and discussions regarding the plan and future meetings.	18 Feb. 2021
Kick-off Meeting	First countywide meeting held was held with all key stakeholders, including Emergency Management, schools, and community representatives and officials. Community and School representatives worked on Action Worksheets and STAPLEEs at this time.	27 May 2021
Community Meeting	Met with the city administrator to gain interest in Hazard Mitigation and discuss the city's role in the plan update ⇨ **City of Warsaw**	18 Feb. 2021
Community Meeting	Met with the Superintendent to gain interest in hazard mitigation and discuss district's role in plan update. ⇨ **Warsaw R-IX School District**	3 Mar. 2021
Community Meeting	Met with the mayor to gain interest in Hazard Mitigation and encourage the participation in the plan update. ⇨ **Village of Ionia**	4 Mar. 2021
Community Meeting	Met with the Superintendent to gain interest in hazard mitigation and discuss district's role in plan update. ⇨ **Cole Camp R-I School District**	4 Mar. 2021
Community Meeting	Met with the mayor and city clerk to gain interest in Hazard Mitigation and encourage participation in plan update. ⇨ **City of Lincoln**	10 Mar. 2021
Community Meeting	Met with the city clerk and city administrator to gain interest in Hazard Mitigation and encourage participation in plan update. ⇨ **Lincoln R-II School District**	10 Mar. 2021
Community Meeting	Met with the Superintendent to gain interest in hazard mitigation and discuss district's role in plan update. ⇨ **City of Cole Camp**	17 Mar. 2021

Step 2: Plan for Public Involvement *2(a), (b), (c) and (d)*

(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.

At a minimum, the planning process included 2 opportunities for public comment: 1) during the drafting stage and 2) prior to plan approval.

- The first opportunity for public comment regarding this plan started June 1st, 2021 and lasted for a month, overlapping with the time that was used to send the first full draft to SEMA.

- A sixty-day comment period for this plan ran on KBRPC's website just before the plan went to SEMA, first while SEMA reviewed the first draft, then second when the second draft was completed just before the final draft was sent to SEMA.
    - No citizen feedback was received other than some comments from public officials.

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.

During the planning process, stakeholders were given the opportunity to be involved[3(b)]. Stakeholders included the following:

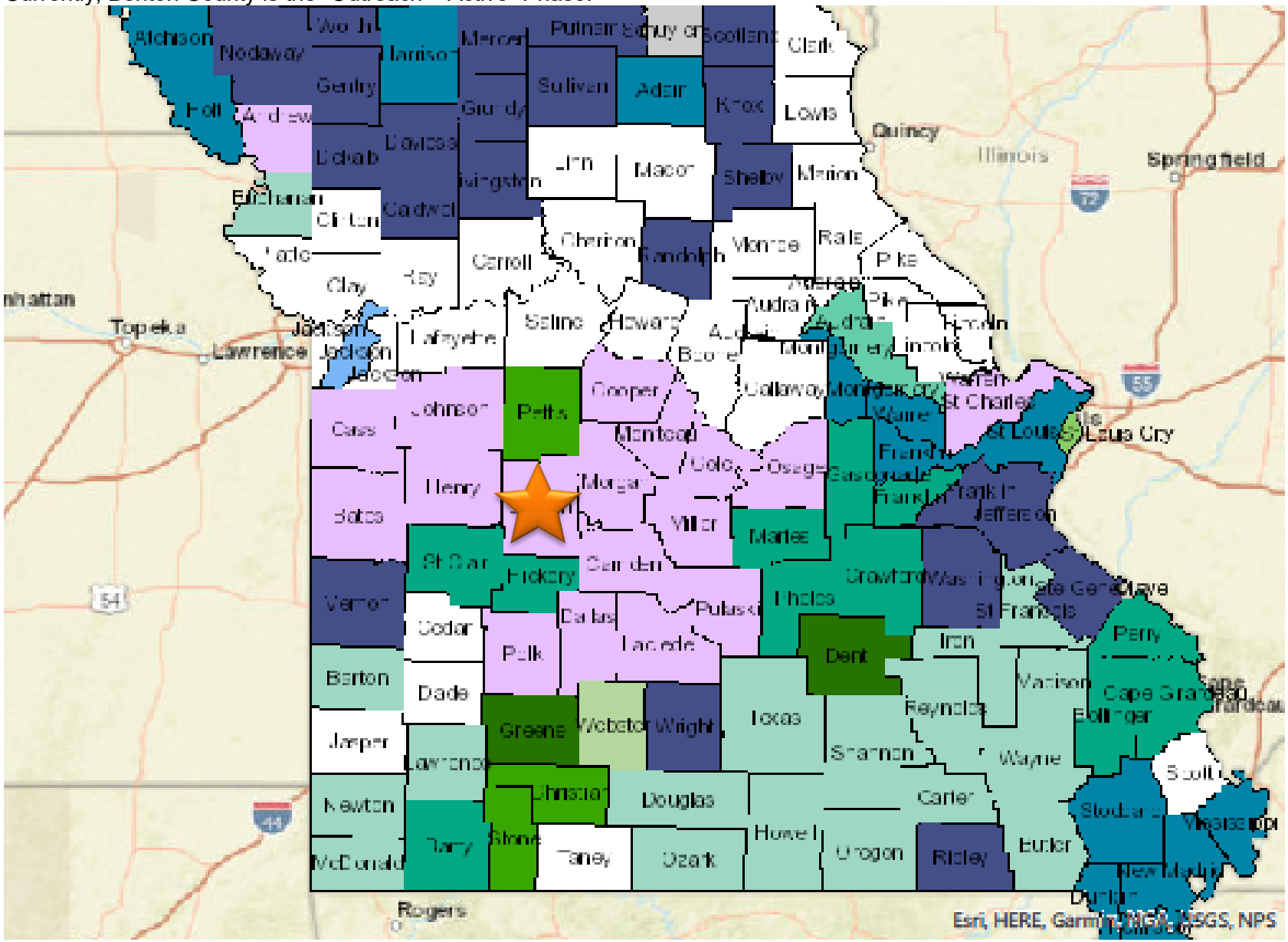
- All four incorporated communities of Benton County
- Benton County Local Emergency Planning Committee
- Local businesses
- All three major school districts (Cole Camp, Lincoln and Warsaw)
- Other private and non-profit interests

For the countywide meeting, attempts to involve members from the Army Corps of Engineers due to their role in regulating and maintaining the Harry S. Truman Dam was made, but were unsuccessful.

- Invitations to participate in the countywide meeting went out on April 29th, 2021 to all known representatives of the community, school districts and other key personnel.
- The letter that was used in the invitation is included in **Appendix B**.

Coordination with FEMA Risk MAP Project[3(a)]

- According to FEMA, the most recent Risk MAP project product for Benton County is recent, having been updated in 2019. Currently, Benton County is the “Outreach – Active” Phase.



Integration of Other Data, Reports, Studies, and Plans

- Nearly every stakeholder from each community and school district attended the planning meeting in May 2021, which served as the best opportunity to collaborate and brainstorm ideas as a community. Data from this meeting is sprinkled throughout this plan.
- Previous technical reports and historic data analyzed the past events of Benton County and provided a glimpse of what was to come in the future. Documents included the mitigation plans of the state and adjacent counties, reports from university extensions, Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), State Department of Natural Resources (DNR) dam information, the National Inventory of Dams (NID), dam inspection reports, state fire reports, Wildland/Urban Interface and Intermix areas from the SILVIS Lab - Department of Forest Ecology and Management - University of Wisconsin, local comprehensive plans, economic development plans, capital improvement plans, US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics, and local budgets.
- Using information presented from sources, such as the ones listed above, this data was incorporated into the plan because it was relevant to Benton County, had the information been for somewhere else and did not apply to Benton County, it would have been omitted. It allowed readers and reviewers alike to see what information was prevalent in the county besides what had been done locally.

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

- For the bulk of the planning process, much time was dedicated to the risk assessment chapter, chapter 3, because this section was data intensive and relied on information from varying outside sources.
- It was imperative that the information collected was accurate and true, so relying on word of mouth without credible information would not be included.
- Chapter 3 also saw the addition of a new section for this plan update, the inclusion of a 'Pandemic' section, as the plan was written during the time of a global pandemic caused by COVID-19.

Step 5: Assess the Problem: Identify Assets and Estimate Losses
(Handbook Task 5)

- For this particular section, much of the information and data collected comes from the data collection questionnaire assigned to communities and school districts.
- While some communities have this information readily available as it is part of the community's insurance policy, places like Warsaw have a more extensive list of properties and their values. This would take longer and not be ideal.
- Furthermore, for school districts in Benton County, this process was much easier.
    - School districts do not possess as many buildings and critical infrastructures as say a community would.
    - Their school insurances provided the content values and exposure values.
- This information is included at the start of the risk assessment chapter.

Step 6: Set Goals
(Handbook Task 6)

During the countywide meeting held in May 2021, stakeholders from the communities in Benton County, as well as the School Districts, had their best opportunity to review the Goals outlined in the 2016 version of the plan. One suggestion from the group that gathered was the simplification of the goals from six to four. All agreed this would make the process much easier to accomplish whilst sticking to the SMART goal requirements. These new goals are seen in the beginning of the plan as well as in Chapter 4 – Mitigation Strategy.

Step 7: Review Possible Mitigation Actions and Activities
(Handbook Task 6)

- During the large countywide meeting on May 27th, there was a thorough review of the last plan and the stakeholders identified their completed mitigation actions.
- The results of this is found in Chapter 4 – Mitigation Strategy.
- It was at this time that the number of goals was reduced from 6 in 2016 to now a 4 goal approach for 2021 and beyond.
- Further remarking on the countywide meeting, it was the role of the KBRPC Disaster Recovery Coordinator to demonstrate the Action Worksheet and STAPLEE process.
    - Key stakeholders were given step by step instructions for how to fill out the Action Worksheet and STAPLEE.
    - Examples were provided for the communities and the school districts.

Step 8: Draft an Action Plan
(Handbook Task 6)

The action worksheets, including the plan for implementation, submitted by each jurisdiction for the updated Mitigation Strategy are included in Chapter 4, these helped create an action plan for Benton County.

Step 9: Adopt the Plan
(Handbook Task 8)

Pursuant to requirement laid out in the Handbook for adoption this plan, the process was straightforward and explained to stakeholders in each community and school district that adoption resolutions were a requirement for the plan to go forward. Communities and school districts each adopted the plan at different times but all did so timely and unanimously. A school district or community could not adopt the plan without responding to the data collection questionnaire first. Adoption Resolutions are included in Appendix D.

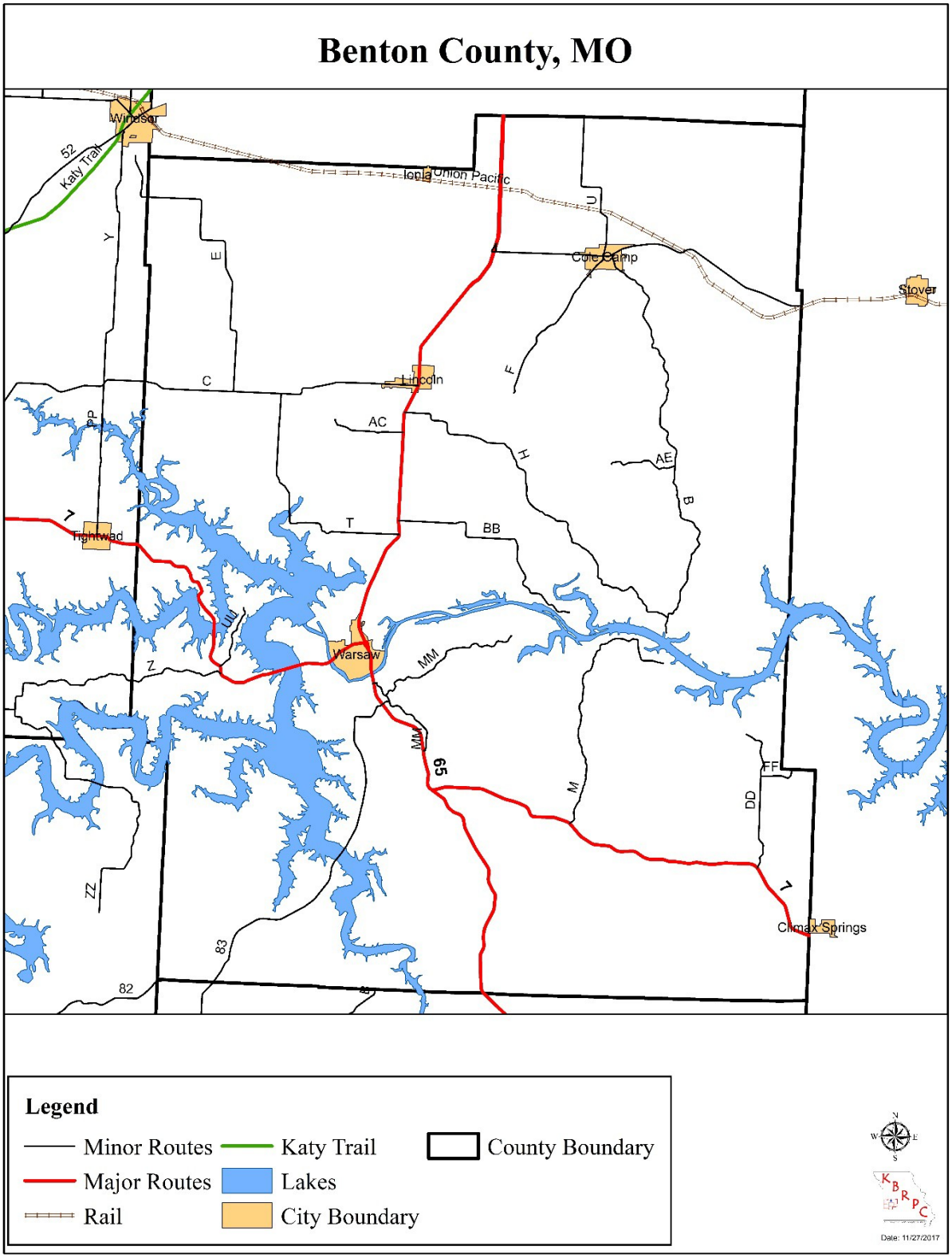
Step 10: Implement, Evaluate, and Revise the Plan
(Handbook Tasks 7 & 9)

As required by the handbook, the plan maintenance resided as a mutual agreement between KBRPC and Benton County stakeholders that as circumstances dictate, there would be revisions made to the plan in extreme situations. However, revisions could be made at any time before, during or after a disaster event.

2 PLANNING AREA PROFILE AND CAPABILITIES

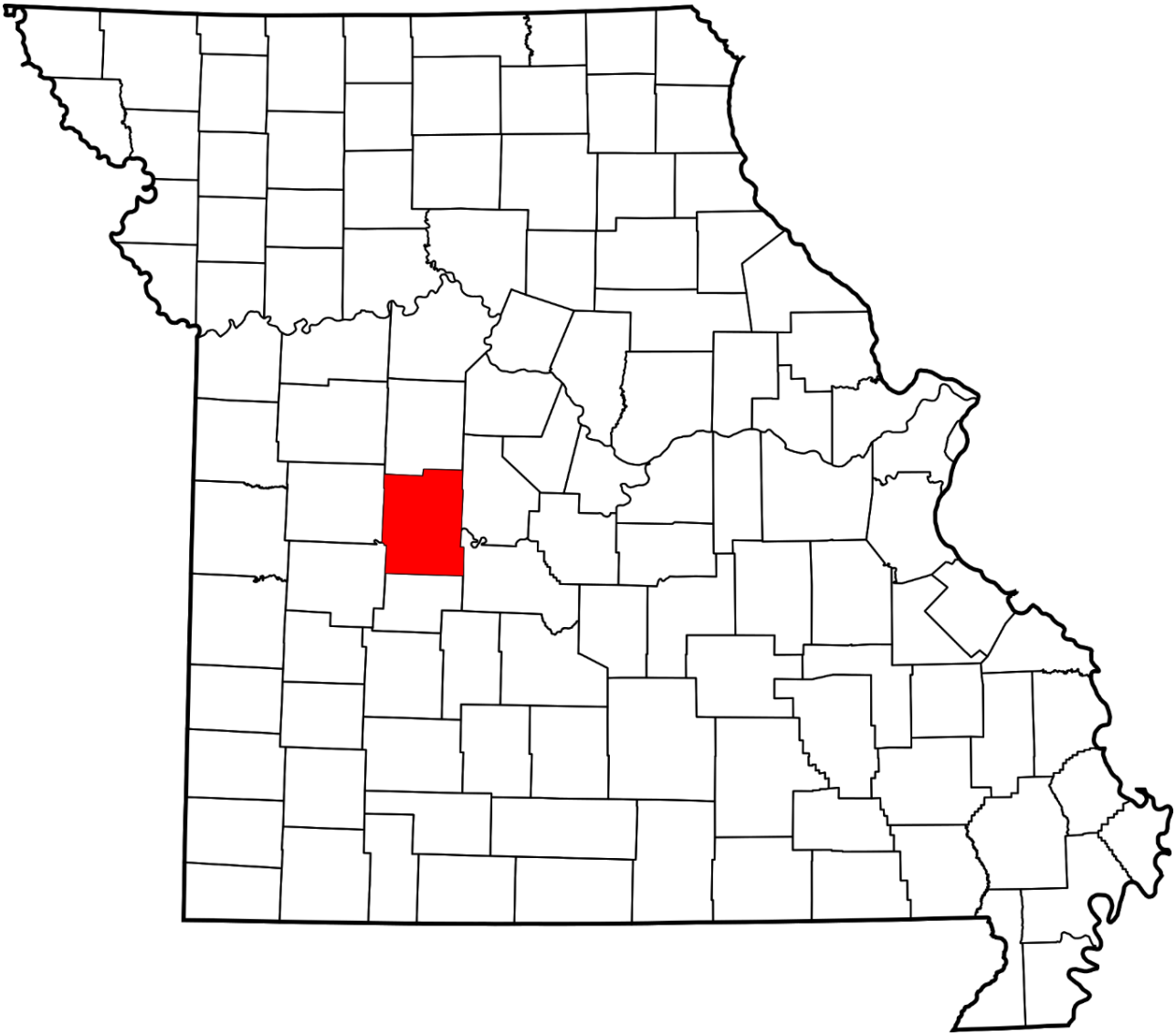
2.1.1 Benton County Planning Area Profile

Figure 2.1. Map of Benton County



*Note: The rail line in this map is part of the future Rock Island Trail, there are no active rail lines in Benton County anymore.

Figure 2.2. Map of Missouri, Benton County shown in RED



The US Census Bureau estimated that in 2019, Benton County had 19,443 citizens. This is a 2% uptick in population since 2010, which also a big jump from 17,180 in 2000. Overall, the population of Benton County has increased since 2000.

The median household income in Benton County is $40,249 in 2019 dollars. This average salary falls below the Missouri and national averages of $51,542 and $57,652, respectively. This salary was up from the last census, when it was a meager $26,646, but the state and nationwide increases were 27.0 and 28.3% respectively.

In Benton County, the median home value was $117,500 in 2019 dollars. Home values in Benton County fall below the state average and national average that sees $145,500 in Missouri and $193,500. Home values have continued to increase, and may eventually rise to the state average in the coming years.

2.1.2 Geography, Geology and Topography

Benton County, unlike its surrounding communities and counties is unique in which it is a major hub for watersheds. Because of this, there are many bluffs along the Osage River culminating with the Harry S. Truman Dam located in Warsaw. In much of the county, it is prairielands, along with many native grasses and relatively flat with not much change as far as topographical layout. The Truman Reservoir, created by the aforementioned watersheds of the Osage River flows east and west to the Lake of the Ozarks in Miller and Camden Counties. The southern part of the county has more twists and turns to it.

Sources of Data:

- FEMA Flood Insurance Study (if recent). This can be accessed from the FEMA Flood Map Service Center
  https://msc.fema.gov/portal
- Environmental Protection Agency Website for watershed details,
  http://cfpub.epa.gov/surf/locate/index.cfm
- NRCS Soil Survey,
  https://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=MO

2.1.3 Climate

Mean average precipitation for Benton County is 44.0 inches. May is typically the wettest month on average with 5.4 inches. Most of the rain falls in the early months of the year from March till June. October can also be a wet month, with 8 of 31 days on average seeing rain. Mean temperature in January is 20˚ and average maximum temperature in July is 88.7˚.

2.1.4 Population/Demographics

Table 2.1. Benton County Population 2000-2019 by Jurisdiction

Jurisdiction	2000 Population	2010 Population	2019 Annual Population Estimate or ACS Population	# Change (2010-2019)	% Change (2010-2019)
Cole Camp	1,028	1,121	1,134	+23	+1.1%
Ionia	108	88	87	-1	-1.1%
Lincoln	1,026	1,190	1,194	+4	+0.3%
Warsaw	2,070	2,127	2,204	+77	+3.6%
Unincorporated Benton County	12,948	14,530	14,824	+294	+2%

Source: U.S. Bureau of the Census, Decennial Census, annual population estimates/ 5-Year American Community Survey 2019;
population includes the portions of these cities in adjacent counties

Table 2.2. Unemployment, Poverty, Education, and Language Percentage Demographics, Benton County, Missouri

Jurisdiction	Total in Labor Force	Percent of Population Unemployed	Percent of Families Below the Poverty Level	Percentage of Population (High School graduate)	Percentage of Population (Bachelor's degree or higher)	Percentage of population with spoken language other than English
Benton County	**6,710**	**8.73%**	**10.1%**	**84.5%**	**13.0%**	**0.5%**
Cole Camp	**504**	**4.1%**	**4.4%**	**87.2%**	**11.5%**	**1.2%**
Lincoln	**467**	**4.3%**	**21.1%**	**86.7%**	**14.2%**	**4.9%**
Warsaw	**980**	**1.2%**	**18.9%**	**86.2%**	**11.4%**	**0.8%**
Missouri	**3,074,639**	**2.9%**	**13.2%**	**89.9%**	**29.2%**	**6.3%**
United States	**164,629,492**	**3.4%**	**10.5%**	**88.0%**	**32.1%**	**21.6%**

Source: U.S. Census, 2019 American Community Survey, 5-year Estimates.

2.1.5 History

Located in west central Missouri, Benton County has been around since 1835, where it was incorporated on January 3rd, 1835. As of the 2010 census, the population in Benton County was 19,056. The county is named for former Missouri US Senator Thomas Hart Benton. The county seat is Warsaw. There are **3** main school districts in Benton County, Cole Camp R-I, Lincoln R-II, and Warsaw R-IX. There are two private schools, Lutheran School in Cole Camp and Cornerstone Academy of the Ozarks in Warsaw, located within Benton County that does not belong to any of the aforementioned three school districts. Nearby Windsor in Henry County has district boundaries that are close to the county line with Benton but are excluded from this plan.

2.1.6 Public School Districts and Private Schools

Benton County is home to **three** main school districts:

- Cole Camp R-I (K-12)
- Lincoln R-II (K-12)
- Warsaw R-IX (K-12)

Additionally, there are **two** private schools in Benton County

- Lutheran School Association – Cole Camp (PK-8)
- Cornerstone Academy of the Ozarks – Warsaw (PK-6)

2.1.7 Occupations

Table 2.3. Occupation Statistics, Benton 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
Benton County	**29.8%**	**21.2%**	**19.7%**	**10.7%**	**18.5%**
Cole Camp	**26.4%**	**19.0%**	**21.9%**	**8.0%**	**24.7%**
Lincoln	**32.6%**	**23.6%**	**12.7%**	**12.0%**	**19.2%**
Warsaw	**22.4%**	**30.1%**	**23.0%**	**4.9%**	**19.6%**

Source: U.S. Census, 2019 American Community Survey, 5-year Estimates.

2.1.8 Agriculture

In Benton County, there are a total of 749 farms, which is down 6 from the 2012 agricultural census. The average farm size was 299 acres, also down from 300 acres at the last agricultural census. Most farms in Benton County are between 50 and 179 acres, additionally most farms have value of sales that are less than $2,500. The market value for all products sold by Benton County farms was $82,737,000 and farm-related income is $1,391,000. Further information is included with the 2017 Agricultural Census mentioned in Chapter 3.

The top crop items in Benton County were (in acres):

1. Forage-land used for all hay and haylage, grass silage, and greenchop – 42,261 acres
2. Soybeans for beans – 16,135 acres
3. Corn for grain – 8,673 acres
4. Wheat for grain – 2,705 acres
5. Corn for silage or greenchop – 1,548 acres

The top livestock items in Benton County were:

1. Broilers and other meat-type chickens – 1,618,769
2. Horses and Ponies – 224,570
3. Turkeys – 104,335
4. Cattle and calves – 47,535
5. Sheep and lambs – 1,118

2.1.9 FEMA Hazard Mitigation Assistance (HMA) Grants in Benton County

Table 2.4. FEMA HMA Grants in Benton County from 1993-2020

Disaster Declaration	Project Type	Sub-Grantee	Date Approved	Project Total
DR-4144-0011-P	91.1: Local Multihazard Mitigation Plan	Benton County	2014-09-04	$118,948.00
DR-1676-0023-P	91.1: Local Multihazard Mitigation Plan	Benton County	2008-10-17	$764,410.00
TOTAL = 2				$883,358.00

Source: Federal Emergency Management Agency, 1 April 2021

2.1.10 FEMA Public Assistance (PA) Grants in Benton County

Table 2.5. FEMA PA Grants in County from 1993-2020

Disaster Declaration	Project Type	Project Size	Applicant	Project Total
1631	44	Small	Benton County	$ 883.50
1676	309	Small	Benton County	$ 6,642.12
1676	313	Small	Benton County	$ 37,982.80
1676	351	Small	Benton County	$ 787.43
1676	352	Small	Benton County	$ 3,800.80
1676	385	Small	Benton County	$ 6,679.86
1676	400	Small	Benton County	$ 783.90
1676	480	Small	Benton County	$ 1,292.31
1676	547	Small	Benton County	$ 19,274.63
1736	28	Small	Benton County	$ 1,200.16
1736	153	Small	Benton County	$ 1,045.64
1736	181	Small	Benton County	$ 261.49
1736	243	Small	Benton County	$ 6,482.70
1736	244	Small	Benton County	$ 30,636.29
1736	246	Small	Benton County	$ 23,406.92
1736	249	Small	Benton County	$ 6,302.60
1736	265	Small	Benton County	$ 2,665.37
1736	266	Small	Benton County	$ 6,357.93
1961	467	Small	Benton County	$ 15,249.74

1961	468	Small	Benton County	**$ 16,614.36**
1961	512	Small	Benton County	**$ 5,012.78**
1961	513	Small	Benton County	**$ 789.20**
1961	649	Small	Benton County	**$ 1,218.75**
1961	650	Small	Benton County	**$ 1,070.12**
1961	653	Small	Benton County	**$ 9,428.96**
1961	718	Small	Benton County	**$ 6,927.74**
1961	724	Small	Benton County	**$ 9,456.07**
4238	98	Small	Benton County	**$ 20,302.43**
4238	105	Small	Benton County	**$ 4,900.08**
4238	229	Small	Benton County	**$ 7,568.94**
4238	230	Small	Benton County	**$ 15,867.83**
4238	231	Small	Benton County	**$ 14,739.83**
4238	232	Small	Benton County	**$ 12,692.58**
4238	233	Small	Benton County	**$ 13,946.61**
4238	234	Small	Benton County	**$ 23,764.73**
4238	265	Small	Benton County	**$ 9,281.28**
4238	281	Large	Benton County	**$ 102,144.21**
4238	283	Large	Benton County	**$ 290,249.99**
4238	284	Small	Benton County	**$ 29,524.39**
4451	599	Large	Benton County	**$ 508,881.83**
TOTAL = 40				**$1,276,118.90**

Source: Federal Emergency Management Agency, 26 February 2021

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 and ongoing mitigation capabilities 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 Benton County

Benton County's jurisdictions includes all incorporated areas and unincorporated areas alike within the county's boundaries. It is considered a Class III county in Missouri. The Benton County Commissioners preside as the governing body, three members and multiple liaisons to different functions in the county. This includes a Presiding Commissioner, a Northern Commissioner and a Southern Commissioner. These individuals are responsible for establishment of county policies, establishment and maintenance of a county budget, and numerous countywide functions. The departments featured in Benton County are as follows:

- Board of Commissioners
- County Assessor
- Circuit Clerk
- County Clerk
- Collector
- Coroner
- Emergency Management/NFIP Floodplain Administrator
- Prosecuting Attorney
- Public Administrator
- Recorder of Deeds
- Sheriff
- Surveyor
- Treasurer
- Victim Advocate

Mitigation Initiatives/Capabilities

- National Flood Insurance Program

The County NFIP Floodplain Administrator is also the Emergency Management Director for Benton County, though is a part-time role, therefore this individual accepts, evaluates and monitors all land use proposals and enforces NFIP regulations where applicable.

Further, as the EMD for Benton County, this individual is responsible for collaboration with local government officials and private organizations to: 1) prevent avoidable disasters and reduce vulnerabilities of citizens to any disaster that impacts Benton County; 2) establish capabilities for protecting citizens from the effects of disasters; 3) respond effectively to the actual occurrence of disasters and 4) provide the recovery in the aftermath of any emergency involving extensive damage within the county. The EMD is responsible for the development and maintaining of the Local Emergency Operations Plan.

Table 2.6 provides information on Benton County's mitigation capabilities based on responses to a Data Collection Questionnaire. This also includes the three main school districts in Benton County. Private schools are not mentioned but not included.

Unincorporated Benton County Mitigation Initiatives/Capabilities

Table 2.6. Unincorporated Benton 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	Yes, applies to Warsaw, Lincoln and Cole Camp
County Emergency Operations Plan	Yes, Updated biannually
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes, 2021
Debris Management Plan	No
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, but controlled burns are monitored by USACE and MDC
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	Yes
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes, NFIP
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Stormwater Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	Yes, Benton County Health Dept.
Historic Preservation Ordinance	No
Landscape Ordinance	No
Seismic Construction Ordinance	No
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program (NFIP)	Yes
NFIP Community Rating System (CRS) program	No
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	Yes, but only applies to Warsaw with a 5/5Y

Capabilities	Status Including Date of Document or Policy
Economic Development Program	Yes
Land Use Program	No
Public Education/Awareness	Yes, Local Fire Depts. Health Dept., CERT Team
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)	All Cities
Hazard Analysis/Risk Assessment (County)	Yes, 2021
Flood Insurance Maps	Yes
FEMA Flood Insurance Study (Detailed)	Yes. 2009
Evacuation Route Map	Yes
Critical Facilities Inventory	Yes, Annex H – County EOP
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	Yes, Benton County Assessor
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Director	Yes, Part-time
NFIP Floodplain Administrator	Yes, Part-time
Emergency Response Team	Yes, CERT
Hazardous Materials Expert	Yes
Local Emergency Planning Committee	Yes
County Emergency Management Commission	Yes
Sanitation Department	No
Transportation Department	Yes, Full-time
Economic Development Department	Yes, Jo Ann Lane
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	Yes, KCMO Chapter
Salvation Army	Yes
Veterans Groups	American Legion, VFW, Marine Corps League
Local Environmental Organization	Stream Team
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes

Capabilities	Status Including Date of Document or Policy
Local Funding Availability	
Apply for Community Development Block	No
Fund projects through Capital	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	No
Impact fees for new development	Yes
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	No
Withhold spending in hazard prone areas	Yes

Source: Data Collection Questionnaire 13 April 2021

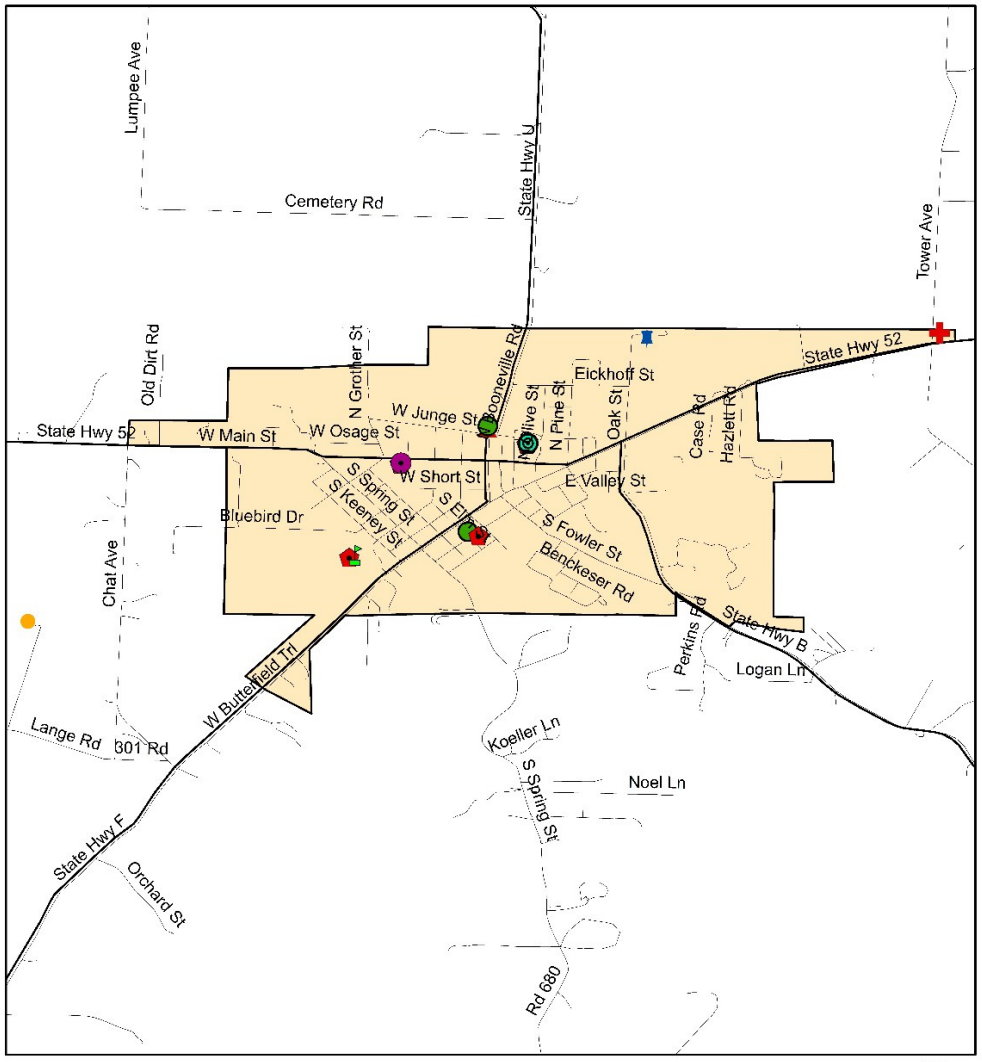
2.2.1 City of Cole Camp

Located in the northern portion of Benton County, Cole Camp is slightly more populated than Lincoln, but fewer than the city of Warsaw. Cole Camp R-I School District lies within the city limits of Cole Camp. The community is run by a mayor with a city clerk and city aldermen. In 2010, the population of Cole Camp was 1,121; which is up from 2000 when the population was 1,028. Currently, the Main Street district of Cole Camp is on the National Register of Historic Places. Cole Camp possesses a fair amount of capabilities to accommodate its citizens and students. Some capabilities include:

- Police Department
- Fire Department
- Tornado Warning Sirens
- City Hall
    - Mayor
    - City Clerk
    - Board of Aldermen
- Bothwell Regional Health Center – Cole Camp Clinic
- Post Office
- Wastewater Treatment Facility
- Red Cross Temporary Emergency Shelter

A full breakdown of Cole Camp's Mitigation Capabilities is featured in **Table 2.7**.

Critical Infrastructures - Cole Camp



Miles
0 0.075 0.15 0.3 0.45 0.6
1 inch = 0 miles

Legend

- Cole Camp R-I School
- City Hall
- Senior Center
- Temporary Emergency Shelter
- Waste Water TF
- Warning Siren
- Fire Department
- Police Department
- Cole Camp Clinic
- Red Cross Temporary Emergency Shelter
- Water Tower
- Roads
- Lakes
- City Boundary

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Author: Cyn
Date: 4/20/2017

Table 2.7. Cole Camp Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	Yes
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	Yes
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	Combined with County
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	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	Yes, eCode360
Building Code	No
Floodplain Ordinance	Yes
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant	No
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	6
Economic Development Program	Yes, combined with County
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes

Capability	Status Including Date of Document or Policy
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	Yes
Hazard Analysis/Risk Assessment (County)	Yes
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes
Emergency Management Coordinator	Yes
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	No
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
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	
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	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire 20 April 2021

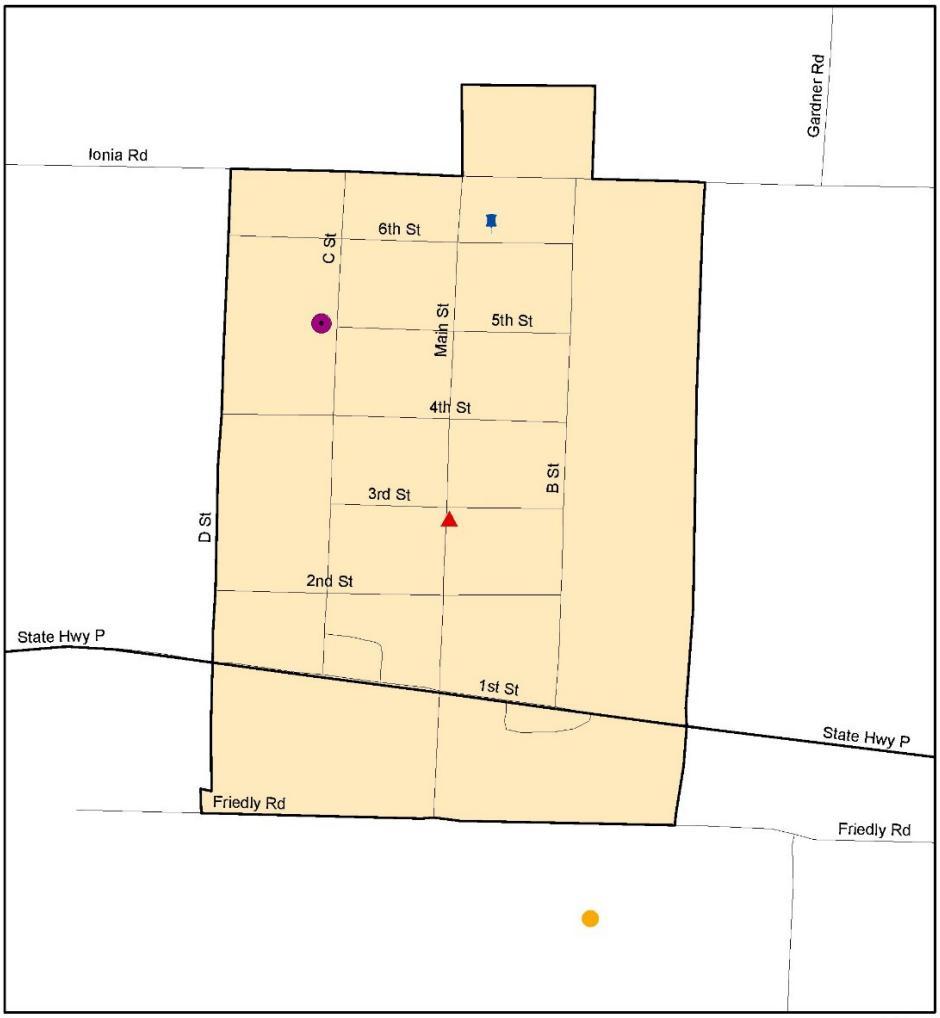
2.2.2 Village of Ionia

As the smallest incorporated community in Benton County, a small part of Ionia actually lies within Pettis County, but all of its capabilities lie in Benton County. Ionia does not have a school, at least anymore (they used to), like the other three communities in Benton County, kids in Ionia usually go to Cole Camp Schools. They do have a few capabilities that contribute to the overall wellbeing of the county as a whole. The population of Ionia is rather small; in 2010, the population was only 88. Unfortunately, this was down from 108 at the 2000 census. Some of the limited capabilities of Ionia include:

- Village Hall
    - Mayor
    - Village Clerk
    - Village Council
- Volunteer Fire Department
- Wastewater Treatment Facility
- Post Office

A full breakdown of Ionia's Mitigation Capabilities is featured in **Table 2.8**.

Critical Infrastructures - Ionia



Miles
0.035 0.07 0.105 0.14
1 inch = 0 miles

Legend

- City Hall
- Fire Department
- Waste Water TF
- Water Tower
- Roads
- Lakes
- City Boundary

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Author: Cyn
Date: 5/1/2017

Table 2.8. Ionia Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	No
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	Yes
Local Mitigation Plan	No
County Mitigation Plan	Yes, 2021
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
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	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa 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	Awaiting Application
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	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

Capability	Status Including Date of Document or Policy
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	Yes
Hazard Analysis/Risk Assessment (County)	Yes
Flood Insurance Maps	No
FEMA Flood Insurance Study (Detailed)	No
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	Yes, 2015
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	Yes, but as needed
Development Planner	No
Public Works Official	No
Emergency Management Coordinator	No
NFIP Floodplain Administrator	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	No
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	No
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	No
Community Organizations (Lions, Kiwanis, etc.	No
Local Funding Availability	
Ability to apply for Community Development Block Grants	No
Ability to fund projects through Capital Improvements funding	No
Authority to levy taxes for a specific purpose	No
Fees for water, sewer, gas, or electric services	Water and Sewer Only
Impact fees for new development	No
Ability to incur debt through general obligation bonds	No
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 23 March 2021

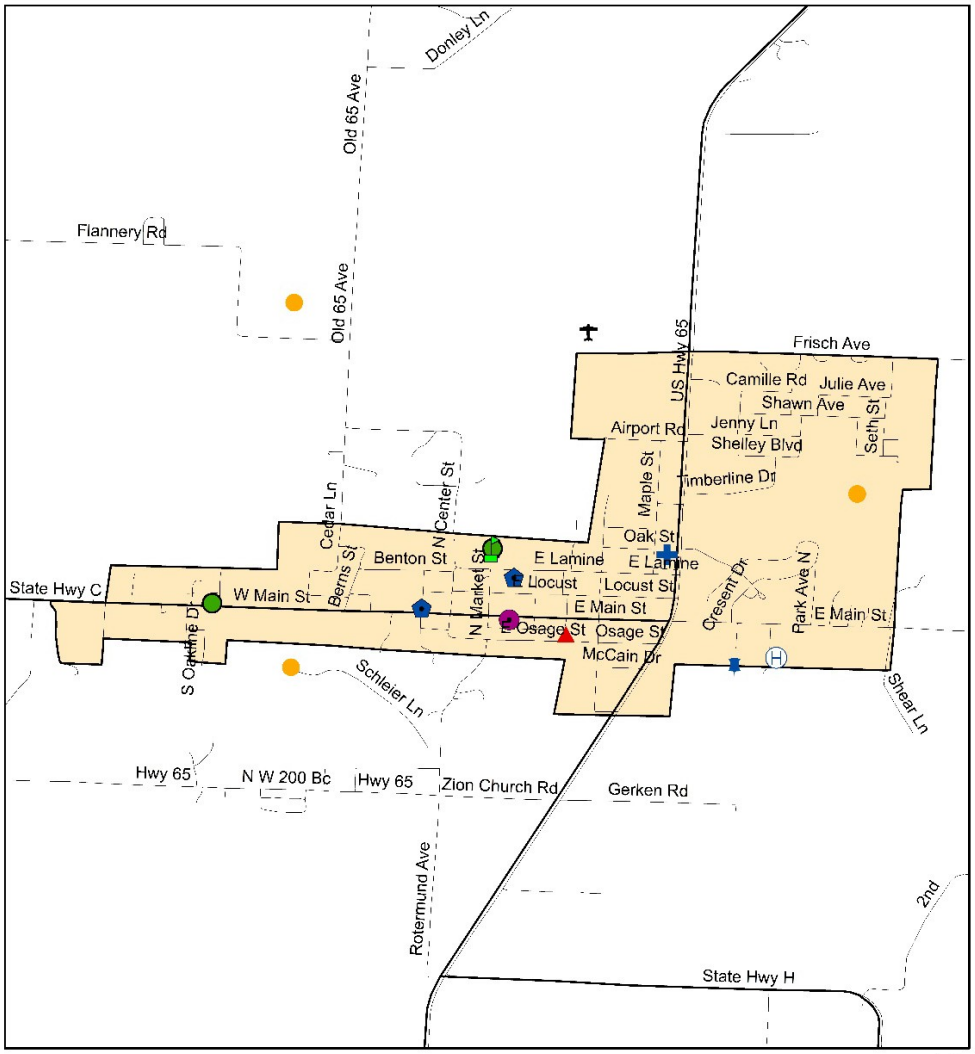
2.2.3 City of Lincoln

Lincoln is located in central Benton County along 65 Highway that runs through the center of the county and connects to several other areas. It is the second most populated community in Benton County and has more to offer as far as capabilities for mitigation than say Ionia. Lincoln also includes Lincoln R-II School District and a small airport. The population of Lincoln was 1,190 at the 2010 census, which is up from the 1,026 counted at the 2000 census. Lincoln features three wastewater treatment facilities, a police department, fire department, city hall with mayor and city clerk. Lincoln also includes an EMS station that serves Cole Camp, Ionia and other unincorporated communities north of Warsaw. Furthermore, the capabilities of Lincoln include:

- City Hall
    - Mayor
    - City Clerk
    - Board of Aldermen
- Police Department
- Fire Department
- EMS Station
- Emergency Shelter
- Red Cross Emergency Shelter
- Tornado Warning Sirens
- Air Strip
- Wastewater Treatment Facilities

A full breakdown of Lincoln's Mitigation Capabilities is included in **Table 2.9**.

Critical Infrastructures - Lincoln



Legend

- Lincoln R-II Schools
- City Hall
- Waste Water TF
- Warning Siren
- Helipad
- Fire Department
- Police Department
- EMS
- Temporary Emergency Shelter
- Red Cross Temporary Emergency Shelter
- Runway Strip
- Water Tower
- Roads
- Lakes
- City Boundary

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KBRPC

Author: Cyn
Date: 4/20/2017

Table 2.9. Lincoln Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
Local Emergency Plan	Yes, 2016
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	No
County Mitigation Plan	Yes, 2021
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
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	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	Yes, eCode360
Building Code	No
Floodplain Ordinance	Yes
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	No
Drainage Ordinance	No
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	Yes, 2021
Codes Building Site/Design	Yes, 2021
National Flood Insurance Program (NFIP) Participant	Yes
NFIP Community Rating System (CRS) Participating Community	Yes, In Progress
Hazard Awareness Program	Yes, 2021
National Weather Service (NWS) Storm Ready	Yes, 2021
Building Code Effectiveness Grading (BCEGs)	Yes
ISO Fire Rating	6
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

Capability	Status Including Date of Document or Policy
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	Yes, 2021
Hazard Analysis/Risk Assessment (County)	Yes, 2021
Flood Insurance Maps	Yes
FEMA Flood Insurance Study (Detailed)	Yes, In Progress
Evacuation Route Map	No
Critical Facilities Inventory	No
Vulnerable Population Inventory	No
Land Use Map	Yes, 2015
Staff/Department	
Building Code Official	Yes, Combined with Public Works
Building Inspector	Yes, Combined with Public Works
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes
Emergency Management Coordinator	No
NFIP Floodplain Administrator	Yes, Part-Time
Emergency Response Team	Yes, Lincoln Fire
Hazardous Materials Expert	No
Local Emergency Planning Committee	Member of Benton County LEPC
County Emergency Management Commission	Yes
Sanitation Department	No
Transportation Department	No
Economic Development Department	Combined with County
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	No
Local Funding Availability	
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 29 March 2021

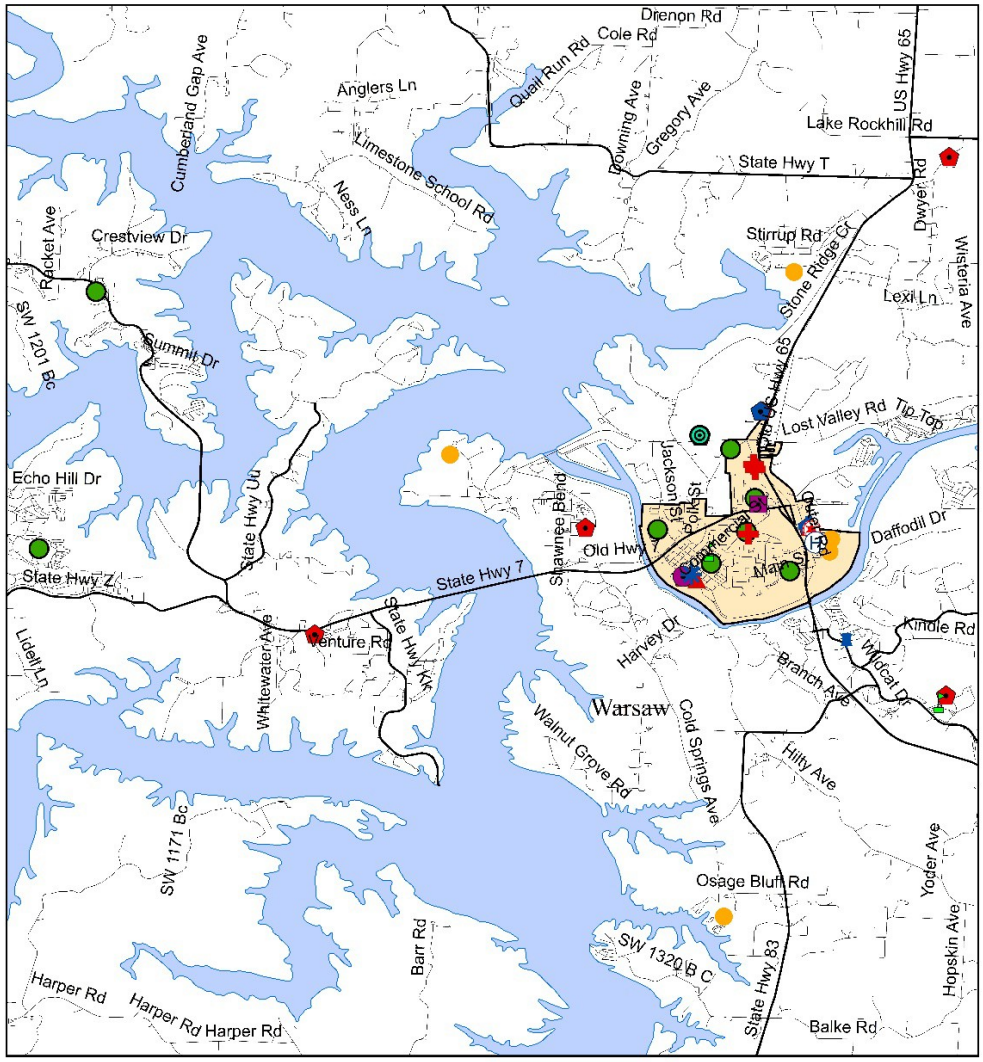
2.2.4 City of Warsaw

The County Seat for Benton County, Warsaw is the largest community in the county, and has many capabilities. Warsaw is located in the southern tier of Benton County along 65 Highway, much like Lincoln to the north, but Warsaw also sees the junction of 7 Highway from the west and the two highways are interconnected to a point south of town where 7 Highway continues east toward the Lake of the Ozarks. Warsaw is also where the Benton County Emergency Management Office and 911 Call Center is located. Warsaw R-IX School District located south of the Osage River. In 2010, the population of Warsaw was 2,127, which is up from 2,070 in 2000. The Upper Bridge, which is the one of the original highway bridges in Warsaw, was added to the National Register of Historic Places in 1999. Warsaw is the home of the Harry S. Truman Dam that creates Truman Lake. Some of the capabilities of the City of Warsaw include the following:

- Benton County Courthouse
- City Hall
    - Mayor
    - City Clerk
    - City Administrator/Planner
    - Board of Aldermen
- Fire Department
- Police Department
- 911 Dispatch Center
- Benton County Jail
- Benton County Sheriff
- Municipal Airport
- Benton County Emergency Management
- Wastewater Treatment Facilities
- Katy Trail Community Health Center
- Tornado Warning Sirens
- US Army Corps of Engineers Office
- Temporary Emergency Shelters
- Red Cross Approved Emergency Shelter
- Warsaw Food Pantry

A complete breakdown of Warsaw's Mitigation Capabilities is included in **Table 2.10**.

Critical Infrastructures - Warsaw



Legend

Courthouse	Plice Department	Temporary Emergency Shelter
City Hall	Sheriff Department	Red Cross Temporary Emergency Shelter
Waste Water TF	Helipad	Warsaw R-IX Schools
Senior Center	911 Dispatch	Water Tower
Food Pantry	EMS	Roads
Warning Siren	Health Center	City Boundary
Fire Department	Runway Strip	Lakes

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Author: Cyn
Date: 4/20/2017

Critical Infrastructures - Warsaw

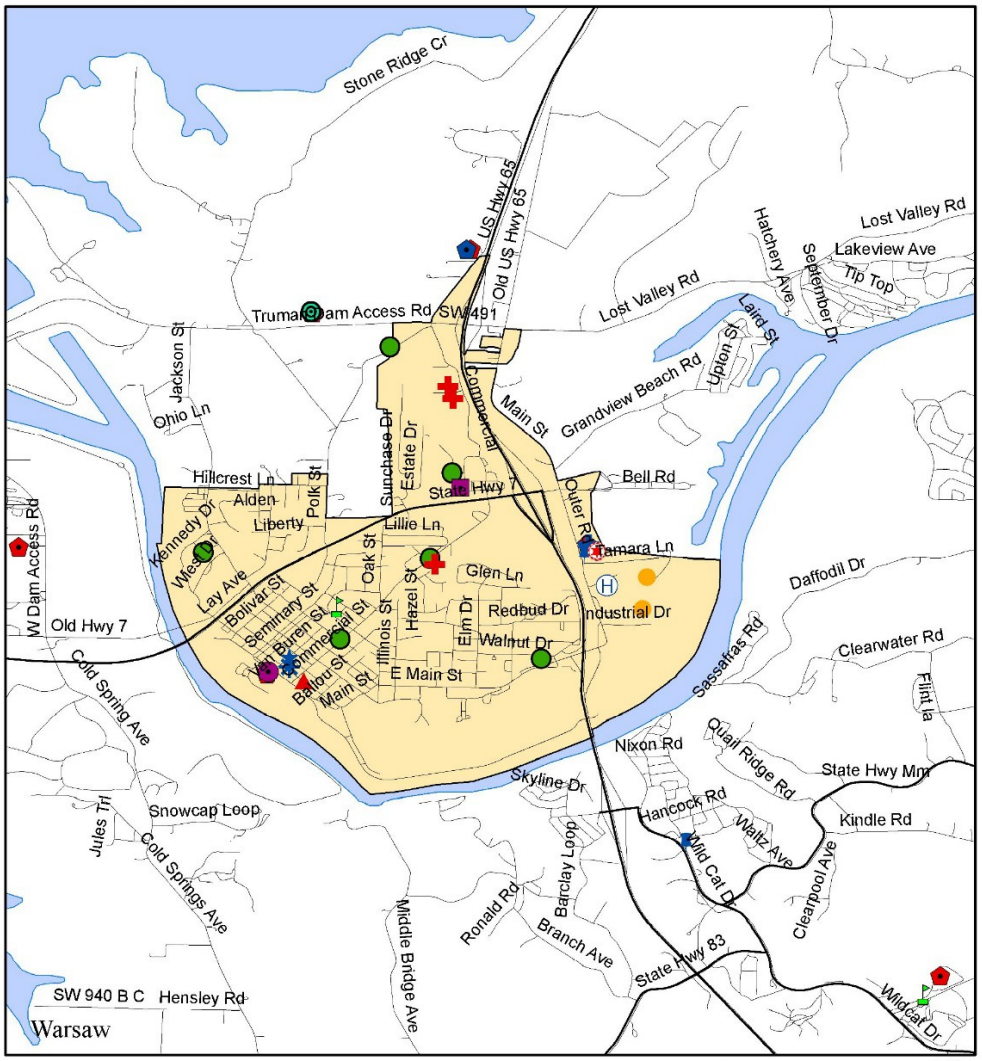


Table 2.10. Warsaw Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes, 2016
Builder's Plan	Yes
Capital Improvement Plan	Yes, 2016
Local Emergency Plan	No
County Emergency Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
Local Mitigation Plan	Yes
County Mitigation Plan	Yes
Local Mitigation Plan (PDM)	No
County Mitigation Plan (PDM)	No
Economic Development Plan	Yes, 2016
Transportation Plan	No
Land-use Plan	Yes, 2015
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
Firewise or other fire mitigation plan	No
School Mitigation Plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	Yes
Policies/Ordinance	
Zoning Ordinance	Yes, 2015
Building Code	Yes, 2015
Floodplain Ordinance	Yes, 2002
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	Yes, 2020
Drainage Ordinance	Study in Progress
Seismic Construction Ordinance	No
Capability	
Site Plan Review Requirements	Yes, 2015
Historic Preservation Ordinance	No
Landscape Ordinance	No
Iowa Wetlands and Riparian Areas Conservation Plan	No
Debris Management Plan	No
Program	
Zoning/Land Use Restrictions	Yes, 2015
Codes Building Site/Design	Yes, 2015
National Flood Insurance Program (NFIP) Participant	Yes
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	5
Economic Development Program	Combined with County
Land Use Program	No
Public Education/Awareness	Yes
Property Acquisition	No
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	In Progress
Mutual Aid Agreements	Yes

Capability	Status Including Date of Document or Policy
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	Yes
Hazard Analysis/Risk Assessment (County)	Yes
Flood Insurance Maps	Yes
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	Yes, County EMA
Critical Facilities Inventory	Yes
Vulnerable Population Inventory	No
Land Use Map	Yes
Staff/Department	
Building Code Official	Yes, part-time
Building Inspector	Yes, part-time
Mapping Specialist (GIS)	No
Engineer	Yes, Contracted
Development Planner	Yes, full-time
Public Works Official	Yes, full-time
Emergency Management Coordinator	No
NFIP Floodplain Administrator	Yes, County EMD
Emergency Response Team	Warsaw Fire
Hazardous Materials Expert	No
Local Emergency Planning Committee	No
County Emergency Management Commission	Yes
Sanitation Department	No
Transportation Department	No
Economic Development Department	Combined with County
Housing Department	No
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	No
Salvation Army	Yes, serves all of Benton County
Veterans Groups	No
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
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	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	Yes
Ability to incur debt through private activities	Yes
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire 31 March 2021

2.2.5 Summary of Jurisdictional Capabilities

Table 2.11. Mitigation Capabilities Summary Table

CAPABILITIES	Unincorporated Benton County	Cole Camp	Ionia	Lincoln	Warsaw
Planning Capabilities					
Comprehensive Plan	No	No	No	No	Yes, 2016
Builder's Plan	No	No	No	No	Yes
Capital Improvement Plan	No	No	No	No	Yes, 2016
Local Emergency Plan	Yes, applies to Warsaw, Lincoln and Cole Camp	Yes	No	Yes, 2016	No
County Emergency Plan	Yes, updated biannually	Yes	Yes	Yes	Yes
Local Recovery Plan	No	No	No	No	No
County Recovery Plan	No	No	Yes	No	No
Local Mitigation Plan	No	No	No	No	Yes
County Mitigation Plan	Yes, 2021	Yes, 2021	Yes, 2021	Yes, 2021	Yes, 2021
Local Mitigation Plan (PDM)	No	No	No	No	No
County Mitigation Plan (PDM)	Yes	No	No	No	No
Debris Management Plan	No	No	No	No	Yes, 2016
Economic Development Plan	No	No	No	No	No
Transportation Plan	No	No	No	No	Yes, 2015
Land-use Plan	No	No	No	No	No
Flood Mitigation Assistance (FMA) Plan	No	No	No	No	No
Watershed Plan	No	No	No	No	No
Firewise or other fire mitigation plan	No, but controlled burns are monitored by USACE and MDC	No	No	No	No
School Mitigation Plan	No	No	No	No	No
Critical Facilities Plan (Mitigation/Response/Recovery)	Yes	No	No	No	Yes, 2016
Policies/Ordinance					
Zoning Ordinance	No	Yes	No	Yes, eCode360	Yes, 2015
Building Code	No	No	No	No	Yes, 2015
Floodplain Ordinance	Yes, NFIP	Yes	No	Yes	Yes, 2002
Subdivision Ordinance	No	No	No	No	No
Tree Trimming Ordinance	No	No	No	No	No
Nuisance Ordinance	No	No	No	No	No
Storm Water Ordinance	No	No	No	No	Yes, 2020
Drainage Ordinance	No	No	No	No	Study in Progress
Site Plan Review Requirements	Yes, Benton County Health Dept.	No	No	No	No
Historic Preservation Ordinance	No	No	No	No	No
Landscape Ordinance	No	No	No	No	No

Seismic Construction Ordinance	No	No	No	No	No
Zoning/Land Use Restrictions	No	No	No	No	Yes, 2015
Codes Building Site/Design	No	No	No	No	Yes, 2015
National Flood Insurance Program (NFIP) Participant	Yes	NSFHA	No	Yes	Yes
NFIP Community Rating System (CRS) Participating Community	No	No	No	Yes, In Progress	No
CAPABILITIES	**Unincorporated Benton County**	**Cole Camp**	**Ionia**	**Lincoln**	**Warsaw**
Program					
Hazard Awareness Program	No	No	No	Yes	No
National Weather Service (NWS) Storm Ready	No	No	No	Yes	No
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	No
ISO Fire Rating	Yes, applies to Cole Camp, Lincoln and Warsaw	6	No	6/6Y	5/5Y
Economic Development Program	Yes	Yes	Yes	Yes	Yes
Land Use Program	No	No	No	No	No
Public Education/Awareness	Yes	No	No	No	Yes
Property Acquisition	No	No	No	No	No
Planning/Zoning Boards	No	Yes	No	No	Yes
Stream Maintenance Program	No	No	No	No	No
Tree Trimming Program	No	No	No	No	No
Engineering Studies for Streams (Local/County/Regional)	No	No	No	No	In Progress
Mutual Aid Agreements	Yes	Yes	No	Yes, Lincoln PD	Yes
Studies/Reports/Maps					
Hazard Analysis/Risk Assessment (Local)	All Cities	Yes, 2021	Yes, 2021	Yes, 2021	Yes, 2021
Hazard Analysis/Risk Assessment (County)	Yes, 2021	Yes, 2021	Yes, 2021	Yes, 2021	Yes, 2021
Flood Insurance Maps	Yes	No	No	Yes	Yes
FEMA Flood Insurance Study (Detailed)	Yes. 2009	No	No	Yes, In Progress	Yes
Evacuation Route Map	Yes	No	No	No	Yes, County EMA
Critical Facilities Inventory	Yes, Annex H – County EOP	No	No	No	Yes
Vulnerable Population Inventory	No	No	No	No	No
Land Use Map	No	No	Yes, 2015	Yes, 2015	Yes
Staff/Department					
Building Code Official	No	No	No	Yes, Combined with Public Works	Yes, part-time
Building Inspector	No	No	No	Yes, Combined with Public Works	Yes, part-time
Mapping Specialist (GIS)	Yes, Benton County Assessor	No	No	No	No

Engineer	No	No	As needed	No	Yes, Contracted
Development Planner	No	No	No	No	Yes, full-time
Public Works Official	No	Yes	No	Yes	Yes, full-time
Emergency Management Coordinator	Yes, Part-time	Yes	No	No	No
NFIP Floodplain Administrator	Yes, Part-time	No	No	Yes, Part-Time	Yes, County EMD
Emergency Response Team	Yes, CERT	No	No	Yes, Lincoln Fire	Warsaw Fire
Hazardous Materials Expert	Yes	No	No	No	No
Local Emergency Planning Committee	Yes	No	No	Member of Benton County LEPC	No
County Emergency Management Commission	Yes	No	No	Yes	Yes
Sanitation Department	No	No	No	No	No
Transportation Department	Yes, Full-time	No	No	No	No
Economic Development Department	Yes	Yes	Yes	Yes	Yes
Housing Department	No	No	No	No	No
Historic Preservation	No	No	No	No	No
Non-Governmental Organizations (NGOs)					
American Red Cross	Yes, KCMO Chapter	No	No	No	No
Salvation Army	Yes	No	No	No	Yes
Veterans Groups	American Legion, VFW, Marine Corps League	Yes	No	Yes	No
Environmental Organization	Stream Team	No	No	No	No
Homeowner Associations	Yes	No	No	No	No
Neighborhood Associations	Yes	No	No	No	No
Chamber of Commerce	Yes	Yes	No	Yes	Yes
Community Organizations (Lions, Kiwanis, etc.	Yes	Yes	No	No	Yes
Financial Resources					
Apply for Community Development Block Grants	No	Yes	No	Yes	Yes
Fund projects through Capital Improvements funding	Yes	Yes	No	Yes	Yes
Authority to levy taxes for specific purposes	Yes	Yes	No	Yes	Yes
Fees for water, sewer, gas, or electric services	No	Yes	Water and Sewer Only	Yes	Yes
Impact fees for new development	Yes	No	No	No	No
Incur debt through general obligation bonds	Yes	Yes	No	Yes	Yes
Incur debt through special tax bonds	Yes	Yes	No	No	Yes
Incur debt through private activities	No	No	No	No	Yes
Withhold spending in hazard prone areas	Yes	No	No	No	No

Source: Data Collection Questionnaires

2.2.6 Public School District Profiles and Mitigation Capabilities

Table 2.12. Cole Camp R-1 Buildings and Enrollment Data 22 December 2020

District Name	Building Name	Building Enrollment
Cole Camp R-1	Cole Camp Preschool	23
Cole Camp R-1	Cole Camp Elementary	255
Cole Camp R-1	Cole Camp Middle	217
Cole Camp R-1	Cole Camp High	219

Source: http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx 22 December 2020

Table 2.13. Lincoln R-II Buildings and Enrollment Data, 22 December 2020

District Name	Building Name	Building Enrollment
Lincoln R-II	Lincoln Elementary	256
Lincoln R-II	Lincoln High	228

Source: http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx 22 December 2020

Table 2.14. Warsaw R-IX Buildings and Enrollment Data, 22 December 2020

District Name	Building Name	Building Enrollment
Warsaw R-IX	North Elementary	348
Warsaw R-IX	South Elementary	262
Warsaw R-IX	John Boise Middle	295
Warsaw R-IX	Warsaw High	378

Source: http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx 22 December 2020

Table 2.15. Cole Camp R-1 Mitigation Capability

Capability	Cole Camp R-1
Planning Elements	
Master Plan/Date	Yes, 2015
Capital Improvement Plan/Date	No
School Emergency Plan / Date	Yes, 2020
Weapons Policy/Date	Yes, 2020
Personnel Resources	
Full-Time Building Official (Principal)	Yes
Emergency Manager	No
Grant Writer	No
Public Information Officer	No
Financial Resources	
Capital Improvements Project Funding	Yes
Local Funds	Yes
General Obligation Bonds	Yes
Special Tax Bonds	No
Private Activities/Donations	Yes
State and Federal Funds/Grants	Yes
Other	
Public Education Programs	Yes
Privately or Self- Insured?	Self-Insured
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	No
Lock-Down Security Training	Yes
Mitigation Programs	No
Tornado Shelter/Saferoom	Yes, though not FEMA-361 Compliant
Campus Police	No

Source: Data Collection Questionnaire, 12 April 2021

Table 2.16. Lincoln R-II Mitigation Capability

Capability	Lincoln R-II
Planning Elements	
Master Plan/ Date	No
Capital Improvement Plan/Date	No
School Emergency Plan / Date	Yes, 2019
Weapons Policy/Date	Yes, 2019
Personnel Resources	
Full-Time Building Official (Principal)	Yes, Superintendent
Emergency Manager	Yes, School Director
Grant Writer	No
Public Information Officer	Yes, Superintendent
Financial Resources	
Capital Improvements Project Funding	Yes
Local Funds	Yes
General Obligation Bonds	No
Special Tax Bonds	No
Private Activities/Donations	No
State and Federal Funds/Grants	No
Other	
Public Education Programs	Yes
Privately or Self- Insured?	Self-Insured
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	Yes
Lock-Down Security Training	Yes
Mitigation Programs	No
Tornado Shelter/Saferoom	Yes, Unknown if FEMA-361 Compliant
Campus Police	Yes, Lincoln PD

Source: Data Collection Questionnaire, 22 April 2021

Table 2.17. Warsaw R-IX Mitigation Capability

Capability	Warsaw R-IX
Planning Elements	
Master Plan/ Date	Yes
Capital Improvement Plan/Date	Yes, 2019
School Emergency Plan / Date	Yes, 2020
Weapons Policy/Date	Yes
Personnel Resources	
Full-Time Building Official (Principal)	Yes, Principal
Emergency Manager	Yes, School SRO
Grant Writer	Yes, Assistant Superintendent
Public Information Officer	Yes, Superintendent
Financial Resources	
Capital Improvements Project Funding	Yes
Local Funds	Yes
General Obligation Bonds	Yes
Special Tax Bonds	No
Private Activities/Donations	Yes
State and Federal Funds/Grants	Yes
Other	
Public Education Programs	Yes
Privately or Self- Insured?	Self-Insured
Fire Evacuation Training	Yes
Tornado Sheltering Exercises	Yes
Public Address/Emergency Alert System	Yes
NOAA Weather Radios	No
Lock-Down Security Training	Yes
Mitigation Programs	Yes
Tornado Shelter/Saferoom	No
Campus Police	Yes, SRO

Source: Data Collection Questionnaire, 30 March 2021

Table 2.18. Summary of School Mitigation Capabilities: Cole Camp R-I, Lincoln R-II, Warsaw R-IX

Capability	Cole Camp R-I	Lincoln R-II	Warsaw R-IX
Planning Elements			
Master Plan/Date	Yes, 2015	No	Yes
Capital Improvement Plan/Date	No	No	Yes, 2019
School Emergency Plan / Date	Yes, 2020	Yes, 2019	Yes, 2020
Weapons Policy/Date	Yes, 2020	Yes, 2019	Yes
Personnel Resources			
Full-Time Building Official (Principal)	Yes	Yes, Superintendent	Yes, Principal
Emergency Manager	No	Yes, School Director	Yes, School SRO
Grant Writer	No	No	Yes, Assistant Superintendent
Public Information Officer	No	Yes, Superintendent	Yes, Superintendent
Financial Resources			
Capital Improvements Project Funding	Yes	Yes	Yes
Local Funds	Yes	Yes	Yes
General Obligation Bonds	Yes	No	Yes
Special Tax Bonds	No	No	No
Private Activities/Donations	Yes	No	Yes
State and Federal Funds/Grants	Yes	No	Yes
Other			
Public Education Programs	Yes	Yes	Yes
Privately or Self- Insured?	Self-Insured	Self-Insured	Self-Insured
Fire Evacuation Training	Yes	Yes	Yes
Tornado Sheltering Exercises	Yes	Yes	Yes
Public Address/Emergency Alert System	Yes	Yes	Yes
NOAA Weather Radios	No	Yes	No
Lock-Down Security Training	Yes	Yes	Yes
Mitigation Programs	No	No	Yes
Tornado Shelter/Saferoom	Yes, though not FEMA-361 compliant	Yes, Unknown if FEMA-361 Compliant	No
Campus Police	No	Yes, Lincoln PD	Yes, SRO

Source: Data Collection Questionnaires

3 RISK ASSESSMENT

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 ultimate goal of the Benton County risk assessment is to provide an in-depth overview of all hazards that impact Benton County that may incur significant monetary loss, property damage, or individual injury. The risk assessment is a self-enabling instrument that allows communities within Benton County such as school districts and communities to recognize their individual risks to given hazards and potential disasters. It also assesses the risk present to critical infrastructure within county boundaries. It works to protect the critical infrastructure (CI) and assists in the creation of a plan for stakeholders on how to mitigate against hazards and disasters in Benton County.

There are four key components to this chapter.

- **Section 3.1 Hazard Identification** gives an overview to the hazards that are specific to Benton County and how likely each one is to impact the county.
- **Section 3.2 Assets at Risk** showcases Benton County's critical infrastructure that would be in danger for significant monetary or economic losses in a disaster.
- **Section 3.3 Land Use and Development** considers current structural mitigation strategies that effectively manage the existing environment and proposes new strategies that could also be used if sustainable and or feasible with available resources within Benton County.
- **Section 3.4 Hazard Profiles and Vulnerability Analysis** suggests additional findings regarding the Benton County and its future potential for hazards and disasters. Each pre-identified hazard has three subsections. 1) Hazard Summary gives a detailed description of the hazard, the geographical area impacted, the strength/magnitude of the hazard, previous incidents involving said hazard, projected future likelihood of the event, and the impact of future land use operations on the risk of said hazard; 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 describes the problem and proposes solutions on how to mitigate the potential hazard/risk.

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.

Due to its geography, Benton County faces a unique set of risks and hazards that impact the communities that lie within its boundaries. As a result, Benton County experiences many natural hazards such as tornadoes, extreme heat, drought, extreme winter weather, flooding, levee failure, droughts, wildfires, and dam failure that create a unique hazard profile. SEMA's Hazard Mitigation Plan (2018) identifies some hazards such as landslides as a hazard prevalent in Missouri but for purposes of this plan do not impact Benton County. A special note regarding earthquakes will be discussed later.

Other hazards such as hurricanes, volcanoes, coastal erosion, or tsunamis do not impact Benton County due in large part to its topographic nature. As seen in **Section 3.1.1**, hazards specific to Benton County are required to be outlined and other hazards are not.

3.1.1 Review of Existing Mitigation Plans

An extensive review of SEMA's latest State Hazard Mitigation Plan (2018) reveals several similarities to the Benton County Hazard Mitigation Plan (2021); however, there are some hazards that exist on the SEMA plan that do not impact Benton County, like sinkholes. Per FEMA mandate, the Benton County Hazard Mitigation Plan is not required to have a hazard profile for the following hazards: avalanches, volcanoes, coastal erosion, coastal storms, hurricanes, and tsunamis. Due to the topographical synopsis of Benton County, these are excluded from this Hazard Mitigation Plan

3.1.2 Review Disaster Declaration History

Since 1965, Benton County has had 17 total federally declared disaster declarations. Of these 17 declarations, 8 have been for severe storms, 5 for severe ice storms, 2 for floods, 1 for drought, and 1 for a hurricane evacuation. Specifics on each of the 17 declarations shall be outlined in **Table 3.1.**

Table 3.1. FEMA Disaster Declarations that included Benton County, Missouri, 1965-Present

Disaster Number	Year	Description	Declaration Date Incident Period	Individual Assistance (IA) Public Assistance (PA)
DR-372-MO	1973	Heavy Rains, Tornadoes, & Flooding	1973-04-19 1973-04-19 T 05:00:00.000Z	**Individual Assistance (IA) Public Assistance (PA)**
DR-779-MO	1987	Severe Storms & Flooding	1986-10-14 1986-09-18 – 1986-10-15	**Public Assistance (PA) only**
DR-995-MO	1993	Severe Storms & Flooding	1993-07-09 1993-06-10 – 1993-10-25	**Individual Assistance (IA) Public Assistance (PA)**
DR-1054-MO	1995	Severe Storms, Tornadoes, Hail, & Flooding	1995-06-02 1995-05-13 – 1995-06-23	**Individual Assistance (IA) Public Assistance (PA)**
DR-1463-MO	2002	Severe Storms, Tornadoes & Flooding	2003-05-06 2003-05-04 – 2003-05-30	**Individual Assistance (IA) only**
DR-1403-MO	2003	Severe Winter Ice Storm	2002-02-06 2002-01-29 – 2002-02-13	**Individual Assistance (IA) only**
DR-1524-MO	2004	Severe Storms, Tornadoes, & Flooding	2004-06-11 2004-05-19 – 2004-05-31	**Individual Assistance (IA) only**
DR-1631-MO	2006	Severe Storms, Tornadoes, & Flooding	2006-03-17 2006-03-08 – 2006-03-13	**Individual Assistance (IA) Public Assistance (PA)**
DR-1676-MO	2007	Severe Winter Storms & Flooding	2007-01-16 2007-01-12 – 2007-01-22	**Public Assistance (PA) only**
DR-1736-MO	2008	Severe Winter Storms	2007-12-27 2007-12-06 – 2007-12-15	**Public Assistance (PA) only**
DR-1961-MO	2011	Severe Winter Storm & Snowstorm	2011-03-23 2011-01-31 – 2011-02-06	**Public Assistance (PA) only**
EM-3017-MO	1976	Drought	1976-09-24 1976-09-24 T 04:00:00.000Z	**Public Assistance Type A (PA-A) only**
EM-3232-MO	2005	Hurricane Katrina Evacuation	2005-09-11 2005-08-29 – 2005-10-01	**Public Assistance Type B (PA-B) only**
EM-3281-MO	2008	Severe Winter Storms	2007-12-12 2007-12-08 – 2007-12-15	**Public Assistance (PA) only**
EM-3303-MO	2009	Severe Winter Storms	2009-01-30 2009-01-26 – 2009-01-28	**Public Assistance Type B (PA-B) only**
EM-3317-MO	2011	Severe Winter Storms	2011-02-03 2011-01-31 – 2011-02-06	**Public Assistance Type B (PA-B) only**
DR-4238-MO	2015	Severe Storms, Tornadoes, Straight-Line Winds, & Flooding	2015-08-08 2015-05-15 – 2015-07-28	**Public Assistance (PA) only**
DR-4451-MO	2019	Severe Storms, Tornadoes, & Flooding	2019-07-09 2019-04-29 – 2019-07-06	**Public Assistance (PA) only**
EM-3482-MO	2020	COVID-19	2020-03-13 2020-01-20 – Ongoing	**Public Assistance Type B (PA-B) only**

Source: Federal Emergency Management Agency, https://www.fema.gov/data-visualization-summary-disaster-declarations-and-grants

3.1.3 Research Additional Sources

- Missouri State Hazard Mitigation Plan (2018)
- Benton County Hazard Mitigation Plan (2016)
    - Benton County Land Use Disaster Plan (2017)
- Federal Emergency Management Agency (FEMA) Disaster Declaration Index
- National Centers for Environmental Information (NCEI)
    - While this source is one of the most reliable and effective for storm data generated by NOAA, there may be some discrepancies as to whether what is reported to NCEI is as truly accurate as it strives to be.
    - For purposes of this plan, it is presumed that the NCEI data is accurate and true.

3.1.4 Hazards Identified

Table 3.2. Hazards Identified for Each Jurisdiction

Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Temperatures	Flooding (River and Flash)	Levee Failure	Severe Winter Weather	Thunderstorm/Lightning/Hail/ High Wind	Tornado	Wildfire
Benton County	x	x	x	x	x	x	x	x	x	x
Cole Camp	-	x	x	x	x	-	x	x	x	x
Ionia	-	x	x	x	x	-	x	x	x	x
Lincoln	-	x	x	x	x	-	x	x	x	x
Warsaw	x	x	x	x	x	x	x	x	x	x
Schools and School Districts										
Cole Camp R-I	-	x	x	x	x	-	x	x	x	x
Lincoln R-II	-	x	x	x	x	-	x	x	x	x
Warsaw R-IX	-	x	x	x	x	-	x	x	x	x

3.1.5 Multi-Jurisdictional Risk Assessment

The purpose of this multi-jurisdictional risk assessment is to update the existing risk assessment previously done in 2016. Communities in Benton County such as Cole Camp, Ionia, or Lincoln, do face much of the same hazards that impact the larger community of Warsaw; however, Warsaw has one hazard that the rest of the county does not. In Warsaw, there is a heightened fear of dam failure, although no dam has failed in Benton County as of the writing of this assessment.

Benton County's climate is uniform throughout the county, though its topography varies from community to community. For example, Warsaw has a different topography than Cole Camp or Ionia. The community of Lincoln is unique in which they feature an airport on the north side of town, which makes this section of the community and Benton County flatter than most of the rest of the county. As far as building construction in Benton County goes, many of the buildings are older so they may be at risk for future hazards and disasters if those hazards and disasters are severe enough. Being the most populated area in Benton County, Warsaw is at greatest risk for larger disasters because of the Truman Dam lies within the community. Of note, there are 21 dams in total throughout Benton County. Granted most individuals live a reasonable distance from the dam in case of failure, it is still a prevalent hazard to the community. This could prove challenging for future vulnerability in Warsaw but not the rest of the county. Aside from this there is plenty of agricultural areas within Benton County outside of the four main communities within county lines. Each of these differences in community hazard vulnerability will be discussed in the vulnerability section of each hazard.

3.2 ASSETS AT RISK

This particular section reviews the critical infrastructure that is considered to be at risk. Critical infrastructure is the lifeblood of a community much like the citizens that encompass it. In Benton County, this can range from businesses in Warsaw to the roadways and electric power lines that are found throughout the county, each of these is considered to be risk for hazards and disasters. This applies to all incorporated communities of Benton County (Cole Camp, Ionia, Warsaw, and Lincoln). Using a tool provided by SEMA, we can analyze how truly at risk each asset in these communities is. Of note, this tool features only the following pieces of critical infrastructure (State owned facilities, State leased facilities, schools, and State owned bridges). Furthermore, this section will also include total populations at risk in addition to the aforementioned critical infrastructure.

The following link provides direct access to county information as collected by SEMA, it is semi open-source, so anyone who has the link can access it. It is also parcel data, so it provides estimated building values using FEMA's software HAZUS.

https://drive.google.com/drive/folders/0Bzg99s866kWocFB5Y3hCRlRuWWM

Unincorporated County and Incorporated Cities

For each of the following three tables, population data is based on 2010 Census Bureau data (Will be updated to 2020 in the next plan, or as information becomes available). Building counts and building exposure values are based on parcel data developed by the State of Missouri Geographic Information Systems (GIS) database. This data, organized by County, is available on Google Drive through the link provided in the previous section. 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 and are defined below in **Table 3.3**. 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 3.3 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 Benton County**. Table 3.4** that follows provides the building value exposures for the county and each city in the Benton County broken down by usage type. Finally, **Table 3.5** provides the building count total for the county and each city in the Benton County broken out by building usage types (residential, commercial, industrial, and agricultural).

Table 3.3. Maximum Population and Building Exposure by Jurisdiction (In $ Thousands)

Jurisdiction	2010 Annual Population Estimate	Building Count	Building Exposure ($)	Contents Exposure ($)	Total Exposure ($)
Cole Camp	1,121	581	$75,230	$39,826	$115,056
Ionia	88	52	$5,376	$2,656	$8,032
Lincoln	1,190	524	$68,167	$32,118	$100,285
Warsaw	2,127	1,094	$131,723	$72,215	$203,938
Unincorporated Benton Co.	14,530	13,143	$1,314,150	$694,589	$2,008,740
Totals	**19,056**	**15,394**	**$1,594,646**	**$841,405**	**$2,436,051**

Source: U.S. Bureau of the Census, Annual population estimates/ 5-Year American Community Survey 2010/2015; Building Count and Building Exposure, Missouri GIS Database from SEMA Mitigation Management; 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 3.4. Building Values/Exposure by Usage Type (In $ Thousands)

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Total
Cole Camp	$66,198	$3,322	$1,448	$20	$75,230
Ionia	$5,312	**-0-**	**-0-**	$64	$5,376
Lincoln	$56,936	$3,650	**-0-**	$59	$68,167
Warsaw	$116,732	$8,859	$724	**-0-**	$131,723
Unincorporated Benton Co.	$1,215,263	$65,293	$13,748	$12,791	$1,314,150
Totals	**$1,460,440**	**$81,124**	**$15,931**	**$12,934**	**$1,594,646**

Source: Missouri GIS Database, SEMA Mitigation Management Section

Table 3.5. Building Counts by Usage Type

Jurisdiction	Residential Counts	Commercial Counts	Industrial Counts	Agricultural Counts	Total
Cole Camp	486	81	2	4	573
Ionia	39	0	0	13	52
Lincoln	418	89	0	12	519
Warsaw	857	216	1	0	1093
Unincorporated Benton County	8,922	1,592	19	2,601	13,139
Totals	**10,722**	**1,978**	**22**	**2,630**	**15,342**

Source: Missouri GIS Database, SEMA Mitigation Management Section; Public School Districts and Special Districts

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 3.6** 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 3.6. Population and Building Exposure by Jurisdiction-Public School Districts (In $ Thousands)

Public School District	Enrollment	Building Count	Building Exposure ($)	Contents Exposure ($)	Total Exposure ($)
Cole Camp R-I	**720**	**4**	**$3,009**	**$24,595.16**	**$27,604.16**
Lincoln R-II	**472**	**2**	**$7,522**	**$2,902.70**	**$10,424.70**
Warsaw R-IX	**1,202**	**12**	**$1,504**	**$5,310.88**	**$6,814.88**
Unincorporated Benton County	**202**	**3**	**$6,018**	**-0-**	**$6,018.00**

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

3.2.1 Critical and Essential Facilities and Infrastructure

For the following section, information will include data from the Data Collection Questionnaire and other sources concerning the vulnerability of participating jurisdictions' critical, essential, high potential loss, and transportation/lifeline facilities to identified hazards herein in this place. 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 3.7 includes a summary of the inventory of critical and essential facilities and infrastructure in the Benton County. The list was compiled from the Data Collection Questionnaire as well as the following sources:

- 2018 Missouri State Hazard Mitigation Plan and Hazard Mitigation Viewer
- 2016 Benton County Natural Hazard Mitigation Plan
- 2016 Benton County Disaster Land Use Plan
- Benton County Emergency Operations Plan
- Local Planning Mechanisms that are applicable where possible

Table 3.7. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction

Jurisdiction	Airport Facility	Bus Facility	Childcare Facility	Communications Tower	Electric Power Facility	Emergency Operations	Fire Service	Government	Housing	Shelters	Highway Bridge	Hospital/Health Care	Nursing Homes	Police Station	Potable Water Facility	Sanitary Pump Stations	School Facilities	Wastewater Facility	TOTAL
Cole Camp	-	x	-	-	x	x	x	x	x	x	x	x	x	x	x	-	x	x	13
Ionia	-	-	-	-	x	x	x	x	x	-	-	-	-	-	x	-	-	-	7
Lincoln	x	-	-	x	x	x	x	x	x	x	x	x	x	x	x	-	x	x	14
Warsaw	x	x	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15
Benton County	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	18
Totals	**3**	**3**	**1**	**2**	**5**	**5**	**5**	**5**	**5**	**4**	**4**	**4**	**4**	**4**	**5**	**2**	**4**	**4**	**69**

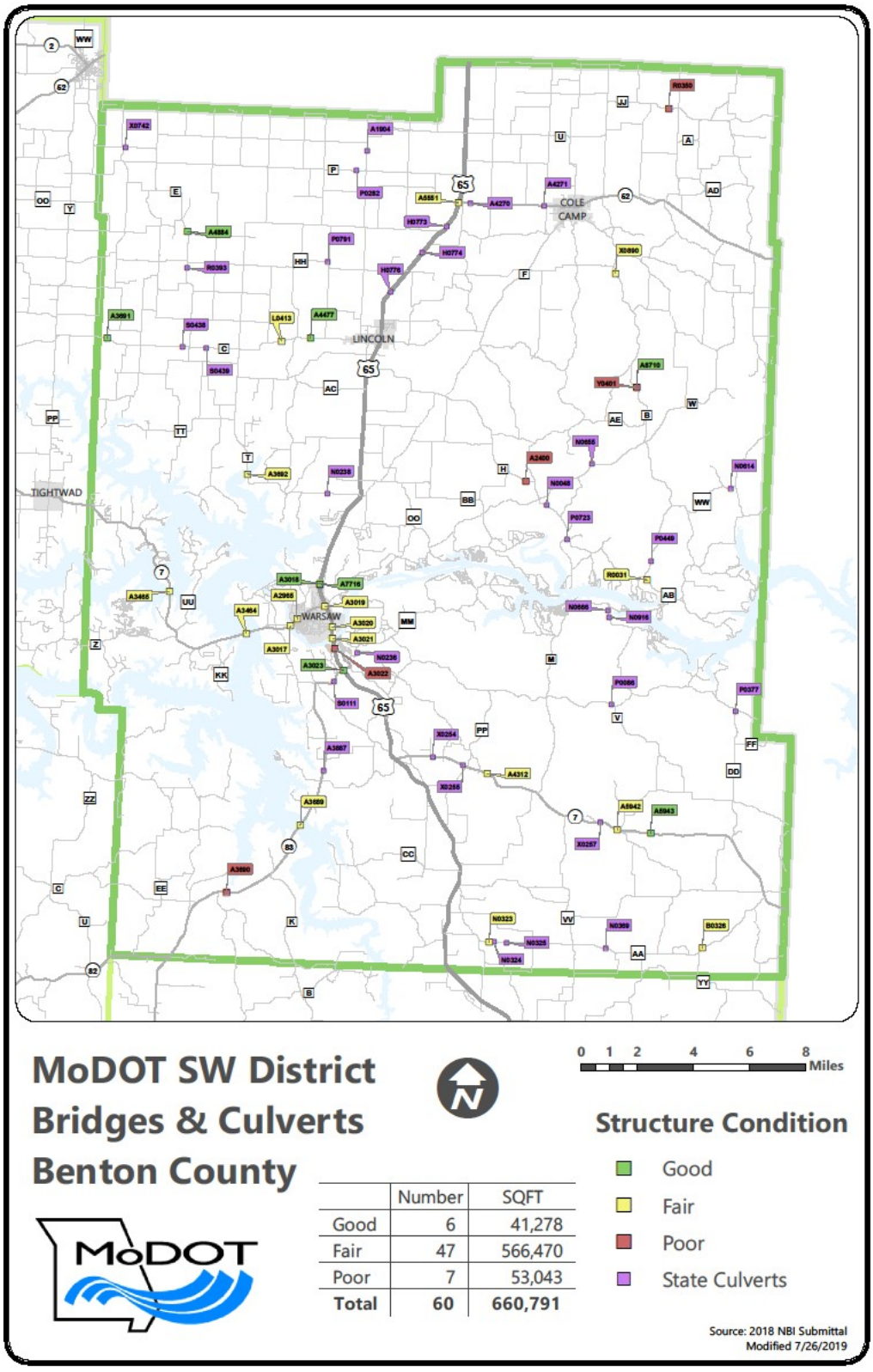
Source: Missouri 2018 State Hazard Mitigation Plan and Hazard Mitigation Viewer; Data Collection Questionnaires; HAZUS, etc.

3.2.2 Bridges in Benton County

What is Scour Critical?

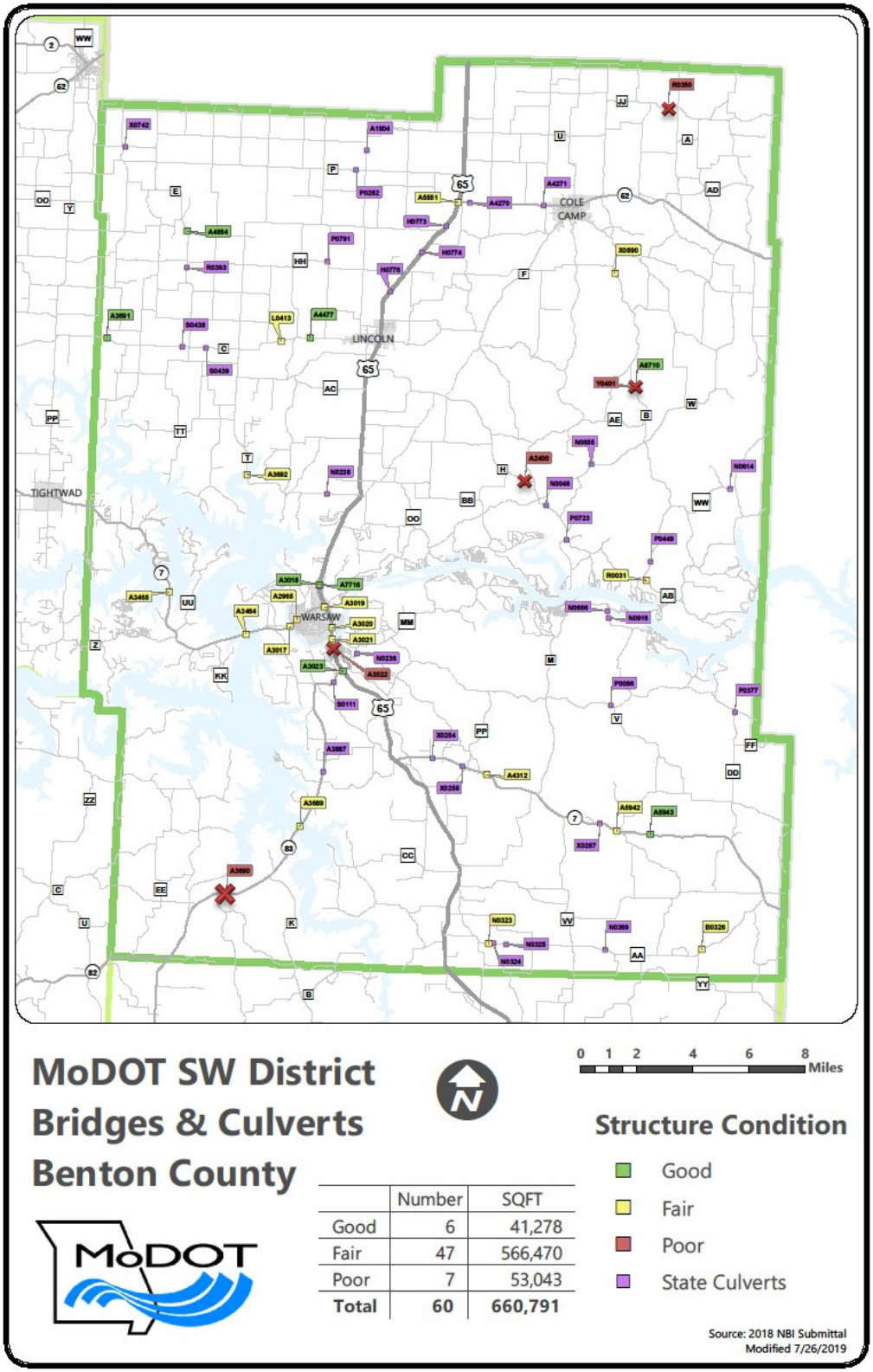
- The term “scour critical” refers to one of the database elements in the National Bridge Inventory. This element is quantified using a “scour index”, which is a number indicating the vulnerability of a bridge to scour during a flood. Bridges with a scour index between 1 and 3 are considered “scour critical”, or a bridge with a foundation determined to be unstable for the observed or evaluated scour condition.
- According to the Federal Highway Administration, Benton County has 11 structurally deficient bridges, many of which are controlled by the Missouri Department of Transportation on the state’s supplemental highway system (the lettered routes (A, M, etc.).
    - Only one bridge, the US 65 bridge over the Osage River, is federally controlled, though maintained by the city of Warsaw.
- Likewise, the Missouri Department of Transportation identified 7 bridges in 2019 as being in ‘poor’ condition, see **Figure 3.1**[1]**.**
- It is important that these bridges are maintained when funding is available because they are critical infrastructure and lifelines in a community, and in some cases, like the US 65 bridge over the Osage River is the only way to get from one side of the river to the other. If this bridge somehow were to fail, it would in essence divide Benton County in two. It is a vital lifeline for the region and the cities it serves.
- Structurally deficient bridges are seen in **Figure 3.2**, and are marked with a **RED X**.

[1] The map shows **5** poor condition bridges despite 7 being mentioned.



	Number	SQFT
Good	6	41,278
Fair	47	566,470
Poor	7	53,043
Total	**60**	**660,791**

Figure 3.1. Benton County Structurally Deficient Bridges ➔ Marked with Red 'X'



3.2.3 Other Assets[5(d)]

Part of assessing Benton County's to disaster also requires data on the natural, historic, cultural, and economic assets of the area. This is done in multiple stages.

- These resources are vital to the county's economy, for without them the economy would regress.
- Recognizing that if higher amounts of damage were to result from more significant disasters would be from these facilities.
- Ensuring that proper reconstruction and recovery measures are taken on these structures for future mitigated actions are followed.
- Certain ecological aspects could actually benefit Benton County in mitigating against some major disasters.

One of these ecological aspects of the county is the threatened and endangered species, and for purposes of this plan, they are important to be considered at-risk, but in a different way than people.

Threatened and Endangered Species: The following table (**Table 3.8**) showcases the Federally Threatened, Endangered, Proposed and Candidate Species in the county of Benton.

Table 3.8. Threatened and Endangered Species in Benton County

Common Name	Scientific Name	Status
Gray Bat	Myotis Grisescens	Endangered
Indiana Bat	Myotis Sodalis	Endangered
Northern Long-eared Bat	Myotis Septentrionalis	Threatened
Eastern Hellbender Missouri Dps	Cryptobranchus Alleganiensis	Proposed Endangered
Niangua Darter	Etheostoma Nianguae	Threatened
Mead's Milkweed	Asclepias Meadii	Threatened

Source: U.S. Fish and Wildlife Service, http://www.fws.gov/midwest/Endangered/lists/missouri-cty.html; see also https://ecos.fws.gov/ipac/

Natural Resources: It is the responsibility of the Missouri Department of Conservation to provide a list of state parks and other state maintained conservation areas that lay within Benton County boundaries. **Table 3.9** provides the names and locations of parks and conservation areas in the Benton County.

Table 3.9. Parks and Conservation Areas in Benton County

Park / Conservation Area	Address	City
Big Buffalo Creek Conservation Area	Big Buffalo Rd and State Highway WW	Cole Camp
Brickley Hollow Conservation Area	Fire Rd 401-2	Lincoln
Edmonson Access	Kulhman Rd & State Highway H	Lincoln
Granny's Acres Conservation Area	Day Rd.	Warsaw/Fristoe
Hi Lonesome Prairie Conservation Area	NE 301 BC/NE 221 BC	Cole Camp
Ionia Ridge Conservation Area	Hoffman Rd	Ionia
Lost Valley Fish Hatchery	28232 Hatchery Ave.	Warsaw
Mora Conservation Area	11905 State Highway U	Mora (Unincorporated)
Mount Hulda Towersite	State Highway W	Cole Camp
Truman Reservoir Management Lands (Brush Creek)	State Highway TT	Warsaw

Truman Reservoir Management Lands (Leesville)	SE 80 Rd (Henry County)	Racket
Truman Reservoir Management Lands (Little Tebo Creek)	Georgetown Ave.	Warsaw
Truman Reservoir Management Lands (Tebo Islands)	State Highway TT	Warsaw

Source: http://mdc7.mdc.mo.gov/applications/moatlas/AreaList.aspx?txtUserID=guest&txtAreaNm=s
The best source for park information is usually county and community websites.

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 3.10. Benton County Properties on the National Register of Historic Places

Property/Properties	Address	City	Date Listed
Downtown Cole Camp	100 E & W Main St, Maple St, 105 E Butterfield, 106 N Olive St & 107 N Boonville Rd.	Cole Camp	04/11/2002
Augustus Sander House	408 W. Jefferson St.	Cole Camp	06/09/2004
Upper Bridge over Old Highway A	Old Highway A	Warsaw	09/17/1999

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

Table 3.11. Major Non-Government Employers in Benton County

Employer Name	Main Locations	Product or Service	Employees
Leeson Manufacturing	Warsaw	Manufacturing	250
Walmart	Warsaw	Retail	220
Warsaw R-IX Schools	Warsaw	Education	195
Lincoln R-II Schools	Lincoln	Education	100+
Good Samaritan Care Center	Cole Camp	Elderly Care	100+
Hilty Quarries Inc.	Warsaw	Rock Products	100
Warsaw Manufacturing	Warsaw	Manufacturing	71
Cole Camp R-I Schools	Cole Camp	Education	60+
Newman's Country Mart	Warsaw	Retail	60

Source: Data Collection Questionnaires; local Economic Development Commissions

While Agriculture is not a vital aspect to the municipalities of Benton County, it is the unincorporated aspect of Benton County that relies heavily on agriculture as a means of making money for the County economy. **Table 3.12** will exhibit the agriculture related jobs in Benton County. This information comes from the 2017 USDA Agricultural Census. **IT MAY NOT REFLECT BENTON COUNTY IN 2021.**

Table 3.12. Agriculture-Related Jobs in Benton County

**These numbers are from 2017, and may not reflect the current status of agricultural life in Benton County in 2021. The next Agricultural Census will be done in 2022.*

Benton County
Missouri

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	749	-6
Land in farms (acres)	223,782	-7
Average size of farm (acres)	299	-1
Total	**($)**	
Market value of products sold	82,737,000	+32
Government payments	785,000	-22
Farm-related income	1,391,000	-67
Total farm production expenses	63,036,000	(Z)
Net cash farm income	21,877,000	+372
Per farm average	**($)**	
Market value of products sold	110,463	+41
Government payments (average per farm receiving)	4,847	+12
Farm-related income	4,715	-65
Total farm production expenses	84,160	+6
Net cash farm income	29,208	+404

1 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	19
Livestock, poultry, and products	81

Land in Farms by Use (%) [a]

Cropland	35
Pastureland	40
Woodland	22
Other	4

Acres irrigated: 658
(Z)% of land in farms

Land Use Practices (% of farms)

No till	13
Reduced till	5
Intensive till	6
Cover crop	4

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	201	27
$2,500 to $4,999	55	7
$5,000 to $9,999	86	11
$10,000 to $24,999	115	15
$25,000 to $49,999	127	17
$50,000 to $99,999	68	9
$100,000 or more	97	13

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	31	4
10 to 49 acres	130	17
50 to 179 acres	253	34
180 to 499 acres	216	29
500 to 999 acres	78	10
1,000 + acres	41	5

USDA United States Department of Agriculture
National Agricultural Statistics Service
www.nass.usda.gov/AgCensus

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**82,737**	**54**	**114**	**1,328**	**3,077**
Crops	**16,114**	**75**	**114**	**1,795**	**3,073**
Grains, oilseeds, dry beans, dry peas	13,380	73	112	1,299	2,916
Tobacco	-	-	4	-	323
Cotton and cottonseed	-	-	5	-	647
Vegetables, melons, potatoes, sweet potatoes	(D)	74	113	(D)	2,821
Fruits, tree nuts, berries	72	50	111	1,413	2,748
Nursery, greenhouse, floriculture, sod	63	68	108	1,479	2,601
Cultivated Christmas trees, short rotation woody crops	(D)	27	37	(D)	1,384
Other crops and hay	2,562	28	114	988	3,040
Livestock, poultry, and products	**66,623**	**20**	**114**	**755**	**3,073**
Poultry and eggs	38,030	11	112	311	3,007
Cattle and calves	23,609	27	113	679	3,055
Milk from cows	1,445	34	97	867	1,892
Hogs and pigs	(D)	48	111	(D)	2,856
Sheep, goats, wool, mohair, milk	(D)	(D)	111	(D)	2,984
Horses, ponies, mules, burros, donkeys	100	53	113	1,437	2,970
Aquaculture	(D)	16	43	(D)	1,251
Other animals and animal products	10	68	111	1,497	2,878

Total Producers [c]	**1,269**
Sex	
Male	788
Female	481
Age	
<35	110
35 – 64	730
65 and older	429
Race	
American Indian/Alaska Native	4
Asian	3
Black or African American	1
Native Hawaiian/Pacific Islander	2
White	1,259
More than one race	-
Other characteristics	
Hispanic, Latino, Spanish origin	7
With military service	152
New and beginning farmers	314

Percent of farms that:

Have internet access	73
Farm organically	(Z)
Sell directly to consumers	4
Hire farm labor	19
Are family farms	97

Top Crops in Acres [d]

Forage (hay/haylage), all	42,261
Soybeans for beans	16,135
Corn for grain	8,673
Wheat for grain, all	2,705
Corn for silage or greenchop	1,548

Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	1,618,769
Cattle and calves	47,535
Goats	252
Hogs and pigs	(D)
Horses and ponies	665
Layers	224,570
Pullets	80
Sheep and lambs	1,118
Turkeys	104,335

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.

• May not add to 100% due to rounding. [b] Among counties whose rank can be displayed. [c] Data collected for a maximum of four producers per farm. [d] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. • Position below the line does not indicate rank. (D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

Source: USDA Census for Agriculture – 2017

3.3 LAND USE AND DEVELOPMENT

3.3.1 Development Since Previous Plan Update

Since 2016, the last time the Benton County Hazard Mitigation Plan was updated, there has been some significant population swings within the county. For the most part, Benton County has seen positive population growth, but some communities like Cole Camp and Lincoln have seen negative population growth. Ionia, the smallest community in Benton County, has seen zero growth since the 2010 census.

Table 3.13. County Population Growth, 2010-2019

Jurisdiction	Total Population 2010	Total Population est. 2019	2010-2019 # Change	2010-2019 % Change
Benton County	19,056	19,488	+432	**+2.2%**
Cole Camp	1,121	1,073	-48	**-4.5%**
Ionia	88	88	0	**0**
Lincoln	1,190	1,181	-9	**-1.0%**
Warsaw	2,127	2,204	+77	**+3.5%**

Source: U.S. Bureau of the Census, Decennial Census, Annual Population Estimates, American Community Survey 5-year Estimates; Population Statistics are for entire incorporated areas as reported by the Census bureau

Populations and housing units in any given city can change from year to year. However, for purposes of this plan, the table below, **Table 3.14,** provides the changes seen over a ten year span, from 2010, when the last complete Census was done, till 2019, the year before the last complete census in 2020 is done. Overall, these changes resemble changes in peoples' preference to live in other areas of Benton County, such as Lincoln or Warsaw. There are a multitude of factors that play into these changes so not one single factor can be identified for the changes in population nor housing units in Benton County

Table 3.14. Change in Housing Units, 2010-2019

Jurisdiction	Housing Units 2010	Housing Units 2019	2010-2019 # Change	2010-2019 % Change
Benton County	14,011	14,182	+171	+1.2%
Cole Camp	658	591	-67	-11.33%
Ionia	46	54	+8	+14.81%
Lincoln	467	514	+47	+9.14%
Warsaw	1,015	1,283	+268	+21%

Source: U.S. Bureau of the Census, Decennial Census, American Community Survey 5-year Estimates; Population Statistics are for entire incorporated areas as reported by the U.S. Census Bureau

Since 2016, the last time the Benton County Hazard Mitigation Plan was updated, there has not been a lot of changes to the county's landscape. Overall, there has been a net gain as far as housing units in three of four communities, with Cole Camp being the only exception. Much of the businesses featured in the previous plan are still the dominant employers in Benton County. The following section outlines a basic overview from the Data Collection Questionnaire as well as a summation of data presented previously. Note that school districts are not included.

Jurisdictions

- **Cole Camp** – Projections are that Cole Camp will slowly decline in population over time, but then level out, and maybe re-rise gradually.
- **Lincoln** – This community is seeing some growth, albeit slow growth but this community may see zero growth for a few years.
- **Ionia** – Despite seeing zero growth in the last 10 years, projections suggest minimal growth.
- **Warsaw** – This community continues to see an uptick in growth and is likely to continue it.

3.3.2 Future Land Use and Development

- By 2030, Benton County is projected to have a population of 20,228, which coincides with the overall state of Missouri, which is expecting an overall increase to the population by 2030 as well, according to the University of Missouri.
- Although increasing the population is normally a good thing, it also adds to the risk. More people in the population means the potential for larger fatality numbers in large scale disasters.
- Fortunately, more citizens will assist in driving Benton County's economy further than if there were fewer individuals in the county.
- This will also add to the land use in Benton County if there are more people than housing units, etc. which also will contribute to the overall risk of the county.

3.4 HAZARD PROFILES, VULNERABILITY, AND PROBLEM STATEMENTS

Each hazard will be analyzed individually in a hazard profile. The profile will consist of a general hazard description, location, strength/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.

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 Benton County. 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 areas in Benton County that are **affected** by the hazard. Where available, use maps to indicate the specific locations of the Benton County that are vulnerable to the subject hazard. For some hazards, the entire Benton County is at risk, like a tornado or pandemic outbreak.
- **Strength/Magnitude/Extent:** This includes information about the strength, 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. This section should also include information on the typical or expected strength/magnitude/extent of the hazard in the Benton County. Strength, magnitude, and extent can also include the speed of onset and the duration of hazard events. Describing the strength/magnitude/extent of a hazard is not the same as describing its potential impacts on a community. Strength/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. Tables will

showcase the previous occurrences of hazards in this plan only back 20 years, though illustrations may demonstrate events further back than the 20 year suggested date range if there is insufficient data going back 20 years.

- **Probability of Future Occurrence:** Based on the past occurrences of specific hazards, estimates of future hazards can be performed. If an event occurs annually, therefore the probability is presumed to be 100%. However, this is not the case with every hazard. Best ballpark estimates will be used to determine the future likelihood of any hazard listed herein this plan so estimates may not be truly accurate.
- **Changing Future Conditions Considerations:** Additionally, due to the ever changing conditions of the climate and environment, consideration should be given to this. All efforts shall be made to consider future events that will impact Benton County.

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 hazardareas.

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 are based on the best available data. The vulnerability assessments can also be based on data that was collected for the 2018 State Hazard Mitigation Plan Update.

The Missouri Hazard Mitigation Viewer includes a Map Viewer with a legend of clearly labeled features, a north arrow, a base map that is either aerial imagery or a street map, risk assessment data symbolized the same as in the 2018 State Plan for easy reference, search and query capabilities, ability to zoom to county level data and capability to download PDF format maps. The Missouri Hazard Mitigation Viewer can be found at this link: http://bit.ly/MoHazardMitigationPlanViewer2018.

The vulnerability assessments in the Benton 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.

Following the Vulnerability Assessment, each of the following relevant hazards in Benton County will have these subheadings:

- **Vulnerability Overview:**
  The plan will provide an overall summary of each jurisdiction's (Cole Camp, Ionia, Lincoln, Warsaw) vulnerability to the identified hazards. The overall summary of vulnerability identifies structures, systems, populations, or other community assets as defined by the community that are susceptible to damage and loss in hazard events.
- **Potential Losses to Existing Development:**
  (including types and numbers, of buildings, critical facilities, etc.) For each participating jurisdiction, the plan describes the potential impacts of any hazard. Impact meaning the consequences of effect of the hazard on the jurisdiction and its assets. Assets are determined by the community and include, for example, people, structures, facilities, systems, capabilities, and/or activities that have value to the community. For example, impacts could be described by referencing historical disaster impacts and/or an estimate of potential future losses.
- **Previous and Future Development:**
  This section will include information on how changes in development have impacted the community's vulnerability to this hazard.
- **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 must conclude with a brief summary of the problems created by the hazard in Benton County, and possible ways to resolve those problems. Include jurisdiction-specific information in those cases where the risk varies across the Benton County. The focus of the problem statements sub-section is to synthesize the "problems" revealed through the risk assessment and then through the process of updating the mitigation strategy, develop mitigation actions that are aimed at "solving" the identified problems. Problem statements should be as specific as possible; relating to specific jurisdictions as well as specific assets or areas of the Benton County that are problematic. This will in turn prompt development of specific mitigation actions.

3.4.1 Flooding (Riverine and Flash)

Hazard Profile

Hazard Description

A flood is limited or extensive inundation of ordinarily arid land areas. River flooding is defined as the overspill of rivers, streams, drains, and lakes due to undue rainfall, rapid snowmelt, or ice up. 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 and levee failure is discussed in **Sections 3.4.2** and **Section 3.4.3** respectively. 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 unique form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow.

Flooding is not always attributed to natural factors. Flooding occurs in many places because excess water in one place over a quick period of time has nowhere to go. So when this happens flash flooding is the usually a quick onset disaster with minimal time to prepare and mitigate its risks.

Moreover, flash flooding can result from meteorological factors, such as training thunderstorms, those that occur over one area for an extended period of time. This causes in the rainwater to accumulate in low lying areas and create quickly produced flash floods.

Unfortunately, current infrastructure is aging to the point where it cannot hold excess rainfall as well as it did when it was new. Because of this, some floods inundate people’s homes and flood basements.

Despite the unpredictability with flash flooding, advances in meteorological technology are making it a little easier to predict the probability of flash floods. As these advances continue to be tweaked and adjusted to fit the situation as it unfolds in real time.

Geographic Location

Flooding can occur anywhere in Benton County and its respective SFHAs (Special Flood Hazard Areas). Preliminary maps developed as part of a Risk MAP project are used as best available data for planning purposes. The Map Service Center provides access to the latest effective products as applicable.

- **Table 3.15** shows Benton County flood history if there is enough flood event history to warrant it. Note that NCEI data includes events for flooding and for flash flooding. In order to obtain information for the following tables, consult event narratives. Those events without location-specific information will be tabulated under “unspecified” locations in the table. Generally, using a 20-year time frame for previous events is adequate. However, where flooding records are scanty, use as many years needed for a solid probability calculation.

Table 3.15. Benton County NCEI Flood Events by Location, 2000-2020

Location	# of Events
Unincorporated Benton County	44
-Unincorporated Benton County (Brandon) – 3 flood events	
-Unincorporated Benton County (Countywide) – 4 flood events	
-Unincorporated Benton County (Dell Jct.) – 2 flood events	
-Unincorporated Benton County (Edwards) – 4 flood events	
-Unincorporated Benton County (Fristoe) – 2 flood events	
-Unincorporated Benton County (Hastain) – 6 flood events	
-Unincorporated Benton County (Knobby) – 3 flood events	
-Unincorporated Benton County (Mt. Hulda) – 1 flood event	
-Unincorporated Benton County (North Portion) – 1 flood event	
-Unincorporated Benton County (Northwest Portion) – 1 flood events	
-Unincorporated Benton County (Racket) – 2 flood events	
-Unincorporated Benton County (Santiago) – 3 flood events	
-Unincorporated Benton County (South Portion) – 3 flood events	
-Unincorporated Benton County (Tackner) – 1 flood event	
-Unincorporated Benton County (West Portion) – 1 flood event	
-Unincorporated Benton County (Whitakerville) – 1 flood event	
-Unincorporated Benton County (Zora) – 3 flood events	
Cole Camp	8
-Cole Camp – 8 flood events	
Lincoln	7
-Lincoln – 7 flood events	
Warsaw	11
-Warsaw – 11 flood events	
Total = 69	

Source: National Centers for Environmental Information, October 16, 2020

Flash floods tend to occur when there is a large amount of rain falling within a short period of time, which in turn floods roadways and makes them virtually impassable.

Strength/Magnitude/Extent

Flooding has long been an issue for the state of Missouri as a whole due to its geography and being a commonplace for some of the country's major rivers and their basins. For Benton County, this event has 7 flood events and 69 flash flood events since 2000. Prior to 2000, there was the Great Flood of 1993, which was likely the most significant flooding event in the state on record. However, for purposes of this plan, it has been omitted. Floods can sweep away homes, cars and other personal belongings that are not secured.

National Flood Insurance Program (NFIP) Participation

Only Benton County (Unincorporated), Lincoln and Warsaw participate in the National Flood Insurance Program, Ionia does not as they have no flood concerns other than a spot flash flood, and the City of Cole Camp, despite 8 flood events since 2000, does not participate because they believe that they do not have any properties within a floodplain, therefore they do not participate.

Table 3.16. NFIP Participation in Benton County

Community ID #	Community Name	NFIP Participant (Y/N/Sanctioned)	Current Effective Map Date	Regular-Emergency Program Entry Date
#290029	City of Lincoln	Y	NSFHA	04/29/2020
#290030	City of Warsaw	Y	06/02/2009	08/04/1987
#290028	City of Cole Camp	S	06/02/2009	N/A
#290057	Benton County (Unincorporated)	Y	06/02/2009	03/01/1987
#290986	Town of Ionia	N	06/02/2009	N/A

Source: NFIP Community Status Book, October 13, 2020; 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

Below are four maps of each community in Benton County associated with the National Flood Insurance Program, including Cole Camp and Ionia who do not participate in NFIP as noted earlier.

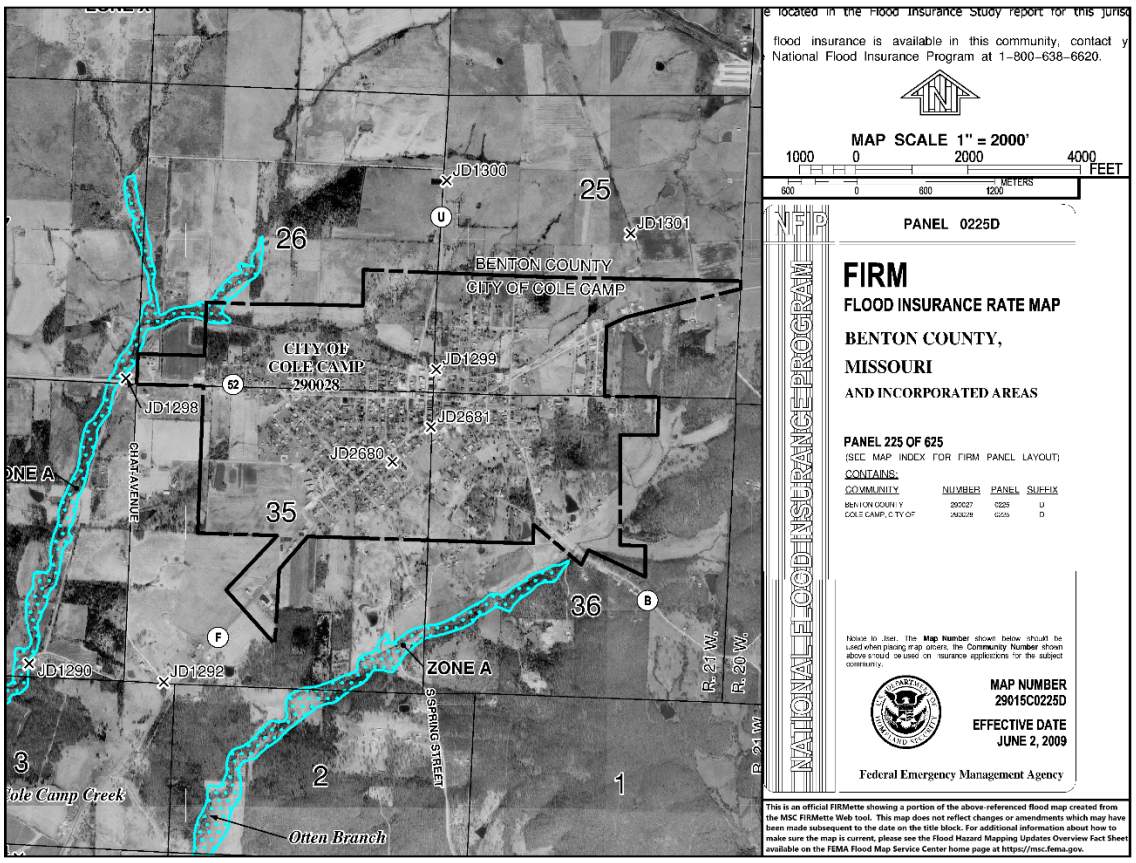


Figure 3.1: City of Cole Camp FIRMette – Courtesy of FEMA

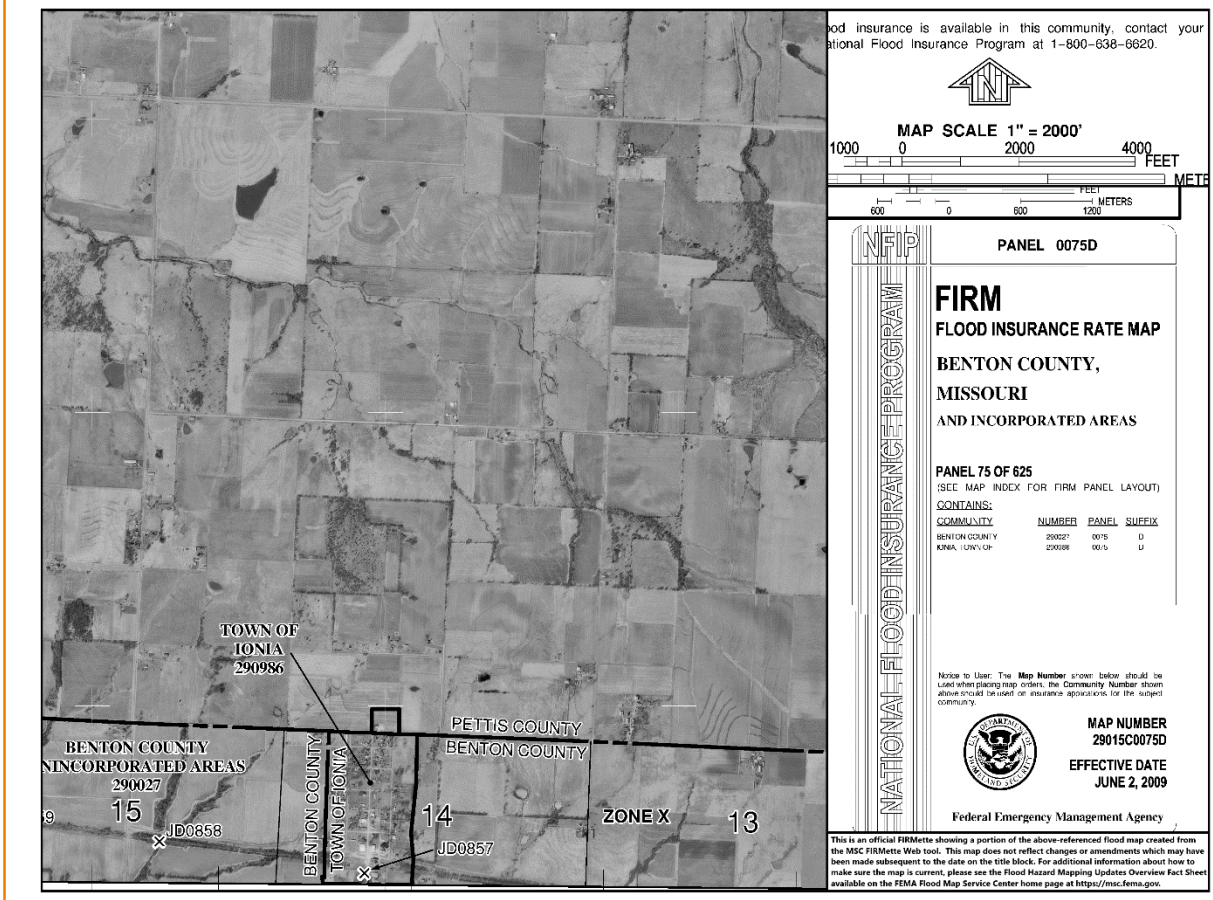


Figure 3.2 Town of Ionia FIRMette – Courtesy of FEMA

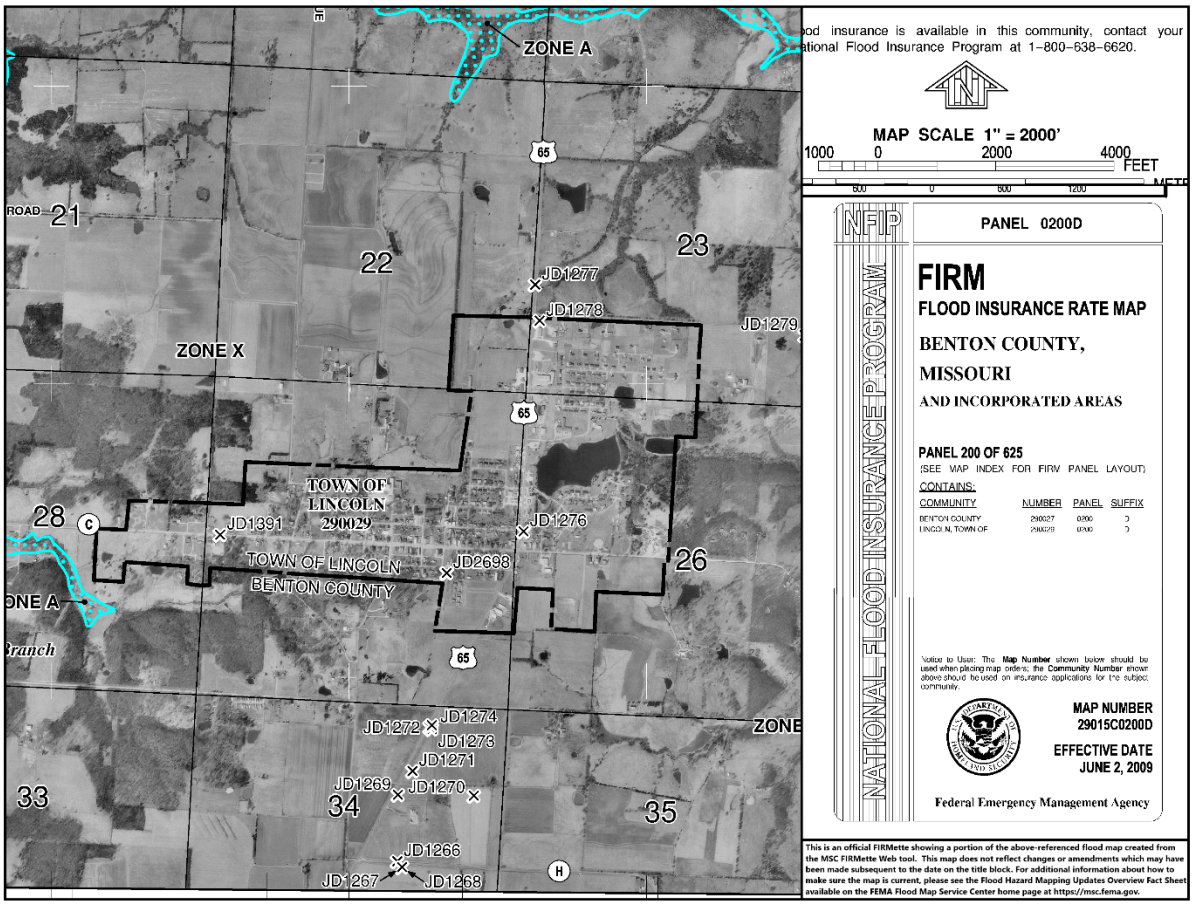


Figure 3.3. City of Lincoln FIRMette – Courtesy of FEMA

Figure 3.4a City of Warsaw FIRMette 1 of 4 – Courtesy of FEMA

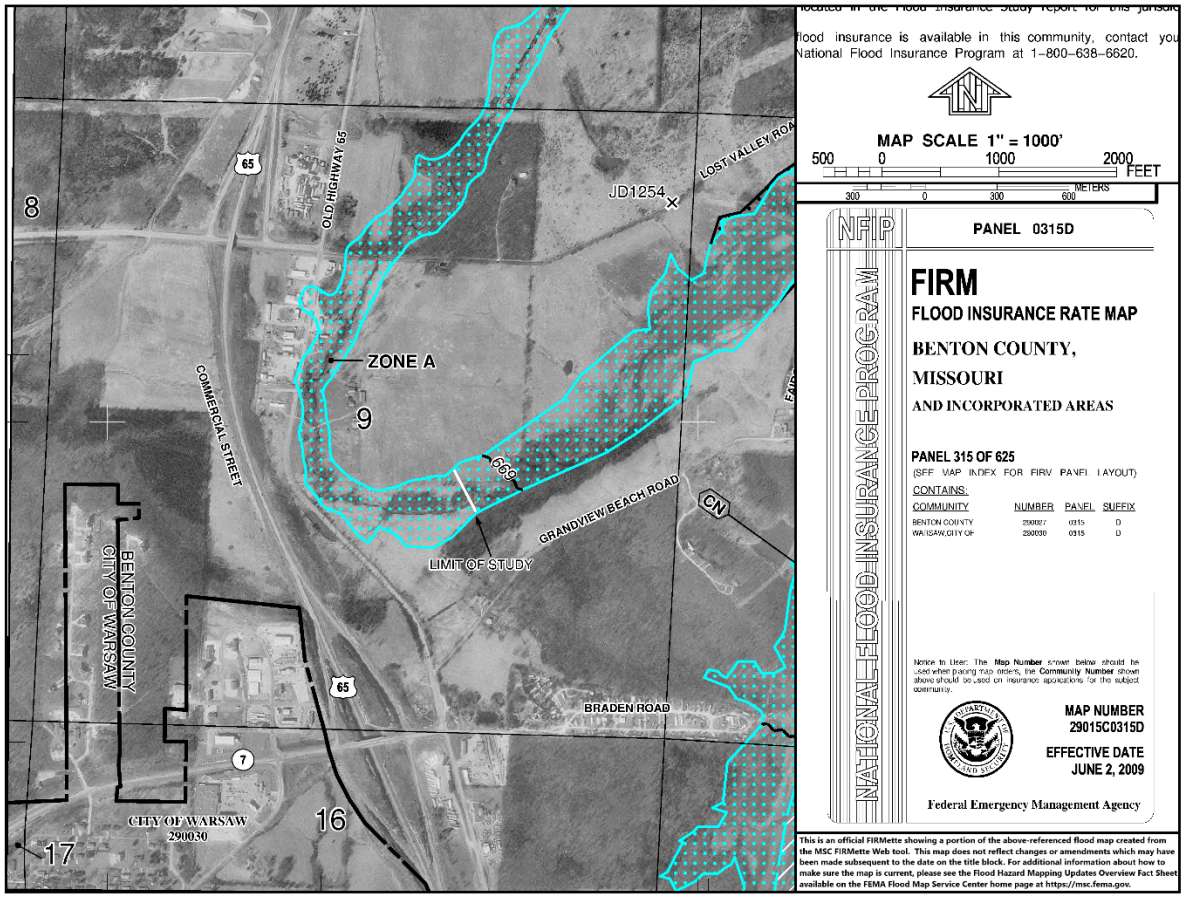


Figure 3.4b City of Warsaw FIRMette 2 of 4 – Courtesy of FEMA

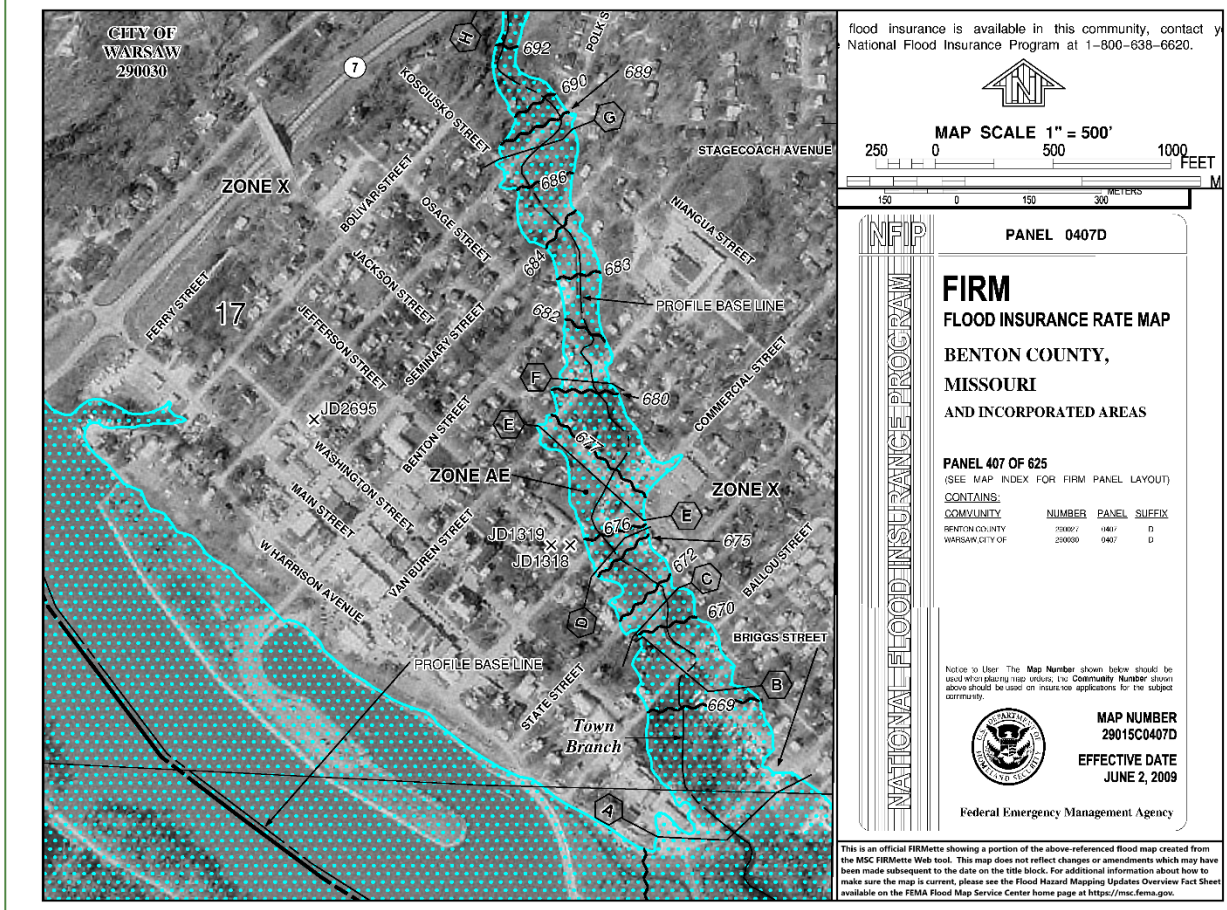


Figure 3.4c City of Warsaw FIRMette 3 of 4 – Courtesy of FEMA

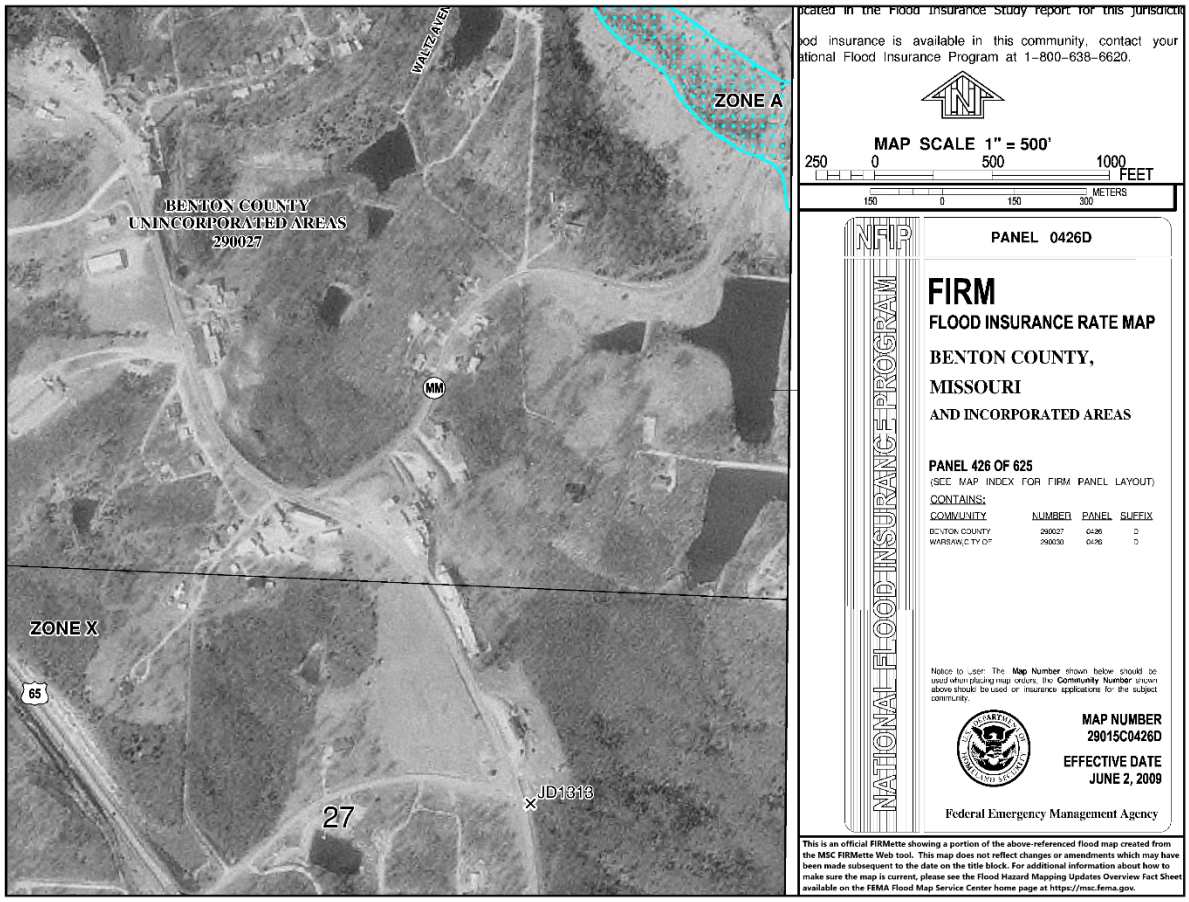


Figure 3.4d City of Warsaw FIRMette 4 of 4 – Courtesy of FEMA
(this one is the closet one with the Warsaw School District included)

Repetitive Loss/Severe Repetitive Loss Properties

Repetitive Loss Properties are those properties with at least two flood insurance payments of $1,000 or more in a 10-year period. According to the Flood Insurance Administration, jurisdictions included in the planning area have a combined total of 0 repetitive loss properties. As of 2 February 2021, 0 properties have been mitigated, leaving 0 un-mitigated repetitive loss properties.

Table 3.17: Benton County Severe Repetitive Losses

Jurisdiction	# of Properties	Type of Property	# Mitigated	Building Payments	Content Payments	Total Payments	Average Payment	# of Losses
Benton County	0	0	0	0	0	0	0	0

Source: Flood Insurance Administration as of 1 January 2021

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.

Previous Occurrences

Table 3.18. NCEI Benton County Flash Flood Events Summary, 2000 to 2020

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
2000	**1**	**0**	**0**	**0**	**0**
2001	**10**	**0**	**0**	**0**	**0**
2002	**1**	**0**	**0**	**0**	**0**
2003	**2**	**0**	**0**	**0**	**0**
2004	**4**	**0**	**0**	**0**	**0**
2005	**4**	**0**	**0**	**0**	**0**
2006	**0**	**0**	**0**	**0**	**0**
2007	**3**	**0**	**0**	**0**	**0**
2008	**7**	**0**	**0**	**0**	**0**
2009	**4**	**1**	**0**	**0**	**0**
2010	**9**	**0**	**0**	**0**	**0**
2011	**0**	**0**	**0**	**0**	**0**
2012	**1**	**0**	**0**	**0**	**0**
2013	**0**	**0**	**0**	**0**	**0**
2014	**0**	**0**	**0**	**0**	**0**
2015	**9**	**0**	**0**	**0**	**0**
2016	**1**	**0**	**0**	**0**	**0**
2017	**1**	**0**	**0**	**0**	**0**
2018	**5**	**0**	**0**	**0**	**0**
2019	**6**	**1**	**0**	**0**	**0**
2020	**1**	**0**	**0**	**0**	**0**
Total	**69**	**2**	**0**	**0**	**0**

Source: NCEI

The following graphic illustrates the flood impact that Benton County has experienced since 1996.

Source – FEMA

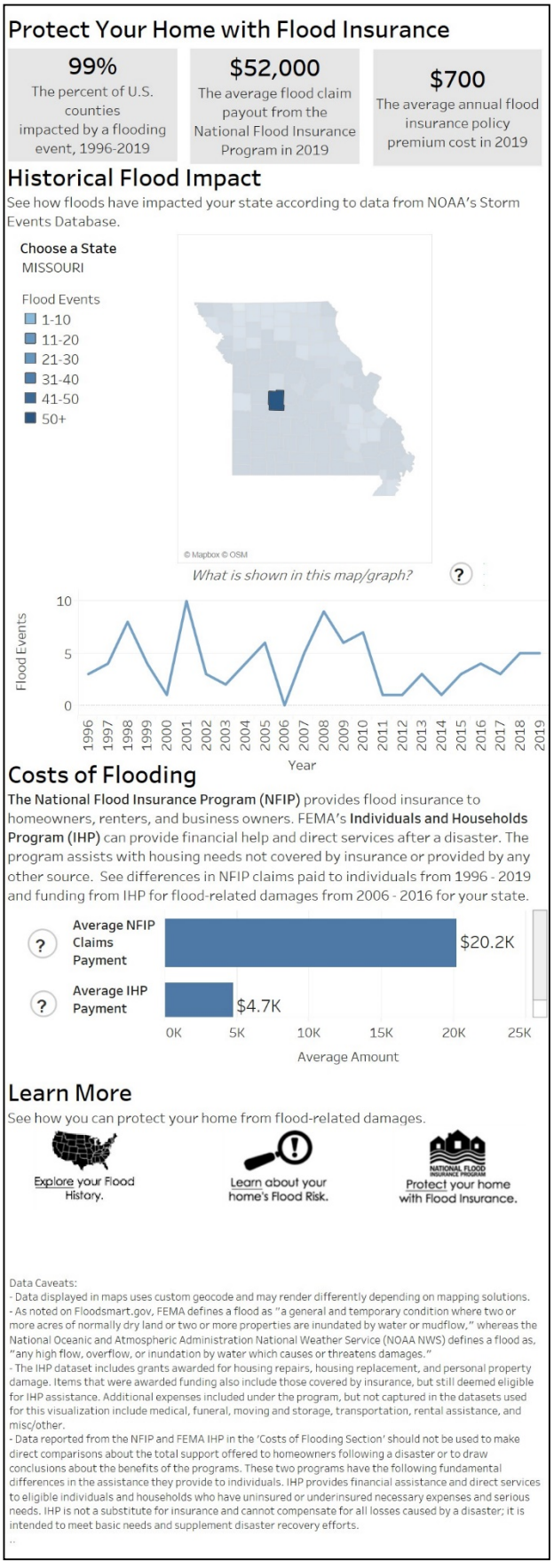


Table 3.19. NCEI Benton County Riverine Flood Events Summary, 2000 to 2020

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
2000	0	0	0	0	0
2001	0	0	0	0	0
2002	2	0	0	0	0
2003	0	0	0	0	0
2004	0	0	0	0	0
2005	2	0	0	0	0
2006	0	0	0	0	0
2007	1	0	0	0	0
2008	2	0	0	0	0
2009	0	0	0	0	0
2010	3	0	0	0	0
2011	1	0	0	0	0
2012	0	0	0	0	0
2013	3	0	0	0	0
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	2	0	0	0	0
2017	3	0	0	0	0
2018	3	0	0	$25,000	0
2019	3	0	0	0	0
2020	5	0	0	0	0
Total	**30**	**0**	**0**	**$25,000.00**	**0**

Source: NCEI, 13 October 2020

The costliest flood in the last twenty years occurred in Santiago, an unincorporated community in Benton County, in 2018. Herein is the narrative from that event from the National Weather Service Office in Springfield, Missouri:

- **A culvert was lifted upward due to heavy rainfall and asphalt was washed away on State Highway HH about 4 miles west of Highway 65 northwest of Lincoln, Missouri.**

This flood event did $15,000 in damages.

Probability of Future Occurrence

Flash Flooding

$$\frac{69\ Flash\ Floods\ since\ January\ 2000}{21\ Years\ Since\ January\ 2000}$$

100% Probability

$$An\ average\ of\ 3\ flash\ floods\ annually!$$

Riverine Flooding

$$\frac{30\ Riverine\ Flooding\ Events\ since\ January\ 2000}{21\ Years\ cince\ January\ 2000} = 1\ to\ 2\ Riverine\ Floods\ Annually$$

100% Probability

Changing Future Conditions Considerations[4(c)]

With the onset of climate change, it is inevitable that floods will continue to occur in Benton County, but they are increasing in intensity and frequency. As it stands right now, floods are a frequent occurrence in the county, but projections are that the floods will be much worse, potentially matching the Great Flood of 1993 or worse.

Vulnerability

Vulnerability Overview

Floods present more than just one hazard than just inundation of low-lying areas. While this is the primary hazard associated with flooding, there are additional considerations that are to be considered with flooding vulnerability. Flooding causes water damages to buildings and tears thru levees, causing massive agricultural damages.

Flooding takes a toll on current and existing infrastructure, for flooding can erode portions of bridges, causing them to collapse. This would be especially problematic to those aforementioned scour critical bridges outlined in section titled **'Bridges in Benton County'** as well as the included Missouri Department of Transportation maps.

Furthermore, flooding can create cascading disasters, such as sewer backup, which creates health problems and can overstrain the sewer systems. It is best to address these issues before a flooding event occurs so any shortcomings identified in critical infrastructure can be fixed.

Potential Losses to Existing Development

As suggested by Benton County's past history of flooding, there are several critical facilities that are at-risk. Flooding in the past has historically been somewhat devastating compared to what it could be. The only riverine flood since 2000 that caused any damage was in 2018, but since 2000 there have been **0** devastating flash floods despite a confounding **69** occurrences.

Impact of Previous and Future Development[4(c); 5(f)]

Ideally, future developments should be placed in the areas away from identified floodplains. The issue is though people do not like being told they cannot build in a particular area because it clashes with their desires. This has long been an argument between the general public and emergency planners for many years. Although Lincoln and Warsaw are active members of the National Flood Insurance Program, it is highly advised that building in flood prone areas be avoided at all costs.

Hazard Summary by Jurisdiction

Benton County – As a whole, flooding is an ever present hazard to disrupt the daily lives of those in incorporated communities and the unincorporated alike. Some communities will only see flash flooding; but others may experience both riverine flooding and flash flooding, which will be discussed below.

Jurisdictions

- **Cole Camp** – With no rivers nearby the community of Cole Camp, riverine flooding is unlikely, but flash flooding is likely in a severe thunderstorm.
- **Lincoln** – Like Cole Camp, Lincoln is not likely to experience riverine flooding; yet it may experience flash flooding in a heavy rain storm.
- **Ionia** – As with the previous two communities, Ionia will not see any river flooding, but flash flooding is likely in severe weather.
- **Warsaw** – Unlike the previous three communities, Warsaw is subject to both river flooding and flash flooding. Being on the Osage River means Warsaw may be flooded this way and in heavy rainfall events as well that creates flash floods.

School Districts

- **Cole Camp R-I** – This school district faces more of a threat of a flash flooding event than a riverine flooding event.
- **Lincoln R-II** – Similar to Cole Camp R-I, this school district faces more of a chance of flash flooding than a river flooding event.
- **Warsaw R-IX** – Despite the city of Warsaw being at risk for both river flooding and flash flooding, the school district is realistically only at-risk for flash flooding directly, but riverine

flooding would have an indirect impact on the school district.

Problem Statement

- Flooding in Benton County will continue to be an issue going forward, both riverine flooding and flash flooding alike. Some of the better mitigation strategies for flooding includes knowing the hazard potential for your current location. Flash flooding can strike rather quickly from a severe thunderstorm, so knowing how to reach higher ground in a short period of time is effective. As well as receiving wireless emergency alerts on either your mobile device, or through a weather alert radio.

3.4.2 Levee Failure

Hazard Profile

Hazard Description

Levees are manmade earthen embankments aimed at serving one of many purposes: flood control and flood protection. Many of the levees built in the United States date back to the early 1900s in the aftermath of the Johnstown (Pennsylvania) Flood of 1899, which assisted in creating the Army Corps of Engineers. Many early disaster management strategies revolved creating earthen levees as a means of flood control, in turn mitigated strategies.

However, like the rest of the critical infrastructure in the United States and particular Benton County, they are not immune from failure. The city of New Orleans learned this lesson the hard way in the wake of Hurricane Katrina in 2005, so it is important to maintain and repair levees as they age.

FEMA describes **2** different kinds of levee failure.

- **Overtopping: When a Flood Is Too Big**

  Overtopping occurs when floodwaters exceed the height of a levee and flow over its crown. As the water passes over the top, it may erode the levee, worsening the flooding and potentially causing an opening, or breach, in the levee.

- **Breaching: When a Levee Gives Way**

  A levee breach occurs when part of a levee gives way, creating an opening through which floodwaters may pass. A breach may occur gradually or suddenly. The most dangerous breaches happen quickly during periods of high water. The resulting torrent can quickly swamp a large area behind the failed levee with little or no warning.

http://mrcc.isws.illinois.edu/1913Flood/awareness/materials/SoYouLiveBehindLevee.pdf

Levees can experience damage in many different ways, it's not just water that causes a levee to fail or give way. While water, large quantities of it, is the main reason for levee failure, nature has its own way of causing them to fail. Burrowing animals can cause small levees to fail, debris from storms like large branches can also lead to failure. In moderate flood events, it is usually the smaller levees, like those that protect smaller farms, that fail.

Geographic Location

Benton County is unique in which it has a plethora of dams, and a few levees, however, there is no uniform means of inventorying these levees. Efforts are underway to try and make this simpler, but changes in political policy and administrative rulings have made this effort more difficult.

There are two concurrent nation-wide levee inventory development efforts, one led by the United

State Army Corps of Engineers (USACE) and one led by Federal Emergency Management Agency (FEMA). The National Levee Database (NLD), developed by USACE, captures all USACE related levee projects, regardless of design levels of protection. The Midterm Levee Inventory (MLI), developed by FEMA, captures all levee data (USACE and non-USACE) but primarily focuses on levees that provide 1% annual-chance flood protection on FEMA Flood Insurance Rate Maps (FIRMs).

Smaller levees and minor agricultural levees are not incorporated to the Corps' National Levee Database and likely are not subject to the extensive inspection and maintenance checks as those on the NLD.

Figure 3.4. County Levees Shown on DFIRM as Providing Protection from the 1-Percent Annual Chance Flood

Source: FEMA Flood Insurance Rate Map 16 October 2020

Strength/Magnitude/Extent

Levee failure is typically an additional or secondary impact of another disaster such as flooding or earthquake. The main difference between levee failure and losses associated with riverine flooding is magnitude. Levee failure often occurs during a flood event, causing destruction in addition to what would have been caused by flooding alone. In addition, there would be an increased potential for loss of life due to the speed of onset and greater depth, extent, and velocity of flooding due to levee breach.

Previous Occurrences

Based on information provided by the Army Corps of Engineers and SEMA, Benton County has never experienced levee failure in the past.

Probability of Future Occurrence

Currently the Warsaw levee is undergoing extensive study and is possibly going to be removed or altered in such a fashion that it will no longer be classified as a levee. Similar work is being done on the western levee in Warsaw. For further information, please contact the City of Warsaw's City Administrator, he will provide an overview of what is to come for this levee. Therefore, it is not feasible to calculate the probability of future failure.

Changing Future Conditions Considerations

Climate change has the possibility to throw a curveball into the concept of levee safety for Benton County, but it is unlikely. Because Benton County does not border the Missouri nor the Mississippi Rivers, it does not present the same potential as a St. Louis County or Cole County would for levee failure. Aforementioned probabilities list levee failure as near 0, which is based on the likeliest odds given in information presented by the Corps.

Vulnerability

Vulnerability Overview

Levees are routinely inspected by the Corps' of Engineers, and for each inspection, they define three levels of levee ratings. **Figure 3.3** below defines the three ratings.

Figure 3.5. Definitions of the Three Levee System Ratings

Levee System Inspection Ratings

Acceptable	All inspection items are rated as Acceptable.
Minimally Acceptable	One or more levee segment inspection items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable inspection items would not prevent the segment/system from performing as intended during the next flood event.
Unacceptable	One or more levee segment inspection items are rated as Unacceptable and would prevent the segment/system from performing as intended, or a serious deficiency noted in past inspections (previous Unacceptable items in a Minimally Acceptable overall rating) has not been corrected within the established timeframe, not to exceed two years.

THE LONE LEVEE IN BENTON COUNTY DOES NOT HAVE A RATING FROM THE US ARMY CORPS OF ENGINEERS

Potential Losses to Existing Development

In the time since the levee in the City of Warsaw was built, the businesses that were previously located near the levee have since left the city altogether. Estimates are currently unknown as far as losses to existing developments near the Warsaw levee since the area has been redeveloped.

Impact of Previous and Future Development

The City of Warsaw has been in discussions with the Corps of Engineers to determine if the levee still meets its original intent. The levee was originally constructed for the pump back of water released from Truman Lake into Lake of the Ozarks and back into Truman Lake for regeneration of power. This pump back system eventually failed to perform as planned and the system was abandoned. City discussion with the Corps is on-going for long-term renovation and redevelopment of a body of water trapped by the southern levee into a more tourist friendly area to include a marina that will allow access to the Lake of the Ozarks in the east by way of the Osage River.

Hazard Summary by Jurisdiction

Benton County – As a whole, Benton County faces a threat of flooding, both riverine and flash flooding alike, and it is expected that there could be as many as 5 flooding events a year, some may be severe, and others may not.

Jurisdictions

- **Cole Camp** – Because of Cole Camp's geography, it is not likely to face levee failure.
- **Lincoln** – In all likelihood, Lincoln will not see levee failure.
- **Ionia** – This small community may not experience any levee failure.
- **Warsaw** – Of all the incorporated communities in Benton County, Warsaw is at the greatest risk for levee over topping. The levee has gates placed in various locations. These gates have been left open since the pump back system was abandoned. This allows the water on each side to equalize during high water events. The top of the levee is elevation 666. A high-water event higher than this elevation will overtop the levee. The main threat to flooding is the Town Branch that feeds into the city side of the levee and flows through the gates into the Lake of the Ozarks.

School Districts

- **Cole Camp R-I** – This particular school district is unlikely to bear the consequences of levee failure.
- **Lincoln R-II** – There is no threat to this school district from levee failure.
- **Warsaw R-IX** – Unlike the city of Warsaw, this school district is under no direct threat of levee overtopping. The schools are positioned strategically away from the levee.

Problem Statement

- Because Benton County only has one firm levee, it should be noted that this levee could fail in the future, but there is a high potential that any agricultural levees are just as likely to fail as the Warsaw levee. While the levee is subject to long-term actions, this will inheritably provide more beneficial results. A report by the US Army Corps of Engineers dated September 1980 titled *Final Report and Final Supplemental Environmental Impact Statement II for Downstream Measures at Harry S. Truman Dam and Reservoir* provides great insight to the reason for the Warsaw levee and the design criteria that creates a levee uniquely different to traditional levees used for flood control. The US Army Corps of Engineers report was provided by the City of Warsaw for information used in this section.

3.4.3 Dam Failure

Hazard Profile

Hazard Description

A dam is defined as a barrier constructed across a waterway for the purpose of storing, manage, or rerouting 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.

Table 3.20. MoDNR Dam Hazard Classification Definitions

Hazard Class	Definition
Class I	Most significant threat to public safety.
Class II	Moderate threat to public safety.
Class III	Least threatening to public safety.

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

Table 3.21. NID Dam Hazard Classification Definitions

Hazard Class	Definition
Low Hazard	Minimal chance of dam failure
Significant Hazard	Heightened chance of dam failure
High Hazard	Extreme risk of dam failure

Source: National Inventory of Dams

Geographic Location

Dams Located Within the Benton County

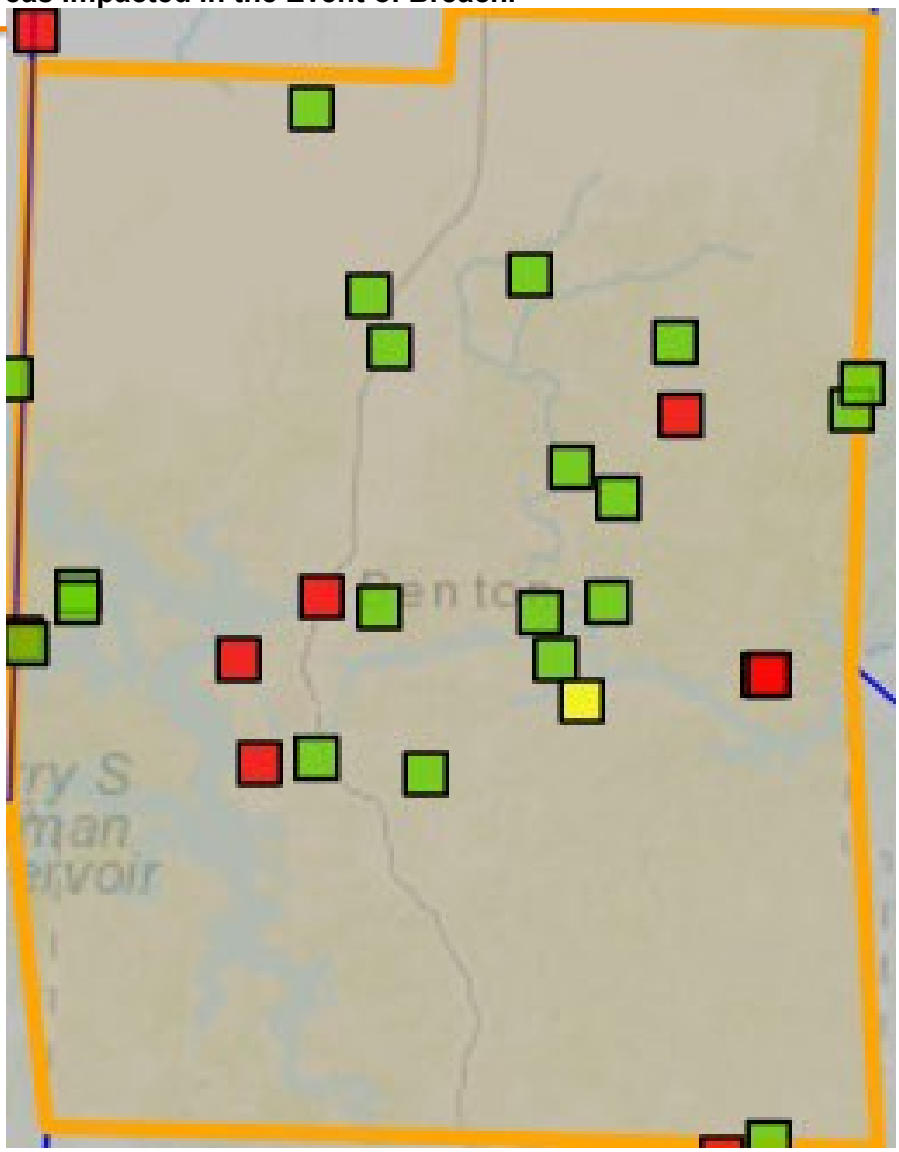
Table 3.22. High Hazard Dams in Benton County

Dam Name	Emergency Action Plan (EAP)AP	Dam Height (Ft)	Normal Storage (Acre-Ft)	Last Inspection Date	River	Nearest Downstream City	Distance To Nearest City (Miles)	Dam Owner
Harry S. Truman	Yes	98	5,202,000	01/31/18	Osage	Warsaw	1 Mi.	Army Corps of Engineers
Jackson Keller Trust Lake North	Not required	30	112	Unknown	Cooney Creek	N/A	N/A	G.B. Keller Co. Haas & Wilk
Jackson Keller Trust Lake South	Not required	25	54	Unknown	Cooney Creek	N/A	N/A	Jackson Keller
Kyle Lake Dam	Not Required	30	96	Unknown	Indian Creek	Lincoln	3 Mi.	Don Kyle

Mirror Lake #2	Not Required	32	51	Unknown	South Grand	N/A	N/A	Larry Shyrock
Tatge Lake Dam – Section 29	Not Required	28	150	Unknown	Osage	Warsaw	1 Mi.	H.H. Tatge

Sources: Missouri Department of Natural Resources, https://dnr.mo.gov/geology/wrc/dam-safety/damsinmissouri.htm and National Inventory of Dams, http://nid.usace.army.mil/cm_apex/f?p=838:12.

Figure 3.6. High Hazard Dam Locations in Benton County and Areas Impacted in the Event of Breach.



Source: U.S. Army Corps of Engineers, Missouri Department of Natural Resources

Upstream Dams Outside the Benton County

According to the Corps' of Engineers, there is a private, high-risk dam located outside Benton County, but it does not present a significant hazard risk to Benton County because it smaller and does not possess a large inundation area.

Strength/Magnitude/Extent

In a worst-case scenario, dam failure of the Harry S. Truman Dam in Warsaw would be catastrophic. This dam holds a lot of water, and should it fail, all buildings located below the dam would be flooded

instantaneously.

Previous Occurrences

BENTON COUNTY HAS NEVER EXPERIENCED A DAM FAILURE THAT WAS NOTED.

Probability of Future Occurrence

Despite no previously recorded dam failure, it is entirely possible that a dam could fail in the future. The Harry S. Truman Dam is a federally controlled dam and is subject to routine inspection, but private dams like Kyle Lake Dam are not subject to the same precautionary measures. It is near impossible to predict the probability of future dam failures for Benton County.

Changing Future Conditions Considerations

With the onset of climate change being ever present, dam safety should remain a priority on the federally controlled dam, the Harry S. Truman Dam, as well as privatized high-risk dams. If the Truman Dam were to fail, the consequences would be insurmountable for the town of Warsaw. Though if a private dam fails, it would be consequential for the dam owner and their lands.

Vulnerability

Vulnerability Overview

Of the six high hazard dams in Benton County, the Truman Dam presents the highest hazard risk and vulnerability of failing. Though federally maintained and regulated, it is possible for some defect to slip through the cracks. Other high-risk dams are not subject to federal regulations and inspection protocol though they should be maintained and inspected regularly by their private owners.

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

Buildings and critical facilities located near high-hazard dams are at greatest risk for being damaged from the dam failure. The amount of damage that could be done is insurmountable with the amount of infrastructure provide ample room for destruction, granted much has changed with the landscape in Warsaw in the last handful of years.

Impact of Previous and Future Development

In all likelihood, dam failure in Warsaw would cause flooding of areas below the dam, and it would be cataclysmic on current infrastructure. New infrastructure, while good for the economy, would be negative for the overall cost affiliated with a dam failure.

Hazard Summary by Jurisdiction

Benton County – With high-hazard dams scattered throughout Benton County, any one of them can fail, though none have failed before, this does not mean that none will fail.

Jurisdictions

- **Cole Camp** – Cole Camp has one dam in its vicinity, but it is considered to be a low-risk dam for failure, though it should be inspected routinely and retrofitted, as necessary.
- **Lincoln** – Akin to Cole Camp, Lincoln only has one dam that is not in imminent danger of failure, but should be inspected routinely to ensure there are no shortcomings.
- **Ionia** – Ionia does not have any dams in its small area, so this should not be an issue for them.
- **Warsaw** – Home to the Harry S. Truman Dam, this dam is routinely inspected by the Army Corps of Engineers to ensure proper dam safety. If something dire were to happen to this dam, it would have lasting impacts on the community-at-large.

School Districts

- **Cole Camp R-I** – The one dam in Cole Camp, should failure occur, it could have indirect effects on the schools in the district.
- **Lincoln R-II** – Like Cole Camp, the Lincoln School District should consider the potential, even though a small one, for dam failure because it may have indirect effects on the district.
- **Warsaw R-IX** – The city of Warsaw itself faces the direct threat of dam failure, but the schools face the indirect threat of it. Rather, should a dam fail in Warsaw, it could impact the ability of students, depending on where they live, to reach the schools, located on the other side of the dam.

Problem Statement

Despite no record of a dam failure in Benton County, it is still entirely possible that a dam could fail somewhere in the county. Of particular concern is the Harry S. Truman Dam in Warsaw. Because this dam is a federally controlled dam, meaning one controlled by the Army Corps of Engineers, it is subject to an excoriating inspection process and must have an Emergency Action Plan. This dam protects the city of Warsaw and is considered by the Corps of Engineers as ‘High Risk’. Public education efforts between the Corps’ and the city of Warsaw should exist to promote dam safety as well preparing for a worst-case-scenario.

3.4.4 Earthquakes

Hazard Profile

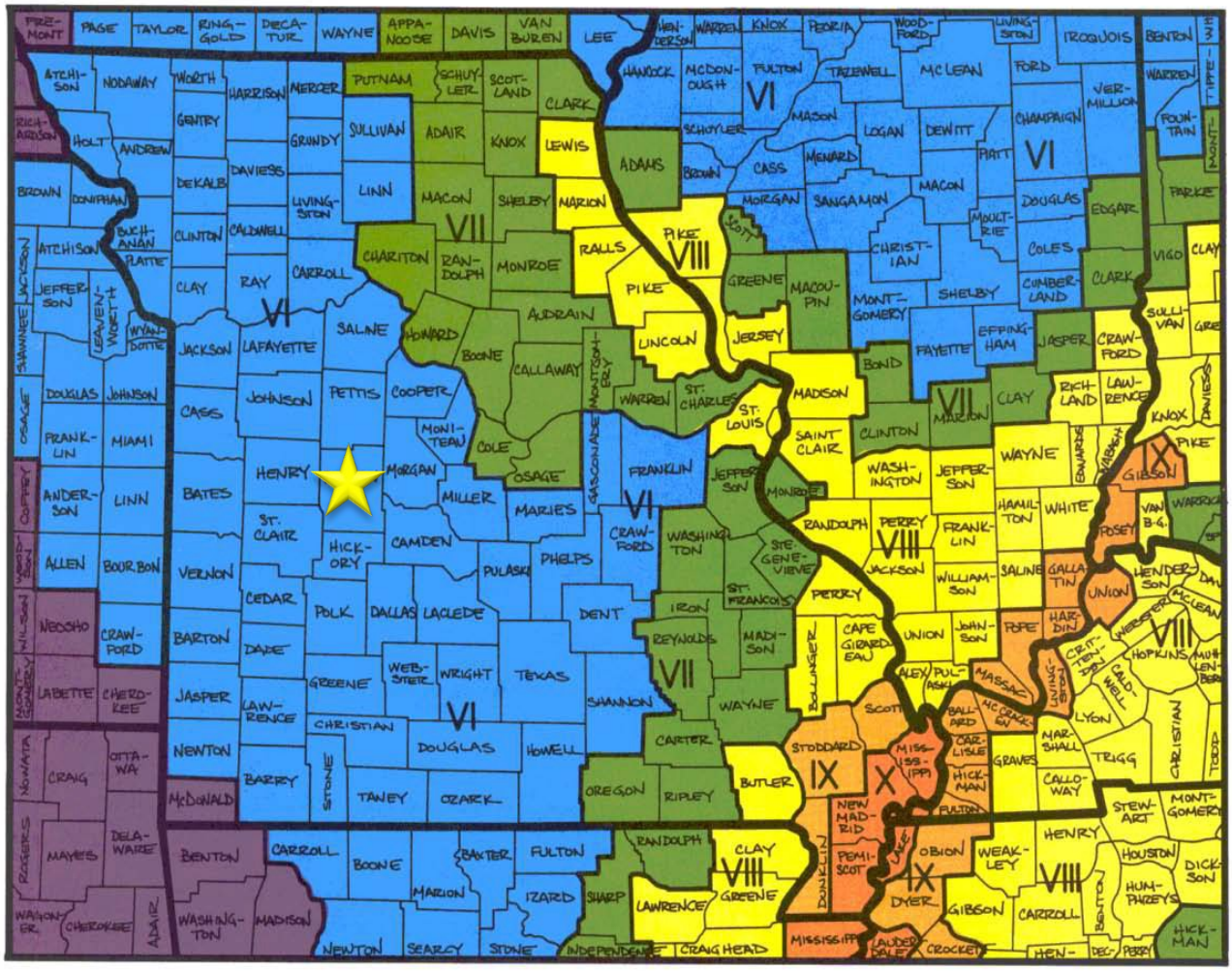
Hazard Description

Earthquakes are quick sudden movements of tectonic plates beneath the earth's surface or by other means that creates tectonic movement and shaking of the ground. Earthquakes have occurred in Missouri in the past and some experts believe there are severe earthquakes are due to happen again. The New Madrid Fault is considered to be the most threatening to Benton County. It presents an enhanced risk of earthquakes, and perhaps major quakes, to the area. The last major New Madrid earthquake occurred in three successive years: 1811, 1812, and 1813. Geologists and emergency management personnel believe another major quake from the New Madrid Zone is due to occur at any time, so mitigated measures should be heeded now.

Geographic Location

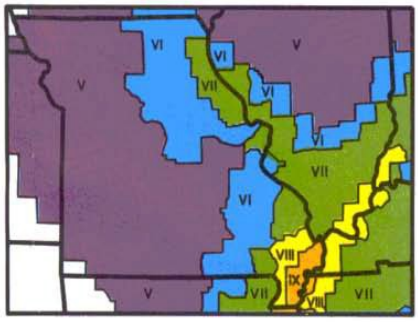
SEMA's map (**Figure 3.5**) shows the highest projected Modified Mercalli intensities by county from a potential magnitude 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid Seismic Zone. The secondary maps on **Figure 3.5** on page 3.98 of the Missouri State Hazard Mitigation Plan shows the same regional intensities for 6.7 and 8.6 earthquake, respectively. Insert arrows or outline the Benton County or use narrative to describe what the following maps illustrate about the Benton County.

Figure 3.6. 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

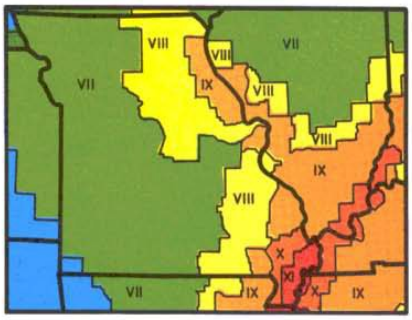


This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 6.7 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

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: https://sema.dps.mo.gov/docs/EQ_Map.pdf

Figure 3.7. Projected Earthquake Intensities

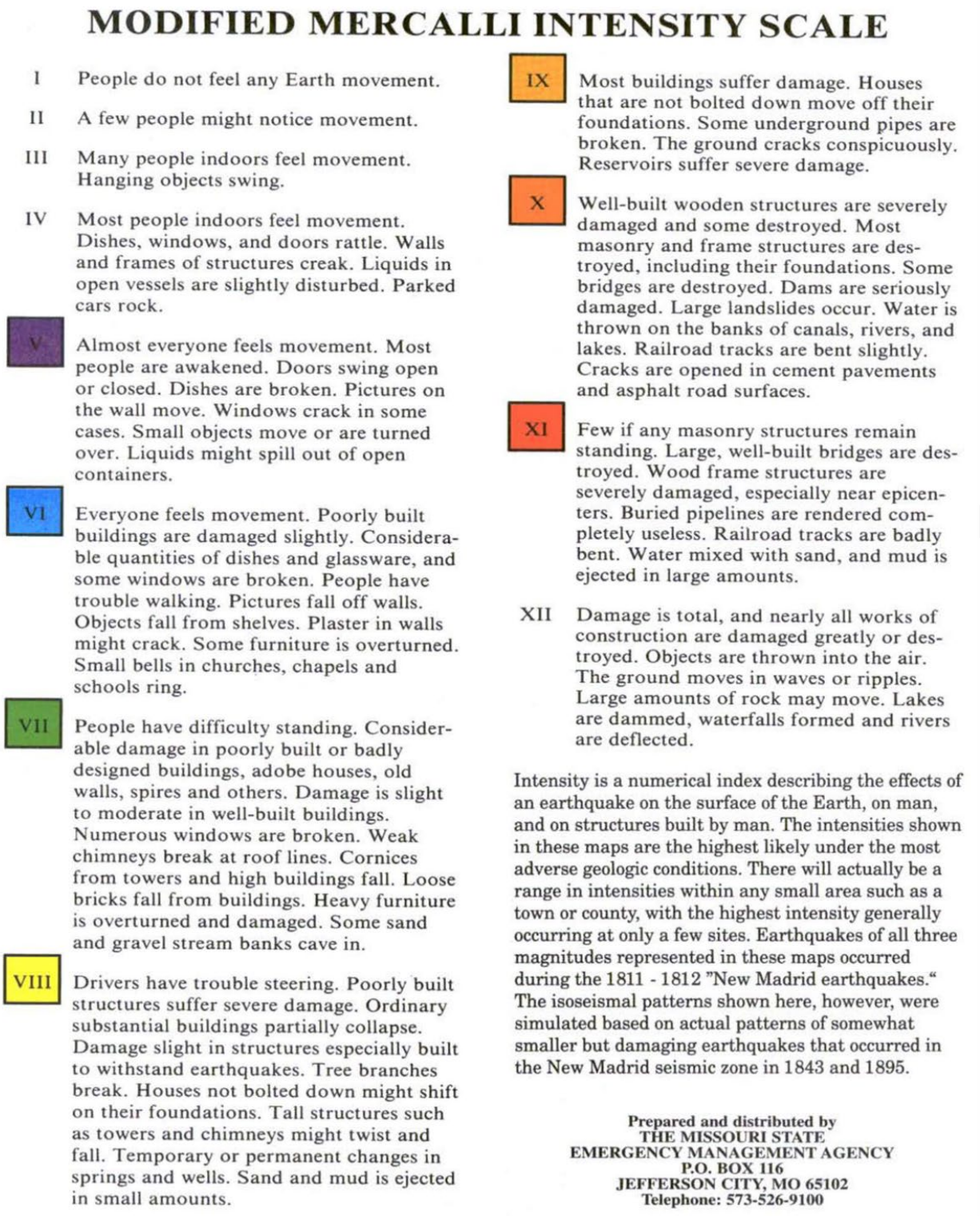
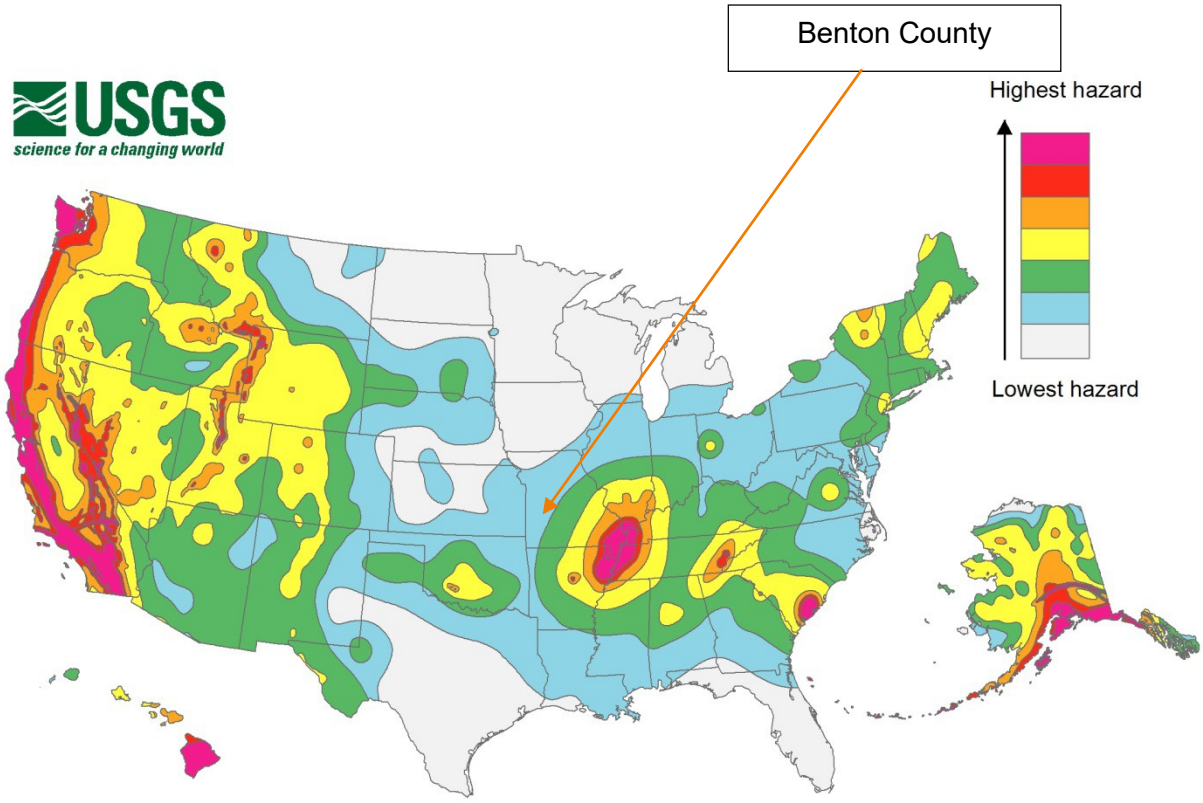


Figure 3.8. United States Seismic Hazard Map



Source: United States Geological Survey at
https://earthquake.usgs.gov/hazards/hazmaps/conterminous/2014/images/HazardMap2014_lg.jpg

Strength/Magnitude/Extent

There are two ways to measure the strength of an earthquake… 1. The Richter Scale, which measures the magnitude of an earthquake, and 2. The Modified Mercalli Intensity Scale, which measures the direct effect of an earthquake on the surface.

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. For example, comparing a 5.3 and a 6.3 earthquake shows that the 6.3 quake is ten times bigger in magnitude. Each whole number increase in magnitude represents a tenfold increase in measured amplitude because of the logarithm. Each whole number step in the magnitude scale represents a release of approximately 31 times more energy.

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

Despite no earthquakes occurring in Benton County since 1931, New Madrid still presents a chance of an earthquake with a magnitude of 5.0 or higher over the next 50 years, but it is a slim chance. *See below*.

Probability of Future Occurrence

According to some reports, there is merely a **0.39%** chance of a significant earthquake from the New Madrid Zone occurring in Benton County in the next 50 years. *This probability considers a further history of quakes in Missouri dating back to 1813, the last significant New Madrid earthquake.*

Changing Future Conditions Considerations

Based on earthquake history throughout Missouri dating back to the major quakes of the 1810s, it is expected that the next big one will occur sometime soon. How soon? The answer is not as crystal clear as this plan would like it to be. Perhaps climate change will play a role in triggering the next major New Madrid quake, and when it does, it will be a big deal. Remember the 3 successive New Madrid quakes were stronger and more devastating than anything California has ever faced. So it is important to remember this going forward as conditions change.

Vulnerability

Vulnerability Overview

- According to the last Earthquake Report compiled by the state of Missouri in 2015, the average premium for earthquake insurance in Benton County increased between 0 and 129% (see exact number below).
- Additionally, between 16 and 25% of Benton County residents were said to have owned earthquake insurance.
    - However, this was a drop off of between 2 and 15% since the previous earthquake report.
- Between 2000 and 2014, the cost of earthquake insurance in Benton County rose from $26 a month to $56 monthly, an increase of **117.3%**.

Potential Losses to Existing Development

A severe earthquake, if one ever struck on the New Madrid Fault, would be devastating for Benton County because much the critical infrastructure in the county is older and not able to withstand a major earthquake. It is likely that there would be widespread damage throughout the county in the event of a major New Madrid Earthquake above Magnitude 5.0.

Impact of Previous and Future Development

Future developments in Benton County will not necessarily increase the risk from a major earthquake, rather it would add to the total exposure of risk to the area from an earthquake.

Hazard Summary by Jurisdiction

Benton County – All together, Benton County has a risk of an earthquake sometime in the future, but it is not exactly known when this quake will happen.

Jurisdictions

- **Cole Camp** – As will be the case with these communities, each of them has a uniform risk of an earthquake hazard, Cole Camp could face serious damages from a significant New Madrid earthquake due to its older infrastructure that may not withstand a quake.
- **Lincoln** – Similar to Cole Camp, Lincoln is likely to experience an earthquake at some point, and this could have impacts more than just buildings. Because US 65 runs through it, the roadway could be damaged by a significant quake.
- **Ionia** – Though a village of 88 people, Ionia's risk of an earthquake could impact all 88 people, and the infrastructure that exists in Ionia. A major quake would result in considerable losses to Ionia and its appurtenances such as the small church in town or grain elevator.
- **Warsaw** – Of all the communities in Benton County, Warsaw would see some significant damages from an earthquake, from its buildings to potentially the Harry S. Truman Dam are among the most at-risk infrastructure.

School Districts

- **Cole Camp R-I** – A major New Madrid earthquake would be devastating to the Cole Camp School District, for it would likely cause substantial damages to school district buildings.
- **Lincoln R-II** – Comparably for Lincoln, the next major New Madrid earthquake will likely have tremendous impacts to the school district and its structures
- **Warsaw R-IX** – Likewise in Warsaw, the school buildings are considered at-risk of an earthquake, and a significant quake on the New Madrid fault would be ravaging to the district.

Problem Statement

While there has not been a major earthquake to impact Benton County in the last 207 years, this does not mean the hazard risk for earthquakes is 0. In fact, experts warn that another major earthquake within the New Madrid Fault Zone will occur sometime, but they do not know exactly know when. Despite the discrepancies, earthquake risks should be taken into consideration and heeded as if the next big one could happen tomorrow. Retrofitting existing structures in Benton County should be given priority to help mitigate the risk of a major earthquake as much as possible. Running drills and participating in the Statewide Shakeout, a Missouri-wide earthquake drill every March is one way that Benton County can prepare for the next big quake.

3.4.5 Drought

Hazard Profile

Hazard Description

Droughts are 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 State 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.

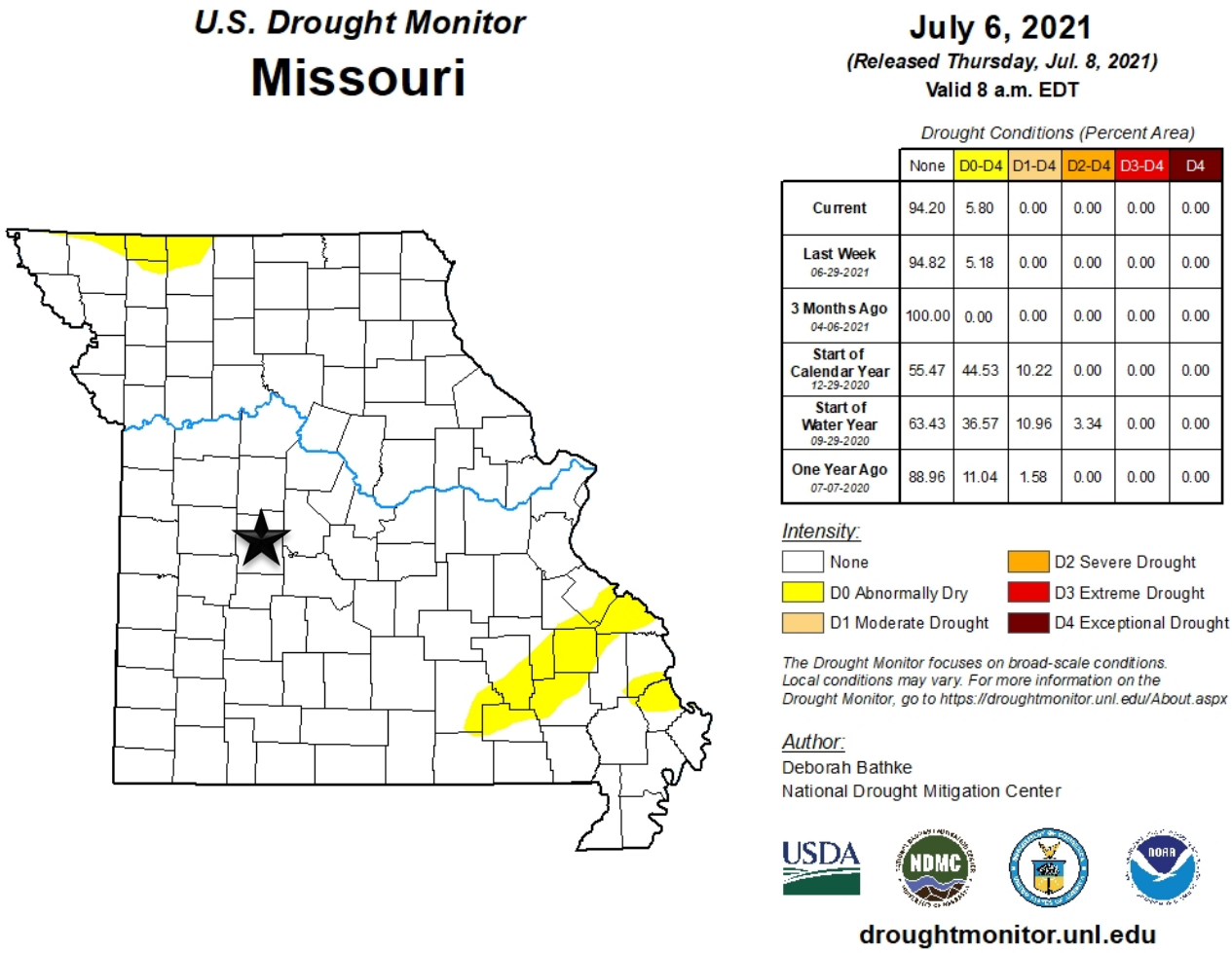
- **Agricultural** drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth,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

- **Socioeconomic** drought refers to when physical water shortage begins to affect people.

Geographic Location

Benton County is not immune to the effects of a drought. In fact, its location in west central Missouri makes it a prime target for droughts. Previously, there was only one major drought that impacted Benton County: in 1976. Despite a track record of only one drought, there is possibility that another drought may hit Benton County. When it does, it will have a major impact on the agricultural lifestyle that unincorporated Benton County depends on. Figure 3.8. indicates an example of the potential for drought within Benton County. *Note: Benton County is marked with a* ***black star****.*

Figure 3.8. U.S. Drought Monitor Map of Missouri on 6 July 2021



Strength/Magnitude/Extent

Droughts are measured in the United States using the Palmer Index. The Palmer Index determines nearly exactly the strength, magnitude, and extent of a drought. The range on the index extends from abnormally dry to exceptional drought. Abnormally dry is typical in Benton County when there is has been little rain for just a short period of time, like a week. However, the longer Benton County goes without rain, the meteorological drought intensifies. As the meteorological drought intensifies up the Palmer Index, then it becomes a cascading disaster. For example, severe droughts are enough to begin agricultural droughts, and extreme droughts can cause hydrological droughts.

Exceptional droughts, the worst kind of drought on the Palmer Index, causes meteorological, hydrological, agricultural, and socioeconomic droughts.

Previous Occurrences

Only one time since 1975 has a drought impacted Benton County, in 1976. Because of this, the only information available is a FEMA Federal Disaster Declaration, *DR-3051-MO*. USDA records do not go far enough back to showcase the strength, magnitude, and extent of this disaster.

Probability of Future Occurrence

Because Benton County's lone drought occurred 44 years ago, it makes it near impossible to predict when the next drought will strike. However, due to the onset of climate change and other environmental issues, it is entirely possible for a drought to strike Benton County again. The issue remains trying to predict how bad it will be or even when it could strike. According to SEMA, Benton County is considered to be at a low-medium risk for future droughts.

Changing Future Conditions Considerations

With consideration given to the ever changing climate, droughts in Benton County are a bit of a rarity, but that is not to say that one will not happen. It's just a challenge to predict when it will occur.

Vulnerability

Vulnerability Overview

According to data compiled by SEMA, the incorporated communities of Cole Camp, Ionia, Lincoln, and Warsaw face near equal probabilities and vulnerabilities to droughts as the unincorporated side of Benton County. However, the unincorporated side of the county may suffer more from an agricultural drought whereas the communities may face hydrological and socioeconomic droughts if the conditions are prime.

Potential Losses to Existing Development

When the next major drought strikes Benton County, it will have a significant impact on the agricultural community. In turn, it could also affect the rest of the county's economy. While the agricultural aspect of communities like Lincoln or Warsaw, it could be the hydrological aspect that could impact these communities' water infrastructure. There are so many possible events that could occur should a drought impact Benton County. Though with only one event to go off for historical information, it must reiterate that it is a challenge to forecast the next drought in the county.

Impact of Previous and Future Development

A drought in an extreme situation would take a toll on all facets of the Benton County economy, and the water supply would drastically be impacted by the impacts of a drought. This would make firefighting difficult for rural departments during peak wildfire season.

Changing Future Conditions Considerations

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.

Hazard Summary by Jurisdiction

There is not much variance between the four incorporated jurisdictions of Benton County, and droughts would affect cities and rural areas equally but in different degrees. For example, Warsaw would not see the same effects as a more rural farming community in Benton County. This does not mean, however, that their vulnerability levels are different.

Benton County – A drought in Benton County, while rare, would have devastating impacts to the agricultural sector of the county, but it would also impact water supplies and have socioeconomic impacts on citizens of Benton County.

Jurisdictions

- **Cole Camp –** A drought in Cole Camp would likely impact the town's water supply and make it difficult for the farming community just outside Cole Camp.
- **Lincoln –** Lincoln's risk, while low, of a drought would ultimately harm the agricultural aspect of the community, but also the socioeconomic effects could prove troublesome.
- **Ionia –** For a small town, a drought would prove extremely costly to Ionia, for it would cause major issues for the entire small town.
- **Warsaw –** Should a drought impact Warsaw, it will have significant socioeconomic problems that reverberate throughout the community, it could also have lasting impacts on infrastructure.

School Districts

- **Cole Camp R-I** – When it comes to a drought's impact on Cole Camp schools, drought would likely impact the water supply to the schools and the socioeconomic aspects of the school (students, administration, teachers, etc.)
- **Lincoln R-II –** When it comes to a drought's impact on Lincoln schools, drought would likely impact the water supply to the schools and the socioeconomic aspects of the school (students, administration, teachers, etc.)
- **Warsaw R-IX** – When it comes to a drought's impact on Warsaw schools, drought would likelyimpact the water supply to the schools and the socioeconomic aspects of the school (students, administration, teachers, etc.)

Problem Statement

Ultimately, this risk assessment has sought to showcase the impact of a drought on Benton County, which is among the hardest weather phenomenon to forecast. Droughts can have severe impacts not only on agriculture, but water systems are as much of a risk as the agriculture. When the next drought, it will remain to be seen how severe it will be. This risk assessment took into consideration the past drought of 1976 but there was not enough information to draw from to get the necessary information. Water conservation efforts should be implemented during times where droughts are projected, although hard to forecast, but droughts should be mitigated for as much as any other hazard.

3.4.6 Extreme Temperatures

Hazard Profile

Hazard Description

Temperature extremes, both those that are heat related and cold related have an equal probability to impact Benton County. Heat is likely to impact Benton County in the summertime and cold is likely in the wintertime. For reference, the heat index, which measures the true feel of the hot weather and the wind chill, which measures the perceived cold temperatures are provided herein this plan. The relationship of these factors creates what is known as the apparent temperature. The Heat Index chart shown in **Figure 3.9** uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions. **Figure 3.10** on the other hand displays the wind chill index.

Both extreme colds and extreme heat can have adverse effects on infrastructure in Benton County. In extreme colds, pipes have the potential to freeze and stop working correctly. This can lead to major problems for water systems, and extreme heat can lead to droughts as mentioned in the previous section. Extreme colds and extreme heat also have impacts on socially vulnerable populations, of particular caution is given to the elderly.

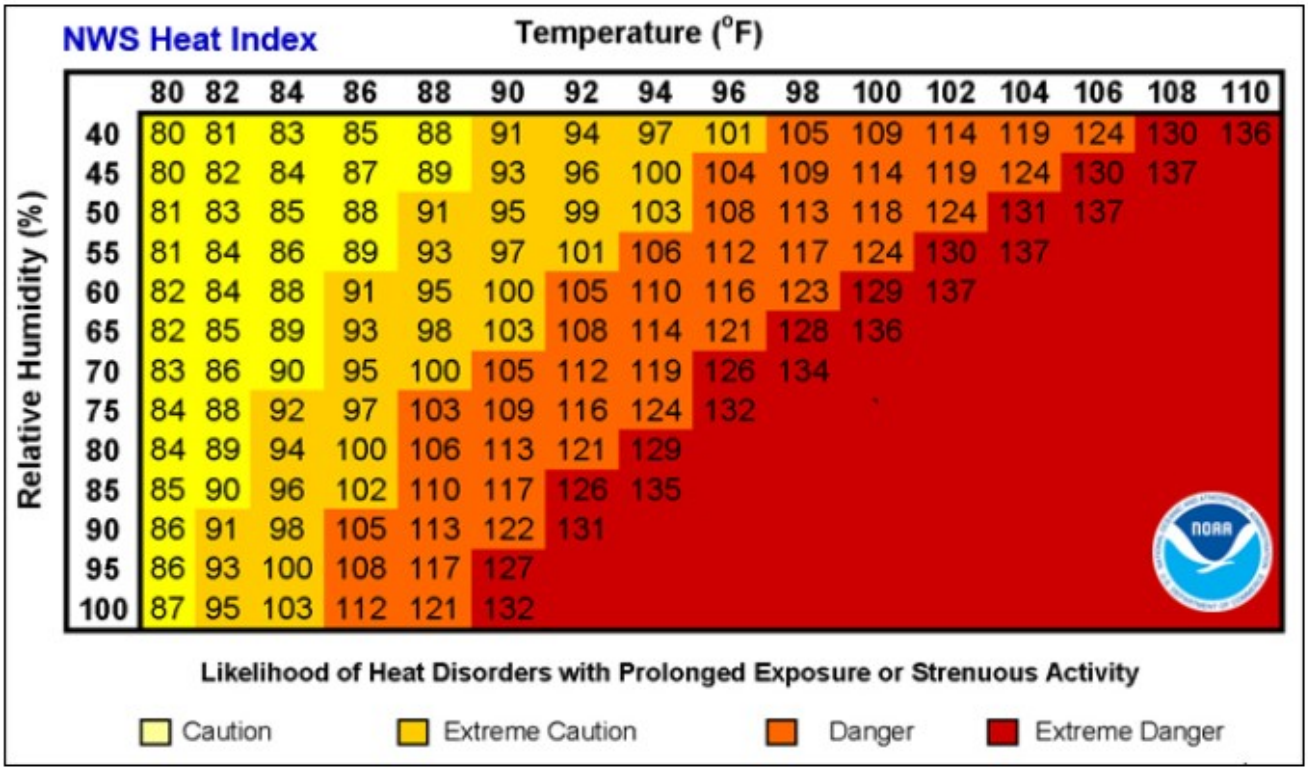
The National Institute on Aging estimates that more than 2.5 million Americans are elderly and especially vulnerable to hypothermia, with the isolated elders being most at risk. About 10 percent of people over the age of 65 have some kind of bodily temperature-regulating defect, and 3-4 percent of all 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.

Geographic Location
Due to its geographic location, Benton County is not immune from extreme temperatures. In fact, the temperatures may vary greatly in the summer and the winter months.

Strength/Magnitude/Extent
The National Weather Service (NWS) 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.

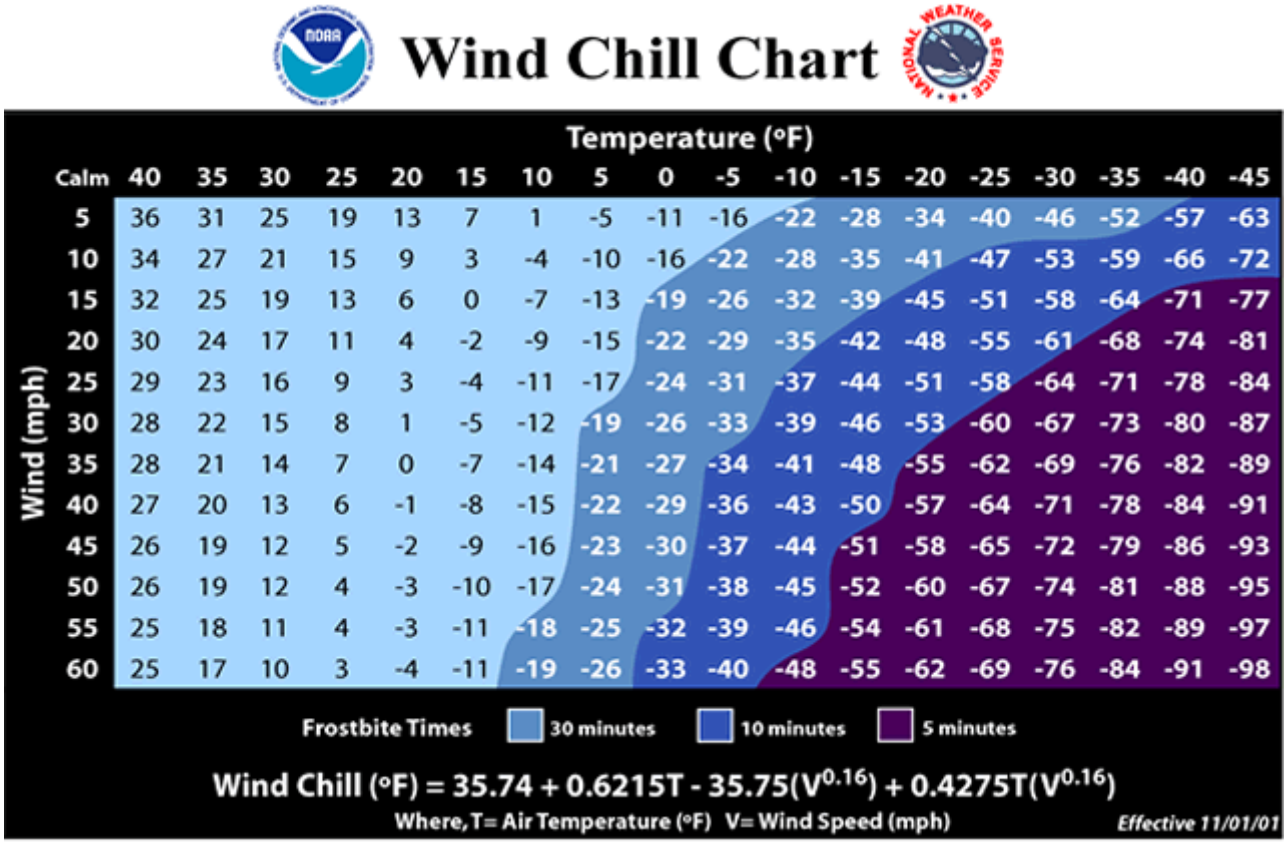
Figure 3.9. Heat Index (HI) Chart



Source: National Weather Service (NWS); https://www.weather.gov/safety/heat-index
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.

The NWS Wind Chill Temperature (WCT) index uses advances in science, technology, and computer modeling to provide an accurate, understandable, and useful formula for calculating the dangers from winter winds and freezing temperatures. The figure below presents wind chill temperatures which are based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 3.10. Wind Chill Chart



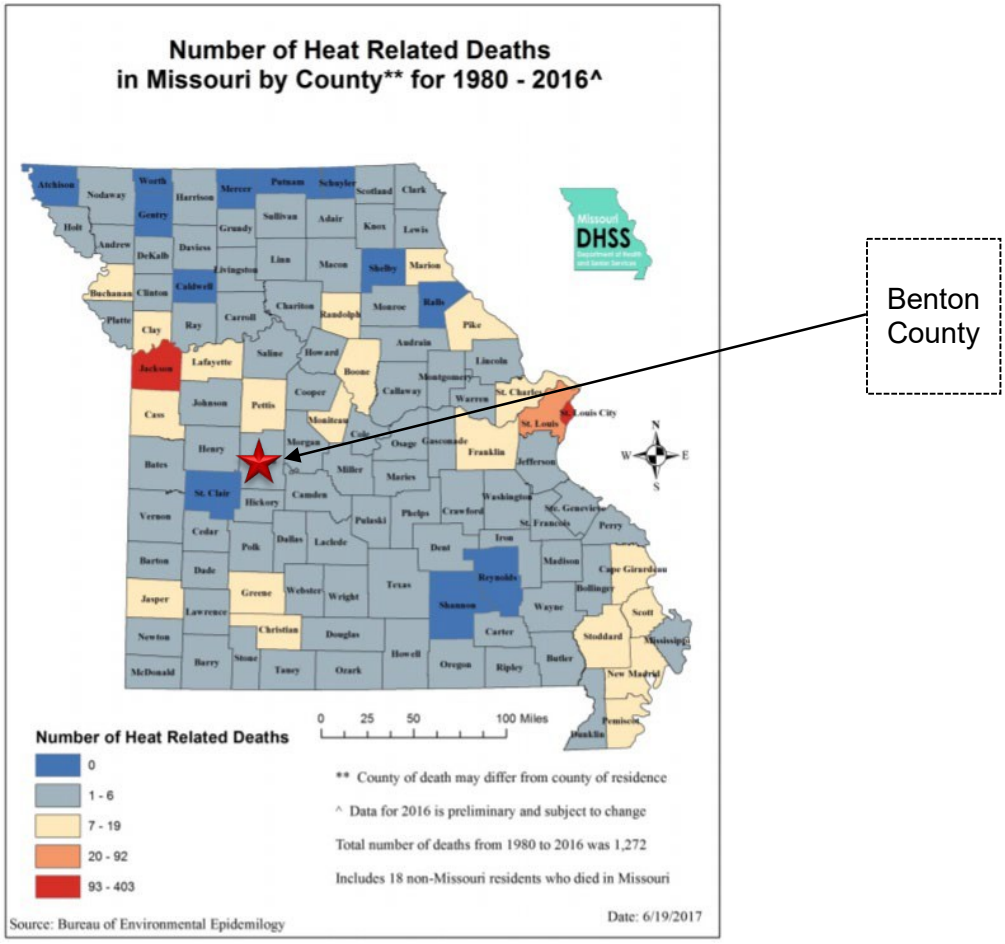
Source: https://www.weather.gov/safety/cold-wind-chill-chart

Previous Occurrences

On record with the National Center for Environmental Information, there have been two instances of extreme cold in Benton County, once in December 2000 and then again in January 2001. Both these storms resulted in some damage to county infrastructure, the December 2000 damaged a school roof. The January 2001 extreme cold did no damage but created havoc for drivers and farmers.

According to the NCEI, there have been no recorded events of extreme heat in Benton County since 1950. Despite this, effects from extreme heat should sought to be mitigated wherever possible. Surrounding areas have not been as lucky as Benton County when it comes to heat related deaths. While Benton County has only between 1 and 6 heat deaths, nearby Jackson County has had at least 93 heat related deaths annually since 1980.

Figure 3.11. Heat Related Deaths in Missouri 2000 - 2016



Source: https://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/stat-report.pdf

Probability of Future Occurrence

Fortunately, there has been **0** excessive heat events in Benton County since 1950, so the probability of a future excessive heat event is rare, but there is still a chance in the future. This chance is hard to predict based on lack of past events.

Changing Future Conditions Considerations

Despite there being zero excessive heat events in Benton County since 1950, it should be noted there is potential for one or more in the future. Climate Change is causing temperatures to be higher than normal, so perhaps Benton County will see its first excessive heat event in the not too distant future. As the average temperature rises, it is likely that temperatures will be hotter than normal much more frequently.

Vulnerability

Vulnerability Overview

Those socially vulnerable populations that are at greatest risk for heat related illness are the elderly citizens (65 and over), as well as small children (under 5 years of age). Additionally, prolonged exposure or work environments that require extensive outdoor work can also enhance risk for adverse health effects related to extreme heat.

Heat can also affect pets and animals, in particular livestock. Cattle lack an efficient way of cooling themselves unless they are near water so monitoring their health should be considered when the forecast calls for extreme heat.

Table 3.23 lists typical symptoms and health impacts due to exposure to extreme heat.

Table 3.23. 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

Potential Losses to Existing Development

Historically there has been no crop damage as a result of the extreme heat, however, it would take just one major heat wave during the summer months in Benton County to change that statistic in the wrong direction. Hopefully, it never happens but there is always a chance that it may.

Impact of Previous and Future Development

Population growth can result in increases in the age-groups that are most vulnerable to extreme heat. Population growth also increases the strain on electricity infrastructure, as more electricity is needed to accommodate the growing population. Currently there are 3 of four incorporated communities in Benton County that are growing: Warsaw, Cole Camp and Lincoln. Ionia has not seen any growth in the last ten years.

Hazard Summary by Jurisdiction

Benton County – As a complete county, Benton County is likely to exposed to extreme temperatures, both hot and cold alike, both of which will take a toll on the communities in the county as well as agriculture within the county.

Jurisdictions

- **Cole Camp –** For areas with limited access to air conditioning/heat, extreme temperatures will take a direct toll on the older populations of Cole Camp.
- **Lincoln** – For areas with limited access to air conditioning/heat, extreme temperatures will take a direct toll on the older populations of Lincoln.
- **Ionia** – For areas with limited access to air conditioning/heat, extreme temperatures will take a direct toll on the older populations of Ionia.
- **Warsaw** – For areas with limited access to air conditioning/heat, extreme temperatures will take a direct toll on the older populations of Warsaw.

School Districts

- **Cole Camp R-I** – The most vulnerable to extreme heat in the schools is the small children, though all schoolchildren should be considered vulnerable should extreme temperatures impact the schools in Cole Camp whether hot or cold.
- **Lincoln R-II –** The most vulnerable to extreme heat in the schools is the small children, though all schoolchildren should be considered vulnerable should extreme temperatures impact the schools in Lincoln whether hot or cold.
- **Warsaw R-IX –** The most vulnerable to extreme heat in the schools is the small children, though all schoolchildren should be considered vulnerable should extreme temperatures impact the schools in Warsaw whether hot or cold.

The most vulnerable populations to the extreme heat are young children (under age 5) and the older populations (over the age of 65). Other populations, including overweight and those on special medications are excluded from this information because it not easily accessible. **Table 3.30** 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 3.24. Benton County Population Under Age 5 and Over Age 65, 2019 Estimated Census Data

Jurisdiction	Population Under 5 yrs.	Population 65 yrs. and over
*Benton County	**4.6%**	**31.2%**
Cole Camp	**4.9%**	**26.2%**
Ionia	**-0-**	**15.3%**
Lincoln	**8.7%**	**21.7%**
Warsaw	**7.5%**	**23.3%**

Source: U.S. Census Bureau, (*) includes entire population of each city or county

Problem Statement

Based on the statistics presented in the analysis, Benton County has an increasing population of individuals over the age of 65, which is considered a vulnerable population for exposure to extreme temperatures. Given that nearly 1 in 3 individuals of Benton County is over 65, extra precautions should be instituted wherever possible to protect these individuals using air conditioning or by other means necessary.

3.4.7 Severe Thunderstorms; Including High Winds, Hail, and Lightning

Hazard Profile

Hazard Description

Thunderstorms

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 60 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 (discussed separately in **Section 3.4.1**) and tornadoes (discussed separately in **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, called heat lightning. 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.

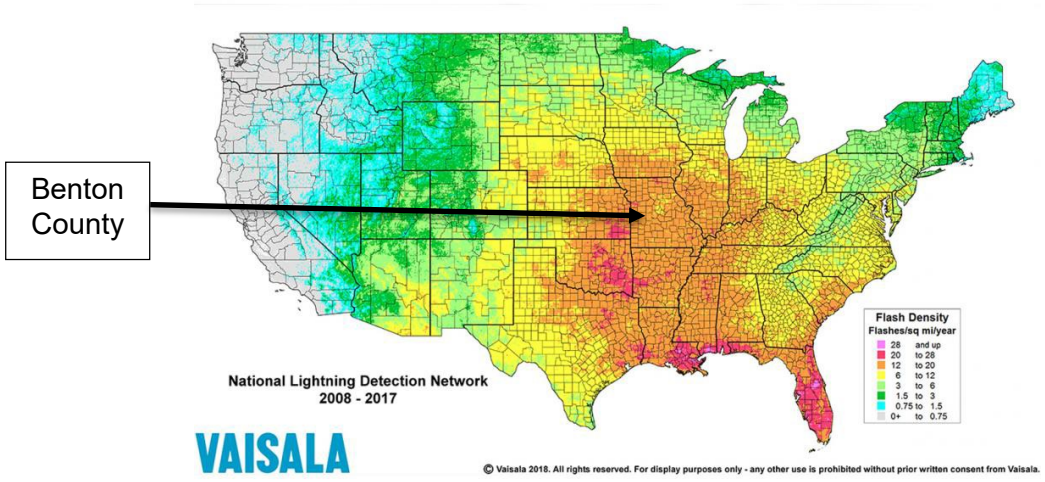
Hail

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 do damage.

Geographic Location

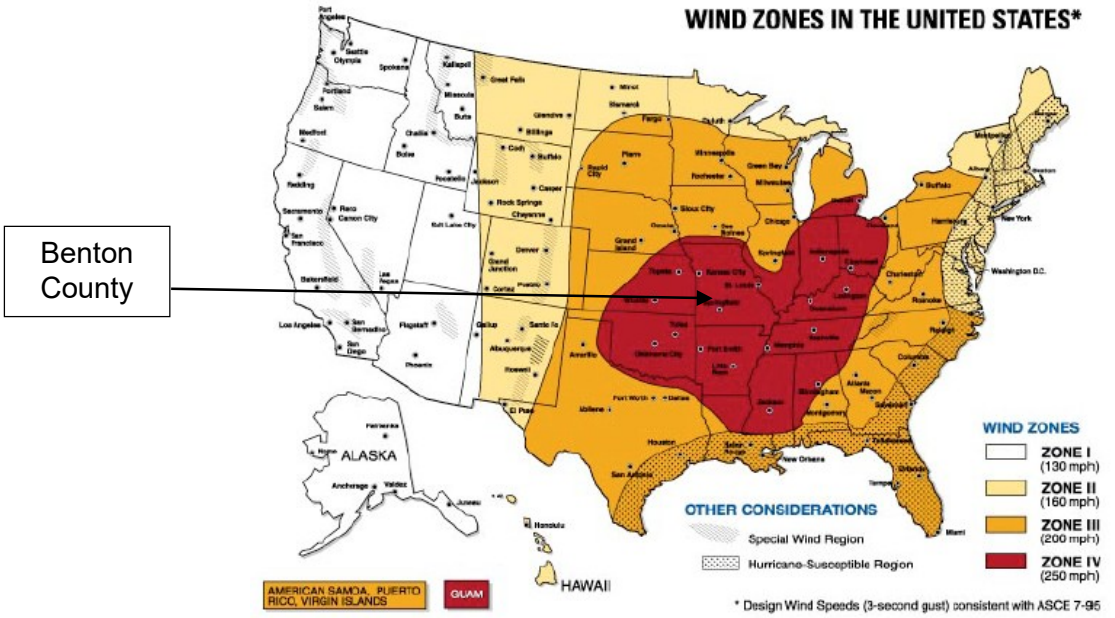
Thunderstorms/High Winds, and Hail can happen anywhere in Benton County, and usually spawn from ripe atmospheric conditions. The following two graphics will showcase where Benton County is and how likely it is to see hail from thunderstorms.
Figure 3.12 shows lightning frequency in the state. Benton County is indicated on both graphics.

Figure 3.12. Location and Frequency of Lightning in Missouri



Source: National Weather Service, http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx .

Figure 3.13. Wind Zones in the United States



Source: FEMA 320, Taking Shelter from the Storm, 3rd edition, https://www.fema.gov/pdf/library/ism2_s1.pdf

Strength/Magnitude/Extent

Based on information provided by the Tornado and Storm Research Organization (TORRO), **Table 3.25** below describe typical damage impacts of the various sizes of hail.

Table 3.25. 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 and 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.

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

Limitations to the use of NCEI reported lightning events include the fact that only lightning events that result in fatality, injury and/or property and crop damage are in the NCEI.

The table below (**Table 3.32**) summarize past crop damages as indicated by crop insurance claims. The table illustrate the magnitude of the impact on Benton County's agricultural economy.

Agriculture is big business in areas outside the four main incorporated communities of Warsaw, Lincoln, Ionia, and Cole Camp, accounting for much of the county's economy so any damages to the agricultural sector of Benton County would be a major problem for the county.

Of note, there was only one year where insurance payments were doled out, in 2014, there were insurance payments made out due to hail, no other form of severe weather is mentioned.

Table 3.26. Crop Insurance Claims Paid in Benton County from Hail (2014).

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
2014	Corn	Excess Moisture	No amount given
2014	Soybeans	Excess Moisture	No amount given
Total			Unknown

USDA Risk Management Agency, Insurance Claims, https://www.rma.usda.gov/data/cause

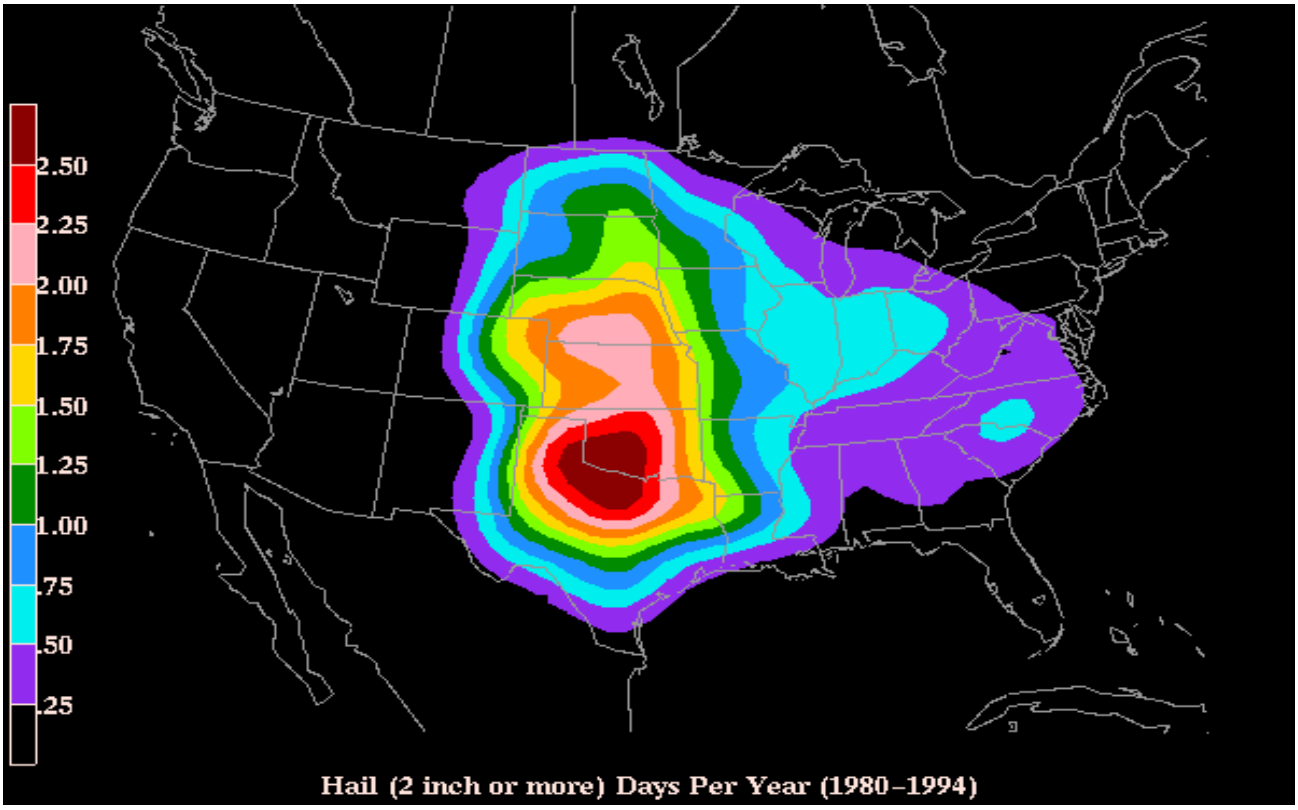
Probability of Future Occurrence

399 Severe Weather Events Since January 2000/21 Years since January 2000

Several severe weather events are expected in Benton County annually.

100% PROBABILITY

Figure 3.14. Annual Hailstorm Probability (2" diameter or larger), 1980-1994



Source: NSSL, http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif

Changing Future Conditions Considerations

As climate change continues to persist, severe thunderstorms will be continuing in Benton County. Some of these storms will produce major hailstones, though it will not happen as frequently in Benton County as it does in places like Oklahoma or Texas. Some sources that support this include the following:

- 2018 State Plan, see Chapter 3, Section 3.3.1, Changing Future Conditions Considerations, page 3.293
- US Climate Resilience Toolkit; https://toolkit.climate.gov/tools/climate-explorer
- National Climate Assessment; https://nca2014.globalchange.gov/

Vulnerability

Vulnerability Overview

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 Benton 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. http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx and http://www.lightningsafety.noaa.gov/

Potential Losses to Existing Development

Because there have been 399 severe weather events in Benton County since 2000, many of these storms have not been damaging, but that is not to say that there have not been damaging storms. A handful of these storms have caused damage to crops, such as the one in 2014 that caused issues for the corn and soybeans in the county.

Previous and Future Development

Benton County as a whole has seen an uptick in population since the 2010 census, so naturally there has been some more homes built in the county. Whether or not these homes can tolerate significant lightning and severe thunderstorms depends largely on the construction of the home. One can hope that they are adequately built to bear the force of Mother Nature.

Hazard Summary by Jurisdiction

Benton County – Because of the county's geography, it is subject to a multitude of severe weather events. In fact, the county sees about **20** per year across the whole county. Severe weather has the capacity to only cause property damages but also crops are damaged by severe storms.

Jurisdictions

- **Cole Camp –** Similar to the other three incorporated communities in Benton County, Cole Camp is susceptible to the effects of severe weather. Crop damage is likely but rare.
- **Lincoln –** Similar to the other three incorporated communities in Benton County, Lincoln is vulnerable to the effects of severe weather. Crop damage is likely but rare.
- **Ionia –** Similar to the other three incorporated communities in Benton County, Ionia is subject to the effects of severe weather. Crop damage is likely but rare.
- **Warsaw –** Similar to the other three incorporated communities in Benton County, Warsaw is prone to the effects of severe weather. Crop damage is likely but rare.

School Districts

- **Cole Camp R-I –** The Cole Camp School District is at risk for severe weather, adequate planning should protect students, staff, administrators and other school staff from the elements.
- **Lincoln R-II –** The Lincoln School District is exposed to the effects severe weather, adequate planning should protect students, staff, administrators and other school staff from the elements.

- **Warsaw R-IX –** The Warsaw School District is threatened by severe weather, sufficient planning should protect students, staff, administrators and other school staff from the elements.

Problem Statement

According to the NCEI dataset, there have been **399** documented cases of severe weather in Benton County since 2000, and if this is any indication, the entire county is subject to severe weather on a regular basis. In some cases, there will be multiple severe weather events throughout Benton County each year. Proper preparedness (including drills in schools) will ensure proper mitigation strategies for severe weather. Participating in drills and having a plan for what to do in case of severe weather will serve the public better than no plans at all. Schools should run drills and exercise their plans regularly to ensure proper preparedness for severe weather.

3.4.8 Severe Winter Weather

Hazard Profile

Hazard Description

Major winter storms 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.

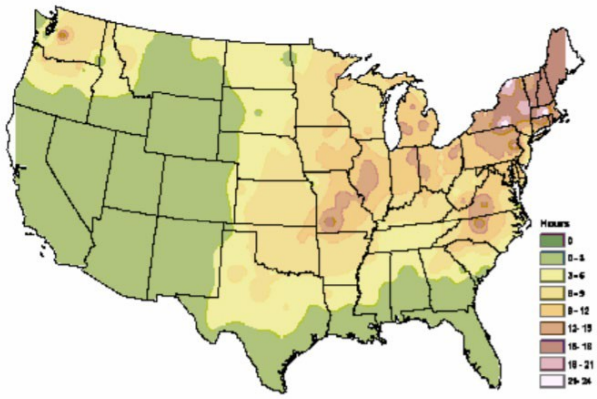
- **Blizzard**—Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, 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

Largely due to its geography, Benton County can experience winter storms that produce freezing rain, sleet, and in some instances, ice. Ice storms can impact telephone poles and other critical infrastructure and render them inoperable. This can knock out communication towers until the ice thaws. **Figure 3.15** shows where roughly Benton County is and how much time on average the county gets of freezing rain annually.

Figure 3.15. NWS Statewide Average Number of Hours per Year with Freezing Rain

BENTON COUNTY SEES AN AVERAGE OF 12-15 HOURS OF FREEZING RAIN ANNUALLY.



Source: American Meteorological Society. "Freezing Rain Events in the United States." http://ams.confex.com/ams/pdfpapers/71872.pdf

Figure 1. Average number of hours per year with freezing rain in the United States.

Strength/Magnitude/Extent

Severe winter storms include heavy snowfall, ice, and strong winds which can push the wind chill well below zero degrees in Benton County. For severe winter weather conditions, the National Weather Service office in Springfield, Missouri issues some or all of the following products as conditions warrant in Benton County. NWS Springfield may collaborate with local partners to determine when an alert should be issued for the county of Benton.

- **Winter Weather Advisory —** Winter weather conditions are expected to cause significant inconveniences and may be hazardous. If caution is exercised, these situations should not become life threatening. Often the greatest hazard is to motorists.
- **Winter Storm Watch** — Severe winter conditions, such as heavy snow and/or ice are possible within the next day or two.
- **Winter Storm Warning** — Severe winter conditions have begun or are about to begin.
- **Blizzard Warning** — Snow and strong winds will combine to produce a blinding snow (near zero visibility), deep drifts, and life-threatening wind chill.
- **Ice Storm Warning** – Dangerous accumulations of ice are expected with generally over one quarter inch of ice on exposed surfaces. Travel is impacted, and widespread downed trees and power lines often result.
- **Wind Chill Advisory** – Combination of low temperatures and strong winds will result in wind chill readings of -20 degrees F or lower.
- **Wind Chill Warning** – Wind chill temperatures of -35 degrees F or lower are expected. This is a life-threatening situation.
- **Snow Squall Warning –** A combination of squall lines and snowstorms, a newer warning issued by NWS offices but is possible if conditions merit it.

Previous Occurrences

According to the NCEI, this is the event narrative from the 2007 ice storm that resulted in $300,000 in damages, the most significant storm since 1997**:**

- ***Three inches of sleet pack caused several barns and businesses to collapse. Damage amounts were estimated at $300,000.***

This is not the only severe winter weather event to impact Benton County since 1997, but it is the most significant.

Table 3.34. NCEI Benton County Winter Weather Events Summary, 1997—2021

Type of Event	Inclusive Dates	Magnitude	# of Injuries	Property Damages	Crop Damages
Heavy Snow	01/08/1997	N/A	0	$5,000	0
Winter Storm	12/20/1998	N/A	0	0	0
Winter Storm	01/01/1999	N/A	0	0	0
Extreme Cold Wind Chill/Heavy Snow	12/12/2000	N/A	0	0	0
Extreme Cold/Wind Chill	01/01/2001	N/A	0	0	0
Ice Storm	01/28/2001	N/A	0	0	0
Ice Storm	02/21/2001	N/A	0	0	0
Ice Storm	01/30/2002	N/A	0	$25,000	0
Winter Storm	03/02/2002	N/A	0	0	0
Winter Storm	01/02/2003	N/A	0	0	0
Winter Storm	02/23/2003	N/A	0	0	0
Winter Storm	03/05/2003	N/A	0	0	0
Heavy Snow	12/10/2003	N/A	0	0	0
Ice Storm	01/25/2004	N/A	0	0	0
Winter Storm	11/24/2004	N/A	0	0	0
Winter Storm	11/30/2006	N/A	0	0	0
Ice Storm	01/12/2007	N/A	0	$300,000	0
Winter Storm	01/20/2007	N/A	0	0	0
Ice Storm	12/09/2007	N/A	0	$20,000	0
Ice Storm	02/21/2008	N/A	0	0	0
Winter Storm	01/26/2009	N/A	0	0	0
Winter Storm	02/28/2009	N/A	0	0	0
Winter Storm	12/25/2009	N/A	0	0	0
Winter Storm	03/20/2010	N/A	0	0	0
Blizzard	02/01/2011	N/A	0	0	0
Winter Storm	02/21/2013	N/A	0	0	0
Winter Storm	02/25/2013	N/A	0	0	0
Winter Storm	03/24/2013	N/A	0	0	0
Winter Storm	12/20/2013	N/A	0	0	0
Winter Storm	01/11/2019	N/A	0	0	0
Ice Storm	02/06/2019	N/A	0	0	0
Winter Weather	02/15/2019	N/A	0	0	0
Winter Weather	12/16/2019	N/A	0	0	0
Winter Weather	01/11/2020	N/A	0	0	0
Heavy Snow	02/05/2020	N/A	0	0	0
Total = 37			**0**	**$350,000.00**	**0**

Source: NCEI Accessed 13 October 2020

Probability of Future Occurrence

$$\frac{\text{37 Recorded severe winter weather events since January 2000}}{\text{21 years since January 2000}}$$

100% PROBABILITY

Changing Future Conditions Considerations

Due to Climate Change, it is likely that an increase in severe winter weather will accompany this trending change. Just as La Niña events are becoming a more regular occurrence, this will in turn create wintrier conditions for Benton County. Because of these changes, Benton County can expect more severe winter weather, coming in the form of ice, slush, or heavy snow. Preparing for these events shall, at least in turn, mitigate against threats that loom from climate change.

Vulnerability

Vulnerability Overview

According to SEMA, based on Benton County's location, Benton County is more likely to experience significant winter weather, and this may result in an increased level of preparedness. This should be noteworthy based on the history of winter storms that have impacted Benton County in the past. If the ice storm in January 2007 was any indication, Benton County is vulnerable to ice storms and other winter weather.

Potential Losses to Existing Development

If previous severe winter weather was any indication of what's to come for Benton County, the most significant hazard will be ice. Ice Storms in Benton County have caused the most damage of any severe winter weather event since 1997.

Previous and Future Development

Current development in Benton County should already be prepared for severe winter weather, but new development may or may not be prepared for severe winter weather. It depends largely on location and how easily accessible services like snow removal can respond to specific areas. There are priorities when it comes to snow removal, so some neighborhoods may see it sooner than others.

Hazard Summary by Jurisdiction

Benton County – As a collective whole; the county is considered to be an at-risk county for severe winter storms, since 1997, there have been a total of **37** severe winter weather events in Benton County, causing a total of $350,000 in damages, which for a small rural county is extremely costly. Benton County will face more severe winter weather going forward.

Jurisdictions

- **Cole Camp** – Much like the other communities in Benton County, Cole Camp is at risk for severe winter weather, and it would likely wreak havoc on this small community.
- **Lincoln** – Much like the other communities in Benton County, Lincoln is at risk for severe winter weather, and it would likely wreak havoc on this small community.
- **Ionia** – Much like the other communities in Benton County, Ionia is at risk for severe winter weather, and it would likely wreak havoc on this small community.
- **Warsaw** – Much like the other communities in Benton County, Warsaw is at risk for severe winter weather, and it would likely wreak havoc on this small community.

School Districts

- **Cole Camp R-I –** Severe winter weather would likely close schools in the Cole Camp School District and they would remain closed until students can safely return to class.
- **Lincoln R-II –** Severe winter weather would likely close schools in the Lincoln School District and they would remain closed until students can safely return to class.
- **Warsaw R-IX –** Severe winter weather would likely close schools in the Warsaw School District and they would remain closed until students can safely return to class.

Problem Statement

Winter storms have the potential to wreak havoc in Benton County, disrupting normal life during the winter months. They may impact some crops if they are not adequately protected. Severe winter weather will likely bring normal life to a standstill and prevent schools from opening. Pretreatment can assist in getting the main roads cleared, such as Routes 7 & 52 and US 65, but then other routes will have to be cleared following the high priority routes.

3.4.9 Tornado

Hazard Profile

Hazard Description

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 in an area known by storm chasers and meteorologists alike as 'Tornado Alley' The unique geography of the central United States allows for the development of thunderstorms that spawn tornadoes. The jet stream, which is a high-velocity stream of air, determines which area of the central United States will be prone to tornado development. The jet stream normally 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 sizable thunderstorms that breed tornadoes.

Tornadoes spawn from the largest thunderstorms. The associated cumulonimbus clouds can reach heights of up to 55,000 feet above ground level and are commonly formed when Gulf air is warmed by solar heating. The moist, warm air is overridden by the dry cool air provided by the jet stream. This cold air presses down on the warm air, preventing it from rising, but only temporarily. Soon, the warm air forces its way through the cool air and the cool air moves downward past the rising warm air. This air movement, along with the deflection of the earth's surface, can cause the air masses to start rotating. This rotational movement around the location of the breakthrough forms a vortex, or funnel. If the newly created funnel stays in the sky, it is referred to as a funnel cloud. However, if it touches the ground, the funnel officially becomes a tornado.

Geographic Location

Tornadoes can strike anywhere in Benton County at any time, so it is imperative to be prepared and mitigate against the direct impacts of tornadoes. Knowing your location, your proximity to a tornado warning siren, places to take shelter, and planning are all excellent methods for mitigating your risk against tornadic events.

Strength/Magnitude/Extent

Of all natural hazards, tornadoes are widely considered by experts in meteorology to be the deadliest and devastating disasters. They can produce hailstorms, heavy rains, and swaths of damage to an area. In the aftermath of the Joplin tornado of 2011, the National Weather Service adopted impact based warning phenomenon to better enhance protective actions for tornado based events. This has led to better understanding and preparedness for tornadoes, though they can still be deadly. Example includes Moore, Oklahoma in 2013, which was an EF5 similar to Joplin in almost every way imaginable. The following section will explain the Enhanced Fujita Scale and severity of tornadoes based on ranks assigned by the National Weather Service.

Tornado magnitude is classified according to the EF- Scale (or the Enhanced Fujita Scale, based on the original Fujita Scale developed by Dr. Theodore Fujita, a renowned severe storm researcher). The EF-Scale (see **Table 3.36**) 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 3.26. Enhanced F Scale for Tornado Damage

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest ¼-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	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 3.37**. 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. Information on the Enhanced Fujita Scale's damage indicators and degrees or damage is located online at **www.spc.noaa.gov/efscale/ef-scale.html**

Table 3.27. 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 severely 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
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 severely 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

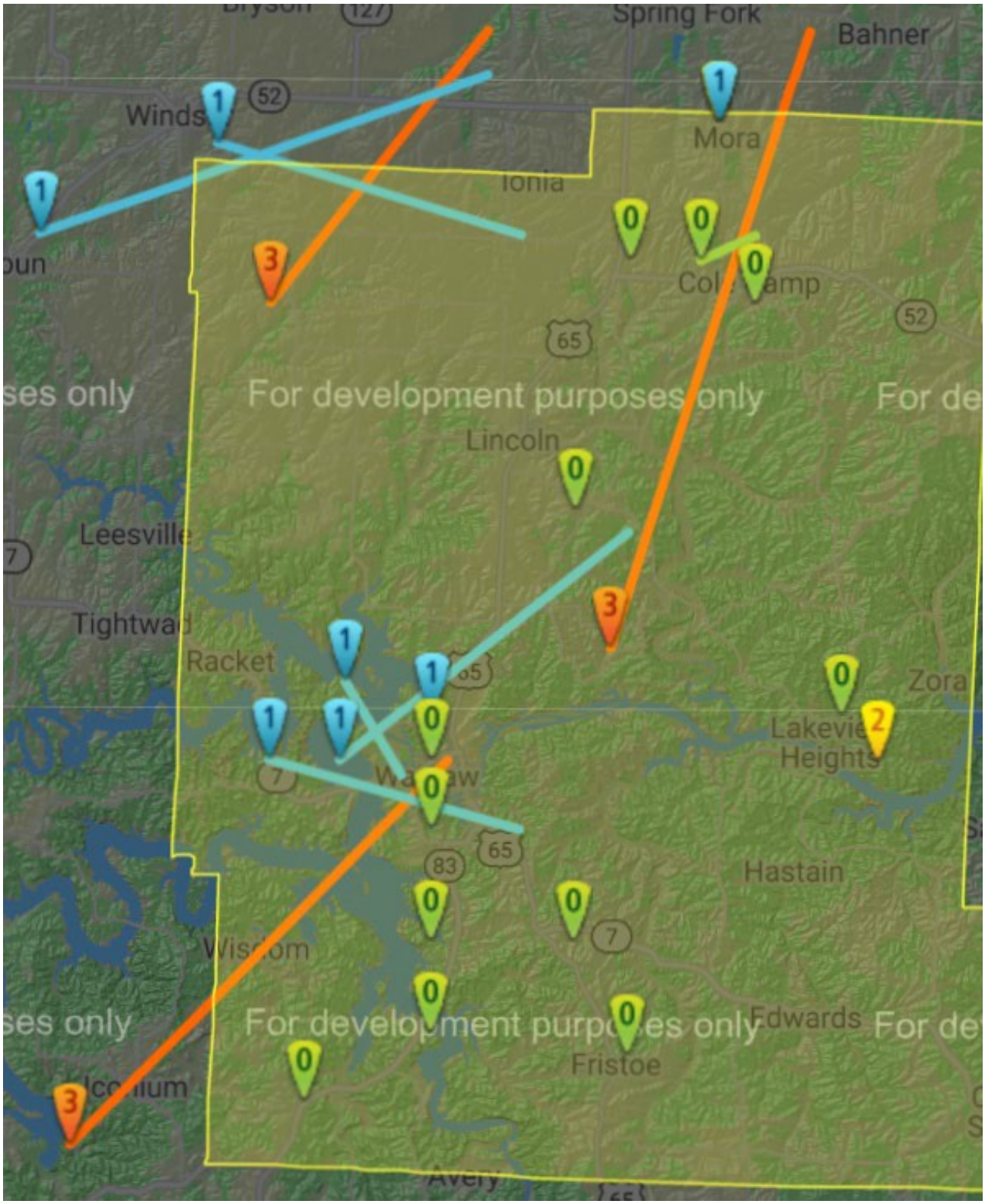
While the NCEI data is a great source of information on tornadoes, it is not without limitations. The NCEI data may not be truly accurate, or it only displays a small portion of the storm, that is if it originated anywhere besides Benton County. Overall it is quite reliable for summaries of incidents, and has gotten better since the Enhanced Fujita Scale became the main method of determining the strength of a tornado.

Table 3.28. Recorded Tornadoes in Benton County, 1994 – Present

Date	Beginning Location	Ending Location	Length (miles)	Width (yards)	F/EF Rating	Death	Injury	Property Damage	Crop Damages
1994-04-15	4 Miles W of Warsaw	Warsaw	7	100	F1	0	0	$500,000	0
1995-05-17	1 Mi. E of Fristoe	Fristoe	0.5	50	F0	0	0	0	0
1995-06-08	Warsaw	Warsaw	1	50	F0	0	0	0	0
1999-05-04	Cole Camp	Cole Camp	0.1	50	F0	0	0	$5,000	0
2003-05-06	2 Miles S of Warsaw	2 Miles S of Warsaw	0.2	25	F0	0	0	0	0
2003-05-06	Bentonville	Bentonville	0.2	25	F0	0	0	0	0
2006-03-12	5 Miles W of Brandon	1 Mi. NW of Brandon	4	100	F1	0	0	$100,000	0
2006-03-12	2 Mi. W of Cole Camp	1 Mi. N of Cole Camp	3	20	F0	0	0	$50,000	0
2008-01-07	3 Mi. SE of Lincoln	3 Mi. SE of Lincoln	0.17	25	EF0	0	0	$20,000	0
2015-07-01	3 Mi. ESE of Racket	1 Mi. WSW of Warsaw	3.25	600	EF1	0	0	$500,000	0
TOTAL = 10						0	0	**$1,175,000**	0

Source: National Centers for Environmental Information, http://www.NCEI.noaa.gov/stormevents/

Figure 3.16. Benton County Map of Historic Tornado Events



Source: Missouri Tornado History Project, http://www.tornadohistoryproject.com/tornado/Missouri

Probability of Future Occurrence

$$\frac{\text{10 Recorded Tornadoes Since January 1993}}{\text{28 Years since January 1993}}$$

36% Probability of a Tornado in Benton County Annually.

Changing Future Conditions Considerations

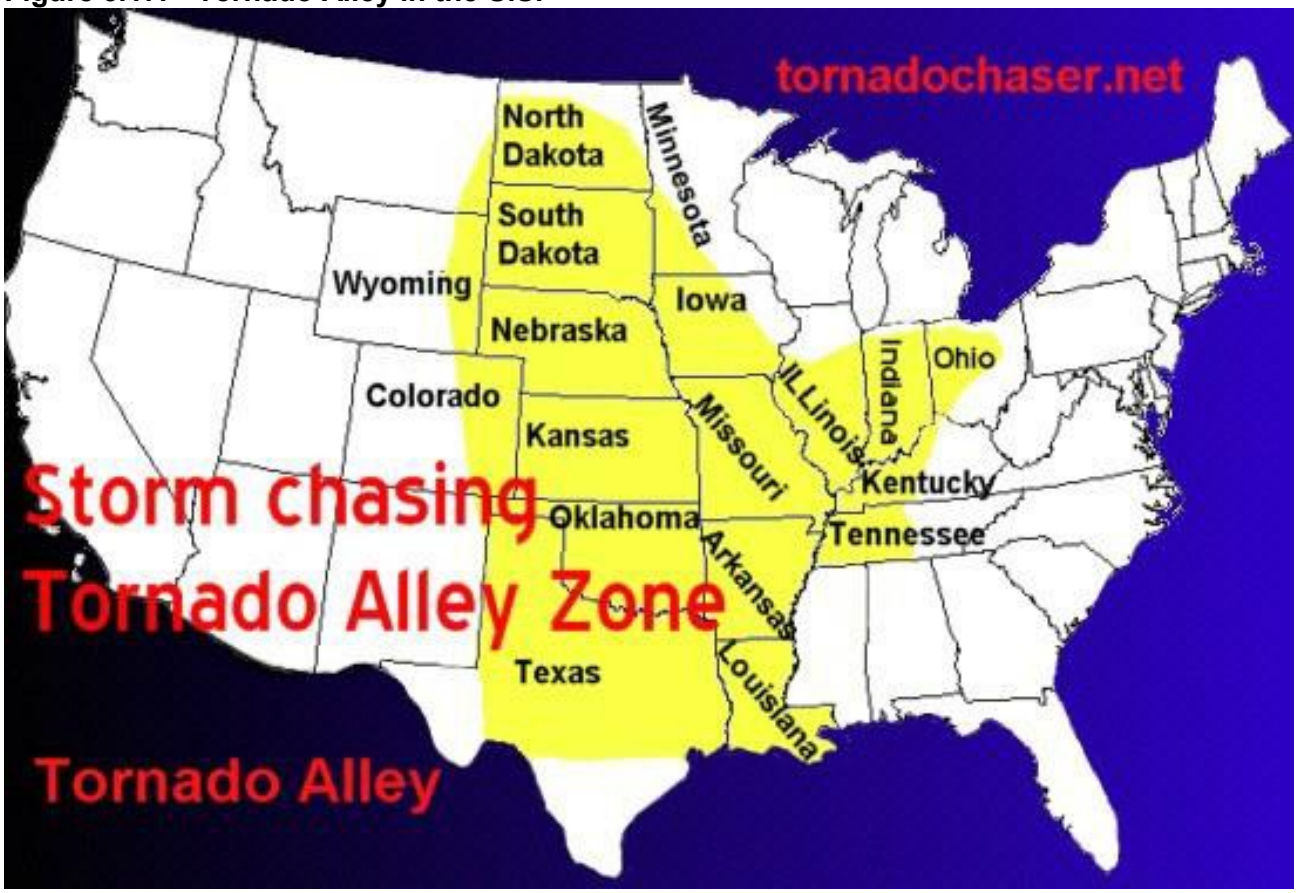
With the current status and ever changing status of the climate, there is plenty of reason to suspect that Benton County will see more tornadic events in the coming years. What is not known is the strength these tornadoes could possess. However, despite fairly good odds of a tornado occurring in any given year, there many years with many smaller, like EF0 or EF1 tornadoes in Benton County, other years might see one major tornado for the entire calendar year.

Vulnerability

Vulnerability Overview

Due to the geography of Benton County, it lies within an area known as Tornado Alley, see **Figure 3.17** But what this means is that tornadoes can happen more often in Benton County than in places like Chicago for example. Recent research in tornadoes suggests that Tornado Alley may be shifting further east from its current location, which does not take Benton County out of the line of fire, it keeps it within Tornado Alley.

Figure 3.17. Tornado Alley in the U.S.



Source: http://www.tornadochaser.net/tornalley.html

Potential Losses to Existing Development

Based on Benton County's history of tornadoes, when the storm exceeds the F1, nowadays EF1, rating, it is reasonable to assume there will be some significant damage to existing structures.
Building codes may require that all new structures be fitted to withstand damages up to EF2 strength, though check with the local fire departments, or building inspection offices or the Missouri State Fire Marshal's office for the most up-to-date code compliance.

Previous and Future Development
Schools, mobile home parks, and other non-sturdy structures present the greatest risk for tornado damage, this is not to say that other structures are not, these three usually see the largest damages. Future developments in Benton County suggest that if buildings are not built to withstand extreme weather that there will be major damages.

Hazard Summary by Jurisdiction

Benton County – Although Benton County has only seen 10 tornadoes since 1993, it is considered at-risk for future tornadoes. Many of these storms have passed through rural areas of the county.

Jurisdictions

- **Cole Camp –** As one of two communities to take a near direct hit from a tornado, Cole Camp is vulnerable to the impact of a tornado.
- **Lincoln –** Despite no direct impacts from any tornadoes since 1993, this community is still considered at-risk for tornadoes.
- **Ionia –** Tornadoes have never impacted Ionia directly, but they are still at-risk for tornadoes.
- **Warsaw –** Warsaw has seen a handful of tornadoes historically, so it is quite at-risk for any future tornadic storms.

School Districts

- **Cole Camp R-I –** Similar to the other two school districts in the county, Cole Camp schools are considered at-risk for tornadoes, and should work to, if not already, prepare for them.
- **Lincoln R-II –** Similar to the other two school districts in the county, Lincoln schools are considered at-risk for tornadoes, and should work to, if not already, prepare for them.
- **Warsaw R-IX –** Similar to the other two school districts in the county, Warsaw schools are considered at-risk for tornadoes, and should work to, if not already, prepare for them.

Problem Statement

Benton County should be adequately prepared to deal with tornadoes in the densely populated communities of Warsaw, Cole Camp, and Lincoln. Ionia might require additional mitigation planning and pre-planning strategies before they are satisfactorily prepared for tornadoes due to its small size and population of only 88. Participation in tornado drills is one way, there are multiple, to being adequately prepared for tornadoes. Education of the public and schools may also provide some mitigative efforts. If schools or other businesses in Benton County would like to obtain safe-rooms, their best bet is to submit the necessary paperwork (notice of interest and others) so that this plan can assist in getting a safe room.

3.4.10 Wildfire

Hazard Profile

Hazard Description

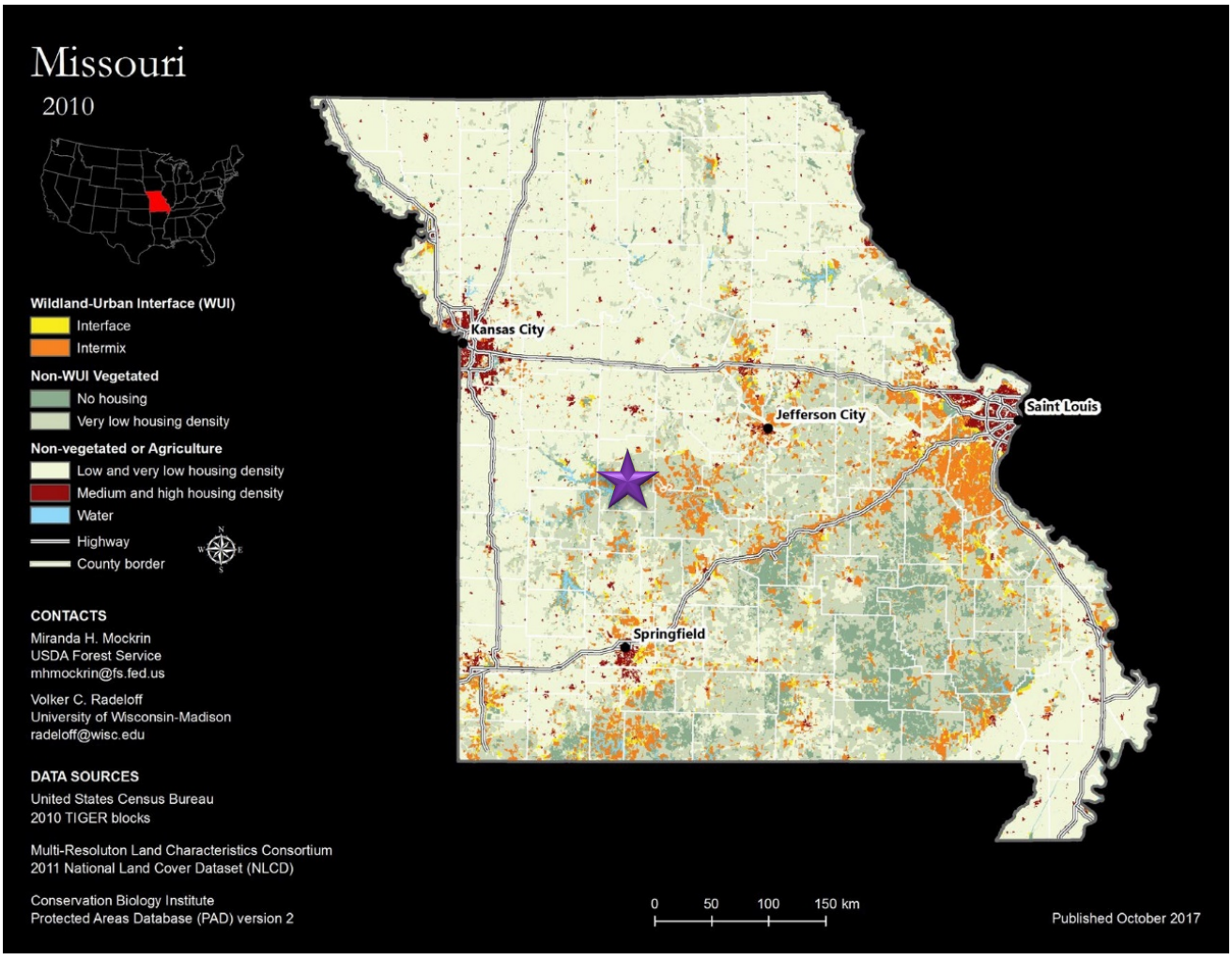
The fire incident types for wildfires include: 1) natural vegetation fire, 2) outside rubbish fire, 3) special outside fire, and 4) cultivated vegetation, crop fire.

The 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.

Geographic Location

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. See **Figure 3.18** for more information.

Figure 3.18. WUI Overview of Wildfire Potential in Missouri



Strength/Magnitude/Extent

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.

Of the many, many, fires faced in Benton County since 2010, the most destructive ones have consumed 400 acres. Fortunately, there have been no fires larger than this.

Previous Occurrences

Since 2010, there have been **960** documented cases of wildland fires in Benton County.
There is no evidence that any of these fires impacted any of the three major school districts or their infrastructure.

Probability of Future Occurrence

960 Fires since January 2010/11 Years since January 2010

100% PROBABILITY

Changing Future Conditions Considerations

Unfortunately, with the ever changing climate, wildfires are becoming more common, but of note, most wildfires in Benton County are human caused, unlike California and the West that sees them caused by natural forces. However, because of this, wildfires in Benton County have the potential to become very destructive.

Vulnerability

Vulnerability Overview

According to SEMA, Benton County’s vulnerability to wildfires is rather high, the total value of

structures in Benton County amounts to nearly **$1.5 Billion** in total exposure. Therefore, based on this staggering statistic, vulnerability to wildfires in Benton County is immense, and a major wildfire would be devastating to Benton County.

Potential Losses to Existing Development

Current development in Benton County is at an enhanced risk for wildfires, and while none of them have been significant like wildfires seen in places like California, but the $1.5 billion dollars' worth of total exposure signifies that a major wildfire could drastically impact current developments in Benton County.

Impact of Previous and Future Development

As it stands now, some current development in WUI hazard areas, and efforts should be made to prevent building in areas with heightened fire danger, for these buildings, while good for the economy add to the total exposure for the county when it comes to wildfire danger.

Hazard Summary by Jurisdiction

Benton County – Benton County, within the last 11 years, has seen nearly 1,000 wildland fires within the county, as such, it is reasonable to assume to that the county will see more wildland fires in the future. Some fires are intentionally set, some are meteorologically caused, and others are freak accidents go awry. In any case, wildfires will continue in Benton County going forward.

Jurisdictions

- **Cole Camp –** Cole Camp has seen its fair share of wildland fires in the last 11 years, and it is expected that these will continually occur. While some fires are good for the ecological aspect of Cole Camp, not all wildland fires produce positive longstanding benefits.
- **Lincoln** – Based on Lincoln's location, surrounded by prairies, it makes for a hotspot for wildfires. Because of this, the community is at risk for them and caution should be exercised during prime fire season.
- **Ionia** – Ionia, on record, has not seen any major wildland fires, but this is not to say that they will not see any. In fact, they are just as vulnerable as neighboring communities as unincorporated Benton County.
- **Warsaw –** Wildfires near Warsaw take a toll on the wildlands, while Warsaw is not typically considered a hotbed for wildfires, there still exists some potential that one could occur near Warsaw.

School Districts

- **Cole Camp R-I** – Wildfires are likely to impact Cole Camp schools, but it would impact it in terms of potential loss to outdoor equipment rather the actual school buildings.
- **Lincoln R-II** – Wildfires are likely to impact Lincoln schools, but it would impact it in terms of potential loss to outdoor equipment rather the actual school buildings.
- **Warsaw R-IX** – Wildfires are likely to impact Warsaw schools, but it would impact it in terms of potential loss to outdoor equipment rather the actual school buildings.

Problem Statement

Benton County is a county with an extensive history of wildland fires, seeing as they've had almost 1,000 since 2010. Prescribing best practices for avoiding wildland fires should be sought be fire departments in Benton County to ensure safe burns and not burning during burn bans and red flag warning conditions. Sometimes equipment or technology malfunctions and starts fires and those are harder to mitigate because there is truly little warning before it happens. Other means of mitigation can include controlled burns by agencies like the MDC so as to ensure proper vegetation and plant growth long-term. When red flag warnings are issued by NWS Springfield, burn bans should be automatically in place. As Smokey the Bear says…

3.4.11 Pandemic

Hazard Profile

Hazard Description

According to the Centers for Disease Control and Prevention (CDC), a pandemic is classified as a global outbreak of a disease. Normally, this stems from a viral outbreak of a given disease, one that has high infectivity rates and sometimes high morbidity rates. New outbreaks contain little to no immunity; therefore, the virus spreads globally.

Geographic Location

All of Benton County is susceptible to a pandemic outbreak due to its characteristic of being able to spread globally to all sectors of the world.

Strength/Magnitude/Extent

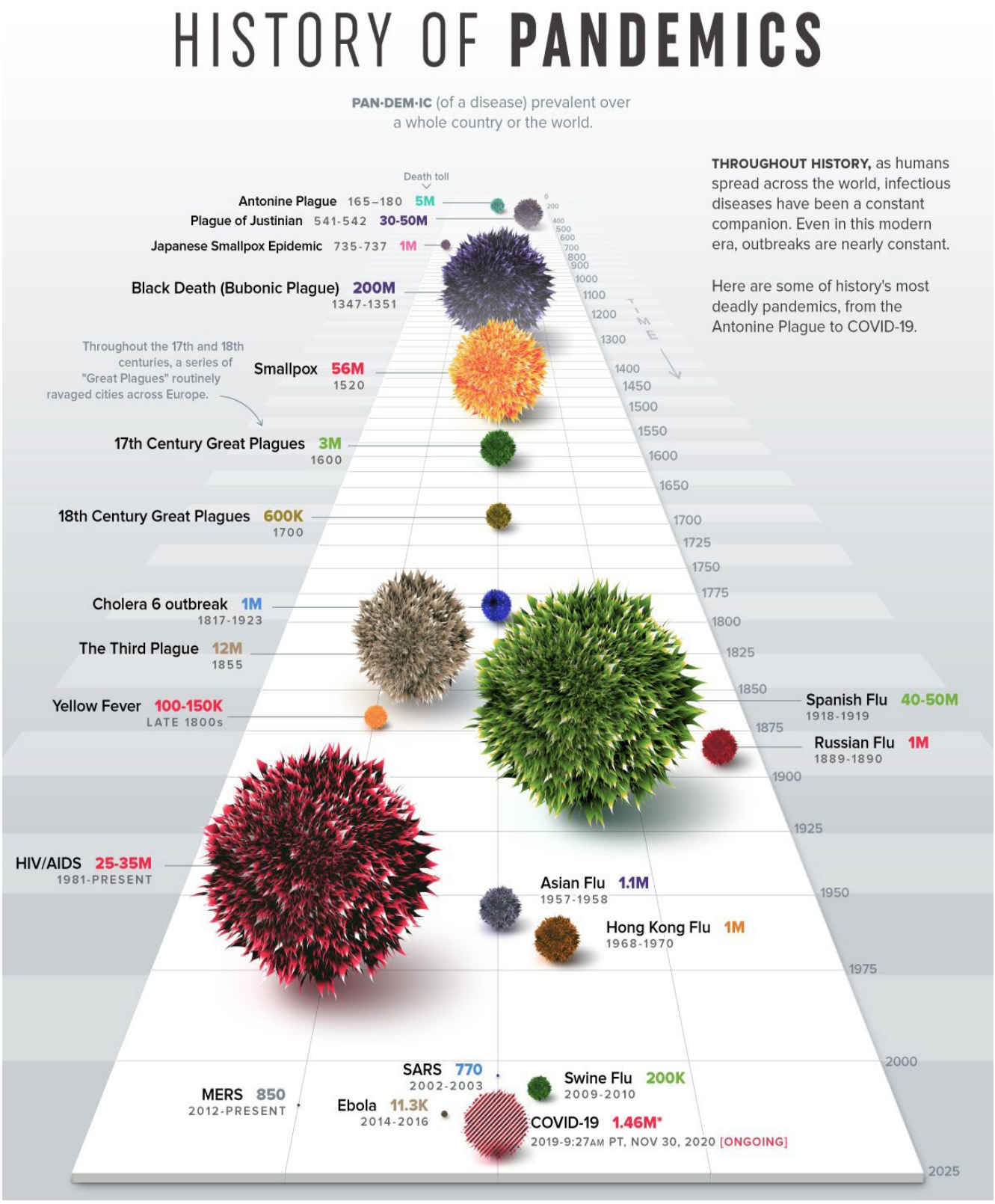
Risk of pandemics is independent of many factors, including severity of the disease causing agent, the spread probability and how soon the agent can be contained by medical experts at the highest level. Vaccines are developed in response to pandemics, but they are time-consuming to develop, test, and deploy. While the vaccine is being developed by high ranking scientists and medical personnel, non-pharmaceutical intervention strategies may be employed to combat the disease. These are essential to slowing spread of the agent and can be essential in mitigating its impacts.

Previous Occurrences

Benton County, like the rest the global community, is currently experiencing a pandemic situation. COVID-19, the short name given to a novel coronavirus, is currently causing the current pandemic. COVID-19's infectivity rate is remarkably high, and its lethality rate is high, though not everyone who contracts the virus dies from the virus. It was declared a Pandemic by the World Health Organization (WHO) on March 11th, 2020. Many of the viral outbreaks in recent (<100 years) have been the result of influenza related bugs. Since 1900, there have been four instances of this type of pandemic, including the Spanish Flu outbreak in 1918 and 1919. Most all have been respiratory diseases that progress in a specific way, outlined further in the "Pandemic Intervals Framework", a product of the CDC. Usually, a pandemic begins with the investigation phase, followed by recognition, initiation, and acceleration. Currently, COVID-19 is in the acceleration phase, but signs suggest that it may be nearing a deceleration phase in 2021, though it is unclear of whether that will occur or not as a pair of vaccines are rolling out at the end of 2020. Countries around the world may be in different phases, and even different parts of the same country may not match the rest of the country itself. Same rule of logic applies to counties in the United States. Benton County's status will be presented shortly.

Throughout history, dating back to the mid-2nd century AD, there have been numerous pandemics, some in Europe, some in the Americas, and some all over the world. **Figure 3.19** further illustrates this point, showcasing pandemics back as far as 165 AD. *Note: this graphic is dated in November 2020, so it does not reflect the current status of COVID-19.

Figure 3.19. History of Pandemics 165 AD – Present Day



Source: https://www.visualcapitalist.com/history-of-pandemics-deadliest/

Probability of Future Occurrence

Pandemics will be a threat to Benton County long into the future, as they are also a concern globally.

Changing Future Conditions Considerations

Climate change, to the surprise of many, has an impact on future disease outbreaks. This stems from the loss of habitats of many animals, who can be the instigator of pandemic outbreaks and who can transmit a disease to humans. Flooding, discussed earlier in this risk assessment, can also cause many pollutants and carry pathogens that may seep into homes and businesses. Some pathogenic agents also spread in hotter weather.

Vulnerability

Vulnerability Overview

According to the CDC, each sector of the population is vulnerable to the effects of a pandemic. Seeing as much of Benton County is in the older population (>65 years), an outbreak similar to what is being experienced with COVID-19, would have major ramifications for the economy and the communities in the county. The CDC has found that the Social Vulnerability Score for Benton County is **0.50**, which amounts to a **LOW** to **MODERATE** vulnerability for the entire population.

Potential Losses to Existing Development

During disease outbreaks, like COVID-19, people have been required to adjust their daily routines, schools have done hybrid (in-person and online) learning off and on, and restaurants/bars have not been allowed indoor dining to prevent the pandemic from spreading. However, some have not complied with this, continuing indoor dining or taking actions to stop the spread of COVID-19. The losses have hit some well-known areas harder than others, meaning that recovery will be harder for those who have been forced into uncharted territory.

Impact of Previous and Future Development

Pandemics disrupt normal life in some capacity, and if urbanization is going to continue at a high rate, then it is likely diseases will come with that. Macro trends in society may not be as prevalent in rural communities, like Benton County, but it is trickle-down effect from the larger metropolitan areas like Springfield or Kansas City.

Hazard Summary by Jurisdiction

Benton County is a rural county, so it would make sense for there to be adequate protective measures to protect against community spread. Larger areas do not have this advantage; however, pandemics are global so no one community in the county has pure immunity to a pandemic.

Problem Statement

The best course of action for keeping transmission of a disease outbreak, residents of Benton County should follow best practices during a pandemic, refusal to comply only exacerbates the situation further. By following these actions, the county can be safer, and the pandemic will be resolved faster. Providing information to the public is also important, and improvising if needed.

4 MITIGATION STRATEGY

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 [updated] 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 Benton County's existing hazard mitigation plan approved by FEMA on 7 October 2016. Therefore, the goals from the 2016 Benton 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 second meeting to review and update the plan goals. To ensure that the goals developed for this update were comprehensive and supported State goals, the 2018 State Hazard Mitigation Plan goals were reviewed. The MPC also reviewed the goals from current surrounding county plans.

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.

The 2016 plan update at first outlined **6** goals, several objectives, and many more action steps… those goals are as follows:

1. **Reduce risks and vulnerabilities of people in hazard prone areas.**
2. **Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.**
3. **Promote education, outreach, research and development programs to improve the knowledge and awareness among citizens and industry about the hazards they face, their vulnerability to identified hazards and hazard mitigation alternatives that can reduce their vulnerabilities**
4. **Strengthen communication and coordinate participation between public agencies, citizens, nonprofit organizations, business and industry to create a widespread interest in mitigation.**
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 interest.**
6. **Secure resources for investment in hazard mitigation.**

However, for the 2021 update, consensus among community members, the MPC, and other key stakeholders was to reduce the amount of goals to **4**. Those new goals are as follows:

1. ***Protect the lives and livelihood of all citizens.***
2. ***Mitigate the effects of future natural hazards in the community.***
3. ***Reinforce communication and awareness to coordinate participation between public agencies, citizens, nonprofit organizations, business and industry.***
4. ***Update written policies and procedures for preparedness and mitigation responses to natural disasters.***

During the countywide MPC meeting, the results of the risk assessment update were provided to the MPC members for review and the key issues were identified for specific hazards. Changes in risk since adoption of the previously approved plan were discussed. 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 included problem statements in the plan update at the end of each hazard profile. The problem statements summarize the risk to the planning area presented by each hazard and include possible methods to reduce that risk. Use of the problem statements allowed the MPC to

recognize new and innovative strategies for mitigate risks in the planning area.

The focus of the countywide meeting was update of the mitigation strategy. For a comprehensive range of mitigation actions to consider[7(a)], the MPC reviewed the following information during the countywide meeting:

- A list of actions proposed in the previous mitigation plan, the current State Plan, and approved plans in surrounding counties,
- Key issues from the risk assessments, including the problem statements concluding each hazard profile and vulnerability analysis,
- State priorities established for HMA grants, and
- Public input during meetings, responses to data collection questionnaires, and other efforts to involve the public in the plan development process.

For the countywide meeting, individual jurisdictions, including school and special districts, developed final mitigation strategy for submission to the MPC. They were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction. They were also 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.

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted, using worksheets included in Appendix C of this plan. Prior to the countywide meeting, the list of actions for each jurisdiction was hand delivered to that jurisdiction's MPC representative along with the worksheets. Each jurisdiction was instructed to provide information regarding the "Action Status" with one of the following status choices:

- ***Completed, with a description of the progress;***
- ***Ongoing, with a description of the progress made to date; or***
- ***Not Yet Started, with a discussion of the reasons for lack of progress.***

Additionally, the future inclusion of each mitigation action in the plan update was identified as either keep, delete, or modify. Based on the status updates, there was **1** (Benton County as a whole had 2; Warsaw had 3) completed action(s), **4** continuing actions (either ongoing or modified), and **25** deleted actions (countywide).

Table 4.1. provides a summary of the action statuses for each jurisdiction:

Table 4.1. Action Status Summary

Jurisdiction	Completed Actions	Continuing Actions (ongoing or modify)	Deleted Actions
Benton County	**2.3.1; 4.1.1**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**
City of Cole Camp	**2.3.1**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**

Village of Ionia	**None.**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**
City of Lincoln	**2.3.1**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**
City of Warsaw	**2.3.1; 5.1.3; 5.1.5**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**
Cole Camp R-I School District	**None.**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**
Lincoln R-II School District	**None.**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**
Warsaw R-IX School District	**None.**	**2.2.1; 3.2.1; 5.1.4; 5.2.1**	**1.1.1; 1.2.1; 1.2.2; 1.2.3; 1.3.1; 1.3.2; 2.1.1; 2.3.2; 3.1.1; 3.1.2; 3.2.2; 3.3.1; 3.3.2; 3.3.3; 4.1.1; 4.1.2; 4.1.3; 4.2.1; 4.2.2; 5.1.1; 5.1.2; 5.2.2; 6.1.1; 6.1.2; 6.1.3; 6.2.1; 6.3.1**

Table 4.2 provides a summary of the completed and deleted actions from the previous plan.

Table 4.2. Summary of Completed and Deleted Actions from the Previous Plan

Completed Actions	Completion Details (date, amount, funding source)
2.3.1 (Countywide)	Unsure of funding amount or source but at some point in the last five years, the larger communities incorporated eCode360 to develop minimum standards/codes. Ionia did not do this.
5.1.3 (Warsaw)	The city of Warsaw recently completed a stormwater management plan with the assistance of a contracted engineer. Funding source unknown. Tied into the action 5.1.5 (see below).
5.1.5 (Warsaw)	The city of Warsaw recently completed a stormwater management plan with the assistance of a contracted engineer. Funding source unknown.

Deleted Actions	Reason for Deletion
1.1.1	Redundant, not measurable or attainable due to funding and community participation
1.2.1	Redundant, not measurable or attainable due to funding and community participation
1.2.2	Redundant, not measurable or attainable due to funding and community participation
1.2.3	Redundant, not measurable or attainable due to funding and community participation
1.3.1	Redundant, not measurable or attainable due to funding and community participation
1.3.2	Redundant, not measurable or attainable due to funding and community participation
2.1.1	Redundant, not measurable or attainable due to funding and community participation
2.3.1	Redundant, not measurable or attainable due to funding and community participation
2.3.2	Redundant, not measurable or attainable due to funding and community participation
3.1.1	Redundant, not measurable or attainable due to funding and community participation
3.1.2	Redundant, not measurable or attainable due to funding and community participation
3.2.2	Redundant, not measurable or attainable due to funding and community participation
3.3.1	Redundant, not measurable or attainable due to funding and community participation
3.3.2	Redundant, not measurable or attainable due to funding and community participation
3.3.3	Redundant, not measurable or attainable due to funding and community participation
4.1.2	Redundant, not measurable or attainable due to funding and community participation
4.1.3	Redundant, not measurable or attainable due to funding and community participation
4.2.1	Redundant, not measurable or attainable due to funding and community participation
4.2.2	Redundant, not measurable or attainable due to funding and community participation
5.1.1	Redundant, not measurable or attainable due to funding and community participation
5.1.2	Redundant, not measurable or attainable due to funding and community participation
5.2.2	Redundant, not measurable or attainable due to funding and community participation
6.1.1	Redundant, not measurable or attainable due to funding and community participation

6.1.2	Redundant, not measurable or attainable due to funding and community participation
6.1.3	Redundant, not measurable or attainable due to funding and community participation
6.2.1	Redundant, not measurable or attainable due to funding and community participation
6.3.1	Redundant, not measurable or attainable due to funding and community participation

Sources: 2016 Benton County Hazard Mitigation Plan; 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 finalize the actions to be submitted for 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 2018 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[7(a)]. During the prioritization process, the jurisdictions used worksheets to assign scores. The worksheets 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 points
Definitely NO = 0 points

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?

The final scores are listed below in the analysis of each action. The worksheets are attached to this plan in the Appendices. The STAPLEE final score for each action, absent other considerations, such as a localized need for a project, determined the priority. Low priority action items were those that had a total score of between 0 and 24. Moderate priority actions were those scoring between 25 and 29. High priority actions scored 30 or above. A blank STAPLEE worksheet is shown in **Table 4.3**.

Table 4.3. Blank STAPLEE Worksheet

STAPLEE Worksheet		
Name of Jurisdiction:		
Action or Project		
Action/Project Number:		
Name of Action or Project:		
Mitigation Category:		
STAPLEE Criteria **Evaluation Rating** Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0		**Score**
S: Is it **Socially** Acceptable		
T: Is it **Technically** feasible and potentially successful?		
A: Does the jurisdiction have the **Administrative** capacity to execute this action?		
P: Is it **Politically** acceptable?		
L: Is there **Legal** authority to implement?		
E: Is it **Economically** beneficial?		
E: Will the project have either a neutral or positive impact on the natural **Environment**?		
Will historic structures be saved or protected?		
Could it be implemented quickly?		
STAPLEE SCORE		
Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**
Will the implemented action result in lives saved?	Assign from 5-10 points based on the likelihood that lives will be saved.	
Will the implemented action result in a reduction of disaster damages?	Assign from 5-10 points based on the relative reduction of disaster damages.	
MITIGATION EFFECTIVENESS SCORE		
TOTAL SCORE (STAPLEE + Mitigation Effectiveness)		

☐ **High Priority (30+ points)**	☐ **Medium Priority (25 - 29 points)**	☐ **Low Priority (<25 points)**

Completed by
(Name, Title, Phone Number) _____

In addition to the STAPLEE cost benefit review prioritization, implementation plans were discussed with the MPC for each action. An action worksheet was used to develop the implementation plan.

Table 4.4. Blank Action Worksheet Template

Action Worksheet	
Name of Jurisdiction:	
Risk / Vulnerability	
Hazard(s) Addressed:	
Problem being Mitigated:	
Action or Project	
Applicable Goal Statement:	
Action/Project Number:	
Name of Action or Project:	
Mitigation Category:	
Action or Project Description:	
Estimated Cost:	
Benefits:	
Plan for Implementation	
Responsible Organization/Department:	
Supporting Organization/Department:	
Action/Project Priority:	
Timeline for Completion:	
Potential Fund Sources:	
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status:	
Report of Progress:	

Goal 1: Protect the lives of livelihood of all citizens

Action Worksheet	
Name of Jurisdiction:	Benton County
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Lack of Emergency Notification System Participation
Action or Project	
Applicable Goal Statement:	Goal 1
Action/Project Number:	1.1
Name of Action or Project:	Increase RAVE Participation
Mitigation Category:	Education & Outreach
Action or Project Description:	Opt-in Emergency Notification System
Estimated Cost:	0
Benefits:	Increased Participation
Plan for Implementation	
Responsible Organization/Department:	Benton County Emergency Management
Supporting Organization/Department:	USACE & County Commission
Action/Project Priority:	High
Timeline for Completion:	0-6 Months
Potential Fund Sources:	USACE or ARPA
Local Planning Mechanisms to be Used in Implementation, if any:	None
Progress Report	
Action Status:	
Report of Progress:	

Goal 1: Protect the lives of livelihood of all citizens

Action Worksheet	
Name of Jurisdiction:	Cole Camp R-1 School District
Risk / Vulnerability	
Hazard(s) Addressed:	Severe Weather, Extreme Temperatures
Problem being Mitigated:	Lack of Storm Shelter
Action or Project	
Applicable Goal Statement:	Goal 1
Action/Project Number:	1.1
Name of Action or Project:	Storm Shelter
Mitigation Category:	Prevention
Action or Project Description:	Construction of a storm shelter accessible to the school and general community of Cole Camp
Estimated Cost:	$4,000,000
Benefits:	Safety for school and community
Plan for Implementation	
Responsible Organization/Department:	School board and Superintendent
Supporting Organization/Department:	School board and Superintendent
Action/Project Priority:	High
Timeline for Completion:	1-5 Years
Potential Fund Sources:	Local, State and Federal
Local Planning Mechanisms to be Used in Implementation, if any:	County Emergency Operations Plan, School Master Plan, School Capital Improvement Plan, School Emergency Plan
Progress Report	
Action Status:	
Report of Progress:	

Goal 1: Protect the lives and livelihood of all citizens

Action Worksheet	
Name of Jurisdiction:	Ionia
Risk / Vulnerability	
Hazard(s) Addressed:	Severe Weather; Tornadoes
Problem being Mitigated:	Lack of proper severe weather warning for all citizens
Action or Project	
Applicable Goal Statement:	Goal 1
Action/Project Number:	1.1
Name of Action or Project:	New Storm Siren
Mitigation Category:	Prevention/Structure and Infrastructure
Action or Project Description:	Installation of storm sirens
Estimated Cost:	$10,000-$15,000
Benefits:	Saving lives & property in times of danger
Plan for Implementation	
Responsible Organization/Department:	Village Council
Supporting Organization/Department:	Village Council
Action/Project Priority:	High
Timeline for Completion:	3-5 Years
Potential Fund Sources:	State or Federal Grants
Local Planning Mechanisms to be Used in Implementation, if any:	None
Progress Report	
Action Status:	
Report of Progress:	

Goal 1: Protect the lives of livelihood of all citizens

Action Worksheet	
Name of Jurisdiction:	Lincoln R-II Schools
Risk / Vulnerability	
Hazard(s) Addressed:	Severe Weather, Extreme Temperatures
Problem being Mitigated:	Lack of Storm Shelter
Action or Project	
Applicable Goal Statement:	Goal 1
Action/Project Number:	1.1
Name of Action or Project:	Storm Shelter
Mitigation Category:	Prevention
Action or Project Description:	Construction of a storm shelter accessible to the school and general community of Lincoln
Estimated Cost:	$3,900,000
Benefits:	Safety for school and community
Plan for Implementation	
Responsible Organization/Department:	School board and Superintendent
Supporting Organization/Department:	School board and Superintendent
Action/Project Priority:	High
Timeline for Completion:	1-5 Years
Potential Fund Sources:	Local, State and Federal
Local Planning Mechanisms to be Used in Implementation, if any:	County Emergency Operations Plan, School Master Plan, School Capital Improvement Plan, School Emergency Plan
Progress Report	
Action Status:	
Report of Progress:	

Goal 1: Protect the lives and livelihood of all citizens

Action Worksheet	
Name of Jurisdiction:	Warsaw
Risk / Vulnerability	
Hazard(s) Addressed:	Public Safety
Problem being Mitigated:	Lack of formal police department building
Action or Project	
Applicable Goal Statement:	Goal 1
Action/Project Number:	1.1
Name of Action or Project:	New Police Department building
Mitigation Category:	Emergency Services
Action or Project Description:	Creation of a formalized police department building to enhance response to public emergencies and disasters
Estimated Cost:	$1,000,000
Benefits:	Reduce deficiencies in responding to disasters
Plan for Implementation	
Responsible Organization/Department:	City of Warsaw
Supporting Organization/Department:	City of Warsaw
Action/Project Priority:	High
Timeline for Completion:	0-5 Years
Potential Fund Sources:	Local, State, Federal
Local Planning Mechanisms to be Used in Implementation, if any:	Benton County Emergency Operations Plan
Progress Report	
Action Status:	
Report of Progress:	

Goal 1: Protect the lives of livelihood of all citizens

Action Worksheet	
Name of Jurisdiction:	Warsaw R-IX School District
Risk / Vulnerability	
Hazard(s) Addressed:	Severe Weather, Extreme Temperatures
Problem being Mitigated:	Lack of Storm Shelter
Action or Project	
Applicable Goal Statement:	Goal 1
Action/Project Number:	1.1
Name of Action or Project:	Storm Shelter
Mitigation Category:	Prevention
Action or Project Description:	Construction of a storm shelter accessible to the school and general community of Warsaw
Estimated Cost:	$4,100,000
Benefits:	Safety for school and community
Plan for Implementation	
Responsible Organization/Department:	School board and Superintendent
Supporting Organization/Department:	School board and Superintendent
Action/Project Priority:	High
Timeline for Completion:	1-5 Years
Potential Fund Sources:	Local, State and Federal
Local Planning Mechanisms to be Used in Implementation, if any:	County Emergency Operations Plan, School Master Plan, School Capital Improvement Plan, School Emergency Plan
Progress Report	
Action Status:	
Report of Progress:	

Goal 2: Mitigate the effects of future natural hazards in the community

Action Worksheet	
Name of Jurisdiction:	Benton County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding (Flash and Riverine)
Problem being Mitigated:	Stormwater Management
Action or Project	
Applicable Goal Statement:	Goal 2
Action/Project Number:	2.1
Name of Action or Project:	Watershed Study for improvements of Stormwater drainage
Mitigation Category:	Prevention
Action or Project Description:	Possible removal of low water crossings and replacing with box culverts to mitigate flooding hazard.
Estimated Cost:	$250,000
Benefits:	Better roads, less loss of land erosion to minimize damages
Plan for Implementation	
Responsible Organization/Department:	Benton County Road & Bridge Department
Supporting Organization/Department:	County Commission
Action/Project Priority:	High
Timeline for Completion:	1-5 Years
Potential Fund Sources:	Local Funding; Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Benton County Emergency Operations Plan
Progress Report	
Action Status:	Continuing
Report of Progress:	Ongoing

Goal 2: Mitigate the effects of future natural hazards in the community

Action Worksheet	
Name of Jurisdiction:	City of Cole Camp
Risk / Vulnerability	
Hazard(s) Addressed:	Severe Weather/Earthquakes
Problem being Mitigated:	Unsafe Buildings
Action or Project	
Applicable Goal Statement:	Goal 2
Action/Project Number:	2.1
Name of Action or Project:	Retrofitting of Unsafe Buildings within City Limits
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Citywide effort to bring existing structures up to Code
Estimated Cost:	~$200,000
Benefits:	Safer homes, increased life safety, and reduction of unsafe properties.
Plan for Implementation	
Responsible Organization/Department:	City of Cole Camp – Building Officer
Supporting Organization/Department:	City of Cole Camp
Action/Project Priority:	High
Timeline for Completion:	Ongoing
Potential Fund Sources:	State/Federal Grants
Local Planning Mechanisms to be Used in Implementation, if any:	Municipal Codes
Progress Report	
Action Status:	Continuing
Report of Progress:	Ongoing

Goal 2: Mitigate the effects of future natural hazards in the community

Action Worksheet	
Name of Jurisdiction:	Lincoln
Risk / Vulnerability	
Hazard(s) Addressed:	Severe Weather; Tornadoes
Problem being Mitigated:	Lack of situational awareness during severe weather
Action or Project	
Applicable Goal Statement:	Goal 2
Action/Project Number:	2.1
Name of Action or Project:	New Storm Siren in East Lincoln
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Install new storm siren to underserved area of Lincoln
Estimated Cost:	$20,000
Benefits:	Better severe weather notification
Plan for Implementation	
Responsible Organization/Department:	Lincoln Police Department
Supporting Organization/Department:	Benton County Emergency Management
Action/Project Priority:	High
Timeline for Completion:	2 Years
Potential Fund Sources:	Local & USDA
Local Planning Mechanisms to be Used in Implementation, if any:	None
Progress Report	
Action Status:	
Report of Progress:	

Goal 3: Reinforce communication and awareness to coordinate participation between public agencies, citizens, nonprofit organizations, business and industry

Action Worksheet	
Name of Jurisdiction:	Benton County
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Social Media Platform
Action or Project	
Applicable Goal Statement:	Goal 3
Action/Project Number:	3.1
Name of Action or Project:	Social Media Platform
Mitigation Category:	Education and Outreach
Action or Project Description:	Education of disasters through social media
Estimated Cost:	$500.00
Benefits:	Timely and Accurate information during an event or disaster.
Plan for Implementation	
Responsible Organization/Department:	Benton County Emergency Management
Supporting Organization/Department:	County Commission
Action/Project Priority:	High
Timeline for Completion:	0-6 months
Potential Fund Sources:	EMPG
Local Planning Mechanisms to be Used in Implementation, if any:	None
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	Benton County
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Continued Comprehensive Planning
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.1
Name of Action or Project:	LEOP Update
Mitigation Category:	Emergency Services
Action or Project Description:	Through comprehensive planning, Benton County Emergency Management can update their Local Emergency Operations Plan and
Estimated Cost:	0
Benefits:	Ensure accurate emergency operations plan is on file
Plan for Implementation	
Responsible Organization/Department:	Benton County Emergency Management
Supporting Organization/Department:	County Commission
Action/Project Priority:	High
Timeline for Completion:	0-6 Months
Potential Fund Sources:	EMPG
Local Planning Mechanisms to be Used in Implementation, if any:	Previously developed County Emergency Operations Plan; County Economic Development Plan
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	City of Cole Camp
Risk / Vulnerability	
Hazard(s) Addressed:	All Hazards
Problem being Mitigated:	Lack of Emergency Training & Plan
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.1
Name of Action or Project:	Cole Camp Emergency Plan
Mitigation Category:	Prevention
Action or Project Description:	Develop emergency plan for the city of Cole Camp
Estimated Cost:	0
Benefits:	Provide city with adequate all-hazards emergency plan.
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Department:	City Council
Action/Project Priority:	Low
Timeline for Completion:	5 years
Potential Fund Sources:	None
Local Planning Mechanisms to be Used in Implementation, if any:	Local Economic Development Plan
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	Cole Camp R-I School District
Risk / Vulnerability	
Hazard(s) Addressed:	All Natural Hazards
Problem being Mitigated:	Out-of-date Policies and Procedures
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.1
Name of Action or Project:	Emergency Crisis Plan
Mitigation Category:	Education & Outreach
Action or Project Description:	Updating policies & procedures for natural hazard mitigation
Estimated Cost:	0
Benefits:	Trained response for staff & students in disaster response
Plan for Implementation	
Responsible Organization/Department:	Superintendent & School Board
Supporting Organization/Department:	Superintendent & School Board
Action/Project Priority:	High
Timeline for Completion:	0-6 Months
Potential Fund Sources:	District funding
Local Planning Mechanisms to be Used in Implementation, if any:	None
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	Lincoln R-II School District
Risk / Vulnerability	
Hazard(s) Addressed:	All Natural Hazards
Problem being Mitigated:	Out-of-date Policies and Procedures
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.1
Name of Action or Project:	Emergency Crisis Plan
Mitigation Category:	Education & Outreach
Action or Project Description:	Updating policies & procedures for natural hazard mitigation
Estimated Cost:	0
Benefits:	Trained response for staff & students in disaster response
Plan for Implementation	
Responsible Organization/Department:	Superintendent & School Board
Supporting Organization/Department:	Superintendent & School Board
Action/Project Priority:	High
Timeline for Completion:	0-6 Months
Potential Fund Sources:	District funding
Local Planning Mechanisms to be Used in Implementation, if any:	None
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	Warsaw R-IX School District
Risk / Vulnerability	
Hazard(s) Addressed:	All Natural Hazards
Problem being Mitigated:	Out-of-date Policies and Procedures
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.1
Name of Action or Project:	Emergency Crisis Plan
Mitigation Category:	Education & Outreach
Action or Project Description:	Updating policies & procedures for natural hazard mitigation
Estimated Cost:	0
Benefits:	Trained response for staff & students in disaster response
Plan for Implementation	
Responsible Organization/Department:	Superintendent, SRO, and School Board
Supporting Organization/Department:	Superintendent, SRO, and School Board
Action/Project Priority:	High
Timeline for Completion:	0-6 Months
Potential Fund Sources:	District funding
Local Planning Mechanisms to be Used in Implementation, if any:	None
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	Benton County
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Development in Floodplain
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.2
Name of Action or Project:	Continued NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Estimated Cost:	$100,000
Benefits:	Reduce development in the SFHA and/or protect floodplain
Plan for Implementation	
Responsible Organization/Department:	County EMD
Supporting Organization/Department:	County Commission
Action/Project Priority:	High
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinance
Progress Report	
Action Status:	Continuing
Report of Progress:	Ongoing

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	City of Lincoln, Missouri
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Development in Floodplain
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.2
Name of Action or Project:	Continued NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Estimated Cost:	$5,000
Benefits:	Keeping development away from the floodplain
Plan for Implementation	
Responsible Organization/Department:	City of Lincoln, MO – Public Works
Supporting Organization/Department:	City of Lincoln, MO – Public Works
Action/Project Priority:	32/High
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Ordinances/Resolution
Progress Report	
Action Status:	Continuing
Report of Progress:	Ongoing

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	City of Warsaw, Missouri
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Development in Floodplain
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.2
Name of Action or Project:	Continued NFIP Participation
Mitigation Category:	Prevention
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Estimated Cost:	$100,000
Benefits:	Reduce development in the SFHA and/or protect floodplain
Plan for Implementation	
Responsible Organization/Department:	City of Warsaw, MO
Supporting Organization/Department:	Board of Aldermen
Action/Project Priority:	High
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinance – Chapter 415
Progress Report	
Action Status:	Continuing
Report of Progress:	Ongoing

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	City of Warsaw, Missouri
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding
Problem being Mitigated:	Flooding impacts of Town Branch Creek
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.3
Name of Action or Project:	Hydraulic Analysis of Town Branch Creek
Mitigation Category:	Structure and Infrastructure Projects
Action or Project Description:	Evaluate Town Branch Creek using updated stream geometry and current conditions of the creek to identify updated representative flood elevations and extents. Use this to 1) communicate flood risk for properties and 2) identify future improvements for flood mitigation.
Estimated Cost:	$200,000
Benefits:	Evaluate impacts of flood mitigation; Communicate flood risk.
Plan for Implementation	
Responsible Organization/Department:	City of Warsaw, MO
Supporting Organization/Department:	Board of Aldermen
Action/Project Priority:	42/High
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Warsaw Stormwater Study – 9/30/2020
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	City of Warsaw, Missouri
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding; watershed stormwater management need
Problem being Mitigated:	Design of stormwater systems
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.4
Name of Action or Project:	Stormwater Policy and Criteria Update
Mitigation Category:	Prevention
Action or Project Description:	Develop and define updated policies and design criteria for a watershed approach to stormwater management. This will build on a previous effort that evaluated existing policies, criteria of Warsaw and regional peer cities. Input and feedback from the community will be integral to the update
Estimated Cost:	$250,000
Benefits:	Set criteria for future stormwater management; Listen to and educate the community
Plan for Implementation	
Responsible Organization/Department:	City of Warsaw, MO
Supporting Organization/Department:	Board of Aldermen
Action/Project Priority:	42/High
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Warsaw Stormwater Study – 9/30/2020
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	City of Warsaw, Missouri
Risk / Vulnerability	
Hazard(s) Addressed:	Flooding; water quality
Problem being Mitigated:	Flooding; stormwater management; water quality
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.5
Name of Action or Project:	Wetlands Improvement
Mitigation Category:	Natural Systems Protection
Action or Project Description:	Design and construction of a stormwater mitigation wetland along Town Branch Creek corridor near Jackson-Commercial Street intersection to manage stormwater from the roadway, improve water quality, provide neighborhood benefits and restore the natural riparian and wetland habitat along the existing creek.
Estimated Cost:	$814,000
Benefits:	Reduce flooding risk on Town Branch Creek; restore natural riparian and wetland habitat
Plan for Implementation	
Responsible Organization/Department:	City of Warsaw, MO
Supporting Organization/Department:	Board of Aldermen
Action/Project Priority:	42/High
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Warsaw Downtown Marina District Transportation Project – 2021
Progress Report	
Action Status:	
Report of Progress:	

Goal 4: Update written policies and procedures for preparedness and mitigation responses to natural disasters.

Action Worksheet	
Name of Jurisdiction:	City of Warsaw, Missouri
Risk / Vulnerability	
Hazard(s) Addressed:	Data management
Problem being Mitigated:	No centralized tracking of existing utility asset management
Action or Project	
Applicable Goal Statement:	Goal 4
Action/Project Number:	4.6
Name of Action or Project:	Digital utility management system
Mitigation Category:	Prevention
Action or Project Description:	Develop digital data using existing available resources to show mapping of utilities managed by the City, including stormwater mapping of assets. Develop a process for tracking the maintenance of existing assets.
Estimated Cost:	$200,000
Benefits:	Compile utility information into a mapping platform; standardize asset management for utilities
Plan for Implementation	
Responsible Organization/Department:	City of Warsaw, MO
Supporting Organization/Department:	Board of Aldermen
Action/Project Priority:	42/High
Timeline for Completion:	Ongoing
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Existing hard-copy maps
Progress Report	
Action Status:	
Report of Progress:	

Table 4.5. Mitigation Action Matrix

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Prevention Public Education								
1.1	Ionia Emergency Plan	Ionia	High	Goal 1	Severe WX	Yes	Yes	No
1.1	Warsaw Police Department Building	Warsaw	High	Goal 1	Public Safety	No	Yes	No
2.1	Watershed Study for improvements of Stormwater drainage	Benton County	High	Goal 2	Flooding	Yes	Yes	No
4.1	Cole Camp Emergency Plan	Cole Camp	Low	Goal 4	All Hazards	Yes	Yes	No
4.2	Continued NFIP Participation	Benton County	High	Goal 4	Flooding	Yes	Yes	Yes
4.2	Continued NFIP Participation	Lincoln	High	Goal 4	Flooding	Yes	Yes	Yes
4.2	Continued NFIP Participation	Warsaw	High	Goal 4	Flooding	Yes	Yes	Yes
4.4	Stormwater Policy and Criteria Update	Warsaw	High	Goal 4	Flooding	Yes	Yes	No
4.6	Digital Utility Management System	Warsaw	High	Goal 4	Data management	Yes	Yes	No
Structure and Infrastructure Projects								
2.1	East Lincoln Storm Sirens	Lincoln	High	Goal 2	Severe WX	Yes	Yes	No
2.1	Removal of Unsafe City Buildings	Cole Camp	High	Goal 2	Severe WX; Earthquake	Yes	Yes	No
1.1	Storm Shelter	Cole Camp R-I	High	Goal 1	Severe WX	Yes	Yes	No
1.1	Storm Shelter	Lincoln R-II	High	Goal 1	Severe WX	Yes	Yes	No
1.1	Storm Shelter	Warsaw R-IX	High	Goal 1	Severe WX	Yes	Yes	No
4.3	Hydraulic Analysis of Town Branch Creek	Warsaw	High	Goal 4	Flooding	Yes	Yes	No
Natural Systems Protection								
4.5	Wetlands Improvement	Warsaw	High	Goal 4	Flooding	Yes	Yes	No
Emergency Services								
4.1	LEOP Update	Benton County	High	Goal 4	All Hazards	Yes	Yes	Yes
1.1	Warsaw Police Department Building	Warsaw	High	Goal 1	Public Safety	No	Yes	No
Education and Outreach								
1.1	Increased RAVE Participation	Benton County	High	Goal 1	All Hazards	Yes	Yes	No
3.1	Social Media Platform	Benton County	High	Goal 3	All Hazards	Yes	Yes	No
4.1	Emergency Crisis Plan	Cole Camp R-I	High	Goal 4	All Hazards	Yes	Yes	No
4.1	Emergency Crisis Plan	Lincoln R-II	High	Goal 4	All Hazards	Yes	Yes	No
4.1	Emergency Crisis Plan	Warsaw R-IX	High	Goal 4	All Hazards	Yes	Yes	No

5 PLAN MAINTENANCE PROCESS

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

The MPC and KBRPC are advisory bodies 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 Benton County Emergency Management Director will be responsible for initiating the plan reviews and will invite members of the MPC and KBRPC to the meeting.

In coordination with all participating jurisdictions, the Emergency Management Director, in collaboration with KBRPC, will be responsible for initiating a five-year written update of the plan to 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[10(b)] 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 Benton County Board of Commissioners 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 districts, will use existing plans and/or programs to implement hazard mitigation actions. Those existing plans and programs were described in **Section 4.1** of this plan. Based on the capability assessments of the participating jurisdictions, communities in Benton 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:

- *General or master plans of participating jurisdictions;*
- *Ordinances of participating jurisdictions;*
- *Benton County Emergency Operations Plan;*
- *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 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 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[10(b)] review of the Hazard Mitigation Plan, the Benton County Emergency Management Director and Kaysinger Basin Regional Planning Commission will convene to provide the updated Mitigation Strategy with current status of each mitigation action to the Benton County Commissioners as well as all Mayors, City Clerks, and School District Superintendents[10(a)]. The Emergency Management Director will request that the mitigation strategy be incorporated, where appropriate, in other planning mechanisms.

Table 5.1 below lists the planning mechanisms by jurisdiction into which the Hazard Mitigation Plan will be integrated.

Table 5.1. Planning Mechanisms Identified for Integration of Hazard Mitigation Plan

Jurisdiction	Planning Mechanisms	Integration Process for Previous Plan	Integration Process for Current Plan
Benton County	County Emergency Operations Plan County Economic Development Plan	None due to lack of education on the process and hazard mitigation	Benton County Emergency Management will maintain an updated Emergency Operations Plan and request additional resources as needed.
City of Cole Camp	Local Emergency Operations Plan Local Economic Development Plan	The local emergency operations plan serves Cole Camp well for all major incidents and disasters and should continue to bode well for them.	Public engagement will be key to developing thorough up to date plans in the community.
Village of Ionia	Local Emergency Operations Plan	The local emergency operations plan serves Ionia well for all major incidents and disasters and should continue to bode well for them.	Public engagement will be key to developing thorough up to date plans in the community.
City of Lincoln	Local Emergency Operations Plan (2016)	The local emergency operations plan serves Lincoln well for all major incidents and disasters and should continue to bode well for them.	Public engagement will be key to developing thorough up to date plans in the community.
City of Warsaw	Local Land Use Plan (2015) Local Capital Improvement Plan (2015) Local Transportation Plan (2016) Local Economic Development Plan (2016)	Warsaw's many resources allow for its residents, tourists, and other affiliates within city limits to operate safely without giving a false sense of security in the event of a significant disaster.	Public engagement will be key to developing thorough up to date plans in the community.
Cole Camp R-I Schools	School Master Plan (2015) School Emergency Plan (2020) School Weapons Policy (2020)	Cole Camp School's resources allow for them to safely hold school on a regular basis.	Formal adoption of the final FEMA-approved plan took place before the end of the school year.
Lincoln R-II Schools	School Emergency Plan (2019) School Weapons Policy (2019)	Lincoln School's resources allow for them to safely hold school on a regular basis.	Formal adoption of the final FEMA-approved plan took place before the end of the school year.
Warsaw R-IX Schools	School Master Plan School Capital Improvement Plan (2019) School Emergency Plan School Weapons Policy	Warsaw School's resources allow for them to safely hold school on a regular basis.	Formal adoption of the final FEMA-approved plan took place before the end of the school year.

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[10(b)] reviews will be posted in the local newspaper, as well as, on Kaysinger's website following each annual[10(b)] review of the mitigation plan[10(a)] and will solicit comments from the public based on the annual review. 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.

Appendix A:
Meeting Sign-In Sheets

MEETING SIGN-IN SHEET

Project:	Benton County Natural Hazard Mitigation Plan Update Benton County Emergency Management Agency	**Date:** February 18th, 2021	
Facilitator:	KBRPC	**Time:** 10:00 am	

Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
Dillon J. Hamess	Disaster Recovery Coordinator	KBRPC	660-885-3393	dhamess@kaysinger.com	60	2/18/2021
Jo Ann Lane	Benton County Economic Development Director	KBRPC / Benton County	660-492-3402	jlane@kaysinger.com	18	2/18/2021
Mark Richerson	Benton County Emergency management Director	Benton County	660-438-9585	mark.richerson@bentoncountymo.com	0	2/18/2021

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MEETING SIGN-IN SHEET

Project: Benton County Natural Hazard Mitigation Plan Update
City of Warsaw

Date: February 18th, 2021

Facilitator: KBRPC

Time: 11:00 am

Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
Dillon J. Harness	Disaster Recovery Coordinator	KBRPC	660-885-3393	dharness@kaysinger.com	58	2/18/2021
Jo Ann Lane	Benton County Economic Development Director	KBRPC / Benton County	660-492-3402	JLane@kaysinger.com	17	2/18/2021
Randy Pogue	City Administrator & Planner	Warsaw	660-438-5522	r.pogue@welcometowarsaw.com		3/04/21

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MEETING SIGN-IN SHEET

Project: Benton County Natural Hazard Mitigation Plan Update (Cole Camp R-I School District and Village of Ionia)

Facilitator: KBRPC

Date: 4 March 2021

Time: 10:30 AM

	Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
	Dillon J. Harness	Disaster Recovery Coordinator	KBRPC	660-885-3393	dharness@kaysinger.com	80	3/4/21
	Steve Hubbard	Superintendent	Cole Camp	660-668-4427	hubbards@colecamp.k12.mo.us	8	3/4/21
	William Smart	Mayor	Ionia	660-285-3431	williamandjoyce@gmail.com	0	3/4/21
	JoAnn Lane	Benton Co Economic Dev	KBRPC	660-492-3402	jlane@kaysinger.com	38	3/4/21

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MEETING SIGN-IN SHEET

Project:	Benton County Natural Hazard Mitigation Plan Update Warsaw R-IX School District	**Date:** March 3rd, 2021	
Facilitator:	KBRPC	**Time:** 10:30 am	

Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
JoAnn Lane	Benton County Economic Development	Benton County	660 492-3402	jlane@kaysinger	8	3/3/2021
SHAWN POYSER	Warsaw R-IX Superintendent	Warsaw	660-723-7773	spoyser@warsawkii.org	0	3/3/2021
Dillon Harness	~~KBRPC~~	~~Clinton~~	660 885-3393	dharness@kaysingeruw	70	3/3/21
	Disaster Recovery Coordinator	KBPRC				

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MEETING SIGN-IN SHEET

Project: Benton County Natural Hazard Mitigation Plan Update
City of Lincoln

Date: 10 March 2021

Facilitator: KBRPC

Time: 10:00 AM

	Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
	Dillon J Harness	Disaster Recovery Coordinator	KBRPC/Clinton	660-885-3393	dharness@kaysinger.com	52	3/10/21
	JoAnn Lane	Benton County Economic Dev Dir	KBRPC/ Benton County	660-492-3402	jlane@kaysingerplan		3/10/21
	JOHN KING	MAYOR OF LINCOLN	BENTON COUNTY LINCOLN	660-723-0311	MAYOROFLINCOLN@GMAIL.COM		3/10/21
	RUTH ECKHOFF	CITY CLERK	CITY OF LINCOLN	660-547-2318	lincolncityclerk@gmail.com	0	3/10/21

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MEETING SIGN-IN SHEET

Project:	Benton County Natural Hazard Mitigation Plan Update Lincoln R-II School District	**Date: 10 March 2021**	
Facilitator:	KBRPC	Time: 10:45 AM	

	Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
	Dillon J Harness	Disaster Recovery Coordinator	KBRPC / Clinton	660-895-3393	dharness@kaysinger.com	53	3/10/21
	JoAnn Lane	Benton County Ec Dev	KBRPC / Benton County	660-492-3462	jlane@kaysinger.com		3/10/21
	Kevin Smith	Lincoln R-2 Supt.	Lincoln	660-547-3514	smithk@lincoln.k12.mo.us		3/10/21

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MEETING SIGN-IN SHEET

Project:	Benton County Natural Hazard Mitigation Plan Update City of Cole Camp	**Date: 17 March 2021**	
Facilitator:	KBRPC	**Time: 10:00 AM**	

Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
Dillon J Harness	Disaster Recovery Coordinator	KBRPC/Clinton	660-885-3393	dharness@kaysinger.com	72	3/17/21
Jeff Canfield	Chief Police	Colelamp Mo.	660 438 0290	ccpd350@gmail.com	.5	03/17/21
JoAnn Lane	Benton Co Economic Dev Dir	Benton County KBRPC	660 492-3402	jlane@kaysinger		3/17/2021

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MEETING SIGN-IN SHEET

Project:	Benton County Hazard Mitigation Plan Action Worksheets & STAPLEEs	**Date: 27 May 2021**	
Facilitator:	Kaysinger Basin Regional Planning Commission	**Time: 11:30 AM**	

Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
Dillon Harness	Disaster Recovery Coordinator	KBRPC	660-885-3393	dharness@kaysinger.com	54	27-May-21
Loyce Smart	Clerk	Ionia	660-285-3[illegible]	Williamandloyce@gmail.com	20	5/27/21
Jessi Kendall	Clerk	Warsaw	660-438-5522	jessica.kendall@welcometowarsaw.com	22	5/27/21
David Fajen	School Resource officer	Warsaw R-IX	(660) 723-0515	dfajen@warsaw.k12.mo.us	22	5/27/21
William Smart	Mayor	Ionia	660-285-3431	williamandloyce@gmail.com	20	5/27/21
Steve Dulesme	county comm	Benton	660-438-5006	steve.dulesme@bentoncountymo.com	25	5-27-21
Steve Hubbard	Supes - Cole Camp	Cole Camp	660-201-9155	hubbards@colecamp.k12.mo.us	40	5/27/21
Kevin Smith	Supt	Lincoln	660-525-2604	SmithK@lincoln.k12.mo.us	1	5-27-21
Eddie Simons	Mayor	Warsaw	660-438-5522	Mayor@welcometowarsaw.com		
John King	Mayor	Lincoln	660 723-6311	MayorofLincoln@gmail.com	1	5/27/21
JoAnn Lane	Benton County Economic Development	KBRPC	660-492-3400	jlane@kaysinger.com	22	5/27/21

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Name	Title	Affiliation/Town	Phone	E-Mail	Miles Traveled Round Trip	Date
Amie Breshears	CES, MU Extension		660 438 5012	abreshears@missouri.edu	24	5/28/21
Sean McCannon	Chief of Police	WAEston				

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Appendix B: Planning Process Documentation

Kaysinger Basin Regional Planning Commission
An Economic Development District

221 N Second Street
Clinton, MO 64735
Phone: (660) 885-3393
Fax: (660) 885-4166
www.kaysinger.com

Dear Stakeholders,

You may or may not be aware that Benton County and all its jurisdictions within its geographical boundaries are involved in a Natural Hazard Mitigation Plan (NHMP). A NHMP organizes and proclaims all susceptible entities, costs and potential hazards that can affect a given community or even an entire county. Every five years, that particular plan is updated for Benton County. Since your county has a NHMP, you are eligible for financial funding through the Federal Emergency Management Agency (FEMA) for both pre and post-disaster mitigation funding.

The NHMP is designed to assist the participating jurisdictions become more sustainable and resilient to the adverse effects of disasters and determine appropriate mitigation actions to partake in.

Kaysinger Basin Regional Planning Commission will be conducting a mandatory meeting on Thursday, May 27th, 2021 at 11:30 AM at Foster Hall in Lincoln. Lunch courtesy of Mozark Mocha in Lincoln will be provided. Even as cases of COVID-19 are still prevalent in our communities, as long as we do this meeting safely by social distancing, then we can accomplish the task at hand. That task is to complete what is known as Action Worksheets and STAPLEEs. These documents are paramount to your community's participation in the Plan update. At the meeting, we will discuss what these documents are and provide examples from another county's FEMA-approved NHMP plan as reference material. It is imperative that communities and school district officials work together on this in case you have similar ideas that could benefit both your community or school. ***For this meeting, it would be best if the Benton County Commissioners, City and Village Clerks, Mayors, City Administrators, Emergency Management personnel, and Superintendents attended. If you are unable to attend for any reason, please let me know in advance and send someone who represents your community in your place so your community is represented.*** **In order to be eligible for pre and post disaster mitigation funds, participation is mandatory.**

If you have any questions or would like to speak directly to me, my contact information is listed above and below. I would be delighted to address any concerns you may have by phone or in person if needed.

Sincerely,

Dillon J Harness

Please RSVP to dharness@kaysinger.com or call (660) 885-3393
By 5:00 pm on May 20th, 2021 for a lunch count.

Dillon Harness
Disaster Recovery Coordinator

Appendix C: Completed/Ongoing/Inserted Mitigation Goals/Actions

Completed Actions

1. Benton County – 2.3.1: Educate and assist communities in developing minimum building standards and building codes in all cities.
    a. 4.1.1: Develop joint meetings with different organizations/agencies for emergency planning.
2. City of Cole Camp – 2.3.1: Educate and assist communities in developing minimum building standards and building codes in all cities.
3. City of Lincoln – 2.3.1: Educate and assist communities in developing minimum building standards and building codes in all cities.
4. City of Warsaw – 2.3.1: Educate and assist communities in developing minimum building standards and building codes in all cities.
    a. 5.1.3 – Develop a stormwater management plan
    b. 5.1.5 – Require contractor stormwater management in all new developments., both residential and commercial properties.

Deleted Actions

1. 1.1.1 – Education programs on personal emergency preparedness.
2. 1.2.1 – Secure funding for early warning systems, improved communication systems, GIS/GPS systems and mitigation projects.
3. 1.2.2 – Promote the purchase of weather radios by local residents to ensure advanced warning about threatening weather or disasters.
4. 1.2.3 – Partner with local radio stations to assure that adequate warning is provided to county residents of impending disasters.
5. 1.3.1 – Use and promote social media applications to inform county residents of impending disasters.
6. 1.3.2 – Secure funding for road and bridge improvements.
7. 2.1.1 – Educate and assist businesses to develop emergency plans.
8. 2.3.2 – Develop and implement regulations for securing of hazardous materials, tanks and mobile homes.
9. 3.1.1 – Distribute SEMA brochures at public facilities and events.
10. 3.2.2 – Press releases by cities/county regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.
11. 3.3.1 – Publicity campaigns by county health department and local American Red Cross chapter that make residents aware of proper measures to take during times of extreme heat or cold.
12. 3.3.2 – Increase the number of relationships with the warming and cooling centers in each community.
13. 3.3.3 – Publicize county or city-wide drills.
14. 4.1.2 – Joint training or drills between agencies, public and private entities including schools or businesses.
15. 4.1.3 – Develop a database & pool different agency resources to achieve widespread results.
16. 4.2.1 – Hold meetings between city, county EMDs, and elected officials to familiarize everyone with mitigation planning, implementation, and budgeting for mitigation projects.

17. 4.2.2 – Improve overall communications on a local and multijurisdictional level.
18. 5.1.1 – Secure resources for enhanced warning systems.
19. 5.1.2 – Road and bridge upgrades would reduce danger to residents during occurrences of natural disasters.
20. 5.2.2 – Zone areas in floodplain as open space as needed.
21. 6.1.1 – Work with SEMA coordinator to learn about new mitigation funding opportunities.
22. 6.1.2 – Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns can be met.
23. 6.1.3 – Work with local/state/federal agencies to include mitigation in all economic and community development projects.
24. 6.2.1 – Implement public awareness programs about the benefits of hazard mitigation programs, both public and private.
25. 6.3.1 – Prioritize mitigation projects, based on cost effectiveness and largest threatened population/property.

Ongoing Actions

1. 2.2.1 – Educate residents about the dangers of floodplain development and the benefits of the National Flood Insurance Program (NFIP).
2. 3.2.1 – Cities/county will continuously re-evaluate the hazard mitigation plan and merge with other community planning.
3. 5.1.4 – Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
4. 5.2.1 – Local governments to purchase properties in the floodplain as funds become available and convert that land into public/recreational space.

Appendix D: Signed Adoption Resolutions

COUNTY OF BENTON, MISSOURI
RESOLUTION NO. 2021-2

A RESOLUTION OF THE COUNTY OF BENTON ADOPTING THE BENTON COUNTY MULTIJURISDICTIONAL NATURAL HAZARD MITIGATION PLAN (UPDATED 2021)

WHEREAS the County of Benton recognizes the threat that natural hazards pose to people and property within the County of Benton; and

WHEREAS the County of Benton has participated in the preparation of a multi- jurisdictional local hazard mitigation plan, hereby known as the **2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan**, hereafter referred to as the ***Plan***, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the County of Benton from the impacts of future hazards and disasters; and

WHEREAS the County of Benton recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the County of Benton will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the County of Benton demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE COUNTY OF BENTON, IN THE STATE OF MISSOURI, THAT:

In accordance with (*local rule for adopting resolutions*), the County of Benton adopts the final *FEMA-approved Plan*.

ADOPTED by a vote of 3 in favor and 0 against, and 0 abstaining, this 10th day of May, 2021.

By (Sig): _____
Print name: Steve Dulesky

ATTEST:
By (Sig): _____
Print name: Susan Porterfield

City of Cole Camp, Missouri

Resolution No. 2021 - 1

A RESOLUTION OF THE CITY OF COLE CAMP ADOPTING THE BENTON COUNTY REGIONAL ALL-HAZARD MITIGATION PLAN (UPDATED 2021)

WHEREAS, the City of Cole Camp recognizes the threat that natural hazards pose to people and property within the city of Cole Camp; and

WHEREAS, the City of Cole Camp has participated in the preparation of a multi-hazard mitigation plan, hereby known as the ***Benton County Regional All-Hazard Mitigation Plan (Updated 2021)***, hereafter referred to as the Plan, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, the Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the City of Cole Camp from the impacts of future hazards and disasters; and

WHEREAS, the City of Cole Camp recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the City of Cole Camp will endeavor to integrate the Plan into the comprehensive planning process and

WHEREAS, adoption by the City of Cole Camp demonstrates their commitment to hazard mitigation and achieving the goals outlined in the Plan

NOW THEREFORE, BE IT RESOLVED BY THE CITY OF COLE CAMP, IN THE STATE OF MISSOURI, THAT:

Section 1. In accordance with (local rule for adoption resolutions), the City of Cole Camp adopts the final FEMA-approved plan.

Adopted by a vote of 4 in favor and 0 against, and 0 abstaining, this 20th day of May, 2021.

By _____

Print name: Burton Barmann, Mayor

By Ami Dieckman

Print name: Ami Dieckman, City clerk

By Gregg Ives

Print name: Greg Ives, Pres. of board

Board of Education/Cole Camp R-1 School District Resolution No. 1

A resolution of the Board of Education/Cole Camp R-1 School District adopting the 2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan

Whereas the Board of Education/Cole Camp R-1 School District recognizes the threat that natural hazards pose to people and property within the Board of Education/Cole Camp R-1 School District; and

Whereas the Board of Education/Cole Camp R-1 School District has participated in the preparation of a multijurisdictional local hazard mitigation plan, hereby known as the 2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

Whereas the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Board of Education/Cole Camp R-1 School District from the impacts of future hazards and disasters; and

Whereas the Board of Education recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards. the Board of Education/Cole Camp R-1 School District will endeavor to integrate the Plan into the comprehensive planning process; and

Whereas adoption by the Board of Education/Cole Camp R-1 School District demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

Now therefore, be it resolved by the Board of Education/Cole Camp School District, in the state of Missouri, that:

The Board of Education/Cole Camp R-1 School District adopts the final FEMA approved *Plan*.

Adopted by a vote of 7 in favor and 0 against, and 0 abstaining, this 18th day of May, 2021.

Board President: _____

Printed name: Eric Hoke

Attest:

Superintendent: _____

Printed name: Steve Hubbard

VILLAGE OF IONIA, MISSOURI
RESOLUTION NO. 71

A RESOLUTION OF THE VILLAGE OF IONIA ADOPTING THE 2021 BENTON COUNTY MULTIJURISDICTIONAL NATURAL HAZARD MITIGATION PLAN

WHEREAS, the Village of Ionia recognizes the threat that natural hazards pose to people and property within the Village of Ionia; and

WHEREAS, the Village of Ionia has participated in the preparation of a multijurisdictional local hazard mitigation plan, hereby known as the 2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan, hereafter referred to as the ***Plan***, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, the ***Plan*** identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Village of Ionia from the impacts of future hazards and disasters; and

WHEREAS, the Village of Ionia recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the Village of Ionia will endeavor to integrate the ***Plan*** into the comprehensive planning process; and

WHEREAS, adoption by the Village of Ionia demonstrates their commitment to hazard mitigation and achieving the goals outlined in the ***Plan***.

NOW THEREFORE, BE IT RESOLVED BY THE VILLAGE OF IONIA, IN THE STATE OF MISSOURI, THAT:

In accordance with (local rule for adopting resolutions), the Village of Ionia adopts the final ***FEMA-approved Plan.***

ADOPTED by a vote of 5 in favor and 0 against, with 0 abstaining, this 12th day of May, 2021.

By (Sig): William Smart
Print name: William Smart

ATTEST:
By (Sig): Joyce Smart
Print name: Joyce Smart

APPROVED AS TO FORM:
By (Sig): Harold Steffens
Print name: HAROLD STEFFENS

City of Lincoln, Missouri RESOLUTION NO. 04-21

A RESOLUTION OF THE CITY OF LINCOLN ADOPTING THE 2021 BENTON COUNTY MULTIJURISDICTIONAL NATURAL HAZARD MITIGATION PLAN

WHEREAS the City of Lincoln recognizes the threat that natural hazards pose to people and property within the City of Lincoln; and

WHEREAS the City of Lincoln has participated in the preparation of a multijurisdictional local hazard mitigation plan, hereby known as the 2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan, hereafter referred to as the *Plan,* in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the City of Lincoln from the impacts of future hazards and disasters; and

WHEREAS the City of Lincoln recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the City of Lincoln will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the City of Lincoln demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan.*

NOW THEREFORE, BE IT RESOLVED BY THE City of Lincoln, in the State of Missouri, THAT:

City of Lincoln adopts the final *FEMA*-approved *Plan.*

ADOPTED by a vote of 4 in favor and 0 against, and 0 abstaining, this 12th day of APRIL, 2021.

By (Sig): _____

Print Name: JOHN E. KING

ATTEST: _____

By (Sig): _____

Print Name: RUTH ECKHOFF

APPROVED AS TO FORM:

By (Sig): _____

Print Name: _____

Lincoln R-II School District

101 Lamine St., Lincoln, MO 65338

Lincoln R-2 School, Missouri RESOLUTION NO. _____001_____

A RESOLUTION OF THE Lincoln R-2 School ADOPTING THE
2021 BENTON COUNTY MULTIJURISDICTIONAL NATURAL HAZARD MITIGATION PLAN

WHEREAS the Lincoln R-2 School recognizes the threat that natural hazards pose to people and property within the (local governing body/school district); and

WHERE AS the Lincoln R-2 School has participated in the preparation of a multi- jurisdictional local hazard mitigation plan, hereby known as the 2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the *Lincoln R-2 School* from the impacts of future hazards and disasters; and

WHEREAS the Lincoln R-2 School recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the Lincoln R-2 School will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the Lincoln R-2 School demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE Lincoln R-2 School,
in the State of Missouri, THAT:

In accordance with (*local rule for adopting resolutions*), the Lincoln R-2 School adopts the final *FEMA-approved Plan*.

ADOPTED by a vote of__7__in favor and 0 against, and 0 abstaining, this__19th___day of April, 2021

By (Sig): _____
Print name: Clifford Yeorat

ATTEST: Michelle Smith
By (Sig.): _____
Print name: Michelle Smith

APPROVED AS TO FORM: Kevin Smith
By (Sig.): _____
Print name: Kevin Smith

Resolution 2021-03

A RESOLUTION OF THE CITY OF WARSAW ADOPTING THE 2021 BENTON COUNTY MULTIJURISDICTIONAL NATURAL HAZARD MITIGATION PLAN

WHEREAS the City of Warsaw recognizes the threat that natural hazards pose to people and property within the City of Warsaw; and

WHEREAS the City of Warsaw has participated in the preparation of a multi- jurisdictional local hazard mitigation plan, hereby known as the 2021 Benton County Multijurisdictional Natural Hazard Mitigation Plan, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the City of Warsaw from the impacts of future hazards and disasters; and

WHEREAS the City of Warsaw recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the City of Warsaw will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the City of Warsaw demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE CITY OF WARSAW, in the State of Missouri, THAT:

In accordance with Resolution 2021-03, the City of Warsaw adopts the final *FEMA-approved Plan*.

ADOPTED by a vote of 5 in favor and 0 against, and 0 abstaining, this 3rd day of May, 2021

By (Sig): _____
Print name: Eddie Simms

ATTEST: Jessica Kendall, City Clerk
By (Sig.): _____
Print name: Jessica L Kendall

APPROVED AS TO FORM:
By (Sig.): _____
Print name: _____

Warsaw R-IX School District

20363 Lane of Champions, Warsaw, MO 65355

Warsaw R-IX School District; Warsaw, Missouri RESOLUTION NO. ___001___

A RESOLUTION OF THE *WARSAW R-IX SCHOOL DISTRICT* ADOPTING THE 2021 BENTON COUNTY MULTIJURISDICTIONAL NATURAL HAZARD MITIGATION PLAN

WHEREAS the *Warsaw R-IX School District* recognizes the threat that natural hazards pose to people and property within the Warsaw R-IX School District; and

WHEREAS the *Warsaw R-IX School District* has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the 2021 Benton County Multi-jurisdictional Natural Hazard Mitigation Plan, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the *Warsaw R-IX School District* from the impacts of future hazards and disasters; and

WHEREAS the *Warsaw R-IX School District* recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the *Warsaw R-IX School District* will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the *Warsaw R-IX School District* demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE *WARSAW R-IX SCHOOL DISTRICT*, in the State of Missouri, THAT:

In accordance with (*local rule for adopting resolutions*), the (*local governing body/school district*) adopts the final *FEMA-approved Plan*.

ADOPTED by a vote of 7 in favor and 0 against, and __ abstaining, this 15th day of April, 2021.

By (Sig): Shawn Poyser
Print name: SHAWN POYSER

ATTEST:
By (Sig.): Denise Reno
Print name: Denise Reno

APPROVED AS TO FORM:
By (Sig.): _____
Print name: _____

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