LYMAN COUNTY, SOUTH DAKOTA

HAZARD MITIGATION PLAN

JULY 2025

Prepared by:

Lyman County Hazard Mitigation Planning Team

Technical Assistance Provided By:

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TABLE OF CONTENTS

CHAPTER I
PLANNING PROCESS

Background

This plan is an update of the Lyman County Hazard Mitigation Plan, which was approved by FEMA in February 2021. The purpose of the plan is to prevent or reduce losses to people and property that may result from future hazard events in Lyman County. The plan identifies and analyzes the hazards that the county is susceptible to and proposes a mitigation strategy to minimize future damage that may be caused by those hazards. The document will serve as a strategic planning tool for use by Lyman County in its efforts to mitigate future disaster events.

This is a multi-jurisdictional plan. All the municipalities located within Lyman County were invited to participate in the plan's development, as they had when the current plan (that is, the plan now being updated) was being developed. The Lower Brule Sioux Tribe was also invited to participate. Following is the list of jurisdictions that participated in the plan's development by having a representative attending the planning meetings and by providing input into the plan:

- Lyman County
- Town of Kennebec
- Town of Oacoma
- City of Presho
- Town of Reliance

Production of the plan was the ultimate responsibility of the Lyman County Emergency Management Director, who served as the county's point of contact for all activities associated with this plan. Input was received from a hazard mitigation planning team whose members are listed in **Table 1.1**, as well as the public and other stakeholders.

The plan itself was written by an outside contractor, Planning & Development District III of Yankton, South Dakota, one of the state's six regional planning entities. The office has an extensive amount of experience in producing various kinds of planning documents, including municipal ordinances, land use plans, and zoning ordinances, and it is an acknowledged leader in geographic information systems (GIS) technology in South Dakota. Furthermore, its staff has written hazard mitigation plans for all fifteen of the counties in the District's planning area, including Lyman County's current plan.

Figure 1.1 – County Location

The following staff members of Planning & Development District III were involved in producing the plan. John Clem, a Community Development Specialist, was the project manager and author of the plan. Eric Ambroson assisted in the public outreach and risk assessment efforts and gathered some of the demographic data used in the plan. Harry Redman, a Geographic Information Systems Professional, produced maps for the plan, directed the floodplain risk analysis, and completed the county land cover analysis. Jen Moser assisted with the public outreach and survey effort and Shannon Viereck provided additional research assistance and edited the final copy of the plan.

Development of Planning Team

The initial planning stages for this plan update began in 2023 when an application was submitted to FEMA for funding to help pay for the update. The funds were awarded to the County in October 2024. Following this, Mr. Clem and the Lyman County Emergency Management Director began to develop the methodology and strategy that was used to update the plan.

The first step was to organize the hazard mitigation planning team, the group of individuals representing the participating jurisdictions at the planning team meetings. People invited to participate included elected officials, finance personnel, public works staff, planning and zoning staff, code enforcement staff, floodplain management staff, and emergency response personnel. These individuals provided information that was used to develop the plan, reviewed drafts of the plan as it was being assembled, and approved the final version of the plan.

Other organizations were also invited to participate in the plan's development. These stakeholders included the following:

- Lower Brule Sioux Tribe
- West Central Electric Cooperative
- West River/Lyman-Jones Rural Water System
- Sanford Chamberlain Regional Hospital
- Lyman County *Herald*
- Lyman County School District
- Neighboring counties (Brule, Buffalo, Gregory, and Tripp)

Each individual invited to participate in the plan's development had knowledge in one or more of the following subject areas that helped contribute to the planning process:

- Infrastructure within the county.
- Economic development activities within the county.
- Natural and cultural resources.
- Floodplain management.

- Building codes and other development regulations.
- Mapping and GIS.
- Social services, including vulnerable populations.
- Other technical expertise or specialized knowledge to assist in the planning effort.

Table 1.1 lists the individuals who participated in the plan's development, including their contribution to the process. The columns on the right show their attendance at the planning meetings that were held. Additional meetings took place in the participating jurisdictions; those meetings are not reflected in the table, but documentation is provided in **Appendix B**.

Table 1.1 – Participation in Plan Development

Name	Representing	Position	Role	Mtg 1 4/22/25	Mtg 2 5/27/25	Mtg 3 __/__/__
John Clem	Planning District III	Planner	Plan author	X	X	
Eric Ambroson	Planning District III	Planner	Research, Support	X		
Shannon Viereck	Planning District III	Planner	Research, Support	X	X	
Margo Mitchell	Lyman County	Emergency Mgmt Dir	Guidance, Review	X	X	
Beau Johnson	Lyman County	County commission	Input, Review	X	X	
Ryan Huffman	Lyman County	County commission	Input, Review	X	X	
Timothy Feliciano	Lyman County	County commission	Input, Review	X	X	
Lawrence Thompson	Lyman County	County commission	Input, Review	X	X	
Zane Reis	Lyman County	County commission	Input, Review		X	
Kalli Houchin	Lyman County	Auditor	Input, Data, Review	X	X	
Staci Gran	Lyman County	Director of Equalization	Input, Data, Review	X	X	
Walter Nagel	Lyman County	Hwy Superintendent	Input, Data, Review	X	X	
Gary Dominiack	City of Oacoma	Mayor	Input, Data, Review	X	X	
Jaica Kenzy-Adamson	City of Oacoma	Finance Officer	Input, Data, Review	X		
Bryan Mahrt	City of Oacoma	Public Works Director	Input, Data, Review	X		
Shelly Long	Town of Kennebec	Finance Officer	Input, Review		X	
Charlie Gran	Town of Kennebec	Public Works Director	Input, Review		X	
Brody Ness	Town of Kennebec	*(Private citizen)*	Input, Review		X	
Tonya Ness	Town of Kennebec	*(Private citizen)*	Input, Review		X	
Angela Ehlers	City of Presho	Mayor	Input, Review		X	
Melissa Slaba	City of Presho	Finance Officer	Input, Review		X	
John Uthe	City of Presho	Public Works Director	Input, Review		X	
Cody Uthe	City of Presho	Assistant Public Works Dir	Input, Review		X	
Beth Herman	Town of Reliance	Finance Officer	Input, Review		X	
Shane Neiderworfer	West Central Electric	Staff	Input, Data, Review	X		
Kit Talich	West Central Electric	Manager	Input, Data, Review		X	
Brent Kolstad	SDOEM	Region Coordinator	Guidance	X		

Public Outreach

Throughout the plan's development, efforts were made to obtain broader involvement in the plan beyond the core planning team and stakeholders. This outreach effort included press releases that were printed in the local newspaper, information posted on community websites, and social media.

New for this update, surveys were made available to provide another way for people to contribute their thoughts and opinions on hazard mitigation. Survey forms were distributed to all planning team members, as well as other city and county staff who did not participate in the planning meetings, and other stakeholders. To generate broader public input, the surveys were made available on the community websites and through social media, survey posters with a QR code were placed in various public locations throughout the county [1], and a press release at the start of the planning process included a QR code so that the public could participate in the survey. Respondents were able to provide their opinion of which hazards have the biggest impact on the county, how those hazards have personally impacted them, and what actions could be taken to mitigate the hazards. See **Appendix A** for documentation of the public outreach effort.

Incorporation of Other Plans

Information from various local plans, studies, and reports was incorporated into this plan. Each of the items listed in the table below was reviewed as this plan was developed, and a brief description is given of how relevant information was incorporated into this plan. In addition to these local resources, a considerable amount of information and data was incorporated into this plan from the South Dakota Hazard Mitigation Plan (both the 2019 version and the current enhanced version).

Table 1.2 – Plans, Studies, and Reports Incorporated Into Plan

Item	Notes
Planning & Development District III Comprehensive Economic Development Strategy (CEDS)	The CEDS analyzes development issues within the District III service area, which includes Lyman County. Economic resiliency, including the role that hazard mitigation can play in helping communities maintain economic strength, is discussed at some length. Regional development priorities and demographic data from the CEDS was incorporated into this plan.
Lyman County Highway Plan	The plan includes a list of county roads scheduled for improvements within the next five years, which was useful for development of the mitigation strategy.
Lyman County Local Emergency Operations Plan (LEOP)	The LEOP was used to evaluate the status of previously proposed hazard mitigation actions.
Town of Oacoma Comprehensive Plan	The environmental constraints section of the plan was used to identify areas suitable for development within the city.
Town of Reliance Comprehensive Plan	The environmental constraints section of the plan was used to identify areas suitable for development within the city.
West Central Electric Construction Work Plan	The plan provides details about the cooperative's anticipated projects over the next four years, including location and estimated cost.

[1] Posters were placed at the courthouse, city offices, grocery stores and other retail locations, and at local schools.

Big Bend Dam Emergency Action Plan	This plan, which was developed by the U.S. Army Corps of Engineers, identifies actions to be taken during an emergency situation at the Big Bend Dam. The Corps also has jurisdictional control over construction activity in the area surrounding Lake Sharpe, which is the body of water impounded by the dam. Any work in this area requires regulatory review and permitting.

Planning Meetings

Several meetings were held to develop the plan, as described below. The planning process associated with the plan's development was relaxed and informal, and free-flowing discussion was always encouraged. No subcommittees were formed, no votes were taken or motions made, and decisions were made by mutual consensus of the planning team members. Everyone's opinion was respected, and nobody was discouraged from voicing his/her opinion. Leadership and guidance at the meetings was provided by Planning & Development District III staff and the Lyman County Emergency Management Director.

Prior to the first planning team meeting, the stakeholders identified earlier in this chapter were contacted and invited to participate in the planning process. A survey instrument was also developed, which was distributed to the planning team members and stakeholders, and which was also made available to the public as described earlier in the Public Outreach section.

First Planning Team Meeting

The first planning team meeting began with a reintroduction to the concept of hazard mitigation for the team members, many of whom had participated in the development of the current plan. The county's current mitigation plan was then reviewed, focusing on the hazards identified in the plan and the progress being made to implement the mitigation actions listed in the plan. Discussion also occurred about other local plans and policies that could be incorporated into this plan.

The planning team also reviewed the initial results of the survey, which helped determine which hazards to address in the plan, and additional hard copies of the survey were distributed. The meeting ended with a discussion about the process by which the plan would be developed over the coming months.

Activity between meetings

After the meeting, the Planning & Development District III office did a considerable amount of work on the risk assessment using various methods as described in **Chapter III**. The results of this work were shared with the planning team, including a summary of the textual information presented in **Chapter III**, maps showing hazard-prone areas in relation to important assets in each jurisdiction, and information about the value of property at risk to the various hazards impacting the county. Since the next meeting would focus on development of the mitigation strategy, the District III office also distributed a list of potential

mitigation actions to the team, which was based on FEMA's guidance document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*.

Second Planning Team Meeting

Development of the mitigation strategy was the focus of the second meeting. It began with identification of the mitigation goals and objectives to be achieved, followed by a discussion about local mitigation capabilities. Discussion about the specific mitigation actions to include in the plan followed, the participants being reminded that they should focus on hazard mitigation - *sustained action* taken to reduce the long-term risk to people and property from hazards – as opposed to preparedness. They were also encouraged to consider a comprehensive range of actions, regardless of whether they seemed likely to be achievable in the foreseeable future. A preliminary list of actions for each jurisdiction was developed, including details about the actions, such as estimated cost, timeframe for implementation, and the party responsible for implementation.

Activity between meetings

After the second meeting, each jurisdiction discussed the mitigation actions they wanted to include in the plan. This discussion took place at an official meeting of each jurisdiction's governing body, which ensured that the public could participate in the selection process, since hazard mitigation was an agenda item. The list of mitigation actions selected by the communities is presented in **Chapter IV** (see **Table 4.5**).

Final Planning Team Meeting

Following the jurisdictional meetings, the Planning & Development District III office completed the first draft of the plan. After this, the planning team was brought together again for a final meeting to review the draft and discuss how the plan will be maintained going forward. The importance of integrating the plan into the existing planning mechanisms within the county was emphasized. The public was given another opportunity to provide input into the plan through a press release that was run in the local newspaper and posted on the community websites and social media prior to the meeting.

Post-meeting activity

After the final planning team meeting, some additional information was added to the plan based on discussion at the meeting, primarily involving clarification of some of the details of the proposed mitigation actions. The plan was then submitted to the South Dakota Office of Emergency Management.

Acknowledgements

The Planning & Development District III office would like to thank the members of the Lyman County Hazard Mitigation Planning team for participating in the planning meetings that were held, and for supplying information that was used to develop the plan. We would particularly like to thank County Emergency Management Director Margo Mitchell for arranging the

planning team meetings and for coordinating with the participating jurisdictions. Thanks also are extended to Jim Poppen, Kyle Kafka, Blaire Jonas, and Marc Macy at the South Dakota Office of Emergency Management for information and guidance that was helpful in developing the plan.

CHAPTER II
COMMUNITY PROFILE

Background

This chapter serves as a basic introduction of Lyman County. Topics addressed in this chapter include a general description of the county, its physical characteristics, socio-economic characteristics, infrastructure and utilities, and services. Following chapters are devoted to assessing risks in the county, presenting the county's mitigation strategy, and discussing how the plan will be implemented.

General Description

Lyman County is located in central South Dakota (see **Figure 1.1**). The county covers approximately 1,707 square miles in area, and its Census 2020 population was 3,718. Its population density is only 2.2 people per square mile compared to 11.7 people per square mile in South Dakota and 93.8 people per square miles in the United States. There are four incorporated municipalities located within the county – Kennebec (pop 281), Oacoma (pop 386), Presho (pop 472), and Reliance (pop 128). The county seat is located in Kennebec. Unincorporated communities include Lower Brule (pop 613), Vivian (pop 119) and Iona (pop 81). **Figure 2.1** shows the county's communities and highway network.

Physical Characteristics

Lyman County is very lightly settled, with most of the land devoted to livestock grazing, although crops are grown where the terrain and local conditions are favorable. These crops include corn, wheat, alfalfa, sorghum, and sunflowers. Most of the land is fairly level to gently rolling, but there are some rugged areas, especially along the Missouri and White Rivers. Away from the rivers, there are some isolated buttes that rise prominently from the landscape. The Missouri River forms the county's eastern border.

Figure 2.1 – Lyman County

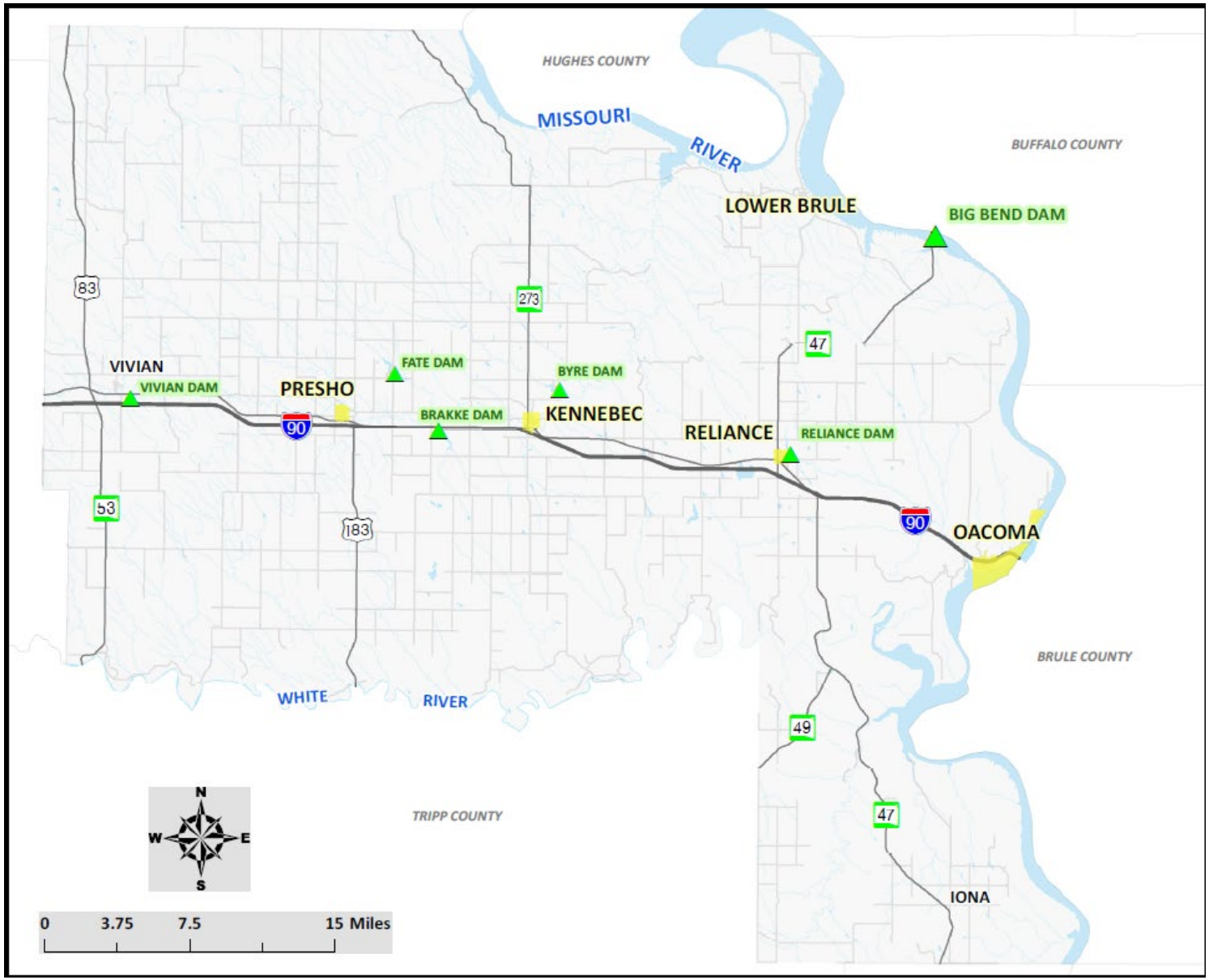


Table 2.1 provides a breakdown of the land cover in Lyman County, which is shown graphically in **Figure 2.2**. The table is based off satellite imagery from the United States Geological Service's National Land Cover Database. As the table shows, the predominant types of land cover in the county are grassland and cropland, which together comprise about 90 percent of the county's area. Developed land makes up only a very small fraction of the land area. The table also tracks the change over time in land cover since 1985; grassland has had the greatest absolute increase, while pastureland has shown the most relative growth. Developed land has also shown significant growth, especially in relative terms.

Table 2.1 - Vegetative Land Cover

Cover Type	Sq Miles (1985)	Sq Miles (2023)	% Change	% Total Area
Grassland	1,014.0	1,051.3	3.7%	61.6%
Cultivated Crops	544.6	491.3	-9.8%	28.8%
Open Water	67.4	66.4	-1.5%	3.9%
Wetlands	41.9	42.6	1.7%	2.5%
Developed, Open Space	21.9	20.6	-5.8%	1.2%
Developed Land (Low to High Intensity)	9.2	18.6	102.3%	1.1%
Pasture/Hay	3.4	9.8	188.5%	0.6%
Forested Land	1.9	4.0	115.6%	0.2%
Barren Land	2.5	2.1	-15.4%	0.1%

Source: www.mrlc.gov/index.php

As in most of South Dakota, the climate of Lyman County is characterized as sub-humid and continental, which means that summers are often hot and winters can be very cold. There are no large bodies of water or mountain ranges to mitigate against these extremes. High temperatures in the summer can exceed 100 degrees Fahrenheit [2], while winter lows can drop below -20 degrees. Precipitation averages about 21.5 inches per year, much of which occurs during the spring and early summer. Following is climate data in the county as reported from the Chamberlain weather station in adjacent Brule County.

Table 2.2 - Monthly Climate Conditions at Chamberlain, SD Weather Station (1896 – 1978)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ave High	28.9	33.5	46.6	62.5	73.4	82.4	89.7	88.0	78.5	66.2	48.2	34.3
Ave Low	5.9	10.2	22.0	35.9	46.5	56.4	62.7	60.2	50.4	38.1	24.1	12.1
Ave Precipitation	0.4	0.6	0.9	2.1	2.9	3.3	2.5	2.2	1.7	1.2	0.6	0.5

Source: www.weather.gov/wrh/climate
The average high and low are in degrees Fahrenheit; the precipitation figures are in inches.

The impact that climate change may have on the county is difficult to predict with any degree of certainty. The South Dakota Hazard Mitigation Plan discusses climate change in some depth, analyzing its possible impacts for each of the hazards affecting the state. According to

[2] According to the National Weather Service, Sioux Falls, South Dakota has averaged about two days per year of 100-degree temperatures since records began to be kept in 1893.

the plan, mean temperatures have been increasing in the northern Great Plains region, especially in the winter. The plan also notes a long-term trend of increasing annual precipitation across South Dakota, among the highest in the country, much of it occurring in the spring and fall seasons.

By 2050, according to research from Headwaters Economics, Lyman County is expected to experience 16 more days per year that reach above 95 degrees Fahrenheit (from 34 days to 50 days per year) and the average annual temperature is expected to increase from 50°F to 53°F. No significant change in average annual precipitation is expected.

There is no consensus yet on climate change science, but it seems likely that communities that are already vulnerable to weather and climate extremes will be further stressed by more frequent extreme events. Increased demand for water and energy may constrain development, stress natural resources, and increase competition for water, and new agricultural practices may be needed to cope with changing conditions.

Socioeconomic Description

Population Trends

Like many other rural counties in the Midwest, Lyman County has been experiencing a steady population decline over the last several decades. The county's Census 2020 population of 3,718 is only 81 percent of the population that was recorded in 1950. As the table below shows, Lyman County's population is expected to continue decreasing. The projections are based on an analysis of past population records and current age and sex cohorts in the county.

Table 2.3 - Lyman County Population

Pop 1950	Pop 1960	Pop 1970	Pop 1980	Pop 1990	Pop 2000	Pop 2010	Pop 2020	Pop 2030 Projected	Pop 2040 Projected	Pop 2050 Projected
4,572	4,428	4,060	3,864	3,638	3,895	3,755	3,718	3,698	3,688	3,638

Source: U.S. Census

Race and Age

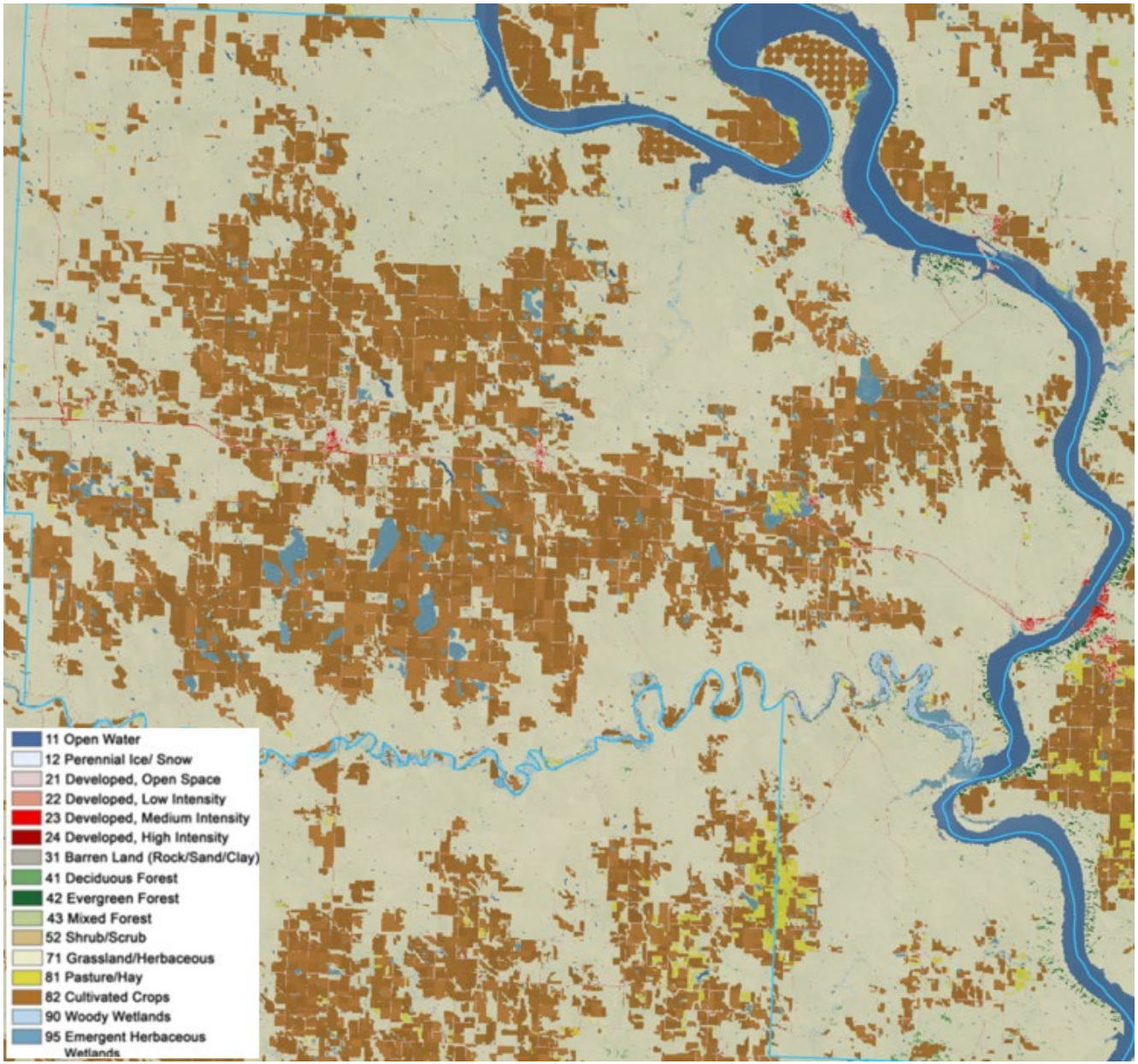
The population of Lyman County includes a large and growing percentage of American Indians. The current 44.1% representation of American Indians in the county is a significant increase over the 2010 figure of 38.2%. The population is also young, which indicates there is some potential for population growth, depending on the level of future out-migration.

Table 2.4 - Racial and Age Characteristics

	White Pop	Black Pop	American Indian Pop	Asian Pop	Other Race	Two or More Races	Hispanic Pop	Pop Under 18	Pop 65 and Over	Median Age
Lyman County	51.6%	0.1%	44.1%	0.1%	0.2%	3.8%	1.2%	28.5%	17.1%	36.0
South Dakota	80.7%	2.0%	8.8%	1.5%	1.8%	5.3%	4.4%	24.1%	18.2%	38.5
United States	61.6%	12.4%	1.1%	6.0%	8.6%	10.2%	18.7%	21.7%	17.3%	39.0

Source: American Community Survey 2022 1-Year Estimates

Figure 2.2 - County Land Cover (2023)



Income and Education

Income levels in Lyman County are below state and national figures. The overall poverty rate in the county is higher than the state and national figures, and much higher among those under 18. Educational attainment also lags somewhat behind state and national averages.

Table 2.5 – Income and Education

	Median Household Income	Poverty Rate – All People	Poverty Rate – Under 18	Poverty Rate – Over 65	High School Grad or Higher	Bachelor's Degree or Higher	Graduate Degree
Lyman County	$60,284	25.1%	35.6%	15.5%	91.5%	23.2%	6.3%
South Dakota	$69,728	12.5%	15.2%	10.9%	93.1%	31.6%	9.9%
United States	$74,755	12.6%	16.3%	10.9%	89.6%	35.7%	14.0%

Source: American Community Survey 2022 1-Year Estimates

Employment

Lyman County's economy is dependent to a large extent upon agriculture, mostly cattle grazing. Government, education, and health care are other important employment sectors, and another important revenue generator is the Golden Buffalo Casino on the Lower Brule Indian Reservation. Industry and manufacturing are essentially nonexistent in Lyman County.

Table 2.6 – Employment Sectors

	Lyman County	South Dakota	United States
Agriculture, Forestry, Fishing, Mining	15.4%	6.4%	1.6%
Construction	7.0%	7.4%	6.9%
Manufacturing	0.8%	9.9%	9.9%
Wholesale Trade	2.8%	2.1%	2.2%
Retail Trade	7.1%	11.4%	11.1%
Transportation, Warehousing, Utilities	2.6%	4.4%	6.0%
Information	1.7%	1.5%	1.9%
Finance, Insurance, Real Estate	5.1%	6.0%	6.7%
Professional, Scientific, Management	5.5%	6.7%	12.6%
Education, Health Care, Social Assistance	28.6%	26.3%	23.1%
Arts, Entertainment, Recreation, Accommodation, Food Service	9.1%	8.8%	8.7%
Other Services	2.4%	4.3%	4.7%
Public Administration	7.6%	4.8%	4.6%

Source: American Community Survey 2022 1-Year Estimates

Vulnerable Populations

There are certain populations and social groups within Lyman County that may be particularly susceptible to the adverse impacts of hazards, suffering disproportionate rates of death, injury, loss, or disruption of livelihood when hazard events occur. Various social, economic, demographic, and housing characteristics are considered here that may influence the

community's ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Available data indicates that Lyman County has a significant proportion of vulnerable people. The Centers for Disease Control Social Vulnerability Index shows Lyman County with a rating of .8670 (0 being least vulnerable and 1 being most vulnerable), which is considered a high level of vulnerability. For comparison, only five of South Dakota's 66 counties have a higher vulnerability score. FEMA's Resilience and Planning Tool shows that the county's Community Resilience Challenges Index (CRCI) percentile is 73 on a scale of 1 (lowest vulnerability relative to the rest of the United States) to 100 (highest). The county's top three drivers of CCRI value are Lack of Health Insurance, Single-Parent Households, and Poverty.

The following table shows the percentage of the population in Lyman County and each of the communities that fall into key metrics of social vulnerability, which is compared to the state and national average. The county is above the state and national averages for many of the variables, and significantly higher for people living in poverty and people without health insurance. At the community level, the Lower Brule community has a very high poverty rate and percentage of people without health insurance, while Presho has a high percentage of people with a disability.

Table 2.7 – Social Vulnerability Indicators

Characteristic	Lyman County	Kennebec	Lower Brule	Oacoma	Presho	Reliance	South Dakota	United States
People living in poverty	25.1%	7.9%	52.7%	3.9%	6.3%	1.8%	12.5%	12.6%
People with a disability	16.3%	11.7%	17.7%	9.2%	29.8%	13.5%	13.2%	13.4%
People w/out health insurance	20.6%	1.6%	37.1%	6.9%	8.9%	4.5%	8.1%	8.0%
Adults w/out high school diploma	8.5%	12.3%	12.4%	7.3%	1.4%	2.6%	6.9%	10.4%
Population under 18	28.5%	31.4%	36.3%	18.2%	10.4%	29.5%	24.1%	21.7%
Population over 65	17.1%	18.4%	10.7%	28.6%	13.0%	30.4%	18.2%	17.3%
People with limited English proficiency	1.8%	0.0%	1.9%	4.1%	1.9%	0.0%	2.1%	8.4%
Households without internet subscription	19.3%	8.4%	37.6%	16.3%	15.2%	17.5%	13.0%	11.5%
Households without a vehicle	7.8%	0.0%	32.7%	7.9%	3.7%	2.5%	4.5%	7.5%

Source: American Community Survey 2022 1-Year Estimates

The margin of error for some of the communities may be over 10% in some instances, due to their small size.

Infrastructure and Utilities

Transportation

Lyman County's main transportation route is Interstate 90, which connects every community in the county, except for Lower Brule and Iona. Other important highways include S.D. Highway 47, which runs north to Lower Brule and south to Iona; U.S. Highway 83 on the

western edge of the county, which runs north to the state capital of Pierre; and U.S. Highway 183, which runs south from Presho to the town of Winner in Tripp County.

Regarding other modes of transportation, a rail line operated by the Mitchell-Rapid City (MRC) Regional Railroad Authority runs parallel to Interstate 90. The line had been out of service for many years, but rehabilitation of the line from the eastern border of the county to Presho was completed in 2013. Eventually the line may be rehabilitated all the way east to Rapid City. Presho has a public airport, and there are private airports in Kennebec and Vivian; all these airports have a gravel landing surface.

Utilities

Most residents of Lyman County are served by the West River/Lyman-Jones Rural Water System. The Town of Oacoma has its own municipal water system, the Mni Wiconi Water System serves the Lower Brule Indian Reservation, and the Tripp County Water Users District serves households in the southeast part of the county, including Iona. Regarding sewage disposal, each community in the county has a wastewater collection and treatment system. Rural residents use individual septic tanks and drainfields.

Solid waste service is provided by the Tri-County Landfill, which operates a landfill located in adjacent Brule County. Designated rubble sites are located outside each community.

Electric power is provided to most county residents by the West Central Electric Cooperative. The Rosebud Electric Cooperative serves the Iona area. There is no natural gas service available anywhere in Lyman County.

Services

Medical Services

The medical service system in Lyman County includes the Kennebec Clinic Avera, the Stanley-Jones Memorial Clinic in Presho, and the Indian Health Service clinic in Lower Brule. The nearest hospital for most county residents is in Chamberlain, although people in the northwest part of the county have closer access to medical treatment in Pierre. People needing serious medical attention can be transported to trauma center hospitals in Pierre, Rapid City, or Sioux Falls.

Fire and Emergency Response

Fire departments in Lyman County are located in Kennebec, Presho, Reliance, and Vivian. Oacoma is served by the Chamberlain Fire Department, which is located just east of Oacoma in Brule County. All these departments respond to both structural and wildland fires, and they also respond to accidents and other emergency events.

The Missouri Valley Ambulance Service, based in Chamberlain, serves the eastern portion of Lyman County. The Lyman County Ambulance Service covers the west side of the county.

Education

The only high schools in the county are located in Presho and Lower Brule. Middle schools are located in Presho and Lower Brule, and elementary schools are located in Kennebec and Lower Brule. The only post-secondary education available in the county is the Lower Brule Community College in Lower Brule.

CHAPTER III
RISK ASSESSMENT

Background

The risk assessment provides the foundation for the rest of the mitigation planning process. It sets the stage for identifying mitigation goals and actions to help Lyman County become disaster resilient and keep county residents safe, and it answers the following questions: What are the hazards that could affect Lyman County? What could happen as a result of those hazards? How likely are the possible outcomes? When the outcomes occur, what are the likely consequences and losses?

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards. FEMA defines risk assessment terminology as follows:

- **Natural Hazard**—A source of harm created by a meteorological, environmental, or geologic event.
- **Assets** – This includes people, structures (e.g. homes, critical facilities, and infrastructure), systems and networks, other resources important to the community, and activities important to the community.
- **Risk**—The potential for damage or loss created by the interaction of natural hazards with assets.

According to FEMA's mitigation planning guidance, the basic components of the risk assessment are: 1) identifying hazards that affect the community, 2) profiling the hazards, 3) conducting an inventory of community assets, and 4) analyzing impacts. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings and other property, and infrastructure to natural hazards.

After reviewing the risk assessment section of the current plan, the planning team decided that no major changes were needed to the risk assessment. This determination was made because of the lack of population growth and development in the county and because no natural disasters have had a major impact on the county since the current plan was completed. However, many of the tables have been updated with more current information, including **Table C.2** in **Appendix C**, which lists significant hazard events that have occurred in the county through 2024.

Identifying Hazards

To determine which hazards to address in this plan, the planning team first reviewed the county's current mitigation plan. The team also considered the results of the survey that was conducted at the start of the planning process, especially the question about the hazards that most impact the county. Following this, the planning participants reviewed historical records of hazard events that have occurred in the county, relying on the National Climatic Data Center's Storm Events Database. See **Table C.2** in **Appendix C** for a list of the storm events. At the end of this process, the planning team decided to focus on the following hazards:

- **Winter storms**
- **Summer storms**
- **Flooding**
- **Drought**
- **Wildfire**

The planning team acknowledges that additional hazards could have been addressed in this plan. High wind events, for instance, are not considered separate from winter storms and summer storms. Following is a list of other hazards the team considered but chose not to include in this plan, with a justification for their omission:

- Geologic Hazards – these hazards, which include earthquakes, landslides, and expansive soils, are profiled in the South Dakota Hazard Mitigation Plan, but the overall significance of such hazards is rated as low, and the state does not appear to be particularly vulnerable to such events. A map generated through the U.S. Geological Service Earthquake Hazards Program website indicates no more than a two percent chance that a quake of at least magnitude 5 will occur in Lyman County in any 100-year period, and virtually no chance of a magnitude 6 or greater earthquake [3]. The largest earthquake known to have occurred in Lyman County was a 4.4 magnitude quake in 1967. Regarding landslides, a review of the United States Geological Survey's Landslide Incidence and Susceptibility Map indicates potential of a landslide occurring along the Missouri River, but such an event likely would be localized and minor. Earthquakes and landslides were the two lowest ranking hazards facing the county, according to the survey conducted for this plan.
- Agricultural pests and diseases - this hazard is profiled in the South Dakota Hazard Mitigation Plan. However, despite the obvious importance of agriculture to the local economy, the planning team considered the subject matter to be outside the intended focus of this plan.
- Technological and human-caused hazards – some of these hazards, including hazardous materials releases, are analyzed in the South Dakota Hazard Mitigation Plan. Again, the planning team considered the subject matter to be outside the scope of this plan.

[3] A magnitude 5 earthquake is considered moderate, potentially causing varying amounts of damage to poorly constructed buildings, but significant damage would be unlikely to occur. A magnitude 6 quake is strong, with the potential to cause damage to well-built structures.

Hazard Profiles

In this section, each of the hazards the planning team chose to focus on is described in terms of the hazard's ***location*** within Lyman County, its ***extent***, the ***history*** of the hazard's occurrence in the county, and the ***probability*** of future events occurring. In addition, a background description of each hazard is presented at the beginning of each hazard's profile.

- ***Location*** is the geographic areas within the county that are affected by each of the hazards. Some of the hazards - winter storms, summer storms, and drought - do not have a geographic definition at this level of analysis, since they occur in all areas of the county more or less with equal frequency. Flooding and wildfires, however, do pose a greater risk in specific areas of the county than in other locations.
- ***Extent*** is the strength or magnitude of the hazard, which is described in a variety of ways depending on the type of hazard. For example, tornado strength is measured on the Fujita Scale, high wind events are measured by speed, fire is measured in terms of acres affected, and winter storms can be measured by snowfall accumulation or the duration of the event.
- A brief section on the ***history*** of each hazard's occurrence in the county is presented, with a description of some of the most significant events. More information about the hazard events that have impacted the county is presented in **Appendix C**, which includes a comprehensive list of weather-related hazard events recorded in the county from the National Climatic Data Center's Storm Events Database and records of hazard events that resulted in a major disaster declaration in the county.
- ***Probability*** of occurrence of a hazard impacting an area is the likelihood that such an event will occur. In this plan, a hazard with a "high" probability is one that is expected to occur at least five times over a ten-year period, a "moderate" probability hazard is expected to occur from two to five times in any given ten-year period, and a "low" probability hazard would be expected to occur no more than twice per ten-year period. Probability for some of the hazards was determined by reviewing the frequency of past hazard events in the Storm Events Database.

Winter Storm

Description

Winter storms include snow events, freezing rain, and sleet, with some storms taking on the characteristics of these categories during distinct phases of the storm. They historically occur from late fall to the middle of spring, varying in intensity from mild to severe. There is a long warning time associated with most winter storms, giving people time to prepare, but they still have a major impact in South Dakota, regularly destroying property and killing livestock. These storms can immobilize a region by blocking transportation routes, which can disrupt emergency and medical services, hamper the flow of supplies, and isolate homes and farms, sometimes for days. Heavy snow can collapse roofs and knock down trees and power lines.

Unprotected livestock may be lost. Economic impacts of winter storms include the cost of snow removal, damage repair, and business losses. According to the survey conducted for this plan, winter storms are the third most serious hazard facing the county, behind tornadoes and drought.

The most dangerous of all winter storms are blizzards, which occur when snow is combined with winds of at least 35 mph that reduces visibility to less than ¼ mile for at least three hours. Severe blizzard conditions exist when heavy snow is accompanied by winds of at least 45 mph and temperatures of 10 degrees Fahrenheit or lower. Early blizzards in South Dakota were so devastating that the state once had the dubious distinction of being called the Blizzard State. Freezing rain is also dangerous because it coats objects with ice and can make travel especially hazardous. Sleet does not generally cling to objects like freezing rain, but it does make the ground very slippery, increasing the number of traffic accidents and personal injuries due to falls.

Extreme cold often accompanies winter storms or is left in their wake. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life threatening. Infants and the elderly are most susceptible. Property damage is also possible when pipes freeze and burst in homes or buildings that are poorly insulated or without heat.

Winter storms can have a major impact on the power lines operated by rural electric providers, especially when they are accompanied by high winds or freezing rain. They can knock down power lines, which tend to be the most vulnerable elements of the electrical grid, and they can even snap the poles.

Location

The topography of South Dakota is such that no part of the state is immune from the effects of winter storms. Farmland and grassland, which covers Lyman County and most of the state, offers little resistance to high winds and drifting snow, and there are no large bodies of water or mountain ranges to mitigate against temperature extremes. All areas of the county are equally likely to be impacted.

Extent

The extent of winter storms in Lyman County can be quite substantial. In terms of snowfall, many winter storms in the county have dropped more than 10 inches of snow. A blizzard in November 2005 dumped 21 inches at Kennebec. In terms of duration, some winter storms in the county have resulted in power outages of over a week in some locations, although typical outages last for no more than a few hours. Regarding wind speed, **Table C.2** in **Appendix C** shows numerous records of high wind events occurring during the winter months with wind speeds in excess of 50 knots (about 58 miles per hour).

History

Table C.2 in **Appendix C** lists many significant winter storms that have impacted the county. Following are details about the winter storms that resulted in a major disaster declaration (see also **Table C.1** in **Appendix C**).

A serious winter storm with ice hit Lyman County in January 1995, resulting in FEMA Disaster Declaration 1045. Unusually foggy January weather resulted in a heavy crust of ice forming on many of the power lines in central South Dakota, including Lyman County. The addition of high winds caused power poles to snap. Deep drifts of snow made it difficult for power company repairers to gain access to the damaged power lines, and in many areas of the county snow removal equipment was required to provide access. In the affected counties, at least 13,435 households were without electric power for varying periods of time, with some homes without power for 12 days. Statewide, more than 1,700 power poles had to be replaced, and the damage estimate was over $3.8 million.

A winter storm in 1997 resulted in FEMA Disaster Declaration 1156. Statewide in the affected counties the event caused over $19,000,000 in reported damage.

Another very serious winter storm to impact Lyman County occurred in late November 2005 when heavy freezing rain coated roads and power lines with ice up to three inches thick throughout much of central and eastern South Dakota. The storm resulted in FEMA Disaster Declaration 1620. Although Lyman County was not part of the disaster declaration, the event had a major impact on the county. Heavy snow, combined with winds gusting to 70 miles per hour, caused blizzard conditions in the county. Many roads, including Interstate 90, were closed due to treacherous travel conditions, and several accidents were reported. Snowfall amounts included 11 inches near Presho and 21 inches at Kennebec.

A severe winter storm accompanied by record snowfall and high winds in December 2009 resulted in FEMA Disaster Declaration 1886. Prolonged snowfall from two days before to the day after Christmas produced heavy accumulations ranging up to over 20 inches in several areas. The snowfall was accompanied by increasing north to northwest winds that caused widespread blizzard conditions.

An unusual late-season winter storm struck South Dakota in March 2019, resulting in FEMA Disaster Declaration 4440. The storm resulted in approximately $25,000 of public assistance funds allocated in Lyman County.

Probability

A total of 91 winter storm events, including blizzards, ice storms, heavy snow, and extreme cold events, have been recorded in Lyman County since the mid-1990s, an average of over three per year (see **Table C.2 in Appendix C**). Therefore, based on the historic evidence, the probability of a significant winter storm affecting Lyman County in a given year is high. The probability of a winter storm causing substantial damage (e.g. power lines blown down) in any given year is at least moderate.

Summer storm

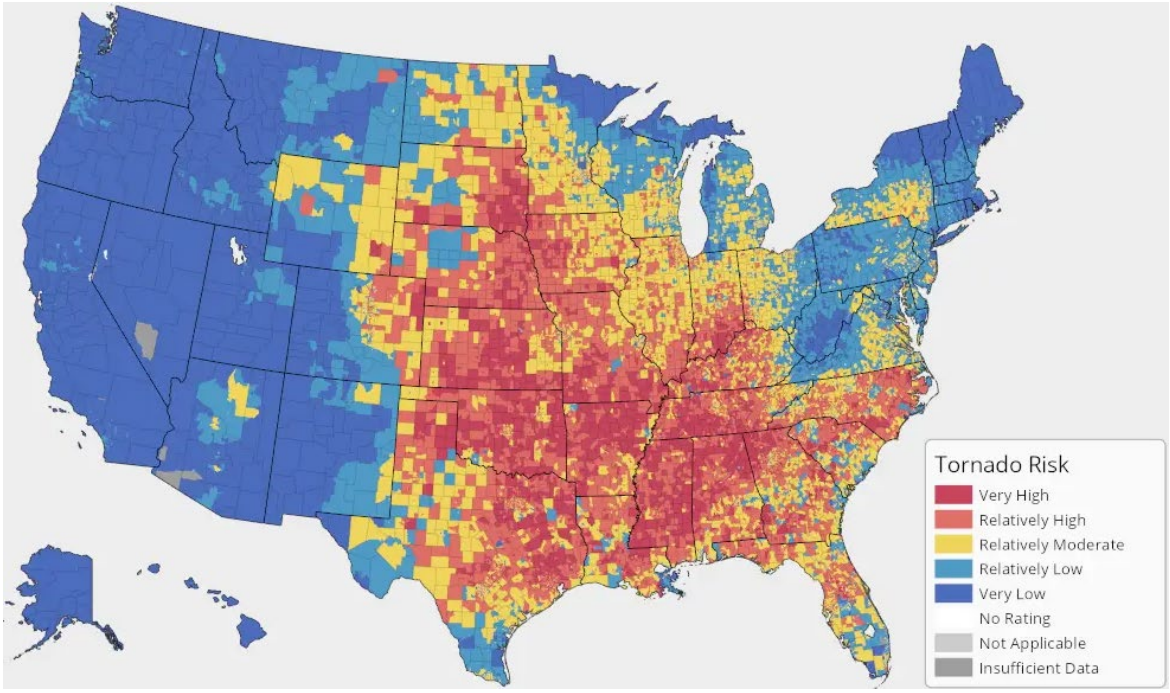
Description

Summer storms can include heavy rainfall, hail, tornadoes, and thunderstorm activity. These events usually are associated with unstable weather conditions. In Lyman County, most

damage from summer storms occurs because of high wind events and/or hail. Hail is always closely connected with thunderstorms. Hailstones can be pea-sized, up to the size of baseballs. Large hailstones are dangerous to people and animals, but most hail damage is typically suffered by crops or structures. Almost every year someone in Lyman County reports some kind of hail damage to crops or property.

Tornadoes are the most dramatic type of summer storm experienced in Lyman County and are a special source of concern. They are one of nature's most violent storms, capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be a mile wide and can extend for more than 50 miles. Tornadoes mostly occur in South Dakota during the months of May, June, and July. The greatest period of tornado activity is between 4 PM and 6 PM. Tornadoes present a difficult mitigation challenge, since few structures can withstand the violent winds of a twister. According to the survey, tornadoes are the most serious hazard facing the county.

South Dakota is located near the northern edge of the core area of tornado activity in the United States, as shown in the image below (it is difficult to tell at this scale, but Lyman County is in the 'Relatively Moderate' category). Often referred to as "tornado alley", this part of the country is susceptible to the conditions that favor the formation of tornadoes: warm air from the Gulf of Mexico coming in contact with cool Canadian air fronts and dry air systems from the Rocky Mountains. According to the National Oceanic and Atmospheric Administration's Storm Prediction Center, South Dakota ranked eighth in the nation in the frequency of tornadoes from 1950 to 1994, with a total of 1,139 tornadoes reported in the state (an average of 25.3 per year). During this period, there were 11 deaths in the state attributed to tornadoes, and 243 injuries. South Dakota ranked 27th in the nation in tornado damage, with average annual losses of $3.8 million.



Source: hazards.fema.gov/nri/tornado

Location

Summer storms are equally likely to occur in all parts of Lyman County.

Extent

The extent of summer storms can be measured in many ways. In terms of wind speed, **Table C.2** in **Appendix C** shows over 50 thunderstorms that produced wind speeds over 60 knots, including 20 that were over 70 knots. **Table C.2** shows more than 90 events with hail at least one inch in diameter, including 13 events with hail at least two inches in diameter. In terms of onset, summer storms typically develop with a long warning time, although certain hazards associated with such storms, such as hail or tornadoes, can develop more suddenly.

Regarding tornadoes, **Table C.2** shows five records of a tornado with a magnitude greater than EF1 – two EF3 tornadoes and three EF2 tornadoes. The following table lists the entire range of tornado strength according to the enhanced Fujita scale.

Table 3.1 – Enhanced Fujita Scale

Scale	Wind Speed (MPH)	Potential Damage
EFO	65 to 85	Minor damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86 to 110	Moderate damage. Roofs severely sLymaned; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111 to 135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136 to 165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings; trains may be overturned; heavy cars lifted off ground and thrown; structures with weak foundations badly damaged.
EF4	166 to 200	Devasting damage. Frame homes are completely destroyed and some may be swept away; cars and other large objects are thrown in the air.
EF5	Over 200	Incredible damage. Nearly all buildings aside from heavily built structures are destroyed; frame houses and brick homes are swept away; cars are thrown hundreds of yards.

Source: en.wikipedia.org/wiki/Enhanced_Fujita_scale

History

As **Table C.1** in **Appendix C** shows, several major disaster declarations involving a summer storm have affected Lyman County. **Table C.2** in **Appendix C** lists many other significant summer storms that have impacted the county.

A thunderstorm that struck near Vivian in July 2010 included extremely large hail, including one hailstone measured at 8 inches in diameter, which is the largest hailstone ever recorded in the United States. Details about the storm are shown in **Table C.2** in **Appendix C**.

A notable summer storm occurred in June 2015, causing substantial property damage and resulting in FEMA Disaster Declaration 4233. Winds estimated at 100 miles per hour caused severe damage to several buildings in Lower Brule, damaged the roof of the Lyman County courthouse, downed many trees, and caused other damage. The Red Cross set up shelter for displaced people. Public assistance costs to Lyman County as a result of this storm were approximately $260,000.

Probability

As shown in **Table C.2 in Appendix C**, over 250 summer storm events, including hailstorms, thunderstorms, lightning, and tornadoes, have been recorded in Lyman County since 1960, an average of more than four per year. Thirty-nine of these storms involved a tornado. From this information, the probability of a summer storm affecting Lyman County in a given year is high and the probability of a storm causing significant damage (e.g., damaging hail or a tornado) can be considered at least moderate.

Flooding

Description

Floods are among the most serious and costly disaster events. In South Dakota, there are two main climatologic causes of flooding: runoff from rainfall and runoff from melting snow. The water from rainfall or melting snow flows overland until it reaches a nearby river or lake. If the river or lake cannot hold all of the water that is entering it, some of the water will begin to overflow, causing flooding. The size of the flood is influenced by such factors as the intensity or length of the rainfall, melting rate of the snow, and the infiltration of the water into the ground. According to the survey, flooding is not among the most serious hazards facing the county, ranking above only earthquakes and landslides.

Following is a description of the four types of flooding that have the potential of impacting Lyman County, based on information in the South Dakota Hazard Mitigation Plan:

- Flash flooding, which results from several inches or more of rain falling in a very short period. This high intensity rainfall is commonly caused by powerful thunderstorms that cover a small geographic area. The flood that occurs because of this runoff happens very rapidly, and is generally very destructive, although usually only a small area is affected.
- Long-rain flooding, which results after several days or even weeks of fairly low-intensity rainfall over a widespread area. This is the most common cause of major flooding. The ground becomes "waterlogged," and the water can no longer infiltrate into the ground. The flooding that results is often widespread, covering hundreds of square miles, and can last for several days or many weeks.
- Flooding resulting from melting snow in the spring. This type has characteristics of both flash floods and long-rain floods. The area covered is generally not as large as that covered by the long-rain flood, but is typically larger than that covered by the flash flood. Generally, the flood lasts for several days, occurring when large amounts of snow melt rapidly due to warm temperatures. The flooding can be made worse if the ground remains frozen while the snow is melting, causing the

melt water to run off to nearby rivers and lakes rather than infiltrating into the ground. Some of the largest floods in South Dakota have been the result of melting snow and ice.

- Dam failure, resulting from natural or man-made causes. Lyman County is vulnerable to this type of flood primarily because of the dams that impound the Missouri River, including the Big Bend Dam, which is considered to be a high hazard dam [4].

Location

Many areas of Lyman County are vulnerable to flooding. The flooding that occurs typically happens during wet springs after winters with heavy snow cover, but flash flooding after very heavy rain also causes trouble. Typical damage includes washed out or damaged roads and culverts. Land along the Missouri River and its tributaries, including the White River, is especially vulnerable. Flooding along the White River sometimes involves ice jams, which occur during the spring thaw and block the flow of water. These ice jams have caused water to flow onto the road surface of the U.S. Highway 183 bridge, but the highway has never actually been closed due to flooding. Medicine Creek, which flows past Kennebec and Presho, also has caused flooding over the years.

In the past, the greatest flooding threat in South Dakota was along the Missouri River, which flows south/southeastward across the state in a deep, wide channel. Flooding along the river used to be an annual threat until a series of huge dams along the river, including Big Bend, was constructed in the 1950s. Now, most of the Missouri River within South Dakota consists of a chain of reservoirs impounded by the dams. From north to south, these dams are Oahe, Big Bend, Fort Randall, and Gavins Point. The dams were built for flood control, to provide water for irrigation, and for the generation of hydroelectricity.

Because of the dams, the threat of flooding from the Missouri River has been greatly reduced, although it has not been entirely eliminated. In 2011, significant flooding along the river did occur. The primary cause of the flooding was very heavy snowmelt at the river's source in the Rocky Mountains, along with extremely high spring rains throughout much of the river's drainage basin. The complicated politics concerning river management also played a role in the disaster that unfolded over the next few months.

Extent

The extent of flooding in Lyman County has rarely been truly significant. Minor, localized flooding typically occurs in the county after very heavy rain events, especially in the spring following snowy winters. Floodwater depth is usually not significant. In terms of duration, flooding can cause road closures lasting from less than a day to several weeks or longer.

The most serious flooding the county has experienced was during the historic 2011 Missouri River flood when the river reached a record 9.6 feet above flood stage at Oacoma. The

[4] A high hazard dam is one whose loss would cause major economic loss, and in which there are anywhere from a few to hundreds of inhabited structures located in the predicted area of inundation.

flooding that occurred in Lyman County in 2019 was notable both for its severity and its widespread impact throughout the county. Many areas of the county experienced water over county and township roads.

History

As shown in **Table C.1** in **Appendix C**, several flood events have resulted in a major disaster declaration in Lyman County. **Table C.2** in **Appendix C** shows many other flooding events that have impacted the county. Following is a summary of the most significant floods the county has experienced.

In the 1980s, Grouse Creek overflowed into Byre Lake, which at the time supplied water to Kennebec, and caused considerable damage. In the mid-1990s, Medicine Creek overflowed and caused considerable damage to county roads between Vivian and Kennebec.

Flooding in 1995 resulted in FEMA Disaster Declaration 1052. All of South Dakota had above normal precipitation from January through May, with many weather stations in the central and eastern portions of the state experiencing their all-time wettest Spring. Damage was caused by ground saturation and flooding due to very high residual groundwater tables from 1994, heavy winter snow and spring rain, and rapid snowmelt. Many roads were under water due to high groundwater saturation, causing interruption of emergency services. Damage also included power transmission and distribution facilities owned by rural electric cooperatives. In the area impacted by the flood, surveys identified over 3,000 homes with some type of damage, the majority caused by groundwater seepage of one to three inches into basements. In many areas the water table rose almost to the surface, saturating septic drain fields and preventing proper treatment of wastewater. The total damage estimate in the affected counties was over $35 million, which included $9.3 million in damage to public infrastructure.

Flooding in 1997 resulted in FEMA Disaster Declaration 1173, which was declared for all counties in South Dakota. At the time, the event was considered one of the top ten natural disasters ranked by FEMA relief costs. From November 1996 through February 1997, the weather across much of the state was cold and very wet, with record setting snowfall in many places. The persistent cold greatly limited snowmelt between storms, which caused snow to pile up from 10 to 24 inches deep. An early April blizzard added to the snow pack, and heavy rain later in the month combined to further saturate the ground. Prairie potholes turned into lakes, causing many people to be evacuated from their homes and farms, and preventing farmers from planting thousands of acres of land. The flood caused over $87 million in damage statewide, and took the lives of two people.

Flooding in 2008 resulted in FEMA Disaster Declaration 1774. Total public assistance costs from the flood in Lyman County were approximately $90,000.

Flooding in the spring and summer of 2010 was the worst in a decade, resulting in FEMA Disaster Declaration 1915. The event caused about $120,000 of public assistance costs throughout the county, primarily due to flooding of county and township roads.

The Missouri River flood of 2011 may have been the most notable flooding event ever to occur in the recorded history of South Dakota, resulting in FEMA Disaster Declaration 1984. The flood resulted in approximately $280,000 of public assistance costs in Lyman County, plus over $95,000 of public assistance to the West Central Electric Cooperative. Extensive bank erosion occurred along the Missouri River in the Oacoma area, which particularly affected the Cedar Shores Resort. The Missouri River at Oacoma reached a record 9.6 feet above flood stage on June 30th, and many people along the river, especially in Oacoma, had to build levees to hold back the rising water, with some locations being flooded.

Flooding in 2019 had a major impact throughout the year in Lyman County, starting in March when heavy rainfall fell on frozen ground, which led to considerable overland flooding of agricultural lands and inundation of numerous roads. This event resulted in FEMA Disaster Declaration 4440. Ice jams caused flooding along the White River throughout southern Lyman County. Additional flooding in the summer resulted in FEMA Disaster Declaration 4463. The total public assistance allocated to Lyman County due to flooding in 2019 was over $1.5 million.

Probability

Table C.2 shows that 32 flooding events have been recorded in Lyman County since the mid-1990s, but some of the events appear to have been a recording of ongoing flood conditions. Excluding these events, it appears there have been 14 separate flood events in Lyman County, or almost five every ten years. Based on this analysis, the probability of flooding occurring somewhere in the county in a given year can be considered moderate to high. **Table C.1** shows that several floods were significant enough to result in a disaster declaration. It is certain that flooding will continue to impact the area to some degree, no matter what mitigation actions are pursued.

Drought

Description

Drought is a deficiency in precipitation over an extended period of time, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. Human factors, such as water demand and water management, can exacerbate the impact that drought has on a region. According to the survey, drought is the second most serious hazard facing the county.

Droughts can occur at any time of the year, but the consequences are worse during the summer growing season, especially after winters with below normal precipitation. A small departure in normal precipitation during the months of June through August can have a significantly negative impact on crop production. The demand for water for multiple uses also impacts water availability. Rural water systems that were originally designed to supply water for people are now also being used for cattle and to fight wildfires, taxing the limits of the systems.

Drought in South Dakota is often accompanied by periods of extreme heat, which is defined by FEMA as a condition in which the air temperature hovers at least 10° Fahrenheit above the average high temperature for the region and lasts for several weeks. Drought and extreme heat often exist together and compound negative effects. According to the National Weather Service, among natural hazards, only the cold of winter takes a greater toll on human life. Between 1936 and 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. Elderly people, small children, people with certain medical conditions, and those on certain medications are particularly susceptible to heat stress.

Location

All areas of the county are equally likely to be impacted by drought.

Extent

Drought severity, the most commonly used term for measuring drought, is a combination of the magnitude and duration of the drought. In terms of magnitude, since 1930 Lyman County has experienced 21 years in which precipitation was less than 75 percent of its average annual amount and nine years with precipitation less than two thirds of normal. The following table shows the total annual precipitation received at the Kennebec weather station from 1930 through 2023.

Table 3.2 – Annual Precipitation in Lyman County (1930 - 2023)

Year	Annual Precip	Year	Annual Precip	Year	Annual Precip	Year	Annual Precip	Year	Annual Precip
1930	19.8	***1949***	16.6	***1968***	21.4	***1987***	16.0	***2006***	12.8
1931	11.1	***1950***	21.8	***1969***	13.3	***1988***	14.4	***2007***	22.7
1932	11.6	***1951***	17.6	***1970***	17.2	***1989***	12.8	***2008***	20.4
1933	11.7	***1952***	12.6	***1971***	16.7	***1990***	18.8	***2009***	21.2
1934	12.5	***1953***	16.5	***1972***	19.0	***1991***	23.9	***2010***	24.4
1935	13.0	***1954***	17.6	***1973***	16.4	***1992***	17.3	***2011***	21.3
1936	11.3	***1955***	12.7	***1974***	15.5	***1993***	24.3	***2012***	14.3
1937	13.3	***1956***	17.3	***1975***	15.9	***1994***	15.5	***2013***	26.5
1938	22.4	***1957***	21.2	***1976***	9.3	***1995***	22.9	***2014***	15.4
1939	17.0	***1958***	12.5	***1977***	25.2	***1996***	21.2	***2015***	18.2
1940	12.7	***1959***	15.9	***1978***	15.3	***1997***	25.7	***2016***	18.6
1941	20.4	***1960***	18.3	***1979***	19.1	***1998***	26.3	***2017***	16.2
1942	24.2	***1961***	14.8	***1980***	14.5	***1999***	25.1	***2018***	26.0
1943	11.7	***1962***	21.4	***1981***	14.4	***2000***	12.9	***2019***	35.7
1944	25.3	***1963***	17.6	***1982***	22.9	***2001***	23.1	***2020***	17.0
1945	14.3	***1964***	12.0	***1983***	13.6	***2002***	12.2	***2021***	21.3
1946	22.2	***1965***	25.1	***1984***	20.1	***2003***	18.9	***2022***	19.2
1947	8.4	***1966***	16.2	***1985***	18.6	***2004***	22.0	***2023***	26.3
1948	17.0	***1967***	14.6	***1986***	22.8	***2005***	20.8		

Source: www.weather.gov/wrh/climate

In terms of duration, it is not unusual for Lyman County to experience periods of below normal precipitation that last for several months. During the 1930s, drought conditions persisted for multiple years. In an area that is so highly dependent on agriculture, the impact of a major drought can be significant. Although most agricultural producers now have crop insurance and agricultural practices today are more advanced, the impacts of drought can still be serious.

History

Lyman County has experienced many significant droughts in its history. The drought of 1976 was one of the most severe in recent years, resulting in South Dakota's only drought emergency declaration to date. Drought in 1980 and 1981 affected the entire state of South Dakota and was rated as a 10 to 25 year event. Drought in 2012 was so devastating that the State of South Dakota activated a Drought Task Force.

The most significant drought in Lyman County's history occurred in the 1930s, the so-called dust bowl years. The drought came in three waves, 1934, 1936, and 1939-1940, but some parts of the Great Plains experienced drought conditions for as many as eight consecutive years. The soil, depleted of moisture, was lifted by the wind into great clouds of dust and sand which were so thick they concealed the sun for several days at a time. The "black blizzards" were caused by sustained drought conditions, compounded by years of land management practices that left topsoil susceptible to the forces of the wind.

Probability

Table C.2 in **Appendix C** shows at least one drought record in Lyman County in ten of the years since 2000. Based on this, the probability of a significant drought occurring in the county in any given year is moderate. The probability of a truly severe drought impacting the county, such as occurred in 2012, is low, expected to occur no more than twice per ten years.

At the statewide level, the developers of the South Dakota Hazard Mitigation Plan cite tree ring research spanning a period of about 400 years indicating that multi-year droughts as significant as the 1930s drought occur on average every 57 years in South Dakota. Based on historical records, notable droughts have occurred somewhere in the state on average about every 12 years.

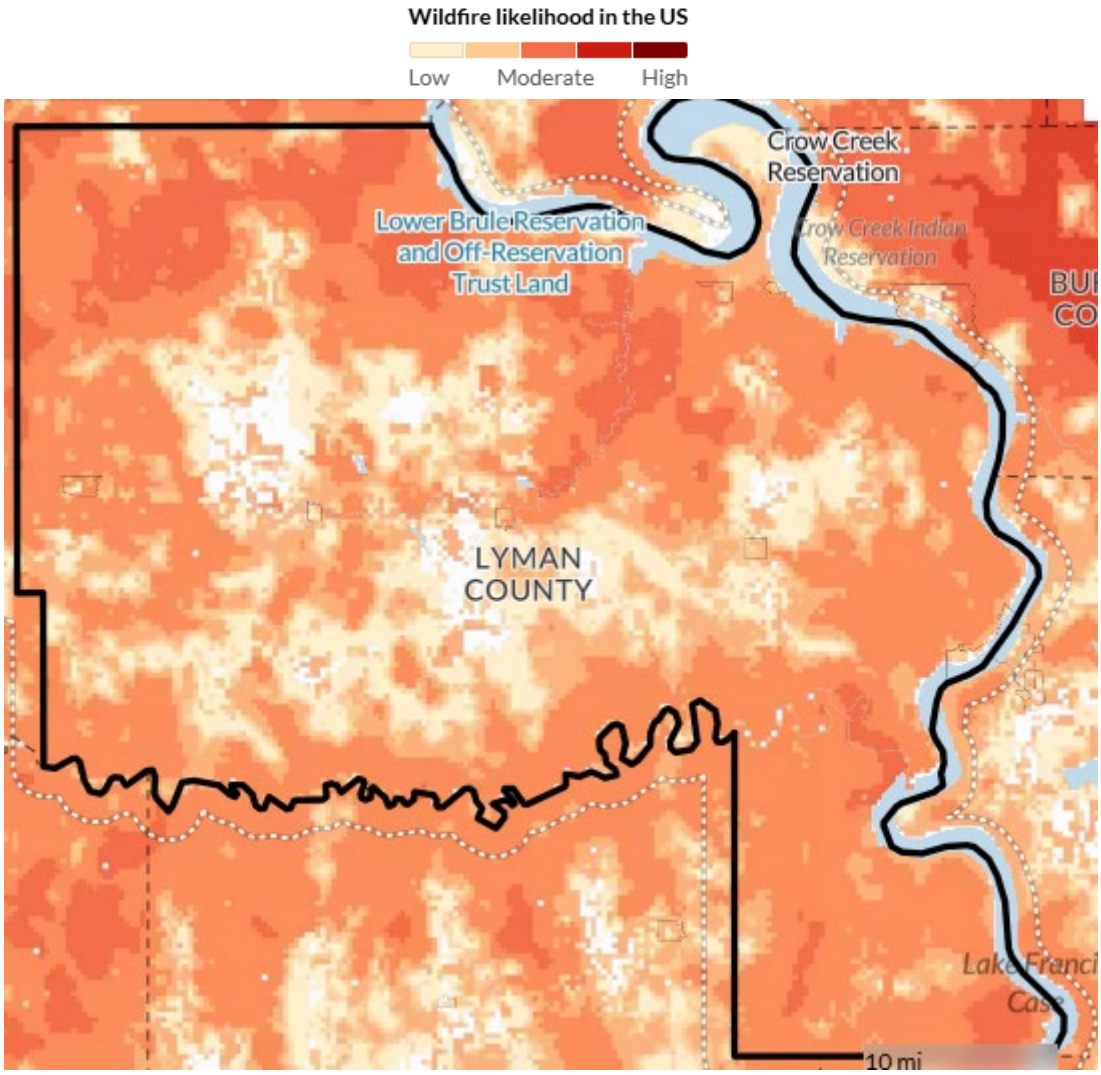
Wildfire

Description

Wildfires are uncontrolled conflagrations that spread freely through the environment. Such fires that occur near populated areas pose threats not only to natural resources, but also to human life and personal property. Wildfires are not as serious a concern in Lyman County as they are in other more forested parts of the country, but the opinion of the planning team is that the hazard does warrant some attention in this plan. According to the survey, wildfire is the fifth most serious hazard facing the county.

Location

Wildfires are most likely to occur in large areas of extensive brush or unmanaged vegetation, including grassland, which makes up over 60 percent of Lyman County's land base. Grassland fires are quite dangerous because they tend to spread faster than forest fires and are thus difficult to attack. A secondary area of concern is the hills and draws along the Missouri River, which contain a significant - and increasing - amount of cedar trees and thick brush. Fires there are difficult to fight because of the uneven terrain. Another concern is controlled burns that get out of control, which can occur almost anywhere in the county. This map, from the U.S. Forest Service's Wildfire Risk to Communities website, shows where wildfires are most likely to occur in the county (it does not reflect the intensity of fire if it occurs).



Extent

Each of the fire departments in the county submits reports to the South Dakota Division of Wildland Fire about the fires they fight. The division compiles the reports and produces a comprehensive database of all the records, which the planning team was able to obtain for fires occurring in the county from 2000 through 2024. The following table summarizes this

information in terms of the size of the fires that have been fought. It shows that most of the fires have been fairly small, most impacting no more than a few acres.

Table 3.3 – Wildfires in Lyman County (2000 - 2024)

1 to 9 Acres	10 to 49 Acres	50 to 99 Acres	100 to 249 Acres	250 Acres or More	Average Annual Acres Burned
151	64	24	22	33	2,030

Source: South Dakota Division of Wildland Fire (based on reports from the local fire departments)

Information on the cause of many of the fires is lacking, but equipment igniting vegetation was a frequently reported cause, as were lightning, burning debris, and such human-related causes as fireworks and smoking. Information is not available on the dollar amount of damage caused by any of the wildfires, or whether any injuries or deaths occurred.

History

Many wildfires have occurred in Lyman County, but nothing on a truly destructive scale. One notable wildfire in 2000 burned approximately 40 square miles of grassland between Kennebec and Lower Brule.

Probability

Wildfires affecting less than ten acres are likely to occur somewhere in Lyman County most years, but large-scale wildfires are much less common. **Table 3.3** shows 33 wildfires of at least 250 acres in size occurred between 2000 and 2024, thirteen of which were over 1,000 acres. Based on this period of analysis, the probability of a significant wildfire occurring each year can be considered high, although the likelihood of a wildfire causing substantial damage is low.

Community Assets

Hazards can affect all parts of the community, but their impact on certain community assets is particularly important to consider. In this section, the most important community assets and facilities in Lyman County are identified, including critical facilities and infrastructure, major employers, and other resources and activities important to the community. Assets that would play an important role in helping the community prepare for and respond to a hazard event are also included.

Government offices

- Lyman County Courthouse, Kennebec
- Lower Brule Tribal Office
- Kennebec City Office
- Oacoma City Office
- Presho City Office
- Reliance City Office

Community facilities

- Kennebec Community Center
- Oacoma Community Center
- Reliance Legion Hall Community Center

Utilities

- Kennebec water tower
- Kennebec sewage treatment lagoon
- Reliance water tower
- Reliance sewage treatment lagoon
- Oacoma water tower
- Oacoma sewage treatment lagoon
- Presho water tower
- Presho sewage treatment lagoon

Medical facilities

- Avera Clinic, Kennebec
- Stanley-Jones Memorial Clinic, Presho
- Indian Health Service clinic, Lower Brule

Educational facilities

- Lower Brule Community College, Lower Brule
- Lyman High School, Presho
- Lower Brule Tribal School, Lower Brule
- Lyman Middle School, Presho
- Lyman Elementary School, Kennebec

Major employers

- Al's Oasis retail complex, Oacoma

Other important resources and activities

- Lyman County Museum, Presho
- Lyman County Rodeo (held in summer at the Lyman County fairgrounds in Kennebec)

Emergency preparedness and response

- Lyman County Emergency Management Office, Kennebec
- Lower Brule Emergency Management Office
- Lyman County Sheriff's Office, Kennebec
- Bureau of Indian Affairs Police, Lower Brule

- Fire departments in Kennebec, Lower Brule, Presho, Reliance, and Vivian
- Lyman County Ambulance Service, Presho
- Missouri Valley Ambulance Service, Chamberlain
- Lower Brule Ambulance Service
- Lyman County Highway Department
- Disaster relief shelters in Kennebec, Lower Brule, Oacoma, Presho, Reliance, and Vivian (see p.57)
- Emergency shelter in Kennebec (see p.57)

Hazard Impact Analysis

This section assesses the vulnerability of Lyman County and the participating jurisdictions to each of the hazards that have been profiled. Vulnerability is defined as the extent to which people and property are exposed to harm or damage created by a hazard. The method of determining vulnerability varies by the type of hazard and the availability of data, but each methodology is based on either potential for loss or actual losses. Following is a description of each specific methodology used.

Potential Loss Methodologies

- FEMA digital Flood Insurance Rate Maps were used to identify 100-year flood zones in the county.
- FEMA's HAZUS loss estimation software was used to estimate potential losses from flooding in each community. HAZUS produces a flood polygon and flood-depth grid that represents the 100-year floodplain, with losses calculated using national baseline inventories (buildings and population) at the census block level. It is an especially helpful planning tool for communities that have not been mapped by the National Flood Insurance Program [5].
- The value of buildings within the county was used to estimate potential losses due to winter storms and summer storms (building exposure).
- Population density within the county was used to estimate potential losses due to winter storms and summer storms.
- Data on the population living in wildfire threat zones was used to estimate potential wildfire losses.

Actual Loss Methodologies

- The National Climatic Data Center's Storm Events Database was consulted for

[5] A limitation of HAZUS is the inadequacies associated with its hydrologic and hydraulic modeling, especially in sparsely populated areas where census blocks - the basis of the loss calculations - are large. The software assumes the population and building inventory to be evenly distributed over the census blocks, whereas in reality flooding may occur only in a small part of the block where there are few buildings or people. Also, HAZUS uses default national databases that may not be applicable at the local level.

historical information regarding weather-related events (see **Table C.2** in **Appendix C**).

- Records from FEMA were consulted for federal assistance provided to Lyman County following major disaster declarations through FEMA's Public Assistance program.
- Data from the U.S. Dept of Agriculture Risk Management Agency was used to assess crop loss due to a variety of natural hazards.
- Information from the National Drought Mitigation Center's Drought Impact Reporter was used to assess the local impact of droughts.

At the conclusion of the vulnerability assessment for each hazard, an attempt is made to determine how vulnerability might change in the future. Factors considered include development trends in the county, which were obtained through an analysis of Census data and population projections, and through discussion with local officials about where housing development and other growth may be likely to occur. Other factors, including the possible impact of climate change, also are considered.

At the end of the chapter, the county's vulnerability to each hazard is summarized. Vulnerability is characterized as either "Low", "Moderate", or "High", based on the results of the risk analysis.

Winter Storms

All areas of South Dakota are vulnerable to winter storms, and the consequences of such storms can be great. They can disrupt the power supply when electrical lines are brought down by high winds, trees falling, or extreme ice buildup. Everyday activities can be significantly disrupted when road conditions deteriorate because of snow cover or precipitation that freezes on road pavement. In extreme situations, roads can be closed because of accumulated snow for days or even weeks. Winter storms also can kill or injure livestock and can cause significant crop losses when they occur early in the growing season.

The rural areas of the county may be somewhat more vulnerable to winter storms than the towns. For example, transmission of electricity in rural areas is dependent on many miles of power lines located in open country that is highly susceptible to high wind events, especially when combined with freezing rain (high winds can snap power poles, and freezing rain and sleet forms ice on the lines, making them heavy and more susceptible to being blown down). Rural residents also are vulnerable if roads are blocked by snow for an extended period of time and they cannot travel into town for groceries, medical supplies, or other important items.

To assess the county's vulnerability to winter storms, the methodology that was used in the South Dakota Hazard Mitigation Plan was essentially followed for this plan. The following factors were considered:

- The number of prior winter storm events in the county

- Past damage amounts
- The county's building exposure
- Population density

Prior Events:

A total of 91 winter storm events, including blizzards, ice storms, heavy snow, and extreme cold events, are shown in the National Climatic Data Center's Storm Events Database for Lyman County through 2024 (see **Table C.2 in Appendix C**). In comparison, the average for South Dakota counties is 104 winter storm events. This would indicate that Lyman County might be somewhat less prone to experiencing adverse winter weather than other counties in the state, especially when considering that Lyman County's total land area is almost half again as much as the average South Dakota county.

Past Damage Amounts:

Winter storms have the potential to cause significant amounts of damage. Substantial damage due to major winter storms has been recorded for the West Central Electric Cooperative's infrastructure located within Lyman County. Many other winter weather events have caused significant amounts of damage in the county.

Given Lyman County's agriculturally based economy, another method to determine vulnerability is to look at the impact of winter storms on the county's agricultural producers. Farmers typically protect themselves from the impacts of adverse weather and other natural hazards by insuring their crops against losses through multi-peril crop insurance, which is underwritten by the Risk Management Agency, a part of the U.S. Dept of Agriculture. Data on indemnity payouts for crop loss in Lyman County due to various types of winter weather events between 2000 and 2023 was obtained from the Risk Management Agency and is presented in the following table. During this period of analysis, winter weather-related payouts represented approximately 10% of all indemnity payouts in Lyman County.

Table 3.4 – Crop Loss Due to Winter Weather

Year	Frost	Freeze	Cold Winter	Cold Wet Weather		Year	Frost	Freeze	Cold Winter	Cold Wet Weather
2000			$155,822			**2012**	$2,592		$53	
2001			$4,202,998	$28,013		**2013**	$23,093		$1,360,444	$30,889
2002	$10,574	$211,722	$89,626	$111,771		**2014**	$44,840	$90,927	$287,656	$289,503
2003	$25,565	$21,562	$3,111	$2,750		**2015**	$31,743	$18,931	$3,071,086	$16,198
2004	$7,937	$60,425	$79,665	$23,805		**2016**	$7,415	$10,873	$50,847	$28,547
2005	$14,243	$71,608	$10,937	$655		**2017**		$99,193	$415,683	$119,354
2006	$37,602	$14,487	$38,011			**2018**	$50,328	$10,910	$34,703	$134,372
2007	$694	$18,010	$322,766			**2019**		$8,479		$892,696
2008		$8,187	$448,281	$21,634		**2020**		$9,395	$2,025	$167,269
2009	$88,810	$241,960	$969,580	$260,055		**2021**			$67,692	
2010	$7,313		$153,578	$19,572		**2022**				$3,998
2011	$13,988	$201,400	$368,693	$210,327		**2023**		$11,247	$476,334	$411,364

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

Building Exposure:

The total value of buildings in Lyman County is approximately $387,530,000, according to the South Dakota Hazard Mitigation Plan, which ranks the county 44th among the state's 66 counties. The median figure for South Dakota counties is approximately $606,000,000. The county's building exposure can thus be considered low.

Population Density:

Lyman County is sparsely populated, with an average of just 2.2 people per square mile, less than the state figure of 11.7 people per square mile and far below the national figure of 93.8. Lyman County would have to be rated low in terms of population density.

Future Vulnerability

Looking ahead, Lyman County's vulnerability to winter storms is not expected to increase significantly in the foreseeable future and may in fact decrease somewhat if the population continues to decrease as expected. However, climate change may have an impact on local vulnerability to winter storms. According to the South Dakota Hazard Mitigation Plan, the winter season is warming at a faster rate than any other season in South Dakota, but winter storms and blizzards will continue to be a severe weather hazard in the state. Warmer winter temperatures could mean more ice and freezing rain events, which would impact electrical utilities and communication systems, the transportation system, and livestock. An increase in the frequency of large snowfall events also is being experienced in the northern U.S. There remains some uncertainty in projections for the coming decades, but the rising trend of extreme precipitation events is something that needs to be considered.

Summer Storms

All areas of Lyman County are vulnerable to summer storms, especially those that are accompanied by tornadoes, lightning, or large hail. Typical damage from summer storms includes blown down power lines, crop damage from hail and high wind, property damage if a populated area is struck, and flooding as the result of heavy rain. Like the rest of the Great Plains, Lyman County is especially vulnerable to summer storms accompanied by high wind because the landscape is open and there is very little topographic relief to block the wind.

As with winter storms, the methodology that was used in the South Dakota Hazard Mitigation Plan to assess vulnerability to summer storms was followed for this plan. The following factors were considered:

- The number of prior summer storm events in the county
- Past damage amounts
- The county's building exposure
- Population density
- Housing stock characteristics in each community

Prior events:

For this analysis, only the number of tornadoes and major hail events (hail at least one inch in diameter) are considered, due to inconsistencies in how the other types of summer storms are recorded in the National Climatic Data Center's Storm Events Database [6]. A total of 39 tornadoes and 65 major hail events were recorded for Lyman County. In comparison, the average number of tornadoes for South Dakota counties is 28 and the average number of major hail events is 57. This would indicate that Lyman County might be somewhat more prone to experiencing severe summer weather than other counties in the state, but again consideration should be given to the fact that Lyman County's total land area is almost half again as much as the average South Dakota county.

Past Damage Amounts:

Summer storms have the potential to cause significant amounts of damage. As shown in **Table C.2**, many summer storm events have caused property or crop damage in the county.

As with winter storms, another method to determine the county's vulnerability to summer storms is to look at the impact of such storms on the county's agricultural producers. Summer storms can cause a lot of damage to cropland, especially when they are accompanied by hail. Data on indemnity payouts for crop loss in Lyman County due to hail as well as high wind events between 2000 and 2023 was obtained from the Risk Management Agency and is presented in the following table. During this period of analysis, summer storm-related payouts represented approximately 8% of all indemnity payouts in Lyman County.

Table 3.5 – Crop Loss Due to Severe Summer Weather

Year	Hail	High Wind		Year	Hail	High Wind		Year	Hail	High Wind
2000	$4,658	$74,606		**2008**	$144,564	$208,958		**2016**	$138,409	$391,781
2001	$94,795			**2009**	$65,968			**2017**	$1,464,948	$62,249
2002	$21,204	$17,150		**2010**	$636,000	$29,337		**2018**	$2,817,919	$4,503
2003	$101,866	$4,716		**2011**	$235,658	$61,046		**2019**	$941,310	
2004		$211,065		**2012**	$1,291,954	$43,176		**2020**	$200,700	
2005	$2,904	$35,601		**2013**	$443,754	$1,140,402		**2021**	$5,210	$85,332
2006	$153	$138,695		**2014**	$108,312	$818		**2022**	$5,422	$742,698
2007		$56,760		**2015**	$277,683	$28,888		**2023**	$547,355	$30,082

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

Building Exposure:

The total value of buildings in Lyman County is approximately $387,530,000, according to the South Dakota Hazard Mitigation Plan, which ranks the county 44th among the state's 66 counties. The median figure for South Dakota counties is approximately $606,000,000. The county's building exposure can thus be considered low.

[6] The analysis goes back to 1960 for tornadoes and 2000 for hail events.

Population Density:

Lyman County is sparsely populated, with an average of just 2.2 people per square mile, less than the state figure of 11.7 people per square mile and far below the national figure of 93.8. Lyman County would have to be rated low in terms of population density.

Housing Stock Characteristics

Differences in the local housing stock were analyzed to help determine vulnerability at the community level. The following table shows that the housing stock in each of the communities is older than the state average, and an assumption can be made that some of the older houses may not be constructed as sturdily as a newer home, thus putting the occupants at higher risk to a powerful summer storm, such as a tornado or other high wind event. The impact on human life might be somewhat worse in Oacoma and Reliance, given the high percentage of mobile homes in those communities.

Table 3.6 – Housing Stock Characteristics

Community	Housing Stock Built Prior to 1960	Housing Stock Built Since 2000	Mobile Homes
Kennebec	51.9%	7.6%	0.0%
Lower Brule	3.0%	9.9%	8.4%
Oacoma	10.3%	26.6%	26.1%
Presho	55.5%	0.0%	5.5%
Reliance	32.5%	7.5%	27.5%
South Dakota	*26.4%*	*31.5%*	*6.4%*

Source: 2020 US Census (DP04 Selected Housing Characteristics)

Future Vulnerability

Looking ahead, the county's expected decline in population suggests that vulnerability to summer storms is not likely to increase in the future. Regarding the impact of climate change, the South Dakota Hazard Mitigation Plan cites the Climate Science Special Report from 2017, which states that damage from convective weather hazards, such as severe thunderstorms and tornadoes, have undergone the greatest increase relative to other extreme weather since 1980. The plan states that the tornado season is getting longer and that an increase in potential days for severe thunderstorms is projected for the mid to late 21st century. The expected increase in the number of days above 95 degrees by midcentury could create conditions favorable to the formation of severe thunderstorms. There is some uncertainty in these projections, but severe thunderstorms and tornadoes will remain a hazard.

Flooding

Like all counties in South Dakota, Lyman is vulnerable to flooding. There are two repetitive loss properties in the county, as detailed in the following table.

Table 3.7 – Repetitive Loss Properties

Jurisdiction	Number of Properties	Property Type
Lyman County	1	Residential
Town of Kennebec	1	Commercial

Because of the specific nature of flooding, the county's vulnerability to flooding will be analyzed first on a general county-level basis, and then specifically for each community. Given the degree to which flooding is geographically based, this approach made the most sense to the planning team.

General Flood Vulnerability

According to the HAZUS analysis run for the South Dakota Hazard Mitigation Plan (see Table 3-45 of that plan), the potential building damage loss from flooding in Lyman County is $3,267,000, whereas the median figure for all South Dakota counties is approximately $2,800,000. The building damage loss ratio (the percent of the total building inventory value that could be damaged from flooding in any given year) of 1.5 percent is higher than the median value for South Dakota counties of 0.80 percent. The potential displaced population in Lyman County was determined to be 145 people, below the median value of South Dakota counties of approximately 255 people.

In addition to impacting buildings and other structures, a good deal of public infrastructure throughout the county is vulnerable to flooding. Flood damage frequently involves washed out or damaged roads and drainage culverts, often occurring in the spring, especially following winters with heavy snow.

Flooding also has a major impact on agriculture. Spring flooding can delay farmers getting into their fields to plant, and later in the growing season it can damage crops. Data on indemnity payouts for crop loss in Lyman County due to flooding, as well as excess moisture/precipitation, between 2000 and 2023 was obtained from the Risk Management Agency and is presented in the following table. During this period of analysis, flood-related payouts represented about 15% of all indemnity payouts in Lyman County.

Table 3.8 – Crop Loss Due to Flooding

Year	Flooding	Excess Moisture/ Precip		Year	Flooding	Excess Moisture/ Precip		Year	Flooding	Excess Moisture/ Precip
2000		$128,380		**2008**		$1,345,816		**2016**		$79,776
2001		$814,871		**2009**		$1,361,315		**2017**		$7,185
2002		$5,215		**2010**	$12,273	$4,346,664		**2018**		$860,637
2003		$153,797		**2011**		$4,044,267		**2019**	$12,963	$5,352,379
2004		$237,488		**2012**		$264,482		**2020**		$1,749,691
2005	$17,736	$812,872		**2013**		$363,277		**2021**		$44,061
2006				**2014**		$1,384,723		**2022**		$898,327
2007		$585,301		**2015**		$104,084		**2023**		$525,491

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

2019 was probably the worst year ever in terms of flooding's impact on South Dakota's agricultural producers. The state ranked first in the nation with almost 4 million acres of farmland prevented from being planted due to flooding, more than double the next nearest state. However, Lyman County was not impacted as much as most other counties in the state.

Approximately 38,000 acres of land in Lyman County were not planted due to flooding in 2019, which was about 4% of land that would otherwise have been planted, ranking the county 38th in South Dakota.

Lyman County is also vulnerable to flooding due to dam failure, primarily because of the Big Bend Dam and the other dams on the Missouri River. As mentioned earlier, it had once been thought that the system of dams on the Missouri River had essentially eliminated the threat of flooding along the river. However, flooding did occur along the Missouri in 2011, due to heavy snowmelt at the river's source in the Rocky Mountains and extremely high rainfall throughout the river's drainage basin in the spring of 2011. Mismanagement of dam releases - which can be considered a type of dam failure - exacerbated the situation. In the unlikely event that the Big Bend Dam completely failed, water would inundate farmland along the river, as well as property in Oacoma, but the rise in water would be gradual enough that everyone could escape, especially since floodwater would be very unlikely to reach Interstate 90, which would serve as the primary escape route [7]. There is also flooding vulnerability associated with several smaller dams located within Lyman County that could cause economic loss if they failed (see **Figure 2.1**).

Local Flood Vulnerability

At the community level, vulnerability was determined by using FEMA's HAZUS loss estimation software to estimate potential losses during a 100-year flood event. Vulnerability was also assessed by using GIS software to overlay areas of flood risk on parcel data to determine the number of housing units at risk of flooding and the assessed value of residential dwellings and commercial buildings at risk. The following table summarizes the results of the analysis (note that both analyses may have included a small amount of land outside the communities, in which case some of the values in the table could be somewhat inflated).

Table 3.9 – Community Flood Loss Estimation

Community	Building Structural Damage	Debris Generated (Tons)	Households Displaced	People Needing Shelter	Housing Units at Risk	Assessed Value of Property at Risk
Kennebec	$1,517,000	1,228	13	6	52	$5,425,000
Presho	$429,000	825	8	1	9	$200,000
Vivian	$250,000	249	19	20	4	$329,000

Sources: FEMA HAZUS loss estimation software; Lyman County Director of Equalization

Future Vulnerability

Looking ahead, the population of Lyman County is expected to continue declining, and no major development has occurred anywhere in the county since the current plan was developed, both of which indicate that the county's vulnerability to flooding is not likely to increase in the future. One factor that may increase the county's vulnerability to flooding is the continuing conversion of wetlands and other marginal land to agricultural production. Farming these marginal lands can increase the probability and severity of flooding in certain

[7] The predicted inundation level is shown in the U.S. Army Corps of Engineers Big Bend Dam Inundation Study, but it is not available for reproduction in this plan.

areas as the land's natural capacity to absorb excess surface water is decreased. The primary impact is on rural roads and infrastructure. Precise statistics on the amount of road damage that flooding has caused over the years in Lyman County are not available, but future updates to this plan could explore this trend in more depth.

The nature and frequency of flooding also could be altered by climate change. The South Dakota Hazard Mitigation Plan notes a long-term trend of increasing annual precipitation across South Dakota, among the highest in the country, much of it occurring in the spring and fall seasons, and there is high confidence that precipitation extremes will increase in frequency and intensity that could exacerbate flooding.

Drought

Without question, Lyman County is vulnerable to drought. The biggest impact of drought in Lyman County is in the agricultural sector, which is not surprising, given the county's heavy reliance on farming. Non-irrigated cropland is most susceptible to drought, and yield reductions due to moisture shortages can be aggravated by wind-induced soil erosion. Fortunately, most farmers in Lyman County have crop insurance, which helps lessen the financial impact of droughts and other natural disasters, and modern agricultural practices, such as no-till farming and the development of more drought-tolerant crops, can help farmers better withstand years of below average rainfall.

Data on indemnity payouts for crop loss in Lyman County due to drought and heat between 2000 and 2023 was obtained from the Risk Management Agency and is presented in the following table. During this period of analysis, drought-related payouts accounted for about 60% of all indemnity payouts in Lyman County, by far more than any other hazard. It is safe to say that drought has a major impact on Lyman County farmers [8].

Table 3.10 – Crop Loss Due to Drought and Heat

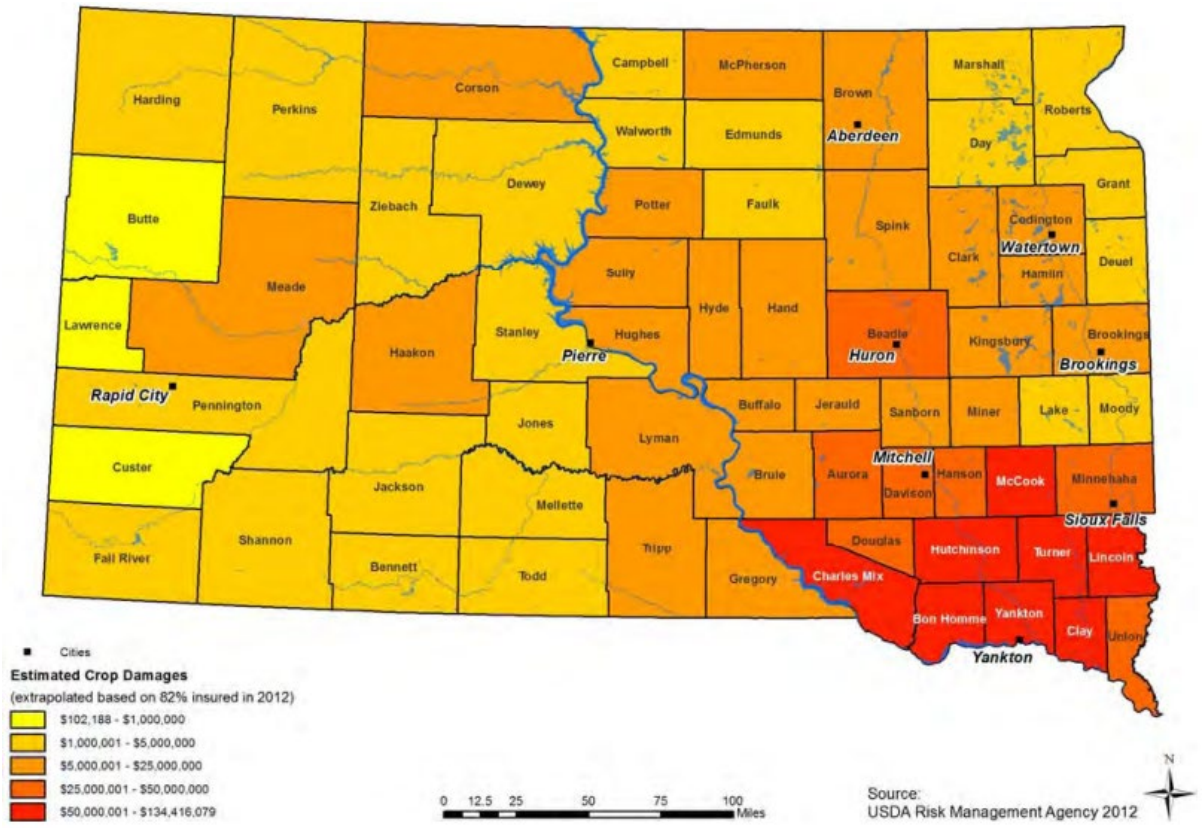
Year	Drought	Heat		Year	Drought	Heat		Year	Drought	Heat
2000	$1,039,736	$11,235		**2008**	$619,977	$11,405		**2016**	$840,552	$299,122
2001	$546,896	$22,804		**2009**	$764,616	$2,723		**2017**	$8,207,636	$67,875
2002	$9,304,102	$48,958		**2010**	$72,347	$2,368		**2018**	$525,580	$21,651
2003	$2,211,763	$77,051		**2011**	$2,587	$108,851		**2019**		
2004	$3,261,774	$708		**2012**	$11,881,713	$103,514		**2020**	$600,595	
2005	$1,354,239	$287,778		**2013**	$13,358,337	$16,131		**2021**	$14,609,672	$387,294
2006	$7,739,684	$15,024		**2014**	$802,473	$0		**2022**	$5,546,245	$116,137
2007	$1,393,804	$460,002		**2015**	$5,287,472	$142		**2023**	$8,671,295	$430,508

Source: USDA Risk Management Agency (www.rma.usda.gov/data/cause.html)

The 2012 drought had a major impact on the state's agricultural producers. Lyman did not suffer as much crop loss that year as counties in the southeastern part of South Dakota did,

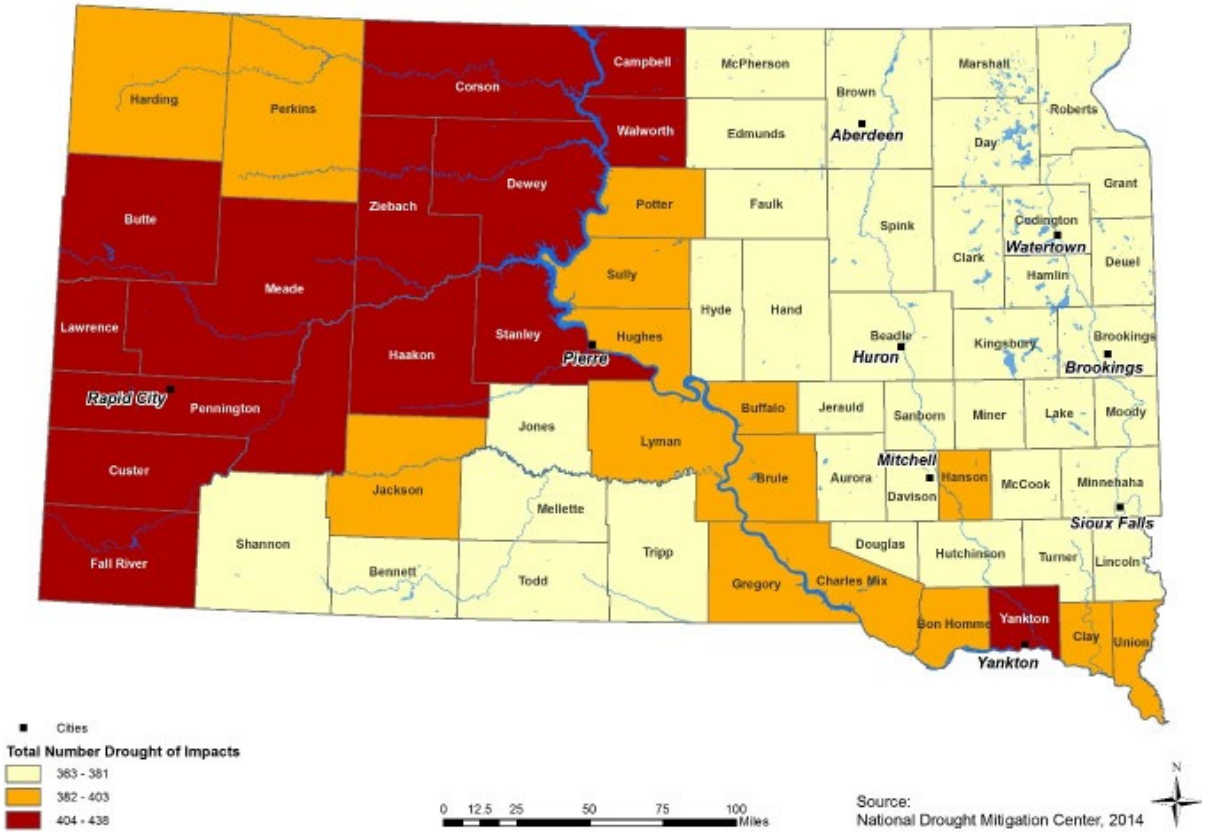
[8] Drought is the costliest natural hazard statewide for South Dakota farmers. From 2000 through 2017, drought payouts accounted for approximately 50% of all indemnity payouts in the state.

but the impact was still considerable. The figure below, as reproduced from the South Dakota Drought Mitigation Plan, shows the 2012 drought's impact statewide.



To determine which areas of the state are most vulnerable to the agricultural impacts of drought, the authors of the South Dakota Drought Mitigation Plan conducted an analysis comparing crop losses in each county to the total value of the county's crops. Crop value was taken from the 2012 Census of Agriculture, while crop loss was based on the Risk Management Agency's crop indemnity data for the period 2000 to 2014. The resulting loss ratio is the average annual loss divided by total crop value; the higher the ratio the higher the vulnerability. Lyman County's average annual loss from drought for the 2000 – 2014 period was $4,326,512, compared to a total crop value of $95,031,000, resulting in a loss ratio of 4.6%. In comparison, the average loss ratio figure for South Dakota counties was 3.1%, with four counties having a loss ratio over 10%. The authors of the South Dakota Drought Mitigation Plan assigned a "Moderate" vulnerability rating for Lyman County for this measure of drought vulnerability.

Vulnerability also was assessed by reviewing the South Dakota Drought Mitigation Plan's section on the National Drought Mitigation Center's Drought Impact Reporter. The Drought Impact Reporter analyzes drought impact information from a broad range of areas, including the social, economic, and environmental realms. As shown in the figure on the next page from the South Dakota Drought Mitigation Plan, Lyman County is in the lower range of counties in terms of the number of drought impacts.



Future Vulnerability

Vulnerability to drought may increase in coming years if current land use trends continue and more marginal land in the county is brought into agricultural production. Climate change also may increase the frequency and severity of droughts in the future. The expected increase in Lyman County's average annual temperature and the number of days over 95 degrees may lead to increased evaporation and drought frequency, which would compound water scarcity problems.

Wildfire

Wildfire risk in Lyman County was analyzed using two different sources. According to the U.S. Forest Service's Wildfire Risk to Communities website, Lyman County's overall wildfire risk is considered medium, higher than 67% of the counties in the United States and 65% of South Dakota's counties, although the risk in Kennebec and Oacoma is considered to be high. Information from the SILVIS Lab at the University of Wisconsin shows that a total of 712 housing units are located in the Wildland-Urban Interface, which are locations vulnerable to wildfires because of a combination of dense housing and vegetation. The 712 housing units at risk represent 46.1% of the total housing stock in Lyman County. For comparison, the statewide figure is 25.9%. The table on the following page summarizes the overall risk in Lyman County.

Table 3.11 – Housing Stock in Wildfire Risk Zones in Lyman County

Houses At Risk	Median Housing Value in Lyman Co.	Total Value of Homes at Risk
712	$132,100	$94,055,200

Sources: silvis.forest.wisc.edu/data/wui-change; 2020 U.S. Census/American Community Survey

Future Vulnerability

Looking ahead, the population of Lyman County is expected to continue to decline, so vulnerability to wildfires is not likely to increase. One factor that could increase wildfire vulnerability is the continued spread of cedar trees. These trees are spreading quickly in Lyman County, and efforts to control their spread have met with only limited success. The fuel load they represent could turn an otherwise routine brushfire into a very serious situation.

The possible impact of climate change also needs to be considered. The South Dakota Hazard Mitigation Plan cites a U.S. Forest Service study that indicates a likely increase in the annual window of high fire risk by 10 to 30%. The plan states that predictions past 2040 are largely speculative, but there will be an increase in the potential for drought and the number of days in any given year with flammable fuels, which may extend the fire season.

Risk Assessment Summary

In this section, the vulnerability of Lyman County and each of the participating jurisdictions to each of the hazards profiled is summarized. Maps are presented at the end of the section to augment the analysis, showing areas vulnerable to flooding; the graphic on page 31 showed areas where wildfire is most likely to occur. Vulnerability to winter storms, summer storms, and drought is not mapped, as those hazards are likely to impact all areas of the county more or less equally.

- **Winter Storms**

Lyman County's vulnerability to winter storms can be considered at least moderate. The authors of the South Dakota Hazard Mitigation Plan assigned Lyman a rating of Moderate when considering prior winter storm events in the county, the county's building exposure, and the county's population density. All areas of the county are vulnerable to winter storms. Major winter storms accompanied by heavy snow or freezing rain contribute to the vulnerability of county residents by making roads dangerous for travel. The isolation of residents living outside of Kennebec, Oacomca, Presho, and Reliance puts them at increased risk. If roads are blocked by snow for extended periods of time, residents outside these communities may not have access to groceries, medical supplies, or other essential items. Winter storms accompanied by high winds have the potential to damage residential and commercial property in the county, as well as infrastructure. A major concern is the vulnerability of rural electric power infrastructure, especially when winter storms are accompanied by high winds and freezing precipitation that can cause ice to build up on

powerlines, which can then cause the lines and poles to come down. Elderly residents who rely on home medical apparatus dependent on a constant supply of power are particularly vulnerable during these times and they are often less able to withstand extreme cold events.

- **Summer Storms**

Lyman County's vulnerability to summer storms can be considered moderate. The authors of the South Dakota Hazard Mitigation Plan assigned Lyman a rating of Moderate when considering prior tornado events in the county, the county's building exposure, and the county's population density. All areas of the county are vulnerable to summer storms. Although the county's population density is low and infrastructure development is not extensive, a large amount of cropland in the county is vulnerable to the effects of hail and other violent summer weather. Vulnerability may be higher in Oacoma and Reliance, where approximately 25% of the housing stock consists of mobile homes, which can be overturned by winds of 60 to 70 miles per hour if they are not anchored properly. Vivian, with 15% of the housing stock consisting of mobile homes, may also be somewhat more vulnerable. Residents of the Lower Brule community are also vulnerable, since much of the housing stock there lacks a basement.

- **Flooding**

The overall vulnerability of Lyman County to flooding can be described as moderate. According to the vulnerability analysis conducted for the South Dakota Hazard Mitigation Plan, Lyman's estimated flood loss is in the middle tier of counties. Much of the vulnerability is to cropland and to rural county roads, especially near the White River. Flood damage to households and businesses generally is not a major concern, with the exception of the Missouri River flood in 2011. Flooding in 2019 caused substantial road damage throughout the county, including two road segments along the White River that were lost to erosion, and two large culverts in Iona Township that were destroyed. Following is a summary of vulnerability in each of the communities:

Kennebec is vulnerable to flooding, as indicated in **Table 3.9**. The only mapped flood zone in Lyman County is located along Medicine Creek in Kennebec. Flooding in 2019 caused considerable damage to the KOA Campground, flooded several homes, and flooded SD Hwy 273 in Kennebec at the Medicine Creek crossing, forcing the road to be closed for a day.

Lower Brule is somewhat vulnerable to flooding. If the Big Bend Dam completely failed, water might inundate some residences just outside the community.

Oacoma is vulnerable to flooding. Although **Table 3.9** does not indicate any risk, a substantial amount of stormwater can descend into Oacoma from the hills immediately north of the community, which can cause temporary flooding in some locations. The Missouri River flood of 2011 damaged some roads, inundated the city park, and would have caused substantial public and private damage except for a sandbagging effort that saved several residential properties and two sewage lift stations. Flooding in 2019 caused a minor amount of damage to a few residential properties, one of which experienced sewage backup.

Presho is somewhat vulnerable to flooding, as indicated in **Table 3.9**. Flooding in 2019 caused major damage to several residential properties, the municipal airport, and the golf course, and caused some damage at the sewage lagoon.

Reliance is somewhat vulnerable to flooding. There is some risk associated with Reliance Lake, which has overflown into the Reliance sewage lagoon during periods of very high rain. Failure of the dam at Reliance Lake would inundate the lagoon, as well as farmland below the dam. Flooding in 2019 had some impact on the community, but not nearly as much as it did in Kennebec and Presho.

Vivian is somewhat vulnerable to flooding, as shown in **Table 3.9**. Flooding in 2019 caused a minor amount of damage to a couple of residential properties.

- **Drought**

Lyman County's vulnerability to drought can be considered at least moderate and is certain to continue for the foreseeable future. The impact is primarily to the agricultural sector, where serious losses have occurred. The South Dakota Hazard Mitigation Plan assigned a vulnerability rating of Moderate for Lyman County in terms of drought's impact to crops between 2000 and 2014. Residential and commercial impacts of drought are minor, as the water supply is considered reliable and secure. None of the water systems serving Lyman County residents has ever had difficulty delivering enough water to their customers.

- **Wildfire**

The overall vulnerability to wildfire in Lyman County can be considered moderate. Approximately 46% of the county's population lives in a location vulnerable to wildfire, well above the statewide figure of 26%. Although no truly destructive wildfire has ever been recorded in the county, there have been several fires since 2000 that burned over 1,000 acres. The continued spread of cedar trees is a factor that could increase the county's vulnerability to wildfire in some areas, especially in the rugged terrain along the Missouri River. The risk assessment conducted for the South Dakota Hazard Mitigation Plan assigned a rating of Low for Lyman County regarding aggregate wildland fire vulnerability.

Figure 3.1 – Kennebec

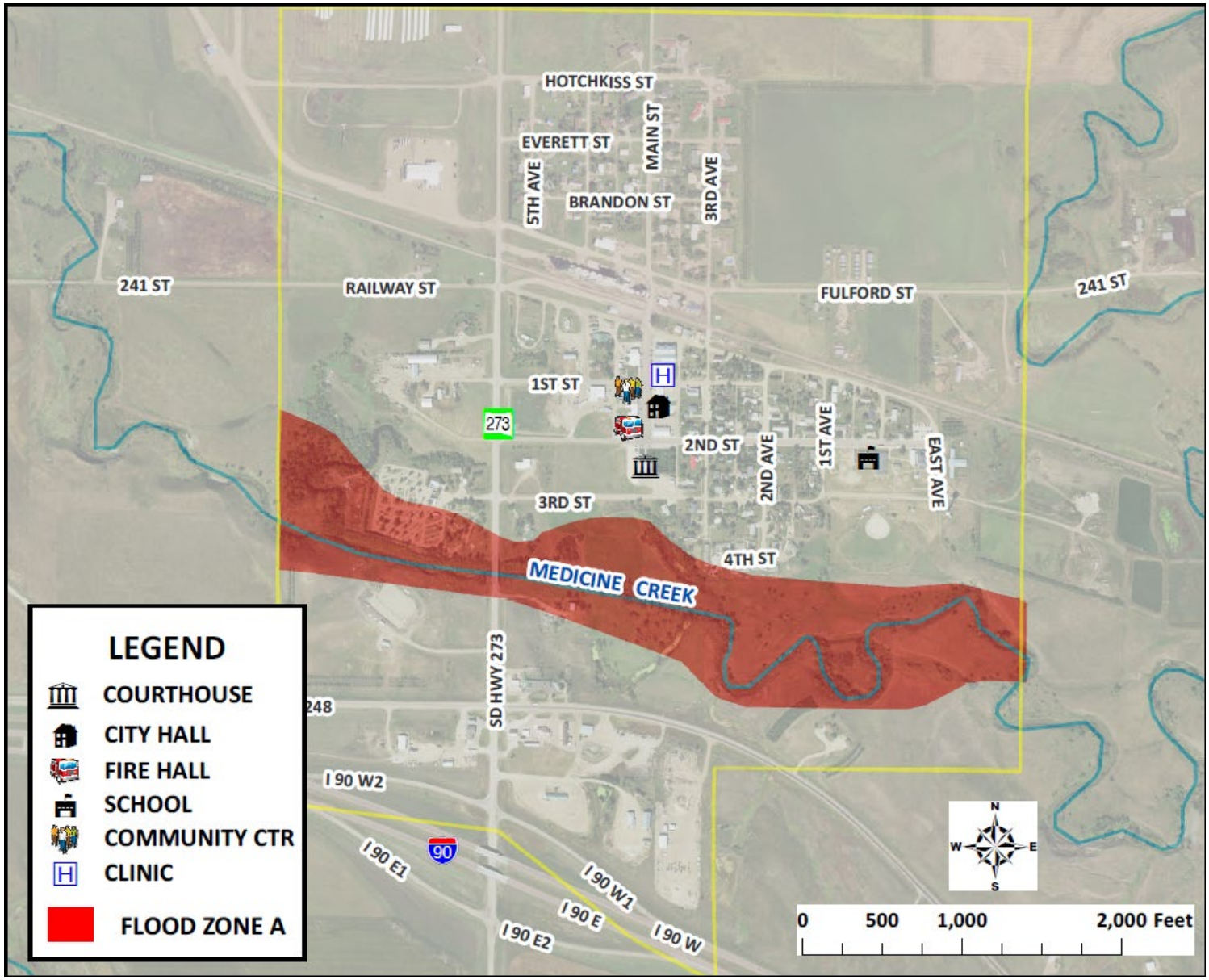


Figure 3.2 – Oacoma

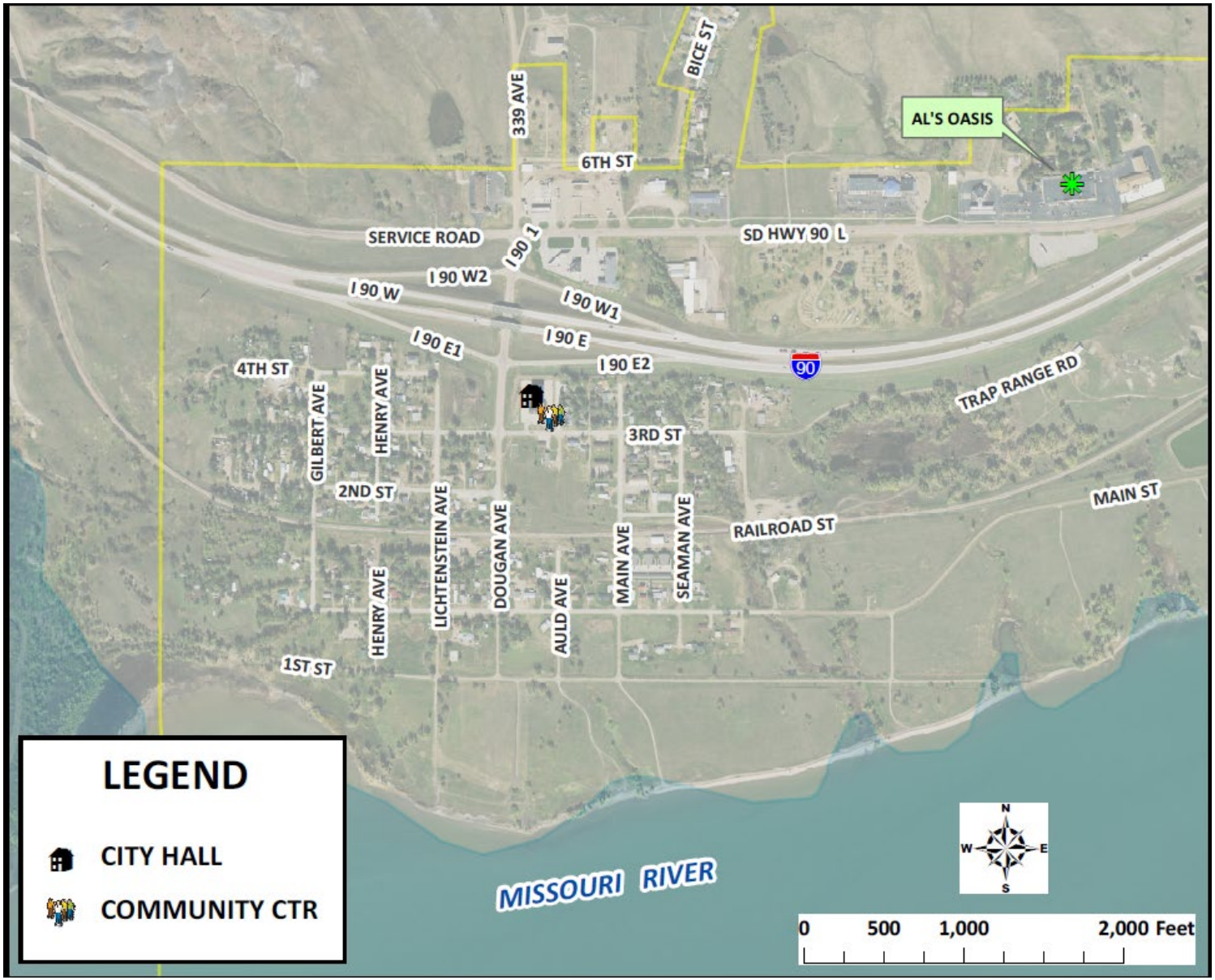


Figure 3.3 – Presho

Figure 3.4 – Reliance

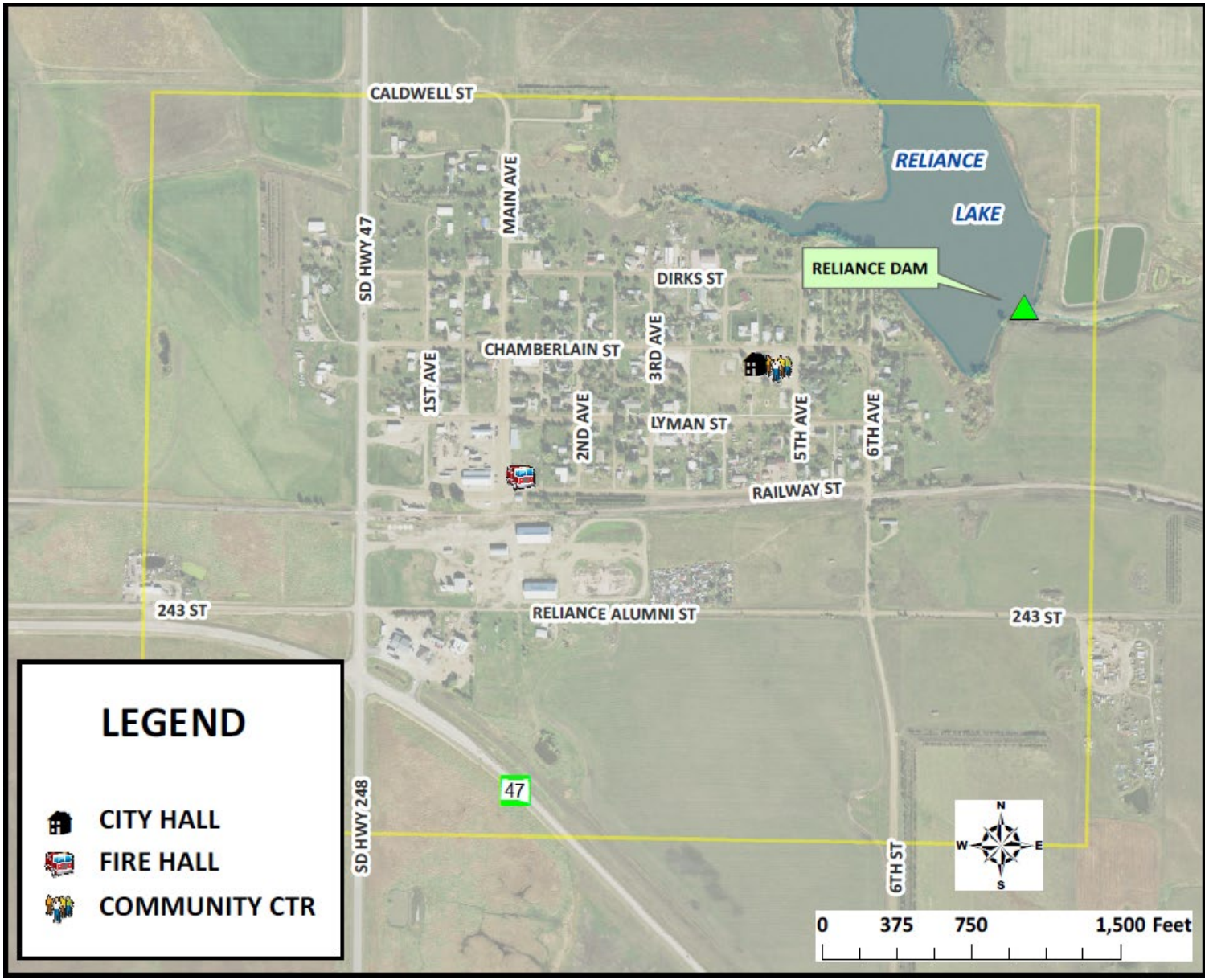


Figure 3.5 – Lower Brule

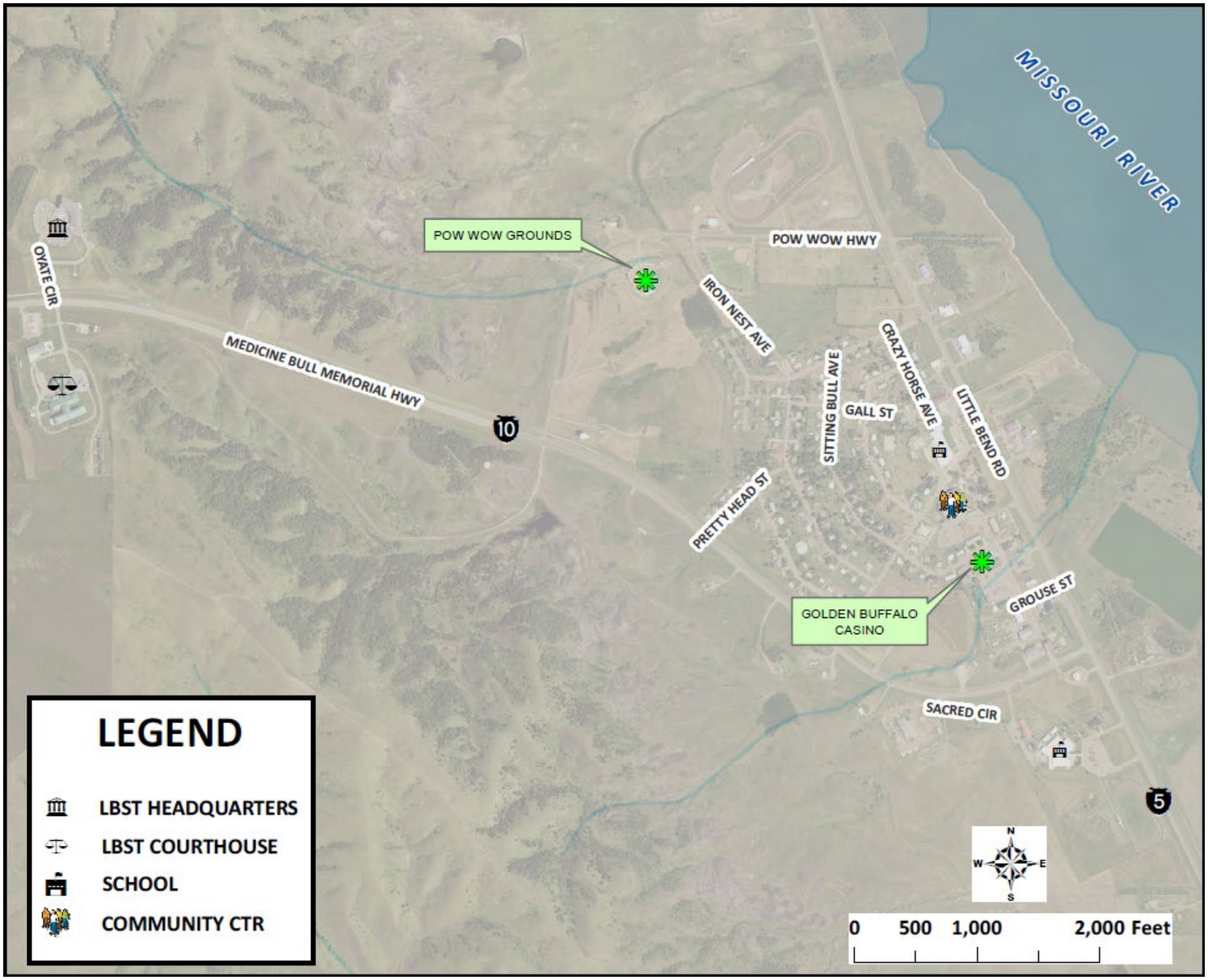
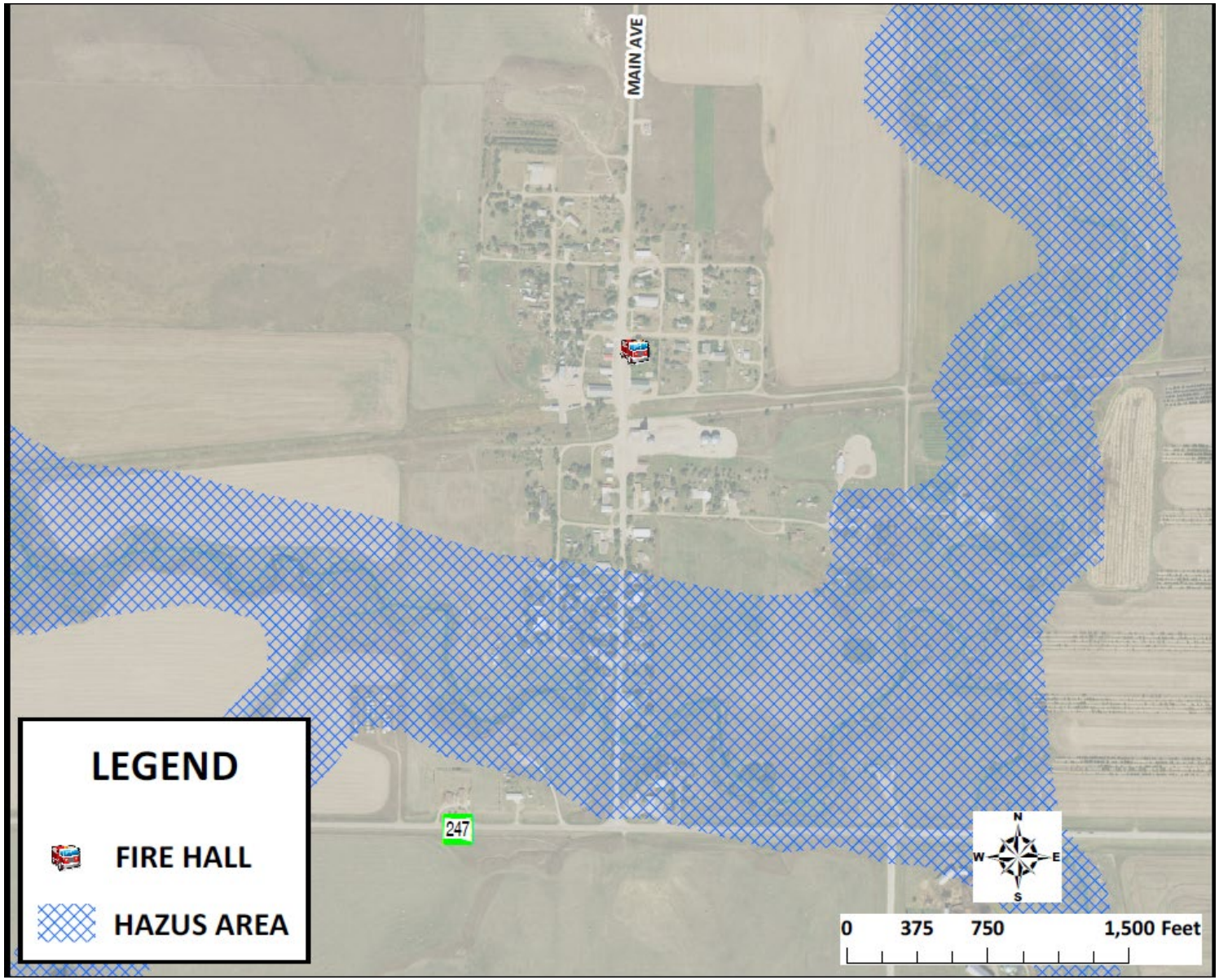


Figure 3.6 – Vivian



CHAPTER IV
RISK MITIGATION STRATEGY

Background

The previous chapter described the types of hazards most likely to impact Lyman County and discussed the county's vulnerability to each of the hazards. This chapter describes the local resources and capabilities available to support hazard mitigation, identifies the hazard mitigation goals and objectives that the planning team decided upon, and then focuses on a presentation of the mitigation actions proposed to achieve the goals and objectives. **Table 4.5** at the end of the chapter provides information about each of the proposed actions.

Community Capabilities

Resources are available at the local level to support mitigation activities and efforts in Lyman County. For the purposes of this plan, these resources are divided into regulatory mechanisms and other capabilities.

Regulatory Mechanisms

Regulatory mechanisms and authorities in Lyman County are limited. The following table summarizes the existing policies, programs, and resources within Lyman County that can support the local mitigation strategy.

Table 4.1 – Regulatory Mechanisms

Item	Notes
Lyman County Burn Ban Ordinance (2016, amended in 2021)	This ordinance prohibits open burning when the National Weather Service has declared the South Dakota Grassland Fire Danger Index to be in the HIGH, VERY HIGH or EXTREME category. It also requires that the Lyman County Sheriff's Office or 911 dispatch be contacted prior to a controlled burn.
Kennebec Floodplain Management regulations	Regulates development within flood hazard areas (see **Table 4.2**).
Oacoma Zoning Ordinance	The ordinance, which is based on the City's comprehensive plan, controls where growth and development can occur within the city.
Reliance Zoning Ordinance	The ordinance, which is based on the Town's comprehensive plan, controls where growth and development can occur within the town.

Lyman County, Kennebec, and Presho participate in the National Flood Insurance Program (NFIP). The Town of Oacoma and the Town of Reliance do not participate in the program because no Flood Insurance Rate Map or Flood Hazard Boundary Map has been issued for either jurisdiction, nor are there any repetitive loss structures within either community. Currently there are a total of seven active National Flood Insurance Program policies in Lyman

County with a total value of $653,000 (one in Lyman County for $350,000 and six in Kennebec for $303,000). The following table provides information on NFIP participation in the county.

Table 4.2 – National Flood Insurance Program Participation

Jurisdiction	CID	Current Effective Map Date	Reg-Emer Date	Appointed Designee	Implementation/Enforcement
Lyman Co.	460278	(NSFHA)	06/08/98	N/A	The County has been a part of the NFIP program since 1998, but it has not been mapped and therefore there are no floodplain regulations.
Kennebec	460050	08/05/86	08/05/86	Finance officer	New construction and substantial improvements must be constructed using methods to minimize flood damage, including the use of materials resistant to flood damage. Residential construction and substantial improvements must have the lowest floor elevated to or above base flood elevation. Non-residential construction or substantial improvements must either have the lowest floor elevated to base flood elevation, or 1) be flood-proofed so the structure is watertight below the base flood level, 2) have structural components that can resist hydrostatic and hydrodynamic loads, and 3) be certified that the standards of the ordinance are satisfied.
Oacoma	*(The community does not participate in the NFIP program)*				
Presho	460297	(NSFHA)	04/25/97	N/A	The City has been a part of the NFIP program since 1997, but it has not been mapped and therefore there are no floodplain regulations.
Reliance	*(The community does not participate in the NFIP program)*				

Other Capabilities

Other resources and capabilities exist within Lyman County to support the mitigation strategy, including administrative and technical resources, financial resources, and education and outreach efforts, as well as physical assets. These capabilities are summarized in the table on the following page and discussed in further detail below.

Table 4.3 – Other Local Capabilities to Support Hazard Mitigation

	Lyman County	Kennebec	Oacoma	Presho	Reliance
ADMINISTRATIVE & TECHNICAL					
Emergency management staff	X				
Planning & zoning staff			X		X
Engineering/Public works staff		X	X	X	
Floodplain management staff	X	X		X	
Code enforcement staff				X	
FINANCIAL					
Budgeting process	X	X	X	X	X
Levy/Project surcharge for specific purposes		X	X	X	
EDUCATION AND OUTREACH					
StormReady program	X				
Severe Weather Awareness Week	X				
Social media	X	X	X	X	
PHYSICAL ASSETS					
Relief shelter		X	X	X	X
Storm shelter	X	X			
Warning siren		X	X	X	X

Administrative and technical staff to support hazard mitigation in the county are limited. For instance, Lyman County has an emergency manager, but the position is only half time and there are no other emergency management staff to support the manager. Planning and engineering staff within the county are likewise limited.

The availability of financial resources is critical to the success of this plan. Since there are no specific local funding sources available to support hazard mitigation in Lyman County, the budgeting process is where the "rubber meets the road" if hazard mitigation is to be achieved. Therefore, the mitigation actions listed in **Table 4.5** should be considered when the jurisdictions begin developing their annual budgets. In this way, the plan will not become a mere wish list of ideas for which there is no practical funding mechanism. To help ensure this happens, the Emergency Management Director will continue reaching out to each community at least annually to discuss hazard mitigation, including the possibility of obtaining funds through FEMA or other sources for the projects they have identified.

Education and outreach to support hazard mitigation in Lyman County is limited, but efforts are being made. The Lyman County Emergency Management office participates in severe weather public awareness campaigns in conjunction with the State Office of Emergency Management and the National Weather Service and communicates regularly with local officials regarding severe weather awareness and training opportunities. Hazard mitigation

information is also available on the Lyman County Emergency Management webpage and on Facebook.

There are many physical assets in Lyman County that can help protect people prior to, during, or after a disaster event or other emergency situation. Outdoor sirens to warn people of impending severe weather are located in each community. Each siren is tested regularly and each has a backup source of power, but only some can be activated remotely. Public facilities that can serve as emergency shelter from a tornado or other severe weather include the basement of the courthouse in Kennebec. Facilities that can provide short-term relief following a disaster include the Kennebec elementary school gym, the Oacoma community center, the Lyman County high school gym in Presho, the Reliance Legion Hall, the Vivian fire hall, and the elementary school and community center in Lower Brule.

Despite limited resources, Lyman County and each of the jurisdictions participating in this plan can enhance their mitigation capabilities. A good way for the jurisdictions to expand their capabilities is through their partnership with the Planning & Development District III office. District III has decades of experience working on various planning and community development activities within Lyman County, and over a decade of experience working with the county's emergency management office. District III wrote Lyman County's current hazard mitigation plan, and its staff has helped develop applications to fund mitigation projects within the county. After funds have been awarded for a project, District III can help ensure that the project is completed satisfactorily and that all FEMA grant award conditions and requirements are followed.

Mitigation Goals and Objectives

For this plan update, there were no significant changes in community priorities, as the planning team decided to keep the goals and objectives listed in the current mitigation plan. This decision was based in part on the results of the survey, which identified the protection of critical facilities and the protection of utilities and infrastructure as the highest mitigation priorities. The team also wanted to ensure that the goals and objectives of this plan supported the priorities of the other local planning resources. The following goals were identified:

- Minimize loss of life and injuries from hazards.
- Reduce losses to critical facilities, utilities, and infrastructure from hazards.
- Reduce impacts to the economy and the environment from hazards.

After the team had settled on the goals, they turned their focus to each of the hazards facing the County. Following are the specific mitigation objectives identified for each of the hazards:

Winter storm

- Reduce property and infrastructure losses due to winter storms.

- Ensure that people are adequately protected from the effects of winter storms.
- Minimize disruptions to the power distribution system.

Summer storm

- Reduce property and infrastructure losses due to summer storms.
- Ensure that people are adequately protected from the effects of summer storms.
- Ensure that people have adequate warning when violent weather threatens.

Flooding

- Reduce property and infrastructure losses due to flooding.
- Minimize development in areas that are prone to flooding.
- Maintain the natural and man-made systems that protect people and property from floods.

Drought

- Reduce economic and environmental impacts due to drought.

Wildfire

- Reduce property, crop, and infrastructure losses due to wildfires.
- Minimize development in areas that are prone to wildfires.

Mitigation Action Plan

With the mitigation capabilities, goals, and objectives identified, the planning team began the process of selecting mitigation actions to accomplish the mitigation strategy. This followed up and built upon the earlier review of the progress being made to implement the actions listed in the county's current hazard mitigation plan. A list of the actions and a summary of the implementation status of each action is shown in the following table.

Table 4.4 – Progress on Implementing Previously Proposed Actions

Mitigation Action	Hazard	Current Status
LYMAN COUNTY		
Powerline burial.	Winter Storm	West Central Electric buries approximately 20 to 30 miles of powerline each year throughout their territory, which includes Lyman County. A total of 47 miles of powerline within Lyman County are planned to be buried within the next four years.
Improvements to various county roads.	Flooding	Some progress has been made, but more work is needed.
Remove vegetation from Medicine Creek to allow better flow.	Flooding	No progress – lack of funds.

Mitigation Action	Hazard	Current Status
Improve or move roads along White River.	Flooding	A half mile segment was moved in 2021, but more work is needed.
Fix slide area on County Road 6 southwest of Oacoma.	Landslide	Completed.
Purchase generator for courthouse.	Winter Storm	No progress – lack of funds.
Construct satellite fire station in Iona.	Wildfire	No progress, but no longer a priority.
TOWN OF KENNEBEC		
Remove vegetation from Medicine Creek to allow better flow.	Flooding	No progress – lack of funds.
Address drainage problems throughout town, including new culverts along Fulford Street.	Flooding	Some progress has been made, but more work is needed.
Upgrade warning siren.	Summer Storm	No progress – lack of funds.
Purchase generators for school and clinic.	Winter Storm	No progress – lack of funds.
Acquire snow removal equipment.	Winter Storm	No progress, but no longer a priority.
Purchase emergency radios for residents.	Multiple	No progress, but no longer a priority.
TOWN OF OACOMA		
Drainage study for the town.	Flooding	No progress – lack of funds.
Relocate water supply intakes.	Drought	The Town hired an engineering firm to assess the situation; the option recommended has an estimated cost of over $7 million.
Install additional culverts to improve drainage.	Flooding	No progress – lack of funds.
Purchase generator for community center.	Winter Storm	No progress – lack of funds.
Acquire warning siren for north side of town.	Summer Storm	Completed.
CITY OF PRESHO		
Generator for fire station.	Winter Storm	No progress – lack of funds.
Clean out Medicine Creek streambed within city limits.	Flooding	Progress has been made – some flooding still occurs, but the affected land is undeveloped greenspace.
Rubble site flood prevention.	Flooding	Completed.
Raise east end of airport runway to prevent flooding.	Flooding	No longer a priority, as airport location will be moving.
Water diversion away from lagoon.	Flooding	No progress – lack of funds.

The participants were encouraged to consider a broad range of mitigation actions, including measures designed to avoid, avert, or adapt to the hazards they face. To guide the jurisdictions in this process, a list of potential mitigation actions based on FEMA guidance was distributed to the team and they were reminded that they should focus on hazard mitigation as opposed to preparedness. The actions discussed and considered can be grouped into the following general categories:

- Plans and regulations: Government authorities, policies, or codes that influence building and development. Examples include:
  - Adopting zoning regulations.
  - Preserving open space.
  - Reviewing and strengthening local flood ordinances.

- Adopting stormwater management regulations.
- Adopting National Building Code standards.
- Enacting measures to restrict non-essential water usage.

- Structure and Infrastructure Projects: Modifying existing infrastructure to remove it from a hazard area or construction of new structures to reduce impacts of hazards. Examples include:
  - Upgrading stormwater infrastructure, such as culverts and storm sewer piping.
  - Replacing overhead utility lines with underground lines.
  - Building tornado safe rooms.

- Natural Systems Protection: Actions that minimize damage and losses and also preserve or restore the functions of natural systems. Examples include:
  - Using low-lying areas as natural water retention ponds.
  - Restoring and preserving wetlands and stream corridors.
  - Forest and vegetation management.
  - Providing incentives for xeriscaping.

- Education and Awareness Programs: Programs to educate the public and decision makers about hazard risks and community mitigation programs. Examples include:
  - Developing a hazard mitigation public awareness program.
  - Participating in the StormReady program.
  - Participating in the Firewise Communities program.
  - Making presentations to school groups or neighborhood organizations.
  - Mailings to residents in hazard-prone areas.
  - Encouraging people to conserve water during droughts.

The final list of mitigation actions identified by the jurisdictions is shown in **Table 4.5**. The table contains the following information for each action:

- The local priority rating.
- The project lead primarily responsible for implementing the action.
- The estimated time frame needed to accomplish the action. Short term actions are those that can be completed within a few years, while Long term actions may take several years or more to accomplish due to cost or other factors.
- The estimated cost to implement the action.
- Resources that may be available to help fund the action.
- Notes and details about the proposed action.

Prioritizing the actions is important because not all of them can be pursued simultaneously, especially when costly projects are considered. Actions providing the most benefit in terms of cost are likely to be pursued first, while some lower priority actions may never be

implemented. The prioritization process was informal and somewhat subjective, but a methodology based on the following criteria helped guide the process:

- Overall benefit - how many lives or how much property will be protected, and how much disruption will be prevented? Are there any critical facilities or important public infrastructure that will be protected?
- Financial feasibility - how expensive will the action be? Could the action qualify for grant or loan funding?
- Political feasibility – will the public support the action? Are there any groups or interests that may be opposed to the action and thus prevent it from being implemented?
- Technical feasibility – does the technology exist for the action to be implemented? Is the action likely to function as intended?
- Environmental feasibility - does the action have the potential to have an adverse impact on the environment?
- Legal feasibility – are there any legal issues that might prevent the action from being implemented?

Guesswork was kept to a minimum during the prioritization process. For instance, in determining the potential benefit of a given action, the amount of property that would be protected by the action could in some cases be estimated with a fair amount of certainty. Assessing the proposed actions in relation to the other criteria was sometimes more difficult. Determining the political feasibility of the actions may have been the most subjective part of the process, but the jurisdiction representatives generally had a good idea of how the public and vested interests would support the actions.

Financial considerations are critical, because neither Lyman County nor any of the other participating jurisdictions have much discretionary money available to fund mitigation activities. Given this reality, it is unlikely that any mitigation action requiring substantial financial resources could be implemented locally without grant assistance. Following are potential sources of outside funding to help the jurisdictions accomplish mitigation projects:

<u>FEMA grant programs</u>

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance (FMA)
- Public Assistance Section 406 funds

<u>Other grant and loan programs/sources</u>

- US Economic Development Administration
- US Department of Agriculture Rural Development grant/loan program
- US Bureau of Reclamation WaterSMART program
- South Dakota Community Development Block Grant program
- South Dakota State Homeland Security Program
- South Dakota Dept. of Agriculture and Natural Resources

- South Dakota Dept. of Transportation
- Natural Resource Conservation Service
- Western States Wildland Urban Interface Grant Program
- High Hazard Potential Dam Program

Table 4.5 - Proposed Mitigation Actions

LYMAN COUNTY ACTIONS	PRIORITY	PROJECT LEAD	TIME	COST	FUNDING	NOTES
Continue participation in the National Flood Insurance Program	HIGH	Director of Equalization	SHORT	N/A	N/A	The DOE will contact the South Dakota floodplain coordinator to learn more about the NFIP program.
Implement zoning in the County	HIGH	County commission	SHORT	N/A	N/A	The County commission is currently discussing this issue.
Implement traffic control procedures to keep drivers off local roads when Interstate 90 is closed	HIGH	County commission	MID	N/A	N/A	Some drivers detour off I-90 when it is shut down due to bad weather and then become stuck on local roads.
Improve drainage along county and township roads	HIGH	Highway Superintendent	LONG	Unknown	DOT; HMGP	County may pursue grant funding if a project appears to be grant eligible.
Improve roads in the vicinity of the White River	HIGH	Highway Superintendent	LONG	Unknown	DOT; Local funds	County may pursue grant funding.
Remove vegetation from Medicine Creek	MEDIUM	County commission	MID	Unknown	DANR; Local funds	This will allow better water flow and reduce the possibility of flooding.
Generator acquisition for the courthouse	MEDIUM	County commission	MID	≈$75,000	HMGP	County may pursue grant funding.
Continue and enhance prescribed burning plan with landowners to reduce the spread of cedar trees	MEDIUM	County commission	SHORT	Unknown	WUIGP	The rapid spread of cedar trees increases wildfire risk and reduces the productivity of grazing land.
Construct a tornado shelter in Vivian	MEDIUM	County commission	MID	Unknown	HMGP; Local funds	Primarily for the benefit of travelers along Interstate 90.
KENNEBEC ACTIONS	**PRIORITY**	**PROJECT LEAD**	**TIME**	**COST**	**FUNDING**	**NOTES**
Continue participation in the National Flood Insurance Program	HIGH	Finance Officer	SHORT	N/A	N/A	The finance officer will contact the South Dakota floodplain coordinator to learn more about the NFIP program.
Generator acquisition for school	HIGH	School superintendent	MID	≈$30,000	HMGP; Local funds	School district may pursue grant funding.
Remove vegetation from Medicine Creek	HIGH	City council	MID	≈$30,000	AFG; HMGP	Town intends to pursue grant funding.
Upgrade stormwater infrastructure	HIGH	Public Works Director	MID	Unknown	DANR; HMGP	Improvements are needed to help improve drainage.
Upgrade warning siren	HIGH	City council	MID	≈ $30,000	HMGP; Local funds	The Town will consider pursuing grant funding.

Construct a tornado shelter or retrofit an existing structure	MEDIUM	City council	MID	Unknown	HMGP	The Town may pursue grant funding for a standalone or multi-purpose structure.
Upgrade fire department capabilities	MEDIUM	Fire chief	MID	Unknown	AFG; Local funds	The Town may pursue grant funding for training, equipment upgrades, or vehicle purchase.
OACOMA ACTIONS	**PRIORITY**	**PROJECT LEAD**	**TIME**	**COST**	**FUNDING**	**NOTES**
Generator acquisition for community center	HIGH	City council	MID	≈$30,000	HMGP; Local funds	The Town may pursue grant funding.
Generator acquisition for sewage lift station	HIGH	Public Works Director	MID	≈$30,000	HMGP; DANR	The Town will be replacing the lift station and has been advised to acquire backup power for it. The Town may pursue grant funding.
Generator acquisition for water treatment plant	HIGH	Public Works Director	MID	≈$30,000	HMGP; DANR	The Town may pursue grant funding.
Conduct drainage study of the town	HIGH	City council	MID	≈ $75,000	DANR; HMGP	The Town may pursue grant funding.
Upgrade stormwater infrastructure	HIGH	Public Works Director	MID	Unknown	DANR; HMGP	Improvements are needed to help improve drainage.
Relocate water supply intakes	HIGH	Public Works Director	LONG	≈ $2 Mil	DANR	The Town may pursue grant funding.
Construct a tornado shelter	MEDIUM	City council	MID	Unknown	HMGP	Primarily for travelers along Interstate 90 and those staying at nearby campgrounds.
PRESHO ACTIONS	**PRIORITY**	**PROJECT LEAD**	**TIME**	**COST**	**FUNDING**	**NOTES**
Continue participation in the National Flood Insurance Program	HIGH	Finance Officer	SHORT	N/A	N/A	The finance officer will contact the South Dakota floodplain coordinator to learn more about the NFIP program.
Water diversion away from sewage lagoon	HIGH	Public Works Director	MID	Unknown	DANR	Stormwater runoff occasionally gets into the lagoon. The City may pursue grant funding.
Continue maintenance of water wells	HIGH	Public Works Director	SHORT	N/A	N/A	The wells were abandoned when the City switched to RWS.
Construct a tornado shelter or retrofit an existing structure	MEDIUM	City council	MID	Unknown	HMGP	The City may pursue grant funding.
Generator acquisition for fire station	MEDIUM	Fire chief	MID	Unknown	AFG; HMGP	The City may pursue grant funding.
RELIANCE ACTIONS	**PRIORITY**	**PROJECT LEAD**	**TIME**	**COST**	**FUNDING**	**NOTES**
Generator acquisition for Legion Hall	HIGH	City council	MID	≈$30,000	HMGP; Local funds	The Town may pursue grant funding.

Replace clay sewer lines	HIGH	Public Works Director	LONG	Unknown	DANR	This would help minimize groundwater infiltration into sewer system; the Town may pursue grant funding.
Construct a tornado shelter or retrofit an existing structure	MEDIUM	City council	MID	Unknown	HMGP	The Town may pursue grant funding.

Potential Resources for Funding Assistance:

AFG FEMA Assistance to Firefighters Grant Program
HMGP FEMA Hazard Mitigation Grant Program
WUIGP Wildland Urban Interface Grant Program
DANR South Dakota Dept of Agriculture and Natural Resources
DOT South Dakota Dept of Transportation

CHAPTER V
PLAN MAINTENANCE

Background

Plan maintenance is a continuous process that requires long-term commitment and focused effort. The process involves evaluating the plan's effectiveness at achieving its goals, updating the plan as needed to keep it current, and making sure it is integrated into other local planning mechanisms. These activities provide the foundation for an ongoing mitigation program and will ensure that the plan remains relevant and effective. This chapter addresses how Lyman County officials intend to implement the plan so that it remains a dynamic, useful tool for mitigating against the impacts of future hazard events.

Public Participation

The plan can be accessed on the Lyman County, Town of Kennebec, Town of Oacoma, and City of Presho websites, and a hard copy is available for review at the Lyman County courthouse and in each city office. Going forward, Lyman County and each of the participating jurisdictions will continue their efforts to make the public more informed about the plan. Outreach efforts will likely evolve over time as different methods are used to get greater public participation in the mitigation planning process. Activities may include any of the following:

- Meetings of the Lyman County Local Emergency Planning Committee.
- Press releases and social media posts.
- Surveys to get feedback from the public about mitigation priorities.
- Community visits by the Lyman County Emergency Management Director to discuss mitigation planning (local schools, civic meetings, etc.).

Any comments and suggestions received from the public through any of the forums described above will be included in the public outreach section of the plan.

Monitoring, Evaluating, and Updating the Plan

The Lyman County Emergency Management Director is ultimately responsible for implementing this plan. The director will work under the direction of the Lyman County Commission and with the support of the Lyman County Local Emergency Planning Committee (LEPC) to ensure that the plan's mitigation strategy is carried out, coordinating his/her

activities with other county departments or the other participating jurisdictions as needed. The jurisdictions also will play a critical role in carrying out the action plan by identifying and prioritizing the actions they want to pursue, allocating resources for their implementation, and applying for funding assistance as needed.

An important part of implementing the plan is plan monitoring and evaluation, which will be performed by the Lyman County Emergency Management Director with the support of the LEPC. The plan will be reviewed at least annually by the LEPC, and it may also be reviewed at other times as the need arises, such as following a significant hazard event or as federal funding for hazard mitigation becomes available.

Major points of discussion at the review meeting will include whether the risk assessment remains valid because of new development or other factors that may impact vulnerability to hazards, whether the mitigation goals and objectives identified in the plan remain sound, and whether progress has been made on implementing the mitigation actions identified in the plan. An opportunity also will be provided to add additional mitigation actions to the plan as needed. If any new projects are identified, the South Dakota Office of Emergency Management will be notified so that the project will be eligible for hazard mitigation assistance in the next funding cycle.

For the plan to remain effective, evaluation needs to be an ongoing process. This will help ensure that the plan remains relevant and able to meet local conditions and priorities, which can change. Following are factors that can have a major impact on mitigation planning:

- Occurrence of a significant disaster event – Serious events can reveal flaws in local jurisdictions' disaster preparedness plans. The 9/11 terrorist strikes are a dramatic example of this type of event.
- Change in the nature or magnitude of risks – Changing environmental conditions can be significant enough to make jurisdictions reevaluate their mitigation strategy. As previously discussed, climate change may increase the County's vulnerability to certain types of hazards.
- Changes in development – Population change and increased development in sensitive areas can impact risk.
- Change in local priorities – Local priorities regarding mitigation projects can change for a number of reasons. Regular meetings between the Lyman County commission and the local township boards are one way in which the county stays current on the townships' needs regarding their roads, bridges, and other infrastructure.
- Funding availability – The availability of money often determines whether an action can be implemented. For example, local budget cuts can delay, or prevent altogether, a mitigation project's implementation. On the other hand, grant opportunities for specific types of mitigation projects may argue for their implementation.
- Other factors – Many other factors can have an impact on hazard mitigation efforts. Political realities, including changes in local leadership, can influence local

mitigation strategies. Changes in laws and regulatory requirements may make certain mitigation actions more or less feasible or desirable. Advances in technology may make it possible in the future to address certain types of hazards more effectively or at lower cost.

Future updates to this plan may occur at any time in response to a change in any of the factors identified above. However, barring a significant change in any of these factors, Lyman County will begin the process of updating this plan approximately two years prior to the plan's expiration date. Led by the Emergency Management Director, the process will consist of the following general steps:

- Apply for funding assistance to update the plan
- Funding assistance obtained
- Hire contractor to write the plan
- Organize planning team
- Begin soliciting public participation and input
- Hold meetings of planning team to develop the plan
- Make draft of the plan available for public review and comment
- Submit plan for State review
- Revise plan as needed based on reviewer comments
- Plan submitted by State to FEMA
- Revise plan as needed based on reviewer comments
- Jurisdictional adoption of approved plan

Plan Integration

The Lyman County Hazard Mitigation Plan is the backbone for hazard mitigation planning within the county, but to remain useful the plan cannot exist in a vacuum. It is designed to work with the planning mechanisms and development regulations that exist within the county, and local officials and policy makers should therefore be familiar with this plan. Neither this plan nor any of the others will work effectively if they contain contrary goals or policy recommendations.

Lyman County and each of the participating jurisdictions will integrate relevant information and strategies from this plan into their planning mechanisms and development regulations. The process of integrating the plan will look different in each of the communities, but there are some commonalities. For instance, each jurisdiction prepares an annual budget. Those communities that are interested in seeking funds for hazard mitigation projects will be able to utilize knowledge gained during the development of this plan, including FEMA grant deadlines and the grant eligibility of specific types of mitigation projects, as they develop their budgets.

Following are the local planning mechanisms into which information from this plan will be integrated. A summary of the process by which integration is expected to occur is provided.

- Lyman County Comprehensive Plan and Zoning Ordinance – if the County does decide to implement zoning, the Planning & Development District III office will work with the Lyman County planning commission to develop a comprehensive plan and then the ordinance. The comprehensive plan will include a section on environmental constraints within the county, into which relevant information acquired through the development of this plan will be integrated. This process will also inform the zoning ordinance, which will be based on the comprehensive plan. For example, if this plan identifies certain areas as unsuitable for development due to environmental hazards, this should be reflected in the zoning ordinance.
- Lyman County Highway Plan – the highway plan is developed by the Lyman County Highway Superintendent. It includes a table of significant county road projects scheduled to occur for the next five years. The South Dakota Dept of Transportation requires that the highway plan be updated annually and approved by the county commission. The highway superintendent will be able to utilize information learned during the development of this plan to identify and plan for road projects that may be eligible for FEMA funding, such as those that involve drainage improvements to mitigate flooding.
- Kennebec Floodplain Management Regulations - the Kennebec floodplain coordinator will review the floodplain management regulations annually or as needed after a significant flood event. This review process will help ensure the regulations do not conflict with anything in this plan regarding development in areas at risk of flooding.
- Oacoma Comprehensive Plan and Zoning Ordinance – the Planning & Development District III office developed the comprehensive plan and zoning ordinance working with the town planning board. The Town and District III will integrate relevant information acquired through the development of this plan into the environmental constraints section of the comprehensive plan when it is next updated. The zoning ordinance will also be modified if needed. For example, if this plan identifies certain areas as unsuitable for development due to environmental hazards, this should be reflected in the zoning ordinance. The Town of Oacoma has contacted the District III office to begin updating the comprehensive plan and zoning ordinance.
- Reliance Comprehensive Plan and Zoning Ordinance – the Planning & Development District III office developed the comprehensive plan and zoning ordinance working with the town planning board. The Town and District III will integrate relevant information acquired through the development of this plan into the environmental constraints section of the comprehensive plan when it is next updated. The zoning ordinance will also be modified if needed. For example, if this plan identifies certain areas as unsuitable for development due to environmental hazards, this should be reflected in the zoning ordinance. The Town of Reliance has contacted the District III office to begin updating the comprehensive plan and zoning ordinance.

It must be acknowledged that little progress has been made to integrate Lyman County's current mitigation plan into other local planning mechanisms, other than the inclusion of some aspects of the plan into the Comprehensive Economic Development Strategy (CEDS) for the Planning & Development District III region, which includes Lyman County. To improve this situation, each community should continue to participate in future updates to this plan. This will continue to expose them to the basic concepts of hazard mitigation, which may be the only practical way for some of the jurisdictions to expand their capabilities. An important part in this process will be played by the Lyman County Emergency Management Director, who will continue to reach out to each community at least annually to review their hazard mitigation needs and priorities.

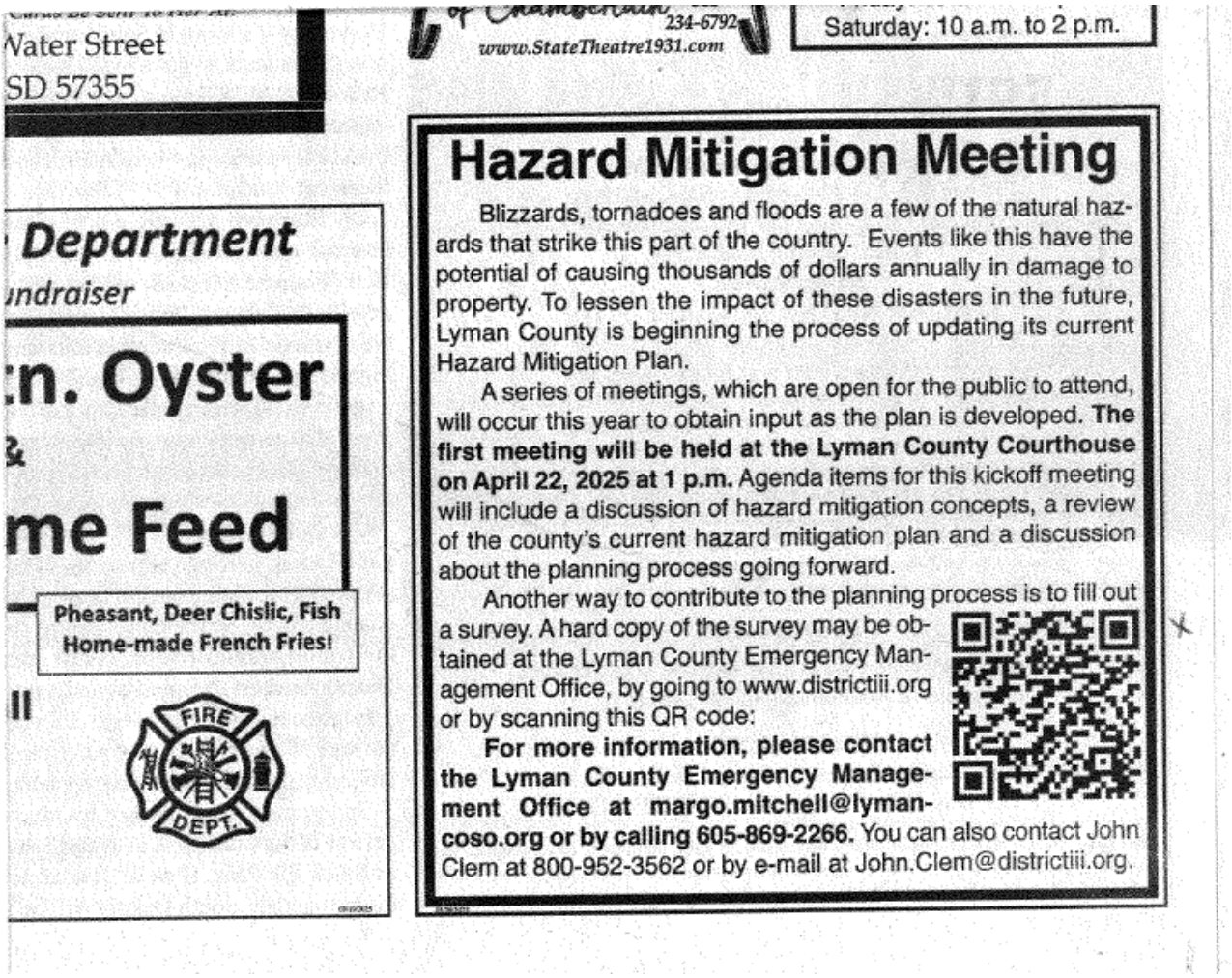
APPENDICES

Appendix A	Outreach Effort
Appendix B	Documentation of Meetings
Appendix C	History of Previous Hazard Occurrences
Appendix D	References

APPENDIX A: Outreach Effort

A major effort was made to solicit input into this plan. Outreach included press releases that were printed in the Chamberlain *Central Dakota Times*, information posted on community websites and social media, and surveys that were made available to the public. This section documents the outreach effort.

Press Release in Chamberlain *Central Dakota Times* Prior to First Meeting:



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Hazard Mitigation Meeting

Blizzards, tornadoes and floods are a few of the natural hazards that strike this part of the country. Events like this have the potential of causing thousands of dollars annually in damage to property. To lessen the impact of these disasters in the future, Lyman County is beginning the process of updating its current Hazard Mitigation Plan.

A series of meetings, which are open for the public to attend, will occur this year to obtain input as the plan is developed. **The first meeting will be held at the Lyman County Courthouse on April 22, 2025 at 1 p.m.** Agenda items for this kickoff meeting will include a discussion of hazard mitigation concepts, a review of the county's current hazard mitigation plan and a discussion about the planning process going forward.

Another way to contribute to the planning process is to fill out a survey. A hard copy of the survey may be obtained at the Lyman County Emergency Management Office, by going to www.districtiii.org or by scanning this QR code:

For more information, please contact the Lyman County Emergency Management Office at margo.mitchell@lymancoso.org or by calling 605-869-2266. You can also contact John Clem at 800-952-3562 or by e-mail at John.Clem@districtiii.org.

Press Release in Chamberlain *Central Dakota Times* Before Final Meeting:

Survey Poster

PUBLIC PARTICIPATION NEEDED!

LYMAN COUNTY

HAZARD MITIGATION PLAN PUBLIC SURVEY

The Lyman County Office of Emergency Management is in the process of updating the County's Hazard Mitigation Plan. Hazard mitigation planning helps local leaders better understand risks from natural hazards, promoting the development of long-term strategies to reduce the effects of disaster-related events and their negative impact on people, property, and environment. Lyman County is seeking feedback from stakeholders and the public to incorporate into the plan.

WHAT IS A HAZARD MITIGATION PLAN & WHY IS IT IMPORTANT?

A hazard mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, such as flooding, severe summer and winter weather, drought, and wildfires. The plan serves as a guide for local decision makers as they commit resources to reducing the effects of natural hazards, and it creates a framework for Lyman County to reduce negative impacts from future disasters on lives, property, and the local economy. Efficient hazard mitigation planning can significantly reduce the physical, financial, and emotional losses caused by natural disasters.

TAKE THE SURVEY

www.districtiii.org

PUBLIC PARTICIPATION IN HAZARD MITIGATION PLANNING

Public participation in the Lyman County Hazard Mitigation Plan is an opportunity for county residents to evaluate a variety of potential hazards affecting the county and it is important to the overall success of the plan. Once approved, the plan will make Lyman County and the participating municipalities eligible to apply for FEMA hazard mitigation funding.

PHONE: (605) 869-2266
EMAIL: MARGO.MITCHELL@LYMANCOSO.ORG

Survey Form with Responses

APPENDIX B: Documentation of Meetings

This appendix includes the following items:

- Signup sheets from the planning team meetings.
- Minutes from each of the participating jurisdictions' meetings as they discussed the mitigation actions they wanted to include in the plan.

SIGNUP SHEET – FIRST MEETING:

Lyman County Hazard Mitigation Planning Meeting

April 22, 2025

NAME	REPRESENTING & Mileage
Shane Neiderwerder	West Central Electric co-op 10
Beau Johnson	County commissioner 15
Lawrence Thompson	County Commissioner 30
Kalli Houchin	County Auditor —
Ryan Huffman	County commission 21
Gary Dominiack	Oacoma 26
Bryan Mahot	Oacoma 26
Margo Mitchell	Lyman EM 0
Brent Holstad	SDOEM 240
Stacie Gran	DOE 0
Walter Magel	Any Super. 0
Jaica Kenzy-Adamson	Oacoma 26
Timothy Feliciano	County Commissioner 28
Shannon Viereck	District III
Eric Ambrosson	District III
John Clem	District III

SIGNUP SHEET – SECOND MEETING:

Lyman County Hazard Mitigation Planning Meeting

May 27, 2025

NAME	REPRESENTING & Mileage
Kelli Houchin	Lyman Aud ø
Ryan Huffman	Lyman County Commission 21
Beau Johnson	Lyman County Commission 18
Lawrence Thompson	Lyman Co Commission 32
Timothy Feliciano	Lyman Co Commissioner 35
Zane Reis	Lyman Co Commission 30
Stacey Gran	DOE
Charlie Gran	Kennebec
Ruth Herman	Reliance – 15
Shelly Long	Kennebec - 9
Melissa Stalker	Presho - 9
Walter Mayo	Lyman County
Johnathan Uthe	City of Presho 9miles
Cody Uthe	City of Presho 9miles
[illegible]	Kennebec 11mi.
[illegible] eps	Kennebec 15mi.
Angela Elvers	Presho 20miles
Kit Talich	WCEC 42 miles
Gary Dominack	Odessa 25 mi.
Margo Mitchell	Lyman EM
Shannon Viereck	District III
[illegible]	Planning District III

SIGNUP SHEET – THIRD MEETING:

LYMAN COUNTY MINUTES

KENNEBEC MINUTES

OACOMA MINUTES

PRESHO MINUTES

APPENDIX C: History of Previous Hazard Occurrences

This appendix provides details about hazard events that have impacted Lyman County in the past. **Table C.1** below lists all the events since 1970 that resulted in a major disaster declaration in which Lyman County was part of the designated area.

Table C.1 – Major Disaster Declarations Affecting Lyman County

Dec #	Declaration Date	Type	Primary Damage Impact
3015	Jun 1976	Drought	
764	May 1986	Severe Storms, Flooding	
1045	Mar 1995	Severe Winter Storm	
1052	May 1995	Flooding	
1156	Feb 1997	Severe Winter Storm	
1173	Apr 1997	Severe Flooding	
1774	Jul 2008	Severe Storms, Flooding	Roads and bridges
1886	Mar 2010	Severe Winter Storm	Emergency Protection
1915	May 2010	Flooding	Roads and bridges
1984	May 2011	Flooding	Roads
4233	Jul 2015	Severe Storms, Tornadoes	Utilities
4440	Jun 2019	Severe Winter Storm	Roads and bridges
4463	Sep 2019	Severe Storms, Flooding	Roads and bridges
4467	Oct 2019	Severe Storms, Tornadoes, Flooding	Roads and bridges

Sources: www.fema.gov/disasters/grid/state-tribal-government/72; www.fema.gov/data-feeds/openfema-dataset-public-assistance-funded-projects-summaries-v1

Table C.2 is a list of the most significant hazard events reported for Lyman County from 1960 through 2024, as recorded in the National Climatic Data Center's Storm Events Database. The National Climatic Data Center receives storm data from the National Weather Service, which gets its information from a variety of sources, including county, state and federal emergency management officials, local law enforcement officials, National Weather Service damage surveys, the insurance industry, and the general public.

The Storm Events Database is useful, but it does have limitations. One problem is that records for certain hazard events, including winter storms and blizzards, only go back to the 1990s. Another issue is that damage amounts in some cases are estimates and for certain types of events, such as winter storms, the data is tracked by forecast zone and thus does not lend itself to analysis at the county level. The database also contains a preponderance of records from the last few decades. This is due to an inconsistency in data reporting over the years and does not indicate an increase in the frequency of events affecting the county.

The table includes the following information about the events:

- Type of event.

- Descriptive information - details are provided for some of the more noteworthy events back to the 1990s.
- Magnitude - the magnitude of tornadoes, hail, thunderstorm winds, and high wind events is given. For events occurring since 2000 the speed is represented by either the highest measured wind gust (M) or the highest estimated wind gust (E). Note that speeds are shown in knots - multiply figure by 1.15 to get approximate speed in miles per hour.
- Property and crop damage - the National Weather Service uses all available data from the sources identified above in compiling the damage amounts, but the figures should be considered as broad estimates. In many cases, damage amounts are unknown.

Table C.2 – History of Significant Hazard Events in Lyman County CURRENT

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
6/26/1960	Tornado		F1	3	
7/25/1960	Tornado		F2	25	
6/21/1962	Tornado		F1		
9/3/1963	Hail		3.00 in.		
7/21/1967	Hail		1.75 in.		
5/25/1969	Hail		1.75 in.		
7/10/1969	Tornado		F1		
5/30/1970	Hail		1.75 in.		
6/4/1971	Tornado		F2		
6/6/1971	Tornado		F0		
7/9/1971	Hail		2.75 in.		
7/9/1971	Tornado		F3		
7/9/1971	Tornado		F3		
7/30/1972	Tornado		F0		
7/1/1973	Hail		1.00 in.		
5/19/1974	Thunderstorm Wind				
5/20/1974	Hail		4.50 in.		
7/2/1974	Thunderstorm Wind		52 kts.		
6/19/1975	Hail		1.75 in.		
4/13/1976	Thunderstorm Wind		61 kts.		
5/18/1977	Thunderstorm Wind		71 kts.		
9/8/1977	Thunderstorm Wind				
7/9/1979	Hail		1.00 in.		
7/14/1979	Thunderstorm Wind				
6/26/1980	Thunderstorm Wind		52 kts.		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
7/3/1980	Thunderstorm Wind		65 kts.		
8/13/1980	Thunderstorm Wind		52 kts.		
8/20/1980	Thunderstorm Wind				
6/23/1981	Hail		1.00 in.		
7/20/1982	Tornado		F0		
7/20/1982	Tornado		F0		
7/20/1982	Tornado		F0		
7/20/1982	Tornado		F0		
8/23/1982	Thunderstorm Wind				
7/18/1983	Thunderstorm Wind		65 kts.		
8/18/1983	Thunderstorm Wind		56 kts.		
8/26/1983	Thunderstorm Wind		54 kts.		
7/25/1984	Thunderstorm Wind		70 kts.		
5/28/1985	Hail		1.00 in.		
5/28/1985	Tornado		F0		
7/16/1985	Hail		1.75 in.		
7/16/1985	Thunderstorm Wind		62 kts.		
7/17/1985	Thunderstorm Wind		69 kts.		
9/2/1985	Thunderstorm Wind		52 kts.		
5/8/1986	Tornado		F0		
6/6/1986	Thunderstorm Wind		56 kts.		
8/6/1986	Hail		2.50 in.		
8/6/1986	Thunderstorm Wind				
7/6/1987	Tornado		F0		
7/6/1987	Tornado		F0		
7/6/1987	Tornado		F0		
7/6/1987	Tornado		F0		
7/6/1987	Tornado		F0		
7/6/1987	Tornado		F0		
7/6/1987	Tornado		F0		
7/6/1987	Tornado		F1		
7/6/1987	Tornado		F1	3	
7/9/1987	Tornado		F1	3	
7/20/1987	Hail		1.50 in.		
8/2/1987	Thunderstorm Wind		54 kts.		
8/5/1987	Tornado		F0		
8/5/1987	Tornado		F0		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
8/5/1987	Tornado		F0		
8/5/1987	Tornado		F1		
8/5/1987	Tornado		F2	250	
5/25/1988	Hail		1.75 in.		
6/12/1988	Thunderstorm Wind				
6/11/1990	Thunderstorm Wind		52 kts.		
6/16/1990	Hail		1.75 in.		
8/2/1991	Hail		1.00 in.		
6/16/1992	Thunderstorm Wind		61 kts.		
6/4/1994	Thunderstorm Wind	Winds destroyed a tin shed and overturned a camper, injuring an occupant. Numerous tree branches were broken.	61 kts.	50	
1/17/1996	Blizzard				
1/24/1996	Heavy Snow				
1/28/1996	Extreme Cold				
2/1/1996	Extreme cold				
2/10/1996	High Wind		57 kts.		
2/26/1996	Heavy Snow				
3/24/1996	Blizzard				
4/17/1996	Thunderstorm Wind		52 kts.		
4/24/1996	High Wind		70 kts.		
4/25/1996	High Wind		60 kts.		
5/18/1996	Hail		1.75 in.		
7/5/1996	Hail		1.00 in.		
7/7/1996	Hail		1.00 in.		
7/7/1996	Thunderstorm Wind		52 kts.		
7/20/1996	Thunderstorm Wind		61 kts.		
8/1/1996	Hail		1.75 in.		
10/29/1996	High Wind		58 kts.		
11/16/1996	Heavy Snow				
11/19/1996	Winter Storm				
12/14/1996	Heavy Snow				
12/16/1996	Blizzard				
1/3/1997	Winter Storm				
1/9/1997	Blizzard				
1/15/1997	Blizzard				
2/3/1997	Winter Storm				
3/21/1997	Flood				

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
4/1/1997	Flood				
4/4/1997	Blizzard				
5/1/1997	Flood				
6/3/1997	Flood				
6/20/1997	Hail		2.75 in.		
6/20/1997	Thunderstorm Wind	Several supercell thunderstorms moved southeast along a strong warm front across southern Stanley, Jones, Hughes, Lyman, and Buffalo counties. Hail up to the size of baseballs and winds gusting to 80mph damaged and destroyed thousands of acres of crops, and caused substantial property damage. The most extensive damage occurred in the areas of Draper, Vivian, Presho, and Kennebec where there was a 20 mile long and 4 mile wide path of destruction.	70 kts.		
11/2/1997	High Wind		50 kts.		
3/6/1998	Heavy Snow				
7/2/1998	Hail		1.75 in.		
11/9/1998	Blizzard				
5/6/1999	High Wind		50 kts.		
5/9/1999	Hail		1.50 in.		
5/9/1999	Thunderstorm Wind		56 kts.		
5/9/1999	Tornado		F0		
5/9/1999	Flash Flood				
6/7/1999	Hail		1.50 in.		
7/18/1999	Hail		1.25 in.		
7/18/1999	Thunderstorm Wind		53 kts.		
2/19/2000	Wildfire	Due to extremely dry and windy conditions, a fire burned about 40 square miles of grassland between Kennebec and Lower Brule. The fire threatened a ranch but changed directions before anyone had to be evacuated.			
4/5/2000	High Wind		55 kts. M		
4/19/2000	High Wind		56 kts. M		
6/14/2000	High Wind		56 kts. M		
7/9/2000	Hail		1.75 in.		
9/3/2000	Hail		1.75 in.		
11/7/2000	Blizzard				
11/11/2000	Winter Storm				
12/10/2000	Heavy Snow				
12/16/2000	Blizzard				
12/28/2000	High Wind		51 kts. M		
1/29/2001	Winter Storm				
2/7/2001	Winter Storm				
2/24/2001	Winter Storm				

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
4/22/2001	Winter Storm				
6/9/2001	Thunderstorm Wind		52 kts. E		
6/18/2001	Hail		1.25 in.		
11/26/2001	Winter Storm				
2/11/2002	High Wind		53 kts. M		
3/14/2002	Winter Storm				
4/23/2002	High Wind		50 kts. M		
6/1/2002	Drought				
6/20/2002	Hail		2.00 in.		
6/24/2002	Thunderstorm Wind		61 kts. E		
7/7/2002	Thunderstorm Wind		52 kts. E		
7/24/2002	Hail		1.75 in.		
7/24/2002	Thunderstorm Wind		52 kts. E		
7/24/2002	Tornado		F0		
7/26/2002	Thunderstorm Wind		52 kts. E		
8/11/2002	Hail		1.75 in.		
8/21/2002	Hail		1.75 in.		
11/29/2002	High Wind		50 kts. E		
1/15/2003	Heavy Snow				
6/9/2003	Hail		1.75 in.		
6/11/2003	Hail		4.50 in.		
6/11/2003	Thunderstorm Wind		78 kts. MG		
6/11/2003	Tornado		F0		
6/11/2003	Tornado		F0		
6/11/2003	Tornado		F0		
6/11/2003	Flash Flood				
6/24/2003	Thunderstorm Wind		61 kts. EG		
7/1/2003	Hail		1.75 in.		
7/1/2003	Flash Flood				
7/4/2003	Thunderstorm Wind		52 kts. EG		
7/5/2003	Thunderstorm Wind		52 kts. EG		
7/8/2003	Thunderstorm Wind		52 kts. EG		
11/3/2003	Heavy Snow				
11/12/2003	High Wind		50 kts. EG		
11/22/2003	Heavy Snow				
2/29/2004	Heavy Snow				
3/1/2004	Heavy Snow				

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
3/10/2004	High Wind		51 kts. MG		
5/11/2004	Thunderstorm Wind		51 kts. MG		
7/10/2004	Thunderstorm Wind		52 kts. EG		
7/27/2004	Thunderstorm Wind		52 kts. EG		
8/1/2004	Hail		1.25 in.		
8/1/2004	Thunderstorm Wind		52 kts. EG		
8/7/2004	Thunderstorm Wind		53 kts. MG		
8/15/2004	Thunderstorm Wind		52 kts. EG		
8/30/2004	Hail		1.00 in.		
10/29/2004	High Wind		50 kts. MG		
1/4/2005	Heavy Snow				
3/10/2005	High Wind		58 kts. MG		
5/13/2005	Flood				
5/17/2005	Thunderstorm Wind		52 kts. EG		
6/7/2005	Thunderstorm Wind		59 kts. MG		
11/8/2005	High Wind		57 kts. MG		
11/27/2005	Blizzard	Snow began across most of central and north central South Dakota in the late afternoon and early evening hours of the 27th with significant snowfall accumulations occurring by the time the snow ended later in the day on the 28th. Strong northwest winds with gusts to 70 mph caused widespread blizzard conditions. Many roads, including Interstate-90, were closed due to the treacherous travel conditions, and several accidents were reported. Snowfall amounts included 11 inches near Presho and 21 inches at Kennebec.			
3/12/2006	Winter Storm				
3/20/2006	Winter Storm				
5/28/2006	Thunderstorm Wind		67 kts. MG		
6/1/2006	Drought				
6/14/2006	Thunderstorm Wind		61 kts. EG		
7/1/2006	Drought				
7/15/2006	Extreme heat	A record high of 112 degrees was set at Kennebec.			
7/28/2006	Extreme heat				
8/1/2006	Drought				
8/4/2006	Hail		1.25 in.		
8/9/2006	Hail		1.75 in.		
8/9/2006	Thunderstorm Wind		61 kts. EG		
8/20/2006	Hail		1.75 in.		
9/1/2006	Drought				
10/1/2006	Drought				

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
11/1/2006	Drought				
12/1/2006	Drought				
12/29/2006	Heavy Snow				
1/1/2007	Drought				
1/8/2007	High Wind		50 kts. EG		
2/1/2007	Drought				
2/24/2007	Winter Storm				
3/2/2007	Blizzard				
4/3/2007	Extreme cold				
6/6/2007	Thunderstorm Wind		52 kts. MG		
6/12/2007	Flash Flood				
7/17/2007	Thunderstorm Wind		52 kts. EG		
7/27/2007	Wildfire	A grassland fire 5 miles east and 2 miles south of Presho burned nearly 100 acres of hay and prairie grass.			
8/6/2007	Hail		1.00 in.		
8/6/2007	Thunderstorm Wind		61 kts. EG		
1/29/2008	Extreme cold				
4/10/2008	Blizzard				
7/16/2008	Hail		2.75 in.		
7/16/2008	Thunderstorm Wind		52 kts. EG		
7/28/2008	Hail		1.75 in.		
7/30/2008	Hail		2.00 in.		
8/4/2008	High Wind		50 kts. MG		
8/13/2008	Hail		1.50 in.		
10/26/2008	High Wind		56 kts. MG		
11/6/2008	Blizzard				
12/13/2008	Blizzard				
12/14/2008	Extreme cold				
12/21/2008	Extreme cold				
2/11/2009	Flood	The White River rose above flood stage of 15 feet near Oacoma on February 11th. The river crested at 17.6 feet on February 13th before it fell below flood stage on the 15th.		5	
2/25/2009	Winter Storm				
2/27/2009	Heavy Snow				
3/30/2009	Blizzard				
4/4/2009	Winter Storm				
6/23/2009	Thunderstorm Wind		56 kts. MG		
6/26/2009	Thunderstorm Wind		56 kts. MG		
8/3/2009	Hail		1.75 in.		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
8/3/2009	Thunderstorm Wind		54 kts. MG		
8/12/2009	Hail		1.50 in.		
12/23/2009	Blizzard				
1/6/2010	Blizzard				
1/7/2010	Extreme cold				
1/22/2010	Winter Storm				
3/8/2010	Flood				
4/13/2010	High Wind		58 kts. MG		
5/24/2010	Hail		1.00 in.		
5/24/2010	Thunderstorm Wind		52 kts. EG		
6/22/2010	Thunderstorm Wind		70 kts. EG		
7/3/2010	Thunderstorm Wind		70 kts. EG		
7/6/2010	Hail		1.25 in.		
7/10/2010	Hail		1.00 in.		
7/10/2010	Flash Flood				
7/21/2010	Thunderstorm Wind		52 kts. EG		
7/23/2010	Hail	During the late afternoon and early evening hours, thunderstorms developed over portions of central South Dakota, severa of which quickly became severe. In particular, one very strong supercell thunderstorm moved southeastward across portions of Stanley, Jones, and Lyman counties. One of the hardest hit locations was the community of Vivian, where extremely large hail, destructive winds, and a brief tornado were reported. A record setting hailstone was ultimately discovered in Vivian, measuring 8.0 inches in diameter, 18.625 inches in circumference, and weighing 1.9375 pounds.	8.00 in.		
7/23/2010	Thunderstorm Wind		63 kts. MG		
7/23/2010	Tornado		EF0		
8/3/2010	Thunderstorm Wind		54 kts. MG		
9/14/2010	Hail		1.75 in.		
9/22/2010	Hail		1.00 in.		
10/26/2010	High Wind		54 kts. MG		
12/30/2010	Blizzard				
1/1/2011	Blizzard				
2/2/2011	Extreme cold				
2/16/2011	Flood	The White River fluctuated above and below flood stage for several days causing minor flooding to occur. The river gage southwest of Oacoma along Highway 47 crested at 21.4 feet or 6.4 feet above flood stage. Flooding of agricultural land occurred.			
2/20/2011	Blizzard				
3/2/2011	Flood	Minor flooding occurred along the White River. The river gauge southwest of Oacoma along Highway 47 crested at 16.9 feet or			

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
		1.9 feet above flood stage. Flooding of agricultural land occurred.			
4/14/2011	Winter Storm				
5/8/2011	Hail		1.75 in.		
5/8/2011	Thunderstorm Wind		70 kts. EG		
5/8/2011	Tornado		EF0		
6/6/2011	Thunderstorm Wind		61 kts. EG		
6/12/2011	Flood	Record snow melt along with much above normal May and June precipitation in the upper Missouri River basin resulted in record high releases on the Oahe Dam upstream. Due to the high releases, the Missouri River at Oacoma and Chamberlain rose to above the flood stage of 65 feet on June 12th, reaching a record of 74.6 feet on June 30th. Many people along the river, especially in Oacoma, had to build levees to hold back the rising water, and some locations were flooded. The flooding continued into July.			
6/20/2011	Flash Flood	Heavy rainfall of 5 to 7 inches brought flash flooding to eastern Lyman county. Many roads were flooded with some washed out. Two women died in two separate vehicles after driving into a washed out portion of a road. The accidents happened 9 miles north of Reliance on BIA 10 just north of the intersection with Highway 47.			
6/22/2011	Flood				
6/30/2011	Thunderstorm Wind		58 kts. MG		
7/1/2011	Flood				
7/9/2011	Hail		1.75 in.		
7/15/2011	Extreme heat				
7/21/2011	Thunderstorm Wind		61 kts. EG		
7/27/2011	Thunderstorm Wind		61 kts. EG		
8/1/2011	Flood				
8/2/2011	Thunderstorm Wind		52 kts. MG		
8/11/2011	Thunderstorm Wind	80 mph winds downed several grain bins, and knocked a few semis off of Interstate 90. The winds also downed some power lines and poles.	78 kts. EG		
9/20/2011	High Wind		54 kts. MG		
10/7/2011	High Wind		51 kts. MG		
2/28/2012	Blizzard				
4/15/2012	High Wind		67 kts. MG		
5/5/2012	Hail		1.50 in.		
5/10/2012	High Wind		55 kts. MG		
6/7/2012	Thunderstorm Wind		50 kts. MG		
6/13/2012	Hail		1.75 in.		
7/17/2012	Hail		1.00 in.		
7/19/2012	Thunderstorm Wind		52 kts. EG		
7/20/2012	Hail		1.00 in.		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
7/20/2012	Thunderstorm Wind		52 kts. EG		
7/24/2012	Drought	A persistent upper level ridge of high pressure over the central U.S. allowed hot and dry air to hold its grip across the region. By July, severe drought conditions had expanded northward into South Dakota. Crops began to show stress, and cattle sell-offs occurred across the region. Range and pasture conditions were poor to very poor, with fire danger remaining a big issue. The severe drought continued into August.			
8/1/2012	Thunderstorm Wind		59 kts. MG		
8/1/2012	Drought	Drought was generally listed as severe to extreme for the area, and was being compared to the worst of the dust bowl years, though not yet over as long a time period. Stress on crops continued, even though August was less hot than July. Crop damage was quite evident. Many local governments had water use restrictions in place.			
9/1/2012	Drought	Drought conditions continued over all of southeast South Dakota. Rainfall for the month varied from around half to less than a quarter of normal. Stress on crops that prevailed over the growing season became even more evident with the start of harvest. Local governments continued to use water use restrictions in an effort to prevent serious water supply problems.			
10/1/2012	Drought				
10/17/2012	High Wind		67 kts. MG		
10/18/2012	High Wind		61 kts. MG		
11/1/2012	Drought				
12/1/2012	Drought	Drought conditions continued over all of southeast South Dakota in December. The effects of the drought on farmers and ranchers continued. Hunting was also affected, with low pheasant numbers, and disease in the deer population.			
12/9/2012	Blizzard				
1/1/2013	Drought				
2/1/2013	Drought				
2/10/2013	Blizzard				
3/1/2013	Drought				
4/1/2013	Drought				
4/8/2013	Winter Storm	14 inches of snow was recorded at Kennebec.			
5/1/2013	Drought				
5/27/2013	Hail		1.75 in.		
5/27/2013	Thunderstorm Wind		75 kts. EG		
6/12/2013	Thunderstorm Wind		50 kts. MG		
6/21/2013	Thunderstorm Wind		65 kts. MG		
6/22/2013	Thunderstorm Wind		56 kts. MG		
7/7/2013	Thunderstorm Wind		53 kts. MG		
7/20/2013	Thunderstorm Wind		58 kts. MG		
8/7/2013	Hail		1.25 in.		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
8/7/2013	Thunderstorm Wind		52 kts. EG		
12/3/2013	Winter Storm				
12/7/2013	Extreme cold				
1/5/2014	Extreme cold				
1/16/2014	High Wind		53 kts. MG		
1/20/2014	High Wind		52 kts. MG		
1/26/2014	High Wind		61 kts. MG		
3/31/2014	Blizzard				
4/28/2014	Flood	Heavy rains of 3 to 4 inches fell across parts of southern Lyman County, resulting in the flooding of several roads between Interstate 90 and the White River south of Kennebec. No travel was advised on a road two miles south of Kennebec.			
6/16/2014	Hail		1.00 in.		
6/21/2014	Thunderstorm Wind		61 kts. EG		
3/3/2015	Blizzard				
3/29/2015	High Wind		51 kts. MG		
5/28/2015	Hail		1.00 in.		
6/9/2015	Thunderstorm Wind		52 kts. EG		
6/19/2015	Thunderstorm Wind		90 kts. MG		
6/20/2015	Thunderstorm Wind	100 mph winds or higher caused severe damage to several buildings in Lower Brule and downed many trees. The roof of the courthouse sustained damage, and light poles at the football field were bent over. The Red Cross set up shelter for displaced people.	87 kts. EG		
6/22/2015	Thunderstorm Wind		61 kts. EG		
7/2/2015	Thunderstorm Wind		70 kts. EG		
7/12/2015	Thunderstorm Wind		50 kts. MG		
7/25/2015	Thunderstorm Wind		52 kts. EG		
7/27/2015	Thunderstorm Wind		52 kts. EG		
8/22/2015	High Wind		51 kts. MG		
9/7/2015	Hail		1.00 in.		
9/7/2015	Thunderstorm Wind		63 kts. MG		
9/16/2015	Thunderstorm Wind		52 kts. MG		
10/11/2015	High Wind		63 kts. MG		
11/18/2015	High Wind		62 kts. MG		
11/30/2015	Heavy Snow				
12/1/2015	Heavy Snow				
12/15/2015	Winter Storm				
12/25/2015	Winter Storm				
2/7/2016	High Wind		58 kts. MG		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
2/19/2016	High Wind		56 kts. MG		
5/24/2016	Thunderstorm Wind		53 kts. MG		
5/26/2016	Hail		1.00 in.		
6/22/2016	Hail		1.75 in.		
7/6/2016	Thunderstorm Wind		73 kts. MG		
7/19/2016	Extreme heat				
7/26/2016	Hail		1.75 in.		
7/26/2016	Flash Flood	Heavy rain of 4 inches caused flash flooding of secondary roads and standing water in fields northeast of Presho.			
8/10/2016	Thunderstorm Wind		56 kts. EG		
8/14/2016	Thunderstorm Wind		56 kts. EG		
9/4/2016	Thunderstorm Wind		52 kts. EG		
9/8/2016	Hail		1.25 in.		
11/5/2016	Wildfire	Very warm, dry, and breezy conditions contributed to a wildfire five miles northeast of Reliance that burned 750 acres. Firefighters from seven fire departments along with several farmers helped extinguish the fire. Some structures were threatened, and a three-mile stretch of SD Hwy 47 had to be closed for over five hours.			
12/16/2016	Heavy Snow				
12/18/2016	Extreme cold				
12/25/2016	High Wind		63 kts. MG		
1/24/2017	Heavy Snow				
3/7/2017	High Wind		57 kts. MG		
6/6/2017	Drought	An extremely dry May caused a severe drought by June. The South Dakota Drought Task force was activated, and CRP lands were opened up for grazing and haying.			
6/11/2017	Hail		2.50 in.		
6/21/2017	Thunderstorm Wind		54 kts. MG		
7/1/2017	Drought	Hot and dry conditions throughout July led to the continuation and expansion of drought across central and northeast South Dakota. By the end of July, extreme drought developed across parts of Lyman County. July was a hot month, accelerating the deteriorating conditions. Average monthly temperatures were from 3 to 5 degrees above normal, with a high of 107 degrees recorded at Kennebec.			
7/5/2017	Thunderstorm Wind		66 kts. MG		
7/17/2017	Thunderstorm Wind		63 kts. MG		
7/25/2017	Thunderstorm Wind		56 kts. EG		
8/1/2017	Drought				
8/12/2017	Hail		1.50 in.		
8/21/2017	Hail		1.50 in.		
8/21/2017	Thunderstorm Wind		56 kts. EG		
9/1/2017	Drought				

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
10/1/2017	Drought				
12/4/2017	Blizzard				
12/11/2017	High Wind		51 kts. MG		
12/13/2017	High Wind		54 kts. MG		
12/26/2017	Extreme cold				
12/31/2017	Extreme cold				
1/1/2018	Extreme cold				
1/21/2018	Heavy Snow				
2/8/2018	Heavy Snow				
2/18/2018	Heavy Snow				
3/5/2018	Blizzard				
3/16/2018	Winter Storm				
4/13/2018	Blizzard	Life threatening conditions developed during this rare mid-April blizzard. Businesses and schools were closed, and I-90 was closed. Livestock losses were substantial as the storm hit during calving season. Total snowfall of 17 inches was measured at Kennebec and 12 inches at Presho.			
5/17/2018	Thunderstorm Wind		57 kts. MG		
5/24/2018	Hail		1.00 in.		
6/5/2018	High Wind		56 kts. EG		
6/8/2018	Thunderstorm Wind		62 kts. MG		
6/11/2018	Thunderstorm Wind		52 kts. EG		
6/21/2018	Flood	Heavy rain in southwest South Dakota from June 17 thru 20 caused flooding along the White River from Kadoka to the confluence of the Missouri River. The river rose about half a foot above flood stage at Oacoma for a short time on June 21st. Minor flooding of agricultural land occurred.			
6/27/2018	Hail		1.75 in.		
6/27/2018	Thunderstorm Wind		61 kts. EG		
6/27/2018	Flash Flood	Flash flooding from heavy rains occurred near Oacoma, with parts of roads underwater.			
7/18/2018	Hail		1.75 in.		
8/4/2018	Hail		1.00 in.		
8/6/2018	Hail		1.75 in.		
8/6/2018	Thunderstorm Wind		69 kts. MG		
8/23/2018	Thunderstorm Wind		54 kts. MG		
8/25/2018	Thunderstorm Wind		57 kts. MG		
8/27/2018	Hail		3.50 in.		
10/3/2018	High Wind		54 kts. MG		
1/18/2019	Heavy Snow				
1/27/2019	High Wind		63 kts. MG		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
2/16/2019	Heavy Snow				
3/2/2019	Extreme Cold				
3/13/2019	Blizzard				
3/14/2019	Flood	A large ice jam formed along the White River around the Highway 47 Bridge. Water backed up behind the ice, causing hundreds of acres of agricultural land to be flooded. The high water inundated several outbuildings and neared a home along Highway 47. The river crested just shy of 25 feet on March 19th. With the continued snow melt, additional rises were recorded, resulting in a second crest of 20.5 feet and a flow of 37,900 cfs on March 25th, the 3rd highest flow on record at the location.			
3/26/2019	Flood				
4/1/2019	Flood				
4/11/2019	Blizzard				
5/22/2019	Flood				
5/26/2019	Flood				
6/30/2019	Hail		1.00 in.		
7/3/2019	Hail		1.75 in.		
7/5/2019	Thunderstorm Wind		52 kts. MG		
7/20/2019	Thunderstorm Wind		56 kts. MG		
8/2/2019	Flash Flood				
8/6/2019	Hail		2.75 in.		
8/6/2019	Thunderstorm Wind		70 kts. EG		
8/9/2019	Thunderstorm Wind		61 kts. EG		
8/9/2019	Tornado		EF0		
8/15/2019	Hail		1.50 in.		
8/15/2019	Thunderstorm Wind		52 kts. MG		
8/17/2019	Hail		1.75 in.		
8/17/2019	Thunderstorm Wind		61 kts. EG		
9/10/2019	Hail		1.00 in.		
11/29/2019	Winter Storm				
12/1/2019	Winter Storm				
1/17/2020	High Wind		54 kts. MG		
6/6/2020	Thunderstorm Wind		66 kts. MG		
6/7/2020	Hail		1.50 in.		
6/7/2020	Thunderstorm Wind		70 kts. EG		
6/14/2020	High Wind		61 kts. MG		
6/20/2020	Hail		1.75 in.		
7/5/2020	Thunderstorm Wind		63 kts. MG		
7/6/2020	Thunderstorm Wind		72 kts. MG		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
7/31/2020	Thunderstorm Wind		50 kts. MG		
8/8/2020	Thunderstorm Wind		52 kts. EG		
8/27/2020	Thunderstorm Wind		50 kts. MG		
10/24/2020	Heavy Snow				
10/31/2020	High Wind		51 kts. MG		
12/23/2020	High Wind		56 kts. MG		
1/14/2021	High Wind		61 kts. MG		
2/6/2021	Extreme cold				
3/14/2021	Heavy Snow				
3/29/2021	High Wind		57 kts. MG		
4/12/2021	High Wind		50 kts. MG		
5/23/2021	Thunderstorm Wind		74 kts. MG		
6/1/2021	Drought				
7/1/2021	Drought				
7/5/2021	Thunderstorm Wind		50 kts. MG		
8/1/2021	Drought				
8/6/2021	Thunderstorm Wind		62 kts. MG		
8/27/2021	Thunderstorm Wind		53 kts. MG		
9/1/2021	Drought				
9/19/2021	High Wind		51 kts. MG		
10/1/2021	Drought				
10/13/2021	High Wind		54 kts. MG		
11/11/2021	High Wind		56 kts. MG		
11/13/2021	High Wind		70 kts. MG		
12/5/2021	High Wind		50 kts. EG		
12/9/2021	Heavy Snow				
12/15/2021	High Wind		56 kts. MG		
1/4/2022	High Wind		53 kts. MG		
1/5/2022	Extreme cold				
2/22/2022	Extreme cold				
3/1/2022	Drought				
4/1/2022	Drought				
4/13/2022	High Wind		55 kts. MG		
4/22/2022	High Wind		57 kts. MG		
5/1/2022	Drought				
5/12/2022	Hail		1.75 in.		
5/29/2022	Hail		1.00 in.		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
6/11/2022	Thunderstorm Wind		50 kts. MG		
6/12/2022	Tornado		EFU		
6/20/2022	Thunderstorm Wind		50 kts. MG		
6/29/2022	Thunderstorm Wind		59 kts. MG		
7/3/2022	Thunderstorm Wind		61 kts. MG		
7/5/2022	Thunderstorm Wind		60 kts. MG		
7/18/2022	Excessive Heat				
8/2/2022	Thunderstorm Wind		54 kts. MG		
8/5/2022	Thunderstorm Wind		65 kts. EG		
8/5/2022	Excessive Heat				
8/24/2022	Thunderstorm Wind		52 kts. MG		
10/1/2022	Drought				
10/13/2022	High Wind		56 kts. MG		
11/1/2022	Drought				
11/9/2022	Ice Storm				
12/1/2022	Drought				
12/13/2022	Heavy Snow				
12/14/2022	Blizzard				
12/21/2022	Blizzard/Extreme Cold				
1/2/2023	Heavy Snow				
1/30/2023	Extreme cold				
2/14/2023	High Wind		50 kts. MG		
2/22/2023	Heavy Snow				
2/24/2023	Extreme cold				
3/1/2023	High Wind		53 kts. MG		
3/31/2023	Blizzard				
4/3/2023	Heavy Snow				
4/29/2023	High Wind		51 kts. MG		
6/20/2023	Drought				
6/23/2023	Hail		1.25 in.		
6/24/2023	Thunderstorm Wind		71 kts. MG		
7/1/2023	Drought				
7/18/2023	Hail		1.50 in.		
7/18/2023	Thunderstorm Wind		87 kts. MG		
7/26/2023	Thunderstorm Wind		56 kts. MG		
8/4/2023	Hail		1.25 in.		
8/4/2023	Thunderstorm Wind		73 kts. MG		

Date	Event Type	Event Description	Mag	Prop Damage ($1,000s)	Crop Damage ($1,000s)
8/21/2023	Excessive Heat				
9/2/2023	Excessive Heat				
9/4/2023	Thunderstorm Wind		51 kts. MG		
10/13/2023	Flood	Cedar Creek near Presho briefly rose above the 12 foot flood stage due to heavy rain in the area. Floodwaters impacted low-lying pasture lands.			
10/13/2023	High Wind		50 kts. MG		
12/4/2023	High Wind		54 kts. MG		
12/25/2023	Blizzard				
1/12/2024	Extreme cold				
2/8/2024	Flood				
2/14/2024	Heavy Snow				
3/3/2024	High Wind		50 kts. MG		
4/1/2024	Heavy Snow				
4/16/2024	Thunderstorm Wind		52 kts. MG		
5/5/2024	High Wind		50 kts. MG		
5/24/2024	High Wind		54 kts. MG		
6/20/2024	Flash Flood				
7/13/2024	Excessive Heat				
7/14/2024	Thunderstorm Wind		66 kts. MG		
7/25/2024	Excessive Heat				
7/27/2024	Excessive Heat				
7/29/2024	Thunderstorm Wind		52 kts. EG		
8/2/2024	Excessive Heat				
10/5/2024	High Wind		52 kts. MG		
10/29/2024	Drought				
11/1/2024	Drought				
11/19/2024	High Wind		56 kts. MG		

Source: National Climatic Data Center Storm Events Database (www.ncdc.noaa.gov/stormevents)

APPENDIX D: References

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