

OGLALA SIOUX TRIBE AND OGLALA LAKOTA COUNTY HAZARD MITIGATION PLAN

SEPTEMBER 2024



Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan

HAZARD MITIGATION PLAN UPDATE OVERVIEW

The Oglala Sioux Tribe (OST) and Oglala Lakota County (OLC) Hazard Mitigation Plan was originally written in 2014 and last updated in 2019.

A plan update was prepared in 2024 to re-assess the hazards that present the greatest risk to OST and OLC communities, including buildings, the environment, infrastructure, the economy, and quality of life, identify areas of vulnerability, and develop long-term strategies and mitigation actions that can reduce or eliminate those risks for OST and OLC.

WHAT IS HAZARD MITIGATION?

The Federal Emergency Management Agency (FEMA) defines **Hazard Mitigation** as any sustained activities or actions that **reduce** or **eliminate risks** to human life, the environment, and property in the **long term.**

Hazard mitigation actions may include wetland conservation, stormwater parks, the development of protective codes and regulations (wildfire codes, building codes, etc.), among others.

TYPES OF HAZARDS ASSESSED IN THE PLAN

Natural hazards are natural and inevitable, with little that can be done to control their force, frequency, and intensity, such as...



Human-caused hazards are a product of society and can occur with significant impacts to communities, such as...



The OST and OLC Hazard Mitigation Plan 2024 Update includes profiles of each hazard impacting the Pine Ridge Indian Reservation and identifies actions for each hazard that can help reduce the long-term risk to OST and OLC communities, property, infrastructure, and culture.



What is a Hazard Mitigation Plan?

A Hazard Mitigation Plan (HMP) is a community-driven guide for reducing the long-term impacts of natural hazards, such as floods and wildfires. The plan identifies the hazards that pose a risk to the Tribe and actions that can be taken to protect important places, infrastructure, resources, and culture from damages in the long-term.

A Hazard Mitigation Plan is different from an Emergency Operations Plan as it does not assess how to respond to disasters and hazards, but rather tries to reduce losses or impacts of hazards before they occur.

MITIGATION PLANNING INCLUDES THREE ELEMENTS:

Community Input

Involving everyone in the community ensures the plan reflects community values, priorities, and concern and identifies mitigation actions that the community values and supports.

Risk Assessment

The hazard mitigation plan looks at how hazards can impact the Tribe and its resources. This focuses on areas at risk from hazards and what important assets are vulnerable.

Mitigation Strategy

The Mitigation Strategy identifies mitigation actions to reduce risk based on public input, known risks, and available resources.

HOW CAN HAZARD MITIGATION HELP THE TRIBE

- ☑ It protects the public and prevents loss of life or injury.
- ☑ It prevents damage to your communities' unique economic, cultural, and environmental assets.
- ☑ It speeds up recovery processes and reduces the long-term costs of disasters

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Appendix F: 2020 OST Drought Adaptation Plan

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Executive Summary

Natural hazards such as severe storms, floods, droughts, and wildfires can threaten lives, property, the economy, and the environment. Human-caused hazards such as dam failure, transportation accidents, or terrorism can also have significant impacts to communities. Hazard mitigation seeks to reduce the impacts of these hazards on life, the economy, and infrastructure. Hazard mitigation planning increases the ability of jurisdictions to effectively function in the face of disasters.

FEMA definition of Hazard Mitigation

"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from [natural] hazards."

The Oglala Sioux Tribe (OST) and Oglala Lakota County (OLC) prepared this Hazard Mitigation Plan (HMP) to reduce impacts from natural and human-caused hazards and to better protect the people and property of the Pine Ridge Reservation. This plan demonstrates the communities' commitment to reducing risks from hazards and serves as a tool to help decision makers establish mitigation activities and resources. The goals of the plan are:

Goal 1: Protect citizens from injuries and loss of life from hazards

Goal 2: Protect existing and future structures within hazard areas

Goal 3: Identify vulnerabilities and reduce losses to critical facilities, utilities, and infrastructure from natural and man-made hazards

Goal 4: Preserve the natural environment, cultural sites, and resources

Goal 5: Identify funding sources to support and assist community mitigation capabilities and efforts

Goal 6: Identify funding sources to improve emergency management capabilities

Goal 7: Identify, protect, and conserve all Tribal water resources, and ensure water supply remains healthy and available for all environmental and community needs

The HMP includes a description of the hazards considered, historic occurrences and recurrence intervals; historic losses; impacts to the built environment; the impacts of climate change; and a comprehensive vulnerability and risk assessment. The hazards covered in this plan are:

- Animal/Plant/Crop Disease
- Bombing Range
- Civil Disorder
- Communicable Disease
- Dam Failure
- Drought
- Earthquakes
- Extreme Temperatures
- Flooding
- Grass/Wildfire
- Hail
- Hazardous Materials Incident
- High Winds
- Severe Thunderstorms
- Severe Winter Storms
- Structure Fire
- Tornadoes

The plan includes 33 actions to reduce the community's overall vulnerability to the above hazards and improve the community's ability to recover from disasters. Each action includes information on how the action will be implemented and administered, such as potential funding sources, estimated cost, and proposed timeline.

This plan is a 2024 update to the Oglala Sioux Tribe and Oglala Lakota County Multi-Jurisdictional Hazard Mitigation Plan originally approved in 2014 and last updated in 2019. The plan update was developed in compliance with the requirements of the Disaster Mitigation Act of 2000 (DMA 2000). The plan covers the entire Pine Ridge Reservation, focusing on the Tribe and Oglala Lakota County. Tribal boundaries for the Pine Ridge Reservation also include Bennett County and the southern half Jackson County; data for those counties are included where available, but they maintain their own HMPs and are not full participants in this plan. The 2024 update was conducted in partnership with the Federal Emergency Management Agency (FEMA) through the Building Resilient Infrastructure and Communities Direct Technical Assistance Program (BRIC DTA).

1 Introduction

Oglala Sioux Tribe (OST) and Oglala Lakota County (OLC) prepared this 2024 Hazard Mitigation Plan (HMP) update to guide hazard mitigation planning to better protect the people, property, culture, and environment of the Pine Ridge Reservation from the effects of hazard events. This plan demonstrates the tribe's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make OST and OLC eligible for certain federal grant programs, specifically the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) grants including the Hazard Mitigation Grant Program, Building Resilient Infrastructure and Communities (BRIC) Grant Program, and Flood Mitigation Assistance Program.

1.1 Plan Organization

The OST and OLC Multi-Jurisdictional HMP update is organized as follows:

- Chapter 1: Introduction – Provides an overview of the plan structure, content, and purpose, as well as a description of the federal and tribal regulations surrounding hazard mitigation planning.
- Chapter 2: Planning Process – Outlines the steps followed to update the plan, from project kickoff to plan adoption, including background information on the various entities involved in the planning process and the roles they played.
- Chapter 3: Community Profile and Capability Assessment – Defines the project planning area and gives detailed information on the population, economy, geography, climate, and natural environment of the Pine Ridge Reservation. This chapter also includes an assessment of the various regulatory, administrative, financial, and educational capabilities of the tribe, and how they can support hazard mitigation.
- Chapter 4: Hazard Identification and Risk Assessment - The Hazard Identification and Risk Assessment (HIRA) focuses on the identification of relevant hazards for the planning area, analyzing the populations, property, and facilities that are most vulnerable to hazards, and to what extent damages or impacts may occur.
- Chapter 5: Mitigation Strategy – The Mitigation Strategy outlines current, ongoing, and future projects, programs, and actions which OST and OLC could pursue to help reduce the community's overall vulnerability to disasters.
- Chapter 6: Plan Implementation and Maintenance – Summarizes how the plan will be used, as well as details on how it's effectiveness will be evaluated and how the plan will be updated in the future.
- Annex: Oglala Lakota County – Provides and expands upon information from each of the above chapters as they relate specifically to Oglala Lakota County.
- Appendices
    - Appendix A – Adoption Resolutions
    - Appendix B – Hazard Mitigation Planning Committee
    - Appendix C – Planning Process Documentation
    - Appendix D – Acronyms, Definitions, and References
    - Appendix E – Sample Annual Progress Meeting Agenda and Report
    - Appendix F – 2020 OST Drought Adaptation Plan
    - Appendix G – OST Water Code Ord. #15-18

Requirement §201.7(c)(6):

The plan must include assurances that the Indian Tribal government will comply with all applicable federal statutes and regulations in effect with respect to the periods for which it received grant funding, including 2 CFR parts 200 and 3002. The Indian Tribal government will amend its plan whenever necessary to reflect changes in Tribal or federal laws and statutes.

1.2 Disaster Mitigation Act of 2000

The U.S. Congress passed the Disaster Mitigation Act of 2000 to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of the DMA 2000 requires that state and local governments develop, adopt, and routinely update a hazard mitigation plan to remain eligible for pre- and post-disaster mitigation funding. These funds include the Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance Program (FMA), Hazard Mitigation Grant Program (HMGP), and HMGP Post Fire. The Federal Emergency Management Agency (FEMA) administers these programs under the Department of Homeland Security (DHS).

This plan was developed in accordance with current tribal, state, and federal rules and regulations governing local hazard mitigation plans. The plan shall be monitored and updated on a routine basis to maintain compliance with the legislation – Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the DMA 2000 (P.L. 106-390) and by FEMA's Final Rule (FR) 8 published in the Federal Register on November 30, 2007, at 44 Code of Federal Regulations, Part 201 (44 CFR § 201).

1.3 Hazard Mitigation Assistance

Mitigation is the cornerstone of emergency management. Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation lessens the impact disasters have on people's lives and property through damage prevention, appropriate development standards, and affordable flood insurance. Through measures such as avoiding building in damage-prone areas, stringent building codes, and floodplain management regulations, the impact on lives and communities is lessened.

- FEMA Mitigation Directorate

FEMA originally initiated the Hazard Mitigation Assistance (HMA) program on June 1, 2009, which aligned certain policies and timelines of the various hazard mitigation programs. These HMA programs present a critical opportunity to minimize the risk to individuals and property from hazards while simultaneously reducing the reliance on federal disaster funds.

Each HMA program is authorized by separate legislative actions, and as such, each program differs slightly in scope and intent.

BRIC: The Building Resilient Infrastructure and Communities program supports state, local, tribal and territorial governments as they undertake hazard mitigation activities, reducing the risks they face from disasters and natural hazards. The BRIC program seeks to fund effective and innovative activities that will reduce risk, increase resilience, and serve as a catalyst to encourage the whole community to invest in and adopt hazard mitigation policies. BRIC is designed to promote a national culture of preparedness and public safety by encouraging investments to protect our communities and infrastructure and strengthen our national hazard mitigation capabilities to foster resilience. BRIC provides grants to identify mitigation actions and implement projects that reduce risks posed by natural hazards, promote partnership to enable high-impact investments, support adoption and enforcement of codes and standards to facilitate

community-wide risk reduction impacts, and to reduce disaster losses and protect life and property from future disasters.

FMA: The Flood Mitigation Assistance program is a competitive program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of flood damage to structures insured by the National Flood Insurance Program (NFIP). To qualify to receive grant funds to implement projects such as acquisition or elevation of flood-prone homes, local jurisdictions must prepare a mitigation plan. Furthermore, local jurisdictions must be participating communities in the National Flood Insurance Program (NFIP). The goal of FMA is to reduce or eliminate claims under the NFIP.

HMGP: The Hazard Mitigation Grant Program ensures that state, local, tribal and territorial governments have the financial opportunity to plan for and implement hazard mitigation measures that reduce the risk of loss of life and property from future natural disasters during the reconstruction process following a disaster. HMGP provides funds to states, territories, tribal governments, local governments, and eligible private non-profits following a presidential disaster declaration. The DMA 2000 authorizes up to seven percent of HMGP funds available to a state after a disaster to be used for the development of state, tribal, and local mitigation plans.

HMGP Post Fire: HMGP Post Fire assistance is available to help communities implement hazard mitigation measures after wildfire disasters for which assistance is provided under a Fire Management Assistance Grant (FMAG) declaration.

2 Planning Process

2.1 Multi-Jurisdictional Planning Approach

FEMA defines a multi-jurisdictional hazard mitigation plan as "a plan jointly prepared by more than one jurisdiction." Jurisdiction or local government is defined in 44 CFR §201, as "any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, any rural community, unincorporated town or village, or other public entity." FEMA recommends the multi-jurisdictional approach under the DMA 2000 for the following reasons:

- It provides a comprehensive approach to the mitigation of hazards that affect multiple jurisdictions.
- It allows economies of scale by leveraging individual capabilities and sharing cost and resources.
- It avoids duplication of efforts; and
- It imposes an external discipline on the process.

Requirement 44 CFR §201.7(b)(1):

Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved. This shall include:

i. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval, including a description of how the Indian tribal government defined "public;"

ii. As appropriate, an opportunity for neighboring communities, tribal and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process;

iii. Review and incorporation, if appropriate, of existing plans, studies, and reports; and

iv. Be integrated to the extent possible with other ongoing tribal planning efforts as well as other FEMA programs and initiatives.

This plan was collaboratively prepared between March and September 2024 by the Oglala Sioux Tribe (OST) and Oglala Lakota County (OLC) in partnership with FEMA. Planning support was provided through FEMA's Building Resilient Infrastructure and Communities Direct Technical Assistance Program (BRIC DTA). This provides tailored support to communities and tribal nations that may not have the resources to begin climate resilience planning and project solution design on their own. Through process-oriented, hand-in-hand assistance, BRIC DTA partners with communities interested in enhancing their capability and capacity to design holistic, equitable hazard mitigation solutions that advance community-driven objectives. WSP USA Environment and Infrastructure (WSP) provided professional planning assistance through a contract with FEMA, to include:

- Assisting in establishing the planning team,
- Ensuring the updated plan meets the DMA requirements as established by federal regulations and following FEMA's planning guidance,
- Facilitating the planning process,
- Identifying the data requirements that plan participants could provide, and conducting the research and documentation necessary to augment that data,
- Producing the draft and final plan update documents, and

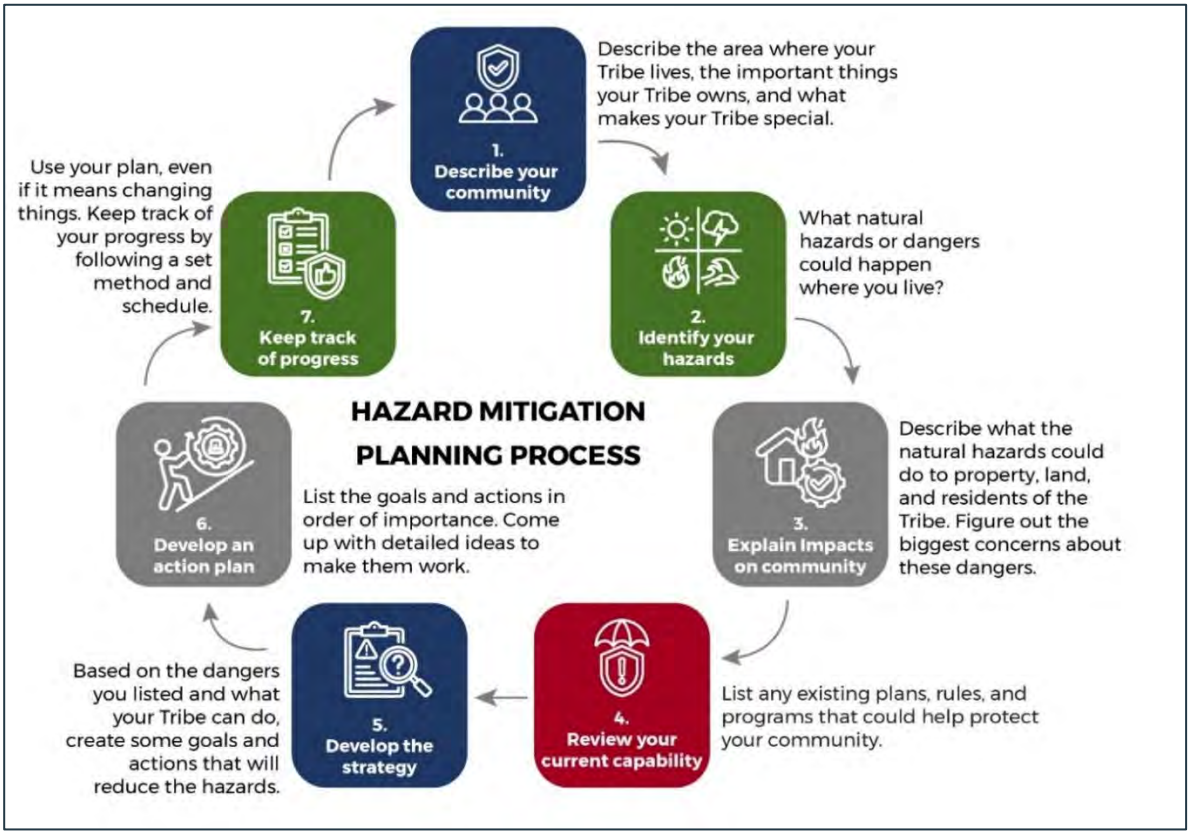
- Coordinating the review and approval of the plan by FEMA.
- For this planning process, OST adapted the hazard mitigation planning process created by FEMA, outlined in Section 2.3 below, to fit the needs of the tribe. This chapter will outline the entire planning process, including specific details on the organization of resources, public involvement and outreach strategy, the planning workshops, and the plan review process.

As a Tribal entity, this plan was developed to meet the requirements of 44 CFR §201.7, *Tribal Mitigation Planning for a Standard Tribal Mitigation Plan*. Throughout the development of this plan, the *Tribal Mitigation Plan Review Guide* was referenced to ensure consistency with FEMA requirements. Because Oglala Lakota County is a participating jurisdiction in the plan update, the plan also adheres to the requirements of 44 CFR §201.6, *Local Mitigation Planning Policy Guide*. To meet requirements specific to just OLC, this plan includes a County Annex that goes into additional detail for the county where necessary.

2.2 Hazard Mitigation Planning Process

The Sandy Recovery Improvement Act of 2013, allows federally recognized tribal governments to obtain their own major disaster declaration, allowing federally recognized tribes to apply for disaster assistance through FEMA independent of a state declaration. The FEMA *Tribal Mitigation Planning Handbook* outlines a 7-step planning process for the development of tribal mitigation plans. These seven steps were used to guide the planning process. Usually cyclical, the steps are shown in the graphic below:

Image 2-1 7-Step Tribal Hazard Mitigation Planning Process



OST and OLC were able to complete the hazard mitigation plan (HMP) update between March and October 2024 with help from FEMA Region 8 and contracting partners. Many different resources were used to make up the planning team (see below) and complete the plan update on time. Planning Team and Involvement.

The Planning Team was made up of tribal members from many departments and organizations, as well as representatives from the community, businesses, and other stakeholders and partners Planning Team members attended Planning Team Meetings and helped develop the plan by reviewing the previous HMP, helping to review and develop goals, identifying and discussing important hazards, providing local knowledge and supporting data on community vulnerability, choosing which actions or projects to focus on, providing new data, and by sharing the plan with other residents. Planning Team members will also create and carry out an annual review of the plan update. All Planning Team members (listed in Table 2-2, below) were required to attend at least one planning meeting; attendance records are included in *Appendix B*.

Table 2-1 Hazard Mitigation Planning Team

NAME	TITLE	ORGANIZATION OR DEPARTMENT
Aaron Smith	Chief	Batesland Volunteer Fire Department
Alicia Mousseau	OST Tribal Vice President	OST Vice President's Office
Alyssa Comer	Commissioner	Oglala Lakota County
Audrey Thompson	Interim Director	OST Solid Waste
Bernard Rodriguez Jr.	Sheriff	Oglala Lakota County
Bob Pille	Manager	OST Seven Years for Seven Generations Projects
Brandon Kill Small	Land Operations	OST Land Office
Carole O'Rourke	District Chairwoman	Pine Ridge Village
D'Ann Her Many Horses	Office Manager	OST Solid Waste
Frank Maynard	Emergency Manager	Oglala Lakota County, Fall River County
Gary Baker	Assistant Emergency Manager	Oglala Lakota County, Fall River County
Jacob Cousin	Policy Advisor/Analyst	OST Vice President's Office
James Ainslie	Sewer Program	Indian Health Services
Jennifer Franks	Safety Officer	IHS
Jesse Big Crow	Planning and Coordination Specialist	OST Emergency Management
Jerry Bordeau	Facility Manager	Pine Ridge District Service Center
Johaunna Dreamer	Chief of Staff	OST Chief of Staff Office
Jon Siedschlaw	Deputy Director	OST Emergency Management
Justin Baur	Module Leader	BIA Wildland Fire
Lynz Bettelyoun	Highway Superintendent	Oglala Lakota County
Marjoe Janis	Fire Operations	BIA Wildland Fire
Mark Donovan	Town of Batesland	Batesland Board President
Nichol Schultz	Board Member	Town of Batesland
Orren Provost	Maintenance	Oglala Sioux Lakota Nursing Home
Patrick Swallow	Public Health Investigator	OST Health Administration
Rebecca Lone Elk	Vice President	Oglala District Executive Board
Reno Red Cloud	Director	OST Water Resources Department
Shaina Johnson	Senior Advisor	OST Vice President's Office
Stacey Martin	GIS	Oglala Lakota County, Fall River County
Stephanie Cuny	Director	OST Tribal Planning
Steve Wilson	Director	OST Emergency Management
Teky Waters	GIS Analyst	OST Roads Department
Tiffany Shangreau	Administrator	Oglala Sioux Lakota Nursing Home
Tonia Ecoffey	GIS Analyst	OST Department of Transportation
Troy Ferguson	E-911 and GIS	OST Department of Public Safety
Wade Vocu	House Keeping	Oglala Sioux Lakota Nursing Home
Wendell Yellow Bull	Commissioner	Oglala Lakota County

2.3 Planning Workshops

In order to address several key elements of the seven-step planning process, two in-person full day workshops were held with the planning team. Over the course of these two workshops, the planning team was able to:

- Identify the Pine Ridge Reservations hazards and assess their risk
- Explain and define the impacts hazards can have on the community
- Review their current capabilities to mitigate hazard impacts
- Develop a mitigation strategy with specific actions to lessen the community's risk

The details of these workshops are discussed below, with further meeting materials and summary information provided in *Appendix C*.

2.3.1 Plan Kickoff and Risk Assessment Workshop

On April 18, 2024, a combined Kick-off and Hazard Identification and Risk Assessment (HIRA) in-person meeting was held at the Prairie Winds Hotel & Casino. There were thirty members of the planning team in attendance at the workshop, representing Tribal and County staff, key partners, FEMA Region 8 staff, and FEMA contractors. The meeting gave attendees a summary of the planning process and parts of the HMP, such as setting goals, identifying hazards, and defining the roles and responsibilities of the planning team.



Participants also reviewed the hazards listed in the 2024 South Dakota State Hazard Mitigation Plan, the 2019 Oglala Sioux Tribe Hazard Mitigation Plan, and newly identified hazards for the area. These hazards were then used to create detailed risk and vulnerability assessments, considering how often they happened in the past and how they affect the community now. The meeting was also a place where information about past hazards was collected, including their impact on the community and culture, effects on residents, and descriptions of damage like property damage, infrastructure problems, blocked roads, power outages, and post-event improvements and projects.

Meeting attendance is listed in *Appendix B*, and sign-in sheets and other meeting materials can be found in *Appendix C*.

2.3.2 Development of Mitigation Strategies

On July 17, 2024, a second in-person planning workshop was held at the Holiday Inn Rapid City Downtown Convention Center to focus on the mitigation strategy for the 2024 plan update. Twenty-three planning team members were in attendance for the mitigation strategy workshop. The identification and prioritization of mitigation measures is an essential component in developing

effective hazard mitigation plans. At the July workshop, Planning Team members discussed the status of mitigation actions identified in the 2019 HMP and also collaborated to develop new mitigation actions to address additional hazards of concern.

There was also a brief discussion about the planning process, when the plan would be available for public review and comment, and additional opportunities to share the public involvement survey with residents.

Meeting attendance is listed in *Appendix B*, and sign-in sheets and other meeting materials can be found in *Appendix C*.

2.4 Public Involvement and Outreach

The Planning Team emphasized the importance of involving tribal members, departments, county officials, and the public in the planning process. For the purpose of this plan, the Tribe defined the 'public' as any tribal residents within the Pine Ridge Reservation, while the County also included all residents who may be non-tribal but reside within the Pine Ridge Reservation boundary.

Outreach to adjacent jurisdictions and the public included notification prior to all public meetings, phone calls and email reminders of upcoming meetings, and invitations to complete surveys and worksheets required for the planning process. Copies of letters, press releases, a project flyer, and survey can be found in *Appendix C*.

Several targeted interviews were conducted with key representatives from the Oglala Sioux Tribe. On June 3, 2024, a one-on-one interview was held with the Director of OST Planning Office, while a one-on-one interview with the Director of OST Water Programs and additional supporting staff occurred on July 9, 2024.

Several items were discussed during the meeting with the Planning Office. These included the scope of work and role of the Planning Office in mitigation efforts, as well as ongoing and future planning initiatives, such as updates to environmental and water codes. The conversation also touched on a wish list of planning projects, including the need for a Stormwater Master Plan and a Financial Capabilities Plan. The Office expressed concerns about challenges related to sustained staffing and project management, as well as the impact of climate change on the community. Additionally, cultural considerations and the political climate were raised as important factors in the planning process.

Outreach with the OST Water Programs focused on the scope and roles of the various water-related departments. Key challenges were identified, including issues related to water access, availability, conservation, quality, and infrastructure. The need for comprehensive water system assessments and upgrades was discussed, along with a review of existing water-related plans and ordinances. There was also a discussion about the potential to establish water as a utility and the enforcement of water rights.

Additionally, the planning team actively involved the nine districts of the Reservation by inviting the District Service Centers to all meetings. The role of the Executive Boards was highlighted as a valuable resource for identifying hazards, problems, and concerns specific to each district. In addition to the formal meetings, word-of-mouth outreach between tribal members and departments, a widely used tactic within OST programs and staff, played a key role in communication. On-the-ground outreach at district offices complemented these engagement efforts, ensuring that a broad range of opinions and concerns were included in the planning process.

To get local opinions on the HMP and find out what issues are important to tribal members and residents, a public survey was created. It was shared at different meetings by the Planning Team and made available on the project website. The Planning Team reached out to adjacent counties, notifying them of the public engagement opportunity and soliciting participation. The goal of the survey was to gather information about the felt impacts of community members, their perceptions of risk and vulnerability, and their view of what community priorities should be emphasized, in their own words.

HOW HAVE YOU BEEN IMPACTED BY HAZARDS?

"I reside in a mobile home in the country, when the wind is high, it affects my home, same with thunderstorms and winter storms"

"I feel we lack infrastructure, development, planning, and we're in crisis mode"

"Winter storms, tornadoes, drought, severe heat, wildfire, high winds. All pose a threat to the community."

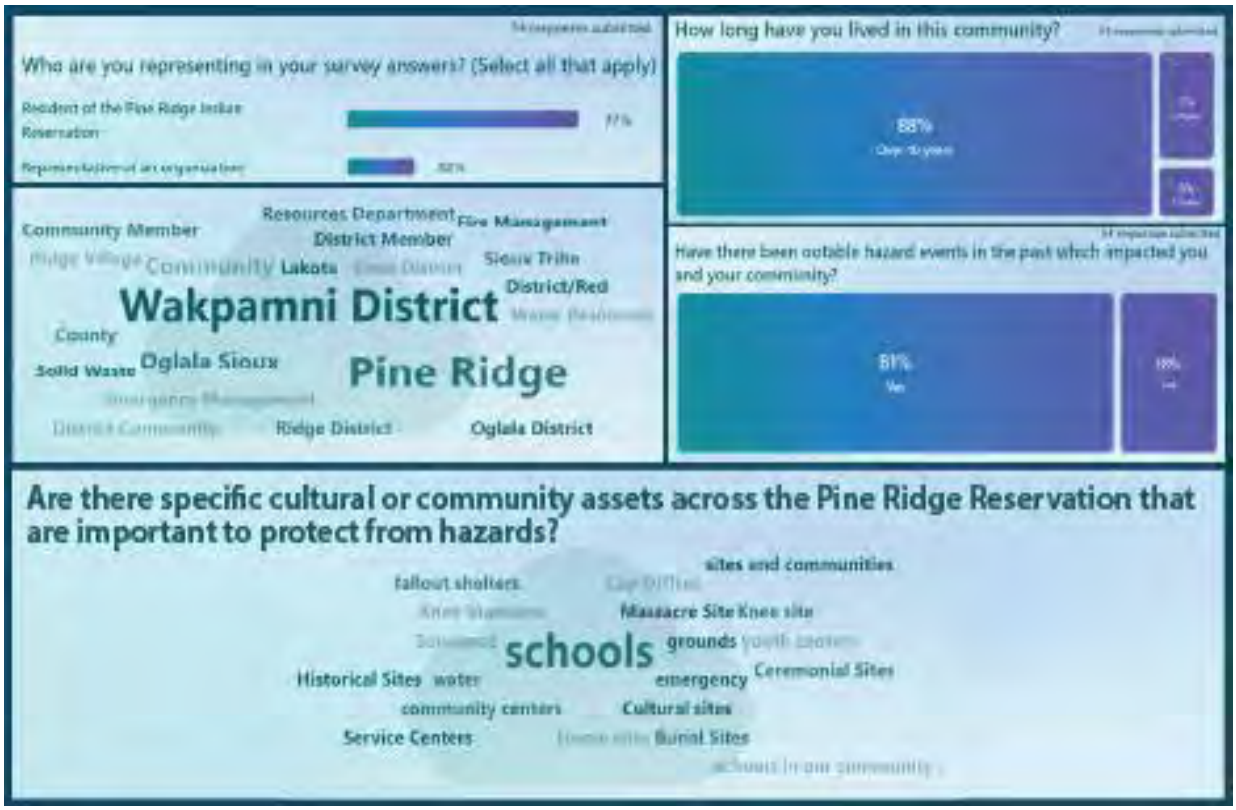
Recognizing the importance of extensive community engagement, two planning team members led an engaged and proactive effort to distribute public surveys across the reservation. Together, they directly engaged with residents, explaining the survey's purpose, providing education on the plan update and the importance of hazard mitigation, and encouraging participation. Both electronic and paper versions of the survey were provided to accommodate preferences and ensure accessibility for all participants.

Door-to-door outreach was a critical part of this effort, and team members specifically targeted vulnerable and hard-to-reach populations, including those in rural districts, youth, and elder tribal members. These outreach efforts encouraged individual participation, ensuring that community members understood the significance of the survey and the ways in which completing it could be beneficial for the Tribe. Additional word-of-mouth outreach between tribal members and departments, along with the on the ground efforts at district offices, further spread awareness and encouraged participation.

During the collection of completed surveys, team members remained available to answer questions, clarify the survey's objectives, and explain the type of information requested. This face-to-face interaction helped address concerns and emphasize the importance of community input in shaping effective hazard mitigation strategies. Efforts were made to ensure each participant felt heard and valued, fostering a collaborative atmosphere.

A total of 59 surveys were completed. Of the 59 people who responded, 54 answered specific questions, which are shown in **Figure 2-1** below. This information helped the planning team and consultant identify the biggest risks and figure out the best ways to reduce those risks. A full copy of the survey with results can be found in *Appendix C*.

Figure 2-1 Sample Survey Results

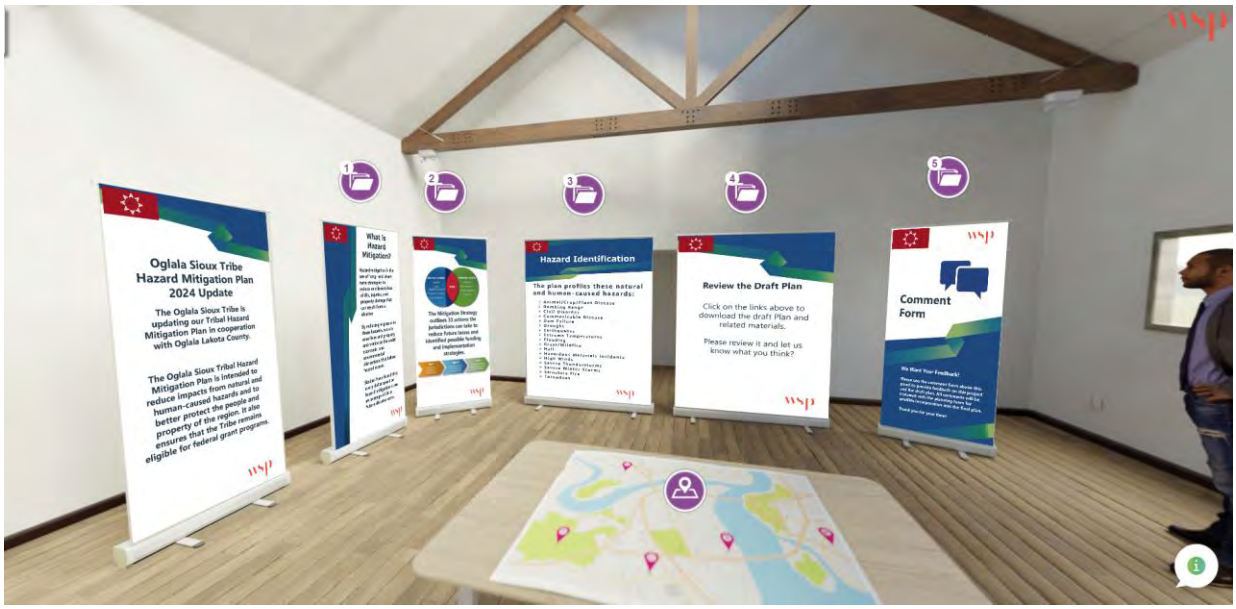


Additional outreach was done through local community members and business owners. In addition to participating in planning committee meetings, these individuals actively promoted the hazard survey in person and ensured that flyers (see Figure 2-3) were readily available to the public at local stores and businesses.

Additionally, adjacent counties were informed of the planning process and invited to participate. Emails were sent to community leaders and county emergency managers, and they shared the information as appropriate. Flyers were distributed to gather input on hazard vulnerabilities within the reservation and to solicit feedback on the final draft of the hazard mitigation plan.

Once the draft of the HMP was completed, a public review period was opened to allow for participants and community members at-large to review the plan and provide comments and changes. The public review period was open from August 21st, 2024, through September 13th, 2024. The public was notified via social media blasts, newspapers, radio, email, and public signs advertising the plans availability for review. Community members were invited to read and comment on the draft plan through a virtual room set up by WSP (Oglala Sioux Tribal HMP Public Engagement Space - VirtualPlatform) see **Figure 2-2**. While comments and suggested changes were received from members of the Planning Team which were incorporated into the final plan, no further comments from members of the general public were received during this time.

Figure 2-2 The Virtual Room



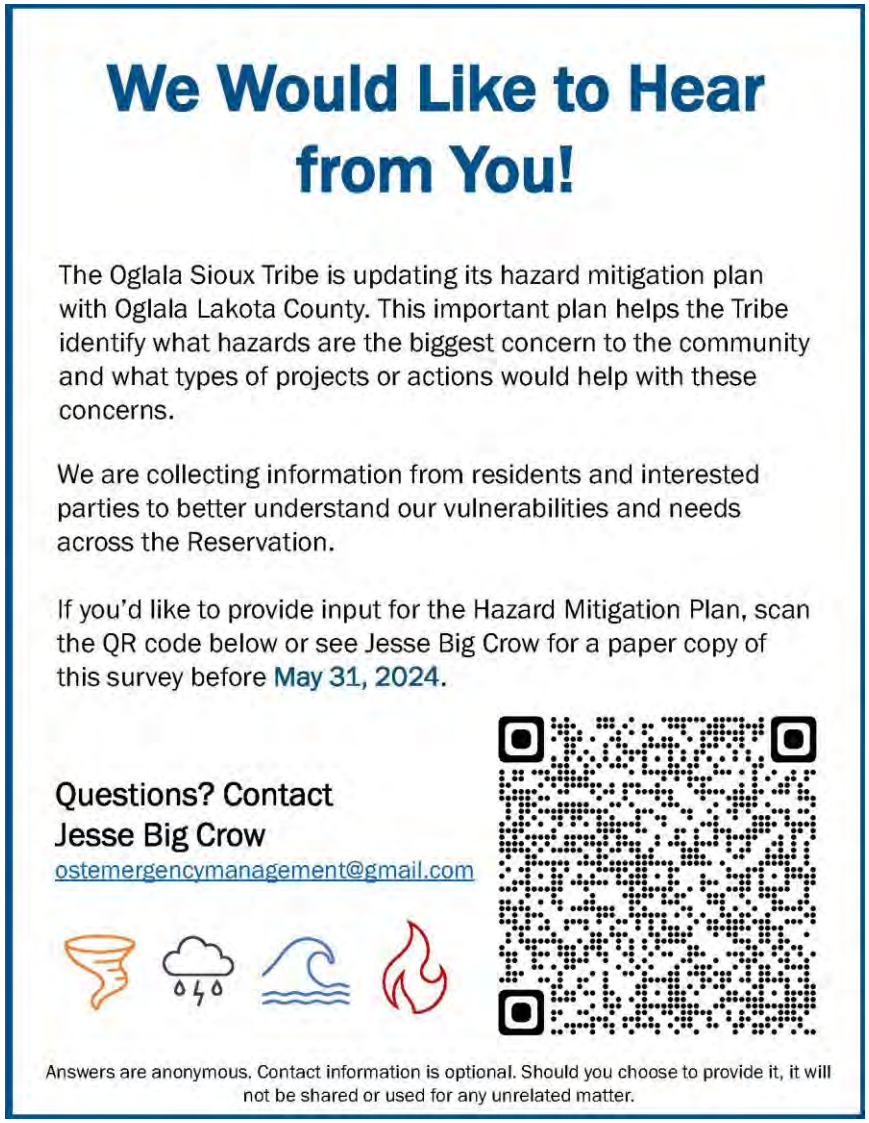
By combining on-the-ground efforts with electronic communication, a thorough and inclusive data collection process was aimed at accurately reflecting the community's needs and perspectives. This approach ensured a diverse cross-section of the population was reached, providing a solid foundation for developing the HMP.

During the next update cycle, public outreach can be further enhanced by leveraging additional communication methods and community engagement strategies. Local radio stations, such as KILI and KZMS, can be used to broadcast public service announcements, with the specified advantage that broadcasts don't break down or fail by internet. These stations offer a familiar and trusted platform to communicate important updates and encourage participation to a broad audience across the Reservation.

Community events, such as career fairs at Oglala Lakota College and end-of-year cookouts, provide additional opportunities to connect with residents in person. These gatherings can serve as ideal settings for distributing information, answering questions, and encouraging community members to share their input on the hazard mitigation plan. By connecting with people in social environments, the planning team can foster a more personal and approachable outreach effort.

In addition to in-person interactions, the next cycle could benefit from the introduction of private communication options. It was noted that some residents may prefer phone calls over face-to-face interactions, as they may feel uncomfortable with outsiders in their personal space. A suggestion was made to establish a dedicated phone line where community members could call in if they did not feel comfortable filling out or mailing in surveys. This approach would provide an alternative line of communication, ensuring those who are hesitant about direct contact are guaranteed a voice in the planning process.

Figure 2-3 Public Input Flyers



We Would Like to Hear from You!

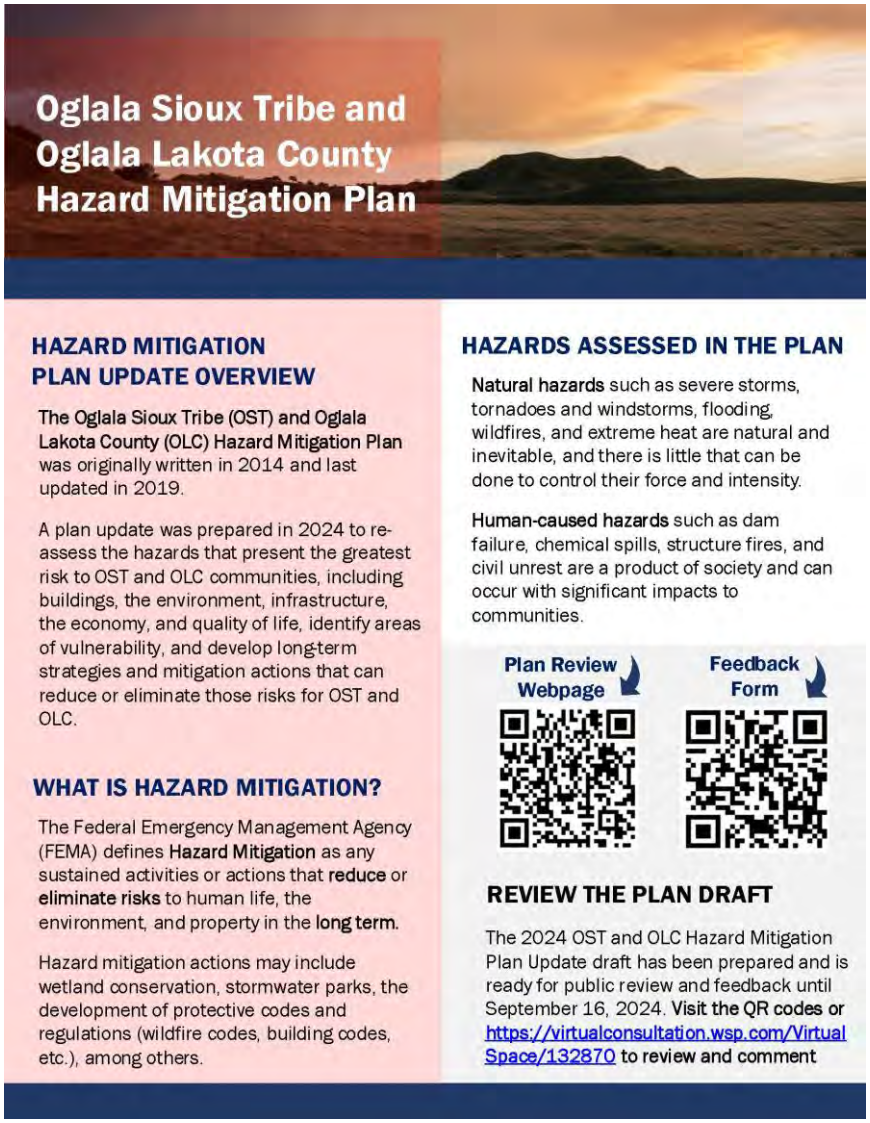
The Oglala Sioux Tribe is updating its hazard mitigation plan with Oglala Lakota County. This important plan helps the Tribe identify what hazards are the biggest concern to the community and what types of projects or actions would help with these concerns.

We are collecting information from residents and interested parties to better understand our vulnerabilities and needs across the Reservation.

If you'd like to provide input for the Hazard Mitigation Plan, scan the QR code below or see Jesse Big Crow for a paper copy of this survey before May 31, 2024.

Questions? Contact
Jesse Big Crow
ostemergencymanagement@gmail.com

Answers are anonymous. Contact information is optional. Should you choose to provide it, it will not be shared or used for any unrelated matter.



Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan

HAZARD MITIGATION PLAN UPDATE OVERVIEW

The Oglala Sioux Tribe (OST) and Oglala Lakota County (OLC) Hazard Mitigation Plan was originally written in 2014 and last updated in 2019.

A plan update was prepared in 2024 to re-assess the hazards that present the greatest risk to OST and OLC communities, including buildings, the environment, infrastructure, the economy, and quality of life, identify areas of vulnerability, and develop long-term strategies and mitigation actions that can reduce or eliminate those risks for OST and OLC.

WHAT IS HAZARD MITIGATION?

The Federal Emergency Management Agency (FEMA) defines **Hazard Mitigation** as any sustained activities or actions that **reduce** or **eliminate risks** to human life, the environment, and property in the **long term.**

Hazard mitigation actions may include wetland conservation, stormwater parks, the development of protective codes and regulations (wildfire codes, building codes, etc.), among others.

HAZARDS ASSESSED IN THE PLAN

Natural hazards such as severe storms, tornadoes and windstorms, flooding, wildfires, and extreme heat are natural and inevitable, and there is little that can be done to control their force and intensity.

Human-caused hazards such as dam failure, chemical spills, structure fires, and civil unrest are a product of society and can occur with significant impacts to communities.

Plan Review Webpage

Feedback Form

REVIEW THE PLAN DRAFT

The 2024 OST and OLC Hazard Mitigation Plan Update draft has been prepared and is ready for public review and feedback until September 16, 2024. **Visit the QR codes or https://virtualconsultation.wsp.com/VirtualSpace/132870 to review and comment**

As discussed above, many community partners representing the healthcare, business, government, education, housing, non-profit and NGOs, and utility sectors were also engaged in the planning process. The graphic below displays some of the groups that were invited to attend HMP meetings. The National Parks Service, various utility, water, wastewater, and road departments were invited to participate and provide comment on the plan. Four of the twelve organizations invited to the HMP Planning Team attended: Indian Health Services, Batesland VFD, Seven Years for Seven Generations, and the Oglala Lakota Nursing Home.

Table 2-2 Notified Partner Groups



2.5 Plan Adoption and Implementation

To secure buy-in and officially implement the plan, the plan was adopted by the governing bodies of OST and OLC. As the adoption process follows the FEMA plan review and approval, copies of the adoption resolution will be included electronically in *Appendix A*. Following adoption, the true worth of any mitigation plan is in the effectiveness of its implementation. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. Progress on the implementation of specific actions identified in the plan is captured in a discussion and the mitigation action plan summary table in Chapter 5 Mitigation Strategy. An overall implementation strategy is described in Chapter 6 Plan Adoption, Implementation and Maintenance. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 6, as well as the OLC Annex.

3 Planning Area Profile and Capabilities

3.1 Pine Ridge Reservation Planning Area Profile

3.1.1 Geography and Topography

The Pine Ridge Indian Reservation is home to the Oglala Sioux Tribe (OST). OST is a subtribe to the Oglala Lakota Nation. The Pine Ridge Indian Reservation is located in southwest South Dakota and covers 3,469 square miles, encompassing Oglala Lakota County, Bennett County, and a portion of Jackson County, as well as a small portion of Sheridan County in Nebraska. The entirety of Oglala Lakota and Bennett Counties are included in the Pine Ridge Reservation, while only the southern half of Jackson County is within tribal boundaries. The planning area is largely made up of two topographic regions: flat grasslands and steep flat-topped buttes.

Oglala Lakota County (OLC) is the western-most county located within the Pine Ridge Reservation. The county encompasses 2,097 square miles. Prior to May 2015, the county was named Shannon County but was renamed after the Oglala Lakota people who live within the county. The only incorporated town in the reservation, Batesland, is found in eastern Oglala Lakota County. Roughly 133,000 acres of Badlands intersect the northwest portion of Oglala Lakota County. The White River and White Clay Creek bisect the county, while the Cheyenne River borders Custer County to the northwest.

The reservation is divided into nine political districts. Each district has one elected council member representative per 1,000 tribal members within the district. These districts include:

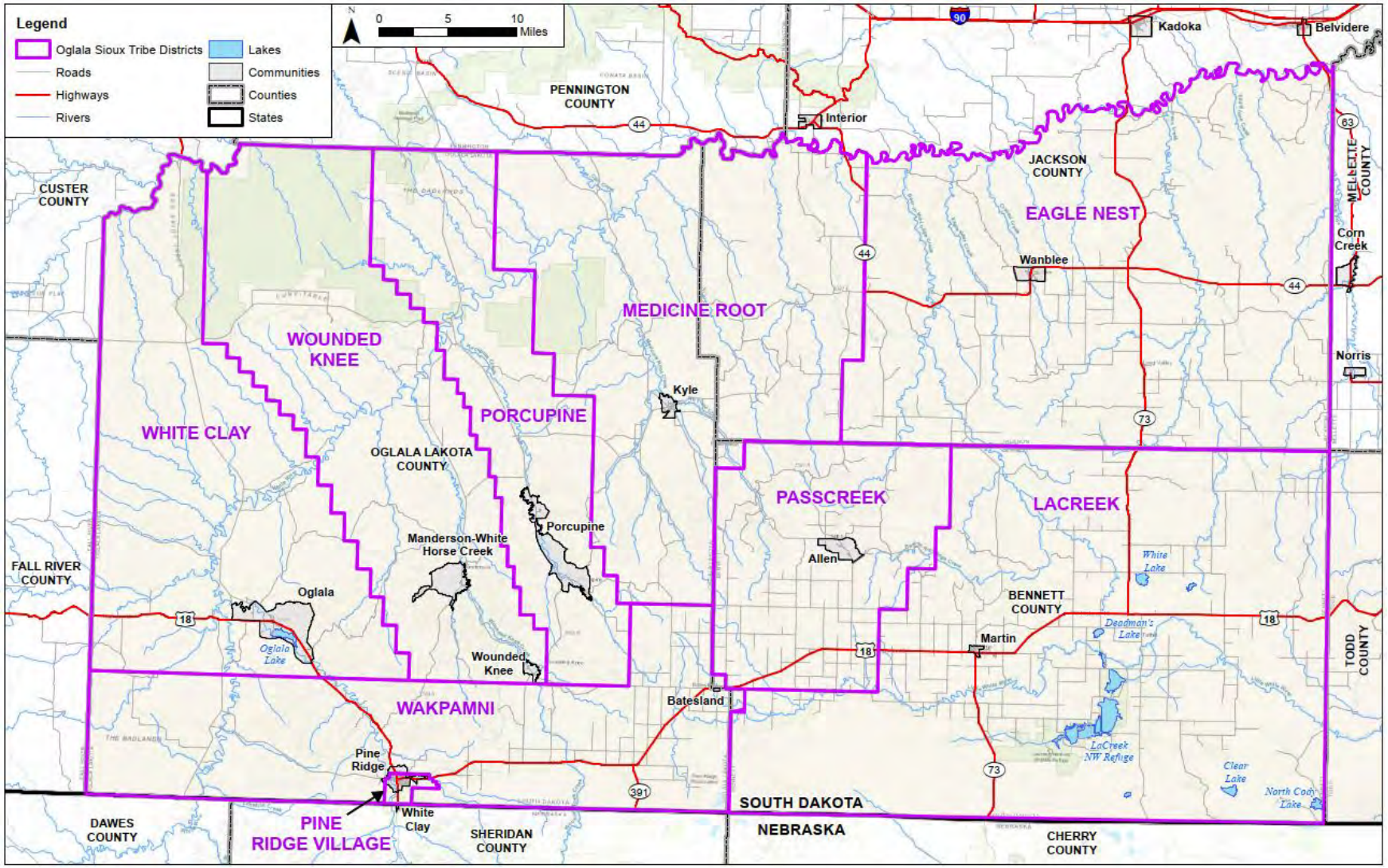
- Eagle Nest
- Lacreek
- Medicine Root
- Pass Creek
- Pine Ridge Village
- Porcupine
- Wakpamni
- White Clay
- Wounded Knee

A map of the Pine Ridge Reservations location in South Dakota is provided in **Figure 3-1**, with the boundaries the reservations nine districts shown in **Figure 3-2**.

Figure 3-1 Pine Ridge Reservation Location



Figure 3-2 Pine Ridge Reservation and Oglala Sioux Tribal District Boundaries



3.1.2 Climate

For the Pine Ridge Reservation, the normal high temperature for the month of July is 88.1˚F. The normal low temperature for the month of January is 9.1˚F. On average, the reservation receives 19.6 inches of rain and 34.9 inches of snowfall per year. The following table compares these climate indicators with those of the entire state. Climate data are helpful in determining if certain events are more or less likely to occur in specific geographic locations. A climate summary is provided for the reservation and the state below as the region as a whole is expected to receive similar conditions. For a more in-depth discussion of climate impacts, see Section Four: Risk Assessment.

Table 3-1 Climate Data for Pine Ridge Reservation

VARIABLE	PINE RIDGE RESERVATION	STATE OF SOUTH DAKOTA
July Normal High Temp	88.1˚F	86.5˚F
January Normal Low Temp	9.1˚F	5.0˚F
Annual Normal Precipitation	19.59 inches	19.21 inches
Annual Normal Snowfall	34.9 inches	24.1 – 36.0 inches

Source: High Plains Regional Climate Center, 1981-2010 Climate Normals; NCEI, Jan 1895-March 2018
*Precipitation includes all rain and melted snow and ice.

3.1.3 Historic and Cultural Sites

In support of Goal 4 of this HMP, the protection of historic and culturally significant sites and artifacts is of the utmost importance to the community. Additionally, any site older than 50 years may be considered historic and may trigger applicable historic preservation rules. Sites that contain cultural resources such as historic buildings, fossils, tipi rings, fire pits, ancient bones and flake chips from the making of arrowheads are protected. To aid in their protection, their locations are not publicly disclosed. Some culturally important sites include Stronghold Table, the Wounded-Knee Massacre Site, Bigfoot Trail, and the old prison camp. Many residents have private facilities and sites for ceremonies and cultural events. The National Register of Historic Places for South Dakota, which was verified by the Planning Team, identifies some historic sites which are listed in the table below.

Table 3-2 National Historic Registry

SITE NAME	ADDRESS	DATE LISTED
Inland Theatre	306 Main St Martin, SD	7/30/2013
Lip's Camp	Address Restricted Wanblee, SD	6/11/1975
Wounded Knee Massacre Site	Wounded Knee Massacre Site	10/15/1966

Source: National Park Service; https://npgallery.nps.gov/NRHP/AdvancedSearch/.

3.1.4 State And Federally Owned Properties

The following table provides an inventory of state and federally owned properties within the planning area.

Table 3-3 State and Federally Owned Facilities

FACILITY	NEAREST COMMUNITY
Badlands National Park	Red Shirt/Rockyford
Various State-Owned Properties	Reservation-wide
US Department of Roads/ Bureau of Indian Affairs (BIA) Roads	Highways Reservation-wide
Lacreek National Wildlife Refuge	Martin

FACILITY	NEAREST COMMUNITY
Allen Clinic – Indian Health Services (IHS)	Allen
Wanblee Health Center – IHS	Wanblee
Kyle Health Center – IHS	Kyle
Pine Ridge Hospital - IHS	Pine Ridge
Manderson Clinic – IHS	Manderson-White Horse Creek

Source: County Assessors

3.1.5 Economy and Housing

The reservation's economic base is a mixture of education and arts and entertainment uses. Employment statistics for the Pine Ridge Reservation, counties, state, and participating community are found below. The U.S. Census Bureau defines "not in the labor force" as individuals without a current job and who are not looking for one. These may include students, stay-at-home parents, and retirees. Individuals within the "Population 16 and Over in Labor Force" without a current job but that are currently looking for work are included in the unemployment rate.

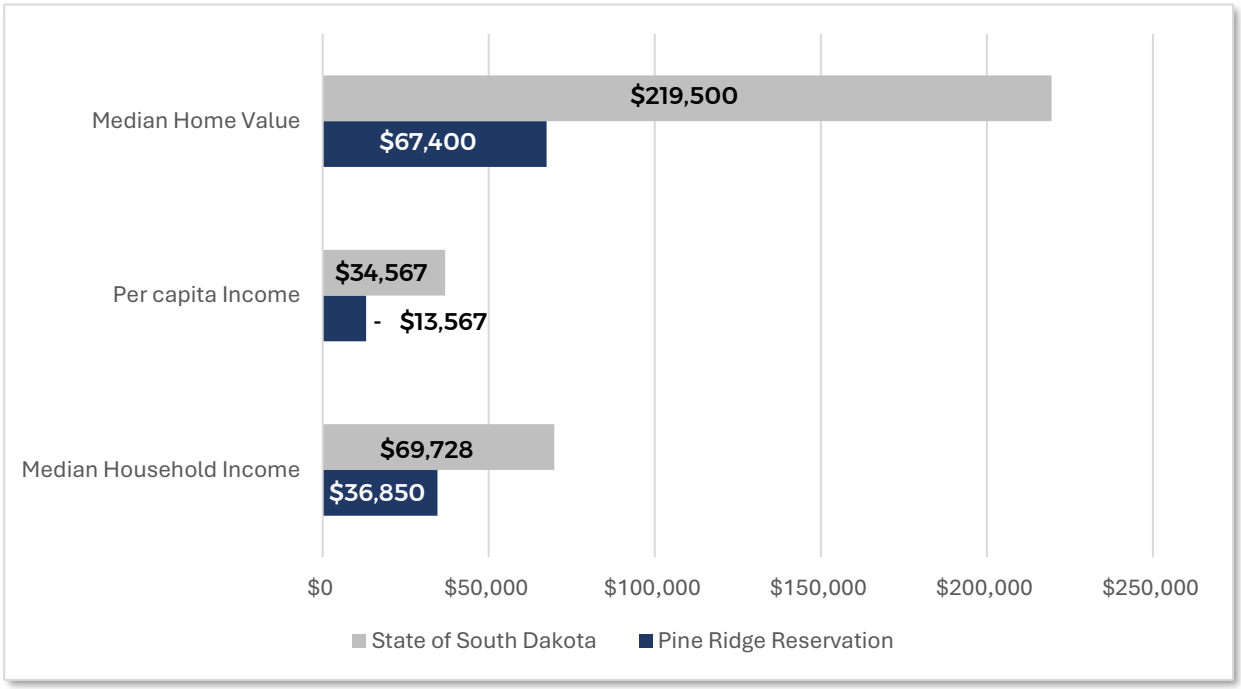
Table 3-4 Employment Statistics on Pine Ridge Reservation

CHARACTERISTIC	PERCENT OF POPULATION
Employed	36.8%
Unemployed	4.5%
Management, business, science, and arts occupations	36.5%
Service occupations	24.7%
Sales and office occupations	16.1%
Natural resources, construction, and maintenance occupations	12.4%
Production, transportation, and material moving occupations	10.3%

Source: U.S. Census Bureau, 2022:ACS 5-Year Estimates, https://data.census.gov/

In comparison to the State of South Dakota, OST has significantly lower median household income, per capita income, and median home values. Additionally, the overall poverty rate within the Pine Ridge Reservation is 50.2%, more than four times the overall poverty rate of the State of South Dakota as a whole, which is 12.3%.

Figure 3-3 Housing and Income



Source: U.S. Census Bureau, 2022 ACS 5-Year Estimates

3.2 Growth and Development Trends

3.2.1 Populations, Demographics, and Structural Vulnerability

The population of the Pine Ridge Reservation as recorded by the US Census Bureau is outlined in **Table 3-5** below. It is important to note that tribal nations are regularly misrepresented by the Census due to a wide variety of factors such as residential mobility, language and literacy barriers, concealment of information because of a disbelief in census confidentiality, fear of retribution from authorities for violation of housing codes or other regulations, irregular and complex household arrangements, and resistance as a strategy for dealing with outsiders, particularly government representatives (NBC News 2019). Acknowledging these potential barriers to accuracy, the US Census Bureau American Community Survey (ACS) is the best available source for consistent data on the wide variety of demographic, housing, social, and economic factors discussed throughout this chapter.

According to these numbers, the Pine Ridge Reservation saw a population decline of 4.14% from 2017 to 2022. While population fluctuations are common, the Census Bureau's methods may not accurately reflect tribal populations. Therefore, the true population might be higher than reported.

Table 3-5 Population of Pine Ridge Reservation

2010	2015	2017	2022	# CHANGE 2017-2022	% CHANGE 2017-2022
18,710	19,541	19,779	18,961	-818	-4.14%

Source: US Census Bureau ACS 5-Year Estimates

Select demographic and social characteristics are shown in **Table 3-6** below.

Table 3-6 Demographic and Social Characteristics, 2022

CHARACTERISTIC	2017	2022	% CHANGE
Total Population	19,779	18,961	-4.31%
SEX AND AGE			
Under 5 years	10.5%	8.8%	-1.7%
Median age (years)	26	26.7	2.62%
Under 18 years	36.7%	37.0%	0.3%
65 years and over	7.5%	8.7%	1.2%
Male	47.5%	48.6%	1.1%
Female	52.5%	51.4%	-1.1%
EDUCATIONAL ATTAINMENT			
High school graduate or higher	76.8%	77.7%	0.9%
Bachelor's degree or higher	13.6%	11.%	-2.6%
INCOME			
Median household income (dollars)	$32,197	$34,567	6.86%
Per capita income (dollars)	$10,509	$13,047	19.45%
VULNERABLE POPULATIONS			
All people below the poverty level	50.4%	50.2%	-0.2%
People under 18 years below the poverty level	59.3%	56.2%	-3.1%
No health insurance coverage	31.3%	38.3%	7.0%
With a disability	15.2%	10.6%	-4.6%
Speak English less than "very well"	2.2%	1.3%	-0.9%
HOUSING			
Total housing units	5,374	5,189	-3.57%
Vacant housing units	19.1%	21.5%	2.4%
Mobile home	28.0%	20.0%	-8.0%
Occupied housing units	4,350	4,071	-6.85%
Owner-occupied	53.8%	53.5%	-0.3%
Renter-occupied	46.2%	46.5%	0.3%
Average household size	4.46	4.57	11.0%
No vehicles available	12.1%	17.8%	5.7%
Gross Rent Median (dollars)	$499	$554	9.93%
RACE			
American Indian and Alaska Native	83.4%	85.9%	2.5%
White	11.2%	11.6%	0.4%
Hispanic or Latino	4.1%	5.5%	1.4%
Black or African American	0.1%	0.1%	0.0%
Asian	0.1%	0.3%	0.2%
Two or more races	3.9%	1.2%	-2.7%

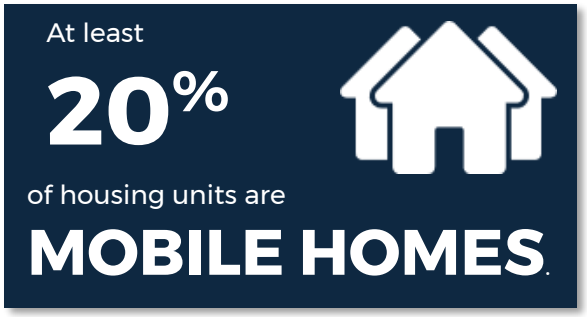
Source: A Source: ACS 2018-2022

The US Census also provides information related to housing units and potential areas of vulnerability. The selected characteristics are examined in **Table 3-7**. Additional details specific to Oglala Lakota County can be found in the County Annex.

Table 3-7 Selected Housing Characteristics

CHARACTERISTIC	PINE RIDGE RESERVATION		STATE OF SOUTH DAKOTA	
	ESTIMATE	PERCENT	ESTIMATE	PERCENT
HOUSING OCCUPANCY				
Total Housing Units	5,189	5,189	396,623	396,623
Occupied Housing Units	4,071	78.5%	351,182	88.5%
HOUSING TENURE				
Occupied Housing Units	4,071	4,071	351,182	351,182
Owner-Occupied	2,176	53.5%	240,328	68.4%
Renter-Occupied	1,895	46.5%	110,854	31.6%
VEHICLES AVAILABLE				
No Vehicles Available	726	17.8%	17,556	5.0%
1 Vehicle Available	1,305	32.1%	99,987	28.5%
2 or More Vehicles Available	2,040	50.1%	233,639	66.5%
HOUSE HEATING FUEL				
Utility Gas	32	0.8%	165,389	47.1%
Bottled, Tank, Or LP Gas	2,197	54.0%	55,269	15.7%
Electricity	1,375	33.8%	113,906	32.4%
Fuel Oil, Kerosene, etc.	86	2.1%	4,996	1.4%
Coal Or Coke	0	0.0%	118	0.0%
Wood	373	9.2%	4,596	1.3%
Solar Energy	0	0.0%	63	0.0%
Other Fuel	8	0.2%	4,123	1.2%
No Fuel Used	0	0.0%	2,722	0.8%
SELECTED CHARACTERISTICS				
Lacking Complete Plumbing Facilities	266	6.5%	1,771	0.5%
Lacking Complete Kitchen Facilities	230	5.6%	3,468	1.0%
No Telephone Service Available	564	13.9%	4,653	1.3%
Mobile home	1,039	20.0%	31,091	7.8%
Median Home Value	$67,400	(X)	$219,500	(X)
Median Rent	$554	(X)	$878	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME				
Less Than 15.0 Percent	523	33.5%	19,390	19.2%
15.0 To 19.9 Percent	140	9.0%	15,777	15.6%
20.0 To 24.9 Percent	200	12.8%	14,273	14.2%
25.0 To 29.9 Percent	60	3.8%	12,359	12.3%
30.0 To 34.9 Percent	46	2.9%	8,981	8.9%
35.0 Percent or More	593	38.0%	30,067	29.8%
Not Computed	333	(X)	10,007	(X)

Source: U.S. Census Bureau, 2022:American Community Survey (ACS) 5-Year Estimates, https://data.census.gov/

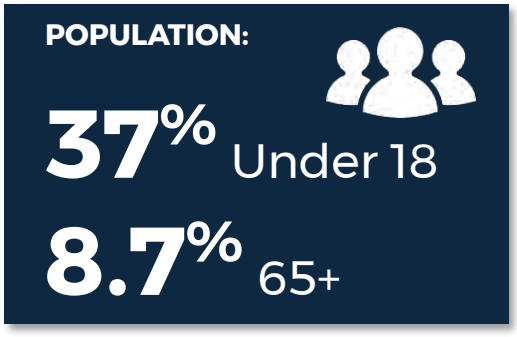


The structural vulnerability within Oglala Lakota County and the Pine Ridge Reservation is significant, with few buildings rated to withstand straight-line winds, tornadoes, or severe storms. While some schools, such as the Redshirt Community School in the White Clay District, are equipped with EF4/EF5-rated concrete domes, most structures lack similar resilience. Indian Health Service (IHS) brick facilities have some level of rating and established tornado shelter protocols for employees, which can occasionally be opened to the public during emergencies. In the event of cold weather or extreme temperature events, schools can serve as temporary shelters, though district buildings have limited capacity. Although there are a few youth shelters across the Reservation, they are not rated for heavy storms or high winds.

At least 20% of housing units in the planning area are mobile homes. Mobile homes have a higher risk of sustaining damages during high wind events, tornadoes, severe thunderstorms, and severe winter storms. Mobile homes that are either not anchored or are anchored incorrectly can be overturned by 60 mph winds. A thunderstorm is classified as severe when wind speeds exceed 58 mph, placing improperly anchored mobile homes at risk.

The Oglala Sioux (Lakota) Housing Authority (OSLHA) is a Tribally Designated Housing Entity chartered in 1998 which now serves approximately 14,000 people on the Pine Ridge Reservation. OSLHA manages more than 1,200 low-income rental units and has built over 500 home ownership units for tribal members. Since 2007 OLC has obtained and managed over $14 million in competitive grant funding to rehabilitate existing houses, construct new houses, and develop new sites for housing including subdivisions in each of the nine districts.

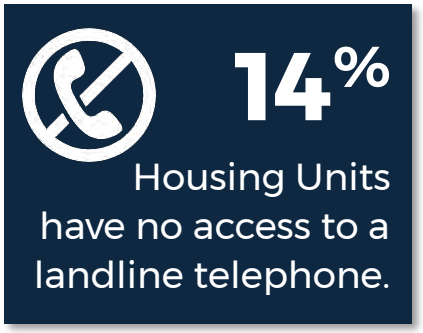
OSLHA manages numerous projects to improve the safety and efficiency of homes throughout the planning area. OSLHA has partnered with the State of South Dakota's Governor House program, which was conceived to provide affordable housing, particularly for senior, disabled, and low-income populations. Some of these homes have been made available for sale to support accessible home ownership on the Reservation, while some have been reserved by OSLHA to serve as low-cost rental units. OSLHA has completed several projects including utilizing a HUD Rural Innovation Grant for $2,000,0000 to design and build 18 energy-efficient and low-maintenance, low-rent houses, two in each of the reservation's districts. OSLHA has also administered funds from the American Rescue Plan Act of 2021 COVID-19 Financial Hardship Homeowner Assistance Fund. Through this program, OSLHA has helped to prevent mortgage delinquencies and defaults, foreclosures, loss of utilities or home energy services, and displacement of homeowners experiencing financial hardship after January 21, 2020, due to the COVID-19 pandemic. Current projects include rehabilitating low-rent housing units, construction of safe houses, water upgrades, lagoon upgrades and expansion, substance abuse and suicide prevention youth programs, and improvements to water, wastewater, and solid waste management systems.



3.2.2 Social Vulnerability

According to the American Community Survey (ACS) 2022 5-Year Estimates, 37% of the population on the reservation is under age 18, and 8.7% is over age 65. The survey recorded 5,189 households, with an average household size of 4.57 people, significantly larger than the US average of 2.6 people per household.

Approximately 14% of housing units within the Reservation lack access to landline telephone service. This does not necessarily indicate that there is not a phone in the housing unit, as cellular telephones are increasingly a primary form of telephone service. However, this lack of access to landline telephone service does represent a population at increased risk to disaster impacts. Reverse 911 systems are designed to contact households via landline services and as a result, some homes in hazard prone areas may not receive notification of potential impacts in time to take protective actions. Emergency managers should continue to promote the registration of cell phone numbers with Reverse 911 systems.



Children and youth are particularly vulnerable, with medical challenges that can be exacerbated during cold and flu seasons, making it difficult to get them to and from medical appointments. The increase in teen and youth suicides since the pandemic, along with rising emergency room visits due to wildfire smoke, further underscores the risks facing this population.

Like minors, seniors (age 65 and greater) are often more significantly impacted by temperature extremes. During prolonged heat waves, seniors may lack resources to effectively address the hazards and as a result may incur injury or potentially death. Prolonged power outages, either standalone events or as the result of other contributing factors, can have significant impacts on any citizen relying on medical devices for proper bodily functions. One study conducted by the Center for Injury Research and Policy found that increases in vulnerability related to severe winter storms (with significant snow accumulations) begin at age 55. The study found that on average there are 11,500 injuries and 100 deaths annually related to snow removal. Males over the age of 55 are 4.25 times more likely to experience cardiac symptoms during snow removal.

As noted above, senior populations make up approximately 8.7% of the Reservation population. These residents are also more likely to be dependent on hard-to-reach health care facilities. **Table 3-8** identifies the number and bed capacity of care facilities throughout the planning area. While Rural Health Clinics do not have beds to allow overnight patients, daytime facilities contain a concentrated number of patients. IHS operates a hospital in Pine Ridge, which is larger and capable of providing more health services than the Rural Health Clinics. These health care facilities don't support permanent housing, but they are likely to see higher concentrations of vulnerable residents which could increase vulnerability to hazards should the facility be damaged or destroyed in a hazard event.

Table 3-8 Inventory of Care Facilities

FACILITY TYPE	LOCATION	NUMBER OF BEDS
Allen Clinic	Allen	-
Wanblee Health Center	Wanblee	48
Kyle Health Center	Kyle	-
Pine Ridge Hospital	Pine Ridge	45
Dialysis Center Sharps Corner	OST	-
Manderson Clinic	Manderson-White Horse Creek	-

Source: South Dakota Department of Health

The social vulnerability within Oglala Lakota County and the Pine Ridge Reservation is heightened by the presence of widespread medical conditions such as heart disease, cancer, and diabetes. Individuals with these medical conditions are a priority during disasters, as accessing medical care is critical for their survival. However, the rural and dispersed nature of the population, with many

7% increase of those without healthcare coverage

9.93% rise in rent costs

Reservation Poverty Rate
~4X higher
than State Rate

5,189
Reservation Households

Average Household:
4.57 people

U.S. Average:
2.6 people

~40.9%
Reservation Households are considered cost-burdened by housing costs

patients living up to 12 miles off main roads on rural drives, poses significant challenges in providing timely medical support and clearing roads to reach these individuals.

Notable demographic changes include a 7% increase in those without healthcare coverage and a 9.93% rise in rent costs. The percentage of people living below the poverty line has remained around 50% since 2017, much higher than the national average of 11.5%. Oglala Lakota County has the highest poverty rate in South Dakota, making residents below the poverty line more vulnerable to all hazards within the planning area. Residents below the poverty line may lack resources to prepare for, respond to, or recover from hazard events. Residents with limited economic resources will struggle to prioritize the implementation of mitigation measures over more immediate needs.

Further, residents with limited economic resources are more likely to live in older, more vulnerable structures. These structures include mobile homes, which make up at least 20% of the housing on the reservation. These structures are at greater risk of fire due to being highly flammable as well as unstable in the event of tornadoes and high winds. Approximately 40.9% of all households on the Reservation are considered cost-burdened by housing costs, meaning they spend more than 30% of their income on housing costs. This drives up social vulnerability by limiting residents' abilities to financially recover from a disaster. Additional details on how vulnerable populations may be impacted by various hazards are provided in each hazard profile in Chapter 4.

Residents who are non-native English speakers may struggle with a range of issues before, during, and after hazard events. General vulnerabilities revolve around what could be an inability to effectively communicate with others or an inability to comprehend materials aimed at notification and/or education. When presented with a hazardous situation it is important that all community members be able to receive, decipher, and act on relevant information. An inability to understand warnings and notifications may prevent non-English speakers from reacting in a timely manner.

Further, educational materials related to regional hazards are most often developed in the dominant language for the area, for the planning area that would be English. Residents who struggle with English in the written form may not have sufficient information related to local concerns to effectively mitigate potential impacts. Residents with limited English proficiency would be at an increased vulnerability to all hazards within the planning area.

The Planning Team indicated that one-third of the population speak the native Lakota as their first language. However, notifications for hazard events and public outreach materials are distributed in English. The majority of people who speak Lakota are elders, but in recent years there has been an increased push to teach Lakota in grade schools. If the local radio station broadcasts in Lakota, they also provide an English translation.

Additionally, approximately 18% of all housing units do not have a vehicle available. Households without vehicles may have difficulty evacuating during a hazardous event and a reduced ability to access resources in time of need. Many homes throughout the reservation are located on rural

roads or set far back from roads, which may increase vulnerability in the case of evacuation or make it difficult for emergency personnel to provide aid.

3.2.3 Development Trends

The tribal planning area has not experienced significant development over the past five years and currently has no plans for major development projects in the upcoming planning cycle. The area's growth has been largely stagnant due to ongoing challenges such as limited resources, infrastructure constraints, and repeated hazard events that divert resources away from development and toward repair. The need to address ongoing hazards has limited the Tribe's ability to invest in long-term growth initiatives. This instability in land use and infrastructure suggests that existing vulnerabilities and risks identified in the previous assessment remain largely unchanged. With regard to new and future development, it is important to note that any new development is generally viewed by the Tribe as increasing the overall vulnerability to hazards, largely due to the hazard exposure and conditions on the Pine Ridge Reservation

3.3 Capabilities Assessment

As part of developing the plan, the planning team conducted a mitigation capability assessment. This assessment identifies existing plans, policies, and procedures that help reduce hazard losses. By combining the risk assessment with the mitigation capability assessment, the plan can more accurately determine net vulnerability to disasters and better focus its goals, objectives, and proposed actions.

The planning team employed a two-step approach for this assessment. First, they created an inventory of common mitigation activities using a matrix to identify current or potential policies and programs. Second, they conducted a thorough review of existing policies, regulations, plans, projects, and programs to assess their effectiveness in reducing hazard-related losses.

3.3.1 Regulatory Mitigation Capabilities

Table 3-9 outlines the planning and land management tools commonly used by local jurisdictions for implementing hazard mitigation activities and indicates which of these tools are currently in place on the Pine Ridge Reservation.

Table 3-9 Regulatory Mitigation Capabilities

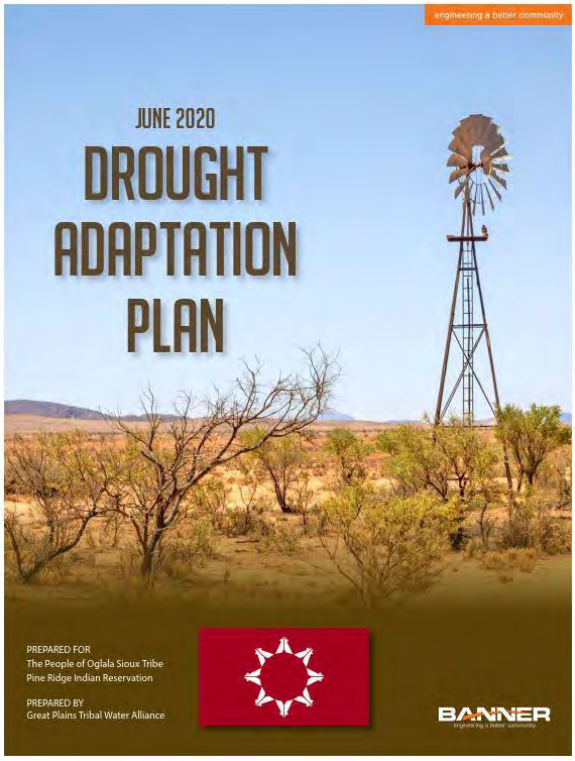
REGULATORY TOOL	CURRENT OST CAPABILITY
Comprehensive, Master or General Plan	No
Land Use Plan	No
Capital Improvement Program or Plan	No – Specific Road Construction Plan updated every 5 years
Economic Development Plan	No
Tribal Emergency Operations Plan	Yes – Base plan complete
Floodplain Management Plan	No
Stormwater Management Plan	No
Stormwater Ordinance	No
Zoning or Land Use Ordinance	No
Subdivision Regulation or Ordinance	No
Building Codes	No
Floodplain Ordinance	No
National Flood Insurance Program	No
Community Rating System	No

REGULATORY TOOL	CURRENT OST CAPABILITY
Wildland Fire Plan	Yes – updating 2024*
Transportation Plan	Road Construction Plan (updated every 5 years);
Historic Preservation Ordinance	No
Debris Management Plan (post-disaster)	No formal plan
Open Space/Conservation Plan	Some cultural areas and wetlands are protected
Environmental Review Code	Yes – Tribal Planning is completing an update to the Tribal Environmental Codes. The Water Code was last updated in 2015, Water Resource Department planning another update to incorporate new climate change data.
Additional Regulatory Mitigation Capabilities	Drought Adaptation Plan (2020) See *Appendix F*

Discussion of Existing Regulatory Mitigation Capabilities

A Tribal Emergency Operations Plan (EOP) is currently being drafted, with the base plan already complete and continued work being conducted to support district-specific EOP materials. This plan will outline procedures and responsibilities for responding to various emergencies, ensuring coordinated actions to protect people, property, and the environment. It will assist organizations in preparing for, responding to, and recovering from emergencies effectively. The Tribal EOP seeks to guide the tribal government through how to respond to and ensure continuity of operations during an emergency or disaster situation. The EOP describes the roles, responsibilities, and functions of each tribal department involved in emergency response. In contrast, this HMP is a long-term strategy which seeks to proactively reduce the overall vulnerability to disasters and improve community resilience for the Pine Ridge Reservation. While these plans are different in their mission and content, both the EOP and HMP support each other and increase OST and OLC's overall resilience to hazards.

The BIA Forestry and Wildland Fire Management – Pine Ridge Agency, which provides wildland fire response efforts for the Reservation, also maintains a Wildland Fire Plan. This plan is in place to manage and mitigate fire hazards, with an update ongoing and scheduled for completion in 2024. The Wildland Fire Plan aims to coordinate efforts among various agencies and stakeholders to enhance the protection of lives, property, and natural resources. Upon completion of the 2024 Wildland Fire Plan, the wildfire risk assessment can be used to inform future iterations of this HMP, providing a detailed assessment of fire risk areas, contributing factors of fire risk, and historical fire data. Mitigation actions suggested in the Wildland Fire Plan can also help inform the broader mitigation strategy of the HMP.



During the next update cycle, the HMP can also further inform the Wildland Fire Plan by providing a foundation to incorporate a wide range of hazards that could exacerbate or be exacerbated by wildfires, aiding the Wildland Fire Plan in multi-hazard risk management. The disproportionate effects of hazards on vulnerable populations that

is explored in the HMP can provide insights that allow the Wildland Fire Plan to address the specific vulnerabilities and needs of populations in fire-prone areas.

OST's Water Resource Department also completed a Drought Adaptation Plan in 2020, included as Appendix F in this HMP. This plan identifies specific vulnerabilities related to drought, including impacts on water supply, agriculture, wildlife, and public health, as well as infrastructure vulnerabilities. This assessment informed the drought profile of the HMP. Additionally, the Drought Adaptation Plan outlines several mitigation strategies and potential programs that were used to inform the mitigation action plan of the HMP. By aligning these two plans, the Tribe can maximize resource efficiency and facilitate improved community resilience through policy and regulatory actions.

As a sovereign government, the Oglala Lakota Nation has the authority to establish and enforce its own building codes on the Pine Ridge Reservation. Currently, neither local codes nor codes recommended by the State of South Dakota are enforced. OST has pursued BRIC funding in previous years to explore the possibility of adopting building codes and providing workforce training to support enforcement work. This is still an initiative the tribe wishes to consider, potentially as a future mitigation action, however there are numerous potential barriers to implementation including code enforcement and how the tribe would bring hundreds of structures on the Reservation into code compliance.

Discussion of National Flood Insurance Program (NFIP) Participation and Compliance

The Oglala Lakota Nation of the Pine Ridge Reservation does not participate in the National Flood Insurance Program (NFIP), and the reservation has not been mapped by FEMA. The Town of Batesland does have an identified Flood Hazard Boundary but does not participate in the NFIP. Review Section A.5.1 of the OLC Annex for more detail on the Town of Batesland and NFIP participation. Jackson County is the only NFIP participant in the planning area, although Jackson County has no special flood hazard area (no SFHA). Because these jurisdictions are not participants in the NFIP, there is no available data on repetitive loss or severe repetitive loss properties in the planning area. However, anecdotal evidence from OST indicates there are properties on the Reservation which have experienced multiple instances of flooding and are likely to in the future.

Table 3-10 Communities with Hazard Area Identified

COMMUNITY NAME	COUNTY	INITIAL FHBM IDENTIFIED	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE	TRIBAL	NFIP PARTICIPATION
Town of Batesland	Oglala Lakota	05/13/1980	None	05.30/80	No	Sanctioned 05/13/81
Jackson County	Jackson	None	None	(no SFHA) 06/08/98	No	Yes

Source: NFIP, August 2024

3.3.2 Administrative and Technical Mitigation Capabilities

Table 3-11 identifies personnel responsible for activities related to mitigation and loss prevention on the Reservation.

Table 3-11 Administrative and Technical Mitigation Capabilities

ADMINISTRATIVE OR TECHNICAL RESOURCE OR TOOL	CURRENT OST CAPABILITY
Planning Board/Planning Commission	Yes – Crazy Horse Planning Commission

ADMINISTRATIVE OR TECHNICAL RESOURCE OR TOOL	CURRENT OST CAPABILITY
Floodplain Administrator	No
GIS Capabilities	Yes
Chief Building Official	No
Civil Engineering	No – contracted
Local staff who can assess community vulnerability to hazards	No
Grant Manager	Yes – Contracts Office, Program Staff, Some programs contract out for individual grants
Mutual Aid Agreement(s)	Yes – some in place for EM, but working to develop resources to help other jurisdictions once capacity is built
Emergency Management	Yes
Community Planner	Yes – Tribal Planning Office Director
Transportation Planner	Not formally – Dave Kelly's office supports planning efforts for Transportation
Warning Systems/Services	Sirens have multiple functions for different storms/hazards; Working with SD EM to add Transportation added to 511 system for road closures; Ever Bridge Mass Communication; IPAWS
Other (if any)	EM Planning and Coordination (Jesse Big Crow)

Changes in community priorities related to hazard mitigation include a greater focus on constructing storm-ready community facilities. The Nation is currently constructing nine community facilities, one in each district. Each facility will have an attached gymnasium that includes meeting spaces, backup generators, kitchen areas, and shelter space for cots, with some storm shelter capabilities built-in or able to be added later.

However, the new buildings are not on a set schedule due to varying designs, timelines, and costs, which presents challenges. Some elements may become cost-prohibitive and might be left out. It is important to consider projects that could be add-ons for community or district offices and buildings, such as generators and shelter space, in case they are omitted initially.

Additionally, schools need backup power generators, but obtaining school board approval for matching funds for these projects can be difficult. Creating a list of sites in need of generators or backup power could be beneficial for future planning.

3.3.3 Financial Capabilities

Table 3-12 lists the financial tools and resources available to the Tribe, which can potentially be used to fund mitigation activities.

Table 3-12 Financial Capabilities

FINANCIAL RESOURCES	CURRENT OST CAPABILITY
Capital Improvement Plan	No
Applied for grants in the past	Yes
Awarded a grant in the past	Yes
Authority to levy taxes for specific purposes, such	Y911 surcharges used by Public Safety but none

FINANCIAL RESOURCES	CURRENT OST CAPABILITY
as Mitigation Projects	levied for mitigation purposes
Gas/Electric Service Fees	No – all vendors, non-Tribal depts
Stormwater Service Fees	No – EM doesn't know of any
Water/Sewer Service Fees	Yes
Development Impact Fees	Yes, TERO fee (Tribal Employment Rights Office collects 4% on construction contracts)
General Obligation Revenue or Special Tax Bonds	...
Community Development Block Grants (CDBG)	Yes – receive on regular basis
Indian Community Development Block Grant (ICDBG)	Yes – At least 2 (possibly more). Housing Dept. Imminent Threat (IT) Grants
BIA Home Improvement Program (HIP)	Yes – have a HIP program

FEMA and Other Grant Funding Leveraged for Hazard Mitigation

Funding for the proposed mitigation projects may come from a variety of sources. Below is a list of funding possibilities. This list is not tied directly to each proposed project; however, these programs could work for specific projects or multiple projects.

- FEMA Hazard Mitigation Assistance Grants including:
  - Building Resilient Infrastructure and Communities (BRIC) program
  - Flood Mitigation Assistance (FMA) program
  - Hazard Mitigation Grant Program (HMGP)
- FEMA High Hazard Potential Dam (HHPD) program
- US Army Corp of Engineers funding
- USDA Environmental Quality Incentive Program
- USDA Conservation Reserve and Conservation Reserve Enhancement Program
- USDA Small Watersheds (NRCS)

The Pine Ridge Reservation has participated in several of these hazard mitigation assistance projects, summarized in Table 3-13 below. There are many more potential funding opportunities available to the Tribe and county. Funding research will be done during the scoping process for each project. New funding mechanisms may be present that were not before.

Table 3-13 OST Hazard Mitigation Assistance Grants

PROGRAM	APPROVAL DATE	PROJECT TYPE	LOCATION	SUBRECIPIENT
HMGP	3/21/2022	400.1: Utility Protective Measures (Electric, Gas, etc.)	Oglala Lakota	La Creek Electric Association
HMGP	12/29/2021	601.1: Generators	Bennett	Bennett County
HMGP	9/9/2021	601.1: Generators	Oglala Lakota	Oglala Sioux Tribe of the Pine Ridge Reservation
HMGP	1/28/2020	205.7: Retrofitting Private Structures - Wind	Oglala Lakota	Oglala Sioux Tribe of the Pine Ridge Reservation
PDM	6/19/2018	91.5: Local Multi-Jurisdictional Multi-Hazard Mitigation Plan -	Bennett	Bennett County Emergency

PROGRAM	APPROVAL DATE	PROJECT TYPE	LOCATION	SUBRECIPIENT
		UPDATE		Management
HMGP	4/3/2017	93.3: Tribal Multi-Hazard Mitigation Plan - UPDATE	Oglala Lakota	Oglala Sioux Tribe of the Pine Ridge Reservation
HMGP	10/11/2016	700.1: Management Costs - Salaries; 700.4: Management Costs - Supplies	Oglala Lakota	Oglala Sioux Tribe of the Pine Ridge Reservation
PDM	2/24/2016	91.1: Local Multi-Hazard Mitigation Plan	Jackson	Jackson County
HMGP	1/9/2015	91.1: Local Multi-Hazard Mitigation Plan	Oglala Lakota	Oglala Lakota County
HMGP	1/20/2012	91.1: Local Multi-Hazard Mitigation Plan	Jackson	Jackson County
HMGP	1/20/2012	91.1: Local Multi-Hazard Mitigation Plan	Bennett	Bennett County
HMGP	3/12/2007	91.1: Local Multi-Hazard Mitigation Plan	Jackson	Jackson County

3.3.4 Education and Outreach Capabilities

Table 3-14 below summarizes the existing education and outreach capabilities available to the Tribe.

Table 3-14 Education and Outreach Capabilities

EDUCATION AND OUTREACH RESOURCES	CURRENT OST CAPABILITY
Ongoing public education or information programs (i.e. responsible water use, fire safety programs, household preparedness, environmental education)	District and community trainings for mitigation, awareness trainings, train the trainer courses to be able to deliver to district-level (Jesse). Health Admin does lots of outreach and education/workshops as well.
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations	Yes - Lakota Nation Disaster Resiliency (LNDR), Partnership with Native Americans (PWNA), South Dakota Volunteer Orgs. Active in Disaster (VOAD)
Firewise Communities Certification	No – still talking to BIA about Firewise Communities Certifications
StormReady Certification	No
Natural Disaster or Safety-related school programs or curriculum	Yes - Working with Lakota Tech about adding courses for CERT, CPR/First Aid. Work with schools to distribute SD OEM information
Tree City USA	No
Other (if any)	

Non-Governmental Organizations (NGOs) and Mitigation Partnerships

Table 3-15 shows the local chapters partnered with the County and participating jurisdictions. Mitigation related partnerships include:

Table 3-15 NGOs and Mitigation Partnerships

NGOS	OST RESOURCE
American Red Cross	The Red Cross of Western and Central South Dakota
Community Organizations (Lions, Kiwanis, etc.)	Re-Member, Friends of Pine Ridge Reservation, One Spirit, Mission of Love, Lakota Friends Circle
Environmental Groups	Earth Tipi, Knife Chief Buffalo Nation Society, Lakota Lands Recovery Project
Salvation Army	The Salvation Army Western Division
Veterans Groups	OST Homeless Veterans Shelter, Native Vets

3.3.5 Overall Capability Summary

The OST is regulated by Tribal ordinances, codes, and policies that address the Tribe's capacity to implement pre- and post-disaster mitigation activities.

OST has experience managing multiple federal grants with grant writers, contracting assistance, and procurement personnel to administer these grants. Tribal procurement regulations are well defined and adhered to ensure that the grant requirements are fulfilled. The Tribe is dependent on these federal grants to meet the basic needs of the Tribe and takes the administration of these grants very seriously.

OLC and OST emergency management reviewed existing codes, ordinances, resolutions, and policies to ensure that mitigation projects are in compliance and meet benefit-cost criteria for HMA funding. The Tribe understands that many federal grants, including HMA grants, require matching funds to support the projects. OST has limited financing available to accommodate these matching requirements; however, the Tribe has comprehensive experience in utilizing in-kind labor for local share.

The Tribal environmental review code states that there is a historical, cultural, and spiritual relationship between the Oglala Sioux people and the natural environment. As such, it is the Tribe's policy to protect and preserve the Pine Ridge Indian Reservation environment and to provide a safe and habitable place for its people. This is being done by establishing procedures to monitor growth and development within the Tribe's jurisdiction. The code states that any new development on the reservation requires a permit and a permit will only be granted if the development is low impact.

OST and OLC currently do not have comprehensive/general plans, zoning ordinances, or floodplain ordinances. During the second Planning Team meeting, there was a thorough discussion regarding the lack of zoning ordinances for the planning area. Several Planning Team members noted that having zoning and floodplain ordinances would be beneficial in reducing the risk to hazards for their communities and residents. While the Tribe and County have identified in *Section Five: Mitigation Strategy* the development of building codes and zoning ordinances as a high priority for the planning area. A future comprehensive or general plan would be another opportunity to integrate this HMP with the wider visioning and future growth of the Reservation. During discussions with the Planning Team, it was widely discussed that while having building codes in place would be beneficial in hazard mitigation, there are significant existing barriers to this initiative. Specifically, beyond just code adoption the tribe would have difficulty with code enforcement, and bringing potentially thousands of residences across the Reservation up to code may place an undue burden on residents. This is still be considered as a potential future action, with attention needed on addressing these issues.

Local schools throughout the reservation have their own emergency response plans which identify emergency procedures in the case of hazard events, but do not identify specific mitigation actions.

Table 3-16 Overall Capability Summary

OVERALL CAPABILITY (LIMITED/MODERATE/HIGH)	OST	OLC
Does your jurisdiction have the financial resources need to implement mitigation projects?	Limited	Limited
Does your jurisdiction have the staff/expertise to implement projects?	Moderate	Limited
Does your jurisdiction have the community support to implement projects?	Moderate	Moderate
Does your jurisdiction staff have the time to devote to hazard mitigation?	Limited	Moderate

3.3.6 Opportunities for Enhancement

The Oglala Lakota Nation of the Pine Ridge Reservation has strong mitigation capacity, supported by extensive outreach efforts and partnerships to maximize implementation potential. Additionally, the Nation has sufficient potential revenue sources for further mitigation funding. These resources could be utilized to implement mitigation measures on the Pine Ridge Reservation.

As discussed above, OST and OLC have considered pursuing adoption and enforcement of building codes. Additionally, the Tribe could pursue developing and adopting a zoning code or land use ordinance. The Pine Ridge Reservation experienced severe flooding most recently in early 2019, which forced evacuations and required a reactive response from OST. While regulations cannot prevent flooding, zoning to restrict building in flood hazard areas or building codes that address flood hazards could help mitigate the impacts.

The OST Tribal Tax Commission manages tax-related matters on the Reservation, including implementing regulations, collecting taxes, and ensuring compliance. Funds collected from local tribally owned businesses can be used for mitigation purposes. Additionally, the Nation can apply for and utilize 638 contract funding for a variety of mitigation projects, including hazardous fuel reduction, flood mitigation, infrastructure protection, and emergency preparedness.

The Nation could consider hiring or establishing a grant writer or mitigation project specialist to improve the chances of securing funding by crafting proposals and navigating complex grant applications. This expertise can help ensure that the Nation effectively uses available financial resources for its projects and initiatives. As noted in Administrative and Technical Mitigation Capabilities, the Nation is prioritizing acquiring backup power for schools and community centers to use as emergency shelters. A grant writer or mitigation project specialist could be extremely beneficial in securing the necessary funds. Below is a list of potential grants for purchasing these generators.

- **Tribal Homeland Security Grant Program (THSGP)**: Provides funding to enhance Tribal Nations' ability to prevent, prepare for, protect against, and respond to terrorist attacks and other hazards. Generators for emergency shelters are eligible expenses under this program.
- **Hazard Mitigation Assistance (HMA) Programs**: Includes the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) Program, which fund projects that reduce disaster risk. Generators for critical facilities, such as emergency shelters, can be funded if they meet eligibility criteria.
- **Emergency Management Performance Grant (EMPG) Program**: Supports state, local, tribal, and territorial governments in enhancing emergency management capabilities, including purchasing generators for emergency shelters. This program aims to improve resilience and preparedness by ensuring reliable power sources during emergencies.

Additional financial resources the Nation can apply for to increase mitigation capabilities include:

- **The Bureau of Indian Affairs (BIA) Wildland Fire Management program:** Offers grants and funding for wildland fire management on federal trust lands held for federally recognized Tribes and individuals.
- **FEMA's Fire Management Assistance Grant (FMAG) Program**: Designed to provide financial assistance to state, local, and tribal governments for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands that threaten to cause major destruction.

Finally, mitigation capabilities can be expanded through education incorporated into local celebrations, fairs, and committee meetings. By partnering with community schools, colleges, neighboring tribes, and emergency management agencies, the spread of knowledge about the importance of mitigation, especially to younger people, can be enhanced. These collaborations can also generate ideas for educational safety programs and effective mitigation actions.

4 Risk Assessment

4.1 Introduction

The ultimate purpose of this hazard mitigation plan is to minimize the loss of life, resources, and property across the planning area. The Hazard Identification and Risk Assessment (HIRA) focuses attention on areas most in need by analyzing the populations, property, and facilities that are most vulnerable to hazards and to what extent damages may occur. The risk assessment identifies how people, properties, and structures could potentially be damaged due to a hazard event. If the hazard can harm structures or people, that is considered a vulnerability. Finding weak points in the system includes identifying building types that are vulnerable to damage and anticipating the loss in high-risk areas. This will help the community to decide what mitigation efforts are required or should be undertaken and how to implement the selected activities.

The following table defines terms that will be used throughout this section of the plan.

Table 4-1 Term Definitions

TERM	DEFINITION
Hazard	A potential source of injury, death, or damages
Asset	People, structures, facilities, and systems that have value to the community
Risk	The potential for damages, loss, or other impacts created by the interaction of hazards and assets
Vulnerability	Susceptibility to injury, death, or damages to a specific hazard
Impact	The consequence or effect of a hazard on the community or assets
Past/Historical Occurrence	The number of hazard events reported during a defined period of time
Extent	The strength or magnitude of the hazard
Probability	Likelihood of a hazard occurring in the future

4.1.1 Hazard Identification

The identification of relevant hazards for the planning area for this plan update began with a review of the 2019 Oglala Sioux Tribe (OST) and Oglala Lakota County (OLC) Hazard Mitigation Plan (HMP), and the 2024 State of South Dakota Enhanced State Hazard Mitigation Plan (ESHMP). The Tribal Planning Team (TPT) reviewed the list of hazards addressed in these two plans and determined which hazards were appropriate for discussion relative to the planning area. A risk assessment was completed for the hazards listed in Table 4-2. As shown in the table, the 2024 OST HMP addresses every hazard covered by the 2019 OST HMP and the South Dakota ESHMP, and also includes additional technological/manmade hazards that pose a risk to the Tribe.

Table 4-2 Hazard Identification and Comparison Chart

2019 OST & OLC HMP	2024 SOUTH DAKOTA ESHMP	2024 OST HMP
Agricultural Plant Disease	Agricultural Pests and Diseases	Animal/Plant/Crop Disease
Bombing Range	--	Bombing Range
Civil Disorder	--	Civil Disorder
Communicable Disease	--	Communicable Disease

2019 OST & OLC HMP	2024 SOUTH DAKOTA ESHMP	2024 OST HMP
Dam Failure	--	Dam Failure
Drought	Drought (Including Extreme Heat)	Drought
Earthquake	Geologic Hazards	Earthquake
Extreme Heat	--	Extreme Temperatures
Flooding	Flood (Including Dam and Levee Failure	Flooding
Grass/Wildfire	Wildfire	Grass/Wildfire
Hail	--	Hail
Hazardous Materials Incident	Hazardous Materials	Hazardous Materials Incident
High Winds	Windstorm	High Winds
Severe Thunderstorms	Summer Storm (Including Lightning and Hail)	Severe Thunderstorms
Severe Winter Storms	Winter Storm	Severe Winter Storms
--	--	Structure Fire
Tornadoes	Tornado	Tornadoes

The hazards evaluated in this plan have occurred historically or have the potential to cause significant human, monetary, and/or cultural losses in the future. No hazards were removed from the 2019 plan. Structure Fire was added as a new hazard to profile, while Extreme Heat was expanded to Extreme Temperatures and Agricultural Plant Disease was expanded to Animal/Plant/Crop Disease. These updates allowed the Tribe to be more specific and capture more detail on the risks and vulnerabilities present on the Pine Ridge Indian Reservation.

4.1.2 Hazard and Risk Assessment Methodology

The risk assessment methodology utilized for this plan consists of four primary steps:

1) Describe the hazard;
2) Identify vulnerable community assets;
3) Analyze risk; and
4) Summarize vulnerability.

Through the profiling process the planning team discussed: past occurrences; the probability of the hazard occurring again in the future; the vulnerability of the population and assets that will be affected by the hazard; the maximum geographic extent; the magnitude or severity of the hazard in terms of injuries/fatalities, personal property, and infrastructure; the impacts of climate change on each hazard; the likelihood for cascading/related hazards to be triggered by each hazard; and an overall risk summary to highlight the key takeaways of the risk assessment.



Requirement §201.7(c)(2):

A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment shall include:

i. A description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

ii. A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

iii. For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The economic impact of disasters is a relatively new area of record-keeping and is generally restricted to major disasters involving both state and federal funding. Smaller, less significant events often do not reflect the economic impact of the incident. For these smaller events, there is a greater reliance on local information and records of impacts.

Table 4-3 below includes a summary of the significance indicators and overall significance rating for each hazard profiled in this HMP. For each of the hazards profiled the best and most appropriate data available will be considered. Further discussion relative to each hazard is discussed in the hazard profile portion of this section.

Table 4-3 Hazard Significance Ranking Summary

HAZARD	LOCATION	FUTURE PROBABILITY	MAGNITUDE/ SEVERITY	HAZARD SIGNIFICANCE
Animal/Crop/Plant Disease	Extensive	Highly Likely	Moderate	**Medium**
Bombing Range	Limited	Unlikely	Critical	**Low**
Civil Disorder	Limited	Occasional	Negligible	**Low**
Communicable Disease	Significant	Likely	Critical	**Medium**
Dam Failure	Limited	Unlikely	Critical	**Medium**
Drought	Extensive	Likely	Critical	**High**
Earthquakes	Negligible	Unlikely	Negligible	**Low**
Extreme Temperatures	Extensive	Highly Likely	Moderate	**High**
Flooding	Significant	Likely	Moderate	**High**
Grass/Wildfire	Significant	Highly Likely	Critical	**High**
Hail	Significant	Highly Likely	Critical	**High**
Hazardous Materials Incidents	Limited	Occasional	Negligible	**Low**
High Winds	Extensive	Highly Likely	Moderate	**High**
Severe Thunderstorms	Extensive	Highly Likely	Moderate	**Medium**
Severe Winter Storms	Extensive	Highly Likely	Moderate	**High**
Structure Fire	Significant	Highly Likely	Moderate	**Medium**
Tornadoes	Significant	Highly Likely	Moderate	**Medium**

Location

Extensive: 50-100% of planning area

Significant: 10-50% of planning area

Limited: Less than 10% of planning area

Potential Magnitude/Severity

Catastrophic: Multiple deaths, shutdown of facilities for 30 days or more, >50% of property is severely damaged

Critical: Multiple severe injuries, shutdown of facilities for at least 2 weeks, >25% of property is severely damaged

Moderate: Some injuries, shutdown of critical facilities for more than one week, >10% of property is severely damaged

Negligible: Minor injuries, minimal quality-of-life impact, interruption of facilities and services for 24 hours or less, less than 10% of property is severely damaged.

Probability of Future Occurrence

Highly Likely: Near 100% probability each year.

Likely: Between 10 and 100% probability per year or at least one chance in ten years.

Occasional: Between 1 and 10% probability per year or at least one chance in next 100 years.

Unlikely: Less than 1% probability in next 100 years.

Overall Significance

(Based on the preceding three factors)

High: widespread potential impact

Medium: moderate potential impact

Low: minimal potential impact

4.1.3 Presidential Disaster Declarations

The Presidential disaster declarations involving the planning area from 1976 to 2024 are summarized in **Table 4-4**. Prior to 2013, tribal reservations were included in County or State based Presidential emergency or major disaster declarations. The Sandy Recovery Improvement Act of 2013 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act to allow federally recognized Indian tribal governments the ability to request a disaster declaration.

Table 4-4 Presidential Disaster Declarations

DISASTER NUMBER	DECLARATION DATE	INCIDENT SUBCATEGORY	JURISDICTION
3015	06/17/1976	Drought	Oglala Lakota County
1156	01/10/1997	Severe Storm	Oglala Lakota County
1173	04/07/1997	Flood	Oglala Lakota County
1280	06/09/1999	Tornado	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
1330	05/19/2000	Severe Storm	Oglala Lakota County
3234	09/10/2005	Coastal Storm	Oglala Lakota County
1702	05/22/2007	Severe Storm	Oglala Sioux Tribe of the Pine Ridge Reservation
1811	12/12/2008	Snowstorm	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
1886	03/09/2010	Severe Storm	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
5010	09/01/2012	Fire	Oglala Lakota County
4115	05/10/2013	Severe Storm	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
4125	06/28/2013	Severe Storm	Oglala Sioux Tribe of the Pine Ridge Reservation
4155	11/08/2013	Severe Storm	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
4233	07/30/2015	Severe Storm	Oglala Lakota County
4237	08/07/2015	Severe Storm	Oglala Sioux Tribe of the Pine Ridge Reservation
4298	02/01/2017	Severe Storm	Oglala Sioux Tribe of the Pine Ridge Reservation
4440	06/07/2019	Flood	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
4448	06/20/2019	Severe Storm	Oglala Sioux Tribe of the Pine Ridge Reservation
3475	03/13/2020	Biological	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
3513	03/13/2020	Biological	Oglala Sioux Tribe of the Pine Ridge Reservation
4527	04/05/2020	Biological	Oglala Lakota County, Oglala Sioux Tribe of the Pine Ridge Reservation
4688	02/20/2023	Winter Storm	Oglala Sioux Tribe of the Pine Ridge Reservation
4689	02/27/2023	Winter Storm	Oglala Lakota County

Source: Federal Emergency Management Agency, 2024

Table 4-5 summarizes the Fire Management Assistance Declarations for the State of South Dakota from 2003 to 2024. Note that not all of these events have occurred within the Pine Ridge Reservation, but each one did impact the state overall.

Table 4-5 Fire Management Assistance Declarations

DISASTER NUMBER	TITLE	INCIDENT PERIOD	PUBLIC ASSISTANCE DOLLARS
FM-5418	Auburn Fire	October 4, 2021 – October 10, 2021	-
FM-5348	Schroeder Fire	March 29, 2021 – April 4, 2021	
FM-5272	South Dakota Vineyard Fire	August 11, 2018 - August 14, 2018	-
FM-5229	South Dakota Legion Lake Fire	December 12, 2017 – December 14, 2017	-
FM-5010	South Dakota Wellnitz Fire	August 31, 2012 – September 2, 2012	$6,664.22
FM-2996	South Dakota Myrtle Fire	July 19, 2012 – July 23, 2012	$622,320.74
FM-2716	South Dakota Boxelder Fire	July 18, 2007 – July 31, 2007	$387,966.83
FM-2710	South Dakota Alabaugh Canyon Fire	July 7, 2007 – July 20, 2007	$1,953,897.04
FM-2658	South Dakota East Ridge Fire	July 27, 2006 – August 7, 2006	$1,543,488.86
FM-2569	South Dakota Skyline #2 Fire	July 16, 2005 – July 17, 2005	$14,231.10
FM-2565	South Dakota Ricco Fire	July 9, 2005 – July 19, 2005	$428,064.13
FM-2557	South Dakota Camp Five Fire	April 17, 2005 – April 19, 2005	-
FM-2513	South Dakota Mill Road Fire	November 20, 2003 – November 21, 2003	$45,685.46

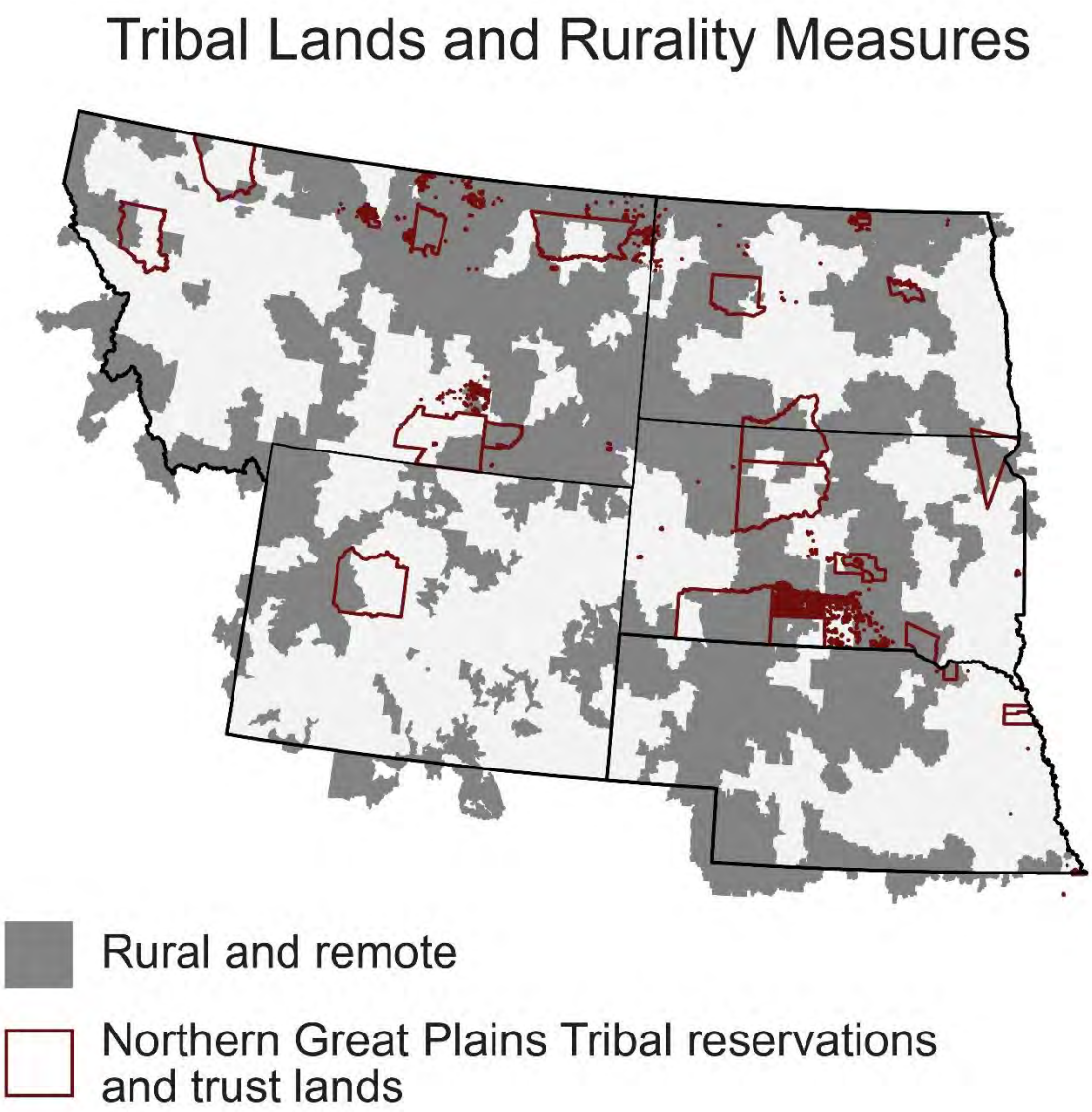
Source: Federal Emergency Management Agency, 2003-2024

4.2 Climate Change Impacts and Adaptation

South Dakota and the Pine Ridge Indian Reservation are located within the Northern Great Plains region, along with Montana, Nebraska, North Dakota, and Wyoming. The Northern Great Plains has observed changes in long-term climate trends and is experiencing unprecedented climate-driven extremes, including severe drought, flood, and wildfire. The Planning Team identified changes in the regional climate as a top concern impacting communities, residents, local economies, and infrastructure throughout the planning area. This section contains general discussions on temperature, precipitation, and climate impacts for the Northern Great Plains region as a whole, with more detailed discussions on how a changing climate is impacting the frequency, severity, and impacts of natural hazards in each of the hazard profiles.

As shown in **Figure 4-1**, the Northern Great Plains is largely rural in character and home to many diverse Indigenous communities, including OST. As noted in the Fifth National Climate Assessment, which will serve as the basis for much of the discussion on climate change in this HMP, there has been significant environmental action from Indigenous communities to adapt to climate change and protect the regions waters and lands, maintain cultural continuity, and navigate a changing climate.

Figure 4-1 Northern Great Plains Region – Tribal Lands



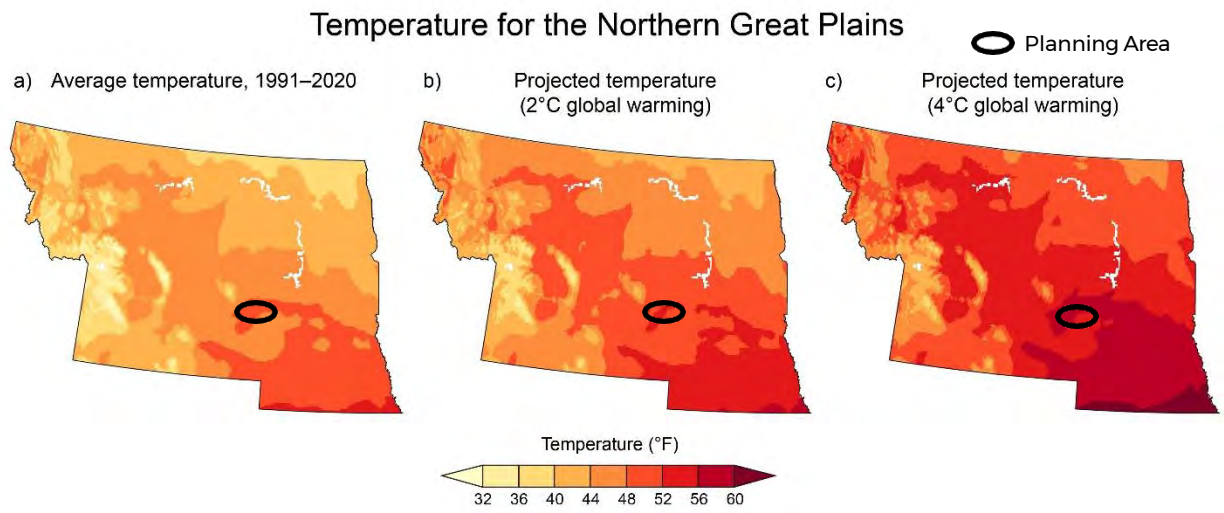
4.2.1 Temperature and Precipitation Changes

Since 1895, South Dakota's overall average temperature has increased by about 2˚F. Regionally, this trend will likely continue in coming years and contribute to an increase in the frequency and intensity of hazardous events, which will cause significant economic, social, and environmental impacts on tribal members. The maps in **Figure 4-2** below (from left to right) show the average temperature from 1991-2020, and the projected changes in average temperatures under a 2˚C and 4˚C warming above preindustrial levels scenario for the Northern Great Plains.

Since 1900, average annual temperature has increased throughout the region by 1.6˚–2.6˚F. While warming has occurred in all seasons, it is most pronounced in winter. Summers have warmed little in North Dakota, South Dakota, and Nebraska. However, warm nights (minimum temperature of 70˚F or higher), which were once rare, have become increasingly common in the region. High nighttime temperatures can reduce grain yields, increase stress on animals, and lead to an increase in heat-related deaths. The region has also experienced fewer very cold days (maximum temperature of 0˚F or lower) than the long-term average (1900–2020) for several decades. These

changes are likely to drive more extreme summer weather, with more heat energy and moisture causing larger storms, as well as decrease snowpack in winter months, further altering water availability, irrigation, and the health and stability of groundwater sources.

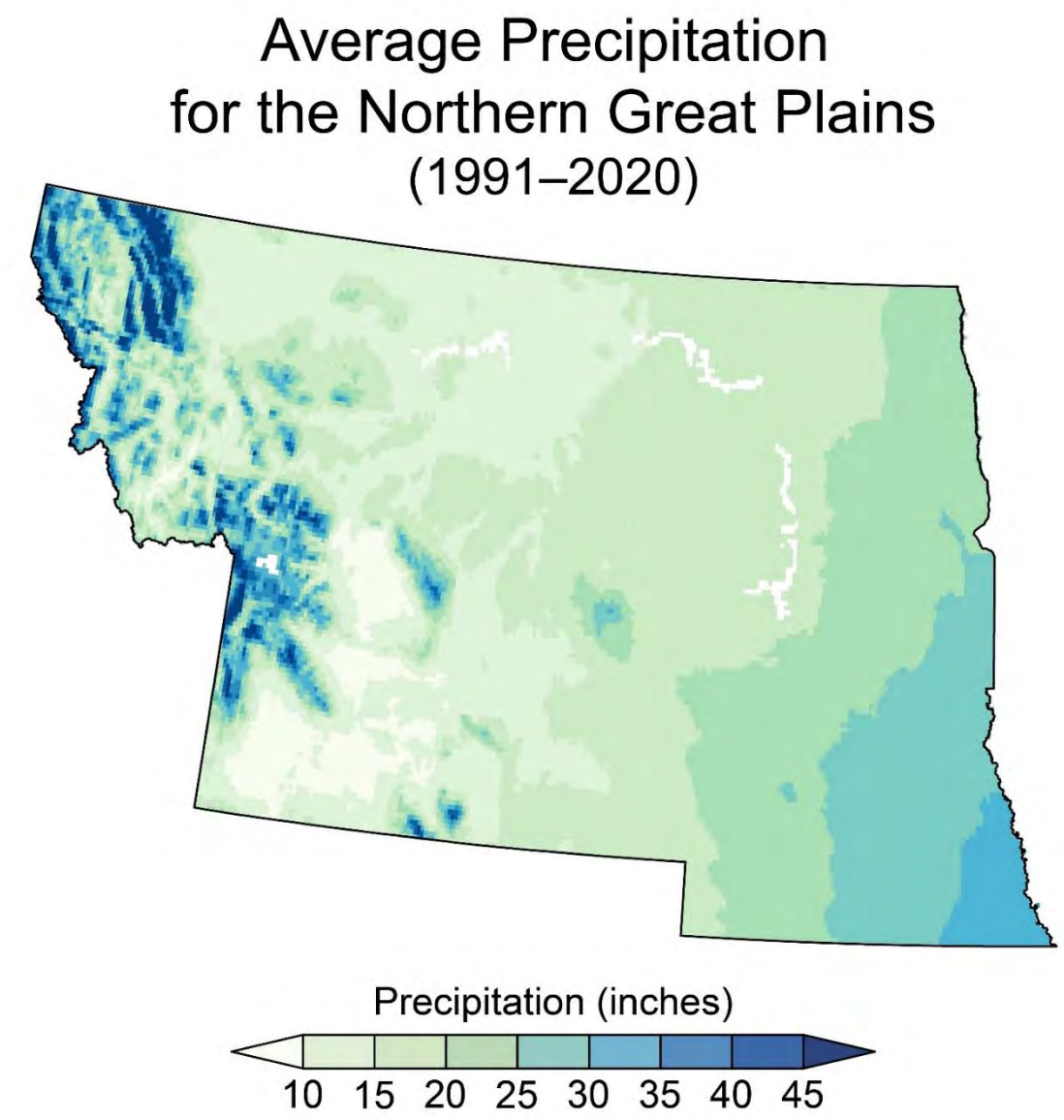
Figure 4-2 Temperature for the Northern Great Plains



Source: Fifth National Climate Assessment, 2023

Changing extremes in precipitation are anticipated in the coming decades, due to the increasing likelihood of greater rain and snow fall as well as more intense drought periods. All states in the Northern Great Plains region recorded their wettest five-year period between 1995 and 2019. Seasonal variations will be heightened, with more frequent and greater intensity rainfall expected in the spring and winter and hotter, drier periods in the summer. Since 1895, yearly annual precipitation for South Dakota has increased slightly. This trend is expected to continue as the impacts of climate change continue to be felt. Climate modeling may show only moderate changes in precipitation and streamflow, however most of the Great Plains region is already at risk to large annual and seasonable variability as seen by flooding and drought events occurring in concurrent years. There are likely going to be more days with a heavy precipitation event (rainfall of greater than one inch per day) across the region. As noted in the Fifth National Climate Assessment, total annual precipitation in the region is expected to remain relatively stable, however shifts in the form and timing of precipitation are expected.

Figure 4-3 Average Precipitation for the Northern Great Plains (1991-2020)



Source: Fifth National Climate Assessment, 2023

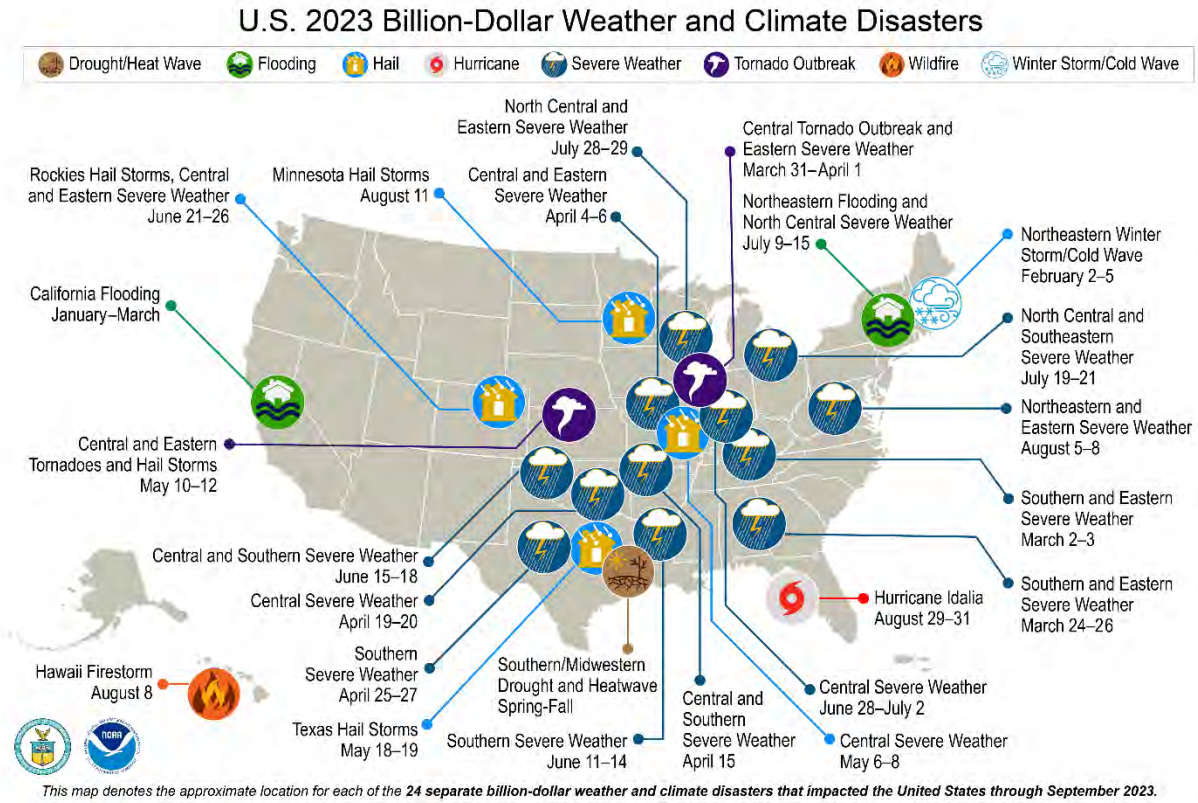
4.2.2 Climate Change Impacts

As the region and the world see the effects of a warming climate, many challenges will emerge that are expected to impact communities, residents, and environments as a result of these changes. Some of these challenges include resolving increasing competition among land, water, and energy resources; developing and maintaining sustainable agricultural systems; conserving vibrant and diverse ecological systems; and enhancing the resilience of the region's people to the impacts of climatic extremes. The Oglala Lakota Nation is working to mitigate the impacts of climate change by building connections and adapting to changing conditions.

Several of the big-picture impacts of climate change beyond just changing weather and hazard patterns include increasing costs of disaster losses and recovery, impacts on physical and mental health of communities, impacts on human and animal migration patterns, and economic impacts and resource and land-based livelihoods must adapt.

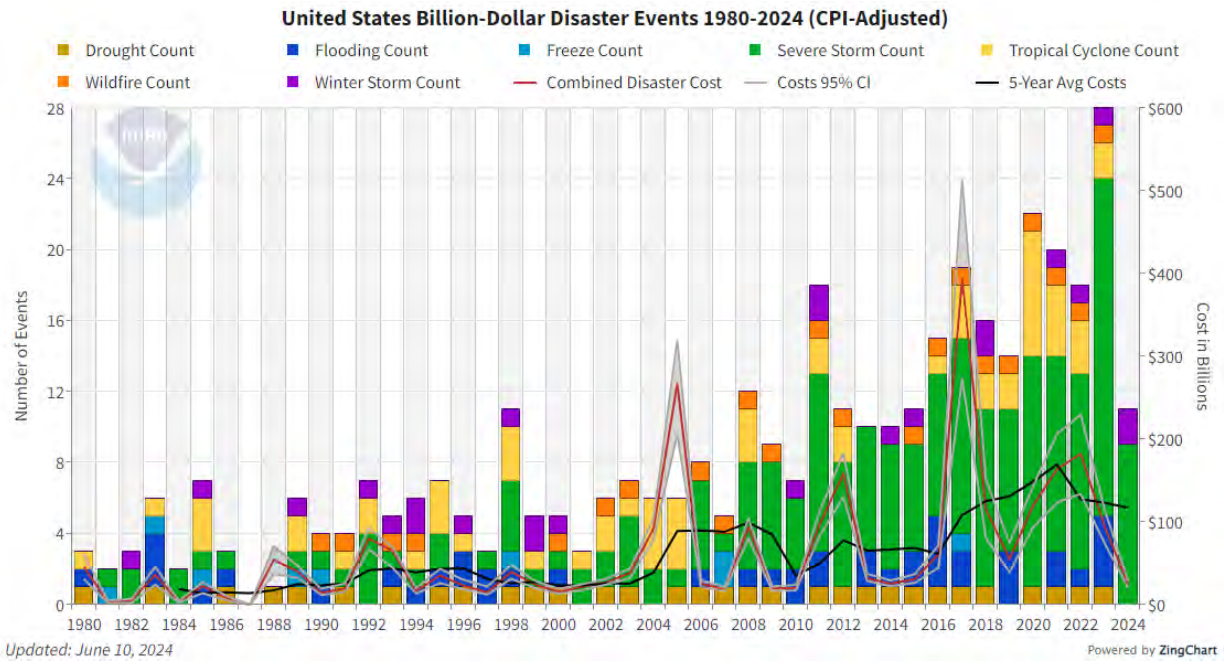
The United States is experiencing an increase in the number of billion-dollar natural disasters (Figure 19). According to NOAA, between 1980-2024 (as of June 10, 2024) there have been 387 confirmed weather/climate disaster events resulting in losses exceeding $1 Billion (after adjusting for inflation). These include 31 drought events, 44 flooding events, 9 freeze events, 195 severe storm events, 62 tropical cyclone events, 22 wildfire events, and 24 winter storm events (Figure 4-5). This figure also illustrates how a rapidly increasing proportion of these events in recent years are driven by severe storms. In 2023 alone, the United States saw the greatest number of billion-dollar disasters than any other year, with 24 events (Figure 4-4). Overall, these events have resulted in 16,434 deaths in addition to massive economic impacts.

Figure 4-4 Billion Dollar Disasters in 2023



Source: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2024)

Figure 4-5 Billion Dollar Disasters by Type



Source: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2024)

Human and ecological health will also face rising threats from climate change. Of great concern for OST are the impacts of climate change on the mental and spiritual health of the community. The Fifth National Climate Assessment notes that solastalgia—the distress specifically caused by environmental change while still in a home environment, particularly prevalent amongst Indigenous communities—is indicative of more subtle but potentially wider-reaching mental health impacts. Indigenous communities share collective ancestral ties to the lands and natural resources where they live or previously lived which are inextricably linked to their identities, cultures, and livelihoods, as well as their physical and spiritual well-being. Climate pressures often result in compounding negative health-related outcomes. For instance, the impacts of floods resulting from earlier snowmelt combined with more intense precipitation events can be worsened by loss of ground cover from past wildfires, putting people at risk of water-borne diseases, trauma and increased mental health issues, and economic losses. Wildfires are more common during hotter months when drought conditions are more prevalent, exposing people to compounding risks and stress from smoke, heat, and poor water quality. These are just a few of the myriad examples of the interconnected impacts of a changing climate.

Projected climate change trends will have a direct impact on energy demands. As the number of 100˚F days increases, along with warmer nights, the stress placed on the energy grid will likely increase and possibly lead to more power outages. Critical facilities and vulnerable populations that are not prepared to handle periods of power outages, particularly during heat waves or winter storms, will be at risk. While increases in extreme heat will create greater stress on water losses, public health, and demand for air conditioning, warmer winters are also expected to occur which lowers winter heating demand, reduced cold stress on livestock, and produces longer growing seasons. Fossil fuel and renewable energy production and infrastructure is expanding across the northern great plains, and increasingly severe weather events put added stress on these systems. Energy sector vulnerabilities also include the transmission and transportation of energy resources. Roads, pipelines, and rail lines are all at risk of damages from flooding, extreme heat, erosion, or added stress from increased residential demands.

Furthermore, the agricultural sector will experience an increase in droughts, changes in the growth cycle as winters warm, changes in the timing and magnitude of rainfall, and greater populations of overwintering insects. Expansions in range or new introductions of invasive species can also impact agriculture and native plant and animal species. These added stressors on agriculture could have devastating economic effects if new agricultural and livestock management practices are not adopted. Each of these climate impacts also poses a threat to the native plant and animal species that provide cultural significance and subsistence food sources to the Oglala Sioux Tribe.

As stated in the Fifth National Climate Assessment, the Northern Great Plains region will experience complex tensions and trade-offs between land use, water availability, ecosystem services, and other factors, all exacerbated by the impacts of climate change. Decision-makers are navigating many complications with shifting demographics, policy and regulatory tensions, and barriers to action when attempting to address these concerns and adapt to future changes. HMPs have typically been informed by *past* events to be more resilient to future events, and this HMP includes strategies for the planning area to address these changes and increase resilience. Future updates to this HMP should include additional climate information and analysis, in order to continuously prepare for the expected impacts of climate change.

4.3 Asset Inventory

Assets inventoried for the purpose of determining vulnerability include people, structures, critical facilities, and natural, historic, or cultural resources. For the planning process, available GIS databases were utilized like the 911 Address Points for all counties within the Pine Ridge Reservation. This property database was obtained from the OST Department of Public Safety in May of 2024 for building exposure and property types. The Assessors for Bennet, Jackson, and Ogalala Lakota Counties don't assess tribal properties, so an average residential value of $66,000 provided by Fall River County GIS was used to estimate values at risk for residential properties only. A critical facilities layer was also created through the combination of facilities provided by OST Department of Public Safety, 2024 Homeland Infrastructure Foundation-Level Data (HIFLD) databases, 2024 National Bridge Inventory, 2024 National Inventory of Dams, SD Department of Agriculture & Natural Resources, and Google Maps. HIFLD is national geospatial data that is open public domain data that can be used to support community preparedness, resiliency, research, and other capacities. A critical facility is defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Where applicable, this information was used in an overlay analysis for hazards such as flood and wildfire.

FEMA organizes critical facilities into eight lifeline categories (Safety and Security; Food, Hydration, Shelter; Health and Medical; Energy; Communications; Transportation; Hazardous Material; and Water Systems) as shown in **Figure 4-6** below.

Figure 4-6 FEMA Lifeline Categories



Source: FEMA Version 2.1 July 2023

These lifeline categories standardize the classification of critical facilities and infrastructure that provide indispensable service, operation, or function to a community. A lifeline is defined as providing indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security. These categorizations are particularly useful as they:

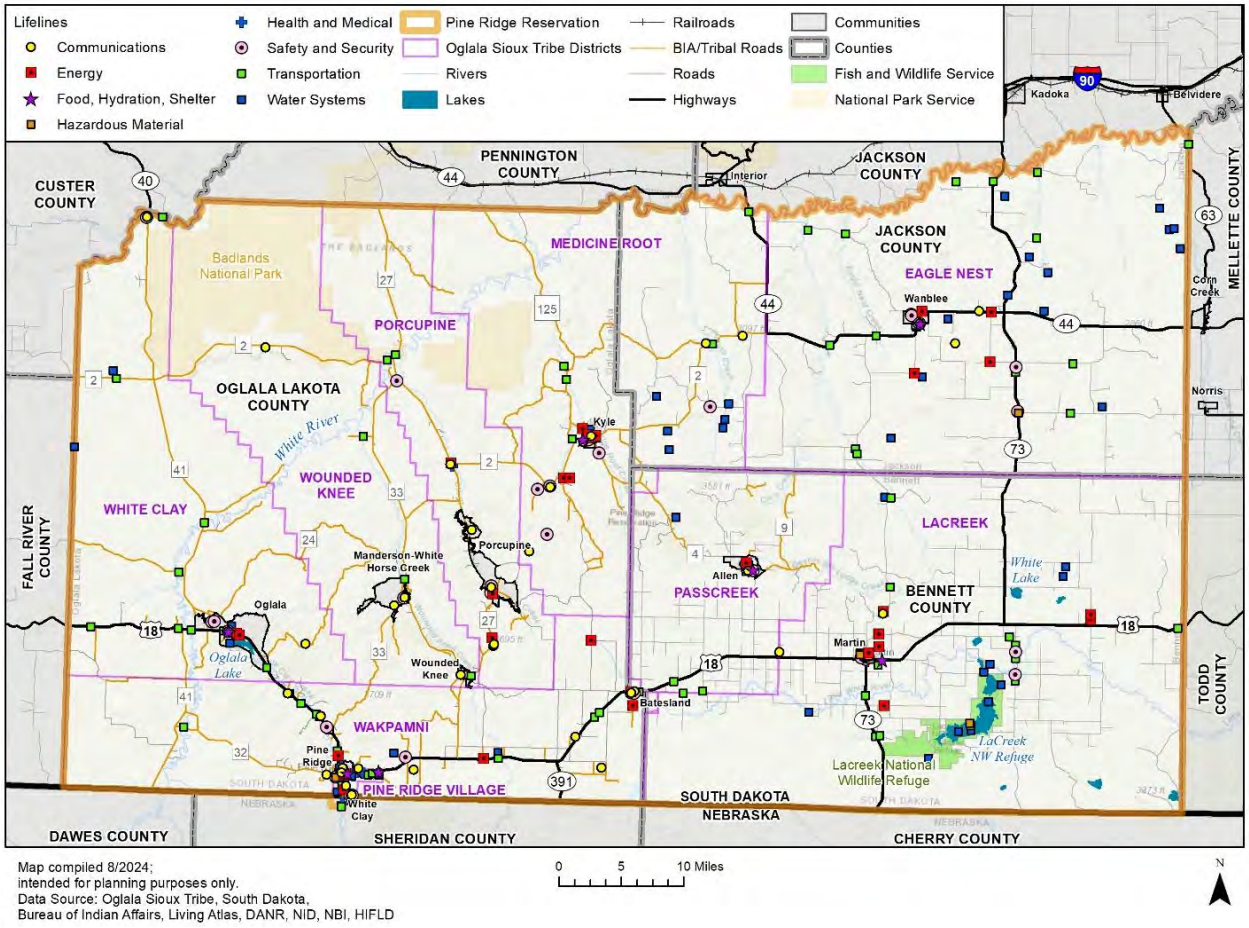
- Enable effort consolidations between government and other organizations (e.g., infrastructure owners and operators).
- Enable integration of preparedness efforts among plans; easier identification of unmet critical facility needs.
- Refine sources and products to enhance awareness, capability gaps, and progress towards stabilization.
- Enhance communication amongst critical entities, while enabling complex interdependencies between government assets.
- Highlight lifeline related priority areas regarding general operations as well as response efforts Tables 4-6 below contains a summary of critical facilities across the counties within the Pine Ridge Reservation and the small portions that extends into Sheridan County Nebraska.

Table 4-6 Pine Ridge Reservation Lifeline Facilities by County

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Bennett	4	9	2	8	4	12	16	14	**69**
Jackson	5	4	1	1	1	6	19	21	**58**
Oglala Lakota	29	21	4	4	7	34	36	13	**148**
Sheridan / NE	-	-	-	-	1	-	1	-	**2**
Total	**38**	**34**	**7**	**13**	**13**	**52**	**72**	**48**	**277**

Source: Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Figure 4-7 Pine Ridge Reservation Lifeline Facilities



Tables 4-7 below contains a summary of address points that represent building exposure across the counties within the Pine Ridge Reservation and the small portion that extends into Sheridan County Nebraska.

Table 4-7 Total Pine Ridge Reservation Property Exposure by County and Districts

COUNTY	DISTRICT	TOTAL BUILDING COUNT	RESIDENTIAL VALUES	RESIDENTIAL CONTENT VALUE	TOTAL RESIDENTIAL VALUE
Bennett	Eagle Nest	2	$132,000	$66,000	$198,000
Bennett	Lacreek	641	$38,148,000	$19,074,000	$57,222,000
Bennett	Medicine Root	34	$2,178,000	$1,089,000	$3,267,000
Bennett	Passcreek	320	$19,932,000	$9,966,000	$29,898,000
Bennett	Wakpamni	32	$1,980,000	$990,000	$2,970,000
Bennett	**Total**	**1,029**	**$62,370,000**	**$31,185,000**	**$93,555,000**
Jackson	Eagle Nest	463	$29,436,000	$14,718,000	$44,154,000
Jackson	Medicine Root	148	$9,636,000	$4,818,000	$14,454,000
Jackson	**Total**	**611**	**$39,072,000**	**$19,536,000**	**$58,608,000**

COUNTY	DISTRICT	TOTAL BUILDING COUNT	RESIDENTIAL VALUES	RESIDENTIAL CONTENT VALUE	TOTAL RESIDENTIAL VALUE
Oglala Lakota	Medicine Root	812	$52,602,000	$26,301,000	$78,903,000
Oglala Lakota	Pine Ridge Village	1,099	$66,330,000	$33,165,000	$99,495,000
Oglala Lakota	Porcupine	724	$47,190,000	$23,595,000	$70,785,000
Oglala Lakota	Wakpamni	984	$64,218,000	$32,109,000	$96,327,000
Oglala Lakota	White Clay	672	$43,494,000	$21,747,000	$65,241,000
Oglala Lakota	Wounded Knee	529	$34,056,000	$17,028,000	$51,084,000
Oglala Lakota	**Total**	**4,820**	**$307,890,000**	**$153,945,000**	**$461,835,000**
Sheridan / NE	n/a	2	$66,000	$33,000	$99,000
Sheridan / NE	**Total**	**2**	**$66,000**	**$33,000**	**$99,000**
	Grand Total	**6,462**	**$409,398,000**	**$204,699,000**	**$614,097,000**

Source: Oglala Sioux Tribe, Fall River County Assessor, WSP GIS Analysis

4.4 Hazard Profiles

Based on research and past experiences, the hazards profiled were determined to either have a historical record of occurrence or the potential for occurrence in the future. As the planning area is generally uniform in climate, topography, building characteristics, and development trends, overall hazards and vulnerability do not vary greatly across the planning area. The following profiles will examine the identified hazards across the region.

Each hazard is profiled using the following structure and format:

Description

This subsection gives a description of the hazard and associated problems, followed by details on the hazard specific to the Reservation.

Location

This subsection discusses which areas of the Reservation are most likely to be affected by a hazard event.

- **Negligible:** Less than 10 percent of planning area or isolated single-point occurrences.
- **Limited:** 10 to 25 percent of the planning area or limited single-point occurrences.
- **Significant:** 25 to 75 percent of planning area or frequent single-point occurrences.
- **Extensive:** 75 to 100 percent of planning area or consistent single-point occurrences.

Past Occurrences

This subsection contains information on historic incidents, including impacts where known. Information provided by the TPT is included here along with information from other data sources, including NOAA's National Centers for Environmental Information (NCEI) Storm Events Database and other data sources. When available, tables showing county-specific data from the NCEI database may be found in each hazard profile.

Probability of Future Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrences is categorized into one of the following classifications:

- **Highly Likely**—90 to 100 percent chance of occurrence in next year or happens every year.
- **Likely**—Between 10 and 90 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.
- **Occasional**—Between 1 and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

The frequency, or chance of occurrence, was calculated where possible based on existing data. Frequency was determined by dividing the number of events observed by the number of years and multiplying by 100. For example, a hazard which has had 18 recorded occurrences over a 25 year period would be considered to have a 72% of occurring in any given year.

This gives the percent chance of the event happening in any given year. For example, three droughts occurring over a 30-year period which equates to 10 percent chance of that hazard occurring any given year.

Magnitude/Severity (Extent)

This subsection discusses the potential magnitude of impacts, or extent, from a hazard event. Magnitude classifications are as follows:

- **Negligible:** Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.
- **Limited:** 10 to 25 percent of property is severely damaged, facilities and services are unavailable between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.
- **Critical:** 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time or result in many permanent disabilities and a few deaths. Overwhelmed for an extended period of time or many deaths occur.
- **Catastrophic:** More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time, or many deaths occur.

Climate Change Impacts

This describes the potential for climate change to affect the frequency and intensity of the hazard in the future.

Vulnerability Assessment

Vulnerability is the measurement of exposed structures, critical facilities, or populations relative to the risk of the hazard. For most hazards, vulnerability is an estimate. Some hazards, such as flood, affect specific areas so that exposure can be quantified, and vulnerability assessments result in a more specific approximation. Other hazards, such as tornadoes, are random and unpredictable in location and duration, which requires more approximate methods. The assessment was conducted through the study of potential impacts to the following specific sectors:

- People

- Property
- Critical Facilities and Lifelines
- Economy
- Environmental and Cultural Resources

These topics are summarized in a table format, with additional discussion, narrative, and figures on casualties, economic and physical losses, and GIS/other data driven vulnerability assessments when available.

Cascading/Related Hazards

This section describes the interconnected nature of hazards by exploring how some hazards can trigger or be triggered by other hazard events, resulting in compounding impacts and increased vulnerability.

Risk Summary

This section summarizes the risks and key takeaways according to the area affected, likelihood, and magnitude of impacts. Hazard Significance is summarized for the Reservation as a whole.

Overall Significance: Based on a combination of the ratings for location, future probability, and magnitude/severity, as well as input and opinions from the TPT on the perceived risk to the Pine Ridge Reservation and the Oglala Sioux Tribe, each hazard also includes an overall significance rating as follows:

- High: widespread potential impact.
- Medium: moderate potential impact.
- Low: minimal potential impact.

4.4.1 Animal/Plant/Crop Disease

Description

Agricultural hazards are categorized as either pests or diseases. For this plan, these hazards are defined as the natural infection of plants, crops, or livestock by insects, vermin, or disease, making them unfit for consumption, sale, or other uses. To adequately profile each element, this hazard profile focuses on events primarily affecting livestock (mainly disease) and crops (diseases and pests). However, in some cases, pests can also act as disease vectors for livestock.

Location: Extensive
Future Probability: Highly Likely
Magnitude/Severity: Moderate
Overall Significance: **Medium**

Plant and Crop Profile

According to the 2020 Drought Adaptation Plan, the Pine Ridge reservation has 1,416,104 acres of farmland across 380 farms, with 223 of those farms being operated by the Oglala Lakota people. According to the 2012 USDA 2012 Census of Agriculture for American Indian Reservations, in 2012 the market value of agricultural commodities produced across all reservations totaled $87 million, but less than 1/3 ($24 million) went to Native American producers. On the Pine Ridge Reservation, an estimated 95% of food consumed is still imported, while most food produced on the reservation is shipped away.

In addition to the ongoing struggle for food sovereignty, the viability of native and subsistence plants used for food and medicines by the Oglala Sioux is increasingly threatened by persistent droughts and climate change, which make these plants more vulnerable to pests and disease. However, in recent years there has been a growing focus on micro-farming and community gardening initiatives aimed at improving food security and the preservation of ancestral crops of the Oglala Lakota people. These include but are not limited to the following:



Canpa (chokecherry)

- Blo (wild potatoes)
- Wagmiza (corn)
- Wild timpsila (turnips)
- Psin (wild onions)
- Canpa (chokecherry)
- juneberry (Wipazutkan)
- Uja (dried berries)
- Mastinca pute (buffaloberries)
- Waziskeca (strawberries)
- Takanhecala (raspberries)

These efforts are part of a broader strategy to create a functioning local food system and address hunger issues within the community. To extend the growing season in the challenging climate, several greenhouse projects have been implemented. These include geothermal greenhouses at Thunder Valley Community Development Corporation, a greenhouse operation at Red Cloud Indian School as part of the USDA Farm to School Program, and underground greenhouses designed to withstand climate challenges.

Animal Profile

Table 4-8 shows the population of livestock within the planning area. Data available is aggregated on a Countywide scale and may include numbers outside the Pine Ridge Reservation. This count does not include wild populations that are also at risk from animal diseases. The Planning Team indicated that cattle and horses encompass the majority of livestock found in the Reservation.

Table 4-8 Livestock Inventory

COUNTY	MARKET VALUE OF 2022 LIVESTOCK SALES	CATTLE AND CALVES	HOGS AND PIGS	SHEEP, GOATS, WOOL
Oglala Lakota	$35,767	$35,537,000	$54,000	-
Bennett	$40,502	$40,352,000	(D)	-
Jackson	$42,836	$41,892	$51,000	$403,000
Total	**$119,105**	**$75,930,892**	**$105,000**	**$403,000**

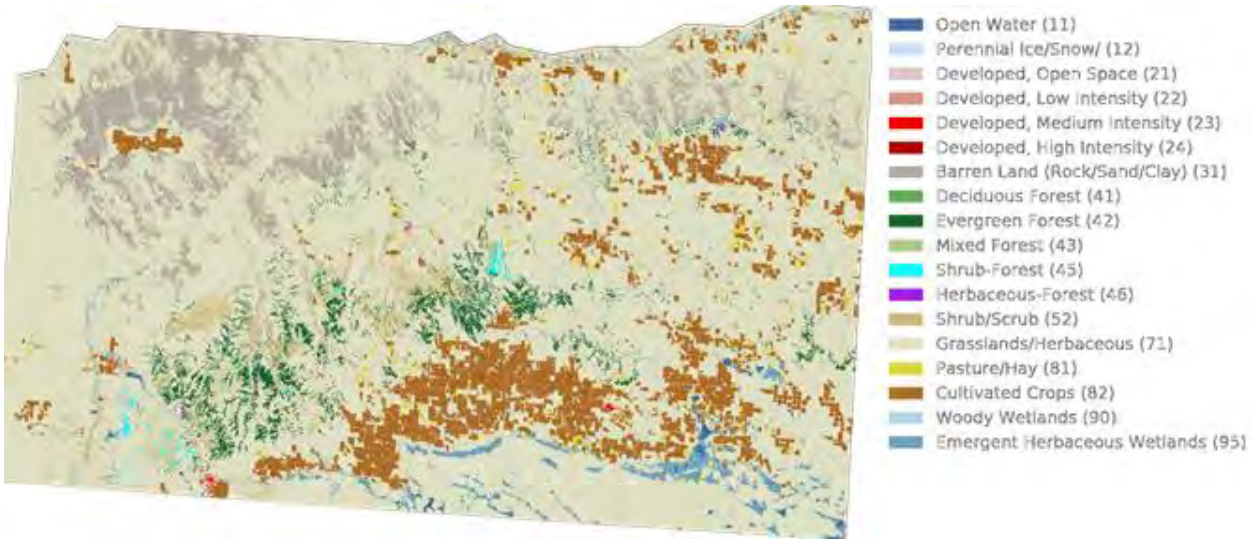
Source: U.S. Census of Agriculture, 2022
(D) indicates withheld to avoid disclosing data for individual farms

Buffalo and other animals like elk have deep cultural importance to the Oglala Lakota. Diseases affecting these species could impact traditional practices and cultural continuity. The Oglala Sioux Parks and Recreation Authority (OSPRA) manages approximately 800 buffalo in their pastures, ensuring that the buffalo, a sacred resource, remains a vital part of the community's heritage. In addition to the buffalo, the Pine Ridge Reservation is home to around 500 free-roaming and pasture elk. These elk serve as an important cultural resource, providing an excellent food source for residents and hunting opportunities for both tribal and non-tribal members. Efforts to manage and conserve these animals reflect their value, not only as food sources but as essential elements of the tribe's cultural heritage and important economic assets.

Location

Animal and plant diseases mainly occur on agricultural lands, rangelands, pasturelands, and forests but can also occur in domestic animals and crops. **Figure 4-8** shows land cover data from the USGS National Map, showing that the planning area is predominately grassland (shaded in beige) and cultivated crops (shaded in brown). Livestock diseases can occur wherever livestock are present, and humans in contact with contaminated livestock or byproducts may also be exposed. Similarly, crop diseases are possible in any cultivated cropland. Given the agricultural presence in the planning area, animal and plant diseases have the potential to affect the entire planning area, with major outbreaks impacting the regional economy.

Figure 4-8 Land Cover Data in Planning Area



Source: The National Map Seamless Server hosted by the USGS, using NLCD 2022 Land Cover data

Past Occurrences

Plant Disease

A variety of diseases can impact crops and often vary from year to year. The South Dakota State HMP provides information on some of the most common plant diseases, which are listed below.

- Fire Blight of Apple and Pear
- Cankers
- Ash Rust
- Cedar-apple Gall Rust
- Cottonwood Rust
- Diplodia Tip Blight
- Dothistroma Needle Blight
- Dutch Elm Disease
- Oak Wilt
- Ponderosa Pine Root Rot
- Thousand Cankers Disease
- Western Gall Rust
- Ash Leaf Curl
- Bagworm
- Bark Beetles
- Black Hills Beetle
- Bronze Birch Borer
- Cankerworms
- Cottonwood Leaf Beetle
- Elm Leaf Beetle
- Emerald Ash Borer
- Longhorned Beetle
- Lymantria dispar
- Mountain Pine Beetle
- Oystershell Scale
- Pine Engraver Beetle
- Pine Needle Scale
- Pine Tip Moths
- Red Turpentine Beetle
- Redhumped Oakworm
- Scurfy
- Spongy Moth
- Spongy Moth Complex
- Twolined Chestnut Borer
- Zimmerman Pine Moth

Animal Disease

The South Dakota State Hazard Mitigation Plan provides reports on diseases that have been known to occur in the state which are listed below. According to the USDA Cattle Death Loss report, South Dakota lost over 155,000 cattle in 2011 to non-predator losses, including disease. These losses cost the state cattle industry an estimated $110 million in lost revenue. While County historical occurrences of animal disease are not available, animal disease outbreaks may still occur throughout the planning area. Some common livestock diseases include:

- Anthrax
- Avian Influenza
- Bovine Spongiform
- Brucellosis
- Chronic Wasting Disease
- Encephalopathy “Mad Cow Disease”
- Foot And Mouth Disease
- Johne’s Disease/Paratuberculosis
- Porcine Reproductive and Respiratory Syndrome
- Pseudorabies
- Trichomoniasis
- Tuberculosis
- Vesicular Stomatitis
- West Nile Virus

Probability of Future Occurrence

The future occurrence of agricultural pests and disease concerns will be impacted by both climate change and development. Climate change will alter the ecology of pests and disease, while growth and development will alter the exposure of agriculture to pests and disease. In a simple example, taking cropland out of production for municipal development will reduce the exposure of crops to pests and disease.

Given the historic record of occurrence of 40 plant disease outbreaks reported in 15 years, see Table 4-9 below, the annual probability of occurrence for agricultural plant disease is 100 percent. Agricultural animal disease probability cannot be calculated due to lack of available data.

Magnitude/Severity (Extent)

Rodents, such as mice and rats, as well as rabbits and insects, are widespread throughout the planning region, with their populations typically fluctuating seasonally. However, when these populations exceed the ecosystems capacity, they threaten agricultural crops and livestock health. Modeling these trends is challenging due to variables such as the geographic distribution of animals and crops, population sizes, the presence of natural predators, and reproduction rates relative to available food resources.

While there is no standard for measuring the magnitude of agricultural disease, historical events have impacted relatively small numbers of livestock and/or crops. **Table 4-9** estimates annual crop losses using data from the USDA Risk Management Agency (RMA). As RMA data is aggregated on a countywide level, some events may be included that did not affect the Pine Ridge Reservation. Additionally, the RMA does not track losses for livestock, so it is not possible to estimate losses due to animal disease.

Table 4-9 Agricultural Plant Disease Losses

COUNTY	NUMBER OF EVENTS	TOTAL CROP LOSS	AVERAGE ANNUAL CROP LOSS
Bennett	20	$293,786	$19,586
Jackson	15	$143,791	$9,586
Oglala Lakota	5	$26,461	$1,764
Grand Total	**40**	**$464,038**	**$30,936**

Source: USDA RMA, 2007-2021

The RMA does not track losses or impacts to plant species that don't fall within the scope of industrial agriculture. There are many plant species that have great cultural importance as medicines or traditional subsistence food sources.

Climate Change Impacts

Climate change is lengthening growing seasons and frost-free periods, which could benefit crop production with industrial agricultural practices. However, rising temperatures may lead to increased heat and moisture stress during critical reproductive periods, as well as greater weed competition and pest infestations, potentially reducing yields. The net effect of climate change on the resiliency of crops to infection and infestations remains uncertain and will depend on complex interactions between temperature, moisture, CO2, and ozone levels, as well as adaptive measures such as changes in crop varieties, mixes, and management practices.

The Fifth National Climate Assessment states that climate change negatively impacts the ability of Indigenous communities in the Northern Great Plain to grow and use traditional foods, medicines, and plants due to species movements and shifts in growing and harvesting seasons. Specifically, the report notes that the above-normal temperatures in the late summer of 2017 delayed the harvest of the Lakota staples of wild turnips, chokecherries, and other berries and medicinal plants. Combating this



Photo Credit: National Parks Service

trend through restoring buffalo populations has been a regional resilience-building strategy for OST. The buffalo has deep cultural and spiritual significance for Tribal Nations in the region and beyond. The Tanka Fund has been pivotal in this regional effort by connecting ranchers to technical support and resources to increase herd sizes. Similarly, the InterTribal Buffalo Council helps Tribal Nations develop and maintain their own herds.

The Northern Great Plains rangelands may fare better under climate change than other livestock regions. Higher temperatures and CO2 levels could extend the growing season and increase plant growth, though with lower nutritional quality. Droughts, however, would reduce plant biomass but improve nutrient concentration and forage quality. Droughts have had smaller impacts on cattle numbers in the Northern Great Plains than other regions; however, ranchers face increasing challenges from heat stress, parasites, pathogens, and shifting forage species including invasive weeds. Tribal producers, often with smaller lands with highly fractionated ownership, tend to be more vulnerable to these stressors.

Vulnerability Assessment

Table 4-10 Animal/Plant/Crop Disease Vulnerability Summary

SECTOR	VULNERABILITY
People	• While animal/plant/crop diseases primarily affect livestock and crops, zoonotic diseases (those transferable between animals and humans) like anthrax or brucellosis could pose direct health risks to individuals involved in agriculture, ranching, and food processing. This is particularly concerning for those with limited access to healthcare services. • Many tribal members rely on subsistence agriculture, hunting, and ranching. A disease outbreak affecting livestock or crops could significantly impact food availability and increase dependency on external food sources, raising concerns about malnutrition and diet changes. • The Pine Ridge Reservation is described as a food desert with limited access to fresh foods. Crop/animal diseases could further strain the already limited food resources available. • The Oglala Lakota face high rates of nutrition-related health issues like diabetes. Reduced access to healthy foods due to crop/animal diseases could worsen these health disparities. • The Oglala Lakota already face high rates of food insecurity, with almost 40% of families reporting food insecurity. Crop or animal diseases could further reduce access to healthy, culturally appropriate foods on the reservation, exacerbating this issue.
Property	• An infestation of agricultural pests can severely impact crop yields, potentially leading to the complete destruction of crops in entire fields. • From 2007 to 2021, insect infestations and crop diseases prompted the USDA RMA to provide $464,038 in indemnities to farmers, averaging roughly $31,000 annually. • However, it's almost certain that additional losses due to agricultural pests were incurred by uninsured crops, meaning the $31,000 represents only a fraction of the total annual loss due to agricultural pests.
Critical Facilities and Community Lifelines	• Stressors on the community's food sources could lead to increased malnutrition and related health concerns, placing further burden on the already strained healthcare network for the Reservation. • Recent initiatives have focused on revitalizing traditional Lakota food systems and agricultural practices. Crop/animal diseases could set back these food sovereignty efforts.

SECTOR	VULNERABILITY
Economy	• Agricultural diseases can harm the economy by reducing farm incomes, increasing production costs, and disrupting trade. • Diseases that affect agricultural resources used in traditional crafts and art can disrupt the production of culturally significant items, such as textiles and food products. • According to the US Census Bureau American Community Survey (ACS) 5-Year Estimates, agriculture, forestry, fishing and hunting, and mining sector jobs comprised 8.3% of the overall employment on the Pine Ridge Reservation in 2020. Diseases affecting crops or livestock could result in major financial losses for tribal members involved in agriculture.
Environmental and Cultural Resources	• Diseases that reduce the availability of ingredients used in traditional cuisine can threaten culinary heritage. • Cultural traditions tied to specific crops and livestock breeds can be threatened by disease outbreaks, which have the capability to decimate these heritage varieties and breeds. • Diseases can disrupt traditional farming and livestock practices, affecting cultural continuity and identity tied to cultural practices and spiritual beliefs that are dependent on agriculture. • Buffalo and other animals like elk have deep cultural importance to the Oglala Lakota. Diseases affecting these species could impact traditional practices and cultural continuity. • Intensive farming practices by non-native farmers on reservation lands already cause issues with chemical runoff and water contamination. Crop diseases could potentially lead to increased pesticide use, further impacting water quality. • Diseases affecting culturally important plant and animal species could impact the transmission of traditional ecological knowledge related to these species.

Cascading/Related Hazards

The inextricable link between environmental factors and agricultural systems results in a chain of cascading events where environmental hazards both lead to, and result from, agricultural disease. Altered precipitation patterns can lead to both waterlogged soils and prolonged dry periods, both of which can weaken crops and native plants, which increases their vulnerability to diseases. Higher temperatures can expand the range of pathogens and pests, allowing them to thrive and multiply in previously unsuitable habitats.

When plants are stressed by factors such as drought or pest infestation, their overall health declines, which may lead to a reduction in moisture content and an increase in the accumulation of dead or dying biomass. Pest infestations kill large numbers of trees and leave behind vast amounts of dead wood. These dead and dying crops lead to an increased risk of damage during high wind events, and an increase in fuel load during fire events. This risk increases exponentially when high winds and wildfire combine, creating the capacity to devastate wildlands and crops.

Invasive species which may thrive under warmer temperatures, can outcompete native species and introduce new pathogens to crops, livestock, and subsistence plants critical to local diets and traditional medicines. Lower crop yields and losses in native and subsistence plants used for food and medicines can lead to food insecurity, economic instability, and loss of traditional knowledge and practices.

Livestock diseases, such as avian influenza or bovine tuberculosis, can jump to humans, especially when zoonotic pathogens are involved. Additionally, increased use of pesticides to combat plant disease raises the risk of respiratory issues, skin conditions, and long-term chronic illnesses.

Risk Summary

Overall, the significance of animal/plant/crop disease in the planning area is **medium**. The probability of an event occurring is **highly likely**, and impacts are likely to be **moderate**.

- Agricultural disease is the natural infection of plants, crops, or livestock by insects, vermin, or disease, making them unfit for consumption, sale, or other uses.
- Agriculture constitutes 8.3% of the economy on the Pine Ridge Reservation. Additionally, subsistence farming, hunting, and traditional food access all present economic value to the tribe, which is vulnerable to this hazard as well.
- Given the agricultural presence in the planning area, animal and plant diseases have the potential to affect the entire planning area, with major outbreaks impacting the regional economy.
- The annual probability of occurrence for agricultural plant disease is 100 percent. Agricultural animal disease probability cannot be calculated due to lack of available data.
- Above-normal temperatures in the late summer of 2017 delayed the harvest of the Lakota staples of wild turnips, chokecherries, and other berries and medicinal plants.
- The effects of climate change make agricultural outbreaks more likely, and in turn, agricultural diseases can lead to zoonotic outbreaks, lower crop and cattle yields, and increased human health risks due to pesticide exposure.

4.4.2 Bombing Range

Location: Limited
Future Probability: Unlikely
Magnitude/Severity: Critical
Overall Significance: **Low**

Description

The Badlands Bombing Range (BBR) is a 340,000-acre plot established during World War II for use as a target range. The land was taken under eminent domain from the Pine Ridge Reservation in 1942, forcing many Native families to leave their homes. Over 874 Lakota and non-Indian landowners (including schools) were recorded as having had between 0.5 to 960 acres seized (Meadows, 2023). Oglala Lakota residents were often given less than ten days to vacate their homes. With few having cars, they had to pack wagons, and many livestock were killed as residents were unable to take them with them. During this time, bombs were dropped within a half mile of residents, imposing an urgency to the situation.

Post-war, the BBR served as a National Guard gunnery range and a Cold War Radar Bomb Scoring site, with portions used by the South Dakota National Guard for artillery practice. Training involved firing at old car bodies and 55-gallon drums painted bright yellow, scattered across what is now Badlands National Park. A target for WWII Bombers, **Figure 4-9**, is still visible on Reservation land.

Figure 4-9 A Target for WWII Bombers Can Still Be Seen on the Pine Ridge Reservation



Source: Chistopher Boyer for kestrelaerial.com

The U.S. Air Force still owns 2,500 acres, while over 200,000 acres were returned to the Oglala Sioux. In addition to significant environmental contamination, the Air Force left behind scatterings of debris including discarded bullet shells and unexploded ordnances, which range from small bullets to large bombs. These unexploded ordnances can be hard to locate as they may be partially visible, covered by snow or vegetation, or buried up to 20 feet underground. Some unexploded ordnances can be removed, while others require controlled detonation.

Location

The bombing range is located in the northwest corner of the planning area, covering portions of Oglala Lakota and Jackson Counties, see **Figure 4-10**. The South Unit of the Badlands Bombing Range, contained entirely within the Pine Ridge Reservation, is considered the most dangerous portion of the former BBR (Meadows 2023).

Past Occurrences

The frequency by which materials are found depends on how active residents, tourists, and clean-up crews may be across the portion of Pine Ridge Reservation formerly occupied by the BBR. Since 1948, teams from the Air Force, Army Corp of Engineers, Department of Defense, and the Environmental Protection Agency, among others, have periodically surveyed and cleaned sections of the range.

In 1993, The Oglala Sioux established the Badlands Bombing Range Project, funded by the Department of Defense, to manage and coordinate these efforts. The Tribal Natural Resources Department manages the current protocol to confiscate or remove bomb materials when found. Local law enforcement is often involved in the process, however limited resources hinder the ability of law enforcement to properly regulate, secure the area, or take proactive steps to remove these materials.

From 2006 to 2014, 17 tons of material, including more than 500 unexploded cartridges and bombs, were collected from targeted areas (Meadows, 2023). Some areas in the Reservation still need to be fully cleared of bomb materials and mapped. While it may be impossible to remove every piece of debris and unexploded ordnance, increased clean-up efforts will reduce the number of incidents over time.

Magnitude/Severity (Extent)

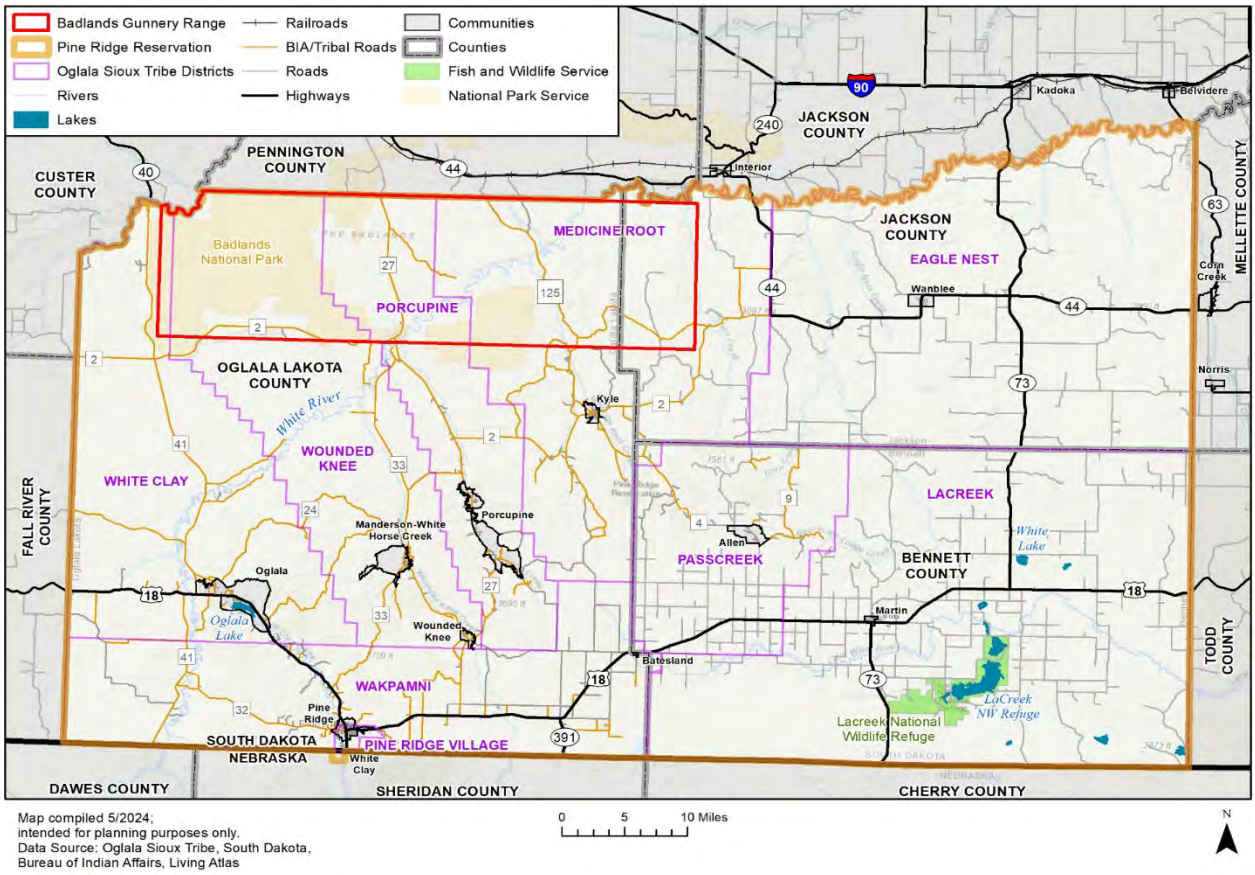
Despite numerous cleanup projects, a 2023 assessment still lists the former range as a “medium risk” site and unexploded ordnances are still frequently reported (Meadows 2023). In 2019, planes using radar developed a topographic map that showed that 90 percent of areas with suspected unexploded ordnances are located within 750 feet of an access road.

There is no standard for measuring the estimated damage or likelihood of damages or injuries from unexploded ordnances. Remaining bomb casings, munitions, or other artillery may be already detonated or still ‘live’, which poses risk to livestock and residents. However, historical events indicate a relatively small extent of damages for the planning area. The lack of sufficient data prevents determining the average annual loss associated with this hazard.

Probability of Future Occurrence

Given the lack of historical data, it is difficult to provide a probability of occurrence for bombing range threats. For the purpose of this plan, finding remnant bomb materials may be likely but the probability of an explosion causing injuries or damages is low.

Figure 4-10 Badlands Gunnery Range



Vulnerability Assessment

Table 4-11 Regional Bombing Range Vulnerability Summary

SECTOR	VULNERABILITY
People	• Live munitions pose major safety risk to anyone in the area. Accidental detonations can cause severe injury to residents, tourists, and clean-up crews. • OST EM and BIA Wildland Fire noted there is a danger to first responders and wildland fire crews when responding to fires in the vicinity of the BBR • Long term exposure to carcinogenic materials used in bombs pose health risks to residents.
Property	• Accidental explosions can damage homes, roads, and other property. • Toxic by-products from debris contaminates soil and water, harming wildlife and ecosystems.
Critical Facilities and Lifelines	• The edges of the Ogallala (also called High Plains) Aquifer intersect with portions of the land formerly occupied by the BBR. Contamination from toxic debris may seep into the aquifer, which doesn't hold an abundance of water at its edges, decreasing its dilution capacity and leading to an increase in contaminates in any well drilled in the area.

SECTOR	VULNERABILITY
	• As noted in the *Magnitude/Severity (Extent)* section, many unexploded ordnances are within 750 feet of an access road. If one of these ordnances were to explode, it could cause damage to the road and any vehicles or emergency responders in the area.
Economy	• Tribal land held under federal control limits potential economic growth. • The presence of unexploded ordnances can deter tourists, minimizing potential revenue.
Environmental and Cultural Resources	• Explosions can cause fires and further environmental degradation. • The environmental degradation left by the former BBR has prevented the Oglala Sioux from reclaiming former lands (Meadows, 2023). • Some culturally significant sites and hundreds of fossil resources have been destroyed, including the large fossil remains of Brontotheres.

Cascading/Related Hazards

The creation and abandonment of the BBR has led to multiple cascading hazards, primarily involving pollution and wildfire. Explosive residues, propellants, and heavy metals from unexploded ordnances, shell casings, and other military debris can leach into the soil. These harmful substances accumulate and can persist for years, disrupting soil health and making the land less suitable for native plants and crops. This may leave native plants and wildlife weakened and more susceptible to infections and infestation. Contaminated soils can also favor invasive species, which may then outcompete native wildlife and further alter the ecosystem.

These chemicals can also seep into groundwater, deteriorating the quality of the Ogallala aquifer. Additionally, precipitation events can cause runoff that carries these contaminants into nearby rivers, streams, and lakes, disrupting aquatic ecosystems, poisoning wildlife, and rendering water unsafe for human consumption.

Fire hazards associated with unexploded ordnances are twofold: they can both cause and be exacerbated by wildfires. The presence of unexploded ordnances significantly increases the risk of wildfire. Explosions from these ordnances can ignite dry vegetation, especially under arid conditions, leading to wildfires that rapidly spread. Such fires can cause the widespread destruction of habitats, killing of wildlife, and damaging of the ecosystem. Toxic smoke from these explosions and subsequent fires can affect people and ecosystems far beyond the designated BBR boundary.

Conversely, wildfires themselves can trigger the explosion of ordnances. The extreme heat generated by wildfires can detonate munitions that are on the surface or shallowly buried. The detonation of one ordnance can set off a chain reaction, causing nearby ordnances to explode as well, potentially igniting more fires. This risk is particularly high in lands located far from inhabited or well-traveled areas, as these areas have not been the focus of clean-up efforts. Additionally, it is often more difficult to fight fires in these areas due to the difficulty of accessing them.

Risk Summary

Overall, the significance of bombing range incidents in the planning area is **low**. The probability of an event occurring is **unlikely**, however impacts can be **critical**.

- In addition to significant environmental damage, the Air Force left behind scattered debris, including discarded bullet shells and unexploded ordnances ranging in size from small bullets to large bombs.
- Some unexploded ordnances can be removed, while others require controlled detonation.
- Explosive residues, propellants, and heavy metals from unexploded ordnances, shell casings, and other military debris can leach into the soil and water, and release into the air when burned.

- While it may be impossible to remove every piece of debris discarded by the Air Force, increased clean-up efforts will reduce the number of incidents over time.
- Despite numerous cleanup projects, a 2023 assessment still lists the former range as a "medium risk" site and unexploded ordnances are still frequently reported.
- These remnants of past military activities introduce multiple threats, primarily through pollution and wildfire hazards.
- Fire hazards associated with unexploded ordnances are twofold: they can both cause and be exacerbated by wildfires.
- Finding remnant bomb materials may be likely but the probability of an explosion causing injuries or damages is low.

4.4.3 Civil Disorder

Description

Location: Limited
Future Probability: Occasional
Magnitude/Severity: Negligible
Overall Significance: **Low**

The term "civil disorder", defined by the US Civil Obedience Act of 1968 and amended in 1994, means any public disturbance involving acts of violence by assemblages of three or more persons, which causes an immediate danger of or results in damage or injury to the property or person of any other individual. Though peaceful public demonstrations are allowed under Tribal and US Federal law, any domestic situations such as a strike or riot involving three or more people could be considered civil disorder if the demonstration has devolved into having a potential for causing injuries, casualties, or property damage.

U.S. Code on civil disorder considers the following actions to be civil disorder:

(1) Whoever teaches or demonstrates to any other person the use, application, or making of any firearm or explosive or incendiary device, or technique capable of causing injury or death to persons, knowing or having reason to know or intending that the same will be unlawfully employed for use in, or in furtherance of, a civil disorder which may in any way or degree obstruct, delay, or adversely affect commerce or the movement of any article or commodity in commerce or the conduct or performance of any federally protected function; or

(2) Whoever transports or manufactures for transportation in commerce any firearm, or explosive or incendiary device, knowing or having reason to know or intending that the same will be used unlawfully in furtherance of a civil disorder; or

(3) Whoever commits or attempts to commit any act to obstruct, impede, or interfere with any fireman or law enforcement officer lawfully engaged in the lawful performance of his official duties incident to and during the commission of a civil disorder which in any way or degree obstructs, delays, or adversely affects commerce or the movement of any article or commodity in commerce or the conduct or performance of any federally protected function.

Threat assessment, mitigation, and response to civil disorder are federal and state directives that work in conjunction with tribal law enforcement. Civil disorder is addressed at the federal level by the US Department of Homeland Security and at the state level by the South Dakota Office of Homeland Security. Efforts are currently being taken by the OST Emergency Management department to update the Tribal Emergency Plans, as well as explore other future planning efforts that address homeland security concerns, public safety, and civil disorder.

Location

Civil disorder could occur throughout the entire planning area. While most of the reservation is rural and sparsely populated, more populated areas are the most likely to see situations involving residents of the Reservation. Rural areas may be host to environmental justice protestors.

Past Occurrences

Previous accounts of civil disorder were identified through the Global Terrorism Database (GTD), Count Love, and archival newspaper reports. According to GTD database, there have been four incidents of civil disorder in the planning area since 1946. Count Love, an open-source database containing a comprehensive list of U.S. protests from January 20th, 2017, to January 21st, 2021, showed one protest for climate action in 2020. In recent years there have not been large civil disorder events on the Reservation, however, there have been a handful of protests held outside the planning area. This includes protests against the Dakota Access pipeline and Keystone XL pipeline, and the reclamation for the Black Hills. On July 3rd, 2020, when President Donald Trump

held a rally at Mount Rushmore, 20 protestors were arrested. Mount Rushmore is known by the Lakota name “He Sapa” meaning “black ridge” that is the heart of the Lakota universe. This protest was a part of a campaign to return He Sapa to Native people. **Table 4-12** describes several large or notable past civil disorder events in the planning area. Some incidents may not meet the definition of civil disorder given above but are included for completeness.

Table 4-12 Civil Disorder Occurrences

YEAR	LOCATION	INJURIES	DEATHS	PROPERTY DAMAGE	DESCRIPTION
1973	Wounded Knee	1	2	Unknown	Around two hundred members of the American Indian Movement (AIM) took over and occupied Wounded Knee after two events: a tribal member was murdered, and the Tribal members were unable to impeach a tribal president they accused of corruption. AIM occupied Wounded Knee for 71 days, the longest- lasting occurrence of civil disorder in US history. They took eleven hostages, whose release was negotiated after two days; only one of them decided to leave the occupied town. Two AIM members were shot and killed and at least one was wounded. A member of the US Marshalls was wounded as well. The occupation ended with the disarmament of AIM.
1975	Pine Ridge	0	3	$20,000	FBI agents were pursuing a vehicle related to an investigation that led them to the Pine Ridge Reservation. A gunfight broke out between AIM members, including Leonard Peltier, and the FBI agents. Peltier was arrested, tried, and convicted for the murders of the two FBI agents, leading to two life sentences in prison. Doubts remain about the fairness of his trial and the evidence used to convict him. Supporters argue that he was wrongfully convicted, citing allegations of misconduct by the FBI, including withholding evidence and coercing witnesses. They also point to the broader context of AIM's struggle for Native American rights and suggest that Peltier was targeted because of his activism. Over the years, there have been numerous calls for his release, including appeals for clemency from human rights organizations and public figures.

YEAR	LOCATION	INJURIES	DEATHS	PROPERTY DAMAGE	DESCRIPTION
					Despite these efforts, Peltier remains in prison, and his case continues to be a symbol of the ongoing struggle for justice and civil rights for Native Americans.
1975	Pine Ridge	0	0	Unknown	AIM is suspected of planting bombs at four separate Bureau of Indian Affairs (BIA) buildings, allegedly in protest of "Columbus Day". The main BIA Office, BIA Law and Order Building, OST Courthouse, and an electrical transformer were all targeted. The OST tribal office was also damaged. The buildings were empty, so no injuries occurred.
1999	Whiteclay, NE	0	0	>$80,000	About 2,000 members of the Oglala Sioux Tribe marched from the Pine Ridge to Whiteclay, Nebraska to protest the village's egregious sale of alcohol to tribal members. The march turned to civil disorder, with tribal members and law enforcement clashing. There were no official reports of injuries or deaths, though reporters witnessed serious physical altercations throughout the event. There are also no official reports of property damage, but reporters observed looting and destruction of public property.
2019	Pine Ridge, SD	0	0	Unknown	Community of Pine Ridge, South Dakota participated in the global climate strike during the UN Summits held in New York City.

Source: New York Times archive, the Global Terrorism Database, the Albuquerque Journal archive, the Lincoln Journal Star archive.

While much of the official data available on this topic is focused on larger demonstrations or instances of widespread civil disorder, it is important to note that civil disorder does not always involve large scale occurrences. There is also an ongoing issue with intermittent violence experienced on the Reservation. Members of the planning team have noted that social vulnerability on the Reservation may also be driving other issues like intermittent gun violence, domestic violence, and substance abuse. These issues, especially when compounded by other hazard events, can lead to cyclical negative impacts for the tribe: Disasters reduce community resilience, which can drive increased civil disorder and violence, which further reduces community resilience.

Probability Of Future Occurrences

Given five incidents over the course of 77 years, the planning area has a 0.1% chance of a large-scale civil disorder incident occurring during any given year.

Magnitude/Severity

Instances of civil disorder can vary greatly in scale and magnitude, depending on the location of the event and the number of participants. The GTD of civil disorder events contains information dating back to 1946. The average damage per event estimate was determined based upon the information available in the database, and local news reports. The bombing in 1975 produced an estimated $45,000 in damages to property, or $625 per year over the 70-year time frame. This does not include unreported losses or losses from displacement, functional downtime, or economic loss. **Table 4-13** describes estimated damages of events in the planning area.

Table 4-13 Civil Disorder Losses

YEAR	LOCATION	ESTIMATED DAMAGE	DESCRIPTION OF DAMAGE
1973	Wounded Knee	Minor (likely <$1 million)	Ransacked trading post
1975	Pine Ridge	Unknown	Helicopter damage, likely other damage
1975	Pine Ridge	$45,000	Buildings and transformer damaged
1999	Whiteclay, NE	Unknown	Stores looted, police cars and street signs damaged

Source: the Global Terrorism Database

Climate Change Impacts

The impacts of climate change are exacerbating existing vulnerabilities and tensions within communities which may lead to public unrest or worsen existing conditions of unrest. This can manifest through resource scarcity, such as water shortages and food insecurity. Climate related policies which do not adequately address the impacts of climate change, or that negatively impact native and culturally significant resources, may themselves be the catalyst of civil disorder or demonstrations. Addressing these challenges requires effective mitigation strategies, equitable resource distribution, and transparent communication with community members.

Vulnerability Assessment

Table 4-14 Civil Disorder Vulnerability Summary

SECTOR	VULNERABILITY
People	• Residents of the Reservation are at risk of gun and domestic violence. • Police officers and first responders at risk of injury or death. • Protestors at risk of injury or death.
Property	• Any easily removed or damaged public infrastructure such as street signs or public art may be at risk. • Targeted buildings may sustain heavy damage. • Public property may be at risk if it is easily damaged.
Critical Facilities and Lifelines	• Police stations and government offices are at a higher risk.
Economy	• Severe civil disorder events are often accompanied by looting. • Damaged businesses can cause loss of revenue and loss of income for workers.

SECTOR	VULNERABILITY
	• Risk of violence in an area may reduce income flowing in and out of that area.
Environmental and Cultural Resources	• Damage to landmarks, historical buildings, and natural habitats can impact areas of cultural significance. • Environmental degradation could occur from rioting through fires, pollution, or trampling through landscape.

Cascading/Related Hazards

Civil disorder can create a cascading effect that increases the likelihood of other hazards. For instance, during periods of civil unrest, the improper handling of fire can ignite widespread wildfires. Furthermore, the movement of large crowds through natural landscapes can result in erosion. On the other hand, civil disorder can also be triggered by a variety of natural hazards. For instance, there have been protests for climate action against big corporations and government to reduce carbon emissions in order to prevent catastrophic hazard events. The impacts of climate change can also bring about civil unrest. Issues such as intensified water scarcity or the spread of communicable diseases can put a strain our resources and services, leading to protests.

Risk Summary

Overall, civil disorder significance in the planning area is **low**. Protest events are expected to occur **occasionally**, and impacts are likely to be **negligible** but could be significant depending upon the size of the gathering and the location on the Reservation.

- Likelihood of civil disorder is low, given there have only been 5 formally recorded incidents in over 77 years. However, the potential impacts can be significant.
- The magnitude of civil disorder events can vary greatly depending on the location, rural or urban, and the number of participants.
- In urban areas, such events can cause significant damage to infrastructure and disrupt daily life for residents.
- In rural areas, civil disorder could lead to environmental damage and disrupt agricultural or other rural activities.
- Beyond the larger or more high-profile instances of civil disorder, the tribe also deals with persistent public safety concerns and sporadic gun violence.

4.4.4 Communicable Disease

Location: Significant
Future Probability: Likely
Magnitude/Severity: Critical
Overall Significance: **Medium**

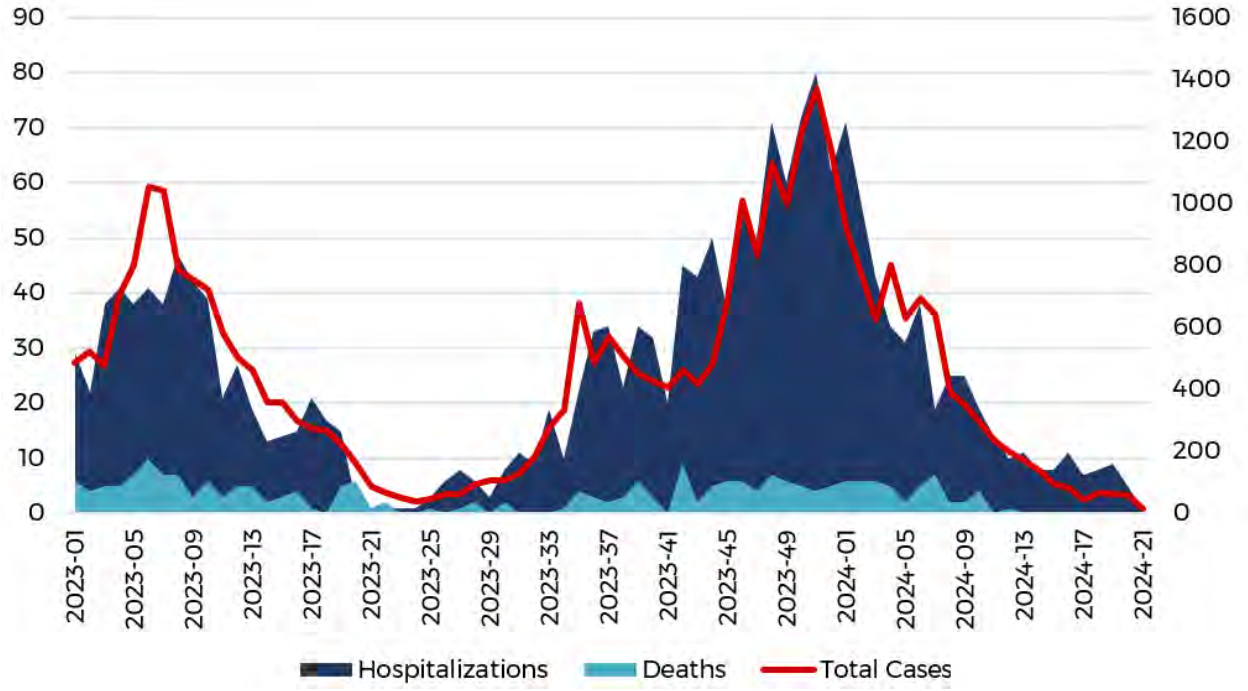
Description

Communicable diseases, also known as infectious diseases, are illnesses caused by infectious agents or their toxins that are transmitted from an infected person, animal, or reservoir to a susceptible host. This transmission can occur directly or indirectly through intermediate plant or animal hosts, vectors, or inanimate environments.

Since the 19th century, the advent of sanitation sewer systems and other improvements in hygiene have significantly reduced the spread of infectious diseases. The discovery of antibiotics and the implementation of universal childhood vaccination programs have further diminished the impact of these diseases on human populations.

Today, organizations such as the OST Health Administration, Indian Health Services (IHS), the Centers for Disease Control (CDC), and South Dakota Department of Health (SD DOH) closely track incidences of human disease outbreaks. This surveillance is critical for identifying possible epidemics and implementing control measures. For instance, the recent COVID-19 pandemic highlighted the importance of such systems in responding to sudden increases in communicable disease cases. **Figure 4-11** uses data from the SD DOH to show the number covid cases in Benett, Jackson, and Oglala Lakota Counties between January 1, 2023, and May 22, 2024. The total number of reported cases is on the right axis, while the total number of hospitalizations and deaths are shown on the left axis.

Figure 4-11 COVID-19 Cases in the Three County Area by Week from 2023-2024



Source: SD DOH, 2024

In South Dakota, healthcare providers are required to report cases of 67 specified infectious agents and 9 outbreak types to the Office of Disease Prevention Services. This reporting system helps monitor disease rates and identify potential epidemic events. The specified infectious agents are rare in South Dakota, so even a few cases can constitute an epidemic. The more common

outbreak types are reported only when the number of cases is high. Reportable illnesses include lead exposure, carbon monoxide poisoning, antibiotic-resistant infections, vector-, food-, and waterborne illnesses, healthcare-associated infections, emerging diseases, influenza, West Nile Virus, tuberculosis, HIV/AIDS, bioterror agents, sexually transmitted infections (STIs), community-associated Methicillin-resistant Staphylococcus aureus (CA-MRSA), and vaccine-preventable diseases.

The State of South Dakota has implemented a lenient vaccination program primarily aimed at children, shown in **Table 4-15**. The following vaccinations are not required by state law, but are highly encouraged: influenza B, pneumococcal meningitis, human papillomavirus, hepatitis A, and hepatitis B.

Table 4-15 Vaccinations Timetable

SCHOOL AGE	VACCINE REQUIRED
Early Childhood	Diphtheria; Pertussis; Tetanus; Poliovirus; Measles; Mumps; Rubella
Entering 6th Grade	Meningococcal Meningitis

SD DOH provides vaccines for children eligible for the federal Vaccines for Children Program at the Pine Ridge Indian Health Service Hospital and the Kyle Health Center in Oglala Lakota County; the South Dakota Department of Health Child and Family Services and the Bennett County Community Health Clinic in Bennett County; and Indian Health Service Wanblee in the portion of Jackson County within the planning area.

Location

Epidemic threshold levels are dependent on disease, location, and season. Normal infectious disease patterns are changing due to increasing human mobility and climate change. Rural populations, including much of the OST planning area, are particularly at risk for vector- and waterborne illnesses.

Past Occurrences

Government reports from 1919 and 1920 reveal that the 1918 pandemic was extremely severe for Native Americans, with mortality rates four times higher than in larger U.S. cities (Groom et al. 2011). High attack rates and significant morbidity and mortality were observed in tribal and other indigenous communities due to crowded housing and limited medical access.

The COVID-19 pandemic highlighted ongoing health inequities for Indigenous peoples worldwide. Native Americans faced an increased risk of death from COVID-19, estimated to be two times that of white Americans, mainly due to a higher burden of comorbidities and underlying health conditions. However, recent analysis suggests that Native Americans had higher in-hospital mortality rates than adults of other races, regardless of comorbidities (Lee et al., 2023). According to the Oglala Sioux Tribe Health Administration and Public Health Authority, the Reservation outpaced the case rate of the State of South Dakota as a whole, with over 9,000 cases by April of 2023. OST reported 75-76 deaths on the Pine Ridge Reservation from direct or indirect exposure to COVID-19.

Today, Native populations still face higher pneumonia and influenza mortality rates and increased hospitalization for respiratory infections. Secondary bacterial infections, such as pneumonia from invasive pneumococcal disease or MRSA, further exacerbate the impact of influenza, posing additional risks during pandemics (Groom et al. 2011).

From 2018 – 2022, the SD DOH Office of Disease Prevention Services identified many disease outbreaks, shown in **Table 4-16**. For the planning area STIs, campylobacteriosis, and community-associated MRSA are the most common infections.

Table 4-16 Total Cases of Reportable Diseases in The Planning Area (2018-2022)

DISEASE	BENNETT COUNTY	JACKSON COUNTY	OGLALA LAKOTA COUNTY	TOTAL
Campylobacteriosis	17*	13*	33	**63***
Chlamydia	175	151	1,662	**1,988**
Cryptosporidiosis	0	2*	5*	**7.5***
Giardiasis	0	3*	12*	**15***
Gonorrhea	120	131	1,325	**1,576**
Hepatitis B, Chronic	0	0	5*	**5***
Hepatitis C, Chronic	10*	20*	126	**156***
Legionellosis	0	3*	3*	**8***
MRSA	10*	10*	34*	**534***
Pertussi	0	0	0	**0**
Salmonellosis	3*	8*	14*	**26***
Shigellosis	0	0	8*	**8***
Streptococcuspneumoniae	0	0	3*	**3***
Shiga toxin-producing E. coli	0	0	11*	**11***
Tularemia	3*	3*	10*	**10***
Varicella	0	8*	3*	**10***
West Nile Disease	0	0	5*	**5***
Total	**338***	**351***	**3,256***	**3,946***

Source: South Dakota Department of Health Office of Disease Prevention Services. Infectious Diseases in South Dakota, 2023.
* indicates an estimate based on one or more counties having recorded between one and five cases, where specific numbers are not available. The displayed figures are the median value of the high and low estimates for these counties.

Probability of Future Occurrence

Based on historical records, an average of between 771 and 809 reportable diseases are recorded annually across the three-county area. While it is likely that cases of communicable disease will occur each year within the planning area, records from the South Dakota Department of Health are only available at the county level, making it impossible to calculate the probability of an epidemic within individual communities.

Magnitude/Severity (Extent)

The scale of a communicable disease outbreak or biological incident is described by the extent of the spread of disease in the community. An outbreak can be classified as an endemic, an epidemic, or a pandemic depending on the prevalence of the disease locally and around the world.

- An **endemic** is defined as something that is natural to or characteristic of a particular place, population, or climate.
- An **epidemic** is defined as a disease that spreads rapidly through a demographic segment of the human population, such as everyone in a given geographic area, a similar population unit, or everyone of a certain age or sex, such as the children or women of a region.
- A **pandemic** is defined as a widespread epidemic with effects felt worldwide.

Tribal governments, as sovereign entities with inherent authority to establish and manage public health programs, are crucial partners in preparing for communicable diseases. Within these

communities, certain subpopulations are particularly vulnerable due to underlying health conditions, while others face increased risk due to limited access to prevention and treatment interventions.

Vulnerable populations in tribal communities include persons with chronic diseases or disabilities, elderly community members, tribal members living in urban centers, and residents of remote and isolated areas. Some are physically vulnerable due to underlying health conditions, while others face vulnerabilities due to access issues that prevent them from receiving crucial information, prevention, and treatment interventions. Vulnerabilities specific to the Oglala Sioux are summarized below:

- Tribal areas often experience higher rates of CA-MRSA, STIs, and waterborne illnesses than non-Tribal areas. As of 2022, roughly 37.0% of the planning area's population is 18 years old or younger, and 11.5% of the planning area is 62 years old or older, while 50.2% of the population lives below the poverty line. These factors increase vulnerability to the impacts of communicable diseases. Refer to *Section Three: Community Profile* for further discussion of age and economic vulnerability in the Pine Ridge Reservation.
- Diabetes prevalence is 14.5% in the tri-county area. These rates are higher than the national average of 11.6%.
- Immunodeficiency disorders like HIV/AIDS and diabetes reduce the ability of the body to fight infection. In 2021, 0.2% of the Native American population in South Dakota had a positive HIV/AIDS diagnosis compared to the national rate of 0.3% making HIV/AIDS a low risk factor for the community.

The extent to which each of these populations is affected by communicable diseases further depends on the attack rate and duration of the disease, and the extent to which herd immunity has been established by the community through effective vaccination programs. Herd immunity occurs when high vaccination rates make the incidence and subsequent spread of a disease unlikely. Health care access is critical for those exposed to acute infectious diseases. There are five health care providers available throughout the planning area: two in Bennett County, two in Oglala Lakota County, and one in Jackson County. The nearest intensive care and hospital facilities are located in Rapid City, South Dakota.

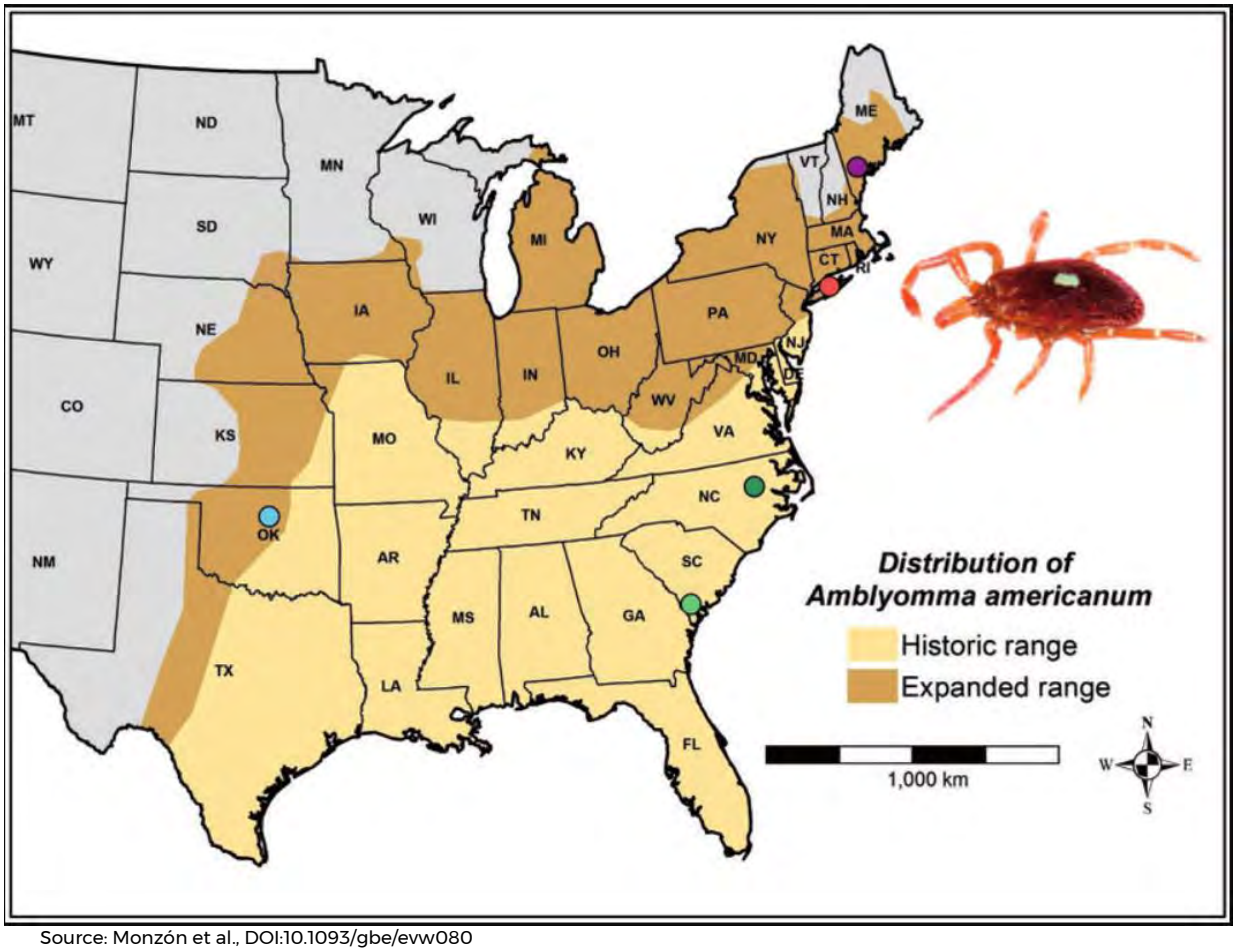
Climate Change Impacts

The impacts of climate change on various environmental factors are leading to increased threats of communicable disease. Changes in temperature, precipitation patterns, and extreme weather events are altering the seasonality, distribution, and prevalence of diseased transmitted by vectors, water, and food. In addition to range expansion and population growth, climate change increases host susceptibility via stress and enhances pathogen transmissions.

Shifts in precipitation and increased flooding are expected to raise the risk of water-borne diseases such as Campylobacter infection. Vector-borne diseases, such as Lyme disease which accounts for about 80% of all reported cases of vector-borne diseases in the US, have steadily increased over the last 20 years, partly due to climate change. The increased distribution and abundance of ticks, including the Lone Star tick which transmits multiple pathogens, are projected to lead to more human disease cases.

While the historic range of the Lone Star tick excluded South Dakota, its expanded range has crept into the southeast corner of the State, see **Figure 4-12**. As climate change accelerates, its range will likely expand to include the Pine Ridge Reservation. Additionally, warmer weather increases ticks' seasonal activity, which will prolong human exposure.

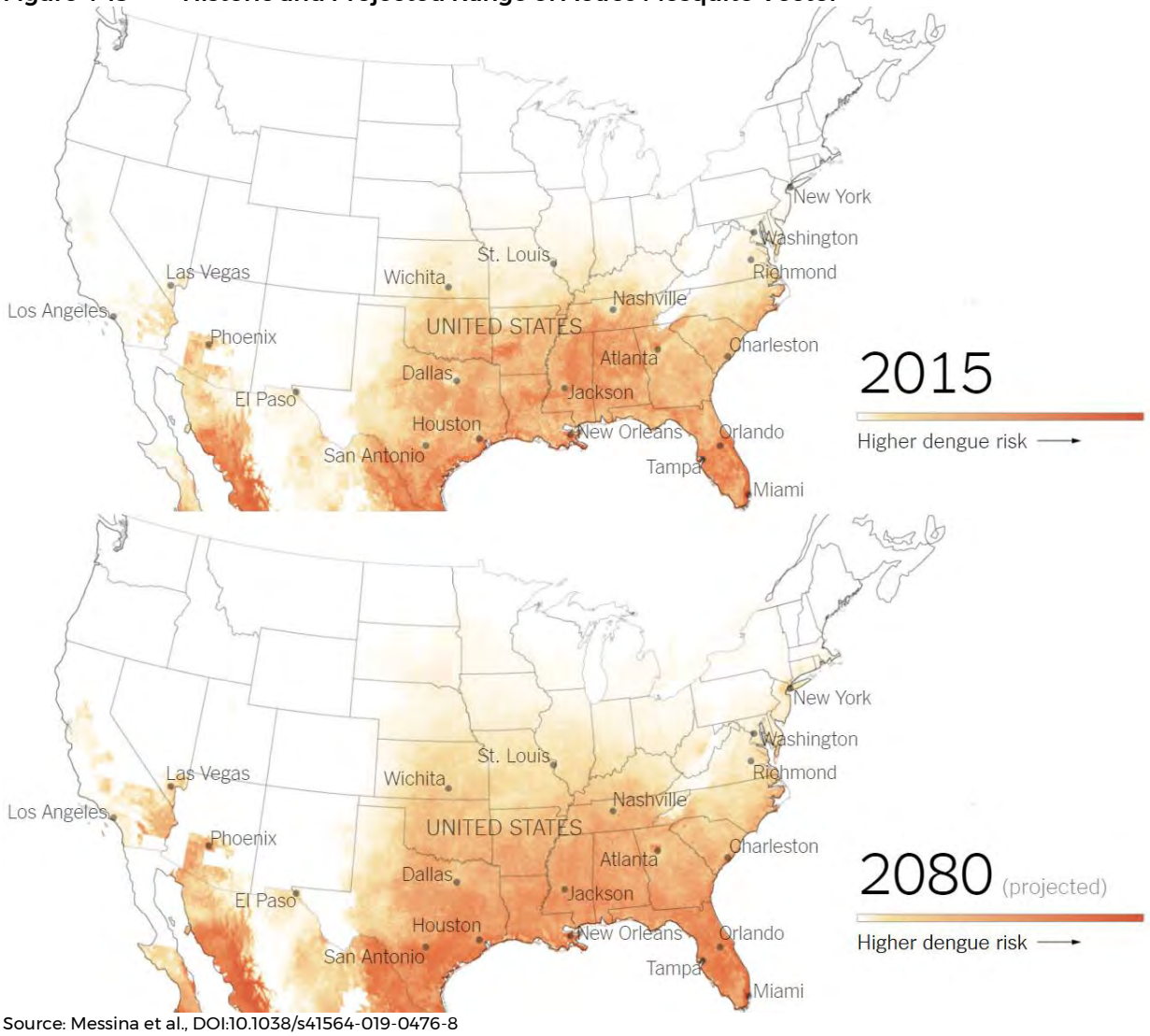
Figure 4-12 Historic and Expanded Range of Lone Star Tick



Source: Monzón et al., DOI:10.1093/gbe/evw080

The spread of mosquito-borne pathogens is influenced by weather, climate, and social factors. Climate change alters the diversity and distribution of mosquito vectors, such as the *Aedes* mosquito, which can carry dengue fever, chikungunya, Zika fever, Mayaro and yellow fever viruses, and other disease agents. The projected range for the *Aedes* mosquito in the US under a 6.5 RCP scenario is shown in **Figure 4-13**. Mosquito-borne transmission of other encephalitis viruses has been sporadic in the last decade and may increase as climate change extends seasonality and expands habitat suitability for mosquito species.

Figure 4-13 Historic and Projected Range of *Aedes* Mosquito Vector



Source: Messina et al., DOI:10.1038/s41564-019-0476-8

Vulnerability Assessment

Table 4-17 Communicable Disease Vulnerability Summary

SECTOR	VULNERABILITY
People	• Vulnerable populations include: the very young, the very old, the unvaccinated, the economically vulnerable, individuals living in higher density environments or crowded households, and those with immunodeficiency disorders. • The nearest intensive care and hospital facilities to the planning area are in Rapid City, reducing patient access to care (especially those in the southeastern portion of the planning area). • Poverty, diabetes, rurality, and alcohol use increase risk of chronic and infectious disease.
Property	• Property is not likely to be affected by this hazard.

SECTOR	VULNERABILITY
Critical Facilities and Community Lifelines	• Transportation routes may be closed if a quarantine is put in place. • Healthcare clinics in the planning area may be overwhelmed quickly by widespread events.
Economy	• Large scale or prolonged events may cause businesses to close temporarily, which could lead to significant revenue loss and loss of income for workers. • Outbreaks can drastically reduce tourism, and any economic income associated with tourism.
Environmental and Cultural Resources	• Disease outbreaks can compromise water quality through increased contamination from medical waste and chemicals used in treatment, harming aquatic ecosystems and the cultural practices that depend on clean water bodies. • Cultural practices that involve community gatherings may be restricted during outbreaks, potentially leading to deterioration of such tradition or increased mental health challenges.

Cascading/Related Hazards

Communicable diseases often thrive in environments where additional stressors are present, and their prevalence is projected to increase as populations and ecosystems become increasingly stressed due to temperature variations and extreme weather events. Changes in habitats, altered migration patterns and expanding ranges, biodiversity loss, and the rise of invasive species contribute to these stress conditions. For example, shifts in precipitation and increased flooding events are expected to increase the risk of water-borne diseases such as Campylobacter infection, and communicable diseases are also often linked to zoonotic diseases, where pathogens are transmitted from animals to humans.

Pandemics can also lead to a rise in other detrimental social impacts, potentially triggering or exacerbating conditions for civil disorder. For instance, the Oglala Sioux Tribe Health Administration and Public Health Authority noted that during the lockdowns for COVID-19 they saw an increase in alcohol related crimes, domestic violence, and assaults. The most concerning impact was that the teen and young adult suicides rates climbed, becoming the highest in the state. Multiple climate-related extreme events that occur concurrently or in rapid succession can result in greater health impacts than singular events and limit the ability of individuals and communities to effectively prepare for, manage, and recover from these events. Singular events that cascade across multiple sectors or regions can result in compound adverse health consequences, such as drinking water contamination after flooding, and vector control program breakdowns during and after flood events.

Risk Summary

Overall, the significance of communicable disease in the planning area is **medium**. Major disease outbreaks are **likely** to occur regularly, and impacts can be **critical**.

- Communicable diseases are illnesses caused by infectious agents transmitted from an infected person, animal, or reservoir to a susceptible host.
- Rural populations, including much of the OST planning area, are particularly at risk for vector- and waterborne illnesses.
- Government reports from 1919 and 1920 reveal that the 1918 pandemic was extremely severe for Native Americans, with mortality rates four times higher than in larger U.S. cities.
- Native populations still face higher pneumonia and influenza mortality rates and increased hospitalization for respiratory infections. Secondary bacterial infections,

such as pneumonia from invasive pneumococcal disease or MRSA, further exacerbate these impacts.

- Vulnerable populations in tribal communities include those with chronic diseases or disabilities, elderly members, and residents of remote areas.
- Vulnerabilities arise from underlying health conditions and access issues preventing them from receiving crucial information, prevention, and treatment interventions.
- Changes in temperature, precipitation patterns, and extreme weather events are altering the seasonality, distribution, and prevalence of diseased transmitted by vectors, water, and food.
- Communicable diseases often thrive where additional stressors are present, with prevalence projected to increase as populations and ecosystems become increasingly stressed due to climate change.

4.4.5 Dam Failure

Description

Location: Limited
Future Probability: Unlikely
Magnitude/Severity: Critical
Overall Significance: **Medium**

According to the South Dakota Legislature Safety of Dams (Chapter 74), dams are defined as "any artificial barrier, including appurtenant works, which impounds or diverts water, and which is:

- 25 feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or from the lowest elevation of the outside limit of the barrier, if it is not across a stream channel or watercourse, to the maximum water storage elevation or
- Has an impounding capacity at maximum water storage elevation of 50 acre-feet or more.

A barrier is not considered a dam for the purpose of this chapter if the height does not exceed 6 feet regardless of storage capacity or if the storage capacity at maximum water storage elevation does not exceed 15 acre-feet regardless of height.

South Dakota uses a classification system for dams throughout the state, including those areas participating in this plan. The classification system includes three classes, which are defined in **Table 4-18** below.

Table 4-18 Dam Size Classification

SIZE	STORAGE CAPACITY (ACRE-FEET)	EFFECTIVE HEIGHT (FEET)
Small	50 to 1,000	25-40
Intermediate	1,001 to 50,000	41 to 100
Large	Greater than 50,000	Greater than 100

Source: South Dakota, 2018

The effective height of a dam is defined as the difference in elevation in feet between the lowest point in the cross section taken along the centerline of the dam and the crest of the emergency spillway. If there is no emergency spillway, the top of the dam is the upper limit.

Dam failure, as a hazard, is described as a structural failure of a water impounding structure. Structural failure can occur during extreme conditions, which include, but are not limited to:

- Reservoir inflows in excess of design flows
- Flood pools higher than previously attained
- Unexpected drop in pool level
- Pool near maximum level and rising
- Excessive rainfall or snowmelt
- Large discharge through spillway
- Erosion, landslide, seepage, settlement, and cracks in the dam or area
- Earthquakes
- Vandalism
- Terrorism

Hazard classification of dams is defined by FEMA's *Federal Guidelines for Dam Safety: Hazard Potential Classification Systems for Dams*:

- **High Hazard –** Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life as well as economic, environmental, and lifeline losses.
- **Significant Hazard Potential –** Dams assigned the significant hazard potential classification are those dams where failure or mis-operation result in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
- **Low Hazard –** Dams assigned the low hazard potential classification are those where failure or mis-operation result in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

South Dakota regulates dam safety and has classified dams by the potential hazard each poses to human life and economic loss. These classifications describe the consequences of a potential failure, not the likelihood of failure, for each individual dam. The following are classifications and descriptions for each hazard class:

- **Category 1 Dam** – a high hazard dam whose failure may cause loss of life.
- **Category 2 Dam** – a significant hazard dam whose failure may cause damage to buildings, highways, railroads, bridges, or public utilities; loss of a water supply reservoir for a water distribution system; other extensive economic loss; or the reservoir is the only source of water for a water distribution system.
- **Category 3 Dam** – a low hazard dam whose failure may cause limited damage to agricultural lands or county and township roads or minimum economic loss.

Location

Communities or areas downstream of a dam, especially high hazard dams, are at greatest risk of dam failure. There are five high hazard dams located throughout Oglala Lakota, Bennett, and Jackson Counties, all of which are federally owned. There are also eight dams located upstream which could affect the Pine Ridge Reservation from Custer, Fall River, and Sioux (Nebraska) Counties. More specifically, if the Angostura Dam in Fall River County fails, it can also create risk to the Red Shirt Community and surrounding areas along Cheyenne River. With the number and distribution of high and significant hazard dams in the planning area, this rates the geographic location as **limited**, meaning that 10-25% of the planning area or limited single-point occurrences are to happen throughout Pine Ridge Reservation.

Dam owners and the South Dakota Department of Natural Resources have opted, at this time, to not include dam breach maps or inundation maps in hazard mitigation plans due to the sensitive nature of this information. Requests can be made of the dam owner or the Dam Safety Division of SDDANR to view an inundation map specific to a dam. In total, there are 39 dams located within the planning area which range from low to high hazard, as shown in **Table 4-19**

Table 4-19 Dams in the Planning Area

COUNTY	LOW HAZARD	SIGNIFICANT HAZARD	HIGH HAZARD
Oglala Lakota County	3	2	3
Bennett County	9	1	2
Jackson County	15	4	0
Total	**27**	**7**	**5**

Source: National Inventory of Dams 2024

Originally constructed in 1938, see **Figure 4-14**, the Oglala Dam has faced persistent issues, with ongoing structural challenges undermining its reliability. A significant design flaw involved a pipe

located on the downstream side of the spillway that collected water, which in turn caused cavities to form beneath the concrete structure. Over time, this flaw weakened the spillway, making the dam increasingly susceptible to collapse.

Figure 4-14 Men Working on the Oglala Dam Project, 1940

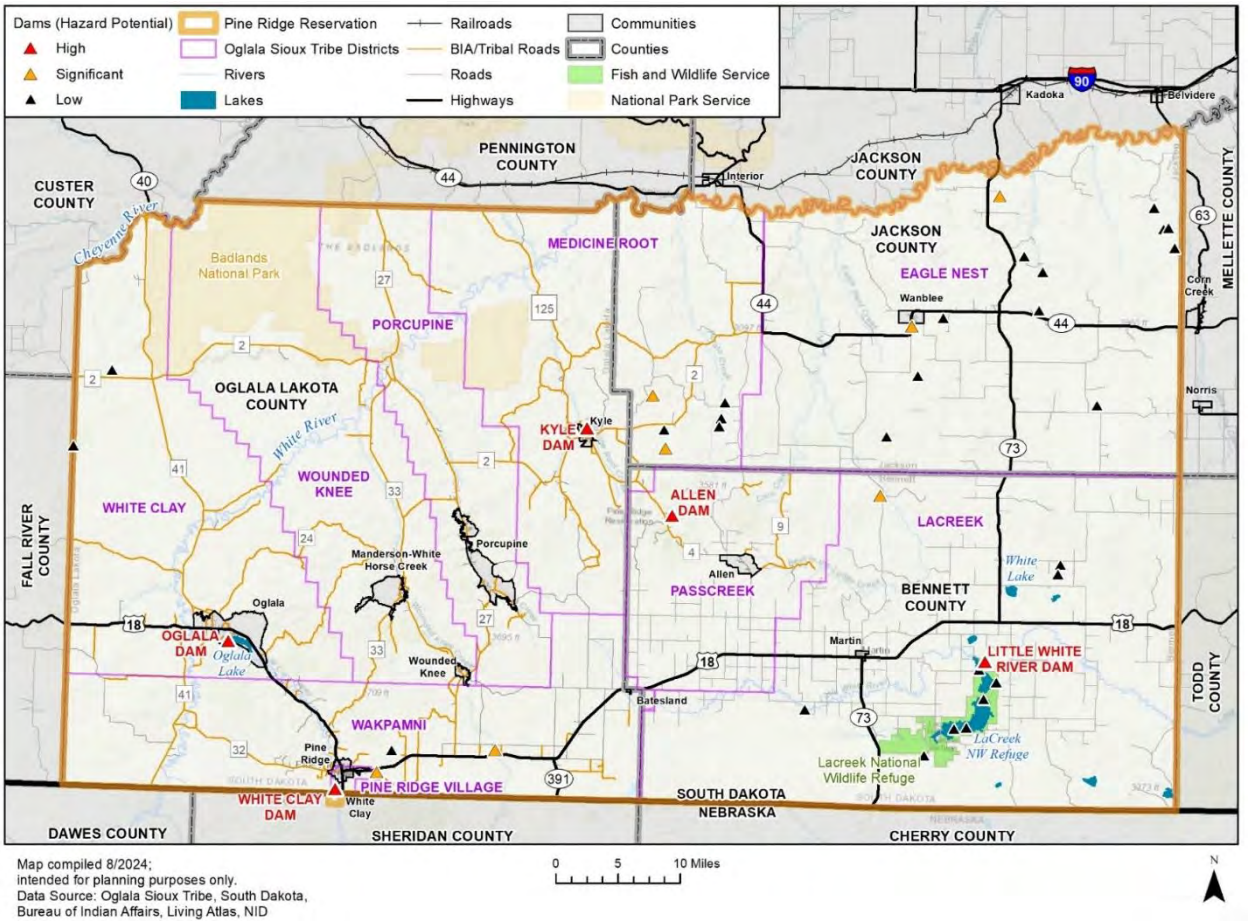


Source: The US National Archives via the Lakota Times, https://www.lakotatimes.com/articles/15m-for-oglala-dam/

The Oglala Dam and White Clay Dam are both in the process of being inspected and repaired for damages. Oglala Dam in particular was found to have damage to the spillway. The Bureau of Reclamation is overseeing the dam repairs. A major transportation route, Highway 18, runs directly north of the Oglala Dam and is at risk of road washouts and damage when the spillway is used. The Planning Team also stated that when the spillway is used, water enters Oglala and cuts off access to several homes. A dam in Kyle is also currently being inspected. Inspections and repairs were completed in 2019.

Dams classified with high hazard potential require the creation of an Emergency Action Plan (EAP). The EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger the structural integrity of the dam within sufficient time to take mitigating actions and to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam. The EAP may also be used to provide notification when flood releases will create major flooding. An emergency situation can occur at any time; however, emergencies are more likely to happen when extreme conditions are present. Currently the three high hazard dams in Oglala Lakota County have EAPs and are undergoing inspections.

Figure 4-15 Oglala Sioux Tribe Dams



Past Occurrences

According to the Association of State Dam Safety Officials, there have been no dam failure events within the planning area. While no such events have occurred, non-failure incidents have occurred and there is still a possibility for dam failure in the planning area. The previous plan update noted that high hazard dam spillways were tested, and the Planning Team observed that during these tests, notifications protocols were insufficient, leading to many tribal members being unaware of planned water released along spillways. This lack of communication resulted in the closure of major transportation routes and restricted access to homes and businesses.

In March 2019, severe flooding and high-water flows caused both the Oglala Dam and White Clay dam to overtop. With heavy amounts of flood melt and runoff, several communities from Pine Ridge to Oglala had been put on notice of possible Dam failure. The BIA issued a notice to the OST EM Office about a possible breach in the Oglala Dam first, where the concrete spillway material had been damaged to the point that emergency repairs had to be made and also resulted in one half of the concrete spillway closed off with water detoured to another portion of the spillway. The Oglala Dam experienced a washout, and teams had to place sandbags to divert water flows. To prevent additional flood risks to nearby residents, the reservoir was eventually drained.

Shortly after the Oglala Dam issues, OST EM was alerted that the White Clay Dam was in a critical state. Again, the concrete spillways were compromised to the point where 100% discharge was not enough to relieve the high-water stress on the spillway. The high water flows also overtopped the spillway on the White Clay Dam, causing damage. Four inches was the maximum allowable depth over the White Clay Dam spillway, and that number grew to 24-26 inches one night. Repairs

to the spillway were made and emergency pumps were brought in to assist the overflow. A few months after the disaster declaration a contractor was hired to bring in a 6-inch multi pipe siphoning system to ensure water levels stay at a safe distance from the spillways.

Both dams sustained damage during the flooding event, with repairs that continued throughout 2019. As of today, Oglala Dam has begun construction rebuilding a new dam and spillway system.

Figure 4-16 Water Flows Over White Clay Dam Spillway



Source: Rapid City Journal, 2019[47]

Additionally, the Planning Team highlighted concerns about individuals swimming near dams and becoming ill due to poor water quality. Although water quality testing is occasionally conducted on inlets and outlets, the tribe has expressed a need for more consistent and regular testing protocols.

Probability Of Future Occurrence

Historically, there have been no high hazard dam failure events in the planning area. The South Dakota State Hazard Mitigation Plan states that many of the state's small dams fail due to insufficient spillway size after heavy rain events. For the purpose of this plan, the probability of dam failure will be rated as **unlikely** stating that there is a less than 1% probability of occurrence in the next year or has a reoccurrence interval of greater than every 100 years.

Magnitude/Severity (Extent)

Dam failures result in a unique source of flash flooding, when a large amount of previously detained water is suddenly released into a previously dry area due to a failure in some way of the dam. The existence of dams classified as High and Significant hazard within the planning area means that potential impacts could include injury and loss of life, property damage, damage to infrastructure, drinking water contamination, loss of crops and livestock, evacuations and

sheltering and associated costs, interruption of commerce and transportation, search and rescue, and clean-up costs. In addition, dam failure and associated flooding can cause damage to and loss of irrigation structures such as headgates and ditches. Loss or damage to water structures negatively impacts an agricultural producer of crops and livestock-and can be costly to repair.

The 2019 near-failure of the Oglala Dam triggered a high-risk assessment of the dam, highlighting the severe consequences of a potential breach. A failure could unleash massive flooding along White Clay Creek, forcing evacuations from Pine Ridge to Oglala and threatening lives, homes, and infrastructure. This event prompted swift action and a $58 million rehabilitation project, with completion expected by November 2025. The Bureau of Indian Affairs has committed significant resources to this effort, including $15 million from the Bipartisan Infrastructure Law, on top of more than $21 million allocated earlier. Despite these investments, the risk remains until the rehabilitation is complete.

The severity and magnitude of a given dam failure will vary on a case-by-case basis. Information on potential impacts of specific failures to dams is considered sensitive and is not detailed in this plan due to Homeland Security concerns. However, emergency management coordinators have access to inundation maps contained in the emergency action plans for the High and Significant Hazard dams in the state. Although the possibility of a dam failure in the planning area is unlikely, the severity of dam failure is rated **critical**.

Climate Change Impacts

With rising temperatures and increasingly extreme precipitation patterns, the impacts on aging infrastructure may accelerate. Intense rainfall events can cause significant inflows of water into reservoirs, potentially exceeding a dam's capacity and leading to overtopping and failure. Conversely, prolonged droughts can lower water levels in reservoirs, exposing more of the infrastructure to degrading elements and heightening sustainability to structural issues.

As dam infrastructure ages, its performance and reliability may decline, posing risks to safety, functionality, and efficiency. Materials such as concrete, steel, and asphalt can deteriorate over time due to environmental exposure to moisture, temperature fluctuations, chemicals, and UV radiation. This degradation can result in cracks, rust, and the weakening of structural elements, increasing the risk of dam failure.

Vulnerability Assessment

As previously noted, there are five high hazard dams in the planning area that could affect downstream areas and communities. The counties in the planning area contain at least one significant hazard dam and there are also eight high hazard dams in upstream counties that have the possibility to affect the planning area.

Table 4-20 Dam Failure Vulnerability Summary

SECTOR	VULNERABILITY
People	• Dam failure can result in sudden and massive flooding, posing severe risk to human life. • Those at greatest risk are those in affected areas who have access and functional needs, such as those with disabilities, injuries, limited access to transportation or financial resources, the elderly, and people experiencing homelessness. • According to the Mendota Dakota, only a minority of Reservation residents own an operable automobile, the predominant form of travel for all ages on the Reservation is walking or hitchhiking, and there is no public transportation available on the Reservation.

SECTOR	VULNERABILITY
Property	• The abrupt released of water from a breached dam can lead to extensive property damage. • Homes, buildings, and infrastructure within the floodplain are at risk of severe damage or destruction due to the intense surge of water. An estimated 75 to 100 structures were damaged by flooding in 2019.
Critical Facilities and Community Lifelines	• Roads, bridges, and railways can potentially be damaged, which can disrupt transportation and communication networks. According to the Mendota Dakota, there are few paved roads on the Reservation, which increases this vulnerability. • The Oglala Dam and Oglala Lake provides drinking water, irrigation water, and supports local economic activity. This is crucial for both residential use and agricultural activities. • An estimated 500 people were left without access to potable water during the 2019 flooding.
Economy	• The long-term depletion of water in a reservoir, essential for potable water needs, could disrupt the water supple, impacting drinking water availability, agricultural requirement, and industrial water usage. • The tribe estimated millions of dollars in damage from the 2019 flooding event. • According to the Mendota Dakota, the unemployment rate on Pine Ridge is reported to be approximately 83-85% and the median income is very low, impacting the ability of people and businesses to fund recovery efforts.
Environmental and Cultural Resources	• Water releases from dams usually contain very little suspended sediment, which can lead to scouring of riverbeds and banks. • Inundation could introduce many foreign elements into local waterways, potentially causing the destruction of downstream habitats. • Oglala Lake, which has a maximum capacity of 18,300 acre-feet, supports wildlife and local ecosystems, as well as recreational activities such as hunting and leisure.

Cascading/Related Hazards

With dam failure, there is likelihood of flooding that can lead to infrastructure damage, economic impact, environmental impact which can harm the safety of the Pine Ridge Reservation. With the possibility of flood related hazards, there could also be severe weather that cascades dam failure through the planning area. The 2019 winter storms are a recent example of the interconnectedness of hazards and how one hazard can trigger others, with that winter storm event resulting in flooding and dam failure incidents.

Risk Summary

Overall, dam failure significance for Pine Ridge Reservation is **medium**. With 13 high hazard dams in and surrounding the planning area, this can put the tribe at risk for damages related to this hazard. The probability of a damaging dam failure event is **unlikely**, but impacts could be **critical** depending upon the dam involved and where it occurred in the planning area.

- There are a total of five high hazard dams in the planning area and eight high hazard dams in surrounding counties that can affect the Pine Ridge Reservation.
- Flooding can cause the possibility for dam failure throughout Pine Ridge Reservation.

- Climate change may result in an increase in temperatures and precipitation, leading to impacts on aging infrastructure causing dam failure.

4.4.6 Drought

Description

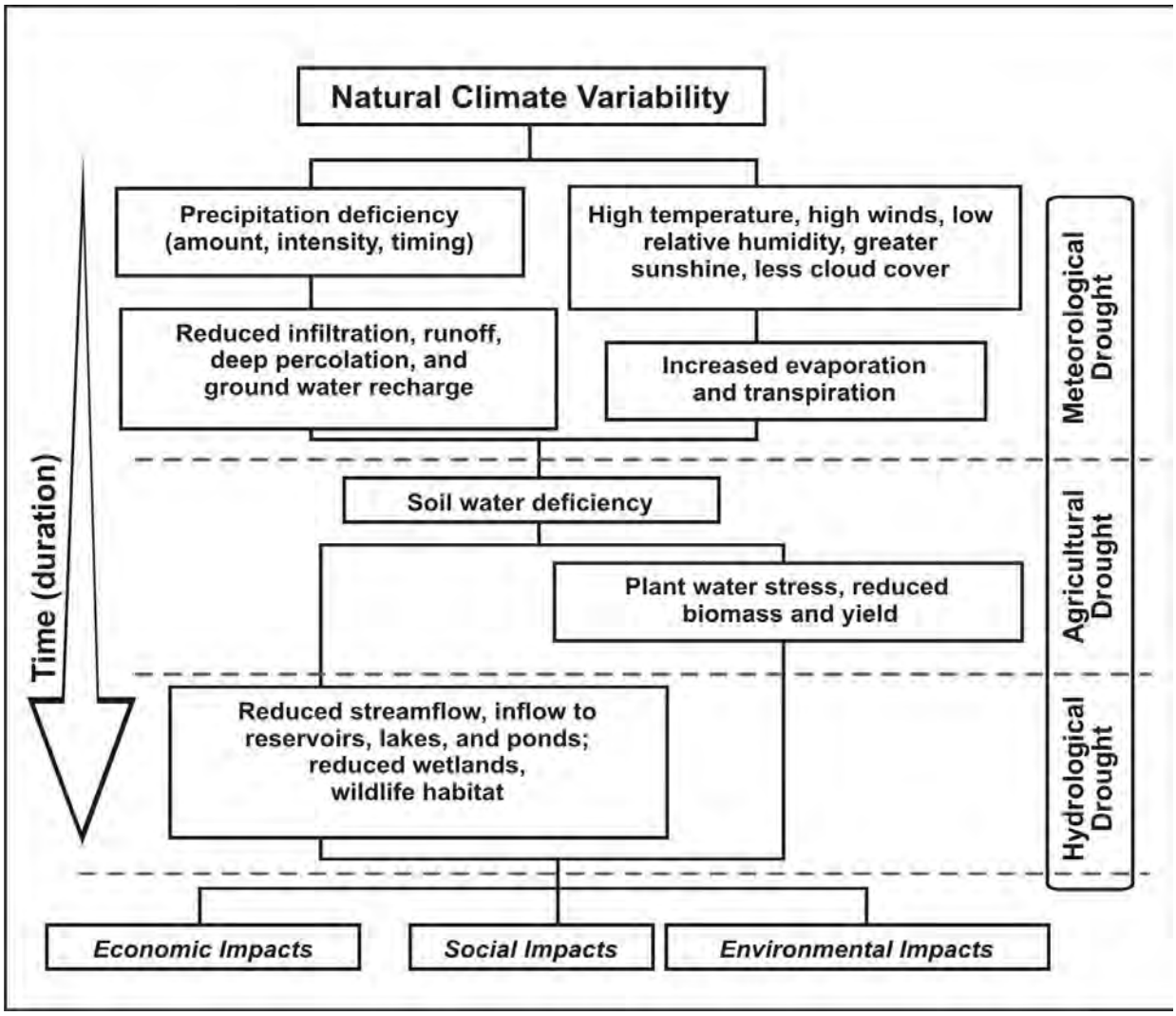
Location: Extensive
Future Probability: Likely
Magnitude/Severity: Critical
Overall Significance: **High**

According to the National Weather Service (NWS), drought is a deficiency in precipitation over an extended period, 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 all climate zones, from very wet to very dry. Human factors, such as water demand and water management, can exacerbate the impact that drought has on a region. There are six common types of drought:

- **Meteorological** drought describes a physical lack of moisture. It is characterized by divergence of precipitation from the long-term average precipitation over a given length of time. Evaporation also plays a role in meteorological drought but is relatively difficult and expensive to measure and is commonly not considered in meteorological drought indices such as the Standardized Precipitation Index (SPI).
- **Hydrological** drought describes how a meteorological drought affects the physical availability of water in streams, lakes, reservoirs, soils, snowpack, and groundwater. Hydrologic drought conditions are also expressed as the deviation from normal or long-term averages. This approach provides a more nuanced definition of drought and is arguably more useful for water managers in regions such as Utah that depend on winter snowpack and reservoir storage.
- **Agricultural** drought describes how meteorological drought and hydrologic drought affect the agricultural sector. Soil water deficiency, which stresses crops and plants, is a key factor that determines agricultural drought. Dry farms can be especially vulnerable to agricultural drought, while impacts to irrigated farms can hopefully be limited to increased irrigation costs.
- **Socioeconomic** drought occurs when a shortfall in water supply causes a shortage of economic goods. For example, if precipitation is low enough, reservoir levels may decline to a point where generation of hydropower is not possible. Snowpack being insufficient to support a good ski season is another example of a socioeconomic drought.
- **Ecological** drought is a prolonged and widespread deficit in the naturally available water supplies – including changes in natural and managed hydrology – that create multiple stressors across ecosystems.
- **Flash** drought refers to relatively short period of warm surface temperature and anomalously low and rapid decreasing soil moisture. It is related to the rate of rapid drought intensification rather than duration of drought conditions.

Figure 4-17 indicates different types of droughts, their temporal sequence, and the various types of effects they can have on a community.

Figure 4-17 Sequence and Impacts of Drought Types



Source: National Drought Mitigation Center, 2024

The Tribe's first Drought Adaptation Plan was approved in June 2020 and sponsored in part by the Great Plains Tribal Water Alliance. The plan serves as a platform to improve resilience where possible and as a framework to connect other planning/resilience efforts such as hazard mitigation plans and agricultural resource management plans.

At the heart of the tribe's water management strategy is the Oglala Sioux Tribal Council's Water Code. This code offers clear guidance on conserving, managing, and protecting the tribe's vital water resources. It secures water rights for the tribe's permanent homeland, ensuring that water resources are used to protect the health, welfare, and economic security of tribal citizens. The Water Code also establishes a system for equitable distribution within the reservation, outlining the beneficial uses of water, which range from domestic, agricultural, and industrial to cultural, recreational, and wildlife purposes. Crucially, the code states that all waters within the reservation are considered the property of OST, reinforcing tribal sovereignty over these essential resources.

To effectively manage drought conditions, the tribe has implemented a robust drought monitoring system. Weather data, including historical drought patterns, is collected from a weather station in Long Valley, South Dakota, while weekly drought conditions are tracked using the U.S. Drought Monitor (UDSM). To analyze long-term trends, the Self-calibrated Palmer Drought

Severity Index (SC-PDSI) is employed, while the Evaporative Demand Drought Index (EDDI) is used to monitor flash droughts. Each month, these indices are reviewed to assess drought severity and determine when to initiate response actions, ensuring the tribe remains proactive in managing water resources during times of drought. The OST Water Resources Department has also worked to establish one weather monitoring station on the Reservation, with plans to add seven more stations over the next several years.

Together, the Drought Adaptation Plan, Water Code, and advanced monitoring systems form a comprehensive strategy aimed at safeguarding the tribe's water resources, enhancing resilience, and supporting the long-term health and economic security of OST.

Table 4-21 Classification of PDSI, sc-PDSI, and USDM

PDSI/SC-PDSI	USDM	CLASS
≥ 4.00	n/a	Extremely Wet
3.00 to 3.99	n/a	Very Wel
2.00 to 2.99	n/a	Moderately Wet
1.00 to 1.99	n/a	Slightly Wet
0.50 to 0.99	n/a	Incipient Wet Spell
-0.49 to 0.49	n/a	Near Normal
-0.99 to -0.50	n/a	Incipient Dry Spell
-1.99 to -1.00	D0	Mild Drought
-2.99 to -2.00	D1	Moderate Drought
-3.99 to -3.00	D2	Severe Drought
-4.99 to -4.00	D3	Extreme Drought
≤-5.00	D4	Exceptional Drought

Source: Maule, et al. 2013, DOI:10.1007/s00382-012-1355-7

Location

The western half of South Dakota is semi-arid and experiences less precipitation than eastern South Dakota. Located in the southwest region of the state, the entire planning area is susceptible to impacts resulting from drought. However, the Reservation has less frequent drought events than the northeast corner of the State. The Reservation experiences approximately 19 to 24 inches of precipitation annually and has an average annual temperature of 47.05˚F. With high temperatures and low rainfall, the soil's moisture content decreases causing low forage production.

Past Occurrences

Drought poses significant risks to agriculture, livestock, and firefighting resources. The Drought Impact Reporter, a comprehensive database of drought impacts across the United States since 2000, recorded 63 drought-related incidents in Oglala Lakota County, Bennett County, and Jackson County. Of these incidents, 78% were related to agriculture, 40% affected plants and wildlife, 17% impacted the water supply, 14% concerned public health, and 11% were associated with fire.

Historical occurrences of drought were documented in the following years:

- 1958–1961: The first recorded drought of significance had a Self-Calibrated Palmer Drought Severity Index (SC-PDSI) of -3.57, measured in August of 1959. The prolonged droughts during these years substantially impacted agriculture, water supplies, energy, transportation of goods, and ecosystems.
- 1968–1972: The second recorded drought of significance had a SC-PDSI of -4.48 in November of 1974.
- 1978–1982: The third recorded drought occurred in the fall of 1978 and lasted until 1982. It was the worst recorded drought in the area's history with the lowest recorded SC-PDSI of -5.41 in April of 1981.
- 1987–1992: The second worst drought on record with a SC-PDSI of -3.91 during November of 1989.
- 2001–2008: A drought occurred between 2001 and 2008 with a recorded SC-PDSI of -3.94 and resulted in many impacts. As a result, emergency programs were developed by the State of South Dakota, including the Drought Relief Hay Exchange. The exchange was developed to help farmers in need of hay locate farmers with available hay. The counties most in need of hay during the 2001–2008 drought were Oglala Lakota, Fall River, and Custer. The service focused on aiding farmers in counties west of the Missouri River and operated with the support of west river county extension offices. The exchange accepted hay listings from across the state.
- 2002: Fireworks were banned over the Fourth of July weekend for much of western South Dakota because of the danger for drought-induced wildfires across the region. That year, Governor Janklow requested a drought disaster designation for all but two South Dakota Counties, which created low-interest emergency loan opportunities for South Dakota farmers and ranchers affected by continued drought conditions. USDA Secretary Mike Johanns declared a disaster for 24 counties in South Dakota because of drought, frost, high winds, insect damage, and hail. As a result, farmers and ranchers in those counties were eligible for low interest emergency loans. In addition, 24 adjoining counties also qualified for relief. South Dakota received $4.3 million from the Livestock Assistance Grant Program to help producers who lost forage due to drought. Eligible producers that applied for the grant received $3 per head for cattle and about 50 cents per head for sheep.
- 2003: Governor Rounds announced that the USDA designated 55 South Dakota counties as primary or contiguous disaster areas because of persistent drought during 2003. Jackson and Oglala Lakota were among the counties were designated as primary disaster areas.
- 2013: The Drought Impact Reporter and the USDM data showed severe, but short drought, during in southern South Dakota. Secondary impacts of this drought included many cattle being sold at auction when water supplies were low, and pastures were bare. At the start of the growing season, the U.S. Department of Agriculture began declaring counties as primary and secondary disaster areas offering impacted farmers low-interest emergency loans. Laura Edwards, the State Climatologist, said that much of the southern South Dakota corn crop during these years was affected by drought, leading farmers to cut it for silage.
- 2017: the Governor of South Dakota announced a statewide drought emergency as crops and livestock continued to suffer without enough rain. The governor activated the state Drought Task Force to monitor rapidly developing drought in South Dakota. Task force members monitored drought information relating to agriculture, fire, and water supplies. The sectors that demanded the largest uses of water were firefighting, human consumption, and agriculture. USDA authorized early haying of Conservation Reserve Program acres to help farmers and ranchers in the Dakotas and Montana. During this time,

the MWRWS system was not able to meet demands during peak water use, and 30 percent reductions on water use were issued to all communities connected to the system.

- 2021: Statewide, South Dakota recorded its 4th warmest and its driest June since record keeping began in 1895. Severe to extreme drought conditions continued from June into July across most of the area. Drought conditions were still prevailing across the State in August, although some improvement in drought conditions were observed by the month's end across portions of Minnehaha and Lincoln Counties.

Probability Of Future Occurrence

Trends indicate that severe, regular droughts are a fixture of the South Dakota climate. Current predictions of climate change suggest the situation may worsen in coming decades (see Climate Change Impacts section below). According to the 2020 South Dakota Drought Mitigation Plan, the state has experienced severe or extreme drought between 15 and 19.9% of the time over a 100-year period. Based on paleoclimatic techniques such as tree ring research, which spans a period of roughly 400 years, multi-year droughts as significant as the 1930s drought or worse occur on average every 57 years. Based on historical records (10 in the past 118 years, counting the 2002-2007 dry spell and other multi- year events as one event) notable droughts have occurred somewhere in the State on average about every 12 years, which is equivalent of an 8% chance any given year.

Magnitude/Severity

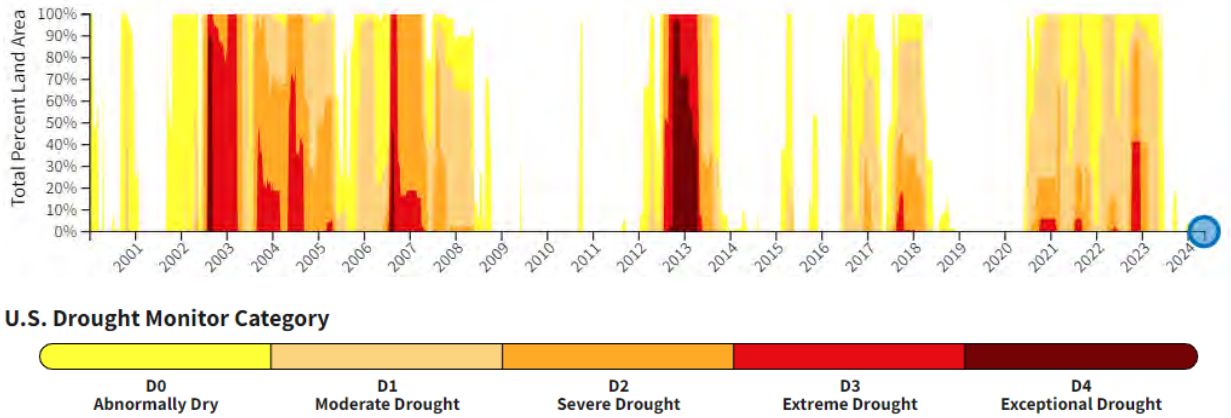
According to U.S. Drought Monitor records, in the 1218-week period from January 1, 2001, through May 7, 2024, the combined counties of Oglala Lakota, Bennett, and Jackson spent 873 weeks (71.67% of the time) in some level of drought, defined as D0 or worse conditions. Weeks in drought are summarized in Table 4-22 and shown in time series in Figure 4-18.

Table 4-22 Historic Droughts

CATEGORY	DROUGHT SEVERITY	PALMER DROUGHT INDEX	STANDARDIZED PRECIPITATION INDEX (SPI)	PINE RIDGE RESERVATION WEEKS IN DROUGHT, 2001 – MAY 7, 2024
D0	Minor	-1.0 to -1.9	-0.5 to -0.7	206
D1	Moderate	-2.0 to -2.9	-0.8 to -1.2	228
D2	Severe	-3.0 to -3.9	-1.3 to -1.5	201
D3	Extreme	-4.0 to -4.9	-1.6 to -1.9	196
D4	Exceptional	-5.0 or less	Less than -2	42

Source: NIDIS U.S. Drought Monitor, Jan. 2001 – May 7, 2024

Figure 4-18: Bennett, Jackson, and Oglala Lakota County Drought Intensity, 2001 - 2024



Source: NIDIS U.S. Drought Monitor, Jan. 2001 – May 7, 2024

Impacts from drought exacerbate wildfire and agricultural loss which significantly impact the economic base of the planning area. Drought impacts water availability for farmers and ranchers. Average annual crop loss was determined based on indemnity payments made by the USDA Risk Management Agency, as shown in **Table 4-23**. According to this data, drought conditions resulted in an estimated annual average of over $1,791,000 in indemnity payments, affecting over 25,000 acres. Since data is aggregated at the county level, some records may be within the three counties but outside the tribal territory. For instance, RMA values for Jackson County may be higher than actual conditions felt in the planning area, as only the southern half of Jackson County is located within the Pine Ridge Reservation.

Table 4-23 Drought Losses

COUNTY	NET ACRES IMPACTS	INDEMNITY AMOUNT
Oglala Lakota	67,866.90	$5,080,955.95
Bennett	120,178.55	$9,309,405.19
Jackson	187,866.80	$12,489,247.48
Total	**375,912.26**	**$26,879,608.62**

Source: USDA RMA, 2007 to 2021

The Mni Wiconi pipeline project (MWRWS), initiated in 1988, was designed to provide clean water to nine counties and three Native American reservations throughout a service area of 12,500 square miles, via a system of pipelines approximately 4,200 miles in total length to bring water from the Missouri River. Initially projected to cost $100 million, the project faced funding issues and construction delays, with the final cost nearing $490 million.

Despite its ability to deliver 20 million gallons of water daily, the project remains incomplete, leaving many tribal communities with outdated water systems. While some areas benefit fully, many remote households on the Pine Ridge Reservation still lack access due to high costs and poverty. Efforts to reduce costs included using existing wells, but infrastructure problems, such as asbestos cement pipes, persist. Nonprofits have helped connect some homes to the water system, but challenges remain, particularly during emergencies like the 2019 flooding, which led to water contamination.

Parts of the Pine Ridge Reservation are underlain by two important groundwater sources: the Arikaree and Ogallala Aquifers. However, the future of the Ogallala Aquifer is concerning, as it is projected to have 56 million acre-feet less groundwater in storage by 2049 compared to the

2000-2009 average. This significant decline poses long-term challenges for water availability in the region, particularly as the reservation's water infrastructure struggles to meet current needs.

Access to safe drinking water is a pressing issue for OST. While most of the reservation is now connected to the MWRWS, 8.9% of tribal homes still lack access to safe drinking water, a stark contrast to just 0.6% of non-Native American homes. Many families remain on waiting lists, hoping for nonprofit organizations to help them connect to the rural water system or afford a private well.

The water infrastructure on the reservation is aging and in dire need of replacement. Half of the water distribution system on the reservation has been replaced, but the remaining portion dates back to the 1960s. Some of the old pipes still in use are made of asbestos-cement, a material known to be a carcinogen. As these pipes age, asbestos can leach into the drinking water, raising concerns about public health. Residents of the reservation already face a 40% higher cancer mortality rate than the U.S. average, though it is unclear how much of this can be attributed to asbestos contamination and metal pollution in the groundwater.

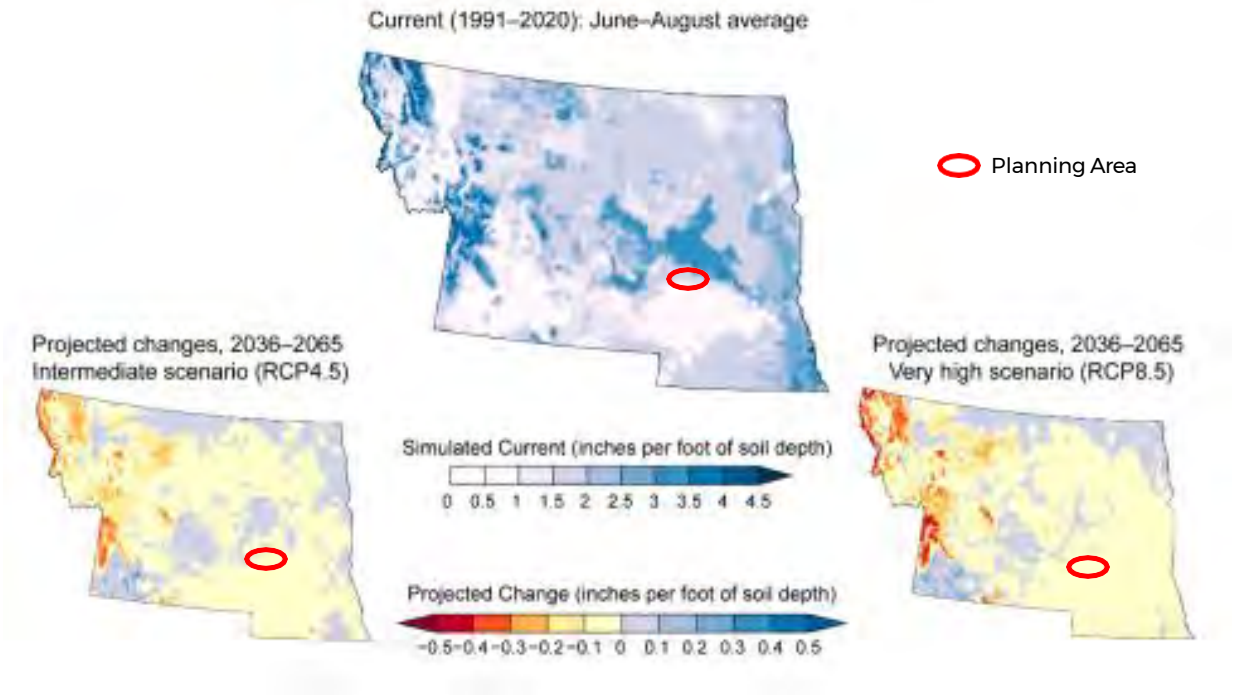
In addition to the aging infrastructure, the tribe's reliance on the MWRWS creates further vulnerability. Any contamination of the Missouri River, which supplies water to the system, would lead to a major water shortage for the tribe. In such a scenario, the tribe would need to impose strict water restrictions and potentially resort to large-scale transportation of water to meet immediate needs. The tribe would also have to rely more heavily on the Arikaree and Ogallala Aquifers, whose declining water levels further exacerbate the risks to long-term water security.

Altogether, the combination of outdated infrastructure, health risks, and declining groundwater levels presents significant challenges for those living on the Reservation to access to safe, reliable water. Comprehensive upgrades to the water system and careful management of groundwater resources will be essential for securing the tribe's water future.

Climate Change Impacts

Based on findings from the 2023 Fifth National Climate Assessment, the Northern Great Plains region, including South Dakota, is projected to have a rise in drought occurrences. with localized droughts increasing by 2040 and more widespread regional droughts by 2070. Projections suggest localized droughts will intensify by 2040, followed by a broader regional increase by 2070. Various climate scenarios indicate a concerning trend of more frequent moderate, severe, and extreme droughts, with anticipated occurrences rising by approximately 10% and 20% by 2050 and 2100, respectively.

Figure 4-19 Current and Projected Soil Moisture in Northern Great Plains Region



Source: Fifth National Climate Assessment, Ch 25, 2023

Vulnerability Assessment

Table 4-24 Drought Vulnerability Summary

SECTOR	VULNERABILITY
People	• Residents of the Reservation have a 40% higher cancer mortality rate than the rest of the US population. This may be due in part to the asbestos-cement pipes used to distribute water in parts of the reservation. • A significant 8.9% of tribal homes still lack access to safe drinking water, compared to only 0.6% of non-Native American households. • Some families are still on waiting lists to be connected to the rural water system or afford a private well. • Parts of the reservation are underlain by the Arikaree and Ogallala Aquifers, which have elevated levels of uranium and arsenic.
Property	• Fractured land ownership patterns can make it difficult for Tribal members to use their lands effectively. • Historical policies and practices have disadvantaged Native landowners in agricultural land use. These disadvantages are compounded during water shortages.
Critical Facilities and Community Lifelines	• Reduction of water availability and water quality, even from the Mni Wiconi Water Project could be exacerbated by spills from the Keystone XL pipeline. • About half of the water distribution system is outdated and original. • Drought can lead to increased likelihood of fire, and Some areas have fire department response times of over 45 minutes. • The Ogallala aquifer is projected to have 56 million acre-ft less groundwater in storage by 2049 compared to the 2000-2009 average.

SECTOR	VULNERABILITY
Economy	• In 2012, less than 1/3 ($24 million) of the $87 million market value of agricultural commodities produced on reservations went to Native American producers. The reservation has 1,416,104 acres of farmland across 380 farms, though only 223 of the 380 farms are operated by Native Americans. • Tribal members and allottees lose income when non-native producers abandon leases mid-drought. • Drought can impact buffalo and elk populations, leading to decreases in income from hunting licenses.
Environmental and Cultural Resources	• Droughts reduce forage production, often leading to a decrease in buffalo, a culturally significant resource. • Drought alters plant communities, increasing non-native and invasive species to the detriment of culturally significant plants

Cascading/Related Hazards

Drought has a high probability of contributing to secondary hazards such as wildfires and animal and crop diseases. The decrease in soil moisture leads to dry, highly flammable vegetation, making it easier for fires to ignite and intensify due to human activities or lightning strikes. Drought compounds the threats from wildfire by reducing the availability of water for wildfire response, further reducing the availability of water for domestic, agricultural, and livestock needs. These specific concerns have been noted by the community in planning meetings as impacting the Reservation in recent years. Additionally, dry soil alters plant communities by stressing plants, weakening their defenses, and making them more susceptible to infections and infestations. These conditions favor the proliferation of non-native and invasive plant species, which are more resilient to drought and can host diseases impacting wildlife populations, such as Epizootic Hemorrhagic Disease (EHD) and bluetongue (BTV).

Risk Summary

Overall, drought significance in the planning area is **high** due to the extensive economic and environmental impacts. Severe or extreme drought conditions have occurred 15-19.9% of the time over the past 100 years, indicating a **likely** probability of a drought event occurring annually. The impacts could become **critical**, exacerbating wildfire risks and agricultural losses, significantly affecting the economic base of the planning area.

- Despite experiencing fewer droughts than other areas of the state, the planning area is greatly impacted by reduced soil moisture and low forage production due to high temperatures and low rainfall.
- Since 2000, the Drought Impact Reporter recorded 63 drought-related incidents in Oglala Lakota County, Bennett County, and Jackson County, with 78% of these incidents related to agriculture.
- South Dakota is projected to see a 10% increase in moderate, severe, and extreme droughts by 2050, and a 20% increase by 2100. This will greatly impacting local agriculture, wildlife, and water supply.
- Drought can also have a cascading impact on other hazards, increasing the risk of wildfires and promoting conditions that lead to animal and crop diseases.
- The OST Drought Adaptation Plan contains more detailed information on drought vulnerabilities and potential response actions, and is included in *Appendix F.*

4.4.7 Earthquakes

Description

Location: Negligible
Future Probability: Unlikely
Magnitude/Severity: Negligible
Overall Significance: **Low**

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. This energy can be generated by a volcanic eruption or by the sudden dislocation of the crust, which is the cause of most destructive earthquakes. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake at varying speeds.

Earthquakes can last from a few seconds to over five minutes; they may also occur as a series of tremors over several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris, because the shocks shake, damage, or demolish buildings and other structures. Disruption of communications, electrical power supplies and gas, sewer, and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides, or releases of hazardous material, compounding their disastrous effects.

Earthquakes tend to reoccur along faults, which are zones of weakness in the crust. Even if a fault zone has recently experienced an earthquake, there is no guarantee that all the stress has been relieved, and another earthquake could still occur in the same area. Small, local faults produce lower magnitude quakes, but ground shaking can be strong, and damage can be significant in areas close to the fault. In contrast, large regional faults can generate earthquakes of great magnitudes but, because of their distance and depth, they may result in only moderate shaking in an area.

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, communication, and transportation lines. Other damaging effects of earthquakes include surface rupture, fissuring, ground settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, fires, and dam failure. The combination of widespread primary and secondary effects from large earthquakes makes this hazard potentially devastating.

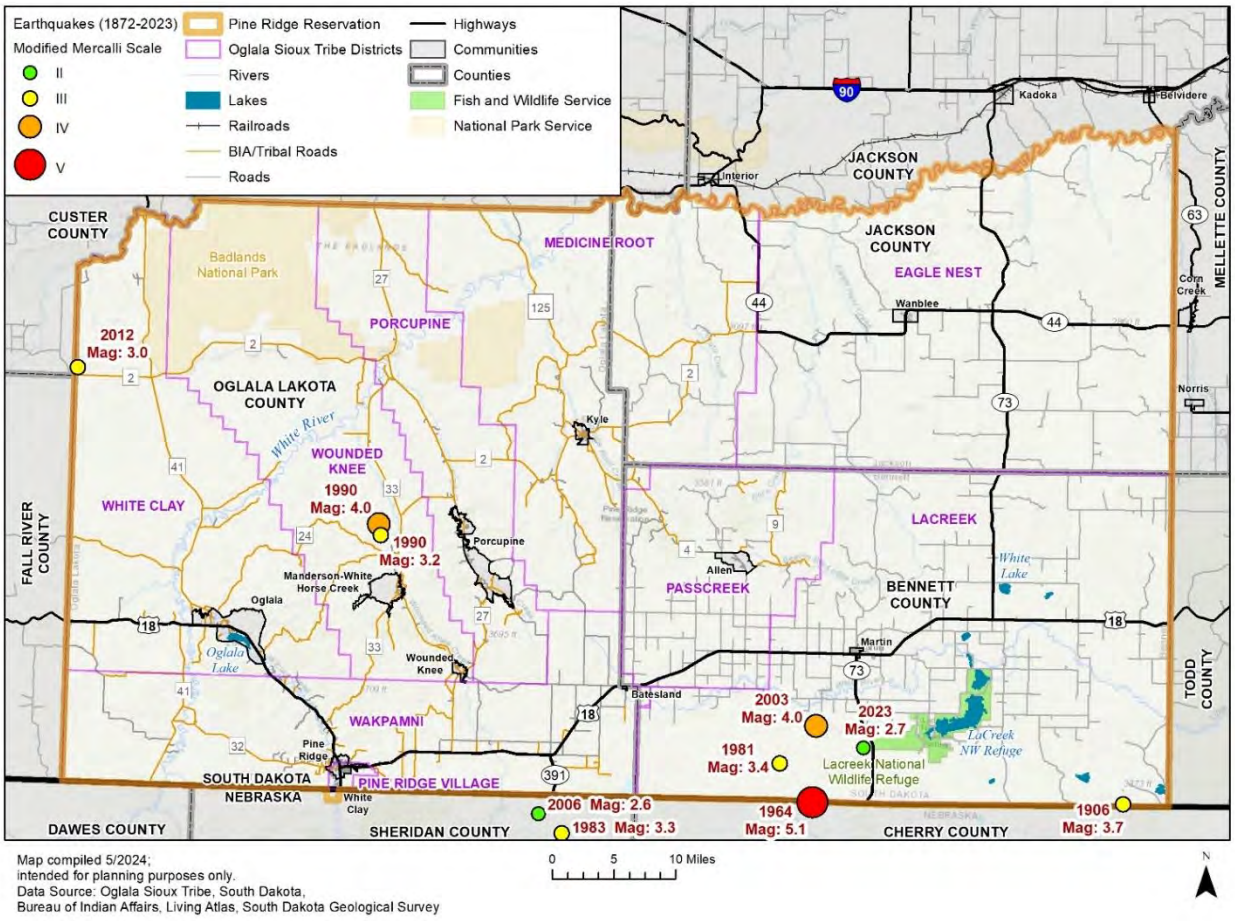
Part of what makes earthquakes so destructive is that they generally occur without warning. The main shock of an earthquake can usually be measured in seconds, and rarely lasts for more than a minute. Aftershocks can occur within the days, weeks, and even months following a major earthquake.

Location

The Pine Ridge Reservation is situated in an area with underlying geological features that could contribute to seismic activity. The reservation sits on a synclinal structure with its fold axis extending into the Williston Basin, and the southwestern corner of the reservation is home to the poorly defined White Clay fault zone, also known as the Pine Ridge Structure. Additional faults further complicate the geology in parts of southwestern Oglala Lakota and Fall River Counties.

According to the State of South Dakota's Hazard Mitigation Plan, the eastern flank of the Black Hills and the southwestern corner of the state may experience earthquake events. This risk is largely due to the presence of a 40-mile-long potentially active fault zone in the east of the Black Hills. However, these events are likely to be small and rare with minimal to no damages. Earthquakes in the planning area typically occur in small and irregular intervals, and the overall rating of earthquakes in the planning area is rated **negligible**.

Figure 4-20 Pine Ridge Reservation Earthquakes (1872-2023)



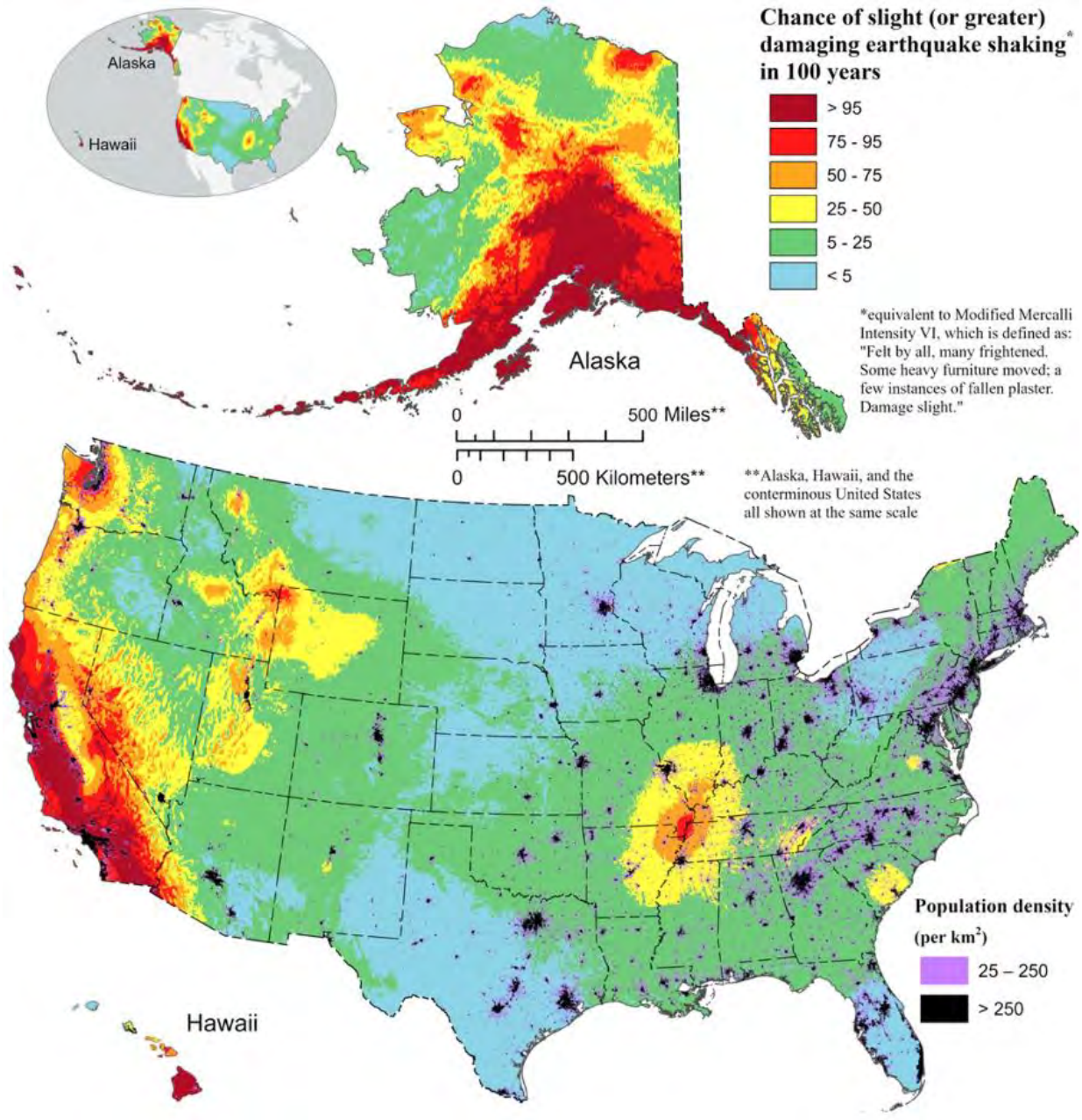
Past Occurrences

Prior to the 1950s, most earthquakes were detected and located by personal reports. Since 1964, the state of South Dakota has logged eight earthquakes near Oglala Lakota, Bennet, and Jackson Counties, with three being 4.0 or greater in Magnitude, and two outside the planning area (see **Figure 4-20** above). The largest magnitude the planning area experienced was a magnitude of 5.0

Probability of Future Occurrence

With a total of 10 recorded earthquakes with a magnitude greater than 2.5 since 1981, Pine Ridge Reservation is not likely to experience a significant earthquake. Based on past occurrences, earthquakes are **unlikely** to occur in the planning area and would likely result in little to no damage. To determine the likelihood of damaging earthquakes the U.S. Geological Survey (USGS) publishes probabilistic acceleration maps for 500-, 1,000-, and 2,500-year time frames. The maps show what ground accelerations may be met or exceeded in those time frames by expressing the probability that the accelerations will be met or exceeded in a shorter time frame. For example, a 10% probability that acceleration may be met or exceeded in 50 years is roughly equivalent to a 100% probability of exceedance in 500 years. The 2,500-year (2% probability of exceedance in 50 years) map is shown in the figure below. The International Building Code uses a 2,500-year map as the basis for building design. The map reflects current perceptions on seismicity in South Dakota as an unlikely occurrence based on available science.

Figure 4-21 National Seismic Hazard Model (2023)- Chance of Damaging Earthquake Shaking



Source: USGS

Magnitude/Severity (Extent)

As previously discussed, an earthquake is the result of a sudden release of energy in the Earth's tectonic plates that creates seismic waves. The seismic activity of an area refers to the frequency, type, and size of earthquakes experienced over a period of time. Although rather uncommon, earthquakes do occur in South Dakota and are usually small, generally not felt, and cause little to no damage. Earthquakes are measured by magnitude and intensity. Magnitude is measured by the Richter Scale, a base-10 logarithmic scale, which uses seismographs around the world to measure the amount of energy released by an earthquake. Intensity is measured by the Modified Mercalli Intensity Scale, which determines the intensity of an earthquake by comparing actual

damage against damage patterns of earthquakes with known intensities. The following tables summarize the Richter Scale and Modified Mercalli Scale.

Table 4-25 Richter Scale

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
Less Than 3.5	Generally not felt, but recorded.
3.5 – 5.4	Often felt, but rarely causes damage.
5.5 - 6.0	At most, slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 – 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 – 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or Greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: FEMA, 2016

Table 4-26 Modified Mercalli Intensity Scale

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	Instrumental	Detected only on seismographs	
II	Feeble	Some people feel it	< 4.2
III	Slight	Felt by people resting, like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves	< 5.4
VII	Very Strong	Mild Alarm; walls crack; plaster falls	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	< 6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	> 8.1

Source: FEMA, 2016, https://www.fema.gov/earthquake.

Based on average magnitude of previous events, if an earthquake were to occur in the planning area, it would likely measure 4.0 or less on the Richter Scale. Because of limited historic record, however, it is possible to underestimate the seismic hazard in the Pine Ridge Reservation if

historic earthquakes are used as the sole basis for analysis. Overall, the severity rating for earthquake events is rated **negligible**. Earthquake and ground motion probability maps give a more reasonable estimate of damage potential in areas with or without exposed active faults at the surface. Current earthquake probability maps that are used in the newest building codes suggest a scenario that would result in moderate damage to buildings and their contents.

Climate Change Impacts

The impacts of global climate change on earthquake intensity and probability are largely unknown, but there is not expected to be a direct correlation.

Vulnerability Assessment

Table 4-27 Earthquake Vulnerability Summary

SECTOR	VULNERABILITY
People	• The degree of exposure is dependent on many factors, such as the structures of homes and the soil types in which their homes may be built on can cause falling objects. • There may be challenges in emergency response following an earthquake due to the remote location of many homes • Pine Ridge is one of the most impoverished areas in the U.S., limiting residents' ability to prepare for or recover from natural disasters like earthquakes.
Property	• Small damage to several valuable buildings may result in a higher total damage figure than what may be found in a county with fewer, less expensive buildings with a higher percentage of damage. • Foundations may be vulnerable to cracking causing damages to structures. • Older buildings may be more susceptible to damages to infrastructures. • Possibility of buildings not designed to withstand seismic activity may collapse, leading to catastrophic loss. • Many homes on the reservation are mobile homes or poorly constructed, which are more susceptible to damage from seismic activity.
Critical Facilities and Community Lifelines	• Transportation corridors can be disrupted during an earthquake, leading to the release of materials to the surrounding environment. • Damage impacts to transportation corridors and communications lines could affect first responders' ability to effectively respond in the aftermath of an earthquake. • The reservation faces issues with water, wastewater, and solid waste management systems, which could be disrupted by earthquakes
Economy	• Impacts to the economy from an earthquake can be direct, in the form of direct damages and losses to buildings and infrastructure, and indirect, often in the form of lost wages and business income, relocation costs, and other costs of recovery.

SECTOR	VULNERABILITY
	• Businesses may suffer from closures due to damages, which can lead to the loss of income. • Costs associated with repairing or rebuilding damaged properties.
Environmental and Cultural Resources	• Earthquake-induced landslides can significantly impact surrounding habitat. • Possibility of streams fed by groundwater drying up because of changes in underlying geology. • Historic building stock is commonly made of unreinforced masonry which is vulnerable to damage from earthquakes.

Cascading/Related Hazards

Earthquakes are interconnected to hazards such as landslides, surface rupture, soil liquefaction, fires, and aftershocks. Effective mitigation strategies involve enforcing building codes, retrofitting existing structures, implementing land-use planning to avoid high-risk areas, etc. Addressing these interrelated hazards requires a multifaced approach that integrates proactive measures that mitigates the risk and impacts of earthquakes throughout the counties.

Risk Summary

Overall, earthquake is a **low** significance hazard to OST. Although earthquakes can occur in surrounding states and counties, Oglala Lakota, Bennett, and Jackson counties have only seen three earthquakes since the year 2000.

- The overall effects on property can include direct damage to structures from earthquake shaking. This can then have economic impacts from damages to the structures.
- The planning area has not experienced high magnitude earthquakes.
- The likelihood for future occurrence of earthquake events is rated **unlikely**.

4.4.8 Extreme Temperatures

Location: Extensive
Future Probability: Highly Likely
Magnitude/Severity: Moderate
Overall Significance: **High**

Description

Extreme temperatures are often referred to as both extreme heat and extreme cold. According to FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Ambient air temperature is one component of heat conditions, with relative humidity being the other. Extreme cold is defined as temperatures at or below 32 degrees Fahrenheit.

Extreme heat is often associated with periods of drought but can also be characterized by long periods of high temperatures in combination with high humidity. During these conditions, the human body has difficulty cooling through the normal method of the evaporation of perspiration. Health risks arise when a person is overexposed to heat. Extreme heat can also cause people to overuse air conditioners, which can lead to power failures. Power outages for prolonged periods increase the risk of heat stroke and subsequent fatalities due to loss of cooling and proper ventilation. The planning area is largely rural, which presents an added vulnerability to extreme heat events; those suffering from an extreme heat event may be farther away from medical resources as compared to those living in an urban setting.

Along with humans, animals also can be affected by high and low temperatures. For instance, cattle and other farm animals respond to extreme heat by reducing feed intake, increasing their respiration rate, and increasing their body temperature. These responses assist the animal in cooling itself, but this is usually not sufficient. When animals overheat, they will begin to shut down body processes not vital to survival, such as milk production, reproduction, or muscle building. Exposure to extreme cold temperatures can cause frostbite or hypothermia than can be dangerous. It is also possible for pipes to freeze and burst in homes that are poorly insulated.

Other secondary concerns connected to extreme heat hazards include water shortages brought on by drought-like conditions and high demand. Government authorities report that civil disturbances and riots are more likely to occur during heat waves. In cities, pollution becomes a problem because the heat traps pollutants in densely populated urban areas. Adding pollution to the stresses associated with excess heat magnifies the health threat to urban populations. The combination of extreme temperatures presents various challenges to the residents of the Pine Ridge Indian Reservation, particularly those with inadequate housing and heating or colling resources.

The National Weather Service (NWS) is responsible for issuing excessive heat outlooks, excessive heat watches, and excessive heat warnings.

- **Excessive heat outlooks** are issued when the potential exists for an excessive heat event in the next 3 to 7 days. Excessive heat outlooks can be utilized by public utility staffs, emergency managers, and public health officials to plan for extreme heat events.
- **Excessive heat watches** are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours.
- **Excessive heat warnings** are issued when an excessive heat event is expected in the next 36 hours. Excessive heat warnings are issued when an extreme heat event is occurring, is imminent, or has a very high probability of occurring.

Location

The geographic location of extreme temperatures is **extensive**. The entire planning area is subject to extreme heat and extreme cold as well as participating jurisdictions. For the planning area, the months with the highest temperatures are June, July, and August. As for extreme cold weather, the average snowfall is highest in December, January, and February. The entire State of South Dakota is vulnerable to extreme temperatures.

Table 4-28 lists typical symptoms and health impacts of exposure to extreme heat.

Table 4-28 Typical Health Impacts of Extreme Heat

HEAT INDEX (HI)	DISORDER
80-90 ˚F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105 ˚F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130 ˚F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, https://www.weather.gov/safety/heat-index

Past Occurrences

According to NCEI, from 2000-2023, there have been 11 extreme temperature events, and this includes, heat, excessive heat, and extreme cold within Oglala Lakota, Bennett, and Jackson Counties. With these events, there has been no extreme temperature related deaths throughout the counties. **Table 4-29** shows how many extreme temperature related events throughout the counties.

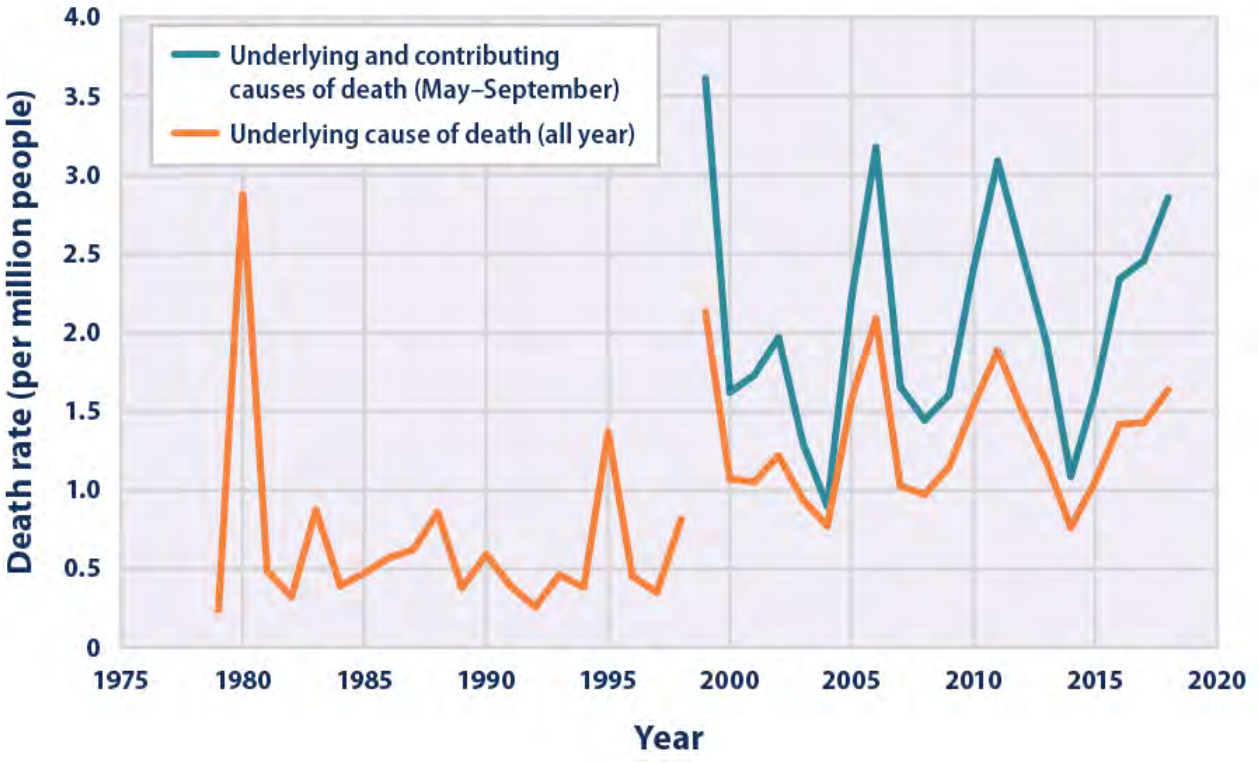
Table 4-29 Extreme Temperature Events, 2000-2023

JURISDICTION	EXTREME COLD	EXCESSIVE HEAT	HEAT
Oglala Lakota	2	0	1
Bennett	3	0	1
Jackson	3	0	1

Source: NCEI

Figure 4-22 shows heat-related deaths in the United States using two methodologies. One method shows deaths for which excessive natural heat was stated as the underlying cause of death from 1979 to 2018. The other data series shows deaths for which heat was listed as either the underlying cause or a contributing cause, based on a broader set of data that at present can only be evaluated back to 1999. For example, in a case where cardiovascular disease was determined to be the underlying cause of death, heat could be listed as a contributing factor because it can make the individual more susceptible to the effects of this disease. Because excessive heat events are associated with summer months, the 1999–2013 analysis was limited to May through September.

Figure 4-22 Deaths Classified as "Heat Related" in the United States, 1979-2018



Source: Environmental Protection Agency, https://www3.epa.gov/climatechange/pdfs/print_heat-deaths-2015.pdf

The National Centers for Environmental Information reported three heat events and eight extreme cold events in and around the OST planning area:

- *July 15, 2006- Heat Event*- High pressure brought record heat to western South Dakota, with temperatures reaching 120 degrees 8 miles north-northwest of Usta in Perkins County.
- *January 5, 2014- Extreme Cold*- A surge of artic air, along with a combination of strong winters produced dangerous wind chills from northwestern through south central South Dakota. Wind chill values were 30 below to 50 below.
- *December 16, 2016- Extreme Cold*- Artic air pushed into the area behind an existing storm system that created the highest temperature to reach below zero on the 17th, with temperatures dropping to 15 below to 35 below zero on the morning on the 18th. Wind chills were reaching as low as 45 below zero.

According to information obtained from NWS for Oglala Lakota, Bennett, and Jackson counties on the Iowa Environmental Mesonet, Iowa State University Department of Agronomy website, there have been a combination of 72 heat advisories, warnings and watched throughout the counties. There has also been 78 freeze warnings and watches. **Table 4-30** shows heat and freeze advisories, watches, and warnings for the counties.

Table 4-30 Heat and Freeze Advisories, Warnings, and Watches, 2005-2023

Year	Heat Advisory	Excessive Heat Warning	Excessive Heat Watch	Freeze Advisory	Freeze Warning	Freeze Watch
Oglala Lakota	12	1	0	0	19	5
Bennett	18	3	0	0	20	6
Jackson	34	3	1	0	22	6
Totals	**64**	**7**	**1**	**0**	**61**	**17**

Source: Iowa State University Environmental Mesonet

The Pine Ridge Reservation has faced increasingly erratic and destructive weather events in recent years, exacerbated by climate change and compounded by poverty and limited resources. In April 2018, a severe ice storm left over 500 homes uninhabitable, caused widespread power outages, and damaged essential infrastructure, prompting a federal disaster declaration. Just a year later, in March 2019, a "bomb cyclone" struck the region, causing extensive flooding that washed out roads, isolated communities, and led to evacuations. Despite the severity of these events, federal aid has been inconsistent, with FEMA denying aid after the 2018 storm due to low property values in the area.

Beyond these storms, Pine Ridge is vulnerable to recurring droughts, severe thunderstorms, flash floods, and blizzards. The reservation's agricultural resources and water supply are continually impacted by these harsh conditions. Winter storms are a persistent threat, bringing heavy snowfall and dangerously cold temperatures. During a severe winter event in December 2022, snow drifts up to 12 feet high trapped many residents in their homes, cutting off access to essential services like food, water, and medical care. OST declared a state of emergency, and the South Dakota National Guard was deployed to assist with clearing roads and delivering firewood and supplies.

Figure 4-23 Aftermath of a Winter Storm on the Pine Ridge Reservation in 2022



Source: Anne Lyon, https://www.kfyrtv.com/2022/12/23/one-natural-phenomenon-after-another-people-pine-ridge-reservation-tackle-extreme-circumstances/

As climate change intensifies, these extreme weather events are becoming more frequent and destructive, putting immense strain on the already impoverished Reservation. Limited federal support has forced the community to rely heavily on local efforts and outside volunteers for disaster recovery. Persistent issues like inadequate infrastructure, propane shortages, and difficulty accessing critical services further complicate the tribe's ability to recover from disasters. These challenges highlight the growing difficulty the Oglala Sioux face as they work to survive on their traditional lands amid climate-related disasters.

Probability of Future Occurrence

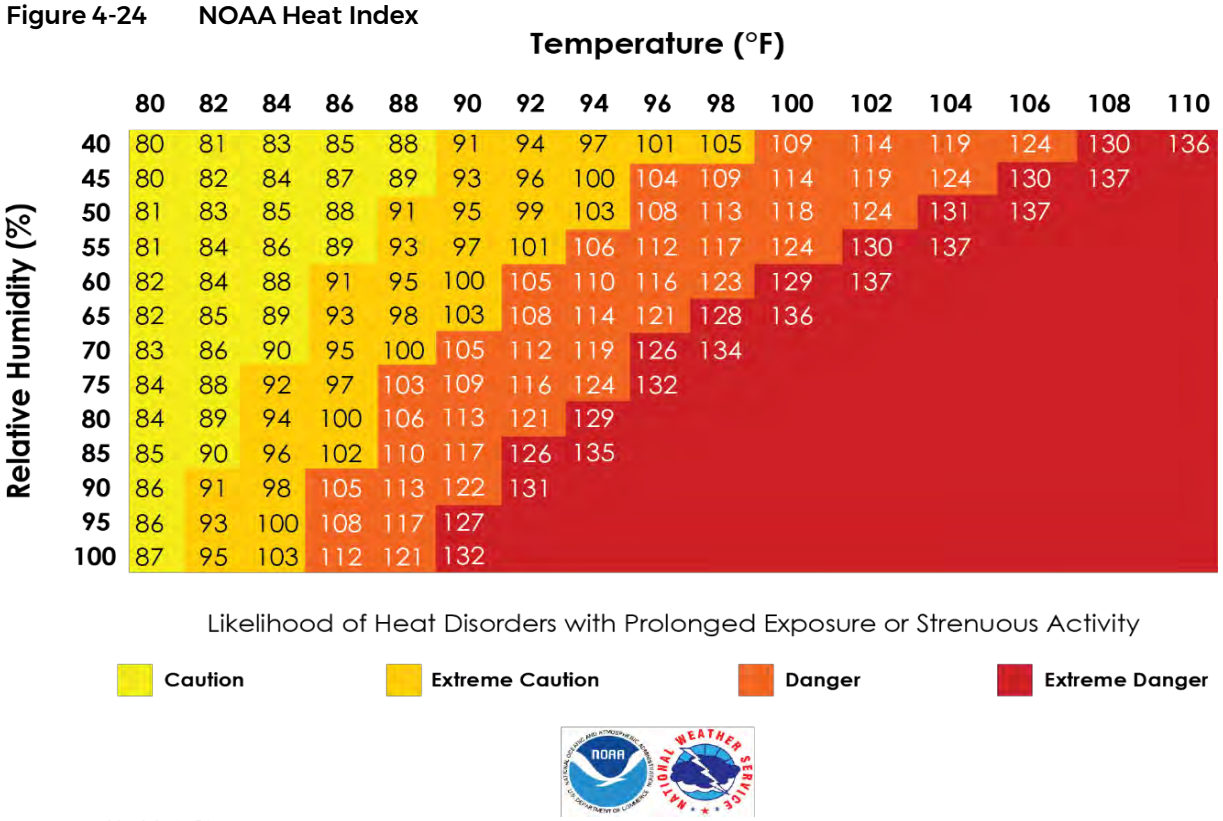
Based on the 86 heat and freeze warnings, and watches from 2005-2023, the probability of occurrence for extreme temperatures is rated **highly likely**. With 63 heat advisories in the planning area, this shows that these counties are vulnerable to extreme heat. That is approximately 3.6 extreme heat events a year and 2.4 freeze events per year.

Magnitude/Severity (Extent)

Extreme heat and extreme cold are considered to have a **moderate** magnitude and severity. This means that there can be some injuries, shutdown of facilities for more than one week, and less than 10% of property is severely damaged. However, it should be noted that it is still possible for extreme temperatures to cause physical damage to property in the future. Extreme temperatures typically occur with ample warning time. Weather forecasters predict extreme temperature events several days before they will occur.

A key factor to consider regarding extreme heat situations is the humidity level relative to the temperature. As is indicated in the following figure from the National Oceanic and Atmospheric Administration (NOAA), as the Relative Humidity increases, the temperature needed to cause a dangerous situation decreases. For example, for 100 percent Relative Humidity, dangerous levels of heat begin at 86˚F whereas a Relative Humidity of 50 percent, require 94˚F. The combination of Relative Humidity and Temperature result in a Heat Index as demonstrated below:

Figure 4-24 NOAA Heat Index

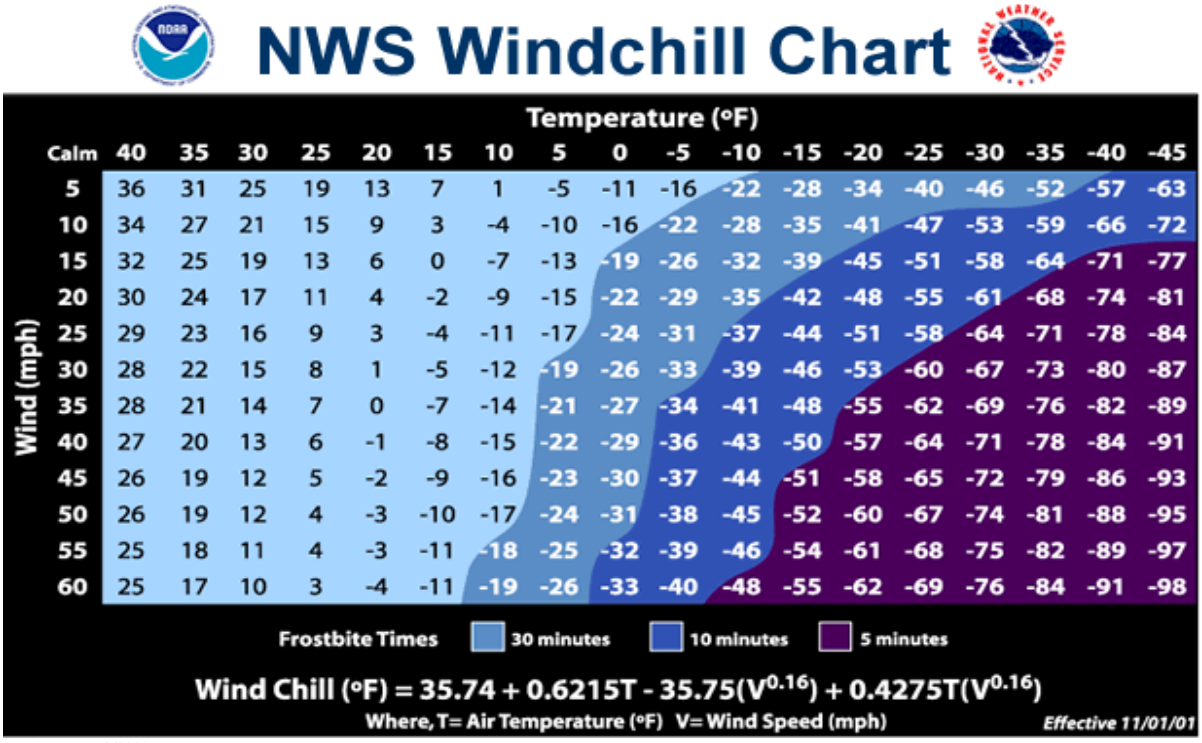


Source: NOAA, 2018

Figure 4-24 above is designed for shady and light wind conditions. Exposure to full sunshine or strong winds can increase hazardous conditions and raise heat index values by up to 15˚F. For the purposes of this plan, extreme heat is being defined as temperatures of 100˚F or greater. Consideration for high heat events should also include an understanding of changing climate trends. The region is experiencing an increase in the average temperature each year. This trend will likely manifest in more days each year with temperatures of 100˚F or greater. Since 1895, South Dakota's overall average temperature has increased by about 2˚F.

In 2001, the NWS implemented an updated Wind Chill Temperature index (**Figure 4-25**). This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 4-25 National Weather Service Wind Chill Chart



Source: NWS

Both extreme heat and cold temperatures can result in measurable damage and losses to crops and agriculture. **Table 4-31** below includes a summary of the insured crop losses and claims paid by the USDA Risk Management Agency (RMA) for the planning area from 2007-2021. Because these figures are aggregated at the county level, they may include portions of Jackson County which are not part of the Pine Ridge Reservation.

Table 4-31 Extreme Temperature Loss Estimations (Heat and Freeze), 2007-2021

COUNTY	TOTAL CROP LOSS (HEAT)	TOTAL CROP LOSS (FREEZE)
Oglala Lakota	$11,307.00	$229,711.20
Bennett	$467,836.00	$656,821.50
Jackson	$242,972.10	$179,410.30
Total	**$722,115.20**	**$1,065,943.00**

Source: USDA RMA, 2007-2021

Climate Change Impacts

According to the Fifth National Climate Assessment, the impacts and risk of climate change are happening across the regions. Several of the climatic changes related to extreme heat. The climate changes could have direct impacts on human health in terms of heat related illness. With the general trend of increased warming of average temperatures, extreme high temperatures will likely increase as well. Cascading impacts include increased stress on water quantity and quality, degraded air quality, and increased potential for more severe or catastrophic natural events such as heavy rain, droughts, and wildfire. Another cascading impact includes increased duration and intensity of wildfires with warmer temperatures.

Vulnerability Assessment

Table 4-32 Regional Extreme Temperature Vulnerability Summary

SECTOR	VULNERABILITY
People	• The greatest risk for extreme temperature related illness and death is among vulnerable populations such as young children, individuals aged 65 and older, and those lacking resources to prepare for extreme temperatures. In the planning area, 37.0% of the population is 18 years old or younger, 11.5% are 62 years old or older, and over 50% live below the poverty line. • On the Reservation, most residents do not own operable automobiles, relying instead on walking or hitchhiking for transportation. With no public transportation available, those with limited mobility may struggle to access essential resources like warming or cooling centers. • People who live or work outdoors or in environments without proper temperature control are at high risk for heat-related illnesses and other temperature-related health issues.
Property	• Poorly insulated homes exacerbate exposure to both heat and cold. • Extreme temperatures can cause roofing materials to deteriorate faster. • Temperature fluctuations can cause soil to expand and contract, which can then affect the foundation of homes. • Extreme heat may overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure. • Damages caused to property on the reservation exacerbates existing challenges such as poverty and inadequate infrastructure.
Critical Facilities and Community Lifelines	• During extreme cold events, there are concerns about propane shortages, which many residents rely on for heating. These challenges are especially severe for elders and those with medical needs who may be prevented from accessing necessary care. • Extreme cold can potentially lead to isolation from necessary resources like propane and wood. After a 2022 winter storm, some residents resorted to burning clothes and furniture to stay warm after running out of firewood.
Economy	• Extreme temperatures can impact crop losses, whether from heat or freeze. The results for the planning area are shown in **Table 4-31**.
Environmental and Cultural Resources	• Extreme temperatures, specifically heat, may cause temporary drought-like conditions, affecting culturally important resources such as native plants and buffalo. • Heat and drought conditions increase the frequency and intensity of wildfires, which can lead to forest destruction.

Cascading/Related Hazards

Extreme temperatures are interconnected to hazards such as drought, wildfire, and severe winter storms. For instance, drought is characterized by prolonged periods of insufficient precipitation, which is often accompanied by extreme heat events. Extreme cold temperatures can potentially

lead to snow, freezing temperatures, etc. These hazards and the impacts do not vary substantially by jurisdiction.

Risk Summary

The overall significance of extreme temperatures is rated **high**. The weather patterns that create extreme heat conditions are regional events, instances of heat will be felt throughout the entirety of the counties. Future heat events are **highly likely** to occur across the entire State of South Dakota, with **moderate** impacts.

- The effects of recent droughts have exposed the vulnerability of the planning area's economy to drought events.
- Climate change may result in an increase in the frequency and severity of extreme temperatures which can lead to impacts to the agriculture industry in the County.
- Extreme temperature events are highly likely throughout the planning area.
- Related hazards: Drought, wildfire, severe winter storms

4.4.9 Flooding

Description

Location: Significant
Future Probability: Likely
Magnitude/Severity: Moderate
Overall Significance: **High**

Flooding is the rising and overflowing of a body of water onto normally dry land. Floods occur when infrastructure does not have adequate capacity to manage water levels, resulting in normally dry areas becoming inundated with water. While floods are usually caused by increased precipitation, they can also be caused by dam or levee failure. The risk of flood by infrastructure damage is increasing as current infrastructure in the United States is aging and, in many cases, has reached or exceeded its expected lifespan.

Floods are among the costliest natural disaster in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than any other hazard.

Additionally, floodwaters can transport large objects downstream which can damage or remove stationary structures, such as dam spillways. Ground saturation can result in instability, collapse, or other damage and objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation is critically important to reduce life and safety impacts from any type of flooding.

Flooding can occur on a local level, sometimes affecting only a few streets, but can also extend throughout an entire region, affecting whole drainage basins and impacting property in multiple states. Heavy accumulations of ice or snow can also cause flooding during the melting stage. These events are complicated by the freeze/thaw cycles characterized by moisture thawing during the day and freezing at night.

There are four main types of flooding common in the planning area:

Riverine Flooding

Riverine flooding, slower in nature, is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt, or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater during rapid runoff are called floodplains. A floodplain or flood risk area is defined as the lowland and relatively flat area adjoining a river or stream. The terms “base flood” and “100-year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin or watershed, which is defined as all the land drained by a river and its tributaries.

Flash Flooding

Flash floods, faster in nature than the other types of floods, result from convective precipitation usually due to intense thunderstorms or sudden releases from an upstream impoundment created behind a dam, landslide, or levee. Flash floods are distinguished from regular floods by a timescale of fewer than six hours. Flash floods cause the most flood-related deaths as a result of this shorter timescale. Flooding from excessive rainfall in Nebraska usually occurs between late spring and early fall.

Sheet Flooding

In some cases, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding, often referred to as sheet flooding, is becoming increasingly prevalent as development exceeds the capacity of the drainage infrastructure, therefore limiting its ability to properly carry and disburse the water flow. Flooding also occurs due to combined storm and sanitary sewers being overwhelmed by the tremendous flow of water that often accompanies storm events. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns.

Ice Jam Flooding

Ice jams occur when ice breaks up in moving waterways, and then stacks on itself where channels narrow or human-made obstructions constrict the channel. This creates an ice dam, often causing flooding within minutes of the dam formation. Ice formation in streams occurs during periods of cold weather when finely divided colloidal particles called "frazil ice" form. These particles combine to form what is commonly known as “sheet ice.” This type of ice covers the entire river. The thickness of this ice sheet depends upon the degree and duration of cold weather in the area. This ice sheet can freeze to the bottom of the channel in places. During spring thaw, rivers frequently become clogged with this winter accumulation of ice. Because of relatively low stream banks and channels blocked with ice, rivers overtop existing banks and flow overland.

Location

The primary rivers in the planning area are the White River, Little White River, and Cheyenne River. The planning area has numerous primary tributaries as listed in the **Table 4-33** below and shown in **Figure 4-27**. The only jurisdiction in the planning area that has a FIRM is Batesland, however they are not a participating jurisdiction in the NFIP.

Table 4-33 Planning Area Tributaries and Creeks

CREEK AND TRIBUTARY NAMES			
Alkali Creek	East Fork Willow Creek	Lost Turkey Creek	Slim Butte Creek
American Horse Creek	East Horse Creek	Medicine Root Creek	South Fork of Cedar River
Bad Hair Creek	East Prong Wolf Creek	Middle Fork Willow Creek	South Prong Wolf Creek
Bear Creek	Elm Creek	Mule Creek	Spring Creek
Bear-in-the-Lodge Creek	Fast Horse Creek	Nancy Hanks Creek	Squaw-Humper Creek
Big Hollow Creek	Fish Creek	No Flesh Creek	Stinking Water Creek
Black Pipe Creek	Fog Creek	North Cottonwood Creek	Threemile Creek
Blacktail Creek	Gay Creek	Palmer Creek	Turtle Creek
Brush Creek	Grass Creek	Pass Creek	West Fork Mule Creek
Buzzard Creek	Hay Creek	Palmer Creek	West Fork Willow Creek
Cain Creek	Herd Camp Creek	Pearson Creek	West Horse Creek
Cedar Bluff Creek	Hume Creek	Peck Creek	White Clay Creek
Cedar Creek	Janis Creek	Pepper Creek	White Horse Creek
Cheyenne Creek	Lake Creek	Phister Creek	Wild Horse Creek
Clifford Creek	Limekiln Creek	Plum Creek	Willow Creek

CREEK AND TRIBUTARY NAMES			
Corn Creek	Little Beam Creek	Porcupine Creek	Wind Creek
Cottonwood Creek	Little Dog Spring Creek	Potato Creek	Wolf Creek
Craven Creek	Little Grass Creek	Red Stone Creek	Wounded Knee Creek
Deep Creek	Little Squaw-Humper Creek	Redwater Creek	
Eagle Nest Creek	Long Creek	Sand Creek	
East Fork Mule Creek	Lost Dog Creek	Settin Up Creek	

Figure 4-26 shows the Special Flood Hazard Area (SFHA) next to the boundaries for the Town of Batesland. A few homes and the town's sewer lagoon are located in the SFHA.

Figure 4-26 Special Flood Hazard Area for Batesland

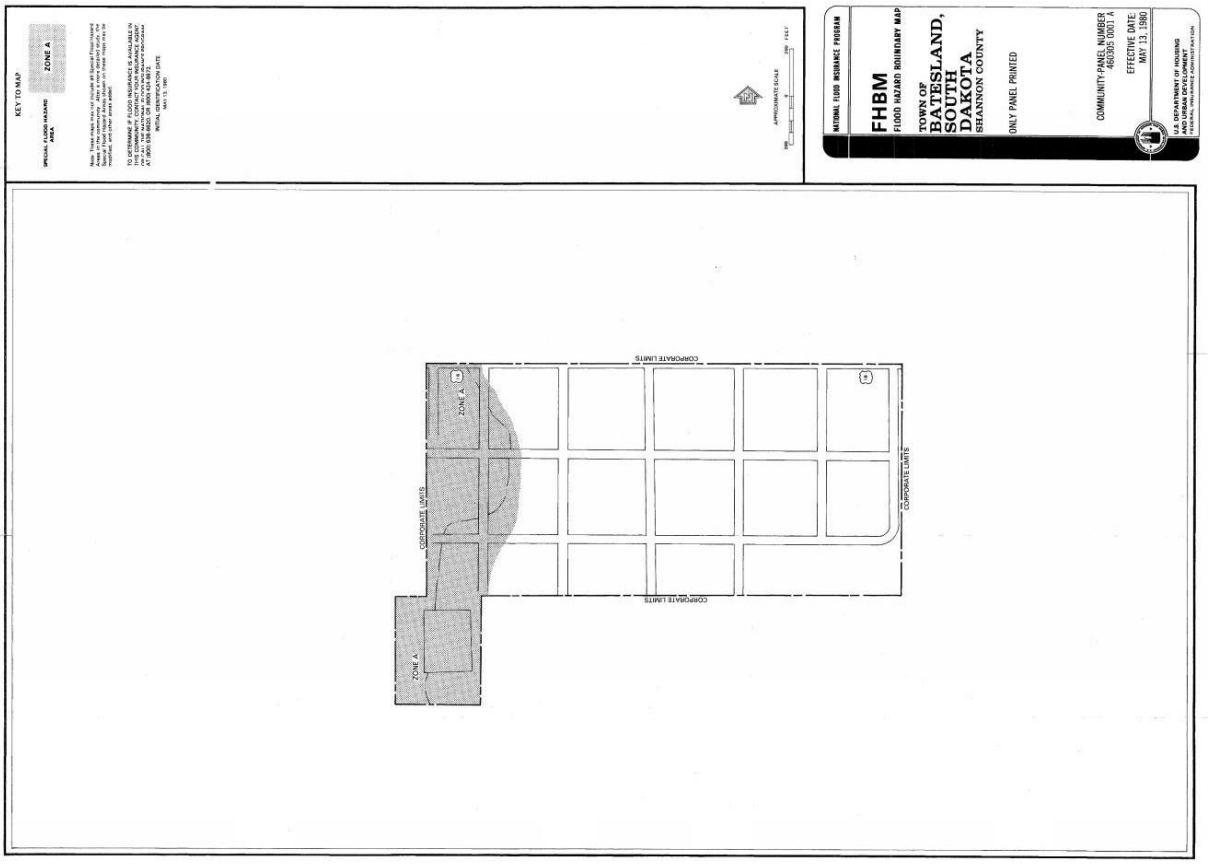


Figure 4-27 shows the rivers, creeks, and tributaries throughout the Pine Ridge Reservation, many of which are listed in **Table 4-33** above.

Figure 4-27 Rivers and Creeks in Pine Ridge Reservation



Table 4-34: FEMA Firm Panel Status

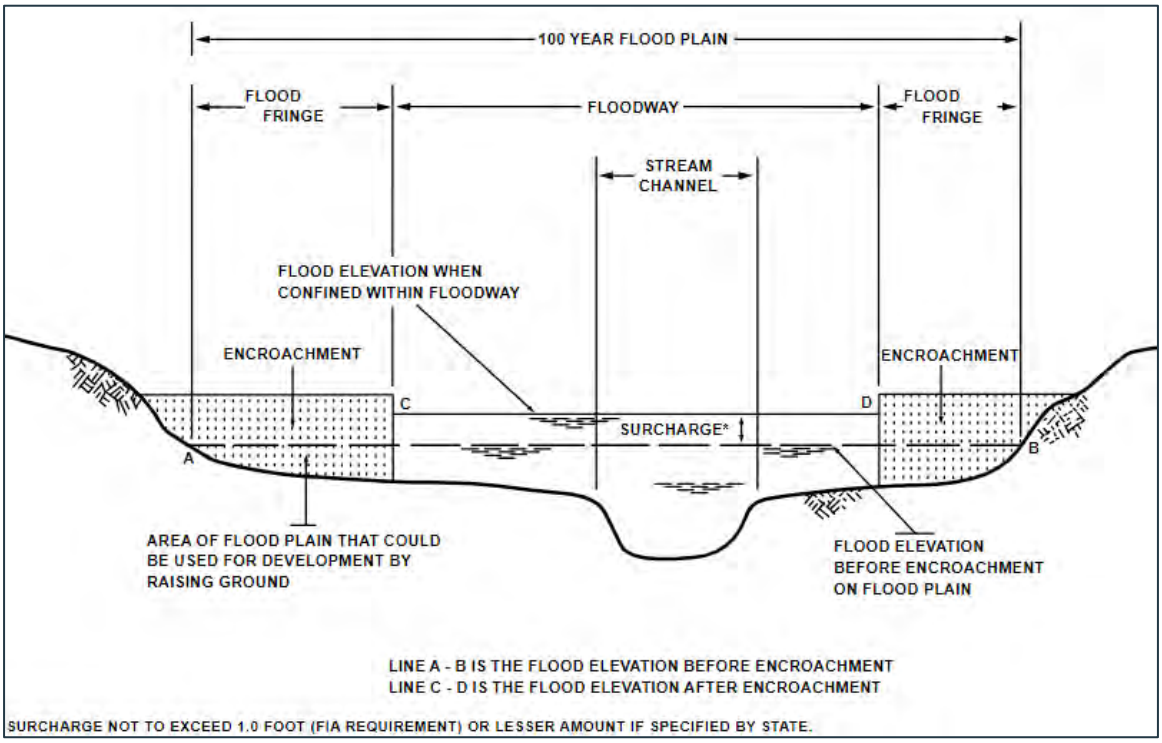
JURISDICTION	PANEL NUMBER	EFFECTIVE DATE
Oglala Lakota County		
Batesland	4603050001A	5/13/1980

Source: FEMA, 2024

Floodplains Defined

FEMA established standards for floodplain mapping studies as part of the National Flood Insurance Program (NFIP). The NFIP makes flood insurance available to property owners in participating communities adopting FEMA-approved local floodplain studies, maps, and regulations. Figure 4-28 depicts a floodplain.

Figure 4-28 Floodplain Schematic



Source: Guidance for Flood Risk Analysis and Mapping – FEMA, 2020

Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. Based on FEMA guidelines, the floodplain refers to the area that is inundated by the 1% annual-chance flood. The 1% floodplain is also referred to as the "100-year floodplain," meaning that it is an area that has a 1% chance of experiencing a flood of a certain magnitude or greater in any given year. Similarly, the 0.2% floodplain is also known as the "500-year floodplain," meaning that it is an area that has a 0.2% chance of experiencing a flood of a certain magnitude or greater in any given year. The 1%-annual-chance flood is the national minimum standard by which communities regulate their floodplains through the FEMA NFIP. The floodway is the channel of the tributary and the land adjacent to it, whereas the flood fringe (shown above) is the remaining portion of the 100-year floodplain, excluding the floodway.

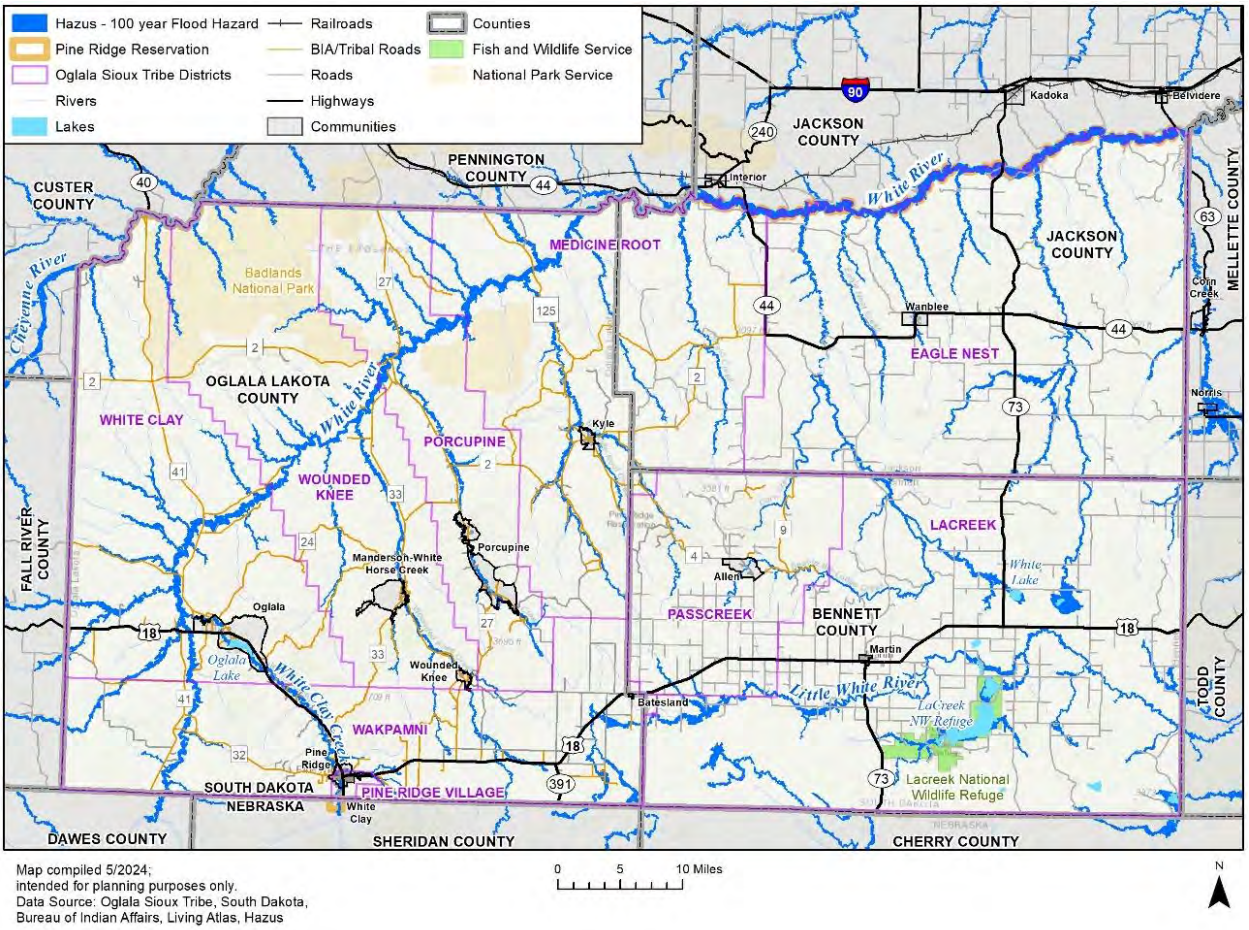
The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. Also, a change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

FEMA has not mapped floodplains for Bennett, Jackson, or Oglala Lakota Counties so a Hazus-derived floodplain was used as a supplement. **Figure 4-29** below illustrates the 100-year Hazus floodplain boundary for the planning area. As shown, the floodplains closely follow the major rivers and tributaries of the White River and Little White River. The 0.2% annual chance floodplain is also shown; however, it is not easily visible at the current map scale.

Past Occurrences

Figure 4-30 below illustrates both flooding and flash flooding events that have occurred in the planning area since 2014 as well as commonly flooded areas as shown in the shaded light-blue areas.

Figure 4-29 Oglala Sioux Tribe 100-Year Floodplain



According to the NCEI Storm Events Database, since 1996 there have been 69 historical occurrences of both flooding and flash flooding in the planning area. Flooding damages have resulted in nearly $3 million in property damages with two injuries.

Table 4-35 NCEI Flood Losses (1996 – 2023)

COUNTY	NUMBER OF EVENTS	TOTAL PROPERTY LOSS
Oglala Lakota	27	$990,000
Bennett	12	$1,347,000
Jackson	6	$250,000
TOTAL	**45**	**$2,587,000**

Source: NOAA's National Centers for Environmental Information https://www.ncdc.noaa.gov/stormevents/

Figure 4-30 Oglala Sioux Tribe Common Recent Flood Areas (2014 – 2024)

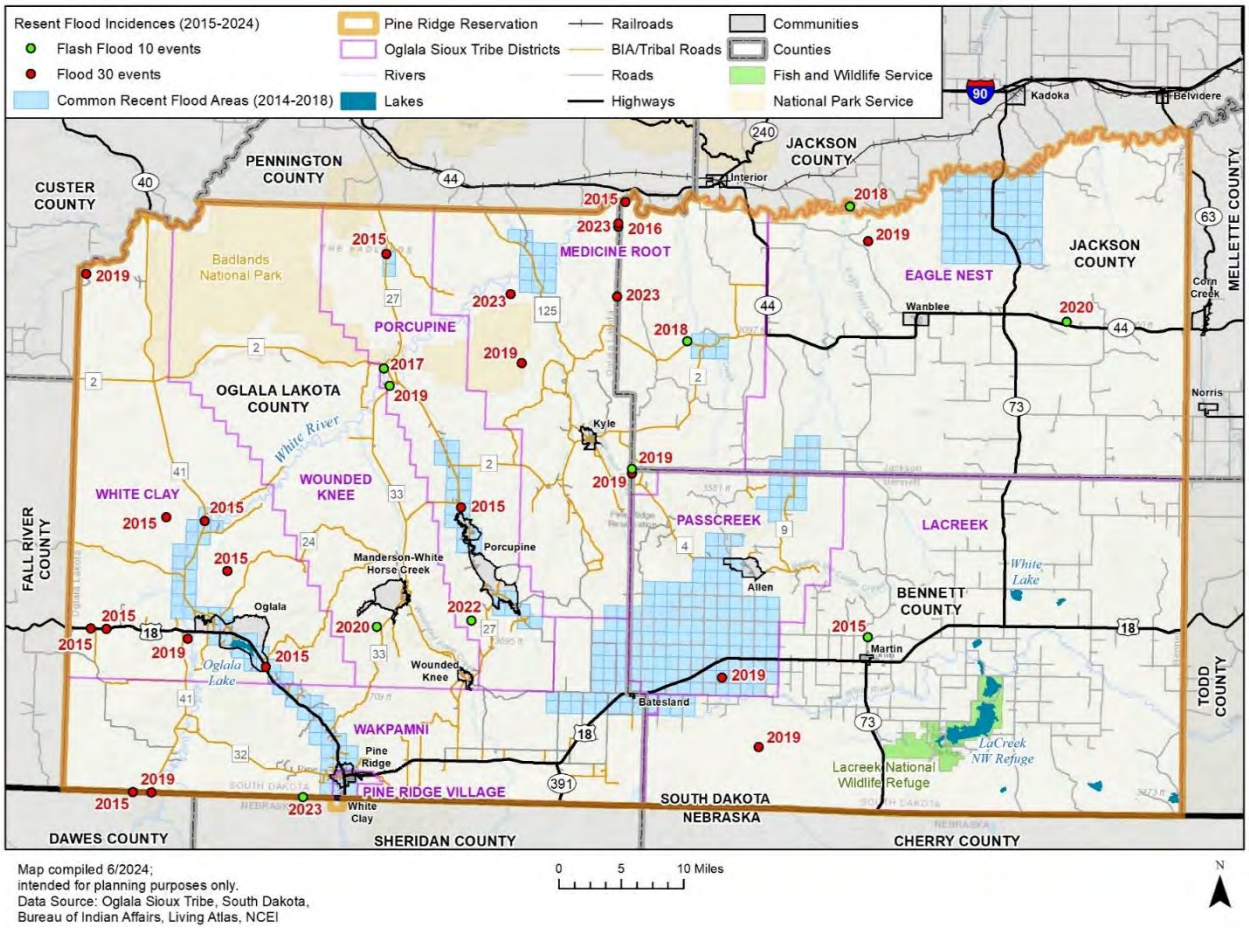


Figure 4-31 depicts the aftermath of a 2019 flood on the Pine Ridge Reservation. Rapid snow melt and severe weather in March and April caused widespread flooding in the area. Local residents were stranded in homes surrounded by water with emergency rescues and supply drop-offs performed by boat to include the activation of the National guard. Eight thousand residents were left without clean drinking water after floodwaters disrupted the local water distribution system. This resulted in OST EM office distributing over 10,000 cases of water and South Dakota National Guard sending "Water Buffalos" to help get relief to residents in these areas. Boil notices were in effect for over a month due to numerous breaks in the water system. Flooding of underground control vaults / pumphouse vaults occurred. Sewage pumps were also lost during the heaviest floods in the Wanblee, Pine Ridge, and Kyle Areas. These pumps would service about 500-600 thousand gallons a day and that number jumped to over a million gallons a day during the heaviest flooding periods. The federal government provided $10 million in emergency relief to help with damages.

Figure 4-31 2019 Springtime Flooding on the Pine Ridge Reservation



Source: Keloland Media Group, 2019

Figure 4-32 National Guard Members Distribute Drinkable Water to Residents of Sharps Corner on the Pine Ridge Reservation



Source: NPR, South Dakota National Guard, 2019

Probability of Future Occurrence

Based on the historic record and reported incidents by participating communities flooding is **likely** to occur in the planning area.

Climate change is expected to heighten the probability of future flooding occurrences as the intensification of precipitation patterns will continue to affect the area. As global temperatures rise, the atmosphere can hold more moisture, leading to heavier rainfall during storms. This increased intensity can overwhelm drainage systems and natural waterways, resulting in more frequent and severe flooding events. Additionally, changes in weather patterns induced by climate change, such as shifts in atmospheric circulation and the frequency of extreme weather events, can further amplify the likelihood of flooding.

Magnitude/Severity (Extent)

The potential for flooding and flood losses is extensive in the planning area. Magnitude and severity can be described or evaluated in terms of a combination of the different levels of impact that a community sustains from a hazard event. Several factors contribute to the relative vulnerabilities of certain areas in the floodplain. Development, or the presence of people and property in the hazardous areas, is a critical factor in determining vulnerability to flooding. Additional factors that contribute to flood vulnerability range from specific characteristics of the floodplain to characteristics of the structures located within the floodplain.

The flood recurrence intervals and probability of occurrence for varying flood magnitudes is shown in **Table 4-36**.

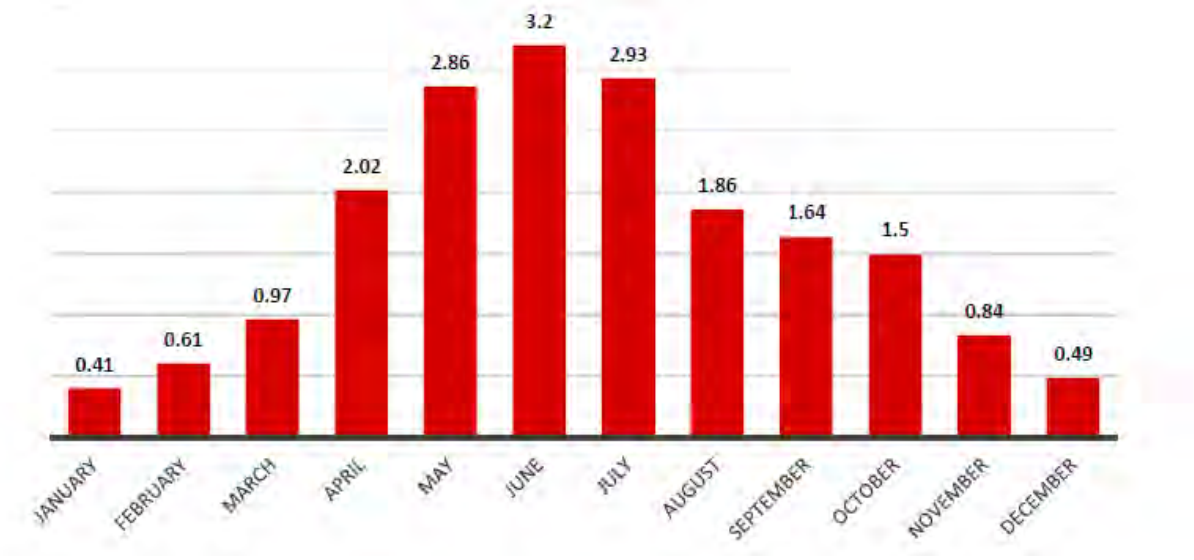
Table 4-36 Flood Recurrence Intervals and Probabilities of Occurrences

RECURRENCE INTERVAL, IN YEARS	PROBABILITY OF OCCURRENCE IN ANY GIVEN YEAR	PERCENT CHANCE OF OCCURRENCE IN ANY GIVEN YEAR
100	1 in 100	1
50	1 in 50	2
25	1 in 25	4
10	1 in 10	10
5	1 in 5	20
2	1 in 2	50

Source: USGS, 2008

Figure 4-33 shows the normal average monthly precipitation for the planning area, which is helpful in determining whether any given month is above, below, or near normal in precipitation. As indicated by the NCEI, the most common months for flooding within the planning area are May and June. While it is possible that major flood events will occur, the likely extent of flood events within the planning area is classified as **moderate**.

Figure 4-33: Average Monthly Precipitation



Source: HPRCC, 2018

[61] Federal Emergency Management Agency. 2018. "FEMA Flood Map Service Center." http://msc.fema.gov/portal/advanceSearch.

[62] National Weather Service. 2017. "Flood Safety." http://www.floodsafety.noaa.gov/index.shtml.

National Flood Insurance Program (NFIP)

The NFIP was established in 1968 to reduce flood losses and disaster relief costs by guiding future development away from flood hazard areas where feasible; by requiring flood resistant design and construction practices; and by transferring the costs of flood losses to the residents of floodplains through flood insurance premiums.

In return for availability of federally backed flood insurance, jurisdictions participating in the NFIP must agree to adopt and enforce floodplain management standards to regulate development in special flood hazard areas (SFHA) as defined by FEMA's flood maps. One of the strengths of the program has been keeping people away from flooding rather than keeping the flooding away from people – through historically expensive flood control projects.

There are currently no NFIP participating communities within the planning area. This plan highly recommends and strongly encourages each community and the tribe to participate with the NFIP. Jurisdictions are encouraged to initiate activities above the minimum participation requirements, which are described in the Community Rating System (CRS) Coordinator's Manual (FIA-15/2017). The Town of Batesland does have an SFHA mapped, however the Town is never participated in the NFIP due to very limited staffing and financial capabilities. The Town lacks the necessary staffing capabilities that would be needed to adopt and administer floodplain regulations.

NFIP Repetitive Loss Structures

There are no documented repetitive loss or severe repetitive loss properties in the planning area.

Climate Change Impacts

Climate change is increasing the threat of flooding for the planning area. As temperatures rise, more water vapor enters the atmosphere, leading to heavier precipitation events. This increased rainfall can overwhelm rivers and drainage systems, causing floods in areas that were previously safe.

According to the Fifth National Climate Assessment, the eastern Dakotas are an area experiencing increasing peak streamflow (which is a proxy for flooding), while the western Dakotas, Montana,

and Wyoming have decreasing peak streamflow. Additionally, with 2˚ to 4˚C (3.6˚ to 7.2˚F) of global warming, the Northern Great Plains would expect to see some of the highest increases in annual flooding damage costs in the contiguous US due to climate change.

As depicted in the light-blue shaded areas in **Figure 4-30**, the impacts of climate change on flooding are not evenly distributed. Some areas are experiencing more frequent and intense floods, while others may see less frequent flooding due to changes in precipitation patterns. The overall trend is clear that climate change is making flooding a more serious threat for the planning area.

Vulnerability Assessment

When examining vulnerability to hazards, social vulnerability as it relates to flood events is a vital component to consider. Low-income and minority populations are disproportionately vulnerable to flood events. These groups may lack needed resources to mitigate potential flood events as well as resources that are necessary for evacuation and response. In addition, low-income residents are more likely to live in areas vulnerable to the threat of flooding but lack the resources necessary to purchase flood insurance.

Other groups that may be more vulnerable to floods, specifically flash floods, include the elderly, those outdoors during rain events, and those in low-lying areas. Elderly residents may suffer from a decrease or complete lack of mobility and as a result, be caught in flood-prone areas. Residents in campgrounds or public parks may be more vulnerable to flooding events. Many of these areas exist in natural floodplains and can experience rapid rise in water levels resulting in injury or death.

There are no building codes or floodplain regulations in place for the Pine Ridge Reservation or Oglala Lakota County. The local Planning Team indicated many residents live in areas near creeks and rivers which are prone to flooding. Additionally, many driveways and roads to residences are unpaved and are washed out during heavy rain or flood events.

Table 4-37 Flooding Vulnerability Summary

SECTOR	VULNERABILITY
People	• Low income and minority populations may lack the resources needed for evacuation, response, or to mitigate the potential for flooding. • The elderly have decreased mobility • Residents in low-lying areas or along creeks and rivers are vulnerable during flash flood events • Residents living in the floodplain may need to evacuate for extended periods • Floods can have significant impacts on people, affecting them physically, emotionally, and economically. o Physically, floods can result in injuries or fatalities as individuals may become trapped or swept away by fast-moving water. They can also lead to waterborne diseases due to contaminated water sources, posing health risks to affected populations. o Emotionally, floods can cause immense stress, anxiety, and trauma as people face the loss of homes, possessions, and even loved ones. The disruption of daily life and the uncertainty of recovery can exacerbate mental health challenges.

SECTOR	VULNERABILITY
Property	• Floods pose significant risks to property, causing damage that can be both extensive and costly. • Homes, buildings, and infrastructure can suffer structural damage from floodwaters, leading to the destruction of walls, foundations, and utilities. • Contents within properties, such as furniture, appliances, and personal belongings, are often irreparably damaged or destroyed by flooding. • The infiltration of water into structures can also result in mold growth, further compromising property integrity and posing health hazards. In addition to direct damage, floods can lead to indirect costs related to cleanup, repairs, and restoration efforts. • Insurance claims for flood damage can strain financial resources for property owners, particularly if they are uninsured or underinsured against flood risks. • The loss of property value in flood-affected areas can also have broader economic implications, impacting real estate markets and local economies.
Critical Facilities and Community Lifelines	• Key support facilities and structures most necessary to withstand the impacts of, and respond to, flood disasters are referred to as critical facilities. Examples of these critical facility types include utilities, transportation infrastructure, and emergency response and services facilities, given failures of components along major lifelines or even closures or inaccessibility to key emergency facilities could limit if not completely cut off transmission of commodities, essential services, and other potentially catastrophic repercussions. • Floods and can disrupt, damage, or destroy these critical facilities, which in turn can impede the ability to respond to and recover from a major flood event. • Past flooding events have left remote rural communities and individual homes completely cut off from accessing the rest of the Reservation due to inundation of roads.
Economy	• Business closures or damages may have significant impacts • Agricultural losses from flooded fields or lost livestock • Closed roads and railways would impact commercial transportation of goods. • Businesses may face property damage, inventory loss, and disruption of operations, leading to financial losses and potential closure. • The displacement of residents due to flooding can result in decreased consumer spending, further impacting local businesses.
Environmental and Cultural Resources	• Floodwaters can inundate historic buildings, museums, and archaeological sites, causing structural damage and irreparable harm to cultural treasures. • Additionally, floods can disrupt cultural events, festivals, and tourism activities, impacting the local economy and community identity. • Flooding can also result in erosion of riverbanks, loss of vegetation, and habitat destruction, affecting the ecological balance and biodiversity of the area. • In particular, riparian zones and wetlands, which are crucial for wildlife conservation and water quality maintenance, are at risk of degradation from flood events.

SECTOR	VULNERABILITY
	• Furthermore, floodwaters can carry pollutants and contaminants, posing threats to water quality and aquatic ecosystems.

People

Vulnerable populations for OST include residents living in known flood prone areas or near areas vulnerable to flash floods. Certain populations are particularly vulnerable. This may include the elderly and very young; those living in long-term care facilities; mobile homes; hospitals; low-income housing areas; temporary shelters; people who do not speak English well; tourists and visitors; and those with developmental, physical, or sensory disabilities. These populations may be more vulnerable to flooding due to limitations in mobility and accessibility, income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings.

During this plan update, an estimate of the population exposed to flooding was created using a GIS overlay of existing Hazus 1% annual chance flood hazard areas where DFIRM was not available, to determine potentially flooded buildings. Hazus does not model 0.2% Annual Chance Floodplains, so this analysis was not included. The flood-impacted population for each county in the Reservation was then calculated by taking the number of residential units in the 100-year floodplains and multiplying that number by the average household size based on the Census Bureau's estimate for OST. The average household factor was 4.57. The results for the Pine Ridge Reservation are displayed below in **Table 4-38**.

Table 4-38 1% Annual Chance Flood Vulnerable Population Estimate in Pine Ridge Reservation

COUNTY	TOTAL # OF FLOODED RESIDENTIAL BUILDINGS	VULNERABLE POPULATION ESTIMATE
Bennett	31	137
Jackson	17	78
Oglala Lakota	289	1,307
Total	**337**	**1,522**

Source: FEMA, HAZUS, Census Bureau average household estimates, WSP GIS Analysis

Property

GIS analysis was used to estimate Pine Ridge Reservation's potential property losses. The 911 Address Points were used as the basis for the inventory of developed buildings. GIS was used to spatially intersect the points with the best available floodplain layers. Another assumption with this model is that every address point has an associated building.

The table below shows loss estimate values which are calculated based upon the average residential value only and estimated contents value. The estimated contents value is 50% of the average residential value for residential, no other property type values were used in this analysis; the total exposure value is the sum of the residential properties and estimated contents values; the loss estimate is 25% of the total value based on FEMA's depth-damage loss curves. For example, a two-foot flood generally results in about 25% damage to the structure (which translates to an estimated loss of 25% of the structure's replacement value). The summarized results for the Tribe are shown below in Table 4-39.

Table 4-39 Pine Ridge Reservation Flooded Property Loss Estimation Summaries

COUNTY	DISTRICT	BUILDING TYPE	TOTAL BUILDING COUNT	RESIDENTIAL VALUES	RESIDENTIAL CONTENT VALUE	TOTAL RESIDENTIAL VALUE	ESTIMATED LOSS
Bennett	Lacreek	Residential	20	$1,320,000	$660,000	$1,980,000	$495,000

COUNTY	DISTRICT	BUILDING TYPE	TOTAL BUILDING COUNT	RESIDENTIAL VALUES	RESIDENTIAL CONTENT VALUE	TOTAL RESIDENTIAL VALUE	ESTIMATED LOSS
Bennett	Medicine Root	Residential	4	$264,000	$132,000	$396,000	$99,000
Bennett	Passcreek	Commercial	1	$0	$0	$0	$0
Bennett	Passcreek	Residential	6	$396,000	$198,000	$594,000	$148,500
Bennett County		**Total**	**31**	**$1,980,000**	**$990,000**	**$2,970,000**	**$742,500**
Jackson	Eagle Nest	Residential	13	$858,000	$429,000	$1,287,000	$321,750
Jackson	Medicine Root	Residential	4	$264,000	$132,000	$396,000	$99,000
Jackson County		**Total**	**17**	**$1,122,000**	**$561,000**	**$1,683,000**	**$420,750**
Oglala Lakota	Medicine Root	Commercial	1	$0	$0	$0	$0
Oglala Lakota	Medicine Root	Residential	78	$5,148,000	$2,574,000	$7,722,000	$1,930,500
Oglala Lakota	Pine Ridge Village	Government	1	$0	$0	$0	$0
Oglala Lakota	Pine Ridge Village	Residential	40	$2,640,000	$1,320,000	$3,960,000	$990,000
Oglala Lakota	Pine Ridge Village	Tribal Structure	4	$0	$0	$0	$0
Oglala Lakota	Porcupine	Residential	47	$3,102,000	$1,551,000	$4,653,000	$1,163,250
Oglala Lakota	Wakpamni	Residential	69	$4,554,000	$2,277,000	$6,831,000	$1,707,750
Oglala Lakota	White Clay	Residential	12	$792,000	$396,000	$1,188,000	$297,000
Oglala Lakota	Wounded Knee	Residential	40	$2,640,000	$1,320,000	$3,960,000	$990,000
Oglala Lakota County		**Total**	**292**	**$18,876,000**	**$9,438,000**	**$28,314,000**	**$7,078,500**
		Grand Total	**340**	**$21,978,000**	**$10,989,000**	**$32,967,000**	**$8,241,750**

Source: Oglala Sioux Tribe, Fall River County Assessor, Batesville FEMA FIRM 5/13/1980, Hazus Flood Model, WSP GIS Analysis

Based on this analysis, the Pine Ridge Reservation planning area has significant assets at risk to the 100-year floods. There are 340 structures within the 100-year floodplain (1% annual chance), for a total value of $32,967,000. Approximately $8.2 million of that total is based on damage estimates from the 1% annual chance flood alone.

Critical Facilities and Lifelines

GIS analysis of flood hazards in Pine Ridge Reservation indicates that there are 277 critical facilities and/or community assets that are potentially exposed to flood hazards. There are 63 facilities in the 100-year floodplain shown in Table 4-40. Replacement values were not available with the data; thus, an estimate of potential monetary loss could not be performed. Impacts to any of these facilities could have wide ranging ramifications, in addition to property damage and other cascading impacts.

Table 4-40 Critical Facilities at Risk to 1% Flood Hazard (FEMA & Hazus) by County

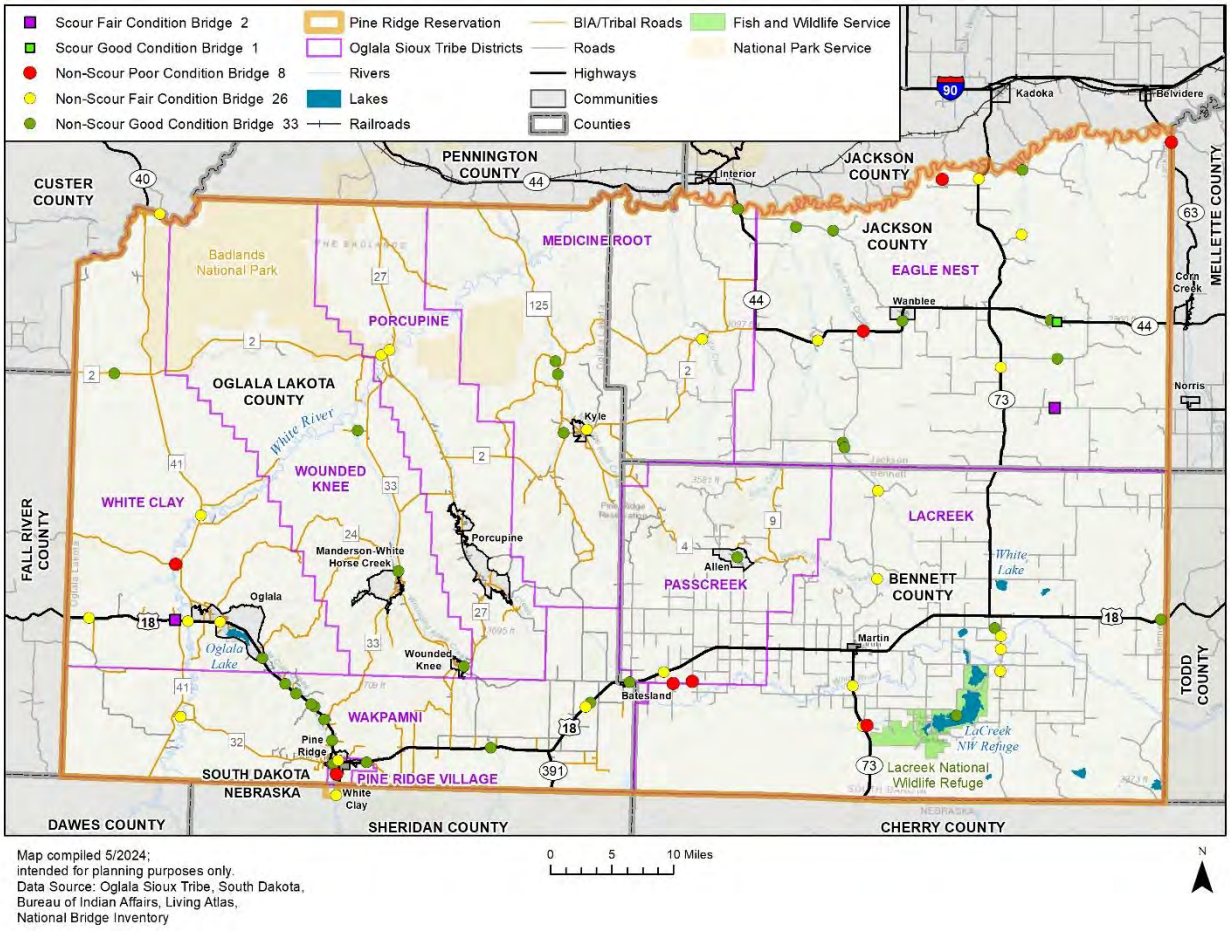
COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Bennett	-	-	-	-	-	-	9	6	**15**
Jackson	-	-	-	-	-	-	13	2	**15**
Oglala Lakota	1	1	-	-	-	-	26	4	**32**
Sheridan / NE	-	-	-	-	-	-	1	-	**1**
Total	**1**	**1**	**0**	**0**	**0**	**0**	**49**	**12**	**63**

Source: Hazus, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Transportation routes could be cut off due to floodwaters, isolating portions of the planning area. These impacts may last after the flood water recedes as flash floods commonly cause extensive damage to roadway infrastructure.

Based on the 2024 National Bridge Inventory (NBI), Pine Ridge Reservation does have a number of bridges of concern; including one good and one fair condition scour critical bridge in Jackson County and one fair condition scour critical bridge Oglala Lakota County (a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition), 8 non-scour poor condition bridges (advanced section loss, deterioration and spalling), and 26 non-scour fair condition bridges (primary structural elements are sound but may have minor section loss, cracking, or spalling). **Figure 4-34** shows the locations and condition of bridges throughout Pine Ridge Reservation.

Figure 4-34 Pine Ridge Reservation Bridges - Scour Critical and Condition Classification



Cascading/Related Hazards

Flooding can arise from a confluence of other hazard events, including high moisture levels, extreme temperatures, heavy rain and thunderstorms, dam failure, and high winds. Convective activity often occurs due to an abundance of moisture in the atmosphere combining with unstable conditions created by sharp temperature contrasts. Additionally, high winds can contribute to the intensification of flood events. Post-fire flooding is another concern, as areas that have recently burned off have scorched earth that prevents precipitation from being readily absorbed into the ground and lacks healthy vegetation to keep soil in place. This can result in increased runoff triggering flash floods, increased erosion, and even severe debris or mudflows.

The damage incurred by flooding and flash flooding events is more often the result of secondary and cascading hazards. Heavy rainfall can lead to flash flooding by overwhelming drainage systems. Similarly, saturated soils increase the risk of landslides and mudslides. Hail, lightning, strong winds, and tornadoes pose threats to crops, vehicles, and infrastructure. Lightning strikes can spark fires and cause electrical damage, while high winds can intensify potential fire threats. Continued infrastructure expansion can exacerbate these risks, although newer construction may be less vulnerable if built to the most recent International Building Code.

Risk Summary

Overall, the significance of flooding in the planning area is **high**. The probability of an event occurring is **likely**, with **moderate** impacts expected.

- There are four main types of flooding in the planning area: riverine flooding, flash flooding, sheet flooding, and ice jam flooding.
- According to the NCEI Storm Events Database, since 1996 there have been 69 historical occurrences of both flooding and flash flooding in the planning area. Flooding damages have resulted in nearly $3 million in property damages with two injuries.
- Climate change is expected to heighten the probability of future flooding occurrences as the intensification of precipitation patterns will continue to affect the area.
- Floods impact vulnerable populations disproportionally, with lower-income households being displaced from their homes.
- Low income and minority populations may lack the resources needed for evacuation, response, or to mitigate the potential for flooding.
- A 2008 national study examining social vulnerability as it relates to flood events found that low-income and minority populations are disproportionately vulnerable to flood events.

4.4.10 Grass/Wildfire

Location: Significant
Future Probability: Highly Likely
Magnitude/Severity: Critical
Overall Significance: **High**

Description

Wildfires, alternatively referred to as brushfires, forest fires, or wildland fires, are any uncontrolled fire that occurs in the countryside or wildland. These areas encompass a variety of landscapes, including grasslands, forests, woodlands, agricultural fields, and other vegetated regions. Wildfires differ from other fires by their extensive size, the speed at which they can spread from the original source, their ability to change direction unexpectedly, and to jump gaps (such as roads, rivers, and fire breaks. While some wildfires burn in remote forested regions, others can cause extensive destruction of homes and other property located in the wildland-urban interface (WUI), the zone of transition between developed areas and undeveloped wilderness.

In many regions across the United States, wildfires are increasingly becoming a hazard, endangering both human lives and property, particularly in zones where indigenous ecosystems intersect with urban expansion. Despite fire's natural and sometimes beneficial role in ecosystems, efforts to suppress it can paradoxically lead to more severe fires due to the buildup vegetation, where create more fuel and increases the intensity and devastation of future fires.

The behavior of wildfires is shaped by various physical factors, including topography, weather conditions, and the composition of fuels. This behavior inherently complex and influenced by variables such as the type of fuel, moisture levels within the fuel, atmospheric humidity, wind patterns, terrain features, geographical location, ambient temperature, weather dynamics, and the ignition source. Fuel is the only physical property humans can control and is the target of most mitigation efforts. The NWS monitors the risk factors including high temperature, high wind speed, fuel moisture (greenness of vegetation), low humidity, and cloud cover in the state daily. The NWS will issue a Red Flag Warning if conditions favorably to wildfire spread are present, defined as warm temperatures, very low humidities, and stronger winds are expected to combine to produce an increased risk of fire danger.

Major wildfire risk factors considered are:

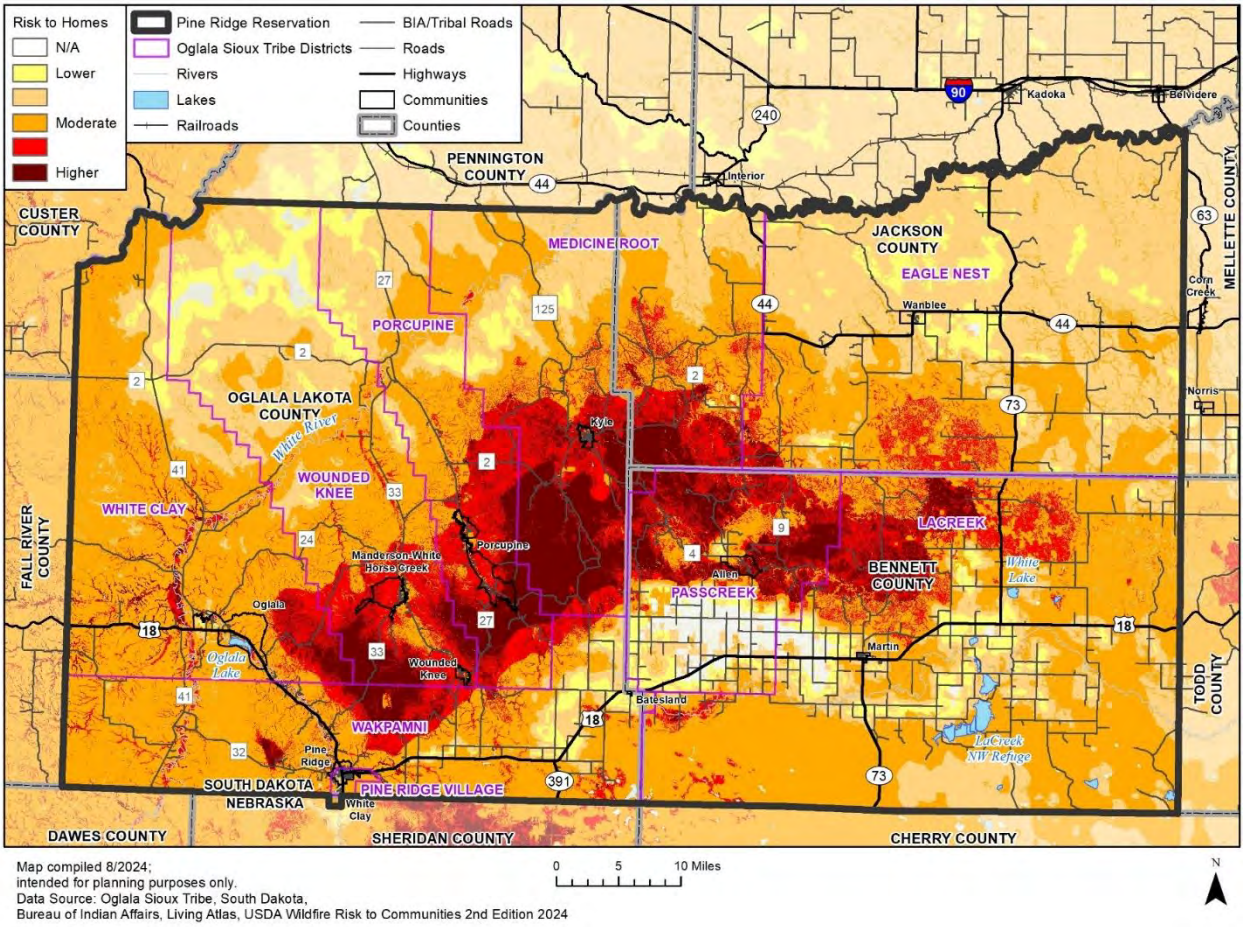
- High temperature
- High wind speed
- Fuel moisture (greenness of vegetation)
- Low humidity
- Little or no cloud cover

Location

The USDA Forest Service, under the direction of Congress in the 2018 Consolidated Appropriations Act (H.R. 1625, Section 210), developed a nationwide wildfire risk assessment. The Wildfire Risk to Communities study results were used to assess risk to wildfire on the Reservation. Wildfire Risk to Communities uses the best available science data to identify risk and provide resources for communities to manage and mitigate risk. This is a national analysis for comparing risk that varies across a state, region, or county to help prioritize actions to mitigate risk. Based on the geographic extent of wildfires in the planning area, the rating is considered to be **significant**.

The Wildfire Risk to homes wildfire analysis categories were reviewed to represent risk. **Figure 4-35** represents the Risk to Homes within the Reservation. Overall, there is a moderate to high wildfire risk based on the figure below for the tribe. For instance, Oglala Lakota County has, on average, greater wildfire likelihood than 96% of counties in the US.

Figure 4-35 Pine Ridge Reservation Wildfire Risk to Homes

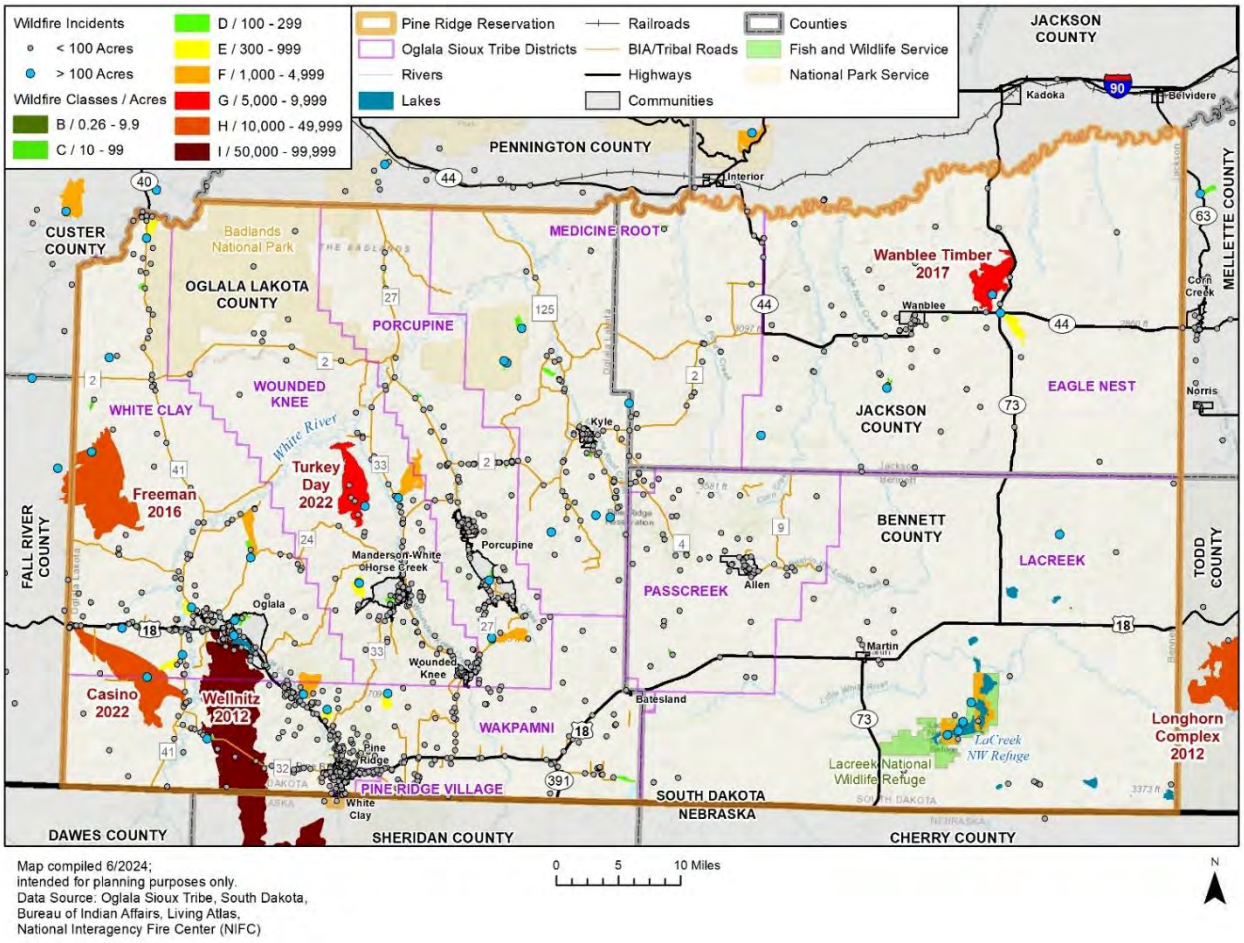


Past Occurrence

The Federal Wildland Fire Occurrence Database was used to analyze fire history on the Pine Ridge Reservation. The database maintained by the USGS and other agencies, includes perimeter and point GIS layers for fires on public lands throughout the United States. The data includes fires dating back to 1980. The National Park Service, Bureau of Land Management, and the U.S. Forest Service reports include all fires of 10 acres and greater. The database is limited to fires on federal lands, though. Some fires may be missing altogether or have missing or incorrect attribute data. Some fires may be missing altogether or have missing or incorrect attribute data. Some fire information may be lacking in the database because historical records were lost or damaged, fires were too small for the minimum cutoffs, documentation was inadequate, or fire perimeters had not yet been incorporated into the database. Also, agencies are at different stages of participation. For these reasons, the data should be used cautiously for statistical or analytical purposes.

There were 1,642 reported wildfires in the planning area from 2012 to 2024. Wildfire in the planning area has become more frequent since the 1980s, but frequency decreased between 2012 to 2013. **Figure 4-36** shows wildfires that have affected the area based on the Federal Wildland Fire Occurrence Database.

Figure 4-36 Pine Ridge Reservation Wildfire Past Occurrences, 2012-2024



Wildfire counts from the National Interagency Fire Center Database for the Pine Ridge Reservation are reported by county in Table 4-41. As the number of reported wildfires by county indicates, the greatest threat of wildfire is in Oglala Lakota County. Most fires occur around populated areas and transportation routes (Figure 39) and burn less than 100 acres.

Table 4-41 Reported Wildfires by County (Within The Planning Area), 2012-2024

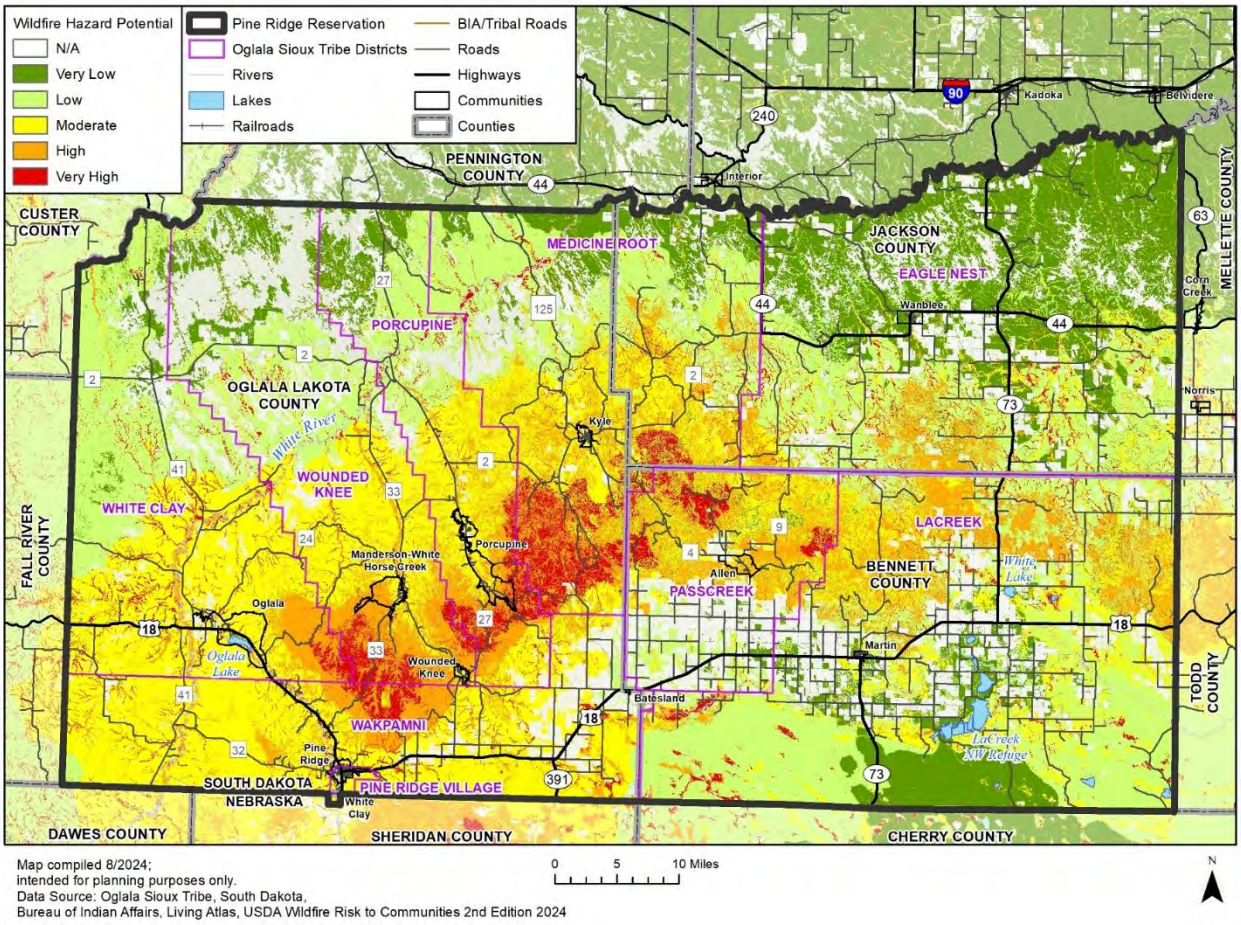
COUNTY	REPORTED WILDFIRES	ACRES BURNED
Oglala Lakota	1,440	133,326
Bennett	111	5,582
Jackson	91	8,461
TOTAL	**1,642**	**147,369**

Source: National Interagency Fire Center (NIFC)

Probability of Future Occurrences

Wildfires occur every year throughout the Pine Ridge Reservation and could occur in any county in any given year. This gives the Reservation a rating of **highly likely** for probability of future occurrence. **Figure 4-37** below shows the wildfire potential for the Reservation.

Figure 4-37 Pine Ridge Reservation Wildfire Hazard Potential



Magnitude/Severity (Extent)

The magnitude of wildfires is typically measured by how many acres they burn, the intensity of the burn and the potential for property losses. Typically, wildfires in the wildfires in the wildland urban interface result in a complete loss of the structure and contents. Wildfires often result in massive evacuations can also cause multiple deaths and injuries. Communities in the Black Hills Region, such as OST, are at the greatest risk to wildfire hazards. Grass/wildfire is considered to have a **critical** magnitude and severity.

Table 4-42 illustrates the number of wildfires by size in the planning area from 2012 to 2024. The planning area experienced 1,642 wildfires in a 12-year period, burning a total of 147,368 acres. The majority of fires burned less than 0.25 acres, while one wildfire burning 77,684 was the largest fire during this time period.

Table 4-42 Oglala Sioux Tribe Wildfire Reported History by Wildfire Size Class, 2012-2024

SIZE CLASS	ACRES	REPORTED WILDFIRES	TOTAL ACRES BURNED
A	less than 0.25	1,331	42
B	0.26 to 9.9	216	354
C	10.0 to 99.9	56	1,615
D	100 to 299	12	2,170
E	300 to 999	13	7,009

SIZE CLASS	ACRES	REPORTED WILDFIRES	TOTAL ACRES BURNED
F	1,000 to 4,999	9	15,793
G	5,000 to 9,999	2	11,250
H	10,000 to 49,999	2	31,451
I	50,000 to 99,999	1	77,684
	Total	**1,642**	**147,368**

Source: National Interagancy Fire Center (NIFC)

Climate Change Impacts

Wildfire conditions throughout South Dakota and the broader western United States are likely to worsen, primarily driven by the impacts of climate change. Rising temperatures, a surge in yearly precipitation levels, and the emergence of frequent droughts are key contributing factors. The increase in temperatures can dry out fuels more rapidly and the increase in moisture levels can provide favorable conditions for fuel (vegetation) growth. The trend towards larger precipitation events with drought as common occurrence provides multiple windows of opportunity for the fuels to dry out and burn, particularly fine fuels like grasses.

According to the Fifth National Climate Assessment, the number of large grassland wildfires in the four semiarid ecoregional grasslands of the Northern Great Plains increased by 213%, from 128 between 1985 and 1995 to 273 between 2005 and 2014, with total area burned increasing in the western ecoregions of the region by 350% but decreasing in eastern ecoregions by 75% or more. The planning team noted that in 2024 there were already over 1,000 acres burned by April, indicating the lengthening of what has historically been considered the normal fire season.

The U.S. Forest Service has published a study titled Wildland Fire and Climate Change detailing the anticipated impact of climate change on atmospheric dynamics influencing fire weather. These shifts are projected to alter fire patterns, subsequently affecting carbon cycling, forest architecture, and species distribution. The study outlines potential scenarios in a doubled CO2 environment, foreseeing heightened lightning activity, increased occurrence of surface pressure systems conducive to surface drying, and fire weather conditions. Such changes indicate a potential expansion of the annual window of heightened fire risk by 10-30%, although predictions beyond 2040 remain speculative due to ongoing trends in fossil fuel emissions. Nevertheless, an escalation in drought likelihood and the frequency of days with combustible fuels is expected. The above variable is anticipated to prolong fire seasons and expand burn areas in ecoregions where fire prevalence correlated with fuel conditions. Severe wildfires can yield soils prone to erosion, escalating sediment deposition in reservoirs and streams, thereby compromising water infrastructure and quality. Furthermore, impacted watershed may face heightened risks of floods and debris flows for several years post-fire, exacerbating the aftermath of destructive blazes.

Vulnerability Assessment

The southwestern portion of South Dakota has the highest risk index rating according to FEMA's NRI data. Oglala Lakota County being one of the counties with the highest chance of wildfire occurring, this can be attributed to environmental factors such as climate change and drought. The local planning team identified grass/wildfire as a top concern for OST and OLC due to its significant impact on agriculture, one the largest economic sectors in the planning area. Grass/wildfires damage grazing and hay production acreages and can destroy ranchers' fence lines, reducing the overall number cattle that can be supported per acre. There is pressing need for additional firefighting equipment for local volunteer fire departments, especially for fire suppression during drought periods. Water supplies for combating grass/wildfires are sourced from fire hydrants or tanker trunks, with dam and lake water available as a last resort. A new fire department is currently being developed, although its location has yet to be determined.

The planning team also noted that there are verbal mutual aid agreements in place between volunteer fire departments throughout the planning area, the Martin Fire Department has a contract with the BIA to provide assistance during wildfire events. The BIA fire department can respond to grass/wildfire incidents but not structural fires. To help mitigate wildfire potential, the BIA conducts fuel management projects such as prescribed burns.

Figure 4-38 South Dakota Wildfire Expected Annual Loss Rating

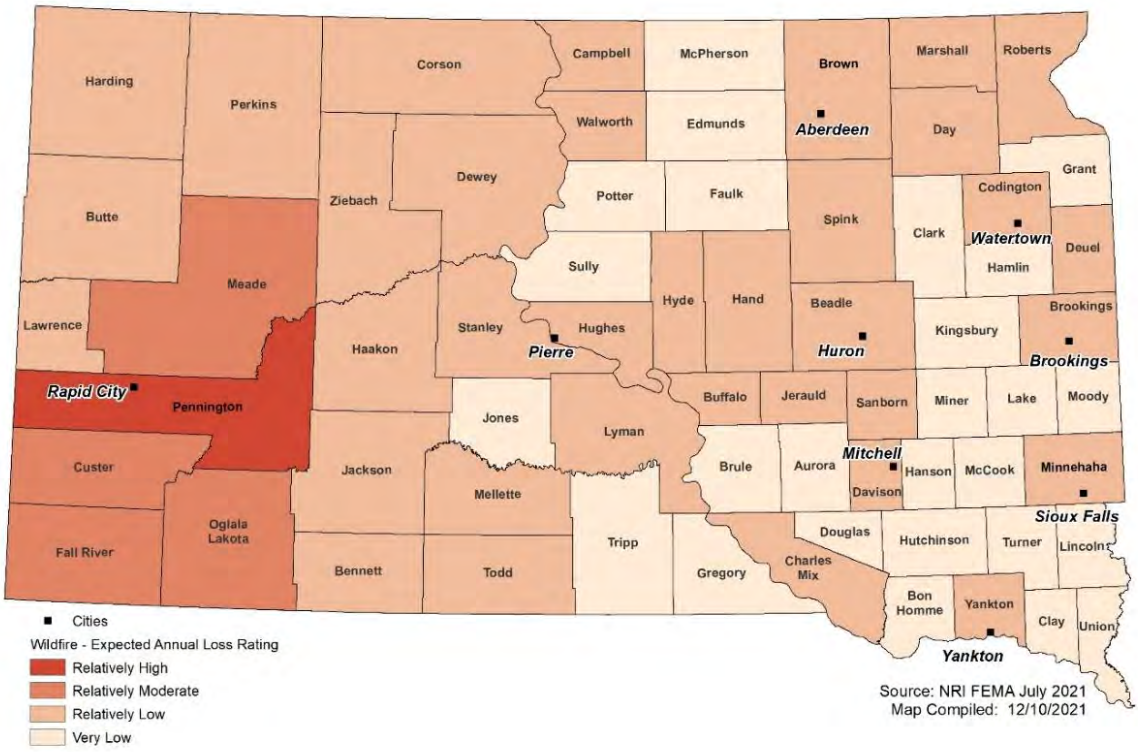


Table 4-43 Grass/Wildfire Vulnerability Summary

SECTOR	VULNERABILITY
People	• Grass/wildfire can lead to displacement of people and loss of homes. • Increase of injury or death • Lack of transportation poses risk to low-income individuals, families, and elderly. • Vulnerable populations such as the elderly, infants, individuals in long-term care facilities, occupants of mobile homes, hospitals, prisons, low-income housing areas, or temporary shelters, non-English speakers, homeless individuals, tourists, visitors, and those with developmental, physical, or sensory disabilities.

SECTOR	VULNERABILITY
Property	• Grass/wildfire can cause damages to homes and businesses. • Homes constructed with combustible materials are more susceptible to catching fire. • Wildland-Urban Interface are properties located at the edge of wildland are at higher risk due to closer proximity to natural fuel sources. • All flammable materials are at risk during a wildfire.
Critical Facilities and Community Lifelines	• Grass/wildfire events can create difficulty in safely evacuating the planning area. • Can create difficulty reaching communities in need of help. • Wildfires can make roads impassable, hindering evacuation and emergency response. • Potentially damage to towers and lines creating a disruption in communication.
Economy	• Loss of property, direct agricultural sector job loss, secondary economic losses to businesses in or near wildland resources like parks and national forests, and loss of public access to recreational resources. • Rebuilding of homes and businesses • Wildfires can destroy crops, leading to a decline in business for farmers. • Damage to roads, bridges, utilities, leading to repair and replacement costs.
Environmental and Cultural Resources	• Loss of crops • Increase in temperatures, drought, and extreme heat can all impact wildfires. • Wildfires can deflate soils which can contribute to soil erosion.

People

The populations most exposed to wildfire hazards reside in areas known as the Wildland-Urban Interface (WUI), where residential properties are directly traditional wildland territories. Exposure levels in these zones correlate with the general exposure of corresponding properties, as discussed further in the subsection titled Property. To date, populations in these zones have been engaged by authorities regarding fire hazards as possible.

Vulnerable populations susceptible to wildfire hazards include residents within WUI zones, especially those with respiratory conditions, the elderly, infants, individuals in long-term care facilities, occupants of mobile homes, hospitals, prisons, low-income housing areas, or temporary shelters, non-English speakers, homeless individuals, tourists, visitors, and those with developmental, physical, or sensory disabilities. Wildfire impacts on these groups can be particularly severe, as families may lack sufficient financial resources to prepare for or recover from wildfires and may have inadequate insurance coverage. Individuals with disabilities may require additional time for evacuation, necessitating early issuance of evacuation notices communicated through diverse and inclusive channels.

Indirect effects of wildfires on individuals can be extensive and severe. Dense smoke from wildfires often envelops vast areas beyond the WUI, adversely affecting health and well-being. Wildfires in the western United States over the past few years have significantly degraded air quality across the region. Dense smoke poses risk to individuals with compromised health as well as those considered healthy. Research from the University of California San Diego has shown that wildfire smoke can be more detrimental to respiratory health than car pollution. Studies have also indicated a surge in ambulance calls, hospital visits, and instances of respiratory or cardiac emergencies attributable to wildfire smoke exposure (NPR 2020).

Population at-risk estimates were developed by multiplying the average household size from the U.S. Census Bureau for Pine Ridge Reservation by the number of residential structures found within each Wildfire Risk to Homes and Wildfire Potential Hazard areas based on USDA Wildfire Risk to Communities data. These results are shown Table 4-44 below.

Table 4-44 Pine Ridge Reservation Population at Risk to Wildfire Potential Hazards

COUNTY	MODERATE WILDFIRE POTENTIAL	HIGH WILDFIRE POTENTIAL	VERY HIGH WILDFIRE POTENTIAL	TOTAL
Bennett	302	101	23	**426**
Jackson	119	46	9	**174**
Oglala Lakota	5,575	873	229	**6,677**
Sheridan / NE	5	0	0	**5**
Total	**6,001**	**1,020**	**261**	**7,281**

Source: Oglala Sioux Tribe, Fall River County Assessor, USDA Wildfire Risk to Communities 2nd Edition, WSP GIS Analysis

Property

The potential repercussions of wildfires on property encompass a range on impacts, including crop destruction, harm to livestock and pets, and structural damage to infrastructure, residences, and other buildings located throughout the wildfire risk area, with greatest potential impact on property, buildings, and infrastructure located within high and very high hazard zones including the WUI, and building and infrastructure located within forested lands, to include national forests and parks. All flammable materials are at risk during wildfires, encompassing both structures and personal belongings. Property vulnerability escalates as proximity to wildfire-prone zones decreases, particularly for structures within the WUI. This vulnerability is further heightened if surrounding properties lack adequate fire mitigation measures.

Effective mitigation techniques utilizing non-combustible materials such as concrete for construction, maintaining appropriate distances between buildings and vegetation areas filled with non-flammable materials like decorative rock or stone, and clearing underbrush and trees. Another approach to assessing vulnerability involves evaluating the value of structures situated within wildfire risk zones.

A method of estimating vulnerability is to determine the value of structures that are located within the USDA's Wildfire Potential Hazard risk areas. For this plan update, GIS analysis was used to estimate Pine Ridge Reservation's potential property losses. The 911 Address Points were used as the basis for the inventory of developed buildings. An assumption with this model is that every address point has an associated building. An analysis of the value of those address points (the average residential value plus estimated value of building contents) quantifies the potential losses from wildfires. The results of this analysis are summarized in **Table 4-45**. The total values shown below include both average residential building value and contents and can be used as an estimate of potential losses since wildfires typically result in a total loss. An estimated $157.7 million in total property value is potentially exposed to the Wildfire Potential Hazards throughout Pine Ridge Reservation. The majority of this exposure is in Oglala Lakota County, which alone comprises about 24% of the exposed property value in the region.

Table 4-45 Pine Ridge Reservation Wildfire Risk, using the USDA's *Wildfire Potential Hazards*

COUNTY	BUILDING COUNT VERY HIGH	BUILDING COUNT HIGH	BUILDING COUNT MODERATE	TOTAL BUILDING COUNT	IMPROVED RESIDENTIAL VALUE	ESTIMATED CONTENTS VALUE	TOTAL VALUE
Bennett	5	23	69	**97**	$6,138,000	$3,069,000	**$9,207,000**
Jackson	2	10	26	**38**	$2,508,000	$1,254,000	**$3,762,000**
Oglala Lakota	53	195	1,240	**1,488**	$96,426,000	$48,213,000	**$144,639,000**
Sheridan / NE	0	0	2	**2**	$66,000	$33,000	**$99,000**
Total	**60**	**228**	**1,337**	**1,625**	**$105,138,000**	**$52,569,000**	**$157,707,000**

Source: Oglala Sioux Tribe, Fall River County Assessor, USDA Wildfire Risk to Communities 2nd Edition, WSP GIS Analysis

Any flammable materials are vulnerable during a wildfire, including structures and personal property. The vulnerability of general property increases as the distance of the property to wildfire-prone areas decreases and is particularly high for structures located in the WUI. These structures receive an even higher level of vulnerability if the properties surrounding them are not properly mitigated for fire. Appropriate mitigation techniques include using non-flammable materials such as concrete for construction, leaving appropriate spaces between buildings and vegetation areas filled with non-flammable materials (such as decorative rock or stone), and clearing of underbrush and trees.

Critical Facilities and Lifelines

Wildfire impacts to critical facilities can include structural damage or destruction, risk to persons located within facilities, disruption of transportation, shipping, and evacuation operations, and interruption of facility operations and critical functions. To estimate the potential impact of wildfire on critical facilities and lifelines, a GIS overlay was performed with the USDA Wildfire Potential Hazard layers and the critical facility point data. Replacement values were not available with the data thus an estimate of potential monetary loss could not be performed. Impacts to any of these facilities could have wide ranging ramifications, in addition to property damage and other cascading impacts.

The total counts and types of critical facilities by FEMA Lifeline category are summarized below. As shown in these tables, the majority of exposed critical facilities are in Oglala Lakota County.

Table 4-46 Critical Facilities at Moderate Wildfire Risk by County and Lifeline

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Bennett	1	1	1	-	-	-	-	3	**6**
Jackson	-	-	-	-	-	-	-	4	**4**
Oglala Lakota	7	4	-	-	1	1	7	4	**24**
Sheridan / NE	-	-	-	-	1	-	-	-	**1**
Total	**8**	**5**	**1**	**0**	**2**	**1**	**7**	**11**	**35**

Source: USDA Wildfire Risk to Communities 2nd Edition, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Table 4-47 Critical Facilities at High Wildfire Risk by County and Lifeline

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Bennett	-	-	-	1	-	-	1	1	**3**
Jackson	-	-	-	-	-	-	-	4	**4**
Oglala Lakota	5	2	-	-	-	1	1	1	**10**
Sheridan / NE	-	-	-	-	-	-	-	-	**0**
Total	**5**	**2**	**0**	**1**	**0**	**1**	**2**	**6**	**17**

Source: USDA Wildfire Risk to Communities 2nd Edition, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Table 4-48 Critical Facilities at Very High Wildfire Risk by County and Lifeline

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Bennett	-	-	-	-	-	-	-	1	**1**
Jackson	-	-	-	-	-	-	-	-	**0**
Oglala Lakota	-	-	-	-	-	-	-	-	**0**
Sheridan / NE	-	-	-	-	-	-	-	-	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**

Source: USDA Wildfire Risk to Communities 2nd Edition, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Facilities in the planning area such as those summarized in the tables above may be exposed directly or indirectly to wildfire. Direct exposures are similar to those of general property and increase as the infrastructure or facilities and capabilities move into the WUI zones. Communication infrastructure and lines passing through susceptible areas such as forests are more exposed than those located in cities and more urbanized areas. The indirect vulnerability of response capabilities increases seasonally and with the number of occurrences. Though the populations making up the response capability systems are not directly exposed to all fire events, the response of some of the personnel to an event lessens the capabilities overall for responses to other emergency situations. If there is a large increase in the number of simultaneous wildland fires, even small ones, the response capability of the Pine Ridge Reservation could easily be compromised.

Economy

The economic impacts of wildfire include loss of property, direct agricultural sector job loss, secondary economic losses to businesses in or near wildland resources like parks and national forests, and loss of public access to recreational resources. Tourism in the State of South Dakota plays a major economic role, with the presence of State and National Parks and other outdoor recreational opportunities. Damage to these assets or disruption of access to them can have far reaching negative impacts to the local economy. Fire suppression may also require increased cost to local and state government for water acquisition and delivery, especially during periods of drought when water resources are scarce.

Oglala Lakota County and other counties in the Black Hills Region that are at higher risk of wildfire exposure, have felt these development pressures. In addition to the increased growth in the WUI, climate change is expected to increase the fire risk for the State by 10-30%, because of increased temperatures, increased likelihood of drought events, as well as the increased risk to beetle and insect infestations. Due to these factors, future vulnerability to wildfire events is likely to increase. The implementation of mitigation projects such as educating homeowners on how to protect their property, or the implementation of development standards and regulations related to wildfire mitigation, will help the State's population and infrastructure be better protected when a wildfire event does occur.

Environmental and Cultural Resources

Increasing temperatures, drought severity, and extreme heat throughout the State has increased the likelihood of wildfires. As previously mentioned, tourism and outdoor industries are particularly susceptible to wildfires. In addition, historic and cultural resources are at risk. The Black Hills have high concentrations of historic properties with wooden features and a high risk to wildfire. These resources exhibit a vulnerability similar to those in general property, however, where vulnerability rating increase closer to the WUI the property is, and the less mitigated the landscaping surrounding the property is. In addition, older buildings may be exempt from internal fire mitigation such as sprinklers and fire suppression technology, which may increase the vulnerability of the resource.

Also, high intensity wildfires can deflate soils, which is damaging to archeological resources. Even low intensity wildfires can denude soils and contribute to increase erosions, which increases risk of damage to archeological resources from erosion and flooding.

Cascading/Related Hazards

Wildfires are interconnected to hazards such as drought, infrastructure failure, extreme heat, lightning, erosion/debris flow, post-fire flooding and windstorms. For instance, drought is characterized by prolonged periods of insufficient precipitation, which can create dry, flammable conditions across landscape. Extreme heat exacerbates this vulnerability, intensifying the drying process and elevating the likelihood of ignition. Lightning strikes can also act as an ignition source and can cause flames to spread rapidly. Windstorms further exacerbate fire behavior, fanning flames and facilitating their spread over rugged terrain. Wildfires destroy vegetation that helps absorb rainfall and without the vegetation erosion occurs. During high rainfall events this can cause debris flow. Debris flow has the possibility of destroying homes, roads, and infrastructures. These interrelated hazards require a multifaced approach that integrates proactive measures to mitigate the risk and impacts of wildfires throughout the counties.

Risk Summary

Wildfires occur throughout Oglala Lakota, Bennett, and Jackson counties on an annual basis, making the probability of future fires **highly likely**, with potentially **critical** impacts. Though it is not likely that the areas at risk will simultaneously face a complete destructive event, a wildfire anywhere on the Reservation is likely to impact most of the Reservation in some way. Overall, wildfire is a **high** significance hazard to OST.

- Magnitude and severity of grass/wildfire is considered **critical**.

- Fires are common for Pine Ridge Reservation, therefore the probability of future occurrences is **highly likely**.
- Smoke and air pollution from wildfires can cause severe negative health impacts, especially for children, the elderly, and those with respiratory and cardiovascular diseases.
- Vulnerable populations include the elderly, infants, individuals in long-term care facilities, occupants of mobile homes, hospitals, prisons, low-income housing areas, or temporary shelters, non-English speakers, homeless individuals, tourists, visitors, and those with developmental, physical, or sensory disabilities.
- Wildfire events can create difficulties in evacuating, with large areas of the Reservation being very remote and disconnected and roads becoming impassable.
- Loss of property, direct agricultural sector job loss, secondary economic losses to businesses in or near wildland resources like parks and national forests, and loss of public access to recreational resources.

4.4.11 Hail

Description

Location: Significant
Future Probability: Highly Likely
Magnitude/Severity: Critical
Overall Significance: **High**

Hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow.



National Weather Service

At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 miles per hour (mph), while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 mph. The largest hailstone recorded in the United States (shown at right) was found in Vivian, South Dakota, not far from the Pine Ridge Reservation, on July 23, 2010, measuring eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea sized hail can do damage.

Hail is commonly associated with severe thunderstorms, and this association makes hail just as unpredictable as severe thunderstorms. Additionally, hail events in thunderstorms often occur in series, with one area having the potential to be hit multiple times in one day. Severe thunderstorms in the planning area usually occur in the evening during the spring and summer months. These, often large, storms can include heavy rain, hail, lightning, and high winds. Hailstorms in the planning area can cause damage to property, crops, and the environment, and kill and injure livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail stones can fall at speeds of up to 100 mph and have been known to cause injury to humans; occasionally, these injuries can be fatal.

Location

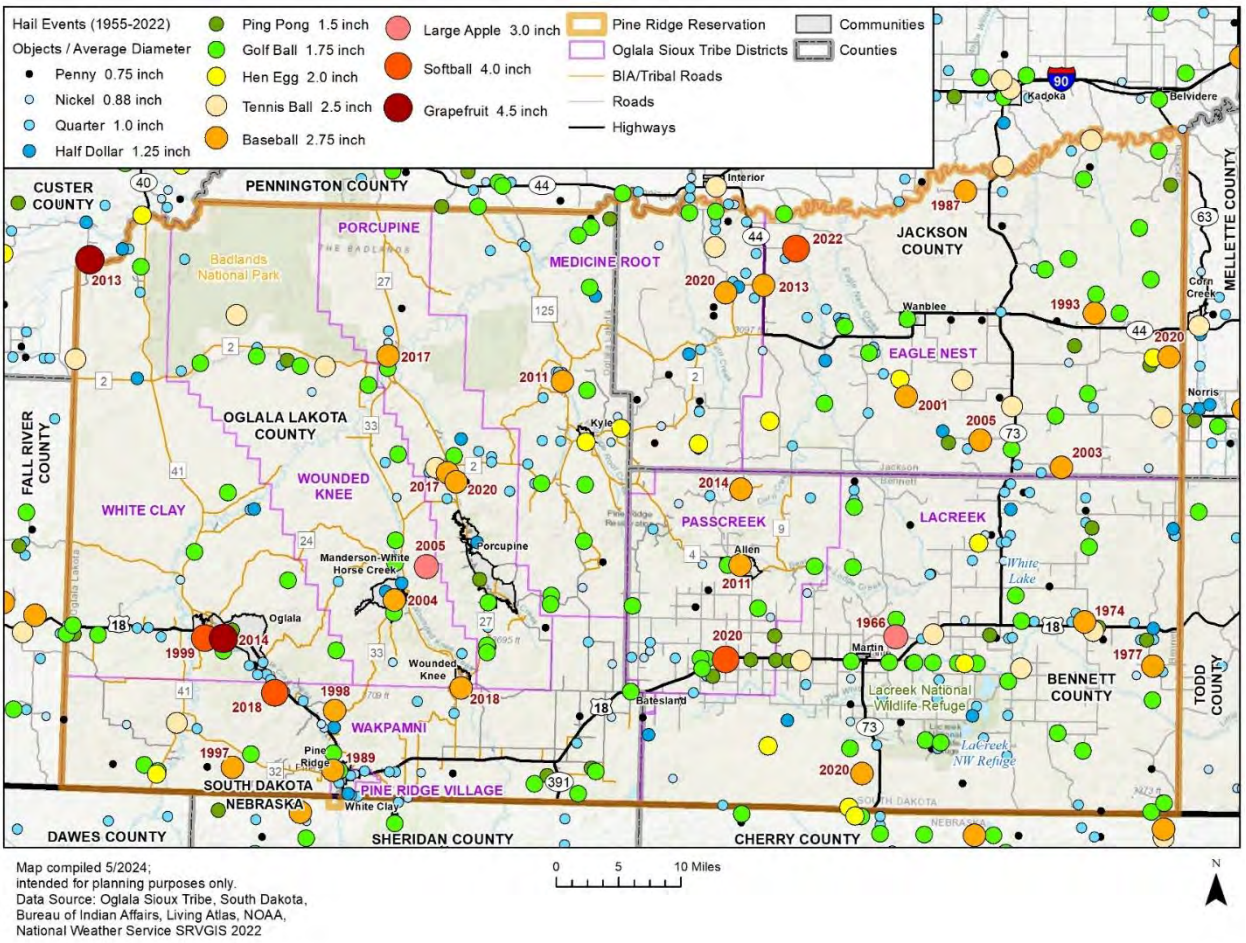
As shown in the map in the following section, the entire planning area is at risk to hail due to the regional nature of this type of event and the widespread occurrence of this type of event.

Past Occurrences

The NCEI reports a total of 190 hail events in the planning area between January 2014 and December 2023. These events were responsible for $36,000 in property damages and resulted in no recorded injuries or fatalities. Recovery efforts since these storms have included the cooperation of multiple agencies and non-profits across the Reservation.

Figure 4-39 below shows the locations of past known hail events across the Pine Ridge Reservation from 1955 to 2022. The NCEI reports events as they occur in each community. A single hail event can affect multiple communities and counties at a time; the NCEI reports these large scale, multi-county events as separate events. The result is a single hail event covering a large portion of the planning area could be reported by the NCEI as several events.

Figure 4-39 Hail Events on the Pine Ridge Reservation, 1955-2022



In July 2018, the Pine Ridge Reservation was struck by a severe ice storm that left a trail of destruction across the community. The storm's hail pelted the reservation with the ferocity of a shrapnel blast, its force so intense that the ice was driven sideways, rather than falling straight down. This relentless assault caused widespread damage, particularly to mobile homes. The hail battered vinyl and aluminum siding, tore into roofs, and shattered windows in both houses and cars, see **Figure 4-40**.

The aftermath was devastating, with over 500 homes rendered uninhabitable, a crushing blow to a community already struggling with poverty. As winter approached, many of these damaged homes were left exposed to the harsh South Dakota elements, amplifying the distress of an already vulnerable population.

Compounding the tragedy, federal disaster aid was denied to the Pine Ridge Reservation, with insufficient total financial damage given the low property values in the area. With no federal assistance forthcoming, the community rallied together. Local residents, alongside volunteers from outside the area, took on the immense task of repairing the damage. They improvised solutions, such as using Plexiglas to cover broken windows, in a desperate effort to protect homes from the encroaching winter.

Figure 4-40 A Home on the Pine Ridge Reservation Damaged by Baseball-Sized Hail in 2018



Image courtesy of the Lakota People's Law Project, https://news.mongabay.com/2019/07/as-climate-chaos-escalates-in-indian-country-feds-abandon-tribes/

Probability of Future Occurrence

Based on historic records and reported events, severe thunderstorms with hail are **likely** to occur several times annually within the planning area. The NCEI reported 593 hail events between 1996 and 2023, or approximately 22 hail occurrences per year.

Magnitude/Severity (Extent)

The Tornado and Storm Research Organization (TORRO) scale is used to classify hailstones and provides some detail related to the potential impacts from hail. **Table 4-49** outlines the TORRO Hail Scale.

Table 4-49 Torro Hail Scale

CLASS	TYPE OF MATERIAL	DIVISIONS
H0: Hard Hail	5 mm; (Pea size); 0.2 in	No damage
H1: Potentially Damaging	5 -15 mm (Marble); 0.2 – 0.6 in	Slight general damage to plants and crops
H2: Significant	10 -20 mm (Grape); 0.4 – 0.8 in.	Significant damage to fruit, crops, and vegetation
H3: Severe	20 -30 mm (Walnut); 0.8 – 1.2 in	Severe damage to fruit and crops, damage to glass and plastic structures
H4: Severe	25 -40 mm (Squash Ball); 1.2 – 1.6 in	Widespread damage to glass, vehicle bodywork damaged
H5: Destructive	30 – 50 mm (Golf ball); 1.6 – 2.0 in.	Wholesale destruction of glass, damage to tiled roofs; significant risk or injury
H6: Destructive	40 – 60 mm (chicken egg); 2.0 – 2.4 in	Grounded aircrafts damaged, brick walls pitted; significant risk of injury

CLASS	TYPE OF MATERIAL	DIVISIONS
H7: Destructive	50 – 75 mm (Tennis ball); 2.4 – 3.0 in	Severe roof damage; risk of serious injuries
H8: Destructive	60 – 90 mm (Large orange); 3.0 – 3.5 in.	Severe damage to structures, vehicles, airplanes; risk of serious injuries
H9: Super Hail	75 – 100 mm (Grapefruit); 3.5 – 4.0 in	Extensive structural damage; risk of severe or even fatal injuries to persons outdoors
H10: Super Hail	>100 mm (Melon); > 4.0 in	Extensive structural damage; risk or severe or even fatal injuries to persons outdoors

Source: TORRO, 2024." https://torro.org.uk/research/hail/hscale

The average damage per event estimate was based on the NCEI Storm Events Database between 2014 and 2023 and number of historical occurrences as described above. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life.

Table 4-50 Hail Losses

COUNTY	NUMBER OF EVENTS	EVENTS PER YEAR	TOTAL PROPERTY LOSS	AVERAGE ANNUAL PROPERTY LOSS
Bennett Co.	49	4.9	$30,000	$3,000
Jackson Co.	25	2.5	$5,000	$500
Oglala Lakota Co.	116	11.6	$325,000	$32,500
Grand Total	**190**	**19**	**$360,000**	**$36,000**

Source: NCEI

Climate Change Impacts

In the Northern Great Plains, temperatures have increased by 1.6-2.6 ˚F, leading to projections of more frequent and severe hailstorms, with larger hailstones and a lengthened hail season throughout this century. This region, especially in July, is expected to see the largest increases in hail risk in the U.S. Future hailstorms are predicted to be 40 percent more damaging, heightening the threat to crops, property, and infrastructure. These projections highlight the urgent need for improved support and preparedness to manage the growing impact of extreme weather events (National Climate Assessment 5 (2023) Chapter 25, Northern Great Plains).

Vulnerability Assessment

Table 4-51 Hail Vulnerability Summary

SECTOR	VULNERABILITY
People	• Homes damaged by hail have been left uninhabitable, or with severe deficiencies, leading to increased exposure to those inside. • The reservation has a high poverty rate, with Oglala Lakota County having the lowest per capita income ($8,768) in the country, making residents less able to recover from hail damage.
Property	• A hailstorm in July 2018 left over 500 homes uninhabitable, demonstrating the vulnerability of housing on the reservation. • Many homes on the reservation are mobile homes or poorly constructed, making them more susceptible to hail damage. • Cars and home components such as roofs, siding, windows, gutters, HVAC systems, etc. can incur extensive damage.

SECTOR	VULNERABILITY
Critical Facilities and Community Lifelines	• The Pine Ridge Airport, a critical transportation link, has asphalt runways that could be damaged by severe hail. • Healthcare facilities, already limited on the reservation, may sustain damage from hail, potentially disrupting essential services. • Power lines and utilities can be damaged, Property damages and power outages can cause disruptions to schools, hospitals, and community centers.
Economy	• Damages to buildings and property can cause significant losses to business owners and cause disruptions to daily life and economic well-being. • Average annual property loss due to hail on the reservation totals around $36,000. With unemployment rates between 80-85% on the reservation, economic recovery from hail damage is particularly challenging.
Environmental and Cultural Resources	• Cultural buildings, dwellings, monuments, and artifacts can be damaged along with particular crops that are important for cultural practices. • Hail can damage the limited agricultural land on the reservation, of which only 84,000 acres are suitable for agriculture.

Cascading/Related Hazards

Cascading hazards associated with hail in the planning area can include:

- Damage to infrastructure- Hail can cause significant damage to buildings, vehicles, and roads, leading to costly repairs and maintenance.
- Power outages- Hail can disrupt power lines and lead to electricity outages, affecting homes and critical facilities like health clinics, grocery stores, and gas stations.
- Agricultural Losses- Hail can destroy crops, culturally significant crops, and affect livestock. This can lead to economic losses for the community which relies heavily on agriculture.
- Transportation disruption- Paved roads can become hazardous due to hail accumulation. Dirt roads can also become hazardous from displaced dirt which create potholes or ruts in the road making travel difficult.

Risk Summary

Overall, the significance of hail in the planning area is **high**. The probability of an event occurring is **highly likely**, with **critical** impacts expected.

- Hail is very common in the planning area and will continue to do so with H4 hail events likely occurring annually.
- One larger hail event is likely having had one H10 event occurring in the planning area since 1996.
- Hail can cause significant damage to cultural resources such as buildings, monuments and artifacts.
- Hail can also cause significant damage to critical infrastructure, disrupt business operations, and important crops and fields.

4.4.12 Hazardous Materials Incidents

Location: Limited
Future Probability: Occasional
Magnitude/Severity: Negligible
Overall Significance: **Low**

Description

Chemicals are found in our daily lives, playing essential roles in purifying drinking water, increasing crop production, and simplifying household chores. However, they can also be hazardous to humans and the environment if used or released improperly. Hazardous materials can include explosives, flammable and combustible substances, poisons, and radioactive materials. Chemical agents such as poisonous vapors and aerosols can have toxic effects on people, animals, and plants. These hazardous materials can lead to fatalities, serious injuries, long-lasting health issues, and significant damage to buildings, homes, and other properties.

A physical hazard material per the National Fire Protection Association (NFPA) code 400 is a substance that is classified as any one of the following in **Table 4-52**.

Table 4-52 Hazardous Material Classes

CLASS	TYPE OF MATERIAL	DIVISIONS
1	Explosives	Division 1.1 – Explosives with a mass explosion hazard Division 1.2 – Explosives with a projection hazard but not a mass explosion hazard Division 1.3 – Explosives which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard Division 1.4 – Explosives which present no significant blast hazard Division 1.5 – Very insensitive explosives with a mass explosion hazard Division 1.6 – Extremely insensitive articles which do not have a mass explosion hazard
2	Gases	Division 2.1 – Flammable gases Division 2.2 – Non-flammable, non-toxic gases Division 2.3 – Toxic gases
3	Flammable Liquids and Combustible Liquids	
4	Flammable Solids, Spontaneously Combustible, and Dangerous When Wet	Division 4.1 – Flammable solids, self-reactive substances and solid desensitized explosives Division 4.2 – Substances liable to spontaneous combustion Division 4.3 – Substances which in contact with water emit flammable gases
5	Oxidizer and Organic Peroxide	Division 5.1 – Oxidizing substances Division 5.2 – Organic peroxides
6	Poison (Toxic) and Poison Inhalation Hazard	Division 6.1 – Toxic substances Division 6.2 – Infectious substances
7	Radioactive	
8	Corrosive	
9	Miscellaneous	

Source: National Fire Protection Association (NFPA) 400, 2022

Location

Hazardous materials incidents are technological events, meaning non-natural hazards created or influenced by humans, that involve unintentional releases of chemical, biological or radiological materials. Incidents can occur during production, storage, transportation, use, or disposal of hazardous materials.

Fixed Facilities

Hazardous materials incidents often involve releases at fixed-site facilities that manufacture, store, process or otherwise handle hazardous materials. These sites include chemical manufacturers, service stations, hospitals, and hazardous materials waste sites. The Environmental Protection Agency (EPA) requires the submission of the types and locations of hazardous chemicals being stored at any facility within the state over the previous calendar year. This is completed by submitting a Tier II form to the State or Tribal Emergency Response Commission (SERC or TERC), Local or Tribal Emergency Planning Committee (LEPC or TEPC), and local fire department as a requirement of the Emergency Planning and Community Right-to-Know Act of 1986. Some facilities that contain extremely hazardous substances are required to generate Risk Management Plans (RMPs) every five years. According to the Right-to-Know network database there are 162 RMP facilities located in South Dakota in 2023. Shown in **Table 4-53**, there is one RMP facility and 13 Tier II facilities within the planning area.

Table 4-53 Fixed Facilities Handing Hazardous Materials

FACILITY NAME	TYPE	LOCATION
CHS Inc. DBA Midwest Cooperative	RMP Facility	Bennett County
Martin Electrical Substation	Tier II Facility	Bennett County
Golden West - Martin	Tier II Facility	Bennett County
Lacreek National Wildlife Refuge	Tier II Facility	Bennett County
City of Martin well # 5	Tier II Facility	Bennett County
City of Martin	Tier II Facility	Bennett County
City of Martin - 1st & Stover Pumphouse	Tier II Facility	Bennett County
City of Martin - Pool	Tier II Facility	Bennett County
Bennett County Highway Department	Tier II Facility	Bennett County
Golden West - Longvalley	Tier II Facility	Bennett County
Handi Stop, LLC	Tier II Facility	Oglala Lakota County
Golden West - Kyle	Tier II Facility	Oglala Lakota County
Golden West - Pine Ridge	Tier II Facility	Oglala Lakota County
Pine Ridge High School	Tier II Facility	Oglala Lakota County

Source: EPA Right-to-Know

Transportation

Hazardous materials incidents can occur along transportation routes such as major highways, railways, navigable waterways, and pipelines.

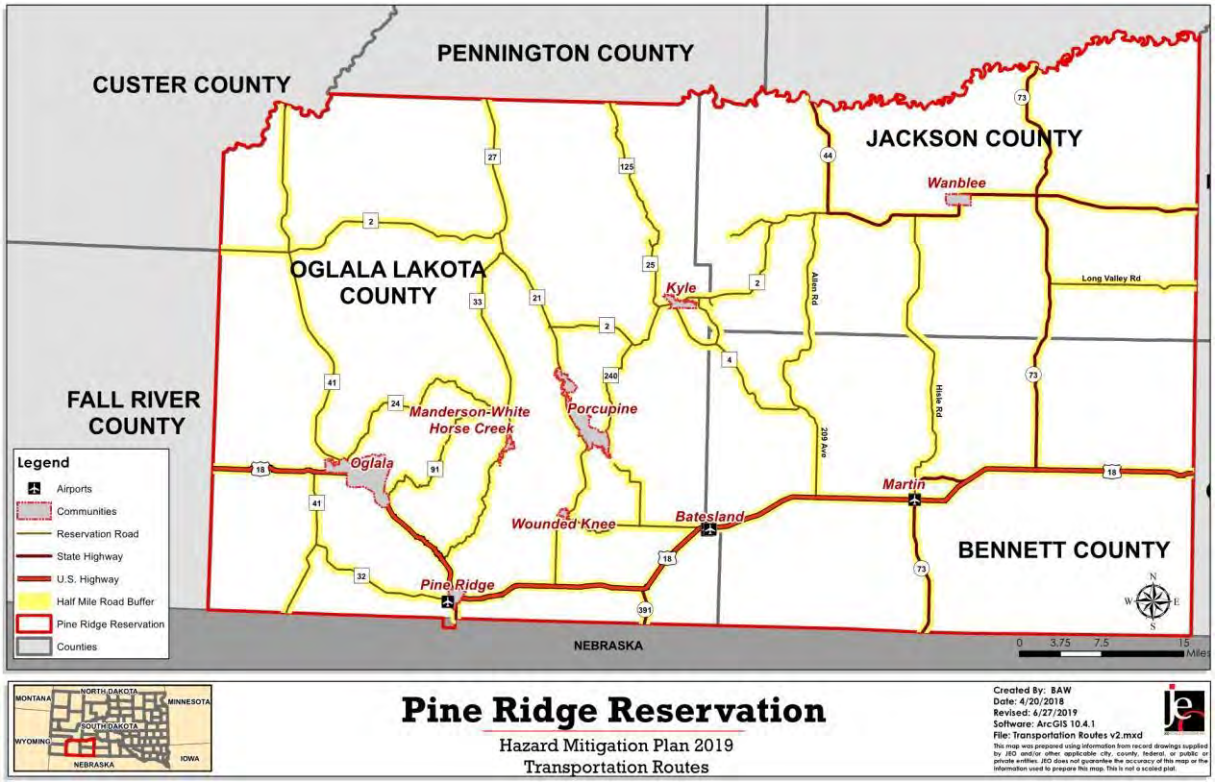
The counties of Oglala Lakota, Bennett, and Jackson don't contain any gas transmission or hazardous liquid pipelines in the National Pipeline Mapping System (NPMS) database. However, the neighboring Fall River County has a liquid petroleum pipeline that routes to Rapid City.

The state of South Dakota also doesn't have hazardous materials routes registered with the Federal Motor Carrier Safety Administration (FMCSA). However, the interstates and other highways and railroads are the typical corridors that have hazardous materials being transported on them. Primary transportation routes of concern within the planning area include Highway 18 and BIA

roads. **Figure 4-41** identifies major transportation routes where there is a higher risk of chemical spills occurring.

The EPA and DOT supervise hazardous material transportation; they regulate who is able to transport, track transportation, provide guidelines for spill response, and mandate consistent labeling of containers. Multiple departments including fire departments, state Department of Transportation, Environmental and Natural Resources, Emergency Management, and local law enforcement are involved in resolving hazardous material incidents. The State of South Dakota has a Duty Officer Program for spills to assist and provide additional resources.

Figure 4-41 Major Transportation Routes With ½ Mile Buffer



Historical Occurrences

According to the U.S. Coast Guard's National Response Center database (NRC), there have been eleven fixed site chemical spills from 1990 – 2023 in the planning area with $700 in property damages reported for these spills. Past events include a 615-gallon fuel spill near Wanblee and another fuel spill from a plane crash north of Batesland. **Table 4-54** displays the spills that have reported in the planning area.

Table 4-54 Historical Hazardous Material Fixed Site Spills

YEAR OF EVENT	LOCATION OF RELEASE	MATERIAL INVOLVED	QUANTITY SPILLED	NUMBER OF INJURIES	PROPERTY DAMAGE
1993	Martin	Amine salt	1 gal	Unknown	$0
1993	Martin	Oil: diesel	300 gal	Unknown	$700
2001	Pine Ridge	Oil: diesel	200 gal	No	$0
2004	Martin	Other oil - tar	75 gal	No	$0
2007	Allen	Sewage	Unknown	No	$0
2012	Wanblee	Raw sewage	Unknown	No	$0

YEAR OF EVENT	LOCATION OF RELEASE	MATERIAL INVOLVED	QUANTITY SPILLED	NUMBER OF INJURIES	PROPERTY DAMAGE
2013	Pine Ridge	Unknown	Unknown	No	$0
2015	Red Shirt	Unknown	Unknown	No	$0
2017	Pine Ridge	Acres of tires on fire	Unknown	No	$0
2017	Wanblee	Gasoline (unleaded)	150 gal	No	$0
2017	Red Shirt	Unknown	Unknown	Unknown	$0

Source: National Response Center, 1990-2023

The Pipeline and Hazardous Materials Safety Administration (PHSMA) reports that two chemical spills occurred during transportation in the planning area between 1990 and 2023. During these events, there were no injuries, no fatalities, no evacuations, and $2,190 in damages. **Table 4-55** provides a list of historical chemical spills during transportation in the planning area.

Table 4-55 Historical Hazardous Material Transportation Spills 1990-2023

DATE OF EVENT	LOCATION OF RELEASE	FAILURE DESCRIPTION	MATERIAL INVOLVED	INCIDENT ROUTE	AMOUNT IN GALLONS	TOTAL DAMAGE
6/15/1993	Pine Ridge	Overfill storage tank while unloading	Diesel Fuel	Hwy 18	147	$2,165
2/6/1997	Pine Ridge	Equipment malfunction	Unleaded Gasoline	Hwy 18, Hwy 407	15	$25

Source: PHMSA, January 1990– December 2023

Probability Of Future Occurrence

Given the historic record of occurrence eleven hazardous material spills reported in 34 years, the annual probability of occurrence is 32 percent. There is a 29 percent chance of a spill at a fixed site and a 5 percent chance of a spill during transport. Based on this record of historic occurrences, this hazard is considered likely to occur in the future, however the magnitude and impact of future occurrences may have a wide range of severity.

Magnitude/Severity

The extent of hazardous material spills varies and depends on the type of material that is released. Ten fixed site releases have occurred in the planning area, with the total amount spilled ranging from 0 gallons to 300 gallons of pollutant. Releases that have occurred during transportation in the planning area ranged from 15 to 147 liquid gallons (LGA). The planning team indicated that most material spills are small, but spilled fuel is the largest contributor and concern for the area. Many are from overfilled gasoline tanks. There have also been some incidents of septic tanks in low lying areas being flooded. Most semi-trailers passing through the Reservation do not carry hazardous materials, however they are not required to report when they do. No hazardous material spills in the planning area have resulted in documented deaths or injuries. Based on historic records, it is likely that any spill involving hazardous materials will not affect an area larger than a quarter mile from the spill location.

Using data from **Table 4-56** Hazardous Material Fixed Site Losses, average annual damages from hazardous material fixed site spills can be estimated.

Table 4-56 Hazardous Material Fixed Site Losses

COUNTY	NUMBER OF EVENTS	EVENTS PER YEAR	TOTAL DAMAGES	AVERAGE ANNUAL PROPERTY LOSS
Oglala Lakota	5	14.7%	$0	$0
Bennett	3	8.8%	$700	$20
Jackson	2	5.8%	$0	$0
TOTAL	**10**	**29.4%**	**$700**	**$20**

Source: National Response Center, 1990-2023

The average damage per event estimate was determined based upon PHMSA's Incidents Reports since 1990 and the number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. This hazard causes an average of $64 per year in property damages.

Table 4-57 Hazardous Material Transportation Losses

COUNTY	NUMBER OF INCIDENTS	TOTAL DAMAGE	AVERAGE ANNUAL PROPERTY LOSS
Oglala Lakota	2	$2,190	$64
Bennett	0	$0	$0
Jackson	0	$0	$0
Total	**2**	**$2,190**	**$64**

Source: PHMSA, January 1990– December 2023

Climate Change Impacts

The effects of a changing climate are unlikely to impact the rates of occurrence for human-caused hazards, such as hazardous material incidents. Nevertheless, it is possible that an increase or change in the occurrence of other hazards, such as severe storms and fire events, may increase the likelihood of an accidental hazardous materials releases from transportation events.

Vulnerability Assessment

Table 4-58 Hazard Materials Incidents Vulnerability Summary

SECTOR	VULNERABILITY
People	• Those in close proximity to spills could have minor to moderate health impacts. • Possible evacuation may be required depending on the scale of an event, which is further complicated by mobility and transportation access issues common on the Reservation. • Hospitals, nursing homes, and the elderly at greater risk due to low mobility.
Property	• A transportation hazmat incident could directly damage property due to vehicle crashes and related damage. • Risk of fire or explosion could result in damage to property.
Critical Facilities and Community Lifelines	• Critical facilities are at risk of evacuation. • Critical facilities near major transportation corridors are at risk. • Transportation routes can be closed during evacuations.

SECTOR	VULNERABILITY
Economy	• A long-term evacuation residents or businesses in affected areas would have a negative effect on the economy in the area. • Evacuations and closed transportation routes could impact businesses near spill.
Environmental and Cultural Resources	• Spill can runoff into rivers and ground water impacting drink water, irrigation water, and wildlife. • Seep into soil affecting plant growth and biodiversity • Desecrate cultural sites

Cascading/Related Hazards

Hazardous material spills can significantly impact the environment by contaminating surrounding soil and water sources. Volatile chemicals can evaporate, polluting the air and creating toxic fumes or smog. Additionally, certain hazardous materials, such as gasoline, are highly flammable and, if not properly managed, can lead to wildfires.

Furthermore, hazard events can lead to hazardous materials being spilled. These hazards can include severe winter storms or high winds that create difficult driving conditions. Severe weather can also knock out power supplies, impacting fixed facilities that handle hazardous materials.

Risk Summary

There is an overall **low** significance of hazardous materials spills, based on their **occasional** probability and **negligible** impacts.

- Reported incidents from 1990-2023 show a 29% chance of a spill at a fixed site and a 5% chance during transport.
- There are limited fixed hazardous materials facilities in the planning area and no pipelines or railways that transport hazardous materials.
- The majority of reported spills have been small, and none have resulted in deaths or injuries.

4.4.13 High Winds

Description

Location: Extensive
Future Probability: Highly Likely
Magnitude/Severity: Moderate
Overall Significance: **High**

The National Weather Service (NWS) defines high winds as sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. The NWS issues High Wind Advisories when there are sustained winds of 25 to 39 miles per hour and/or gusts to 57 mph.

Straight-line winds are generally any thunderstorm winds that are not associated with rotation and are defined mainly as a distinction from tornadic winds. These winds, which can exceed 100 mph, represent the most common type of severe weather in South Dakota and are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect multiple counties.

One type of straight-line wind is the downburst, which can cause damage equivalent to a strong tornado and can be extremely dangerous to aviation.

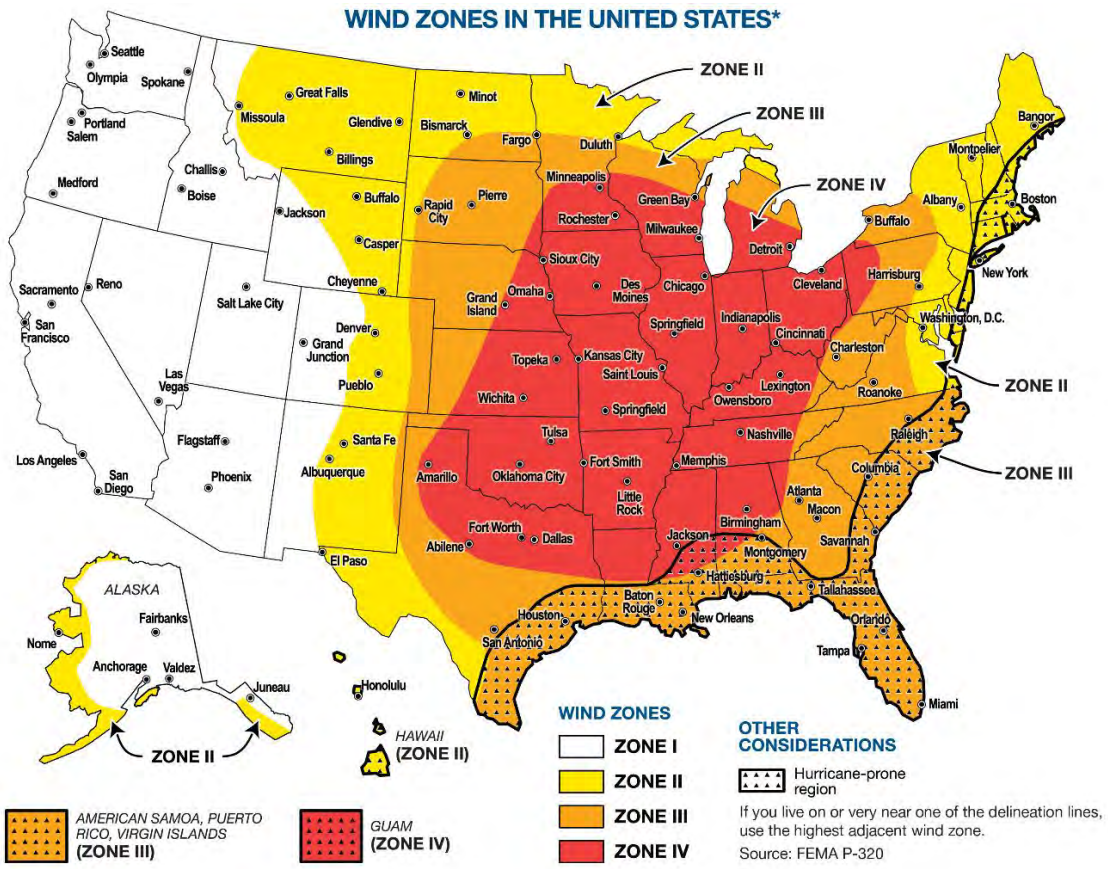
High winds and downbursts associated with thunderstorms over the Northern Plains typically happen between late April and early September, but given the right conditions, they can develop as early as March. They are usually produced by supercell thunderstorms or a line of thunderstorms that typically develop on hot and humid days. Straight-line winds may also exacerbate existing weather conditions, such as blizzards, by increasing the effect on temperature and decreasing visibility due to the movement of particulate matters through the air, as with dust and snowstorms.

Location

The entire planning area is prone to high wind events. **Figure 4-42** shows the wind zones in the United States, which are based on the maximum wind speeds that can occur from a tornado or hurricane event. The planning area is located in Zone III which has maximum winds of 200 mph equivalent to an EF4 tornado (see Tornadoes *Magnitude/Severity (Extent)* subsection).

The future location of high wind hazards will be impacted by both climate change and development trends. As the entire planning location is susceptible to high wind events, any new development will heighten vulnerability by exposing more people and structures to this hazard. The effects of climate change are discussed further in *Climate Change Impacts*.

Figure 4-42 Wind Zones in The U.S.



Source: US DOE Office of Energy Efficiency and Renewable Energy, 2010

Past Occurrences

The NCEI recorded a total of 279 thunderstorm wind events in the planning area from January 2000 to December 2023. Out of these events, 25 resulted in casualties or damages. The details of the recorded damages are presented in **Table 4-59**, with a summary of notable events provided thereafter. **Figure 4-43** illustrates the specific locations of recorded high wind events throughout the Reservation.

Table 4-59 NCEI Recorded High Wind Damages, 2000-2023

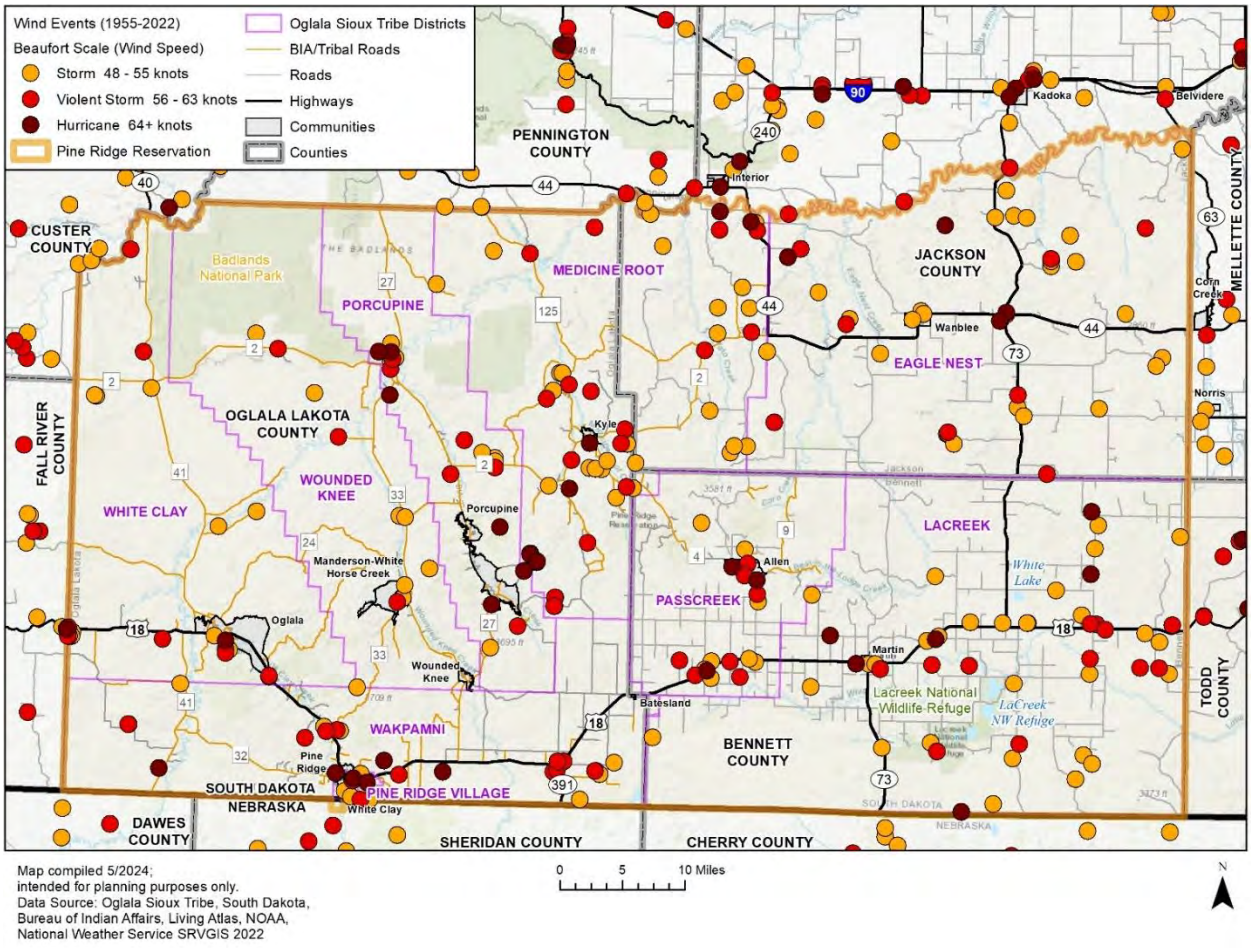
LOCATION	COUNT OF EVENTS	TOTAL DEATHS	TOTAL INJURIES	TOTAL PROPERTY DAMAGE	TOTAL CROP DAMAGE
Bennett County	100	-	1	$118,000	-
Jackson County	50	-	2	$392,500	$0
Oglala Lakota County	253	1	10	$713,000	$80,000
Grand Total	**403**	**1**	**13**	**$1,223,500**	**$80,000**

Source: NCEI Storm Events Database, 2024
Note: Additional high wind events will be recorded in the Tornadoes *Past Occurrences* subsection

- **May 31, 2003.** Strong winds toppled and destroyed a mobile home near Slim Butte, injuring an 18-year-old man inside. Another nearby mobile home had its roof torn off. Additionally, strong winds and hail shattered windows and damaged the siding, roofs, and skirting of 16 other mobile homes.

- **June 7, 2005.** A downburst with estimated winds of 75 mph struck just west of Rockyford, destroying three mobile homes and damaging four others. This event resulted from a storm that moved across northern Shannon County. The Remote Automated Weather Station (RAWS) at Badlands National Park, recorded a wind gust of 67 mph from the southwest.
- **April 17, 2006.** Outflow winds from a nearby thunderstorm destroyed a mobile home west of Oglala. The strong broadside winds caused the mobile home to roll over with several people inside, resulting in five injuries and one fatality.
- **May 28, 2006.** Storms generated wind gusts up to 80 mph and golf ball-sized hail, causing minor damage across parts of the area. A portion of a greenhouse roof was blown off, and two mobile homes were destroyed by the strong winds.
- **July 2, 2006.** Strong winds tore the roof off a mobile home.
- **June 26, 2011.** A severe thunderstorm near the Badlands National Park White River Visitors Center brought quarter-sized hail and strong wind gusts. The powerful winds knocked down several power poles.
- **August 3, 2013.** A severe thunderstorm swept across southern Shannon County, producing ping pong ball-sized hail and strong wind gusts up to 60 mph. The combined force of the wind and hail flattened corn and wheat crops and shattered the windows of a residence.
- **August 30, 2013.** Strong wind gusts from a severe thunderstorm downed power lines and trees, destroyed two mobile homes, and damaged a school roof east of Pine Ridge. The powerful winds knocked down a total of 80 transmission and distribution power poles from 1.5 miles west to two miles east of the Wolf Creek School. The several mobile homes sustained additional damage, and trees were blown down at the Pine Ridge IHS Hospital.
- **July 24, 2014.** Strong winds to 80 mph damaged roofs of several buildings, including the clinic; sheds, and trees in an area about one and a half mile around the community. The storm produced strong wind gusts of 60 to over 80 mph across portions of southeast Shannon and Bennett Counties.
- **July 10, 2020.** A storm swept through the west central and southwestern South Dakota plains, bringing very large hail and strong wind gusts. The storm produced two tornadoes: one in the northern Black Hills and the other in western Bennett County. Extensive roof and structural damage occurred at the Porcupine Dialysis Center, resulting in one minor injury.

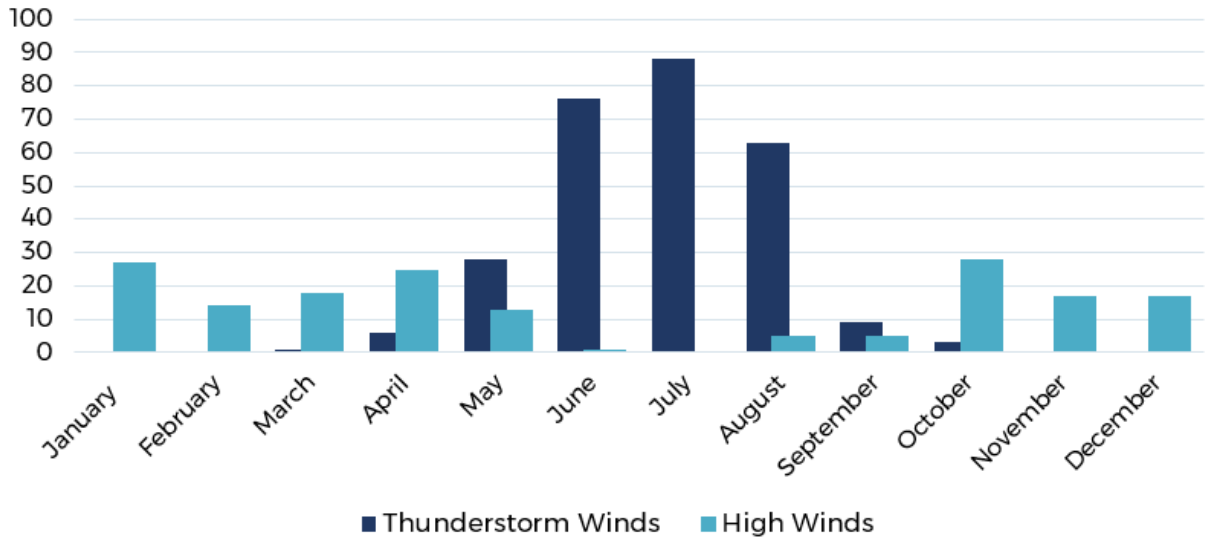
Figure 4-43 High Wind Events on the Pine Ridge Reservation, 1955-2022



Probability of Future Occurrence

Based on historical records and reported events, high winds are highly likely to occur on an annual basis. The NCEI reported 480 high wind events between 2000 and 2023, an average of 20 events a year, resulting in a 100 percent chance annually for high winds. **Figure 4-44** shows the number of high wind events in the planning area by month. Thunderstorm wind events are most likely to occur in spring and summer, while non-thunderstorm high wind events are least frequent during summer, with relatively consistent occurrence rates across the remaining seasons.

Figure 4-44 High Wind Events by Month



Source: NCEI, 2000-2023

Magnitude/Severity (Extent)

The Beaufort Wind Scale can be used to classify wind strength. **Table 4-60** outlines the scale, provides wind speed ranking, range of wind speeds per ranking, and a brief description of conditions for each ranking.

Table 4-60 Beaufort Wind Ranking

BEAUFORT WIND FORCE RANKING	RANGE OF WIND SPEED	CONDITIONS
0	<1 mph	Smoke rises vertically
1	1 – 3 mph	Direction shown by smoke but not wind vanes
2	4 – 7 mph	Wind felt on face; leaves rustle; wind vanes move
3	8 – 12 mph	Leaves and small twigs in constant motion
4	13 – 18 mph	Raises dust and loose paper; small branches move
5	19 – 24 mph	Small trees in leaf begin to move
6	25 – 31 mph	Large branches in motion; umbrellas used with difficulty
7	32 – 38 mph	Whole trees in motion; inconvenience felt when walking against the wind
8	39 – 46 mph	Breaks twigs off tree; generally, impedes progress
9	47 – 54 mph	Slight structural damage; chimneypots and slates removed
10	55 – 63 mph	Trees uprooted; considerable structural damages; improperly or mobiles homes with no anchors turned over
11	64 – 72 mph	Widespread damages; very rarely experienced
12 - 17	72 - > 200 mph	Hurricane; devastation

Source: Storm Prediction Center, 2017

Using the NCEI reported events, the average measured gusts of all high wind events from 2018 to 2023 measured at a Beaufort Wind Force Scale 10, making it likely that this level of event will occur annually.

Common problems associated with high winds include the loss of utilities and related impacts. Loss of utilities, particularly power lines, can happen due to downed trees or other wind-related damage. Those most vulnerable during a power outage include individuals reliant on electricity-dependent medical equipment, such as ventilators. **Table 4-61** displays the total number of beneficiaries who have submitted claims for electricity-dependent durable medical and assistive equipment (DME) and devices, along with "at-risk" individuals who rely on essential healthcare services and electricity-dependent DME. Since this data is aggregated at the county level, it may encompass individuals from Bennett, Jackson, and Oglala Lakota Counties beyond the Oglala Sioux Tribe specifically.

Table 4-61 Medicare At-Risk Populations by Geography

COUNTY	BENEFICIARIES	AT-RISK BENEFICIARIES
Bennett	486	45
Jackson	466	53
Oglala Lakota	1,351	88
Total	**2,303**	**186**

Source: HHS emPower, 2024

Average Annual Damages

Average annual damage was estimated determined based upon recorded damages from NCEI Storm Events Database since 2000, as shown in **Table 4-59**. According to this data, high winds and thunderstorm winds cause an estimated average of over $89,000 in combined property and crop damage annually.

Average annual crop loss was determined based on indemnity payments made by the USDA RMA, as shown in **Table 4-62**. According to this data, excess winds and hot winds resulted in an estimated annual average of over $81,000 in indemnity payments, affecting over 900 acres. Neither annual average damage or crop loss estimates includes losses from displacement, functional downtime, economic loss, injury, or loss of life.

Table 4-62 High Wind Crop Losses

COUNTY	SUM OF DETERMINED ACRES	SUM OF INDEMNITY
Bennett	9,820.4	$897,717
Jackson	3,963.8	$328,227
Oglala Lakota	80.8	$1,412
Grand Total	**13,865.1**	**$1,227,356**

Source: USDA RMA (2007 to 2021)

A current project across the Reservation is working to anchor mobile homes or trailers to prevent damages. OST has anchored roughly 150 homes already, with more planned for 2024.

Climate Change Impacts

In the 1980s, the United States experienced weather or climate disasters causing over $1 billion in losses about every four months. By the 2010s, the frequency increased to one every three weeks or less. In 2022, there were 18 such events. One such event occurred on May 11, when thunderstorms with damaging winds and large hail hit south central South Dakota and the Black Hills, particularly affecting the western South Dakota plains. The most severe damage happened in the Red Owl area due to very strong straight-line winds, which were higher than 80 mph, despite the

highest measured gust being 76 mph. Several outbuildings were either substantially damaged or destroyed.

Over the past four decades, mean wind speeds have generally declined in North America, with a potential but inconsistent reversal in the last decade. This trend is projected to continue, with further declines in mean wind speeds anticipated across much of North America, particularly in western regions where confidence in this projection is highest.

While the models cannot predict specific tornadoes and windstorm events, the conditions that lead to severe storms are expected to become more common in the US. There is also an anticipated rise in tornadic activity during the cooler months of autumn and winter. By the end of the century, the number of mesoscale convective systems, which are large, organized groups of thunderstorms, may triple in the US.

Vulnerability Assessment

Table 4-63 High Wind Vulnerability Summary

SECTOR	VULNERABILITY
People	• Vulnerability is amplified for those living in long-term care facilities, mobile homes, or temporary shelters, and residents living in areas that are geographically isolated. • Many homes throughout the reservation are located on rural roads or set far back, which may increase vulnerability in case of evacuation or make it difficult for emergency personnel to provide aid during high wind events. • Air pollution is dispersed or concentrated by atmospheric conditions, including wind, temperature, and humidity. Climate change is expected to alter these conditions, potentially worsening air quality and posing greater risks to human health.
Property	• All building stock are at risk to damages from high winds. Property located under or near overhead lines or near large trees may be damaged in the event of a collapse. • As wind speeds increase, trees, barns, outbuildings, high-profile vehicles, and power lines or poles can be toppled or destroyed. Additionally, roofs, windows, and homes can sustain significant damage. • A substantial number of homes on the reservation are mobile homes, which are particularly vulnerable to high winds.
Critical Facilities and Community Lifelines	• All above-ground critical facilities are at risk to damages from high winds. • Downed power lines can ignite fires and cause power outages for entire communities. • Downed trees can block road access, affecting emergency response. • The Pine Ridge Airport has asphalt runways that could potentially be damaged by debris carried by high winds. • The reservation faces issues with water, wastewater, and solid waste management systems, which could be disrupted by high wind events.
Economy	• In the past, strong winds and heavy rain have destroyed crops and caused livestock mortality. • Excess winds and hot winds resulted in an estimated annual average of over $81,000 in USDA RMA indemnity payments
Environmental And Cultural Resources	• Sacred sites and landscapes can be affected by wind erosion and damage, leading to cultural loss and environmental degradation.

SECTOR	VULNERABILITY
	• Severe wind events can displace communities and disrupt cultural practices. • Strong winds can physically damage culturally important plants by breaking stems, branches, and leaves, which can reduce yield or kill the plants outright. Delicate crops like fruits, vegetables, and flowers are particularly vulnerable. • Wood resources, which many residents rely on for heating, could be depleted or damaged by high wind events, further straining this limited resource.

Cascading/Related Hazards

While they can occur independent of other weather phenomenon, high winds typically accompany severe thunderstorms, severe winter storms, and other large, low-pressure systems. These winds can cause extensive crop damage, downed power lines, obstruct traffic, and damage property. Secondary effects from these hazards include power outages and disruptions to water and wastewater systems, telecommunications systems, health care services, and economic activities.

South Dakota, like much of the US, is vulnerable to rapid-onset flash droughts, which can develop within days due to extreme high temperatures, high wind speeds, and a lack of rainfall. When combined with drought conditions, high winds can lead to significant soil erosion, removing the fertile top layer and reducing the land's agricultural productivity and natural vegetation growth.

Risk Summary

The overall significance of high winds on the Reservation is **high**, based on their **highly likely** probability and **moderate** impacts.

- High winds and downbursts associated with thunderstorms over the Northern Plains typically happen between late April and early September, but given the right conditions, they can develop as early as March.
- The entire planning area is prone to high wind events. The planning area is located in Zone III which has maximum winds of 200 mph
- NCEI reports a total of 616 thunderstorm and high wind events in the planning area from January 2000 to December 2023.
- According to NCEI data, high winds and thunderstorm winds cause an estimated average of over $63,000 in combined property and crop damage annually.
- Over the past four decades, mean wind speeds have generally declined in North America, with a potential but inconsistent reversal in the last decade.
- High winds, often accompanying severe weather events, can lead to extensive damage to crops, infrastructure, and property, with secondary effects including power outages and disruptions to various essential services and economic activities.

4.4.14 Severe Thunderstorms

Location: Extensive
Future Probability: Highly Likely
Magnitude/Severity: Moderate
Overall Significance: **Medium**

Description

Severe thunderstorms are a common yet unpredictable seasonal event throughout the planning area. A thunderstorm is defined as a storm that contains lightning and thunder, which is caused by unstable atmospheric conditions. When cold upper air sinks and warm, moist air rises, storm clouds or thunderheads develop, resulting in thunderstorms. This can occur singularly, in clusters, or in lines. Thunderstorms can form in under 30 minutes and are capable of reaching up to eight miles into the atmosphere.

Lightning, an inherent characteristic of these storms, can endanger lives, ignite fires, and disrupt power supplies. Lightning generally occurs when warm air mixes with cold air masses resulting in atmospheric disturbances necessary for polarizing the atmosphere. There are three primary types of lightning: intra-cloud, inter-cloud, and cloud to ground. While intra- and inter-cloud lightning are more common, communities are most at-risk from cloud to ground lightning.

Most cloud to ground flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life and are more common as a percentage of total ground strikes during the winter months.

Positive charge cloud to ground lightning is particularly dangerous for several reasons. This form of lightning often strikes beyond the rain core, both preceding and trailing the thunderstorm, reaching distances of up to ten miles from the storm's vicinity. Positive lightning also has a longer duration, so fires are more easily ignited. Additionally, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.



NWS; 12 mi SE Rapid City, B. Fleming

Thunderstorm winds are a common hazard associated with severe thunderstorms. They can reach speeds exceeding 100 miles per hour and are capable of causing significant damage.
Thunderstorm winds can occur in various forms, including:

- **Downbursts.** Strong downdrafts of air that descend rapidly from a thunderstorm cloud to the ground. As they hit the ground, they spread out in all directions, producing strong and often damaging winds.
- **Microbursts.** Smaller-scale downbursts that cover an area less than 2.5 miles in diameter. They can be particularly dangerous for aviation because of their sudden and localized nature.
- **Gust fronts:** The leading edge of cool air rushing out from a thunderstorm. As the cool air hits the ground, it spreads out horizontally, creating a line of strong winds that can extend well ahead of the storm.

Location

The entire planning area is at risk of severe thunderstorms. The geographic extent of a severe thunderstorm event may be large enough to impact the entire planning area or just a few square miles.

The future location of thunderstorm hazards may be impacted by climate change and the vulnerability to these storms is further affected by development. Climate change will alter weather patterns and is discussed further in the subsection below titled *Climate Change Impacts*. Development will alter the exposure of people and assets.

Past Occurrences

NCEI reports a total of 403 thunderstorm wind and one lightning event in the planning area from January 2000 to December 2023. Each of these events occurred in Bennett, Jackson, or Oglala Lakota Counties; however, as the NCEI records events on a county-wide basis, any damages or injuries may have been outside of the Pine Ridge Reservation. The recorded damage from these events is detailed in Table 4-64 below.

Table 4-64 NCEI Recorded Thunderstorm Damages, 2000-2023

EVENT TYPE	EVENT COUNT	DEATHS	INJURIES	CROP DAMAGES	PROPERTY DAMAGES
Thunderstorm Wind	403	1	13	$80,000	$1,408,500
Lightning	1	1	1	$1,000	-
Total	**404**	**2**	**14**	**$81,000**	**$1,408,500**

Source: NCEI Storm Events Database, 2024

The USDA RMA data does not specify severe thunderstorms as a cause of crop loss, and there have been no recorded USDA disaster declarations due to thunderstorms in the planning area.

Since the last HMP update in 2018, there have been two major thunderstorm events which caused documented damages to the planning area.

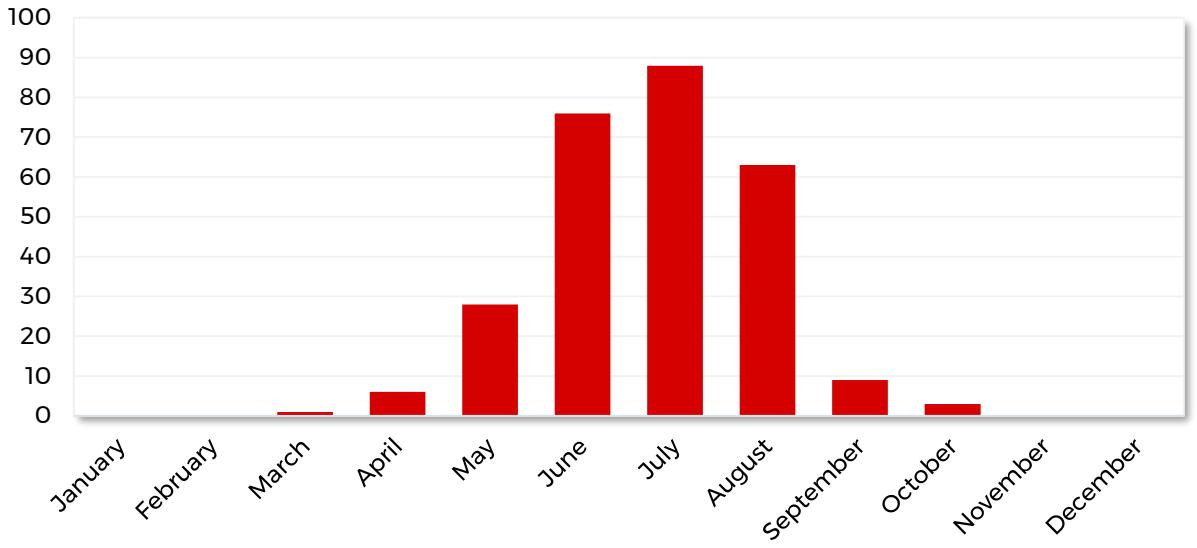
- On July 3, 2019, a large thunderstorm developed over Oglala Lakota County and tracked slowly eastward across southern South Dakota. The storm produced a large swath of large hail and strong winds as it moved across far south-central South Dakota. Brief tornado touchdowns reported over Bennett County did not cause damage. Heavy rain produced flooding in some areas of Oglala Lakota and Bennett Counties. The strong winds tore sheet metal off a roof and broke large tree limbs.
- On July 10, 2020, a thunderstorm tracked from northeastern Wyoming, across the northern Black Hills, and to Bennett County, before moving into Nebraska. The storm brought a swath of very large hail and strong wind gusts. The storm produced two tornadoes: one across the northern Black Hills and the other over western Bennett County. Extensive roof and structural damage occurred at the Porcupine Dialysis Center, with one minor injury.

Probability of Future Occurrence

Based on historical records and reported events, severe thunderstorms are likely to occur on an annual basis. The NCEI reported 404 severe thunderstorm events between 2000 and 2023, an average of 13 a year, resulting in a 100 percent chance annually for thunderstorms.

Severe thunderstorms in the planning area usually occur in the afternoon and evening during the spring and summer months (**Figure 4-45**).

Figure 4-45 Thunderstorm Wind Events by Month



Source: NCEI, 2000-2023

Magnitude/Severity (Extent)

While there is no scale for thunderstorm events, the Lightning Activity Level (LAL) is described in **Table 4-65** below. The LAL is a common parameter that is part of fire weather forecasts nationwide.

Table 4-65 Lightning Activity Level Scale

LEVEL	DESCRIPTION
LAL 1	No thunderstorm or building cumulus clouds observed.
LAL 2	A single or few building cumulus clouds with only an occasional one reaching thunderstorm intensity observed. Thunderstorms or lightning need not be observed for this activity level to be assigned; however at least one large cumulus cloud must be present.
LAL 3	Occasional lightning (an average of 1 to 2 cloud -to-ground strikes per minute) is observed. Building cumulus clouds are common; thunderstorms are widely scattered.
LAL 4	Frequent lighting (an average of 2 to 3 cloud-to-ground strikes per minute) is observed. Thunderstorms are common and cover 10 to 30 percent of the sky. Lightning is primarily of the cloud-to-cloud type but cloud-to-ground lightning may be observed.
LAL 5	Frequent and intense lightning (cloud-to-ground strikes greater than 3 per minute) is observed. Thunderstorms are common, occasionally obscuring the sky. Moderate to heavy rain usually precede and follow the lightning activity. Lightning of all kinds (cloud-to-cloud, in-cloud and cloud-to-ground) is characteristically persistent during the storm period.
LAL 6	A dry lightning situation. Low lightning flash rate observed (less than one to three cloud-to-ground strikes per 5-minute period per storm cell passage). Scattered towering clouds with a few thunderstorms; bases of the clouds are high. Virga is the predominate form of precipitation.

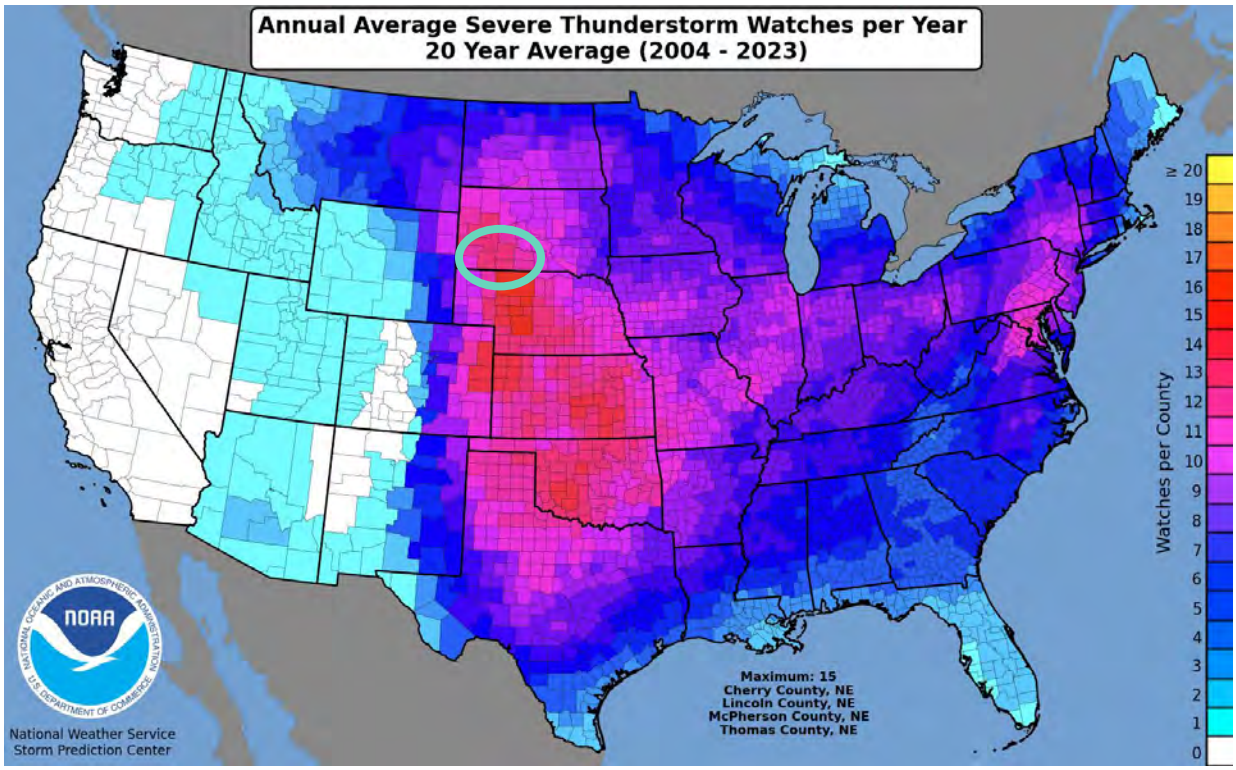
Source: NPS, 2023

Common problems associated with lightning include the loss of utilities and related impacts. Loss of life is uncommon but can occur during severe storms. Loss of utilities, specifically power lines can occur due to strikes or downed trees from lighting. Those most at risk during a loss of power include individuals who rely on electricity-dependent durable medical and assistive equipment and devices, such as ventilators. **Table 4-61** shows the total number of beneficiaries who have submitted claims for electricity-dependent DME and devices, as well as “at-risk” individuals who

depend on a combination of essential healthcare services and well as electricity-dependent DME and devices. Because this information is aggregated on a county level, it may include individuals in Bennett, Jackson, and Oglala Lakota Counties outside of the Oglala Sioux Tribe.

Economically, thunderstorms are generally beneficial in that they provide moisture necessary to support agriculture, South Dakota's largest industry. The majority of thunderstorms do not cause damage, but when they escalate to severe storms, the potential for damages increases. Damages can include crop losses from wind and hail; property losses due to building and automobile damages from hail; high wind; flash flooding; and death or injury to humans and animals from lightning, drowning, or getting struck by falling or flying debris. **Figure 4-46** displays the average number of days with thunderstorms across the country each year. The planning area experiences an average of 27 to 45 thunderstorms annually.

Figure 4-46 Annual Average Severe Thunderstorm Watches, 2004-2023



Source: NOAA, 2023

The NWS defines a thunderstorm as severe if it contains hail that is one inch in diameter or capable of winds gusts of 58 mph or higher.

Average Annual Damages

The average annual damage estimate was determined based upon recorded damages from NCEI Storm Events Database since 2000 and the number of historical occurrences, shown in Table 4-64. According to this data, severe thunderstorms and lightning cause an estimated $62,000 in combined property and crop damage annually. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life.

Climate Change Impacts

Over the past century, there has been a steady increase in the frequency of severe weather events, with the 1990s experiencing four times as many weather-related disasters as the 1950, resulting in economic losses that were 14 times greater. The Climate Science Special Report (2017) states that damages from convective weather hazards (such as severe thunderstorms and tornadoes) have

undergone the largest increase in damages, relative to other extreme weather, since 1980. This rise in severe weather has been attributed to climate change, which has increased the heat in the atmosphere, providing more energy for intense storms.

Historical data suggests that as the climate warms, the probability of severe weather events also increases. The changing climate is projected to bring about more days with temperatures exceeding 90˚F (32˚C) and increased precipitation, conditions favorable for severe thunderstorms. These changes in weather patterns not only impact the frequency, duration, and intensity of storms but can have significant economic impacts from direct damages and damages to the agricultural industry.

Thunderstorms, along with secondary hazards such as hail and lightning, are becoming more frequent and intense, with environmental conditions conducive to producing large hail and lightning strikes becoming more prevalent over the central and eastern US. According to studies referenced by the National Lightning Safety Institute, it could be possible globally to see an increase of 10-20% in the incidence of lightning with each degree Celsius of global temperature increase.

Vulnerability Assessment

Local storm notifications are shared via local radio stations (KILI) and social media (Facebook). The Tribe and Oglala Lakota County are currently working to develop Reverse 911 protocols for easier public notification and localized notifications. The Planning Team noted that it is vital to use both radio and social media outlets in order to reach all residents of the Pine Ridge Reservation, as many elders solely use radio while many younger residents solely use social media.

A need for both additional sirens and shelter locations was identified by the Planning Team. Several communities across the Reservation are expanding and spreading out, highlighting a need for additional sirens to cover populated areas including Wanblee, Allen, Kyle, Porcupine, Manderson, Oglala, and Pine Ridge. There are few structures that can be used by the general public as a storm shelter during hazard events. Most homes across the Reservation are not built to withstand severe weather events. The hospital, police stations, and schools may serve as shelter locations, however Red Shirt Table School is the only tornado rated safe room in the planning area.

Table 4-66 Severe Thunderstorm Vulnerability Summary

SECTOR	VULNERABILITY
People	• Between 1950 and 2013, there were 10 injuries, and 3 fatalities reported due to severe storms/thunderstorms with wind on the Pine Ridge Reservation. • Vulnerable populations, including those with access needs, limited mobility, and fewer financial resources, face increased injury risk during thunderstorms. Approximately 25.2% of the population in Oglala Lakota County (part of Pine Ridge Reservation) speaks English as a second language, which may hinder their ability to receive and understand severe weather warnings. • Mobile home residents are at increased risk of injury and damage to their property. • Residents in rural areas or on unpaved road may be cut off from emergency services due to secondary effects such as flooding. • Thunderstorms can disrupt power supply, impacting those reliant on continuous electricity, such as residents in nursing homes.
Property	• Some aspects of infrastructure that affect vulnerability include construction quality, including electrical systems, and location susceptibility to lightning exposure.

SECTOR	VULNERABILITY
	• Downed trees and tree limbs can damage structures and infrastructure. • Prolonged power outages in rural and agricultural areas can result in heating, cooling, and water supply disruptions, potentially causing significant secondary issues. • The NCEI recorded $1,489,500 in property damages on the Pine Ridge Reservation between 2000 and 2023.
Critical Facilities and Community Lifelines	• The Pine Ridge Reservation has limited healthcare facilities, including one hospital in Pine Ridge, two health centers in Kyle and Wanblee, and three smaller health stations in Allen, Manderson, and Porcupine, which could be vulnerable to damage from hail, lightning, and wind. • Lightning strikes can disrupt communications and infrastructure, leading to delayed responses, hindered interagency communication, and network damage. • Roads may wash out from heavy rains or become blocked from downed tree limbs or the accumulation of hail stones.
Economy	• Economic impacts of a severe thunderstorm are typically short-term, such as power outages or small fires. • Generally, long-term economic impacts arise from hazards that cascade from a severe thunderstorm, such as wildfires ignited by lightning. • With a significant portion of the population living below the poverty level, recovering from the economic impact of thunderstorm damage could be particularly severe for many residents.
Environmental and Cultural Resources	• Lightning from thunderstorms can cause fires to agricultural lands, potentially damaging the limited agricultural resources on the reservation. • Thunderstorms with high winds and hail can damage the natural environment, including trees and vegetation that may have cultural significance to the Oglala Sioux Tribe.

Cascading/Related Hazards

Intense thunderstorms can arise from a confluence of other hazard events, including high moisture levels, extreme temperatures, and high winds. Convective activity often occurs due to an abundance of moisture in the atmosphere combining with unstable conditions created by sharp temperature contrasts. Additionally, high winds can contribute to the intensification of thunderstorms.

The damage incurred by thunderstorms is more often the result of secondary and cascading hazards. Heavy rainfall can lead to flash flooding by overwhelming drainage systems. Similarly, saturated soils increase the risk of landslides and mudslides. Hail, lightning, strong winds, and tornadoes pose threats to crops, vehicles, and infrastructure. Lightning strikes can spark fires and cause electrical damage, while high winds can intensify potential fire threats. Continued infrastructure expansion can exacerbate these risks, although newer construction may be less vulnerable if built to the most recent International Building Code.

Risk Summary

The overall significance of severe thunderstorms on the Reservation is **medium**, based on their **highly likely** probability and **moderate** impacts.

- Severe thunderstorms are a common yet unpredictable seasonal event throughout the planning area.
- The entire planning area is at risk of severe thunderstorms. The geographic extent of a severe thunderstorm event may be large enough to impact the entire planning area or just a few square miles.
- The NCEI reported 312 severe thunderstorm events between 2000 and 2023, resulting in a 100 percent chance annually for thunderstorms.
- According to NCEI data, severe thunderstorms and lightning cause an estimated average of $62,000 in combined property and crop damage annually. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life.
- Common problems associated with lightning include the loss of utilities and related impacts. Loss of life is uncommon but can occur during severe storms.
- Economically, thunderstorms are generally beneficial in that they provide moisture necessary to support agriculture, South Dakota's largest industry.
- Thunderstorms, along with secondary hazards such as hail and lightning, are becoming more frequent and intense, with environmental conditions conducive to producing large hail and lightning strikes becoming more prevalent

4.4.15 Severe Winter Storms

Description

Location: Extensive
Future Probability: Highly Likely
Magnitude/Severity: Moderate
Overall Significance: **High**

Winter storms occur during the winter months and produce snow, ice, freezing rain, sleet, and/or cold temperatures. Winter storms are an annual occurrence in climates where precipitation may freeze and are not always considered a disaster or hazard. Disasters occur when severe storms impact the operations of the affected community by damaging property, stalling the delivery of critical services, or causing injuries or deaths among the population.

Winter storm watches and warnings may be helpful for determining the difference between a seasonal winter storm and a severe winter storm. Warnings are issued if the storm is producing or suspected of producing heavy snow or significant ice accumulations. Watches are usually issued 24 to 36 hours in advance for storms capable of producing those conditions, though criteria may vary between locations. Winter Weather Advisories are issued when a low-pressure system produces a combination of winter weather that presents a hazard but does not meet warning criteria. (Source: National Weather Association Online Glossary, http://www.weather.gov/glossary/)



KFYR TV; Dec. 2022 Winter Storm Diaz

Severe winter storms are an annual occurrence in South Dakota. Winter storms can bring extreme cold, freezing rain, heavy or drifting snow, and blizzards. Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions which greatly inhibit vehicular traffic. Generally, winter storms occur between the months of November and March but may occur as early as October and as late as April. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple an entire jurisdiction by hindering transportation, knocking down tree limbs and utility lines, and structurally damaging buildings.

Heavy snow can immobilize the Pine Ridge Reservation and Oglala Lakota County, isolating communities, stopping the flow of supplies, and disrupting emergency and medical services. Accumulation of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damages are repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.



Rapid City Journal; Dec 2022 Winter Storm Diaz

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible.

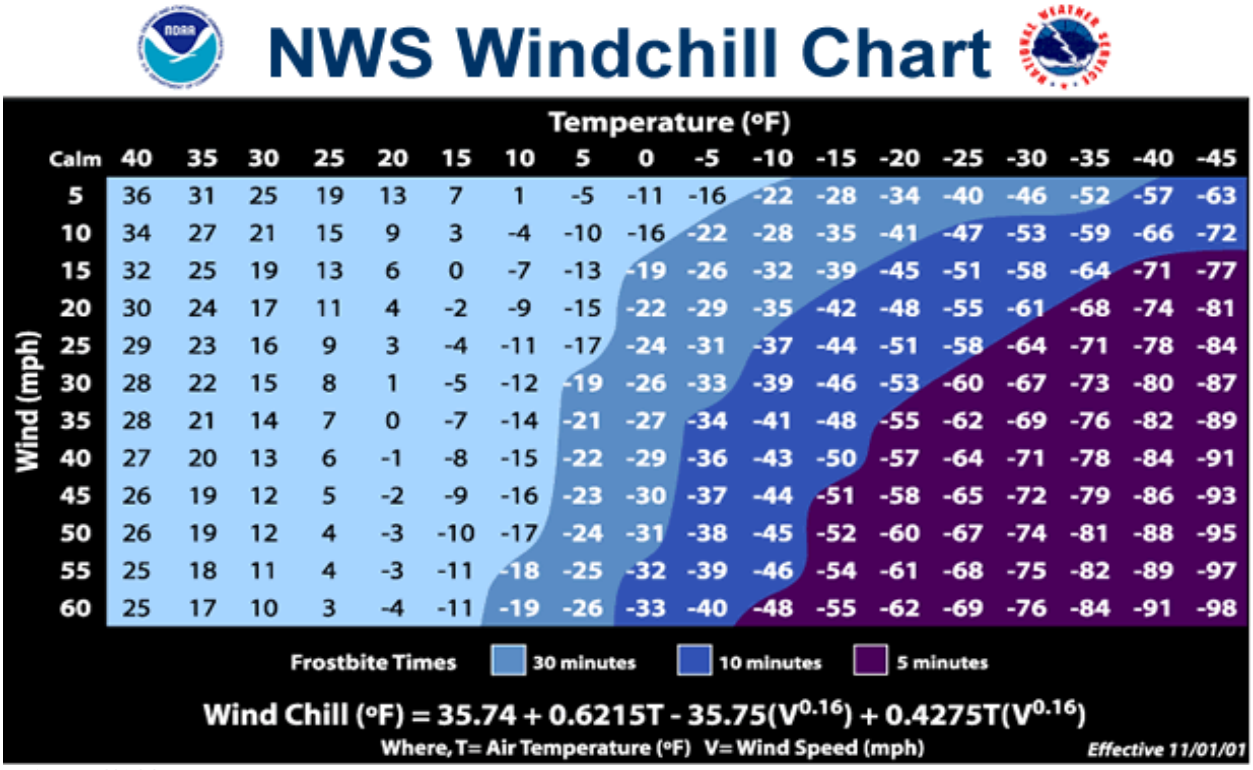
Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities. Extreme cold temperatures can destroy crops and cause utility outages, leaving people without water or power until the utility companies are able to restore service.

What constitutes extremely cold temperatures varies across different areas of the United States, based on normal climate temperatures for the time of year. In South Dakota, cold term temperatures are normal during the winter. When temperatures drop at least 20 degrees below normal winter lows, the cold is considered extreme and begins to impact daily operations of the region. Extreme cold/wind chill impacts plants, animals, and water supplies.

The effects of extremely cold temperatures are amplified by strong to high winds that can accompany winter storms. Wind-chill measures how wind and cold feel on exposed skin and is not a direct measurement of temperature. As wind increases, heat is carried away from the body faster, driving down the body temperature, which in turn causes the constriction of blood vessels, and increases the likelihood of severe injury or death to exposed persons. Animals are also affected by wind-chill however cars, buildings, and other objects are not.

In 2001, the NWS implemented an updated Wind-Chill Temperature index. This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Figure 4-47 NWS Windchill Chart



Source: NOAA

Extreme Cold

Along with snow and ice storm events, extreme cold is dangerous to the well-being of people and animals. What constitutes extreme cold varies from region to region but is generally accepted as temperatures that are significantly lower than the average low temperature. For the planning area, the coldest months of the year are January, February, and December. The average low temperature

for these months is all below freezing (average low for the three months is 11.3˚F). The average high temperatures for the months of January, February, and December are near 34.8˚F.

Freezing Rain

Along with snow events, winter storms also have the potential to deposit significant amounts of ice. Ice buildup on tree limbs and power lines can cause them to collapse. This is most likely to occur when rain falls that freezes upon contact, especially in the presence of wind. Freezing rain is the name given to rain that falls when surface temperatures are below freezing. Unlike a mixture of rain and snow, ice pellets or hail, freezing rain is made entirely of liquid droplets. Freezing rain can also lead to many problems on the roads, as it makes them slick, causing automobile accidents, and making vehicle travel difficult.

Blizzards

Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions, which greatly inhibits vehicular traffic. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple an entire jurisdiction for several days by hindering transportation, knocking down tree limbs and utility lines, and structurally damaging buildings.

Location

Winter storms are a yearly feature for the State of South Dakota and may occur anywhere in the state. Generally, severe winter weather and extreme cold events are considered regional, which implies the storms impact multiple counties simultaneously, often for extended time periods. Although it is possible a storm may directly impact only a small portion of the planning area while still extending over a large portion of the surrounding area. However, even in these instances, while the percent of the planning area directly affected ranges from less than 10% to 100% depending on the specific circumstances, if any portion of the planning area is impacted by the storm, then the entire planning area suffers indirect impacts.

Average snowfall is highest in the months of December, January, and February. The entire State of South Dakota is vulnerable to heavy snow, extreme cold temperatures, and freezing rain. Generally, winter storms occur between the months of November and March but can occur as early as October and as late as April.

Past Occurrences

Due to regional scale of severe winter storms, the NCEI reports events by county. According to the NCEI, from 2000 to 2023, there were a total of 327 severe winter storm events in the planning area. These events resulted in $5,963,000 in property damages for Oglala Lakota, Bennett, and Jackson Counties. According to NCEI, winter storms made up majority of the severe winter storms across the counties. This data is shown in **Table 4-67** below.

Table 4-67 Winter Weather Events Summary 2000-2023

COUNTY	BLIZZARD	HEAVY SNOW	WINTER STORM	WINTER WEATHER	FATALITIES/ INJURIES	PROPERTY DAMAGE	CROP DAMAGE	TOTAL DAMAGE
Oglala Lakota	16	8	44	40	0	$1,100,000	$0	$1,100,000
Bennett	16	8	47	29	0	$1,025,000	$0	$1,025,000
Jackson	19	8	50	28	0	$3,838,000	$0	$3,838,000
Total	**51**	**24**	**141**	**97**	**0**	**$5,963,000**	**$0**	**$5,963,000**

Source: NCEI. The "Winter Storm" column includes events labeled as blizzards, heavy snow, winter storm or winter weather.

One such severe winter storm occurred March 13-14, 2019, impacting the entire Pine Ridge Reservation. This powerful winter storm brought heavy snow and strong winds to northeastern Wyoming and western South Dakota. Snow amounts across the area varied widely, ranging from

around an inch across northwestern South Dakota and the downslope Newcastle area, to 16" in the central Black Hills, and 18" near Kadoka. Wind gusts reached 60 to 70 mph, which created a blizzard. Less than one quarter-mile visibility was reported across the area and drifts several feet deep resulted, even in areas that received only a few inches of snow. The storm and heavy snowfall also triggered severe flooding following the storm. Damage and impacts resulting from this event were extensive, in addition to numerous minor injuries resulting during response activities and one reported death due to the heavy winter storm conditions.

According to the OST Emergency Management Office and FEMA, more than 1,000 private homes were damaged due to the storm and subsequent flooding. The OST BIA Roads Department reported significant damages to roads, both asphalt and gravel, throughout the Reservation, with many roads washing out. This event was ultimately given a Presidential Disaster Declaration, allowing approximately $1.8 million in public assistance funds for the Tribe. Much of the impacts and damages were the result of flooding and snowmelt runoff following the storm, with additional details provided in the Flooding and Dam Failure chapters above. However, this event serves to illustrate a potential worst-case scenario for winter storm impacts to the Pine Ridge Reservation.

In 2022, Winter Storm Diaz struck the Reservation, leaving thousands of residents stranded in their homes. With power outages across the area and limited access to firewood, many people were forced to burn clothing to stay warm. In some parts of the Reservation, the storm dumped more than 30 inches of snow, accompanied by wind gusts up to 60 mph. The harsh conditions prompted tribal offices to declare a state of emergency, opening shelters for those who were able to make it through the snow to find refuge.

Despite these efforts, many roads remained impassible, preventing emergency services from reaching vulnerable individuals. The Reservation's remote location and already struggling infrastructure worsened the situation, deepening concerns about residents running out of food, medications, and propane for heating. While the tribe worked diligently to clear roads and deliver essential supplies, the storm highlighted broader challenges faced by the community, such as poverty, limited infrastructure, and inadequate housing.

Probability of Future Occurrence

According to NCEI, during the 23-year period from 2000 through 2023, the planning area experienced a total of 11 damaging blizzards, winter weather, and winter storm events. Although there have been 313 severe winter weather events, NCEI only recorded 11 resulting in property damage throughout the counties. This results in a rating of **highly likely,** with the planning area all but guaranteed to experience at least one severe winter storm event each year.

Magnitude/Severity (Extent)

The damages caused by severe winter storms, blizzards and extreme cold vary and are dependent on several factors: the duration of the storm; the geographic extent; the time of year; meteorological factors such as wind, moisture content of the snow, ground and air temperatures; and the advance warning of the storm. Impacts from the storm dictate the magnitude of the event, emphasizing that the amount snow may not always directly correlate to how bad the storm is. Damaged power lines and dangerous or impassable roadways may forestall the delivery of critical services such as medical and emergency assistance, the delivery of food supplies and medications, or even the provision of basic utilities such as heat and running water. When events happen with a long warning time, it is possible to pre-mitigate the effects of insufficient supply levels or to pre-test emergency generators, which may prevent some of the previously described impacts from occurring. Unanticipated storms increase the number of people stranded, both in cars and at public locations, which may increase the number of injuries and deaths attributed to the event (often caused by exposure) and place uneven and unanticipated strains on public sheltering capacities.

The weight of the snow, driven by the water content of the fall, increases the potential for damages caused to structures and trees. Lighter snow caused by extreme cold increases the damages caused to livestock, agriculture and landscaping due to freezing conditions. Winter storms which go through periods of thaw and freeze prolong dangerous icy conditions, increasing the likelihood of

frozen and damaged water pipes, impassable or dangerous roadways, damaged communication lines, or more extensive damages to infrastructure and structures caused by seeping water freezing under roofs, porches, patios, inside sidings, or causing damage to vehicles. Extreme cold can also impact livestock and even crops if the event occurs during certain times of the year.

The National Weather Service (NWS) describes different types of snow events as the following:

- Blizzard - Winds of 35 mph or more with snow and blowing snow reducing visibility to less than ¼ mile for at least 3 hours.
- Blowing Snow - Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- Snow Squalls - Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- Snow Showers - Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- Snow Flurries - Light snow falling for short durations with little or no accumulation.

The Sperry-Piltz Ice Accumulation Index (SPIA) was developed by the NWS to predict the accumulation of ice and resulting damages. The SPIA assesses total precipitation, wind, and temperatures to predict the intensity of ice storms.

Figure 4-48 Sperry-Plitz Ice Accumulation Index

ICE DAMAGE INDEX	*AVERAGE ICE AMOUNT (in inches) *Revised: Oct. 2011*	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	<0.25	<15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10 – 0.25	15 – 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	>15	
2	0.10 – 0.25	25 – 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 – 25	
	0.50 – 0.75	>15	
3	0.10 – 0.25	> – 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 – 35	
	0.50 – 0.75	15 – 25	
	0.75 –1.00	>15	
4	0.25 – 0.50	> – 35	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 – 35	
	0.75 –1.00	15 – 25	
	1.00 –1.50	>15	
5	0.50 – 0.75	> – 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeeks in some areas. Shelters needed.
	0.75 –1.00	> – 25	
	1.00 –1.50	> – 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Source: SPIA-Index, 2017

Climate Change Impacts

A warming climate may also result in warmer winters, the benefits of which may include lower winter heating demand, less cold stress on humans and animals, and a longer growing season. However, the potential benefits of warmer winters are expected to be offset by the negative consequences of warmer summer temperatures.

As discussed in Section 4.2.2, the impacts of the projected warmer winters for the Northern Great Plains could include negative impacts to the agricultural sector through drought, changes in the growth cycle as winters warm, and greater populations of overwintering insects. Expansions in range or new introductions of invasive species can also impact agriculture and native plant and animal species. Additionally, warmer winters could result in less winter precipitation in the form of snow and ice and increases in rainfall, which not only may lead to increased flooding, erosion, and other impacts, but decreased health of groundwater and depleted aquifers with the reduced snowpack.

Vulnerability Assessment

The Planning Team identified severe winter storms as the most likely events to cause power outages potentially leaving residents without power for multiple days. Ice storms and ice accumulation damage power lines and severely hinder transportation for both residents and utility workers. Many communities across the planning area are dispersed, with few paved roads within or between them, making access to supplies or emergency resources difficult during hazardous events. Road clearance is handled by multiple entities: the state clear state highways, the BIA clear major roads and tribal roads are cleared by the OST Motor Fuels Department. The Planning Team noted the need for additional or replacement snow-clearing equipment.

Extreme cold is significant concern for tribal members, particularly those with homes that may have been damaged by summer storms and lose heat rapidly. Additionally, many residents in the planning area cannot afford to run a furnace continually during the winter. Not all homes have furnaces or propane heaters, relying instead on wood-burning sources for heat. Some tribal programs provide split and corded wood to residents, but additional funds are needed to continue or expand these programs. Certain Reservation districts and programs, including the Pine Ridge Retreat Center, assist the Pine Ridge Reservation by providing matching funds to help pay energy bills during the winter. (http://www.pineridgeretreatcenter.org/energy-assistance-matching-fund.html) and the Running Strong for American Indian Youth program (http://indianyouth.org/programs/detail/emergency-assistance-programs).

Table 4-68 Severe Winter Storms Vulnerability Summary

SECTOR	VULNERABILITY
People	• In the planning area, 11.5% of the population is 62 years old or older and over 50% live below the poverty line. These populations are considered to be at increased risk to winter storms and associated extreme cold events. • The average low temperature for the coldest months (January, February, March, November, December) is 15.8˚F, putting residents at risk of hypothermia and frostbite. • During extreme cold events, there are concerns about propane shortages, which many residents rely on for heating. These challenges are especially severe for elders and those with medical needs who may be prevented from accessing necessary care. • Extreme cold can potentially lead to isolation from necessary resources like propane and wood. Some residents have resorted to burning clothes and furniture to stay warm during winter storms after running out of firewood.

SECTOR	VULNERABILITY
Property	• NCEI reports 313 severe winter events impacting the planning area in a 23-year period. • The Reservation recorded property loss of $5,963,000 between 2000 and 2023 due to severe winter events. • Heavy snow loads can cause roofs to collapse or trap individuals inside. • Many homes on the reservation are mobile homes or poorly constructed, making them more vulnerable to damage from severe winter storms. • Following severe winter storms, residents can become trapped in their homes due to impassable roads.
Critical Facilities and Community Lifelines	• Severe winter weather may also disrupt the availability of services from essential infrastructure, including utility delivery (gas, electric and water), telephone service, emergency response personnel capabilities, road plowing, and childcare availability. • Hospitals may see an increase in cold-related injuries directly or injuries associated as secondary effects of the cold (traffic accidents, broken bones or severe cuts due to slips, etc.) and a prolonged extreme cold/wind chill event may impact hospital personnel capabilities. • Many homes and communities on the Reservation are accessible only by gravel and dirt roads, making them inaccessible during severe winter storms
Economy	• With unemployment rates between 80-85% on the reservation, economic recovery from winter storm damage can be particularly challenging.
Environmental and Cultural Resources	• Natural resources may be damaged by the severe winter weather, including broken trees and death of unsheltered wildlife. • Unseasonable storms may damage or kill plant and wildlife, which may impact natural food chains until the next growing season. • Historical areas may be more vulnerable to severe winter storms due to construction and age of structures. • Winter storms can deplete wood sources, which many residents rely on for heating.

Cascading/Related Hazards

Severe winter weather is interconnected to hazards such as heavy snowfall, ice storms, and high winds. Rapid accumulation of snow can make it difficult for transportation throughout communities, as well as roofs to collapse of buildings and homes. Freezing temperatures can lead to hypothermia and frostbite, and it is possible for water pipes in homes to freeze and burst causing damage to homes and businesses.

Risk Summary

Severe winter storms occur annually throughout Oglala Lakota, Bennett, and Jackson County. Based on past occurrences, severe winter weather can be expected to impact the planning area multiple times a year, resulting in a rating of likely for future probability. Foremost, there is a significant risk for vehicle accidents with unsafe road conditions and vulnerable populations such as those older than 65, may have larger impacts. Overall, the largest impacts typically involve utility and transportation disruptions. The overall significance of severe winter storms is **high**.

- Severe winter weather can be expected to impact the planning area multiple times a year, resulting in a rating of **highly likely**.
- Property loss of $5,963,000 due to severe winter events.

- The significant risk for vehicle accidents, who may be unprepared to protect themselves from exposure, during winter storms.
- The largest impacts typically involve utility and transportation disruptions.
- Related hazards: Flooding, Extreme Temperatures, High Winds

4.4.16 Structure Fire

Location: Significant
Future Probability: Highly Likely
Magnitude/Severity: Moderate
Overall Significance: **Medium**

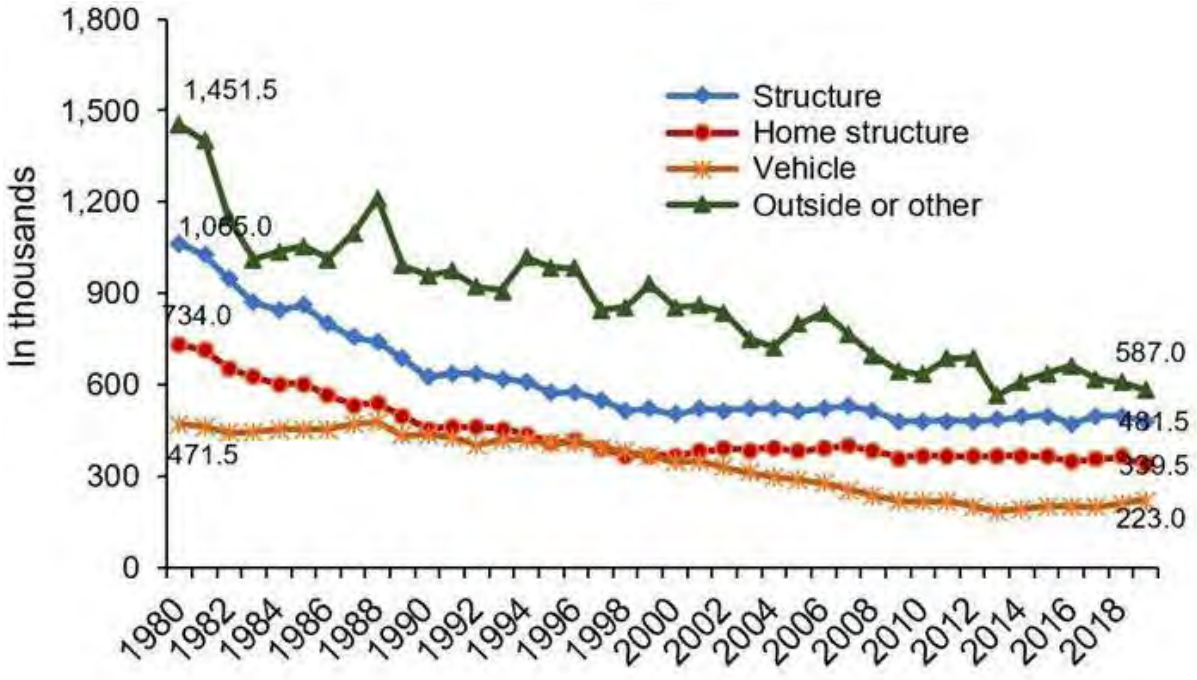
Description

A structure fire refers to a fire that occurs within a building or any other type of structure. This could include houses, apartments, commercial buildings, industrial facilities, or any other enclosed space. Structure fires can be dangerous due to the potential for rapid spread of flames, smoke inhalation, and structural collapse. Firefighters typically respond to structure fires to extinguish the flames, rescue any individuals inside, and prevent the fire from spreading to nearby structures. According to the National Fire Protection Association (NFPA), any fire in or on a building or other structure is considered a structure fire even if the structure itself was not damaged. Mobile property used as a fixed structure, such as manufactured homes and portable buildings, are considered structures.

The leading cause of home structure fires and non-fatal home fire injuries is cooking equipment, while smoking and the use of smoking materials is the leading cause of home fire deaths. Three out of five home fire deaths resulted from fires in which no smoke alarms were present or in which smoke alarms were present but did not operate. Compared to other age groups, older adults are more likely to be killed in a home fire. Without basic insulation or central heating in their homes, many residents on the Pine Ridge Reservation use their ovens to heat their homes which increases the chance of fires by 69%. Additionally, there is an estimated average of 17 people living in each family home (a home which may only have two to three rooms). Some larger homes, built for 6 to 8 people, have up to 30 people living in them.

Overall, non-wildland fires have been trending downwards in their frequency since 1980 as shown in Figure 4-49 below.

Figure 4-49 Fires by Incident Type in the US: 1980-2019



Source: NFPA

Urban fires can be caused by wildland fires spreading into an urban area, as was seen in the destruction of the Town of Paradise, California in the 2018 Camp Fire and in the 2021 Marshall Fire

that destroyed much of the Colorado towns of Louisville and Superior. Many large urban fires are started by an explosion or other hazardous materials incident, such as the 2013 Lac-Mégantic rail disaster that killed 47 people and destroyed much of the Town of Lac-Mégantic, Quebec, Canada.

Additionally, NFPA divides structures into five construction types based on the severity of the fire hazard. **Table 4-69** provides a breakdown of these construction types.

Table 4-69 Structure Fire by Construction Type and Severity

CONSTRUCTION TYPE	DESCRIPTION
Type I: Fire Resistant	Typically used in high-rises. The material comprising the structure is either inherently able to withstand significant exposure to fire (concrete), or in which a fire resistive covering is applied to steel structural members.
Type II: Non-combustible	Typically used in strip shopping center malls. Roofs are constructed out of steel rafters.
Type III: Ordinary construction	Brick and mortar walls, wood frame floors. City rowhouses are where this type of construction is most often found.
Type IV: Heavy timber	Often used in churches or other community-based buildings.
Type V: Wood frame	Typically used in recent construction of single-family dwellings, townhouses, garden apartments with four floors or less.

Source: NFPA

Location

Structural fires regularly occur in all developed areas of the region. All buildings and infrastructure have some vulnerability to a structure fire. Areas with older buildings or buildings built closer together have a higher risk for fire ignition and fire spread. WUI areas are at greater risk from spreading wildland fires (see 4.3.10 Grass/Wildfire). Similarly, areas adjacent to hazardous materials facilities and major transportation routes may be at greater risk of fires started from a hazardous materials incident (see Section 4.4.*12 Hazardous Materials Incidents).*

Past Occurrences

As noted in NFPA's Annual Fire Experience Survey, during a five-year period from 2018-2022 local fire departments responded on average to nearly 500,000 structures fires annually. The annual average damages resulted in nearly $13 billion in property losses with residential structure fires resulting in nearly $9 billion in damages and almost 3,000 annual civilian deaths and 12,000 annual injuries.

The devastation caused by structure fires has been a persistent issue for the Tribe. Structure fires have destroyed important community buildings such as the world-renowned historical church at the Wounded Knee Massacre Site that was completely destroyed by a fire in 2020. As recent as 2024, a wildfire has burned about 1,000 acres of the Pine Ridge Indian Reservation. According to OST Emergency Management, in the past 5 years, approximately 50 homes have been destroyed by fires with 11% resulting in loss of life (see 4.4.*10 Grass/Wildfire for more detailed information on wildfire threats and severity*).

Figure 4-50 Aftermath of a Local Structure Fire



Source: Oglala Lakota Housing Authority

Probability of Future Occurrence

Single-structure fires are an annual occurrence in the region and are expected to continue. The Tribe has been working to improve their response to structure fires in recent years.

Current Challenges to Combating Structure Fires

The Tribe currently faces many challenges in response to structure fires, such as lack of water availability, limited staffing, and too large of a geographic territory to respond in the appropriate timeframe.

Additionally, the Bureau of Indian Affairs (BIA) Fire Department can't address and combat structure fires as they can only work on wildland fires and work to prevent any ongoing structure fires from spreading. The BIA Fire Department does not currently have the training or protective equipment necessary to combat structure fires. There are several volunteer fire departments (VFDs) on the Reservation to include the Batesland VFD and the Alpha One Defense VFD.

The Tribe has been working to improve its response to structure fires in recent years. In 2021, they began the process of creating a new structural fire department. This comes after a number of devastating fires on the Reservation, which have destroyed homes and claimed lives. The new fire department will provide much-needed fire protection for the Tribe. It will also create jobs and help to boost the economy of the Reservation.

In 2017, a significant turning point came for fire safety on the Pine Ridge Reservation. The San Manuel Band of Mission Indians, a California tribe, awarded a $1 million grant to OST. This grant directly addressed the lack of a proper structural fire department. Previously, when there was structure fire on the Reservation, firefighters could only manage the flames around the burning building. Unfortunately, due to limited resources, the structures themselves would often be entirely consumed by the fire. The grant was awarded to the tribe to establish the new Oglala Lakota Structural Fire Department. This department will allow firefighters to actively combat structural fires and significantly improve fire safety for the community.

The Tribe has implemented a three-pronged approach: putting together a team to begin the process of creating a fire suppression program, construction of a new facility, and evaluation of excluded items, finalization, and a final report The project is estimated to create 55 new jobs within the Pine Ridge Reservation, providing an economic boost to the community (Lakota Times, 2021). This effort has since stalled and grant funding was lost, however this serves as a model for a future effort to be pursued in the future.

Magnitude/Severity (Extent)

In the 1800s, large and destructive fires frequently devastated entire American cities due to the use of timber in construction. Improvements in building practices, codes, and fire suppression systems have significantly reduced the extent of permanent damage caused by fires, particularly in modern structures. However, urban fires still pose a substantial threat to residential, commercial, and public properties.

The damage from such fires can vary from minor smoke or water damage to complete destruction of buildings. The aftermath can displace people for months or even years, depending on the severity of the event. More urban fires and explosions also pose significant risks of injury and fatality. In South Dakota, the fire mortality rate is about 15.6 deaths per 1,000 fires, which is higher than the 2022 national average of 6.1 deaths per 1,000 fires. In the most severe fire incidents, the intense heat can compromise critical infrastructure, such as bridges or tall buildings. (see 4.4.*10 Grass/Wildfire for more details).*

Additionally, the fuel load, which is the amount and type of combustible materials within the structure, significantly affects the intensity of a structure fire. Buildings with higher fuel loads tend to experience more severe fires. The rate at which the fire spreads through the building is another crucial factor, influenced by the building's layout, ventilation, and the materials used in its construction. For instance, buildings constructed with highly flammable materials or having poor fire-stopping measures will see a faster spread. Additionally, the type of construction plays a vital role. Structures built with fire-resistant materials and incorporating fire suppression systems, such as sprinklers and fire alarms, generally suffer less damage and pose lower risks to occupants and firefighters.

Fires can be classified by acres burned, and size classes are described in **Table 4-70** below.

Table 4-70 Wildfire Size Classes

SIZE CLASS	ACRES
A	less than 0.25
B	0.26 to 9.9
C	10.0 to 99.9
D	100 to 299
E	300 to 999
F	1,000 to 4,999
G	5,000 to 9,999
H	10,000 to 49,999
I	50,000 to 99,999

Source: National Interagancy Fire Center (NIFC)

Climate Change Impacts

Structure fires and climate change are interconnected in several significant ways, influencing both the frequency and severity of fires. Climate change contributes to more extreme weather conditions, such as prolonged heatwaves, droughts, and increased lightning strikes, all of which can heighten the risk of fires. Higher temperatures and extended dry periods create conditions where structures are more susceptible to ignition and rapid fire spread.

Additionally, climate change can impact the availability and reliability of water sources needed for firefighting efforts. In areas experiencing drought, the reduced water supply can hinder the ability of firefighters to control and extinguish fires effectively. The increased frequency of severe weather events, such as hurricanes and windstorms, can also damage infrastructure and create conditions that further exacerbate the risk of fires.

As previously noted above, building design and construction practices must adapt to these changing conditions. This includes using fire-resistant materials, improving insulation to withstand higher temperatures, and incorporating more robust fire suppression systems. Building codes must also consider the increased fire risk due to climate change, promoting defensible space around structures and integrating better emergency response strategies.

Overall, addressing the intersection of structure fires and climate change requires a comprehensive approach that includes adapting building codes, enhancing fire response capabilities, and implementing sustainable practices to mitigate the underlying factors contributing to climate change.

Vulnerability Assessment

Table 4-71 Structure Fire Vulnerability Summary

SECTOR	VULNERABILITY
People	• Vulnerable groups living in buildings constructed with flammable materials or lacking proper fireproofing, smoke detectors, fire alarms, and sprinkler systems are more vulnerable to structure fires due to delayed detection and rapid fire spread. • Individuals in low-income areas often reside in poorly maintained buildings with inadequate fire safety measures and have limited access to fire safety education and resources, increasing their vulnerability to structure fires. • Vulnerable populations, such as children, the elderly, and people with disabilities, face greater risks during structure fires as they may have difficulty evacuating quickly and safely. • Structure fires also have an effect on the health of people. Inhaling smoke and toxic fumes can lead to respiratory issues.
Property	• Properties constructed with highly flammable materials and lacking proper fireproofing measures are at greater risk of severe damage during a structure fire. Inadequate design features, such as insufficient fire breaks, can also contribute to the rapid spread of fire. • Displacement of homes is possible during a structure fire, which can be difficult for families with limited financial resources. • Properties without modern fire detection and suppression systems, such as smoke detectors, fire alarms, and sprinkler systems, are more susceptible to extensive damage from structure fires due to delayed detection and response. • Many homes on the Reservation are modular or prefabricated, and constructed of materials that are more flammable than stick-built homes. These structures often only have a matter of minutes to be fully evacuated before they are completed engulfed in flames. • Rebuilding efforts may be delated, leaving residents in temporary or substandard housing for extended periods.
Critical Facilities and Community Lifelines	• Structure fires can disrupt the operation of critical facilities, leading to temporary closures or limited services. For example, a hospital may need to evacuate patients or suspend non-emergency procedures due to smoke damage or safety concerns. • The aftermath of a structure fire often increases the demand for social services, including emergency relief, mental health support, and housing assistance. • Critical facilities may sustain damage to their buildings, equipment, or utilities during structure fires. This damage can impair their ability to provide essential services and may require extensive repairs or

SECTOR	VULNERABILITY
	renovations before normal operations can resume. • The aftermath of structure fires on critical facilities can incur substantial economic costs, including repair expenses, loss of revenue, and potential liabilities associated with service disruptions or failures. For example, if a fire station is damaged or incapacitated during a structure fire, it may result in delayed response times and increased risks for residents and firefighters.
Economy	• Structure fires result in direct damage to buildings, infrastructure, and personal property. The costs associated with repairing or replacing these assets can be substantial and may include expenses for materials, labor, and equipment. Insurance coverage may not always fully cover costs, adding economic strain. • Structure fires can have ripple effects throughout the local economy, affecting businesses, property values, and tax revenues. The decline in economic activity and property values in the affected area can further exacerbate the economic impact, leading to decreased investment and development.
Environmental and Cultural Resources	• Structural fires release pollutants into the environment, including particulate matter, carbon monoxide, volatile organic compounds, and hazardous chemicals. These pollutants can degrade air quality, contribute to respiratory problems, and contaminate soil and water sources, posing risks to human health and the environment, which may have ongoing health implications for affected populations. • Structural fires pose a significant threat to historical landmarks, archaeological sites, and cultural heritage assets. Fires can destroy or damage historic buildings, monuments, artifacts, and documents, resulting in the loss of irreplaceable cultural treasures and historical records.

Cascading/Related Hazards

Structure fires are interconnected to hazards such as drought, extreme heat, grass/wildfires, lightning, and windstorms. For instance, drought is characterized by prolonged periods of insufficient precipitation, which can create dry, flammable conditions across landscape. Extreme heat exacerbates this vulnerability, intensifying the drying process and elevating the likelihood of ignition. Lightning strikes can also act as an ignition source and can cause flames to spread rapidly. Windstorms further exacerbate fire behavior, fanning flames and facilitating their spread over rugged terrain. Addressing these interrelated hazards requires a multifaced approach that integrates proactive measures that mitigates the risk and impacts of wildfires and structure fires throughout the counties.

Risk Summary

The overall significance of structure fires on the Reservation is **medium**, based on their **highly likely** probability and **moderate** impacts.

- Structure fires can result in significant damage to buildings, infrastructure, and cultural heritage sites.
- The Tribe has been working to improve their response to structure fires in recent years. In 2021, they began the process of creating a new structural fire department.
- Structure fires can lead to business interruptions, supply chain disruptions, and increased insurance costs, affecting local economies. Given the agricultural presence in the planning area, animal and plant diseases have the potential to

affect the entire planning area, with major outbreaks impacting the regional economy.

- Structure fires release pollutants into the environment, degrade habitats, and pose risks to biodiversity.
- Structure fires pose risks to human life and safety, including injuries, fatalities, and long-term health effects from smoke inhalation and exposure to toxins. The effects of climate change make agricultural outbreaks more likely, and in turn, agricultural diseases can lead to zoonotic outbreaks, lower crop and cattle yields, and increased human health risks due to pesticide exposure.
- Structure fires require significant resources from emergency services, including firefighters, paramedics, and law enforcement agencies.

4.4.17 Tornadoes

Description

Location: Significant
Future Probability: Highly Likely
Magnitude/Severity: Moderate
Overall Significance: **Medium**

The NWS defines a tornado as a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of one-mile wide and 50 miles long. In an average year, about 1,000 tornadoes are reported across the United States, resulting in approximately 80 deaths and more than 1,500 injuries.

Across the Pine Ridge Reservation, and all of South Dakota, tornadoes are a natural phenomenon that typically arise from supercell thunderstorms. To be officially recognized as a tornado, the following criteria must be satisfied:

- A microscale rotating wind area must exist, varying in size from mere feet to several miles.
- This rotating wind, also known as a vortex, needs to be connected to the base of a convective cloud and make contact with the ground.
- The vortex must inflict sufficient damage to be rated on the Fujita Scale as a tornado.

Once formed, tornadoes can unleash extreme violence and destruction. While they have occurred globally, they are most common in the American Midwest and South, particularly in the region dubbed "Tornado Alley." The contiguous United States reports an average of 1,250 tornadoes each year. These tornadoes can cover distances exceeding 100 miles and ascend over 11 miles into the atmosphere. Typically, a tornado will not remain on the ground for more than 20 minutes. The peak tornado season in the United States spans from April to July, with about 80 percent of tornadoes happening between noon and midnight.

Though climate data is available to explain a predisposition to tornadoes, there is no accurate way of predicting when or where a tornado may occur. Tornado systems have been linked to the development of temperature and wind flow patterns in the atmosphere, which can cause moisture, instability, lift, and wind shear. Expert predictions of these conditions begin first by modeling in the long-term and relying on critical analysis of satellite data, weather stations, balloon packages, airplanes, wind profilers, and radar-derived winds to pinpoint storm activity for the short-term.



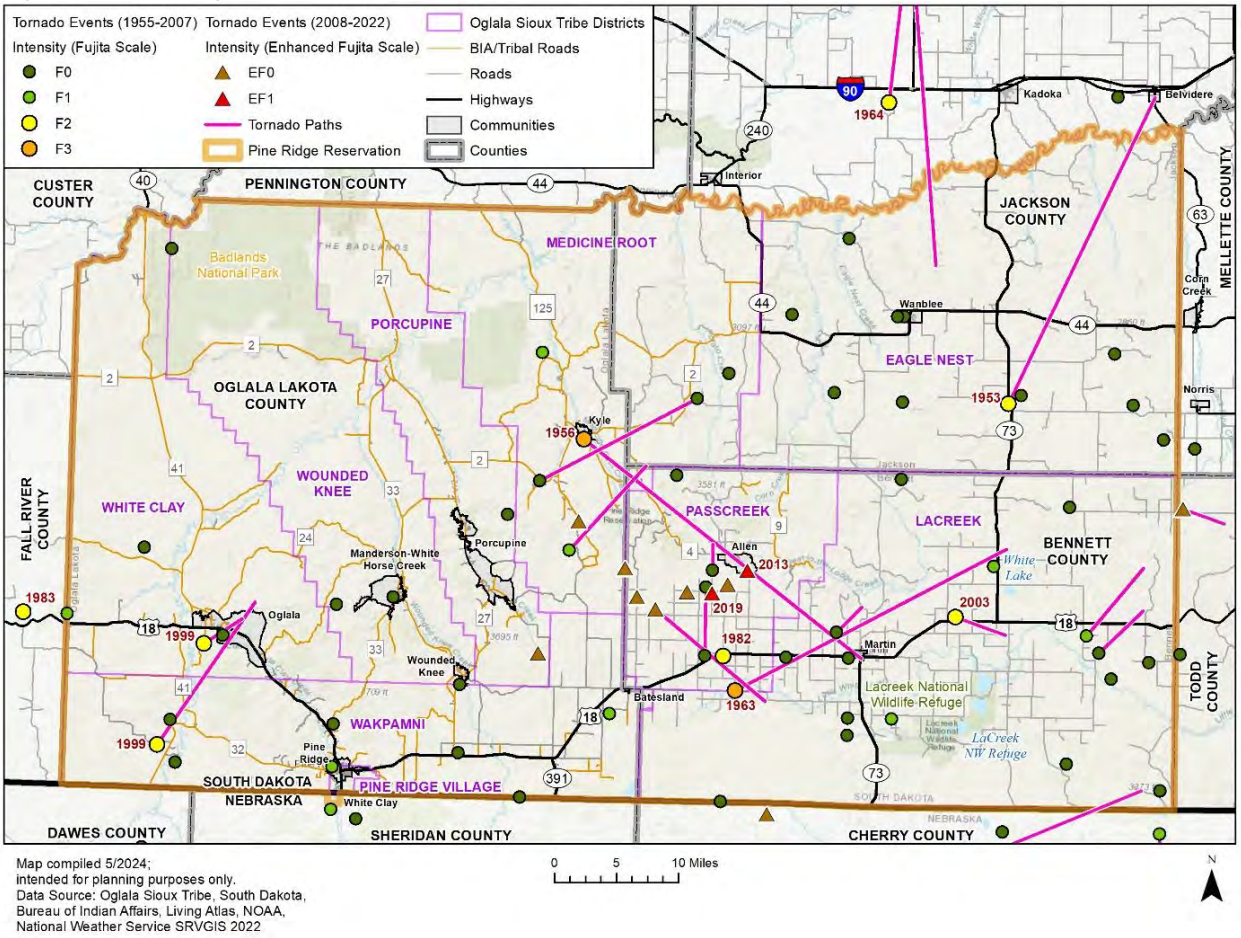
Lakota Times; 2019 Pine Ridge Tornado

In terms of tornado frequency, South Dakota ranks 15th in the United States, with an annual average of 38 tornadoes reported from 1996 to 2023. The accompanying figure illustrates the tornado activity across the United States, summarizing recorded tornadoes of EF3 intensity or higher from 1996-2023.

Location

Tornadoes can occur anywhere in the planning area. The impacts would likely be greater in more densely populated areas. **Figure 4-51** shows the historical track locations across the planning area from 1955 to 2022.

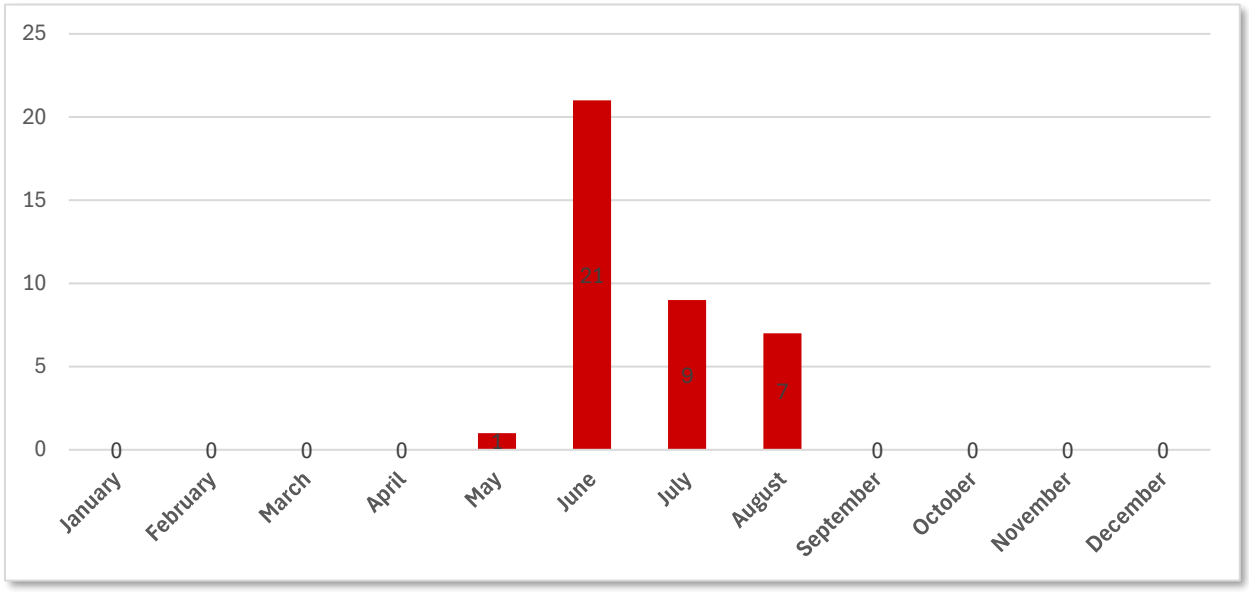
Figure 4-51 Oglala Sioux Tribe Historic Tornado Events



Past Occurrences

The NCEI cites 38 tornadic events within the Pine Ridge Reservation ranging from a magnitude of EF0 to EF2 between 1996 and 2023. These events were responsible for $3,570,000 in property damages. One tornadic event in 1999 led to the death of one individual and injuries to 54 others. A tornado near Allen in 2013 caused $100,000 in damages and injured one person. A tornado in July 2018 destroyed a home near Kyle. Five Tornadoes ranging from EFU to EF1 occurred in the planning area, although there was no damage reported. There was one EF0 Tornado in 2020 also with no damages reported. The following figure shows that the month of June is the busiest month of the year with the highest number of tornadoes in the planning area.

Figure 4-52 Tornadoes by Month in The Planning Area



Source: NCEI, 1996-2023

On July 10, 2020, two tornadoes touched down in southwestern South Dakota, causing significant damage across the Reservation. The first tornado traveled through the Black Hills, crossing Spearfish Canyon and dissipating near Lead, SD. The second tornado, with winds reaching 105 mph, uprooted trees in the Northern Hills and, along with heavy hail, reached the Oglala Sioux Reservation around 7 p.m. This storm produced significant damage, including a knocked-down flagpole and damage to homes and vehicles.

In Sharps Corner, the dialysis center's roof was ripped off by high winds, with the entire building declared a total loss due to the foundation being completely damaged, see **Figure 4-53**. Nearby, the Thunder Valley CDC community building lost its solar panels, which were scattered across the streets. Windows were shattered, and AC units were torn from the ground, although the well-constructed community homes remained largely unaffected. In Bennett County, a storm chaser tracked a tornado between Allen and Batesland. This tornado, rated EF1 with 110 mph winds, caused slight structural and property damage.

Figure 4-53 The Dialysis Center Following July 10, 2020, Tornado



Source: Jerry Mathews via the Lakota Times, https://www.lakotatimes.com/articles/tornado-clocks-in-at-105-mph/

Probability of Future Occurrence

Given the 38 events over the course of 22 years, and the established patterns of tornado activity in the region, there is a 100 percent probability that a tornadic event will occur somewhere in the planning area in any given year. While it is not possible to predict the intensity of these tornados, residents in the planning area should be aware of the heightened risk during peak tornado season.

Magnitude/Severity (Extent)

After a tornado passes through an area, an official rating category is determined, which provides a common benchmark that allows comparisons to be made between different tornadoes. The magnitude of tornadoes is measured by the Enhanced Fujita Scale. The Enhanced Fujita Scale does not measure tornadoes by their size or width, but rather the amount of damage caused to human-built structures and trees. The Enhanced Fujita Scale replaced the Fujita Scale in 2007. The enhanced scale classifies EF0-EF5 damage as determined by engineers and meteorologists across 28 different types of damage indicators, including different types of building and tree damage. To establish a rating, engineers and meteorologists examine the damage, analyze the ground-swirl patterns, review damage imagery, collect media reports, and sometimes utilize photogrammetry and videogrammetry, which is the science of using video or photographic evidence to derive accurate measurements. Based on the most severe damage to any well- built frame house, or any comparable damage as determined by an engineer, an EF-Scale number is assigned to the tornado. **Table 4-72** and **Table 4-73** summarize the Enhanced Fujita Scale and damage indicators. According to a recent report from the National Institute of Science and Technology on the Joplin, Missouri Tornado, tornadoes rated EF3 or lower account for around 96 percent of all tornado damages.

Table 4-72 Enhanced Fujita Scale

STORM CATEGORY	3 SECOND GUST (MPH)	DAMAGE LEVEL	DAMAGE DESCRIPTION
EF0	65-85 mph	Gale	Some damages to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	86-110 mph	Weak	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages might be destroyed.
EF2	111-135 mph	Strong	Considerable damage. Roofs torn off frame houses; mobile homes demolished: boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	136-165 mph	Severe	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	166-200 mph	Devastating	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown, and large missiles generated.
EF5	200+ mph	Incredible	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked: steel re-enforced concrete structures badly damaged

Source: NOAA; FEMA

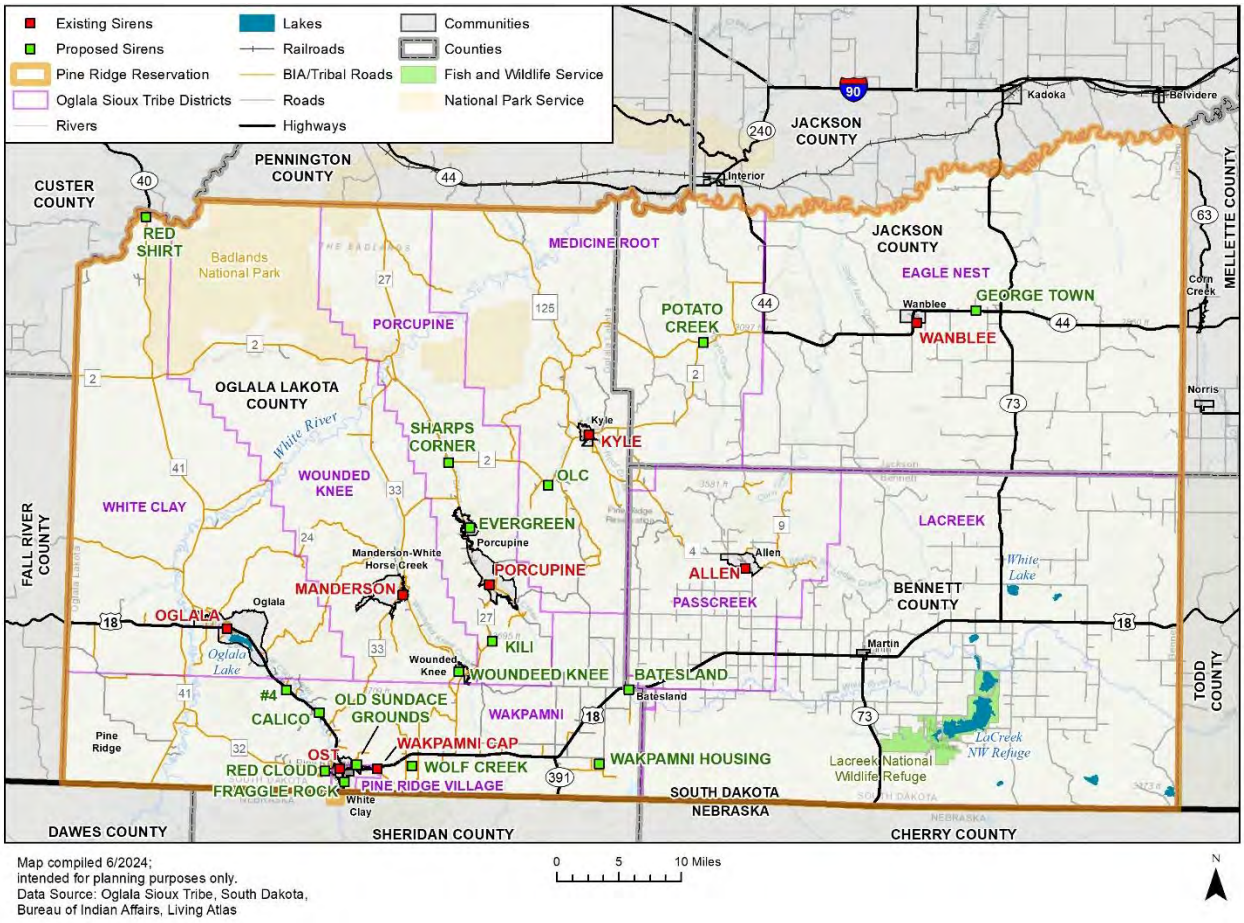
Table 4-73 Enhanced Fujita Scale Damage Indicator

NUMBER	DAMAGE INDICATOR	NUMBER	DAMAGE INDICATOR
1	Small barns, farm outbuildings	15	School - 1-story elementary (interior or exterior halls)
2	One- or two-family residences	16	School - Junior or Senior high school
3	Single-wide mobile home (MHSW)	17	Low-rise (1-4 story) bldg.
4	Double-wide mobile home	18	Mid-rise (5-20 story) bldg.
5	Apartment, condo, townhouse (3 stories or less)	19	High-rise (over 20 stories)
6	Motel	20	Institutional bldg. (hospital, govt. or university)
7	Masonry apartment or motel	21	Metal building system
8	Small retail bldg. (fast food)	22	Service station canopy
9	Small professional (doctor office, branch bank)	23	Warehouse (tilt-up walls or heavy timber)
10	Strip mall	24	Transmission line tower
11	Large shopping mall	25	Free-standing tower
12	Large, isolated ("big box") retail bldg.	26	Free standing pole (light, flag, luminary)
13	Automobile showroom	27	Tree - hardwood
14	Automotive service building	28	Tree - softwood

Source: NOAA; FEMA

Based on the historic record, it is most likely that tornadoes that occur within the planning area will be of EF0 strength. Of the 31 reported events, three were F/EF1 and three were F/EF2. Currently, there are eight tornado sirens on the Reservation, one per major community. The Tribe is hoping to add 16 more tornado sirens to cover more area of the Reservation, as shown in **Figure 4-54**.

Figure 4-54 Existing and Proposed Tornado Sirens



Climate Change Impacts

Changes in smaller-scale, short-lived severe weather such as tornadoes and thunderstorms are more difficult to assess, and direct observations of those events and the conditions associated with them are incomplete. Observational studies indicate a reduction in the number of tornado days in the USA. However, there is an increase in large tornado outbreaks (days with 30 or more tornadoes), the density of tornado clusters, and overall tornado power. This suggests a future with fewer tornado days but more intense and clustered tornado events. Tropical cyclones, severe wind events, and dust storms in North America are also expected to exhibit more extreme characteristics. The trend points towards increased intensity rather than frequency, implying that while the total number of such events may not rise significantly, those that do occur are likely to be more severe.

In addition to the evidence that tornado outbreaks have become more frequent, observational studies also indicate that tornado power has increased, that tornado activity is increasing in the fall, and that "Tornado Alley" has shifted eastward. (National Climate Assessment 5 (2023) Chapter 2, Climate Trends, https://nca2023.gloablchange.cog/chapter/2/#key-message-2.)

Vulnerability Assessment

Table 4-74 Regional Tornado Vulnerability Summary

SECTOR	VULNERABILITY
People	• Citizens living in mobile homes are susceptible due to these structures may often not be anchored securely to the ground and can be easily overturned or destroyed by high winds. • Lack of access to safe shelter below ground or in designated safe rooms. The lack of access can lead to life-threatening situations. • Elderly individuals often experience decreased mobility, which can hinder their ability to seek shelter quickly. Additionally, those with poor hearing may not receive alerts or warnings in adequate time. It is essential for the community to have targeted outreach efforts to ensure that elderly residents are informed and prepared. • Lack of multiple ways of receiving weather warnings, especially at night. Ensuring that residents are equipped with various means of receiving warning is vital for enhancing preparedness. • With emergency services potentially limits response times can be significantly longer, delaying those in need.
Property	• Damage to homes and public buildings, leading to displacement and costly repairs. Homes are vulnerable due to their construction materials and design, which may often not sustain the winds associated with tornadoes. • All above ground infrastructure is at risk for loss or damage, including residential and commercial buildings, bridges, roads, power lines, etc. • Damage to utility infrastructure can lead to widespread outages of electricity, water, and telecommunications. This can lead to emergency response efforts.
Critical Facilities and Community Lifelines	• Lack of approved Tornado shelter for protection. • All above ground infrastructure is at risk to damages impacting communication systems, and transportation infrastructure such as roads, bridges, and highways. • Roads become impassable due to debris blocking roadways • Additional warning sirens are needed in order to cover all communities • Current sirens do not have back-up generators, but do have battery back-up
Economy	• Significant economic losses possible, especially with EF3 tornadoes or greater • Long term economic challenges such as a shift in economic focus to recovery and reconstruction efforts. • Tornadoes can lead to changes in economic policies and development strategies aimed at increasing resilience and preparedness, influencing future economic growth.
Environmental and Cultural Resources	• Possible loss of cultural significant buildings, dwellings, and/or crops. • Tornadoes can cause contamination of water sources through debris, pollutant, affecting both surface and groundwater. • Tornadoes can exacerbate flooding conditions, leading to further damage to wetlands. • Can cause extensive damage to historic buildings, monuments, and landmarks, leading to difficulty in restoring historic sites. • Tornadoes have the ability to impact culturally or spiritually significant landscapes leading to effects on cultural practices and community identity.

Average Annual Damages

The average damage per event estimate was determined based upon NCEI Storm Events Database since 1996 and number of historical occurrences. This does not include losses from displacement, functional downtime, economic loss, injury, or loss of life. Tornadoes cause an average of $162,273 per year in property damage. The biggest concern with tornadoes is the proper anchoring of mobile homes to protect them from tornadoes. Due to a housing shortage across the Reservation, moving or relocated families impacted by damaged or destroyed homes can also be costly and time-consuming.

Table 4-75 Tornado Losses

COUNTY	NUMBER OF EVENTS	EVENTS PER YEAR	TOTAL PROPERTY LOSS	AVERAGE ANNUAL PROPERTY LOSS	TOTAL CROP LOSS	AVERAGE ANNUAL CROP LOSS
Oglala Lakota	14	0.6	$3,395,000	$154,318	$0	$0
Bennett	10	0.5	$175,000	$7,955	$0	$0
Jackson	7	0.3	$0	$0	$8,160	$453
TOTAL	**31**	**1.4**	**$3,570,000**	**$162,273**	**$8,160**	**$453**

Source: NCEI 1996-2024

Table 4-76 Tornado Injuries and Deaths

COUNTY	INJURY/DEATH	DATE	HAZARD
Oglala Lakota	1 death; 54 injuries	1999	Tornado
Bennett	1 injury	2013	Tornado

Source: NCEI, 1996- 2023

Cascading/Related Hazards

Supercell thunderstorms, hailstorms, flooding, power outages and transportation disruptions are all cascading/related hazards that must be planned for in this area of South Dakota. These additional hazards can create a complex emergency situation that requires a comprehensive response and supporting strategies.

Risk Summary

The Northern Plains region, with its history of frequent and destructive tornadoes, presents a complex challenge for community safety and economic stability. The overall significance of tornadoes to the Reservation is **medium**, based on their **highly likely** probability and **moderate** impacts.

- These tornadoes can cause significant damage to properties, infrastructure, and the environment.
- The planning area falls in a zone within the Northern Plains prone to supercell thunderstorms, which often lead to tornado formation.
- The community faces risks to safety, with homes and critical facilities being particularly vulnerable, especially considering the limited number of storm shelters available.
- Important cultural sites in the area are also at risk of damage or destruction during severe tornado events.
- The local economy, which heavily depends on agriculture, could experience severe disruptions and a long recovery time due to tornado-related crop damages.

5 Mitigation Strategy

5.1 Introduction

The primary focus of the mitigation strategy is to establish goals and objectives and identify action items to reduce the effects of hazards on existing infrastructure and property in a cost effective and technically feasible manner. The establishment of goals and objectives took place during the Planning Team meetings.

5.2 Mitigation Goals and Objectives

The development of the mitigation strategy for this plan update includes the addition of several mitigation actions, revisions to the mitigation alternative selection process, and the incorporation of mitigation actions for the additional hazards addressed in the update. The Planning Team reviewed the goals from the 2019 Hazard Mitigation Plan (HMP) and discussed recommended additions and modifications. The intent of each goal is to develop strategies to account for risks associated with hazards and identify ways to reduce or eliminate those risks.

A preliminary list of goals and objectives from the 2019 HMP was provided to the Planning Team during the Kick-Off Meeting and discussed in depth during the Mitigation Strategy Workshop. The Planning Team made several edits to the 2019 goals in order to be more aligned with current needs and priorities of the community. The graphic below compares the 2019 and 2024 goals side-by-side in order to highlight these changes to the goals for 2024. The goals on the right-hand side will be adopted as written for the *2024 Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan.*

Requirement §201.7(c)(3):

A mitigation strategy that provides the Indian tribal government's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:

i. A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

ii. A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

iii. An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the Indian Tribal government.

iv. A discussion of the Indian tribal government's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: An evaluation of tribal laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas; and a discussion of tribal funding capabilities for hazard mitigation projects.

v. Identification of current and potential sources of Federal, tribal, or private funding to implement mitigation activities.

vi. An Indian Tribal government applying to FEMA as a grantee may request the reduced cost share authorized under §79.4(c)(2) of this chapter of the FMA and SRL programs if they have an approved Tribal Mitigation Plan meeting the requirements of this section that also identifies actions the Indian Tribal government has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties), and specifies how the Indian Tribal government intends to reduce the number of such repetitive loss properties.



5.3 Identification and Analysis of Mitigation Actions

The next step in the mitigation strategy is to identify and analyze a comprehensive range of specific mitigation actions and projects to reduce the effects of each hazard on new and existing buildings and infrastructure. During the 2024 HMP update, the planning team analyzed viable mitigation options by hazard that supported the identified goals. The planning team was provided with a wide range of mitigation action examples and success stories from communities across the nation that fall within the following general categories, developed by FEMA:

- Plans and Regulations
- Structure and Infrastructure Projects
- Education and Awareness
- Natural Systems Protection



To identify and select mitigation actions in support of the mitigation goals, the planning team evaluated each hazard identified and profiled in Chapter 4. A link to reference documents titled "Mitigation Ideas" and "Mitigation Action Portfolio" developed by FEMA was made available in the meeting presentation. These documents list common ideas for mitigation by hazard and best practices. The jurisdictions considered both current and future buildings in considering possible mitigation actions. A facilitated discussion took place to examine and analyze the options.

The mitigation strategy is based on existing local and tribal authorities, policies, programs, and resources, as well as the ability to expand on and improve these existing tools. As part of the HMP development, the planning team reviewed existing capabilities for reducing long-term vulnerability to hazards. Those capabilities are noted in Chapter 3 of the Base Plan and Section A.5 of the County Annex and can be assessed to identify gaps to be addressed and strengths to enhance through new mitigation actions.

Based upon the key issues identified in the risk assessment, including the capability assessment, the planning team came to consensus on proposed mitigation actions for each hazard for their jurisdictions. Certain hazards' impacts were best reduced through multi-hazard actions. A lead for each new action, where applicable, was identified to provide additional details on the project so they could be captured in the plan.

5.3.1 Prioritization Process

Once the mitigation actions were identified, the county and tribal planning teams reviewed and evaluated each action to come up a prioritization scale for the mitigation strategy. In order to accomplish this, the planning team utilized the STAPLEE prioritization criteria to determine the importance, effectiveness, and implementation steps of each action. The STAPLEE criteria were developed by FEMA as a means of standardizing a consistent set of evaluation criteria for all jurisdictions to follow. STAPLEE is an acronym for the following:

- **S**ocial: Does the measure treat people fairly? (e.g., different groups, different generations)
- **T**echnical: Is the action technically feasible? Does it solve the problem?
- **A**dministrative: Is there adequate staffing, funding, and other capabilities to implement the project?
- **P**olitical: Who are the stakeholders? Will there be adequate political and public support for the project?
- **L**egal: Does the jurisdiction have the legal authority to implement the action? Is it legal?
- **E**conomic: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- **E**nvironmental: Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

Other criteria used to inform the priority of a mitigation action included:

- Does the action address multiple hazards or areas with the highest risk?
- Does the action protect lives?
- Does the action protect infrastructure, community assets or critical facilities?
- Does the action meet multiple objectives?

While STAPLEE provided a template for the planning team to evaluate a range of specific mitigation actions and projects, the results of the risk assessment were also considered (i.e., probability and severity of impacts for each hazard). Additionally, the opinions of the public on mitigation priorities gathered during the public outreach efforts were also considered. During this process, a planning level cost-benefit review of each action was also considered, in accordance with the requirements of the Disaster Mitigation Act. Quantitative cost-benefit analysis will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects identified in this plan. Planning Team members also weighed the pros and cons of proposed actions based on their judgement, subject matter expertise, and experience with local hazards.

What should Oglala Sioux Tribe and Oglala Lakota County focus on to protect the people of the reservation?



Keeping the STAPLEE criteria in mind, the planning team prioritized the mitigation actions by giving an indication of relative priority, which was then translated into high, medium, and low. The results of the STAPLEE evaluation process produced prioritized mitigation actions for implementation within the planning area. During the plan update, OST and OLC identified several mitigation actions that were ongoing or incomplete projects to be carried forward from the 2019 HMP. Priority levels on these actions were revisited and, in some cases, modified to reflect current priorities based on the STAPLEE principles.

5.4 Oglala Sioux Tribe and Oglala Lakota County 2024 Mitigation Action Plan

Several changes have been made from the 2019 HMP to the 2024 HMP and planning process, including:

- Greater outreach efforts for planning team member involvement;
- Expanded and much more in-depth analysis on climate change impacts to the planning area with specific discussion for each hazard;
- Revised mitigation goals; and
- More detailed discussions on growth, development, and social vulnerability, and how these factors impact the community's vulnerability to hazards.

Specific to the mitigation strategy, changes also included an expanded description of each action, as well as added clarification of jurisdictional responsibility per action, funding sources, and other details. This update also works to unify the various planning mechanisms and organizations throughout the planning area (i.e., local emergency operation plans, tribal and county departments, etc.) to ensure that the goals and objectives identified in the plan are consistent with strategies used in the planning area.

The planning team reviewed and updated the status of each mitigation action identified in the 2019 HMP. Actions were listed as Not Started, In Progress, Ongoing/Annual Implementation, Completed, or Deleted. As shown in **Table 5-1**, of the 25 actions in the 2019 HMP, one action has been completed showing that the Tribe is making progress implementing mitigation activities. One

action was deleted since the Town of Batesland is no longer a participating jurisdiction in the plan update. Three actions were deleted to be revised and improved for the 2024 plan update. The remaining 19 actions were continued over into the 2024 MP, along with 13 new actions, as summarized in **Table 5-2**.

Table 5-1 Completed and Deleted Actions

Jurisdiction	Action #	Mitigation Action	Comments
Oglala Sioux Tribe, Oglala Lakota County	1	Anchor Mobile Homes	Completed. However, action has been revised to be carried forward in the new plan. 150 homes were anchored. Actions complete using inmate labor to help with developing workforce skills. Housing authority asked to be removed as responsible agency- focusing on new stick-built housing and choosing not to pursue additional grant funding to support anchoring projects.
Oglala Sioux Tribe, Oglala Lakota County	4	Education on Disaster Preparation	Deleted. Action was revised and expanded to be included in 2024 plan.
Town of Batesland	8	Improve Snow Removal Resources	Deleted. The Town of Batesland is not participating in the 2024 plan.
Oglala Sioux Tribe	11	Improve Warning Systems	Deleted. Action was revised and expanded to be included in the 2024 plan.
Oglala Sioux Tribe, Oglala Lakota County	15	Mutual Aid Agreements for Emergency Response	Deleted. Action was revised and expanded to be included in the 2024 plan.

The results of the project identification and prioritization exercise for both the OST and OLC are summarized in **Table 5-2**. There are a total of 33 actions in the OST mitigation strategy and 32 actions in the OLC mitigation strategy, including continuing and new actions. Of these actions, 18 are collaborative, being supported by both the OST and OLC. These projects detail specific actions for reducing future hazard-related losses within The Pine Ridge Reservation. The projects are organized by jurisdiction and include notes about the department and partners necessary to implement the project, estimated cost, potential funding sources, timeline, and their relative level of priority high, medium, and low. The lead agency responsible for each action has been bolded.

The Cost Estimate column describes the estimated project costs using the following categories:

- Little to no cost
- Low: Less than $10,000
- Moderate: $10,000-$100,000
- High: $100,000-$1,000,000
- Very High: More than $1,000,000

The Timeline column describes the estimated time of completion for each project using the following categories:

- Short Term: 1-2 years
- Medium Term: 3-5 years
- Long Term: 5+ years
- Ongoing: action is implemented every year

The tables also provide status/implementation notes that describe progress made on the actions so far, using the following categories, and, where applicable, notes if there were changes in the priority level from the previous plan:

- **Not Started**: Work has not begun.
- **In Progress**: Work has begun but not completed.
- **Continuous**: Ongoing annually with no specific end date.
- **New in 2024:** The action is new to this plan update; little to no work has been completed.

Table 5-2 Oglala Sioux Tribe Mitigation Actions

ACTION #	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
2019-2	Conduct Emergency Tabletop Exercise. Utilize tabletop emergency exercise to prepare for hazardous events. Ensure that businesses and residents have appropriate plans in place.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe	**OST Emergency Management**	Moderate	Homeland Security, Tribal General Funds	Long Term	Low	Continuous
2019-3	Develop and Implement Building Codes and Zoning. Develop, implement, and enforce building standards and codes to provide additional protection to natural hazards. Develop zoning ordinances to prevent development in high hazard areas.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Planning,** OST Emergency Management, OLC Emergency Management	Little to no cost	BRIC Building Codes Plus Up, Tribal and County General Funds, Staff Time	Long Term	High	Not Started. Lack of funding and enforcement capabilities has prevented this action from moving forward. However, it is still being considered by the Tribe and County. OST received BRIC grant in F21 for the TERO office to scope code development and implementation, and support compliance officer and inspector training and hiring. The OST staff member that led this effort is no longer with the Tribe and new staff are unsure if there are enough resources to continue the effort.
2019-5	Education on Mitigation Measures. Establish a community program to increase awareness related to household and community-wide mitigation measures in place. Platforms include local media, newspaper articles, county website, school systems, radio, message board at the U.S. Post Office, water bills. Sources: Animal/plant/crop disease information is gathered from the local extension office. Severe summer weather, severe winter weather, tornadoes, high wind information is sourced from the NWS (including storm spotter training and securing property before events) and local information (know where your storm shelter is). Wildfire information is shared from SD Wildland Fire and the FireWise program to promote defensible space and safety information like wearing a mask to prevent impacts of wildfire smoke. SD SOT and SD Pipeline Association for hazardous materials information. Flooding information is also shared from the NWS flooding information. Dam failure information is shared through training and exercise	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**	Low	DHS, HMGP, Tribal and County General Funds	Long Term	Low	In Progress. Jesse Big Crow (OST EM Office) conducts outreach and education in Tribal Districts, CAP offices, etc. Formalizing and expanding the program is desired.

ACTION #	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
2019-6	Complete Emergency Operations Center. Emergency Operations Center Building is still under construction, working to complete utilities hookup, building access, etc.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe	**OST Emergency Management**	High	Mennonite Disaster Service, Tribal General Funds	Medium Term	High	In Progress. Currently no anticipated completion date.
2019-7	Establish Shelter Locations. Identify and evaluate current storm shelter locations in communities and schools. These structures do not serve as FEMA approved safe rooms and is not intended for long-term recovery, such as displacement from floods, fires, etc. The buildings could be used for short terms sheltering during high heat events for those without A/C.	Extreme Heat, Severe Thunderstorms, Severe Winter Storms	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management,** Tribal Planning Office, Tribal Housing Authority	High	HMGP, BRIC, Tribal and County General Funds	Long Term	High	Continuous. There is an ongoing need to inventory existing buildings on the Reservation and identify where meets shelter requirements vs. where shelters are needs/ Ongoing effort by the Tribe to construct multi-purpose buildings within each district to be used for services and community resources (CAP buildings). There has been discussion that these should have shelters in/near them, but cost has been prohibiting factor (Reno, water resources).
2019-9	Improve Emergency Communications System. Evaluate and/or upgrade as needed emergency responder radio system.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe	**Police, Fire Department**, OST Emergency Management	High	Homeland Security, Tribal General Funds	Long Term	High	Continuous
2019-10	Improve Emergency Transportation System. Evaluate and upgrade emergency transportation equipment as needed	Flooding, Severe Winter Storms	Oglala Sioux Tribe	**Transportation Department,** OST Emergency Management	High	HMGP, BRIC, DOT, BIA, Tribal General Funds	Long Term	Low	Continuous
2019-12	Infrastructure Hardening. Harden critical facilities to withstand high winds, hail, heavy snow, etc. by hardening roofs, hail resistant barriers to HVAC systems, shatter-proofing windows, building tie-downs and anchors, and other architectural designs that reduce damage.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe	OST Housing Authority, **OST Emergency Management**	Very High	BRIC, HMGP, Tribal General Funds	Long Term	High	In Progress. Currently no anticipated completion date.
2019-13	Inventory All Assets for Critical Facilities Protection. Conduct inventory of supplied in all critical facilities to be used in the case of severe hazard event	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds,	Oglala Sioux Tribe	**Individual agencies,** OST Emergency Management	Moderate	Individual agency budgets, Staff Time	Long Term	Low	Continuous

ACTION #	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
		Severe Thunderstorms, Severe Winter Storms, Tornadoes							
2019-14	Mapping of Flood Risk Areas. Conduct mapping of floodplain and develop flood risk hazard maps for regulatory use. Update FIRM maps to reflect accurate flood inundation areas within the jurisdiction.	Flooding	Oglala Sioux Tribe	**OST Emergency Management**	Moderate	HMGP, BRIC, Tribal Funds, FEMA RiskMap	Medium Term	High	Not Started.
2019-16	Protect Critical Facilities in Flood Zones. Relocate or remove facilities and homes damaged by flooding.	Flooding	Oglala Sioux Tribe	**Tribal Housing Authority,** OST Emergency Management	Very High	HMGP, BRIC, Tribal General Funds	Long Term	High	Not Started.
2019-17	Provide Backup Generators for Critical Facilities. Provide portable or stationary source of backup power to critical facilities and shelter locations.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe	**OST Emergency Management**	Moderate	EMPG ARPA Grant, FEMA BRIC Grant, FEMA HMGP Grant, Tribal General Funds, School Funds	Short Term	High	Not Started.
2019-18	Provide Emergency Supply Kits. Put together and distribute emergency supply kits to critical facilities to be used in the case of a hazard events.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**	Moderate; $100 per kit	Tribal and County General Funds, private donations, faith-based organizations	Short Term	Medium	Not Started.
2019-19	Provide Structural Fire-Fighting Equipment. Evaluate and improve fire-fighting equipment	Grass/Wildfire, Drought	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Housing Authority,** OST Emergency Management, OLC Emergency Management	Very High	HMGP, Assistance to Firefighters Grant	Medium Term	High	Not Started.
2019-20	Rebuild Unsafe Structures. Rebuild or repair tribal properties damaged by past hazard events. This is an ongoing project. Homes throughout the reservation have been damaged by past events and are in need of repair.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe	**Tribal Housing Authority,** OST Emergency Management	Very High; Varies by structure	HMGP, BRIC, BIA Housing Improvement Grants, Tribal General Funds	Long Term	High	Continuous

ACTION #	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
2019-21	Safe Rooms and Storm Shelters. Identify and evaluate existing safe rooms and/or storm shelters. Improve and/or construct safe rooms and/or storm shelters at shelter locations or critical facilities.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**	High	HMGP, BRIC, BIA Housing Improvement Grants, Tribal General Funds	Long Term	High	In Progress. Lack of Funding
2019-22	Snow Fences. Construct snow fences to protect main transportation routes and critical facilities from excessive snow drifting and road closure.	Severe Winter Storms	Oglala Sioux Tribe, Oglala Lakota County	**Transportation Department**, Streets, SD DOT, OST Emergency Management, OLC Emergency Management	Low	HMGP, BRIC, DOT, Tribal and County General Funds	Medium Term	Low	In Progress. Lack of Funding
2019-24	Training for First Responder Team. Develop or improve training programs for all emergency response personnel and first responders.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OLC Emergency Management,** Police, Fire Department, OST Emergency Management	High	Individual agency staff time, FEMA Assistance to Firefighters Grant, FEMA HMA Grants, USDA Community Wildfire Defense Grants, County General Funds	Medium Term	High	Continuous
2019-25	Update Emergency Operations Plan. Complete and/or update an Emergency Operations Plan	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**	Low	Tribal General Funds	Short Term	High	In Progress. Anticipated completion date 2025.
2024-1	Disease and Public Health Preparedness. Program to educate and assist families in creating DIY Indoor Air Filters for families with respiratory issues around fire/burns. Corsi-Rosenthal boxes (inexpensive and help reduce exposure to indoor air pollutants). Community education material: power outage, fire, preparedness and plan accessible to families.	Communicable Disease, Drought, Extreme Temperatures, Grass/Wildfire, Hazardous Materials Incidents, Structure Fire	Oglala Sioux Tribe, Oglala Lakota County	**OLC Emergency Management**, OLC Emergency Management, OST Health Admin., Indian Health Services (IHS)	Low	CDC PHEP Coop Agreement, Tribal General Funds, Staff Time	Short Term	Medium	New in 2024

ACTION #	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
2024-2	Education on Disaster Preparation. Educate staff and residents about hazard vulnerability and mitigation efforts. Include information for utility shut off protocols. Integrate hazard mitigation discussions into school curriculums. Activities may include classroom modules profiling certain hazards and discussing preparedness measures. Educational materials, such as brochures and fliers, can be developed and provided to parents to increase community-wide hazard awareness.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OLC Emergency Management**, OST Emergency Management, OST Health Admin., IHS	Low	National Association of Voluntary Organizations Active in Disaster (VOAD), Tribal and County Funds	Long Term	Medium	Revised for 2024. Jesse Big Crow (OST EM Office) conducts outreach and education in Tribal Districts, CAP offices, etc. Formalizing and expanding the program is desired.
2024-3	Weather Spotter Training. Make training more accessible to all communities/districts. This would help community members identify weather threats and help identify impacted areas.	Drought, Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management**, OLC Emergency Management, National Weather Service	Low	NWS Partnership, Tribal General Funds, Staff Time, Volunteer Hours	Medium Term	Medium	New in 2024
2024-4	Work with Land Committee to set standards and limitations on fertilizers for agricultural leases. Excessive fertilizer use is resulting in cascading negative impacts, such as polluted runoff, public health impacts, and degraded soil and water quality. Ask land committee to set standards to AG leases for fertilizers	Animal/Plant/Crop Disease, Drought, Hazardous Materials Incidents	Oglala Sioux Tribe	**BIA,** OST Emergency Management	Moderate	BIA Tribal Climate Resilience Grant, EPA Clean Water Act Section 319 Grant, EPA Climate Pollution Reduction Grant	Medium Term	Medium	New in 2024
2024-5	Drought Mitigation – Non-potable system. Identify and develop a non-potable water reserve system to provide for non-consumptive uses, such as firefighting or irrigation. Implementing a drought monitoring system (D1-D4) and the Tribal Water Code, as well as USGS stream data, to determine thresholds and triggers for using non-potable water sources. Identifying decommissioned wells (mni wiconi project) throughout the reservation which are inadequate for domestic use to serve as reserve sources for non-potable water.	Animal/Plant/Crop Disease, Drought, Extreme Temperatures, Grass/Wildfire, Structure Fire	Oglala Sioux Tribe	**OST Water Resource Department,** BIA, TCR	High	BIA Tribal Climate Resilience Grant, EPA Clean Water Act Section 319 Grant, EPA Climate Pollution Reduction Grant, Bureau of Rec. Water Grant Programs, USGS State Water Resources Research Act Program, USDA Emergency	Medium Term	High	New in 2024

ACTION #	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
						Community Water Assist. Grants			
2024-6	Hazardous Material Response Improvement. Address the safe transportation of hazardous materials on public highways. Help educate residents about spotting and preventing residential propane leaks or commercial spills, with assistance from vendors of residential propane. Promote a safe and timely response to hazmat incidents (mitigate response calls).	Hazardous Materials	Oglala Sioux Tribe, Oglala Lakota County	**SD DOT,** OST Emergency Management, OLC Emergency Management OST EPP	High	SD DOT Funding, Residential Propane Vendors, USDOT HMEP Grant, USDOT ALERT Grant	Medium Term	Medium-High	New in 2024
2024-7	Severe Weather Response and Preparedness. Transportation system often fails in severe winter weather and medical operations on the Reservation are overwhelmed. Develop and implement a 511 public notification system regarding severe weather and ensure accessibility for the community. Improve education and public preparedness during inclement weather	Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Severe Winter Weather, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management**, OLC Emergency Management, Municipal and County Governments	Moderate	Tribal and County General Funds, NGWS Grant, NWS Severe Weather Program, FEMA EMPG	Medium Term	Ongoing/ Annual Implementation	Revised for 2024. Since 2019 plan, a 511 system has been initiated. Hospitals and all districts received or updated sirens, currently 9 sirens and plans to expand to 24 sirens total. Consider how residents will be contacted across multiple methods. OST Telecoms group (OST 638 Program) constructing cell towers and wiring with fiberoptics over the next few years. Aiming to be no longer reliant on cell towers and investing in new tech is the priority.
2024-8	Mutual Aid Agreements for Emergency Response with neighboring Jurisdictions. Establish formal mutual aid agreements with neighboring jurisdictions and entities. Formal agreements are needed between the counties, tribe, and emergency services. The tribe is currently developing agreements between departments. This is a collaborative effort between Oglala Sioux Tribe and OLC. This includes environmental, law enforcement, community resources, and emergency management initiatives	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**, Jackson County, Bennett County, Oglala Lakota County, All agencies and Depts., IHS	Low	Tribal and County General Funds, Staff Time	Short Term	High	Revised for 2024
2024-9	Wildfire Mitigation Efforts. Enforcement of burn bans during high fire danger. Prohibit fireworks during high fire danger. Efforts to reduce risk in rangeland, grasslands, and timber environments throughout the reservation. Support fuels management and mitigation projects.	Drought, Extreme Temperatures, Grass/Wildfire, High Winds, Structure Fire	Oglala Sioux Tribe	**BIA**, OST Emergency Management, Water Resource Department	Moderate	BIA Tribal Wildfire Prevention, FEMA FP&S Grants, FMAG, NIFC Rural Fire Assistance Grants	Medium Term	High	New in 2024
2024-10	Economic Development Initiative to improve economic conditions and security for residents on the Pine Ridge Reservation. There are more than 344 businesses across the Pine Ridge Indian Reservation. This is not counting the	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding,	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Planning Office,** OST Emergency Management,	High	CDBG, US Economic Development Administration	Medium Term	High	New in 2024

ACTION #	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
	marijuana dispensaries. Marijuana dispensaries are at 2-6 to a district. About 400+ businesses across the reservation. Most marijuana dispensaries are sheds or trailers.	Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes		OLC Emergency Management		Grants, SBA Grants			
2024-11	Structural Mitigation Action. Reservation wide approximately 300-400 homes are over 40 years old. All homes need to be identified and catalogued, and repairs and structural retrofits implemented to improve the safety and climate resilience. 10 homes are dome homes and are anchored down, ensuring they are climate resilient year-round. These homes could serve as a model for future residential improvements.	Earthquakes, Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Severe Winter Storms, Structure Fire, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Housing Authority**, OST Emergency Management, OLC Emergency Management	Very High	BRIC, BIA Tribal Climate Resilience Funds, HUD GRRP Funds, HMGP	Long Term	High	New in 2024
2024-12	Mobile Home Mitigation Action. There are approximately 15,000 mobile homes across the Pine Ridge Indian Reservation. Most mobile homes across the Pine Ridge Reservation are outdated and are not climate resilient. Estimate of 1000 to 2000 mobile homes units per district. Support efforts to anchor and retrofit mobile homes to improve safety and climate resilience.	Earthquakes, Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Severe Winter Storms, Structure Fire, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Planning Office**, Tribal Housing Authority, OST Solid Waste	Very High	Tribal General Funds, BRIC, BIA Tribal Climate Resilience Funds, HUD GRRP Funds, HMGP,	Long Term	High	Revised for 2024
2024-13	Civil Disorder Mitigation. Population of 40,000 tribal members on reservation. We are a poverty-stricken reservation with an unemployment rate 89%. Listed fifth poorest county in the U.S. Develop an initiative to improve needed security and public safety enforcement before, during, and after a disaster.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe	**Tribal Public Safety,** OST Emergency Management	High	Homeland Security Grant, EMPG, DOJ OJP Funds	Short Term	High	New in 2024

6 Monitoring, Evaluating, and Updating the Plan

Participants of the Oglala Sioux Tribe (OST) Hazard Mitigation Plan (HMP) will be responsible for monitoring, evaluating, and updating the plan, including its goals, objectives, projects, risk assessment, and critical facilities. The plan will be reviewed at least annually and as needed to assess project progress and implementation. A comprehensive review will take place every five years to ensure the plan addresses current conditions and risks. However, updates may be incorporated more frequently, particularly after a major hazard event.

Post-project monitoring of mitigation measures will be directed by the responsible party, ensuring that completed projects are evaluated for their effectiveness and incorporated into the list of implementation activities. Monitoring results will be used to inform future updates and incorporated into implementation activities.

At least six months prior to the five-year update deadline, the governing body will begin the process of evaluating the plan. This evaluation will include a review of the previous plan's goals and objectives, asking key questions such as:

- Do the goals and objectives address current and expected conditions?
- Have the nature, magnitude, or type of risks changed?
- Were the outcomes as expected, and did the projects have the desired impact?
- Are current resources adequate for implementation?
- Are there implementation problems or new partners needed?

Requirement §201.7(c)(4)(i):

A plan maintenance process that includes:

i. A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan.

ii. A system for monitoring implementation of mitigation measures and project closeouts.

iii. A process by which the Indian tribal government incorporates the requirements of the mitigation plan into other planning mechanisms such as reservation master plans or capital improvement plans, when appropriate.

iv. Discussion on how the Indian tribal government will continue public participation in the plan maintenance process.

v. A system for reviewing progress on achieving goals as well as activities and projects identified in the mitigation strategy.

Participants will report on the status of these actions, which will include an evaluation of implementation success and challenges. A status report, detailing project successes and necessary revisions, will be published in the local newspaper for public review.

The governing body will oversee the five-year HMP update, which will be made available for public input before submission to FEMA. All updates will be distributed to plan holders to ensure clear communication of changes and progress.

6.1 Formal Plan Adoption

Requirement §201.7 (c)(5):

Adoption Process. The plan must be formally adopted by the governing body of the Indian tribal government prior to submittal to FEMA for final review and approval.

Based on FEMA requirements, this hazard mitigation plan must be formally adopted by each participant through approval of a resolution. This approval will create individual ownership of the plan by each participant. Formal adoption provides evidence of a participant's full commitment to implement the plan's goals, objectives, and action items. Upon plan approval and formal adoption, completed adoption resolutions will be attached to this HMP in *Appendix A*.

Once adopted, participants are responsible for implementing and updating the plan every five years. Those who participated directly in the planning process would be logical champions for updating the plan. In addition, the plan will need to be reviewed and updated annually or when a hazard event occurs that significantly affects the area or individual participants.

6.2 Plan Maintenance and Implementation Steps

Once adopted, the plan faces the truest test of its worth: continued implementation. While this plan contains many worthwhile actions, the Tribe and County will need to decide which action(s) to undertake or continue. Two factors will help with making that decision: the priority assigned the actions in the planning process, and funding availability. Low- or no-cost actions most easily demonstrate progress toward successful plan implementation.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the benefits to the counties, tribes, communities, and stakeholders. This effort is achieved through the routine actions of monitoring meeting agendas for hazard mitigation related initiatives, coordinating on the topic at meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

In order to achieve the above stated intent, the planning team will take the following steps to maintain, implement, and monitor the effectiveness of the HMP. In order to monitor plan implementation, OST and OLC, along with relevant partners, will convene regularly to discuss the plan and monitor progress on goals and mitigation actions. This will be managed by the OST Emergency Manager.

In order to evaluate the effectiveness of the HMP, the County and Tribe will review the following topics when they convene:

- If the plan goals and objectives are still relevant or need to be updated.
- If and how risk has changed, for example any new growth and development, and recent hazard events.
- To document completion or significant progress made on mitigation actions each year.
- To capture and document demonstrated outcomes from mitigation actions that show progress on increasing community resilience.
- Any obstacles to plan implementation and potential solutions.

Both the Tribe and County will also document the completion of any mitigation actions between this plan adoption and the next update. Post-project monitoring will be accomplished through a report summarizing at a minimum the closeout of the project, the successes and challenges for implementation, how the action supported the plan goals, and any lessons learned to inform future mitigation activities. This process of plan review will be done at least annually, or after any disaster event impacting the Reservation. Prior to the expiration of this plan update in 2029, the OST Emergency Manager will convene the planning team and begin the process to update the plan in order to maintain compliance with the Disaster Mitigation Act of 2000. *Appendix E* contains sample worksheets developed by FEMA to assist with the continued implementation and maintenance of the HMP.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the Region and its counties and tribes will be able to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

6.3 Continued Public Involvement

To ensure continued plan support and input from the public and business owners, public involvement will remain a top priority for OST and OLC. Notices for public meetings involving discussion of an action on mitigation updates will be published and posted in the following locations a minimum of two weeks in advance:

- Public spaces around the jurisdiction
- Town Hall
- Local radio stations
- Websites
- Local newspapers
- Regionally distributed newspapers



6.4 Incorporation into Existing Planning Mechanisms

OST and OLC are committed to reducing risk to lives and property posed by various hazards. Both OST and OLC have had limited planning mechanisms beyond the 2019 HMP to support these efforts. Since 2019 however, both OST and OLC have been successful developing and implementing several new planning initiatives that support the goals of hazard mitigation planning.

This updated HMP is informed by several other planning initiatives, such as the 2020 Drought Adaptation Plan, which has provided valuable insights for enhancing the HMP. The Tribe and County are committed to further integrating the updated HMP into upcoming planning efforts. Several existing mechanisms that regulate both Tribal and County development will be updated in 2024 and beyond, providing opportunity for alignment, including:

- *Oglala Sioux Tribe Emergency Operations Plan*,
- *Oglala Sioux Tribe Wildfire Plan*,

- *Oglala Sioux Tribe Transportation Plan*,
- *Oglala Sioux Tribe Historical Preservation Ordinance*, (last updated in 2019).

Additionally, the HMP's risk assessment can inform the creation of zoning ordinances, enhancing the Tribe's ability to manage development in hazard-prone areas. In areas where specific planning mechanisms are lacking or do not yet exist, the HMP will serve as a guiding document, helping to shape future planning activities and ensuring that hazard mitigation remains a priority in development.

6.5 Plan Amendments and Unforeseen Opportunities

With the current update of the HMP, new opportunities for plan integration have emerged, allowing for future plan alignment and a more comprehensive approach to hazard mitigation. In order to capture changes in community priorities and vulnerabilities, but also potential new innovations which may improve the efficacy of this plan, a plan amendment may be proposed and considered separate from the annual review and other proposed plan amendments. OST will compile a list of proposed amendments received annually and prepare a report for South Dakota Department of Public Safety (SDDPS), by providing applicable information for each proposal, and recommend action on the proposed amendments. A sample report and plan monitoring worksheets from FEMA are provided in Appendix E.

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Annex A Oglala Lakota County

A.1 Mitigation Planning and County Planning Team

This County Annex serves as an update to the *Oglala Sioux Tribe and Oglala Lakota County Multi-Jurisdictional Hazard Mitigation Plan* approved in 2019. Focusing specifically on OLC, this annex builds on the OST & OLC HMP by providing additional details on mitigation planning as they pertain specifically to OLC. As part of the planning process, the County established a County Planning Team (CPT) to develop the mitigation plan and identify potential mitigation projects.

1.1.1 Partner Engagement and Public Involvement

The public involvement in the current planning process was a multifaceted and inclusive endeavor designed to ensure that members of the public were able to help provide information to inform the plan update. Opportunities for partners to be involved in the planning process included engagement from non-profit organizations, Local and Tribal agencies, neighboring communities, and members of the public. The community was able to engage in the planning process through public engagement surveys at libraries and senior centers throughout the planning area. Additionally, a public meeting was held at the community center and informed the planning team that more information was needed about flood insurance in the community.

Specific examples of partners who were engaged in the planning process include:

- Local and regional agencies involved in hazard mitigation activities, such as OLC Emergency Management staff and Bureau of Indian Affairs Wildland Fire Crews.
- Agencies that have the authority to regulate development, such as county commissioners and the Batesland Town Board president, who attended planning meetings.
- Representatives of businesses, academia, and other private organizations were involved, including Lacreek Electric Association, the owner of the Batesland General Store (Handi Stop), and Prairie Wind Casino, who all attended meetings and/or provided input and data to inform the plan.

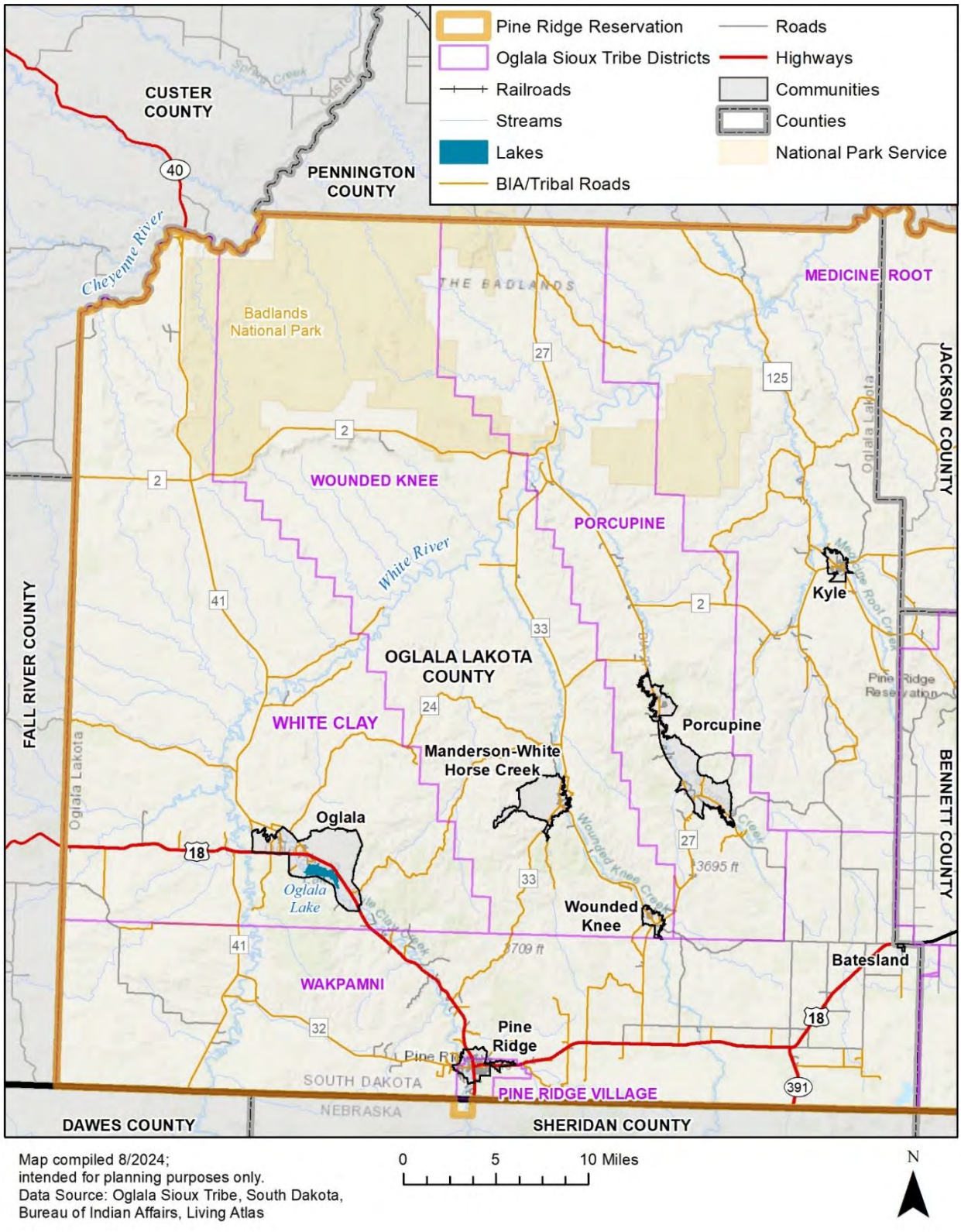
More details on the planning process followed and how the counties, municipalities and partners participated can be referenced in Chapter 2 of the base plan. A full list of local government departments and stakeholders that participated can be found in Appendix B.

1.2 Community Profile

1.2.1 Geography and Climate

OLC is located in southwest South Dakota and is the westernmost county located within the Pine Ridge Reservation. The county encompasses 2,097 square miles. Prior to May 2015, the County was named Shannon County but was renamed for the Oglala Lakota people who live within the County. The County is unorganized territory with the neighboring Fall River County serving as its administration. The only incorporated town in the Reservation, Batesland, is found in eastern OLC. A portion of the Badlands National Park lies within the Reservation. Roughly 133,000 acres of Badlands intersect the northwest portion of OLC. The White River and White Clay Creek bisect the County, while the Cheyenne River borders Custer County to the northwest. Figure A-1 below illustrates the extent of Oglala Lakota County.

Figure A-1 Oglala Lakota County Base Map



OLC has a continental climate with four distinct seasons. The climate of the County does not differ greatly from the overall climate of the Pine Ridge Reservation. For the Pine Ridge Reservation, the

normal high temperature for the month of July is 88.1˚F. The normal low temperature for the month of January is 9.1˚F. On average, the reservation receives 19.6 inches of rain and 34.9 inches of snowfall per year. The following table compares these climate indicators with those of the entire state. Climate data are helpful in determining if certain events are more or less likely to occur in specific geographic locations. A climate summary is provided for the reservation and the state below as the region as a whole is expected to receive similar conditions. For a more in-depth discussion of climate impacts, see Section Four: Risk Assessment in the base plan.

Table A-1 Climate Data for Pine Ridge Reservation

VARIABLE	PINE RIDGE RESERVATION	STATE OF SOUTH DAKOTA
July Normal High Temp	88.1˚F	86.5˚F
January Normal Low Temp	9.1˚F	5.0˚F
Annual Normal Precipitation	19.59 inches	19.21 inches
Annual Normal Snowfall	34.9 inches	24.1 – 36.0 inches

Source: High Plains Regional Climate Center, 1981-2010 Climate Normals; NCEI, Jan 1895-March 2018
*Precipitation includes all rain and melted snow and ice.

1.2.2 Population Trends

Since 1980, OLC has experienced periods of significant population growth and loss, with relatively significant swings in population trends between official censuses. According to the 2022 U.S. Census Bureau American Community Survey (ACS) estimates, OLC has a total population of 13,695. Another official estimate for 2023 puts the population at 13,434, indicating another slight trend toward population decrease in recent years. The largest population center in OLC is Pine Ridge, with an estimated population of 3,138 at the 2020 census, or approximately 23% of the total county population. Oglala is the only other community with a population greater than 1,000 in the County. The majority of the population is spread across the County, many in rural and remote communities.

Table A-2 Population Trends for Oglala Lakota County, 1980 – 2020

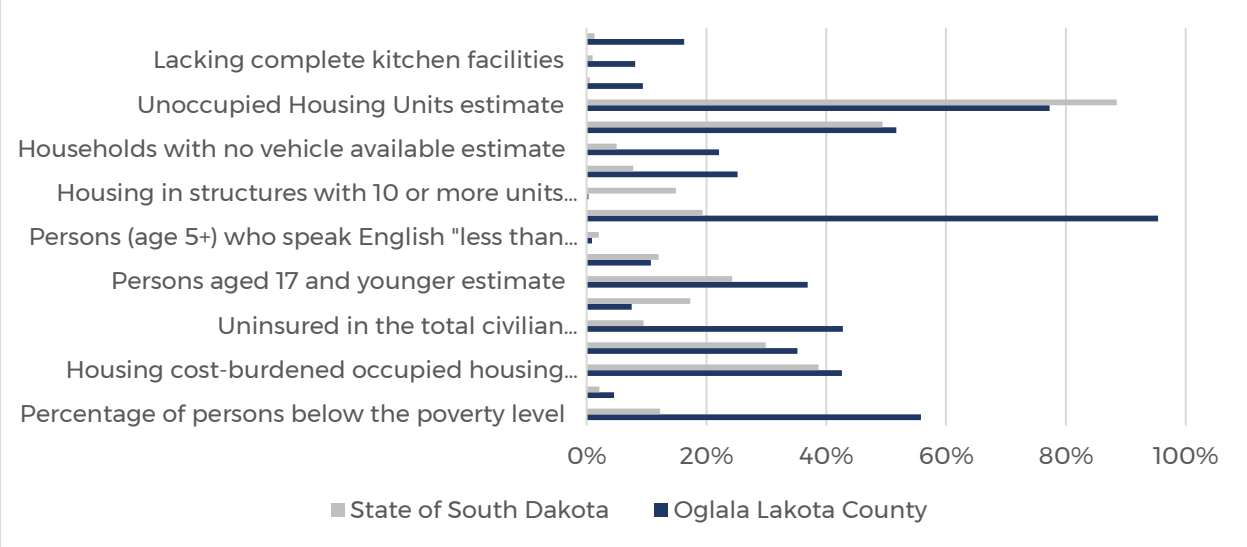
	1980	1990	1980-1990 CHANGE	2000	1990-2000 CHANGE	2010	2000-2010 CHANGE	2020	2010-2020 CHANGE
Oglala Lakota County	11,323	9,902	-12.5%	12,466	25.9%	13,586	9.0%	13,672	0.6%

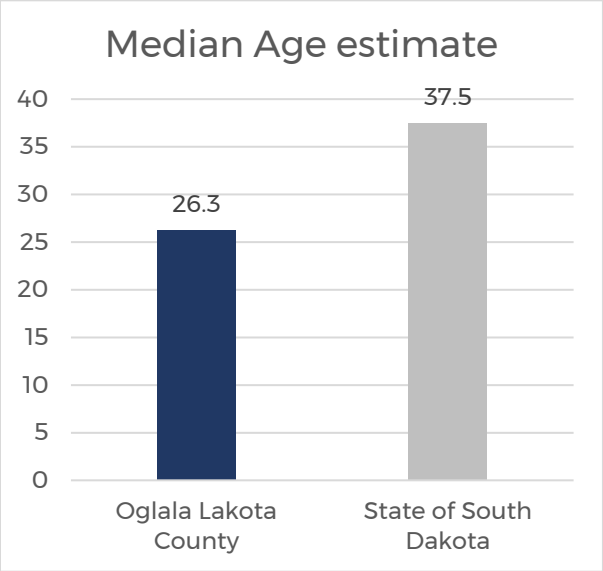
Source: US Census Bureau

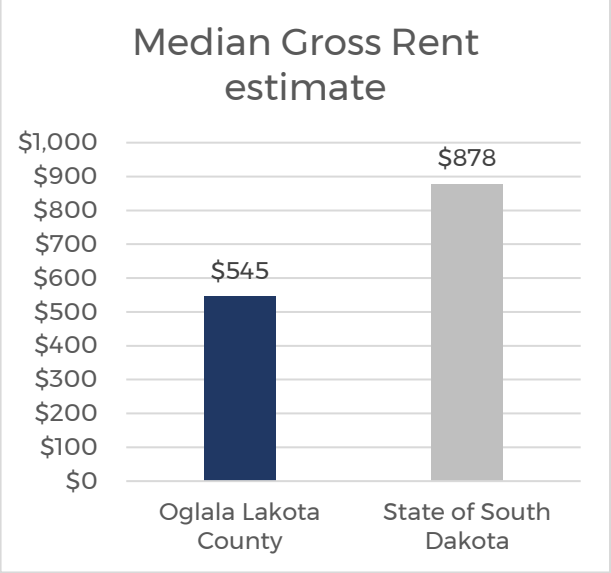
1.2.3 Demographics

The 2022 ACS reports demographic estimates for OLC as summarized in the figure and table below. Many of these characteristics impact overall social vulnerability of a community, as discussed in greater detail in the following section.

Figure A-2 Demographic Characteristics of Oglala Lakota County (2018-2022 ACS)







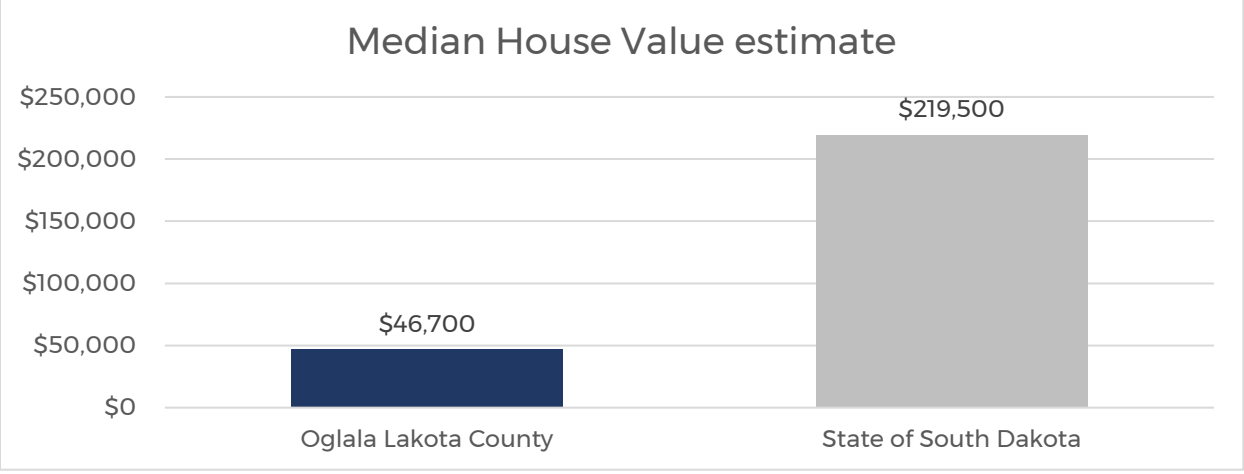


Table A-3 Demographic Estimates for Oglala Lakota County (2018-2022 ACS)

CHARACTERISTIC	OGLALA LAKOTA COUNTY	STATE OF SOUTH DAKOTA
Percentage of persons below the poverty level	55.8%	12.3%
Unemployment Rate estimate	4.60%	2.10%
Percentage of housing cost-burdened occupied housing units (30%+ of income spent on housing costs) estimate	42.6%	38.7%
Percentage of persons with no high school diploma (age 25+) estimate	35.2%	29.9%
Percentage uninsured in the total civilian noninstitutionalized population estimate	42.8%	9.5%
Percentage of persons aged 65 and older estimate	7.5%	17.3%
Percentage of persons aged 17 and younger estimate	36.9%	24.3%
Percentage of civilian noninstitutionalized population with a disability estimate	10.7%	12%
Percentage of persons (age 5+) who speak English "less than well" estimate	0.90%	2%
Minority (other than white non-Hispanic) estimate	95.4%	19.4%
Percentage of housing in structures with 10 or more units estimate	0.3%	14.9%
Percentage of mobile homes estimate	25.2%	7.8%
Percentage of households with no vehicle available estimate	22.1%	5%
Percentage Female estimate	51.7%	49.4%
Median Age estimate	26.3	37.5
Median Gross Rent estimate	$545	$878
Median House Value estimate	$46,700	$219,500
Percent Unoccupied Housing Units estimate	77.3%	88.5%
Lacking complete plumbing facilities	9.4%	0.5%
Lacking complete kitchen facilities	8.1%	1%
No telephone service available	16.3%	1.3%

Source: ACS 2018-2022

1.2.4 Social Vulnerability

Social vulnerability is broadly defined as the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Social vulnerability considers the social, economic, demographic, and housing characteristics of a community that influence its ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards. Additional details on social vulnerability and the National Risk Index (NRI) can be found in the Base Plan.

OLC is one of the poorest counties in the nation, increasing its vulnerability to hazards and decreasing the community resilience and ability to respond to and recover from disaster events. The NRI ranked the social vulnerability in OLC as very high, with a score of 99.11. This places the county higher than every other county in South Dakota, and higher than 99% of counties in the United State. Refer to Section 3.2.2 of the Base Plan for more information on social vulnerability. Several demographic factors which can influence the social vulnerability rating are displayed in Table A-3. For instance, mobile homes are often much more vulnerable to hazard events than stick built and permanent structures. 25.2% of housing units in the County are mobile homes, which is more than 3 times the rate for the State of South Dakota as a whole. According to the ACS the unemployment rate for the County is twice the statewide unemployment rate. The ACS also reports that a significant portion (55.8%) of the population in OLC is below the poverty level, compared to a statewide rate of 12.3%. Additionally, 42.6% of the population in OLC experiences

a housing cost-burden, which is 3.9% greater than the State of South Dakota average, and the number of households without access to a vehicle is more than four times that of the State.

Each of these social, economic, and housing factors can impact individual's ability to prepare for, respond to, and recovery from disasters. Similar to the Tribe, the County has highlighted that they view the entire population as vulnerable to the impacts of hazards. Specific sub-populations throughout the County that are viewed as particularly vulnerable include workers, visiting populations, senior citizens, youth populations (who make up nearly 37% of the overall County population), individuals with disabilities, and lower-income residents.

1.2.5 Development Trends

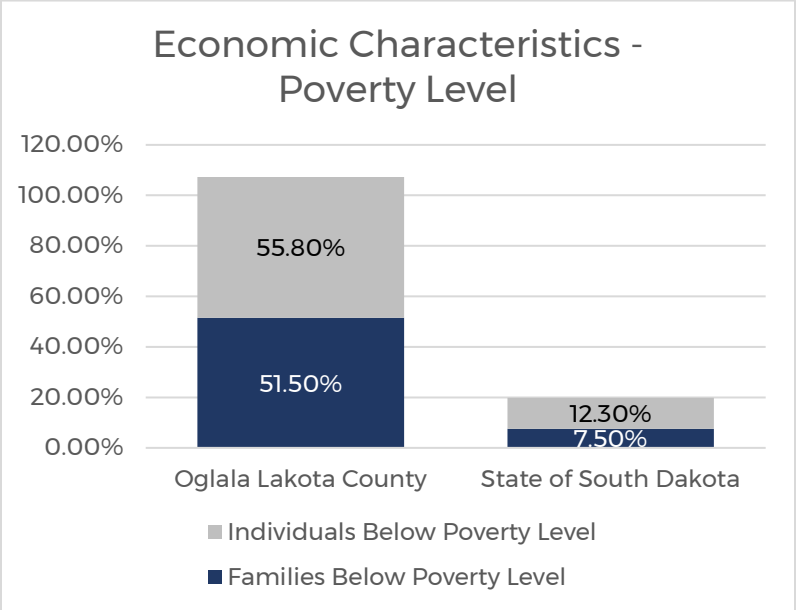
As discussed in the Population Trends section above, the County has generally experienced oscillating periods of significant population growth and loss between official censuses, with the current trend since the 2020 census being a slight population decline. Overall, the County planning team has indicated that there have been no changes in development patterns that would impact the risk and vulnerability of the County to hazards. One ongoing pattern of development that impacts vulnerability for both the Tribe and the County is the informal movement of mobile homes, with residents purchasing them and then moving them onto the Reservation. As there is no formal permitting or enforcement mechanism in place to guide where these homes are placed, they often end up located in areas of high fire danger, exposure to high winds, or areas that flood. This pattern of development has made it difficult for emergency response agencies to not only keep track of new growth and development, but also increases difficulty in response efforts which is further increasing the overall vulnerability of the community to hazards.

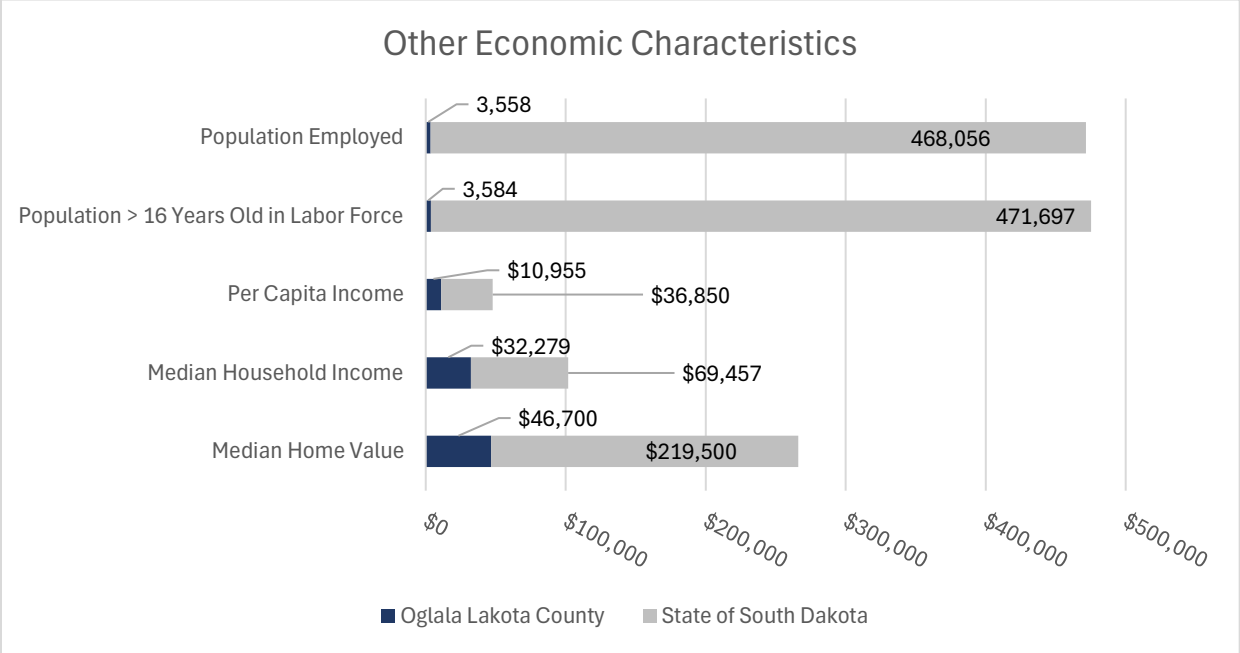
While the entirety of the Pine Ridge Reservation, including OLC, has never been officially mapped by the NFIP, there are known floodplains throughout the County which regularly see impacts and building losses due to the lack of regulation regarding floodplain development. According to the Oglala Sioux Tribal Planning Department, the majority of the Oglala community, the second largest in the County, is within a floodplain. Further growth and development in this community is increasing vulnerability and exposure to flood hazards.

1.2.6 Economy

Table A-4 below provides a brief overview of economic characters in OLC. The following information is provided by the U.S. Census Bureau ACS 5-year estimates from 2018-2022.

Table A-4 Oglala Lakota County Economic Profile





Source: U.S. Census Bureau ACS 5-year estimates, 2018-2022

Table A-5 below shows the breakdown of employment in OLC by the industry sector. According to the ACS, the leading employment sectors in the county are Educational Services, and Healthcare and Social Assistance, which composes almost 40% of the total employment in the county, followed by Public Administration.

Table A-5 Oglala Lakota County Occupation by Industry Profile

ECONOMIC CHARACTERISTICS	OGLALA LAKOTA COUNTY	PERCENTAGE OF WORKFORCE
Agriculture, forestry, fishing and hunting, and mining	170	5.40%

ECONOMIC CHARACTERISTICS	OGLALA LAKOTA COUNTY	PERCENTAGE OF WORKFORCE
Construction	246	7.80%
Manufacturing	38	1.20%
Wholesale trade	54	1.70%
Retail trade	295	9.40%
Transportation and warehousing, and utilities	13	0.40%
Information	0	0.00%
Finance and insurance, and real estate and rental and leasing	86	2.70%
Professional, scientific, and management, and administrative and waste management services	149	4.70%
Educational services, and health care and social assistance	1,233	39.30%
Arts, entertainment, and recreation, and accommodation and food services	246	7.80%
Other services, except public administration	90	2.90%
Public administration	517	16.50%

Source: U.S. Census Bureau ACS 5-year estimates, 2018-2022

1.3 Hazard Identification and Risk Assessment

1.3.1 Identified Hazards

OLC's Overall Hazard Significance* Summary Table provides a summary of the overall hazard significance for the hazards evaluated in this plan. More details on hazards can be found in Chapter 4 of the base plan.

Table A-6 Oglala Lakota County Overall Hazard Significance by Hazard and Jurisdiction*

HAZARD	OGLALA LAKOTA COUNTY	PINE RIDGE RESERVATION
Animal/Crop/Plant Disease	**Medium**	**Medium**
Bombing Range	**Low**	**Low**
Civil Disorder	**Low**	**Low**
Communicable Disease	**Medium**	**Medium**
Dam Failure	**Medium**	**Medium**
Drought	**High**	**High**
Earthquakes	**Low**	**Low**
Extreme Temperatures	**High**	**High**
Flooding	**High**	**High**
Grass/Wildfire	**High**	**High**
Hail	**High**	**High**
Hazardous Materials Incidents	**Low**	**Low**
High Winds	**High**	**High**
Severe Thunderstorms	**Medium**	**Medium**

HAZARD	OGLALA LAKOTA COUNTY	PINE RIDGE RESERVATION
Severe Winter Storms	**High**	**High**
Structure Fire	**Medium**	**Medium**
Tornadoes	**Medium**	**Medium**

*Significance based on a combination of Geographic Extent, Potential Magnitude/Severity and Probability as defined below.

Geographic Extent

Negligible: Less than 10 percent of planning area or isolated single-point occurrences

Limited: 10 to 25 percent of the planning area or limited single-point occurrences

Significant: 25 to 75 percent of planning area or frequent single-point occurrences

Extensive: 75 to 100 percent of planning area or consistent single-point occurrences

Potential Magnitude/Severity

Negligible: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.

Limited: 10 to 25 percent of property is severely damaged, facilities and services are unavailable between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.

Critical: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time or result in many permanent disabilities and a few deaths. overwhelmed for an extended period of time or many deaths occur.

Catastrophic: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time, or many deaths occur.

Probability of Future Occurrences

Unlikely: Less than 1 percent probability of occurrence in the next year or has a recurrence interval of greater than every 100 years.

Occasional: Between a 1 and 10 percent probability of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Likely: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years

Highly Likely: Between 90 and 100 percent probability of occurrence in the next year or has a recurrence interval of less than 1 year.

Overall Significance

Low: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences/impacts or for hazards with minimal mitigation potential.

Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating.

High: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.

1.3.2 Building Inventory and Assets

People, property, critical facilities/infrastructure, and other important assets in OLC are exposed to the hazards identified in this plan. Table A-7 summarizes the property inventory for the County and each participating jurisdiction, based on improvement value (i.e., structures) and includes the building count and value grouped by parcel type and jurisdiction. This is an assessment of the overall property exposed within the County.

Assets inventoried to determine vulnerability include people, structures, critical facilities, economic assets, and natural, historic, or cultural resources. Locally available GIS databases were used in addition to several national databases such as Hazus, Homeland Infrastructure Foundation-Level Data (HIFLD), National Bridge Inventory, National Inventory of Dams, and the South Dakota Department of Agriculture & Natural Resources.

Table A-7 Oglala Lakota County Building Inventory and Value by Jurisdiction

COUNTY	DISTRICT	STRUCTURE COUNT	ESTIMATED VALUE	ESTIMATED CONTENT VALUE	ESTIMATED TOTAL
Oglala Lakota County	Medicine Root	812	$272,467,603	$145,313,783	$417,781,386
	Pine Ridge Village	1,099	$539,984,898	$379,646,642	$919,631,540
	Porcupine	724	$248,705,341	$134,633,846	$383,339,186
	Wakpamni	984	$324,626,789	$169,393,831	$494,020,621
	White Clay	672	$226,001,527	$120,864,303	$346,865,829
	Wounded Knee	529	$191,624,926	$109,302,000	$300,926,926
	Total	**4,820**	**$1,803,411,083**	**$1,059,154,405**	**$2,862,565,488**

Source: Hazus 6.1 WSP Analysis

Total building exposure within OLC based on an analysis of improved parcels is nearly $2.9 billion, with over $1.8 billion in improved value properties and over $1 billion of contents at-risk. Of the nearly $2.9 billion of total building exposure in OLC, Pine Ridge Village is the district with the greatest amount approximately $920 million (32.1%). Each of the remaining districts in OLC are relatively close to one another in total exposure.

Residential properties make up the vast majority of total buildings and property value in OLC, followed by educational buildings.

Table A-8 Oglala Lakota County Total Exposure by Property Type

PROPERTY TYPE	BUILDING COUNTS	BUILDING EXPOSURE
Agriculture	5	$1,875,000
Commercial	41	$65,979,000
Education	24	$217,523,000
Government	10	$2,203,000
Industrial	8	$6,798,000
Religion	8	$3,989,000
Residential	3,321	$978,608,000
Total	**3,417**	**$1,276,975,000**

Source: Hazus 6.1, WSP Analysis

1.3.2.1 Critical Facilities, Infrastructure, and Other Important Community Assets

A critical facility is defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Much of this data is based on GIS databases associated with the 2024 Homeland Infrastructure Foundation-Level Data (HIFLD). Other critical facility databases were also used, such as the National Bridge Inventory (NBI), with supplementation from the HMPC (Hazard Mitigation Planning Committee). Where applicable, this information was used in an overlay analysis for hazards such as flood, landslide, and wildfire.

Figure A-3 below displays the location of critical facilities by FEMA Lifeline in OLC.

Figure A-3 Oglala Lakota County Critical Facilities

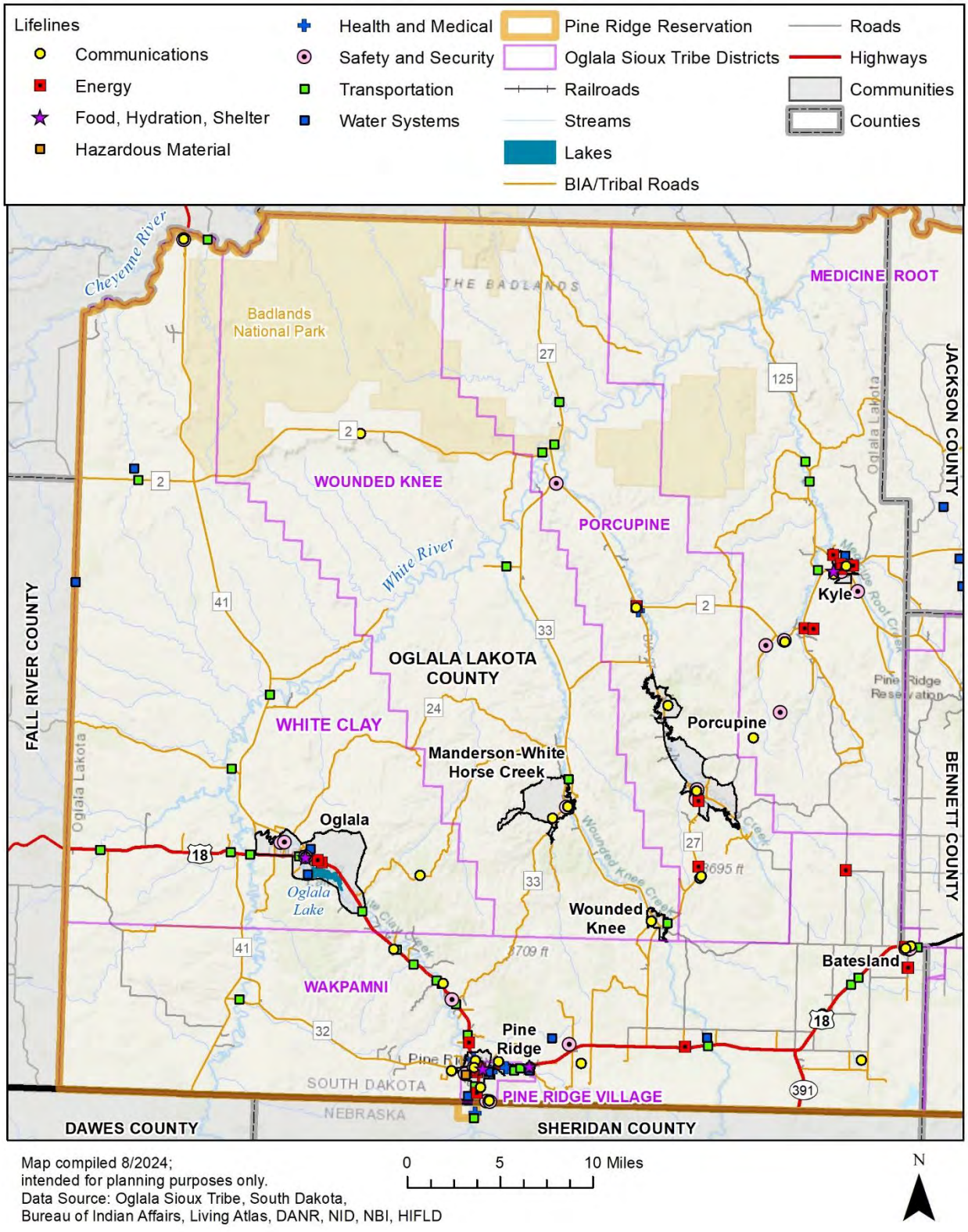


Table A-9 below summarizes the number of critical facilities in the County by FEMA Lifeline Category. In total, there are 148 FEMA Community Lifeline facilities throughout the County.

Table A-9 Oglala Lakota County Critical Facilities by FEMA Lifeline

	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIALS	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL
Oglala Lakota County	29	21	4	4	7	34	36	13	148

Source: Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

In addition to these nationally identified Community Lifelines, there are several specific critical facilities identified by the County as being of significance to the continuous operation of critical business and government functions, human health and safety, or economic security for the County, and in therefore in need of protection and mitigation against the impacts of hazards. These include:

Structures and Economic Assets:

- Schools – Schools are used as shelters during winter storms and play a critical role in the county's ability to respond to hazards. These are identified within the above critical facility analysis under the Safety and Security community lifeline; however, the planning team wishes to emphasize the importance of these assets to the community.

There are **148** FEMA Community Lifeline facilities throughout Oglala Lakota County

- Prairie Wind Casino – This is a major employer and economic driver for the area and plays a significant importance for the Tribe in addition to the county. It may potentially be used for a cooling center in future high heat events. While this facility is not particularly vulnerable to any geologic hazard it is vulnerable to severe weather and atmospheric hazards.
- Batesland General Store (Batesland "Handi Stop") – Local convenience store and gas station located in the Town of Batesland. This store is not only a central gathering point for the Oglala Lakota community, but the store also has a message board that shares important hazard messaging like fire watches and warnings. The store struggles to procure goods/services since transportation and general isolation from city centers is a challenge. It is usually able to be reached via Highway 18 during winter storms, once roads have been cleared by SD DOT, but many roads to it are unplowable and it can create an access challenge during winter storms.

Other Facilities and Infrastructure:

- Lacreek Electric Association Utility Infrastructure – This is the primary source of power for the area that has many exposed lines vulnerable to winter storms. This utility participates in the state hazard mitigation plan and has begun to pursue funding to bury utility lines.

- Golden West Telecommunications – Provides internet and cell phone services to the Oglala Lakota community.
- OLC Highway Shop – Located in the Town of Batesland, this is a critical facility for county operations.
- Emergency Services – Contracted through Bennett County and Oglala Sioux Tribe/Pine Ridge ambulance.

1.3.2.2 Natural, Historic, and Cultural Assets

Assessing the vulnerability of OLC to hazards also involves inventorying the natural, historical, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant more protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a hazard, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

The natural, historic, and cultural assets within OLC are not unique to just the County, playing significant importance to the resilience of the Pine Ridge Reservation and OST as a whole. These elements are discussed in greater detail in Chapter 3: Planning Area Profile.

1.4 Vulnerability to Specific Hazards

This section details vulnerability to specific hazards, where quantifiable, only where it differs from that of the Reservation as a whole. The Vulnerability Assessment section of each hazard identifies which assets are both likely to be exposed to a hazard and susceptible to damage from that exposure.

In this context, assets are:

1. People,
2. Property,
3. Critical facilities and lifelines,
4. The economy,
5. Historic and cultural resources, and
6. Natural resources.

In many cases Chapter 4 contains information that differentiates the risk by county, thus that information is not duplicated here. For most of the hazards the risk does not vary significantly enough from the rest of the Reservation and thus the reader should refer to Chapter 4. Only unique issues or vulnerabilities are discussed, where applicable or where best available information permits. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas and details by jurisdiction and building type. For a discussion of the methodology used to develop the loss estimates, refer to Chapter 4 of the base plan.

- Animal/Plant/Crop Disease
- Bombing Range
- Civil Disorder
- Communicable Disease
- Dam Failure
- Drought

- Earthquakes
- Extreme Temperatures
- Flooding
- Grass/Wildfire
- Hail
- Hazardous Materials Incident
- High Winds
- Severe Thunderstorms
- Severe Winter Storms
- Structure Fire
- Tornadoes

1.4.1 Animal/Plant/Crop Disease

The hazard rating for animal/plant/crop diseases in Oglala Lakota County is **medium**.

According to the ACS 5-Year estimates, about 5% of OLC's industry was classified as agricultural-related in 2022. This is lower than the 8.3% for the Pine Ridge Reservation, making the County slightly less susceptible to agricultural diseases. However, OLC is home to a significant portion of the region's livestock, with 51.4% of all hogs and pigs and 46.8% of cattle and calves on the Pine Ridge Reservation located within the County. This increases the County's vulnerability to animal diseases compared to the Reservation as a whole. Other factors influencing vulnerability, such as biodiversity and water management practices, are largely similar between the County and the Reservation. Animal, plant, and crop disease is a **medium** significance hazard for the County.

Refer to Chapter 4 for a discussion of the risks and vulnerabilities of animal/plant/crop disease relative to OLC and the Pine Ridge Reservation as a whole.

1.4.2 Bombing Range

The hazard rating for bombing in Oglala Lakota County is **low**.

The majority of the Badlands Bombing Range (BBR) is located within OLC, with only a small portion overlapping with Jackson County. The majority of the impacts from the BBR will be in OLC. The BBR is a **low** significance hazard for both the County and the Reservation. Refer to Chapter 4 for a discussion of the risks and vulnerabilities of BBR relative to OLC and the Pine Ridge Reservation.

1.4.3 Civil Disorder

The following instances of civil disorder were identified on the Pine Ridge Reservation in OLC.

The hazard rating for civil disorder in Oglala Lakota County is **low**.

1) **Wounded Knee Occupation:** Around 200 AIM members occupied Wounded Knee for 71 days in response to the murder of a tribal member and the inability to impeach a tribal president accused of corruption. The occupation, the longest-lasting civil disorder in U.S. history, involved taking 11 hostages, two of whom were released after two days. Two American Indian Movement (AIM) members were killed, and at least one other was wounded. A U.S. Marshal was also wounded. The occupation ended with AIM's disarmament.
2) **FBI Shootout:** Leonard Peltier was convicted and sentenced to life in prison for the murders of two FBI agents during a 1975 gunfight on the Pine Ridge Reservation. Doubts about the fairness of his trial persist, with supporters alleging FBI misconduct and arguing that Peltier was wrongfully convicted due to his activism with AIM. His case has become a symbol of the struggle for Native American rights, and despite numerous appeals for clemency, he remains incarcerated.
3) **BIA Bombings:** AIM was suspected of planting bombs at four Bureau of Indian Affairs (BIA) buildings, including the main BIA Office, the BIA Law and Order Building, the OST

Courthouse, and an electrical transformer. These bombings were allegedly in protest of "Columbus Day." The buildings were empty, so no injuries occurred.

4) **Pine Ridge Protest:** Approximately 2,000 OST members marched from Pine Ridge to Whiteclay, Nebraska, to protest the village's excessive alcohol sales to tribal members. The protest escalated into civil disorder, with clashes between tribal members and law enforcement. While no official reports of injuries, deaths, or property damage were made, reporters witnessed physical altercations, looting, and destruction of public property.

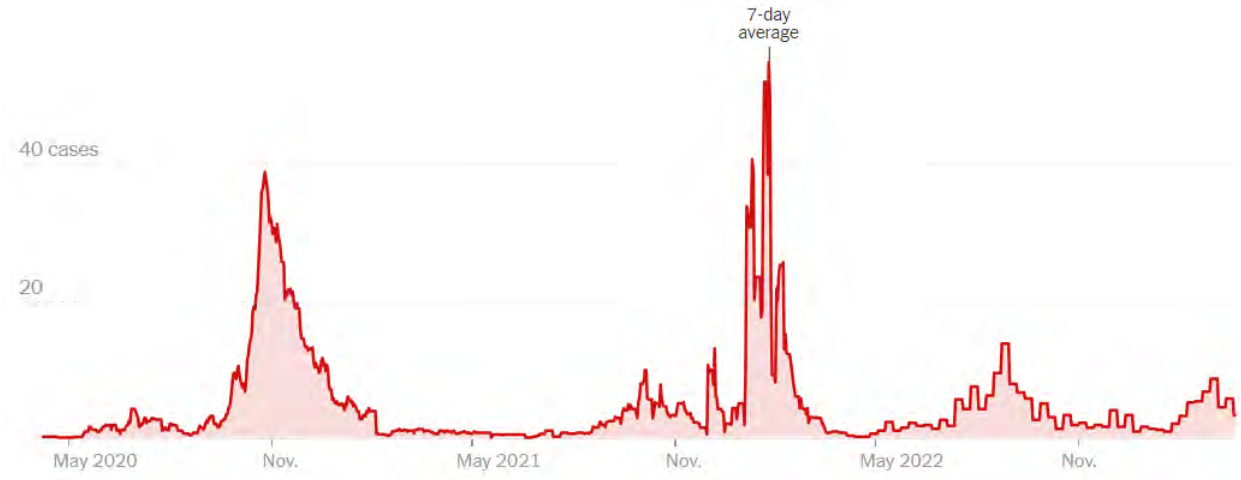
5) The Wounded Knee Occupation and the BIA bombing of the OST Courthouse both occurred in OLC. As the most populous county in the Reservation, Ogalala Lakota has the highest likelihood of civil disorder, but also the most resources to address any future incidents. Civil disorder is a **low** significance hazard for the County and Reservation. Refer to Chapter 4 for a discussion of the risks and vulnerabilities of civil disorder relative to OLC and the Pine Ridge Reservation.

1.4.4 Communicable Disease

The hazard rating for communicable diseases in Oglala Lakota County is **medium**.

OLC has a population density of 6.5 people per square mile, while the Reservation as a whole has a density of 4.4. people per square mile, making the county slightly more vulnerable to communicable disease spread within populations. The seven-day average of newly reported COVID-19 cases in OLC is displayed in Figure A-4 below. In the future, it could be expected that new case of another air-borne pandemic may follow a similar trend. As of March 2023, there were 62 reported deaths attributed to COVID-19 in the County. Additionally, 87% of residents of all ages had been vaccinated against COVID-19, while 92% of people 65 and older had been vaccinated (New York Times, 2023). Communicable disease is a **medium** significance hazard for the County and Reservation. Refer to Chapter 4 for a discussion of the risks and vulnerabilities of communicable disease relative to OLC and the Pine Ridge Reservation.

Figure A-4 Seven-Day Average of Newly Reported COVID-19 Cases, 2020-2023



Source: New York Times "Tracking Coronavirus in Ogalala Lakota County, S.D." March 2023

1.4.5 Dam Failure

The hazard rating for dam failure in Oglala Lakota County is **medium**.

Dam Failure in OLC is ranked **medium**. A dam failure in this area could lead to flash flood, threating nearby communities, including parts of the Pine Ridge Reservation (Table A-10). There are three high hazard dams (all federally owned), two significant hazard dams, and three low hazard dams within the County. Additional high hazard-potential dams exist upstream and could affect the county by potentially damaging homes, agricultural land, and critical infrastructure such as roads and bridges. Figure A-5 displays the location of dams in the OLC area.

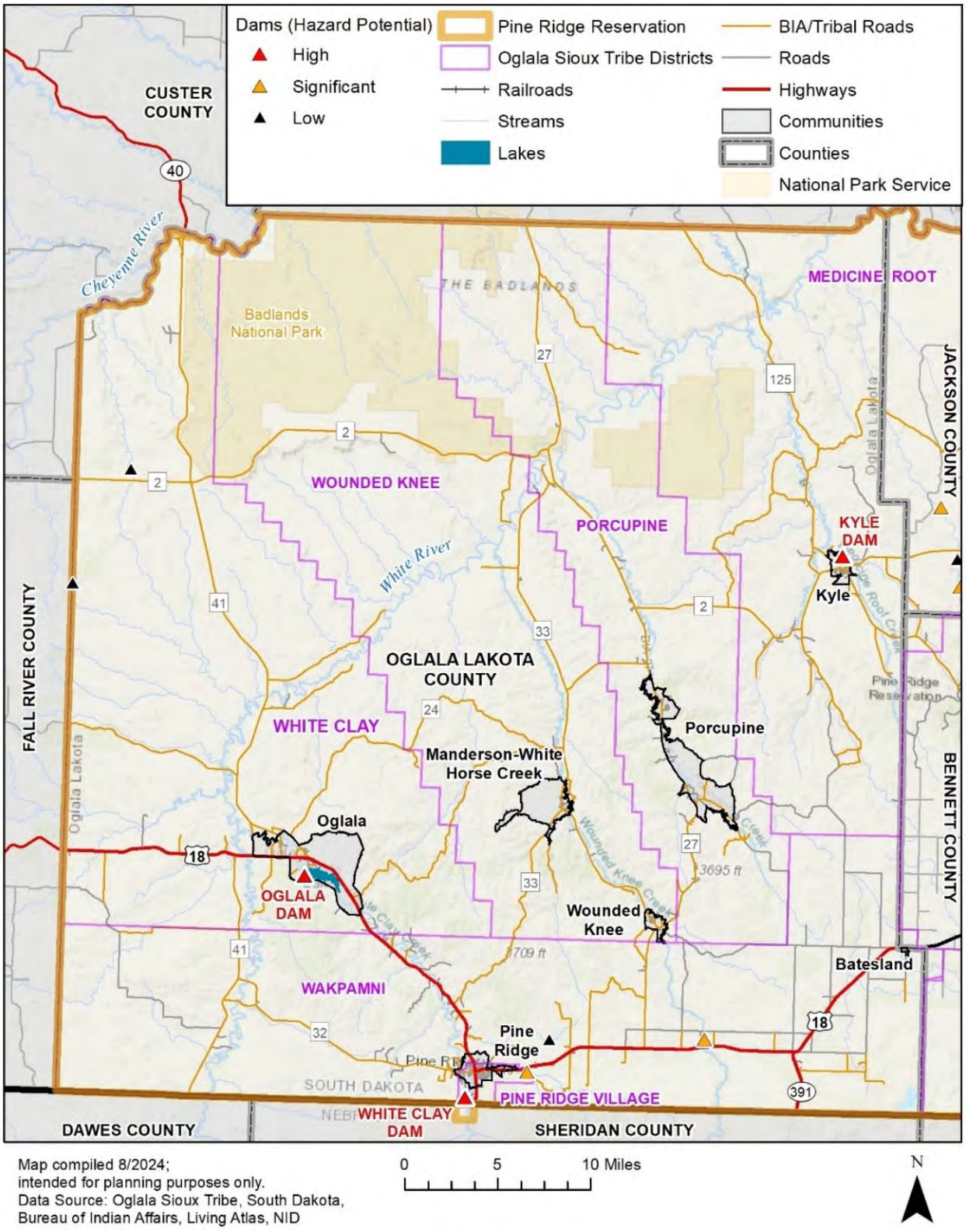
March 2019, the Oglala Dam and White Clay Dam overtopped due to severe flooding and high-water flows. This incident caused several communities from Pine Ridge to Oglala to be put on notice of potential dam failure. The Oglala and White Clay Dams are both in the process of being inspected and repaired for damages.

Table A-10 Oglala Lakota County Dams

HAZARD CLASS	DAM NAME	OWNER
High	Oglala	Federal
High	Kyle	Federal
High	White Clay	Federal
Significant	Denby Dam	Tribal Government
Significant	Wolf Creek	Federal
Low	Tahc'a Okute Mni Onaktake	Private
Low	Chief Dam	Private
Low	Hay Canyon Dam	Private

Source: National Inventory of Dams (NID)

Figure A-5 Oglala Lakota County Dams



Map compiled 8/2024;
intended for planning purposes only.
Data Source: Oglala Sioux Tribe, South Dakota, Bureau of Indian Affairs, Living Atlas, NID

1.4.6 Drought

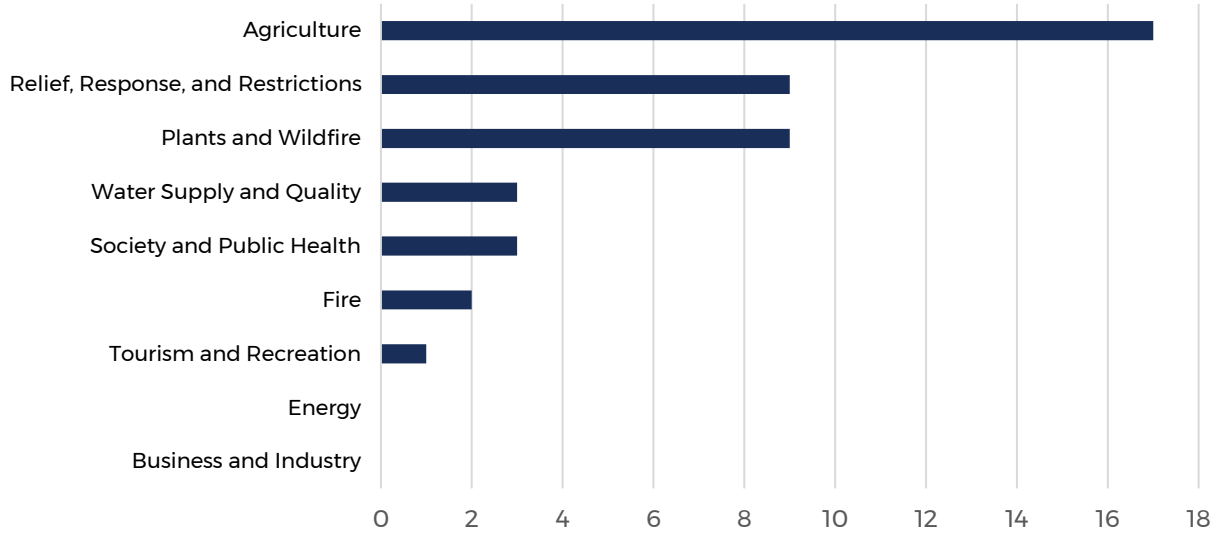
The hazard rating for drought in Oglala Lakota County is **high**.

Of the 95 USDA drought declarations issued for counties that overlap the Pine Ridge Reservation, 20 were specifically for OLC, spanning the years 2017, 2020, 2021, 2022, and 2023 (the impacts of some of these droughts can be seen in Table A-11). Despite being the largest county by area, the relatively lower number of these declarations suggests the County might be somewhat less vulnerable to drought impacts compared to other parts of the Pine Ridge Reservation. Additionally, data from the ACS 5-Year estimates show that in 2022, only about 5% of OLC's industry was agricultural-related, compared to 8.3% for the entire Reservation. This indicates that agriculture in OLC may be less affected by drought than other regions of the Reservation.

Of the tri-county region that overlaps the Pine Ridge Reservation, OLC hosts a significant portion of the region's livestock, including 51.4% of all hogs and pigs and 46.8% of all cattle and calves. This concentration suggests that water shortages impacting livestock may pose a greater economic threat to the County than those affecting agriculture. This is supported by the numerous drought impacts on cattle and grazing lands detailed in Table A-11.

The NDMC Drought Impact Reporter is an online tool created by the National Drought Mitigation Center (NDMC) to collect, document, and map the impacts of droughts across the United States. It serves as the nation's first comprehensive database of drought impacts, allowing users to report local drought conditions, view reports submitted by others, and access data on how droughts affect various sectors such as agriculture, water supply, public health, and more. From January 1, 2000, to December 31, 2023, the County has recorded 21 drought impacts, primarily categorized into agriculture, relief and response measures, and effects on plants and wildlife. These impacts are detailed in Figure A-6 and summarized by year in Table A-11.

Figure A-6 Drought Impacts by Category in the County



Source: NDMC Drought Impact Reporter, 2024

Table A-11 Drought Impacts Summarized by Year

YEAR	# OF IMPACTS	SUMMARY OF IMPACTS
2012	4	To address severe drought, the USDA allowed haying and grazing on previously restricted CRP acres. The southern South Dakota corn crop was heavily impacted, and a drought emergency was declared for the Pine Ridge Indian Reservation and several counties, allowing affected producers to apply for emergency loans.
2013	3	A blizzard killed 80,000 cattle in western South Dakota, compounding the drought's effects. Ranchers faced low water supplies and bare pastures, leading to significant herd liquidations and auctions.
2016	8	Persistent drought in western South Dakota led to reduced forage production, low water supplies, and poor pasture conditions. Additional elk hunting licenses were issued as part of a drought contingency plan. Hay baling activities increased fire risk, and cattle producers struggled with short supplies of pasture and hay.
2017	6	Severe drought has drastically reduced crop production in North and South Dakota, with significant decreases in spring wheat, oats, barley, durum wheat, and winter wheat. Early haying of Conservation Reserve Program (CRP) acres was authorized to aid farmers and ranchers. South Dakota's governor declared a statewide drought emergency and eased transport restrictions for hay and feed. A drought task force was activated to monitor conditions.
2021	1	Intense drought and wildfires in the Dakotas and Montana have destroyed pastureland. Farm Rescue is providing hay relief to affected farmers and ranchers, prioritizing those in extreme drought.
2022	1	South Dakota farmers and ranchers expect drought to continue into spring, with lower stock ponds and surface water. High input costs are causing concern.

Source: NDMC Drought Impact Reporter, 2024

On June 10, 2024, Oglala Sioux Tribal President Frank Star Comes Out declared a State of Emergency for Pine Ridge Village in OLC due to critical issues with the area's water infrastructure. The water system, originally built by the U.S. government before the 1940s, is now outdated and in need of significant upgrades. A project in 2017 estimated the cost of these upgrades at $11 million, although the price is now likely much higher due to inflation.

President Star Comes Out stated that the U.S. government, particularly the Department of the Interior and the Bureau of Indian Affairs, as part of their treaty and trust obligations to the tribe is responsible for maintaining and upgrading the water systems. To ensure access to clean drinking water for those living on the Reservation, he has called on the federal government to release funds to cover necessary repairs and improvements.

Due to the ongoing water supply and infrastructure issues within the County, drought is a **high** significance hazard. Refer to Chapter 4 for a discussion of the risks and vulnerabilities of drought relative to OLC and the Pine Ridge Reservation.

1.4.7 Earthquakes

The hazard rating for earthquakes in Oglala Lakota County is **low**.

Earthquakes are defined as the vibration of earth's surface following a release of energy in the earth's crust. Earthquakes tend to appear along faults and OLC does not have any known fault lines throughout the planning area which mean it is generally considered low seismic activity. Although, there is a 40-mile-long potentially active fault line east of the Black Hills

that can cause some damages. Since 1990, there have been two recorded earthquakes, one having a magnitude of 4.0 and another having a magnitude of 3.2. The potential severity of shaking and impacts to casualties and damage is not uniform across the State but can still affect other areas in South Dakota. The earthquake hazard in OLC is rated as **low**.

1.4.8 Extreme Temperatures

The hazard rating for extreme temperatures in Oglala Lakota County is **high**.

OLC experiences a wild range of extreme temperatures due to its location in the Great Plains and its continental climate. Extreme temperatures are described as extreme heat and extreme cold and are interconnected to hazards such as drought, wildfire, and severe winter storms. Since 2000, there has been only three reports of extreme temperatures in OLC, two being extreme cold and one being heat. According to National Weather Service, there have been 12 heat advisories and 19 freeze warnings in the county (Table A-12). Based on these past occurrences, the hazard rating for extreme temperatures in OLC is **high**.

Table A-12 Heat and Freeze Advisories, Warnings, and Watches, 2005-2023

YEAR	HEAT ADVISORY	EXCESSIVE HEAT WARNING	EXCESSIVE HEAT WATCH	FREEZE ADVISORY	FREEZE WARNING	FREEZE WATCH
Oglala Lakota	12	1	0	0	19	5

Source: Iowa State University Environmental Mesonet

1.4.9 Flooding

The potential for flooding in the County can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. Also, a change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

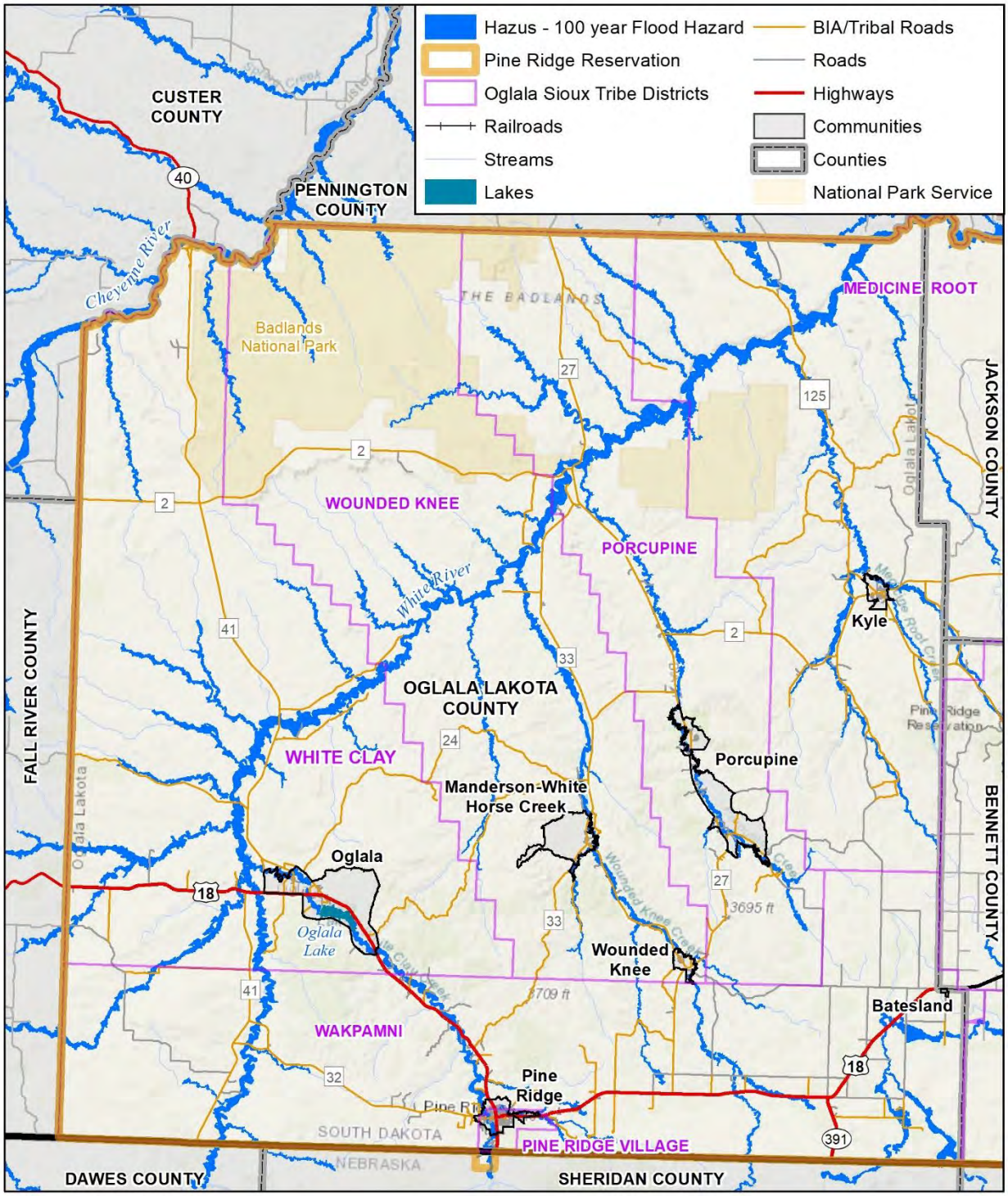
The hazard rating for flood in Oglala Lakota County is **high**.

FEMA has not mapped floodplains for Bennett, Jackson, or Oglala Lakota Counties so a Hazus-derived floodplain was used as a supplement.

Figure A-7 illustrates the 100-year Hazus floodplain boundary for the planning area. As shown, the floodplains closely follow the major rivers and tributaries of the White River and Little White River. The 0.2% annual chance floodplain is also shown; however, it is not easily visible at the current map scale. As shown, there are numerous tributaries and run-off streams and creeks in the County, resulting in the chance for continued inundations and exposure in the county.

According to the NCEI Storm Events Database, since 1996 there have been nearly 30 flood events with close to $1,000,000 in property losses in the County. Based on the historic record and reported incidents by participating communities, flooding is likely to occur annually in the county.

Figure A-7 Oglala Lakota County Hazus – 100 Year Flood Hazard



Vulnerable Populations and Flood Impacts

Vulnerable populations in the County include residents living in known flood prone areas or near areas vulnerable to flash floods. Certain populations that are particularly vulnerable may include the elderly and very young; those living in long-term care facilities; mobile homes; hospitals; low-income housing areas; temporary shelters; people who do not speak English well, tourists and visitors, and those with developmental, physical, or sensory disabilities. These populations may be more vulnerable to flooding due to limitations in mobility and accessibility, income, challenges in receiving and understanding warnings, or unfamiliarity with surroundings.

As mentioned above, during this plan update an estimate of the population exposed to flooding was created using a GIS overlay of existing Hazus 1% annual chance flood hazard areas where DFIRM was not available, to determine potentially flooded buildings. Hazus does not model 0.2% Annual Chance Floodplains, so this analysis was not included. The flood-impacted population for OLC was then calculated by taking the number of residential units in the 100-year floodplains and multiplying that number by the average household size based on the Census Bureau's estimate for the OST. The average household factor was 4.57. The results for OLC are displayed below in Table A-13.

Table A-13 1% Annual Chance Flood Vulnerable Population Estimate in Oglala Lakota County

COUNTY	TOTAL # OF FLOODED RESIDENTIAL BUILDINGS	VULNERABLE POPULATION ESTIMATE
Oglala Lakota	289	1,307
Total	**289**	**1,307**

Source: FEMA, HAZUS, Census Bureau average household estimates, WSP GIS Analysis

1.4.9.1 Property Loss and Flood Impacts

GIS analysis was used to estimate OLC's potential property losses. The 911 Address Points were used as the basis for the inventory of developed buildings. GIS was used to spatially intersect the points with the best available floodplain layers. Another assumption with this model is that every address point has an associated building.

The table below shows loss estimate values which are calculated based upon the average residential value only and estimated contents value. The estimated contents value is 50% of the average residential value for residential; no other property type values were used in this analysis. The total exposure value is the sum of the residential properties and estimated contents values, which is estimated as 25% of the total value based on FEMA's depth-damage loss curves. For example, a two-foot flood generally results in about 25% damage to the structure (which translates to an estimated loss of 25% of the structure's replacement value). The summarized results for the County are shown below in Table A-14.

Table A-14 Oglala Lakota County Flooded Property Loss Estimation Summaries

DISTRICT	TOTAL BUILDING COUNT	RESIDENTIAL VALUES	RESIDENTIAL CONTENT VALUE	TOTAL RESIDENTIAL VALUE	ESTIMATED LOSS
Pine Ridge Village	45	$2,640,000	$1,320,000	$3,960,000	$990,000
Porcupine	47	$3,102,000	$1,551,000	$4,653,000	$1,163,250
Wakpamni	69	$4,554,000	$2,277,000	$6,831,000	$1,707,750
White Clay	12	$792,000	$396,000	$1,188,000	$297,000
Wounded Knee	40	$2,640,000	$1,320,000	$3,960,000	$990,000

Total	**213**	**$13,728,000**	**$6,864,000**	**$20,592,000**	**$5,148,000**

Source: Oglala Sioux Tribe, Fall River County Assessor, Batesville FEMA FIRM 5/13/1980, Hazus Flood Model, WSP GIS Analysis

Based on this analysis, the County's planning area has significant assets at risk to the 100-year floods. There are 213 structures within the 100-year floodplain (1% annual chance), for a total value of $20,592,000. Approximately $5.1 million of that total is based on damage estimates from the 1% annual chance flood alone.

1.4.9.2 Critical Facilities/Lifeline and Flood Impacts

GIS analysis of flood hazards in the County indicates that there are 148 total critical facilities and/or community assets that are potentially exposed to flood hazards. There are 32 facilities in the 100-year floodplain shown in Table A-15. Replacement values were not available with the data; thus, an estimate of potential monetary loss could not be performed. Impacts to any of these facilities could have wide ranging ramifications, in addition to property damage and other cascading impacts.

Table A-15 Critical Facilities at Risk to 1% Flood Hazard (FEMA & Hazus) in Oglala Lakota County

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Oglala Lakota	1	1	-	-	-	-	26	4	**32**
Total	**1**	**1**	**0**	**0**	**0**	**0**	**26**	**4**	**32**

Source: Hazus, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Floodwaters can cut off transportation routes, isolating portions of the planning area. These impacts may last after the flood water recedes as flash floods commonly cause extensive damage to roadway infrastructure. For example, in 2019 the County lost access to roads due to excess flooding during springtime flooding.

Based on the 2024 National Bridge Inventory (NBI), OLC does have a number of bridges of concern; including one fair condition scour critical bridge (a bridge with a foundation element determined to be unstable for the observed or evaluated scour condition), 2 non-scour poor condition bridges (advanced section loss, deterioration and spalling), and 12 non-scour fair condition bridges (primary structural elements are sound but may have minor section loss, cracking, or spalling). Please refer to Figure 4-31 of the Base Plan for more information.

Figure A-8 depicts the aftermath of a 2019 flood on the Pine Ridge Reservation. Rapid snow melt and severe weather in March and April caused widespread flooding in the area. Residents were stranded in homes surrounded by water with emergency rescues and supply drop-offs performed by boat to include the activation of the South Dakota National Guard. Eight thousand residents were left without clean drinking water after floodwaters disrupted the local water distribution system. This resulted in OST EM office distributing over 10,000 cases of water and the National Guard sending "Water Buffalos" to help get relief to residents in these areas.

Based on the above analysis, the hazard rating for flood in OLC is **high**.

Figure A-8 2019 Springtime Flooding on the Pine Ridge Reservation



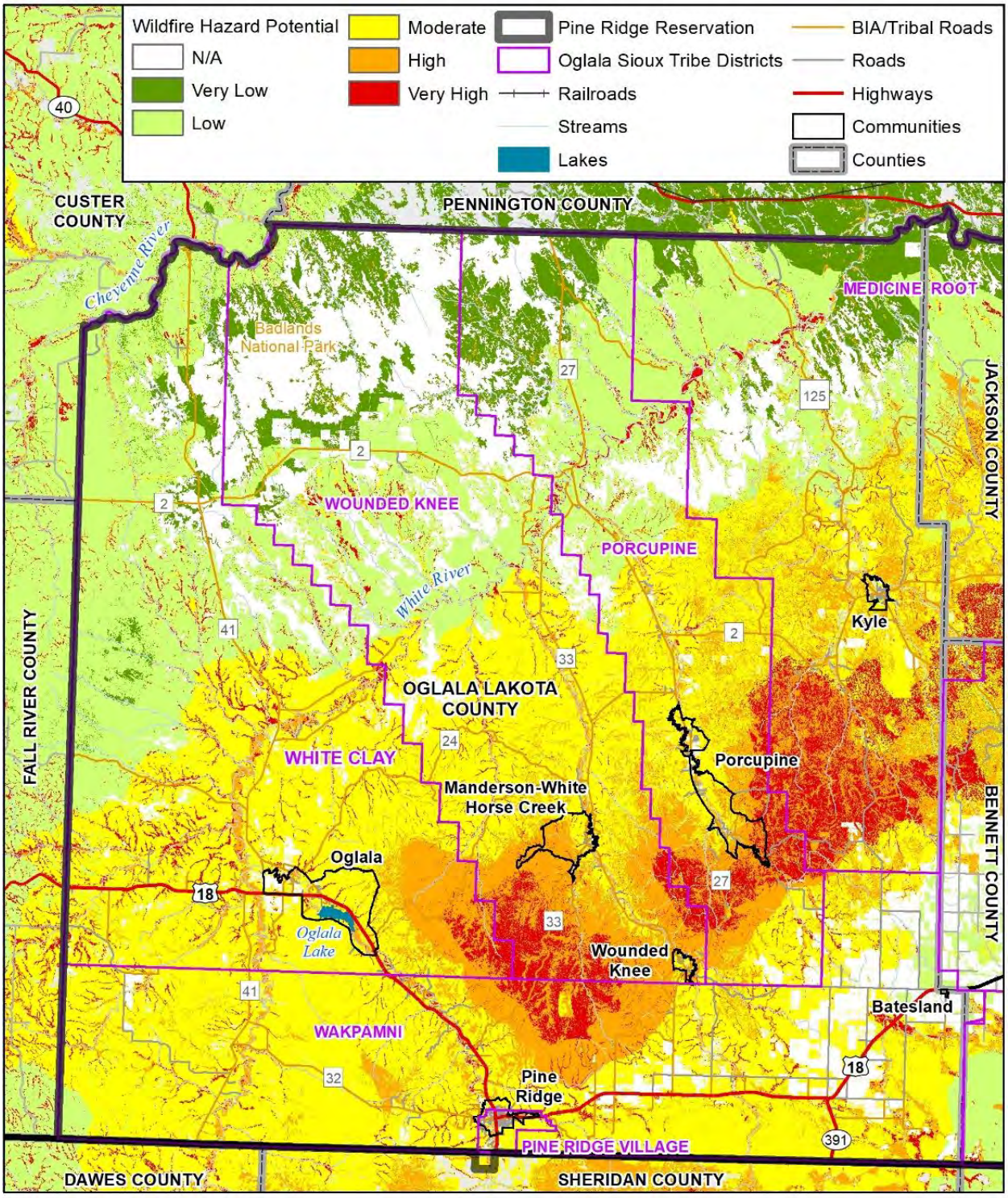
Source: Keloland Media Group, 2019

1.4.10 Grass/Wildfire

OLC is susceptible to wildfires, though the frequency and intensity can vary each year. Droughts and high winds can increase wildfire risk significantly. OLC has, on average, greater wildfire likelihood than 96% of counties in the US, meaning wildfires are one of the greatest threats in the County. Since 2012, there have been 1,440 reported wildfires throughout the county and 133,326 acres burned. Based on this research, the hazard rating for OLC is **high**.

The hazard rating for grass/wildfire in Oglala Lakota County is **high**.

Figure A-A-9 Oglala Lakota County Wildfire Hazard Potential



Map compiled 8/2024;
intended for planning purposes only.
Data Source: Oglala Sioux Tribe, South Dakota, Bureau of Indian Affairs, Living Atlas, USDA Wildfire Risk to Communities 2nd Edition

Vulnerable populations susceptible to wildfire include residents in the Wildland-Urban Interface (WUI) zones. Population at-risk estimates were developed by multiplying the average household size from the U.S. Census Bureau for Pine Ridge Reservation by the number of residential structures found within the Wildfire Potential Hazard areas based on USDA Wildfire Risk to Communities data. These results are shown in Table A-16 below.

Table A-16 Oglala Lakota County Population at Risk of Wildfire

COUNTY	MODERATE WILDFIRE POTENTIAL	HIGH WILDFIRE POTENTIAL	VERY HIGH WILDFIRE POTENTIAL	TOTAL
Oglala Lakota	5,575	873	229	**6,677**

Source: Oglala Sioux Tribe, Fall River County Assessor, USDA Wildfire Risk to Communities 2nd Edition, WSP GIS Analysis

The potential impacts of wildfires on property include a variety of effects, such as the destruction of crops, harm to livestock and pets, and damage to infrastructure, homes, and other buildings within the wildfire risk zone. Property vulnerability increases as closeness to wildfire-prone areas decreases, particularly for structures within the WUI.

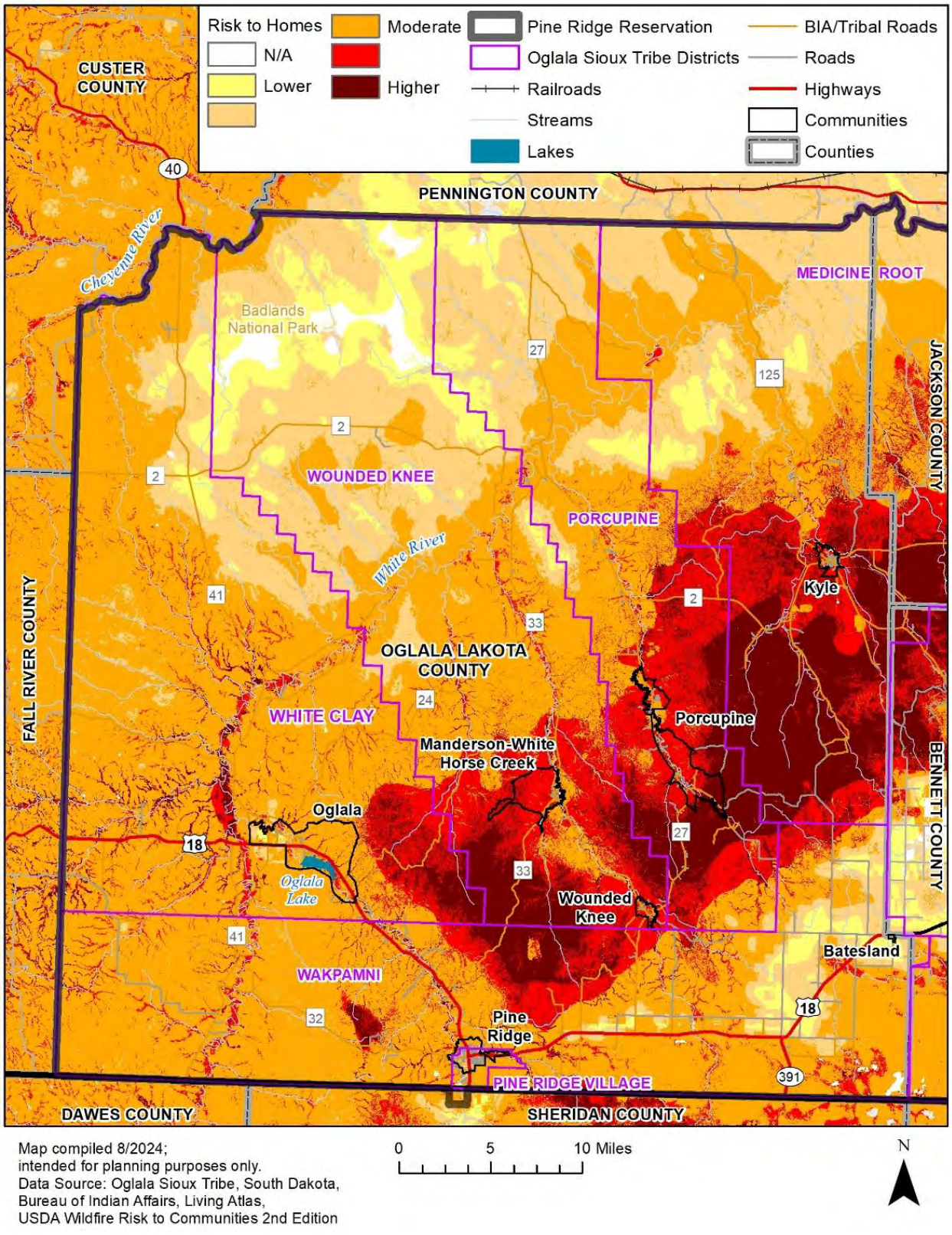
GIS analysis was used to estimate OLC's potential property losses. The 911 Address Points were used as the basis for the inventory of developed buildings. An assumption with this model is that every address point has an associated building. An analysis of the value of those address points (the average residential value plus estimated value of building contents) quantifies the potential losses from wildfires. These results are shown in Table A-17. An estimated $144.6 million in total property value is potentially exposed to wildfire throughout OLC.

Table A-17 Oglala Lakota County Buildings at Risk of Wildfire

COUNTY	BUILDING COUNT VERY HIGH	BUILDING COUNT HIGH	BUILDING COUNT MODERATE	TOTAL BUILDING COUNT	IMPROVED RESIDENTIAL VALUE	ESTIMATED RESIDENTIAL CONTENT VALUE	TOTAL VALUE
Oglala Lakota	53	195	1,240	**1,488**	$96,426,000	$48,213,000	**$144,639,000**

Source: Oglala Sioux Tribe, Fall River County Assessor, USDA Wildfire Risk to Communities 2nd Edition, WSP GIS Analysis

Figure A-10 Oglala Lakota County Wildfire Risk to Homes



Wildfires impacts on critical facilities can include structural damage, threats to individuals within the facilities, disruptions to transportation, shipping, and evacuation operations, and interruptions to facility operations and essential functions. To estimate the potential impact of wildfires on critical facilities and lifelines, a GIS overlay was conducted using the USDA Wildfire Potential Hazard layers and critical facility point data. Replacement values were not available, so an estimate of potential monetary loss could not be calculated. Damage to any of these facilities could have widespread consequences, in addition to property damage and other cascading effects.

Total counts and types of critical facilities by FEMA Lifelines category are summarized below. As shown in these tables, the majority of exposed critical facilities are in the Communications and Transportation Lifelines. Facilities in OLC such as those summarized in Table A-18 through Table A-20 may be exposed directly or indirectly to wildfire.

Table A-18 Critical Facilities at Moderate Risk of Wildfire by County and Lifeline

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Oglala Lakota	7	4	-	-	1	1	7	4	**24**

Source: USDA Wildfire Risk to Communities 2nd Edition, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Table A-19 Critical Facilities at High Risk of Wildfire by County and Lifeline

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Oglala Lakota	5	2	-	-	-	1	1	1	**10**

Source: USDA Wildfire Risk to Communities 2nd Edition, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

Table A-20 Critical Facilities at Very High Risk of Wildfire by County and Lifeline

COUNTY	COMMUNICATIONS	ENERGY	FOOD, HYDRATION, SHELTER	HAZARDOUS MATERIAL	HEALTH AND MEDICAL	SAFETY AND SECURITY	TRANSPORTATION	WATER SYSTEMS	TOTAL COUNT
Oglala Lakota	-	-	-	-	-	-	-	-	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Source: USDA Wildfire Risk to Communities 2nd Edition, Oglala Sioux Tribe, HIFLD, National Bridge Inventory, National Inventory of Dams, SD Department of Agriculture & Natural Resources, Google Maps, WSP GIS Analysis

1.4.11 Hail

The hazard rating for hail in Oglala Lakota County is **high**.

The Storm Events Database managed by the National Centers for Environmental Information (NCEI) is an extensive record of weather-related events across the United States, documenting severe incidents such as hurricanes, tornadoes, floods, and winter storms. The database offers detailed information on the date, location, and impact of these events, including damage estimates and fatalities.

Between January 1, 2014, and December 31, 2023, the database recorded 230 hail events in Bennett, Jackson, and Oglala Lakota Counties. Since this data is aggregated at the county level, some events occurring outside the reservation but within these counties may be included. Of the 230 recorded hail events, 116 occurred in OLC, where almost all reported property damage took place. A summary of these events is presented in Table A-21, followed by a brief overview of selected incidents which have impacted OLC.

Table A-21 Hail Events in Oglala Lakota County, 2014-2024

COUNTY	COUNT OF EVENTS	TOTAL DEATHS	TOTAL INJURIES	TOTAL PROPERTY DAMAGE
Bennett County	49	0	0	$30,000
Jackson County	65	0	0	$5,000
Oglala Lakota County	116	0	0	$325,000
Grand Total	**230**	**0**	**0**	**$360,000**

Source: NCEI Storm Events Database, 2024

- On August 17, 2014, a supercell thunderstorm briefly became severe over southeastern OLC, producing very large hail, including softball-sized stones that damaged property in Oglala, and quarter-sized hail southwest of Wounded Knee.
- On June 21, 2015, a severe thunderstorm developed over northwestern OLC and moved southeast, producing golf ball-sized hail and gusty winds. The storm caused significant damage in Batesland, breaking numerous house and vehicle windows, and damaging siding, roofs, vehicles, and trees.
- On August 14, 2017, a long-lasting severe thunderstorm moved slowly southeast across northern and eastern OLC, producing baseball-sized hail, strong wind gusts, and heavy rain. The large hail caused significant damage, denting vehicles, breaking windows, and damaging property. Rainfall of two to four inches led to flooding on some roads. Baseball-sized hail was reported at the White River Visitors' Center in Badlands National Park.
- On May 23, 2018, a supercell thunderstorm developed over southwestern OLC and moved northeast into southern Haakon County, producing large hail initially and strong wind gusts as it advanced into central South Dakota. The combination of hail and wind was so intense that it broke all the windows on the west side of a house.
- On July 27, a large, long-lived supercell thunderstorm tracked from the Spearfish area across the central Black Hills, southeast through OLC, and into Nebraska. The storm produced large hail and strong wind gusts along its path. The most significant damage occurred in the Oglala area, where hail larger than baseballs damaged over 300 homes

and 100 vehicles, with minor injuries reported from broken glass. Property damage also occurred west of Spearfish due to large hail and strong winds.

- On July 29, 2018, a severe thunderstorm developed over northern OLC and tracked southeast across eastern OLC. Large hail and strong wind gusts accompanied the storm. The storm produced a weak tornado south of Kyle that only damaged some trees.
- On July 3, 2019, a large, long-lived supercell thunderstorm developed over OLC and moved slowly eastward across southern South Dakota through the late afternoon and evening. The storm produced large hail, strong winds with gusts up to 50 mph, and heavy rain, leading to flooding in parts of Oglala Lakota and Bennett Counties. Brief tornado touchdowns were reported and tore the roof from a mobile home. Additionally, a thunderstorm briefly became severe over northern OLC, producing large hail west of Rockyford.

The County is highly vulnerable to severe hail events, as it experiences frequent thunderstorms and very large hailstones, often reaching softball size. These storms cause significant damage to homes, vehicles, and infrastructure, with widespread impacts across multiple communities. Hail is therefore a **high** significance hazard for the County. Refer to Chapter 4 for a discussion of the risks and vulnerabilities of hail relative to OLC and the Pine Ridge Reservation.

1.4.12 Hazardous Materials

The hazard rating for hazardous materials in Oglala Lakota County is **low**.

The NRC Spill Data, which provides comprehensive details on hazardous material spills and releases, recorded 14 incidents across Bennett, Jackson, and Oglala Lakota Counties from 1990 to 2021. Of these, six incidents occurred in OLC. The summaries of these events are outlined below, with additional events from the EPA are included. Notably, two incidents involved the overfilling of storage tanks, and four involved fires at the Pine Ridge Reservation Landfill near Red Shirt. Given that the Reservation's only landfill is situated within OLC, this area may be slightly more vulnerable to the effects of hazardous material incidents compared to other parts of the Pine Ridge Reservation. Hazardous materials incidents are a low significance hazard for the County.

- On June 15, 1993, a fixed incident occurred at Pine Ridge Oil, located near Pine Ridge, South Dakota. The incident involved the overfilling of a storage tank, resulting in the release of 147 gallons of No. 2 fuel oil. The primary cause was operator error. Although no fire was involved, the spilled oil reached the land and soil.
- On March 14, 2001, a diesel fuel storage tank at the BIA Road Shop, near Pine Ridge, experienced an overfill due to operator error. This resulted in the spillage of 200 gallons of diesel fuel into a secondary containment area and onto the surrounding soil. It was discovered that the diesel fuel was within 10 feet of a groundwater monitoring well. The release was secured, but the potential impact on water supplies remains uncertain.
- On June 9, 2011, EPA Region 8's Emergency Response Program received a report of a large, uncontrolled fire at the Pine Ridge Reservation landfill in South Dakota. The fire, which affected about 70 percent (~7 acres) of the landfill, was fueled by poorly compacted waste and uncovered trash, see Figure A-11. Initial attempts to control the fire with soil were unsuccessful, and local firefighters declined to assist due to a lack of suitable equipment. The EPA On-Scene Coordinator deployed to the site on June 12, 2011, and observed noxious gas plumes, decreased oxygen levels, and elevated pollutants, including VOCs and carbon monoxide. The landfill faces challenges with unrestricted

access and limited waste screening, exacerbating the risk of exposure to hazardous materials and potential public health impacts if the facility were to close.

- On June 16, 2013, the Pine Ridge Reservation Landfill was reported to be on fire. The Fire Marshall informed the caller that the blaze, which had been burning for two days, was producing toxic plumes of smoke. The exact materials involved in the fire were unknown. The incident likely had significant impacts on air quality due to potential toxic smoke emissions.
- On November 9, 2015, a landfill fire was discovered at the Pine Ridge Reservation Landfill. The incident involved an unknown amount and type of material, with the fire impacting the air and atmosphere. Remedial actions included requesting assistance from the EPA to address the situation.
- On June 19, 2017, a significant fire occurred at the Pine Ridge Reservation Landfill. The fire involved acres of tires, which were burning and producing huge black fumes. The exact amount of material involved was unknown, and likely had a substantial impact on the air quality in the area. The incident caused severe atmospheric pollution due to the dense, black smoke emitted from the burning tires.
- On November 15, 2017, an individual reported that people were searching for uranium just beyond the Pine Ridge Reservation border, leading her to deploy a radiation detector for one hour. The detector recorded high radiation levels, though it was unclear whether this radiation was naturally occurring or man-made. The report did not include information on whether the radiation had affected anyone's health. Notifications were made as a remedial action, but further details are unknown.

Figure A-11 EPA Working a Pine Ridge Reservation Landfill Fire



Source: EPA On-Scene Coordinator (OSC) Response Sites, 2011

1.4.13 High Winds

The NCEI Storm Events Database recorded 403 thunderstorm wind events in the Pine Ridge Reservation between January 1, 2000, and December 31, 2023. Over half of these events and over

half of the total property damage, as well as the majority of injuries and all deaths and recorded crop damages occurred in OLC. A summary of these events is displayed in Table A-22 below.

Table A-22 NCEI Recorded Thunderstorm Wind Events in Oglala Lakota County, 2000-2023

LOCATION	COUNT OF EVENTS	TOTAL DEATHS	TOTAL INJURIES	TOTAL PROPERTY DAMAGE	TOTAL CROP DAMAGE
Batesland	17	-	-	$2,000	$75,000
Kyle	40	-	-	$33,000	-
Manderson	10	-	-	-	-
Oglala	47	1	8	$178,000	-
Pine Ridge	19	-	1	$50,000	-
Pine Ridge Arpt	25	-	-	$310,000	-
Porcupine	51	-	-	$35,000	$5,000
Red Shirt	11	-	-	$5,000	-
Rockyford	13	-	-	$100,000	-
Sharps Corner	13	-	1	-	-
Slim Butte	6	-	-	-	-
Wounded Knee	1	-	-	-	-
Total	**253**	**1**	**10**	**$713,000**	**$80,000**

Source: NCEI Storm Events Database, 2024

The majority of property damage (42.5%) occurred at the Oglala Lakota Airport, which is a public use airport owned by the Oglala Sioux. While the NCEI Storm Events Database episode narrative does not include information on what specifically was damaged at the airport, it does note that 80 transmission and distribution power poles, a school roof, and mobile homes were damaged or destroyed.

Additional vulnerabilities in the County include mobile homes and trailers, which can be rolled over of have their roofs torn off (see Figure A-12). Trees are frequently uprooted or have branches snapped, leading to secondary damages to structures and powerlines. Roofs of buildings can also be damaged, with shingles and entire roofs being ripped away. Vehicles and equipment can also be damaged by falling debris or direct wind impacts. High winds are a high significance hazard for the County.

1.4.14 Severe Thunderstorms

The hazard rating for severe thunderstorms in Oglala Lakota County is **medium**.

As noted in the base plan, 403 of the 404 thunderstorm events recorded on the Pine Ridge Reservation were thunderstorm wind events, with the remaining event being a lightning event. Of these events, 253 thunderstorm wind events and the single lightning event were recorded in OLC. See Table 4-69 of the base plan and Table A-22 above, as well as the summaries of events and vulnerabilities.

A large portion of Oglala Lakota residents live in mobile homes: 25.2% compared to 20.0% for the Pine Ridge Reservation and 8.7% for the State of South Dakota. Mobile homes are structurally less robust than traditional houses. They are more easily damaged by high winds, hail, and flying debris, and are prone to rolling over, having their roofs torn off, or being complexly destroyed. This increases the risk of injury or death for occupants during severe thunderstorm events.

Additionally, 22.1% of Ogalala Lakota County households have no vehicles available, compared to 17.8% for the Pine Ridge Reservation and 5.2% for the State of South Dakota. Lacking a vehicle increases vulnerability as it limits the ability of residents to evacuate quickly when a thunderstorm or severe weather warning is issued. Without personal transportation, residents may find it difficult to reach safer shelters, leaving them more exposed.

According to the ACS 2022 5-Year Estimates, 33.2% of households on the Pine Ridge Reservation lack internet access, while 35.8% of households in OLC lack internet access. Lack of internet access may delay warnings and alerts, limiting access to crucial preparation information, and hindering communication with emergency services. Without internet, residents may not receive timely updates on approaching storms or be able to coordinate evacuation plans and access emergency resources. This may leave these households at greater risk during severe thunderstorm and weather events.

Thunderstorms are a **medium** significance hazard for the County. See chapter 4 of the base plan for a discussion of the risks and vulnerabilities of severe thunderstorm events relative to OLC and the Pine Ridge Reservation.

1.4.15 Severe Winter Storms

The hazard rating for severe winter storms in Oglala Lakota County is **high**.

Severe winter storms are an annual occurrence for OLC. Winter storms can range from extreme cold, freezing rain, blizzards, etc. Since 2000, there have been 108 severe winter storm events in OLC. According to NCEI, these events have caused $1,100,000 in property damages (Table A-23).

Severe winter storms have significant impacts on OLC, affecting daily life, infrastructure, and community safety. For instance, severe winter weather can cause power outages and hazardous road conditions making it difficult for emergency and medical services in the planning area. This means that all populations in OLC are vulnerable to severe winter weather events. Many residents in the planning area lack resources to keep homes warm in the event of a severe winter storm. Based on this research, the hazard rating for the County is **high**.

Table A-23 Oglala Lakota Winter Weather Events, 2000-2023

COUNTY	BLIZZARD	HEAVY SNOW	WINTER STORM	WINTER WEATHER	FATALITIES/ INJURIES	PROPERTY DAMAGE	CROP DAMAGE	TOTAL DAMAGE
Oglala Lakota	16	8	44	40	0	$1,100,000	$0	$1,100,000

Source: NCEI. The "Winter Storm" column includes events labeled as blizzards, heavy snow, winter storm or winter weather.

1.4.16 Structure Fire

OLC has a population density of 6.5 people per square mile, while the Reservation as a whole has a density of 4.4. people per square mile. The slightly higher population density in OLC increases its vulnerability to structure fires, particularly in areas where fires could spread between buildings. However, rural regions within the County may face significant vulnerabilities as they might have longer response times.

The Pine Ridge Reservation is served by ten fire stations: three each in Bennett and Jackson Counties, and four in OLC. Within OLC, two fire stations are located in Pine Ridge, one in Batesland, and one outside of Kyle. This distribution enhances resiliency in those areas. However, structures in the Oglala and Porcupine areas are at higher risk due to longer travel times for emergency response. The travel time from the nearest fire station to Porcupine is approximately 25 minutes, while travel time from Pine Ridge to Oglala is about 16 minutes. These extended response times can increase the vulnerability of these communities to structure fires.

In June 2024, the Oglala Sioux Tribal President declared a State of Emergency for Pine Ridge Village in OLC due to critical issues with the area's water infrastructure. These water supply issues exacerbate the vulnerability of Pine Ridge Village and surrounding areas reliant on Pine Ridge fire stations, increasing their susceptibility to structure fires and complicating fire suppression efforts. Structure fire is a medium significance hazard for the County. See chapter 4 of the base plan for a discussion of the risks and vulnerabilities of structure fire events relative to OLC and the Pine Ridge Reservation.

1.4.17 Tornadoes

The vulnerability of OLC and the Pine Ridge Reservation are largely similar as both the County and Reservation share similar levels of exposure to tornadoes and severe storms. However, OLC tends to experience more widespread and severe damage to infrastructure during tornado events.

Between January 1, 2004, and December 31, 2023, the NCEI Storm Events Database noted significant damage to infrastructure, such as power lines, mobile homes, and buildings, as well as damage to a school gymnasium. While Bennet and Jackson Counties recorded more frequent damage, the damage was often less severe than that of the County, primarily consisting of broken trees or branches, but also occasionally including damage to a building, barn, or mobile home. A summary of these events is displayed in Table A-24 below.

Table A-24 NCEI Recorded Tornado Events in the Pine Ridge Reservation, 2000-2023

COUNTY	COUNT OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE
Bennett County	10	0	1	$100,000
Jackson County	4	0	0	$0
Oglala Lakota County	8	0	0	$125,000
Grand Total	**23**	**0**	**1**	**$225,000**

Source: NCEI Storm Events Database, 2024

Vulnerability in OLC is further compounded by the large number of mobile homes in the County. A mobile home that had its roof ripped off during a 2019 thunderstorm and tornado event is displayed in Figure A-12 below. According to the NCEI Storm Event Database episode narrative, this long-lived supercell thunderstorm produced a large swath of large hail and strong winds and caused flooding in parts of Ogalala Lakota and Bennett Counties.

Figure A-12 Damage from July 3, 2019, Thunderstorm and Tornado in Allen, SD



Source: National Weather Service, 2019

Tornado is a medium significance hazard for the County. See chapter 4 of the base plan for a discussion of the risks and vulnerabilities of tornado events relative to OLC and the Pine Ridge Reservation.

1.5 Mitigation Capabilities Assessment

As part of the plan development, OLC developed a mitigation capability assessment to update their assessment from 2019. Capabilities are those plans, policies, staffing, and procedures that are currently in place that contribute to reducing hazard losses. Combining the risk assessment with the mitigation capability assessment results in a net vulnerability to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan.

The planning team used a two-step approach to conduct this assessment. First, an inventory of common mitigation activities was made using a matrix and the 2019 plan as a starting point. Second, the planning team conducted an inventory and review of existing policies, regulations, plans, projects, and programs to determine if they contribute to reducing hazard related losses. The purpose of this effort was to identify policies and programs that were either in place or could be undertaken, if appropriate.

1.5.1 Regulatory Mitigation Capabilities

Table A-25 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in OLC.

Table A-25 Oglala Lakota County Regulatory Mitigation Capabilities

REGULATORY TOOL	OGLALA LAKOTA COUNTY
Comprehensive, Master or General Plan	No
Land Use Plan	No

REGULATORY TOOL	OGLALA LAKOTA COUNTY
Capital Improvement Program or Plan	No
Economic Development Plan	No
Emergency Operations Plan	Yes, 2024 Tribal Plan
Floodplain Management Plan	No
Stormwater Management Plan	No
Stormwater Ordinance	No
Zoning or Land Use Ordinance	No
Subdivision Regulation or Ordinance	No
Building Codes	No
Floodplain Ordinance	No
National Flood Insurance Program	No
Community Rating System	No
Wildland Fire Plan	Yes, 2024 Tribal Plan
Transportation Plan	Yes, 2024 Tribal Plan
Historic Preservation Ordinance	Yes, 2019 Tribal Ordinance
Debris Management Plan (post-disaster)	No
Open Space/Conservation Plan	No
Environmental Review Code	Yes, Tribal Codes

Discussion of Existing Regulatory Mitigation Capabilities

Currently regulatory mitigation capabilities in OLC are relatively limited, as the County is considered unorganized and does not have a functioning County seat. The City of Hot Springs in adjacent Fall River County serves as the administrative center for OLC, and has contracted to provide the duties of Auditor, Treasurer, and Register of Deeds for OLC. However, there are some capabilities the County is in the process of or intends to develop.

Discussion of NFIP Participation and Compliance

OLC has never been mapped by FEMA and does not participate in the National Flood Insurance Program. The County and the Pine Ridge Reservation as a whole have known areas prone to flooding, but have thus far lacked the resources and staffing to pursue floodplain mapping and membership in the NFIP. Additionally, as detailed in the HMP base plan, the Town of Batesland does have an identified Flood Hazard Boundary but it does not participate in the NFIP. According to the Batesland Board of Trustees, the Town lacks funding and staffing needing to achieve participation in the NFIP. Batesland instead elects to participate in the SD Municipal Insurance Program for coverage of the Town's physical properties.

Current administrative, technical, and financial capabilities of both the Tribe and the County prohibit them from applying for membership in the NFIP and would also present a significant challenge to maintaining eligibility for membership. Additionally, it has been noted that much of the community would be unable to afford flood insurance even if it was made available for purchase, reducing the potential efficacy of the program.

1.5.2 Administrative and Technical Mitigation Capabilities

Table A-26 identifies the county personnel responsible for activities related to mitigation and loss prevention in OLC.

Table A-26 Oglala Lakota County Administrative/Technical Mitigation Capabilities

ADMINISTRATIVE AND TECHNICAL RESOURCES	OGLALA LAKOTA COUNTY
Planning Board/Planning Commission	No
Floodplain Administrator	No
GIS Capabilities	Yes, Fall River County provides services for OLC (not OST)
Chief Building Official	No
Civil Engineering	No
Local staff who can assess community vulnerability to hazards	No
Grant Manager	No
Mutual Aid Agreement(s)	Yes (fire only)
Emergency Management	Yes, Shared with Fall River County (Southwest District)
Community Planner	No
Transportation Planner	No
Warning Systems/Services (flood)	Yes, Stream gauges on the White River No sirens and no emergency notification systems

1.5.3 Financial Capabilities

Table A-27 identifies the County financial tools or resources that the jurisdictions have access or are eligible to use and could potentially be used to help fund mitigation activities.

Table A-27 Oglala Lakota County Financial Capabilities

FINANCIAL CAPABILITIES	OGLALA LAKOTA COUNTY
Capital Improvement Plan	No
Applied for grants in the past	Yes
Awarded a grant in the past	Yes, FEMA grants to replace culverts, PA funding after disaster events
Authority to levy taxes for specific purposes, such as Mitigation Projects	Yes
Gas/Electric Service Fees	No
Stormwater Service Fees	No
Water/Sewer Service Fees	No
Development Impact Fees	No
General Obligation Revenue or Special Tax Bonds	Yes
Community Development Block Grants (CDBG)	No

FEMA and Other Grant Funding Leveraged for Hazard Mitigation

Funding for the proposed mitigation projects may come from a variety of sources. Below is a list of funding possibilities. This list is not tied directly to each proposed project; however, these programs could work for specific projects or multiple projects.

- FEMA Hazard Mitigation Assistance Grants including:
  - Building Resilient Infrastructure and Communities (BRIC) program
  - Flood Mitigation Assistance (FMA) program
  - Hazard Mitigation Grant Program (HMGP)
- FEMA High Hazard Potential Dam (HHPD) program

- US Army Corp of Engineers funding
- USDA Environmental Quality Incentive Program
- USDA Conservation Reserve and Conservation Reserve Enhancement Program
- USDA Small Watersheds (NRCS)

It is important to note that the HMGP is dependent on federally declared disasters within the State, and funding amounts are based on a percentage of disaster relief costs. There are many more potential funding opportunities available to the municipalities and county. Funding research will be done during the scoping process for each project. New funding mechanisms may be present that were not before. OLC and its jurisdictions have participated in several of these hazard mitigation assistance projects, summarized in the table below.

Table A-28 Oglala Lakota County Hazard Mitigation Assistance Projects

PROGRAM	DATE APPROVED	PROJECT TYPE	STATUS	LOCATION
HMGP	2023-09-08	205.7: Retrofitting Private Structures - Wind	Closed	Oglala Lakota County
HMGP	2017-04-03	93.3: Tribal Multihazard Mitigation Plan - UPDATE	Closed	Bennett; Fall River; Oglala Lakota Counties
PDM		91.1: Local Multihazard Mitigation Plan	Not Selected	Shannon (Oglala Lakota) County
HMGP	2016-10-11	"700.1: Management Costs - Salaries;	Closed	Oglala Lakota County
HMGP	2015-01-09	700.4: Management Costs - Supplies"	Closed	Oglala Lakota County
HMGP	2022-03-21	91.1: Local Multihazard Mitigation Plan	Approved	Bennett; Oglala Lakota Counties
HMGP	2017-04-11	400.1: Utility Protective Measures (Electric, Gas, etc.)	Closed	Oglala Lakota County
HMGP	2021-09-09	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine	Closed	Oglala Lakota County

1.5.4 Education and Outreach Capabilities

Table A-29 below summarizes the existing education and outreach capabilities available to OLC and its jurisdictions.

Table A-29 Oglala Lakota County Education and Outreach Capabilities

EDUCATION & OUTREACH PROGRAMS	OGLALA LAKOTA COUNTY
Ongoing public education or information programs (i.e. responsible water use, fire safety programs, household preparedness, environmental education)	Yes
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations	Yes (CERT, American Red Cross, Salvation Army, VOAD)
Firewise Communities Certification	No

EDUCATION & OUTREACH PROGRAMS	OGLALA LAKOTA COUNTY
StormReady Certification	No
Natural Disaster or Safety-related school programs or curriculum	Yes
Tree City USA	No

1.5.5 Non-Governmental Organizations (NGOs) and Mitigation Partnerships

Table A-30 shows the local chapters partnered with the County.

Table A-30 Oglala Lakota County Non-Governmental Organizations (NGOs)

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)	OGLALA LAKOTA COUNTY
American Red Cross	No
Chamber of Commerce	Yes, Pine Ridge Chamber of Commerce
Community Organizations (Lions, Kiwanis, etc.)	Yes
Environmental Groups	No
Homeowner Associations	No
Neighborhood Associations	No
Salvation Army	No
Veterans Groups	No

1.5.6 Opportunities for Enhancement

Based on the capabilities assessment, OLC has limited existing mechanisms in place to help mitigate hazards, and many of these existing capabilities are through partnerships with the OST. There may be some opportunities for the County to expand or improve on their policies, programs and fiscal capabilities and further protect the community. While OLC is interested in expanding these capabilities, the County is constrained in their ability to do so by a small and rural population to provide services for, limited staffing, and limited funding resources. Currently OLC is working to enhance their capabilities by working to expand community partnerships, such as with churches, schools, and organizations like Kiwanis and Elks Club. OLC has an interest in applying for grants to help establish other mitigation capabilities such as warning systems and sheltering, however limited staffing is a constraint on the management and administration of these grants.

Future improvements may include seeking training opportunities for staff members related to hazards or hazard mitigation grant funding in partnership with the Tribe and the South Dakota Office of Emergency Management (OEM). Additional training opportunities will help to inform OLC and local government staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train staff on mitigation and the hazards that pose a risk to OLC will lead to more informed staff members who can better communicate this information to the public.

Another opportunity for enhancement is to increase public education and outreach efforts on hazards. Creating ongoing public education programs or becoming Firewise and StormReady communities can increase the community's preparedness for hazard events. Improved cross-jurisdictional communication on evacuation and awareness to mitigate life safety impacts during dam incidents, floods, or wildfires including the development of brochures and using existing communication capabilities through social media or other media. Other specific opportunities for improvement include:

- Consider adopting building codes to improve structure resilience to hazards.
- Develop floodplain mapping to better understand the flood risk throughout the County.

- Additional partnerships with area agencies to further develop hazard mitigation programs.

1.6 Mitigation Strategy

This section describes the mitigation strategy and mitigation action plan for OLC. See Chapter 5 of the base plan for more details on the process used to develop the mitigation strategy.

1.6.1 Goals

During the creation of the 2024 OST & OLC Plan, the Tribe and County decided to collaborate and refine their goals from the 2019 plan. The adopted goals are as follows:

- **Goal 1:** Protect Citizens from Injuries and Loss of Life from Hazards
- **Goal 2:** Protect Existing and Future Structures within Hazard Areas
- **Goal 3:** Identify Vulnerabilities and Reduce Losses to Critical Facilities, Utilities, and Infrastructure from Natural and Man-Made Hazards
- **Goal 4:** Preserve the Natural Environment, Cultural Sites, and Resources
- **Goal 5:** Identify Funding Sources to Support and Assist Community Mitigation Capabilities and Efforts
- **Goal 6:** Identify Funding Sources to Improve Emergency Management Capabilities
- **Goal 7:** Identify, Protect, and Conserve all Tribal Water Resources, and Ensure Water Supply Remains Healthy and Available for all Environmental and Community Needs

1.6.2 Summary of Changes since 2019

Several changes have been made to the 2024 Hazard Mitigation Plan and planning process, including: greater outreach efforts for planning team member involvement; expanded and much more in-depth analysis on climate change impacts to the planning area with specific discussion for each hazard; revised mitigation goals; and more detailed discussions on growth, development, and social vulnerability, and how these factors impact the community's vulnerability to hazards. Mitigation strategy changes included an expanded description of each action, as well as added clarification of jurisdictional responsibility per action, funding sources, and other details. This update also works to unify the various planning mechanisms and organizations throughout the planning area (i.e. local emergency operation plans, tribal and county departments, etc.) to ensure that the goals and objectives identified in the plan are consistent with strategies used in the planning area.

During the 2024 planning process, the OLC Planning Team reviewed all the mitigation actions from the 2019 plan. There were 25 total actions included in the 2019 plan, of which 12 actions were developed for implementation by both the Tribe and the County in partnership, and one action was solely OLC. Of their 13 mitigation actions from 2019, one has been completed, while another three were deleted as they were redundant with new actions being refined for inclusion in the 2024 mitigation action plan. Details on these actions are shown in Section 5.6 Table 5-2 of the base plan. Ten remaining actions are being carried forward from 2019 and are in various stages of progress or are implemented annually, demonstrating ongoing progress and building the community's resiliency to disasters. A total of nine new mitigation actions specific to OLC were added to the actions carried over from the 2019 HMP, for a total of 19 actions in the 2024 OLC mitigation strategy.

1.6.3 Mitigation Action Plan

Table A-31 represents OLC's Mitigation Actions and Plan. The process used to identify, develop, and prioritize these actions is described in Chapter 5 of the base plan. The CPT identified and prioritized the following mitigation actions based on the risk assessment, goals, and objectives. They are grouped by hazard(s) mitigated. Background information as well as information on how the action will be implemented and administered, such as ideas for implementation,

responsible office (indicated in **bold font**), partners, potential funding sources, estimated cost, and timeline also are described. Per the Disaster Mitigation Act (DMA) requirement, actions have been identified that address reducing losses to existing development as well as future development.

The Cost Estimate column describes the estimated project costs using the following categories:

- Little to no cost
- Low: Less than $10,000
- Moderate: $10,000-$100,000
- High: $100,000-$1,000,000
- Very High: More than $1,000,000

The Timeline column describes the estimated time of completion for each project using the following categories:

- Short Term: 1-2 years
- Medium Term: 3-5 years
- Long Term: 5+ years
- Ongoing: action is implemented every year

The Status/Implementation Notes column describes the progress made on the actions so far using the following categories:

- **Not Started**: project is carried over from the 2019 Plan; little to no work has been completed.
- **In Progress**: project is carried over from the 2019 Plan; work has begun on the project and is proceeding.
- **Continuous**: project is carried over from the 2019 Plan and is implemented every year on an ongoing basis.
- **New in 2024**: The action is new to this plan update; little to no work has been completed.

Table A-31 below lists the mitigation actions for OLC. The County has developed mitigation actions for each identified hazard in the HMP.

Table A-31 Oglala Lakota County Mitigation Action Plan

#	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
2019-3	Develop and Implement Building Codes and Zoning. Develop, implement, and enforce building standards and codes to provide additional protection to natural hazards. Develop zoning ordinances to prevent development in high hazard areas.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Planning,** OST Emergency Management, OLC Emergency Management	Little to no cost	Tribal and County General Funds, Staff Time	Long Term	High	Not Started. Lack of funding and enforcement capabilities has prevented this action from moving forward. However, it is still being considered by the Tribe and county. OST received BRIC grant in F21 for the TERO office to scope code development and implementation, and support compliance officer and inspector training and hiring. The OST staffer that led this effort is no longer with the Tribe.
2019-5	Education on Mitigation Measures. Establish a community program to increase awareness related to household and community-wide mitigation measures in place. Platforms include: Local media, newspaper articles, county website, school systems, radio, message board at the U.S. Post Office, water bills. Sources: Animal/plant/crop disease information is gathered from the local extension office. Severe summer weather, severe winter weather, tornadoes, high wind information is sourced from the NWS (including storm spotter training and securing property before events) and local information (know where your storm shelter is). Wildfire information is shared from SD Wildland Fire and the FireWise program to promote defensible space and safety information like wearing a mask to prevent impacts of wildfire smoke. SD	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**	Low	DHS, HMGP, Tribal and County General Funds	Long Term	Low	In Progress. This action has been revised with further details for 2024. Anticipated completion date 2027.

#	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
	SOT and SD Pipeline Association for hazardous materials information. Flooding information is also shared from the NWS flooding information. Dam failure information is shared through training and exercise								
2019-7	Establish Shelter Locations. Identify and evaluate current storm shelter locations in communities and schools. These structures do not serve as FEMA approved safe rooms and is not intended for long-term recovery, such as displacement from floods, fires, etc. The buildings could be used for short terms sheltering during high heat events for those without A/C.	Extreme Heat, Severe Thunderstorms, Severe Winter Storms	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management,** OLC Emergency Management	High	HMGP, BRIC, Tribal and County General Funds	Long Term	High	Continuous. There is an ongoing need to inventory existing buildings on the Reservation and identify where meets shelter requirements vs. where shelters are needs/ Ongoing effort by the Tribe to construct multi-purpose buildings within each district to be used for services and community resources (CAP buildings). There has been discussion that these should have shelters in/near them, but cost has been prohibiting factor (Reno, water resources).
2019-18	Provide Emergency Supply Kits. Put together and distribute emergency supply kits to critical facilities to be used in the case of a hazard events.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management,** OLC Emergency Management	Moderate; $100 per kit	Tribal and County General Funds, private donations, faith-based organizations	Short Term	Medium	Not Started. Lack of funding
2019-19	Provide Structural Fire-Fighting Equipment. Evaluate and improve fire-fighting equipment	Grass/Wildfire, Drought	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Housing, OLC Emergency Management,**	Very High	HMGP, Assistance to Firefighters Grant	Medium Term	High	Not Started. Lack of funding. Funding had previously been secured for a new fire department facility, a new

#	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
				OST Emergency Management					vehicle, and some personnel, however project stalled and has not resumed. This is a collaborative effort between the Tribe and the county.
2019-21	Safe Rooms and Storm Shelters. Identify and evaluate existing safe rooms and/or storm shelters. Improve and/or construct safe rooms and/or storm shelters at shelter locations or critical facilities.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**	High	HMGP, BRIC, BIA Housing Improvement Grants, Tribal General funds	Long Term	High	In Progress. Lack of Funding
2019-22	Snow Fences. Construct snow fences to protect main transportation routes and critical facilities from excessive snow drifting and road closure.	Severe Winter Storms	Oglala Sioux Tribe, Oglala Lakota County	**Transportation Department**, Streets, SD DOT, OST Emergency Management, OLC Emergency Management	Low	HMGP, BRIC, DOT, Tribal and County General Funds	Medium Term	low	Not Started. Lack of funding
2019-23	Storm Ready Certification. Work to become a Storm Ready Certified County through the National Weather Service	Drought, Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornado	Oglala Lakota County	**OLC Emergency Management**	Little to no cost	Staff Time	Short Term	Medium	In Progress. Anticipated completion date 2025.
2019-24	Training for First Responder Team. Develop or improve training programs for all emergency response personnel and first responders.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials	Oglala Sioux Tribe, Oglala Lakota County	Police, Fire Department, OST Emergency Management, **OLC Emergency Management**	High	Individual agency staff time, FEMA Assistance to Firefighters Grant, FEMA BRIC, USDA Community Wildfire	Medium Term	High	Annual Implementation

#	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
		Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes				Defense Grants, County General Funds			
2019-25	Update Emergency Operations Plan. Complete and/or update an Emergency Operations Plan	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management, OLC Emergency Management**	Low	Tribal General Funds	Short Term	High	In Progress. Anticipated completion date 2025.
2024-1	Disease and Public Health Preparedness. Program to educate and assist families in creating DIY Indoor Air Filters for families with respiratory issues around fire/burns. Corsi-Rosenthal boxes (inexpensive and help reduce exposure to indoor air pollutants). Community education material: power outage, fire, preparedness and plan accessible to families.	Communicable Disease, Drought, Extreme Temperatures, Grass/Wildfire, Hazardous Materials Incidents, Structure Fire	Oglala Sioux Tribe, Oglala Lakota County	**OLC Emergency Management**, OLC Emergency Management, OST Health Admin., Indian Health Services (IHS)	Low	CDC PHEP, COOP Agreement, Tribal General Funds, Staff Time	Short Term	Medium	New in 2024
2024-2	Education on Disaster Preparation. Educate staff and residents about hazard vulnerability and mitigation efforts. Include information for utility shut off protocols. Integrate hazard mitigation discussions into school curriculums. Activities may include classroom modules profiling certain hazards and discussing preparedness measures. Educational materials, such as brochures and fliers, can be developed and provided to parents to	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OLC Emergency Management**, OST Emergency Management, OST Health Admin., IHS	Low	National Association of Voluntary Organizations Active in Disaster (VOAD), Tribal and County Funds	Long Term	Medium	Revised for 2024. Jesse Big Crow (OST EM Office) conducts outreach and education in Tribal Districts, District Service Centers, etc. Formalizing and expanding the program is desired.

#	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
	increase community-wide hazard awareness.								
2024-3	Weather Spotter Training. Make training more accessible to all communities/districts. This would help community members identify weather threats and help identify impacted areas.	Drought, Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management**, OLC Emergency Management, National Weather Service	Low	NWS Partnership, Tribal General Funds, Staff Time, Volunteer Hours	Medium Term	Medium	New in 2024
2024-6	Hazardous Material Response Improvement. Address the safe transportation of hazardous materials on public highways. Help educate residents about spotting and preventing residential propane leaks or commercial spills, with assistance from vendors of residential propane. Promote a safe and timely response to hazmat incidents (mitigate response calls).	Hazardous Materials	Oglala Sioux Tribe, Oglala Lakota County	**SD DOT,** OST Emergency Management, OLC Emergency Management, OST EPP	High	SD DOT Funding, Residential Propane Vendors, USDOT HMEP Grant, USDOT ALERT Grant	Medium Term	Medium-High	New in 2024
2024-7	Severe Weather Response and Preparedness. Transportation system often fails in severe winter weather and medical operations on the Reservation are overwhelmed. Develop and implement a 511 public notification system regarding severe weather and ensure accessibility for the community. Improve education and public preparedness during inclement weather	Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Severe Winter Weather, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management**, Municipal and County Governments	Moderate	Tribal and County General Funds, NGWS Grant, NWS Severe Weather Program, FEMA EMPG	Medium Term	Medium	Ongoing/Annual Implementation. Revised for 2024. Since 2019 plan, a 511 system has been initiated. Hospitals and all districts received or updated sirens, currently 9 sirens and plans to expand to 24 sirens total. Consider how residents will be contacted across multiple methods. OST Telecoms group (OST 638 Program) constructing cell towers and wiring with fiberoptics over the next few years. Aiming to be no longer reliant on cell towers and investing in new tech is the priority.
2024-8	Mutual Aid Agreements for Emergency Response with neighboring Jurisdictions. Establish formal mutual	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder,	Oglala Sioux Tribe, Oglala Lakota County	**OST Emergency Management,**	Low	Tribal and County General	Short Term	High	Revised for 2024

#	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
	aid agreements with neighboring jurisdictions and entities. Formal agreements are needed between the counties, tribe, and emergency services. The tribe is currently developing agreements between departments. This is a collaborative developing agreements between departments. This is a collaborative effort between Oglala Sioux Tribe and Oglala Lakota County. This includes environmental, law enforcement, community resources, and emergency management initiatives	Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes		**OLC Emergency Management**, Jackson County, Bennett County, Oglala Lakota County, All agencies and Depts., IHS		Funds, Staff Time			
2024-10	Economic Development Initiative to improve economic conditions and security for residents on the Pine Ridge Reservation. There are more than 344 businesses across the Pine Ridge Indian Reservation. This is not counting the marijuana dispensaries. Marijuana dispensaries are at 2-6 to a district. About 400+ businesses across the reservation. Most marijuana dispensaries are sheds or trailers.	Animal/Plant/Crop Disease, Bombing Range, Civil Disorder, Communicable Disease, Dam Failure, Drought, Earthquakes, Extreme Heat, Flooding, Grass/Wildfires, Hail, Hazardous Materials Incident, High Winds, Severe Thunderstorms, Severe Winter Storms, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Planning Office,** OST Emergency Management, OLC Emergency Management	High	CDBG, US Economic Development Administration Grants, SBA Grants	Medium Term	High	New in 2024
2024-11	Structural Mitigation Action. Reservation wide approximately 300-400 homes are over 40 years old. All homes need to be identified and catalogued, and repairs and structural retrofits implemented to improve the safety and climate resilience. 10 homes are dome homes and are anchored down, ensuring they are climate resilient year-round. These homes could serve as a model for future residential improvements.	Earthquakes, Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High Winds, Severe Thunderstorms, Severe Winter Storms, Structure Fire, Tornadoes	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Housing Authority,** OST Emergency Management, OLC Emergency Management	Very High	BRIC, BIA Tribal Climate Resilience Funds, HUD GRRP Funds, HMGP	Long Term	High	New in 2024
2024-12	Mobile Home Mitigation Action. There are approximately 15,000 mobile homes across the Pine Ridge Indian	Earthquakes, Extreme Temperatures, Flooding, Grass/Wildfire, Hail, High	Oglala Sioux Tribe, Oglala Lakota County	**Tribal Planning Office**, Tribal Housing	Very High	Tribal General Funds, BRIC, BIA Tribal	Long Term	High	Revised for 2024

#	ACTION NAME & DESCRIPTION	HAZARDS MITIGATED	JURISDICTIONS	LEAD AGENCY & PARTNERS	COST ESTIMATE	POTENTIAL FUNDING	TIMELINE	PRIORITY	STATUS & IMPLEMENTATION NOTES
	Reservation. Most mobile homes across the Pine Ridge Reservation are outdated and are not climate resilient. Estimate of 1000 to 2000 mobile homes units per district of 9 districts. Support efforts to anchor and retrofit mobile homes to improve safety and climate resilience.	Winds, Severe Thunderstorms, Severe Winter Storms, Structure Fire, Tornadoes		Authority, OST Solid Waste, OST Emergency Management, OLC Emergency Management		Climate Resilience Funds, HUD GRRP Funds, HMGP			

1.7 Plan Implementation and Maintenance

Moving forward the OLC Planning Team will use the mitigation action table in the previous section to track progress on implementation of each project. Implementation of the plan overall is discussed in the following section as well as Chapter 6 of the base plan.

1.7.1 Incorporation into Existing Planning Mechanisms

As described in the capability assessment, the County implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. The County has noted that there are no existing planning mechanisms specific to the County with which the HMP could be integrated. If any are to be created, this HMP would be used as a significant source of information for their development and to guide future decision making.

Where applicable, these existing Tribal mechanisms, which the County has partnered on, could include:

- *Oglala Sioux Tribe Tribal Emergency Operations Plan, 2024*
- *Oglala Sioux Tribe Wildfire Plan, updating 2024*
- *Oglala Sioux Tribe Transportation Plan, 2024*
- *Oglala Sioux Tribe Historical Preservation Ordinance, 2019*
- Oglala Sioux Tribe HMP Risk Assessment informing the creation of zoning ordinance

The process for OLC to integrate the Hazard Mitigation Plan into other community planning mechanisms would involve collaborative partnerships, incorporating existing planning mechanisms, such as OST Emergency Operations Plan, community and partner involvement, external support and resources, and monitoring and updating plans. Because of the County's limited staffing, OLC relies on partnerships with tribal entities, regional planning organizations and state agencies to help provide additional resources for integration efforts. The County can also integrate hazard mitigation priorities into the tribal emergency operation plan, to help ensure that mitigation strategies align with emergency response. Community and partner involvement would allow for the incorporation of public and tribal feedback to ensure that mitigation strategies are effective. Lastly, ensuring that plans are developed or updated regularly will create consistency throughout hazard mitigation goals.

1.7.2 Monitoring, Evaluation and Updating the Plan

OLC will follow the procedures to review and update this plan in accordance with the steps outlined below and in Chapter 6 of the OST & OLC Plan. The County recognizes the importance of reviewing and updating this plan regularly and will update it on a five-year cycle. The OLC Annex to the OST & OLC HMP will be evaluated on a regular basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities.

1.7.2.1 Keeping the Plan Current

At least once every 5 years, this plan will undergo a comprehensive review, update and readoption process as required by federal regulations for hazard mitigation plans. The plan update with respect to OLC will be in accordance with the FEMA Mitigation Planning Policy Guide, effective April 2023, unless this guidance is otherwise updated or changed.

At a minimum, the plan must be reviewed and revised to reflect changes in development, progress in mitigation or adoption efforts, and changes in priorities. It must also incorporate information learned from implementing the plan and the experiences of agencies, municipalities, and other partners in assessing and responding to natural hazards. This includes,

but is not limited to, plan amendments or updates that were identified during the plan maintenance but not yet incorporated.

Changes will be made to the plan based on findings during annual reviews to accommodate for actions that are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions for which implementation has not yet been pursued will also be reviewed during the monitoring and update of this plan to determine feasibility of future implementation. Risk and vulnerability will also be re-evaluated based on current and expected future conditions.

To adhere to the five-year cycle, the hazard mitigation team will hold public meetings to gather input on the plan and its ongoing maintenance, and the final product will be adopted. Additionally, a range of virtual and electronic media options should be offered to ensure participation and input from the communities with limited access.

1.7.2.2 Plan Maintenance and Implementation Steps

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the benefits to the counties, tribes, communities, and stakeholders. This effort is achieved through the routine actions of monitoring meeting agendas for hazard mitigation related initiatives, coordinating on the topic at meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

In order to achieve the above stated intent, OLC will take the following steps to maintain, implement, and monitor the effectiveness of the HMP. In order to monitor plan implementation, OLC will convene with OST quarterly to discuss the plan and monitor progress on goals and mitigation actions. This will be headed up by the Oglala Sioux Tribal Emergency Manager.

In order to evaluate the effectiveness of the HMP, the County and Tribe will convene to review the following topics:

- If the plan goals and objectives are still relevant or need to be updated.
- If and how risk has changed, for example any new growth and development, and recent hazard events.
- To capture and document demonstrated outcomes from mitigation actions that show progress on increasing community resilience.
- Any obstacles to plan implementation and potential solutions.

Both the Tribe and County will also document the completion of any mitigation actions between this plan adoption and the next update. Post-project monitoring will be accomplished through a report summarizing at a minimum the closeout of the project, the successes and challenges for implementation, how the action supported the plan goals, and any lessons learned to inform future mitigation activities. This will be done at least annually, or after any disaster event impacting the county. Prior to this plan updates expiration and the next 5-year plan update cycle, the OST Emergency Manager will convene the planning team and begin the process to update the plan in order to maintain compliance with the Disaster Mitigation Act of 2000. *Appendix E* contains sample worksheets developed by FEMA to assist with the continued implementation and maintenance of the HMP.

1.7.2.3 Continued Public Participation

OLC will continue to seek public participation throughout the plan's implementation, monitoring, and evaluation phases by continuing to engage with residents directly and

providing both electronic and paper versions of the survey to accommodate different preferences to ensure accessibility for all participants. Through public surveys, and continued outreach and education on the survey's objectives, , will allow planning committee members to address concerns and emphasize the significance of their input in creating effective hazard mitigation strategies. The County will leverage social media, local radio, and physical advertisements published in public spaces, town halls, and local newspapers in order to advertise the plan and solicit participation and input from the community.

The County will also provide annual updates on the plan to the County Commission in January and to the Batesland Board of Trustees in the summer.

Appendix A Adoption Resolutions

Note: The records of adoption will be incorporated as an electronic appendix. A sample adoption resolution is provided here. The final FEMA approval package will be included for future reference regarding the five-year expiration date and suggestions for improvement in the next update.

Tribal Hazard Mitigation Plan Adoption Sample Resolution

Resolution # _____

Adopting the Oglala Sioux Tribe and Oglala Lakota County

2024 Hazard Mitigation Plan

Whereas, (name of county or community) recognizes the threat that natural hazards pose to people and property within our community; and

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

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

Whereas, (name of county or community) resides within the Planning Area, and fully participated in the mitigation planning process to prepare this Hazard Mitigation Plan; and

Whereas, the (South Dakota Department of Public Safety's Office of Homeland Security) and Federal Emergency Management Agency, Region VIII officials have reviewed the Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

Now, therefore, be it resolved, that the (name of board or council), hereby adopts the Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan, as an official plan; and

Be it further resolved, Oglala Lakota Office of Emergency Management will submit this Adoption Resolution to the (South Dakota Department of Public Safety's Office of Homeland Security) and Federal Emergency Management Agency, Region VIII officials to enable the Plan's final approval.

Passed: ___(date)___

_____

Certifying Official

RESOLUTION NO. 24-103XB

RESOLUTION OF THE EXECUTIVE COMMITTEE
OF THE OGLALA SIOUX TRIBE
(An Unincorporated Tribe)

RESOLUTION OF THE EXECUTIVE COMMITTEE OF THE OGLALA SIOUX TRIBE APPROVING THE OGLALA LAKOTA SIOUX TRIBE AND OGLALA LAKOTA COUNTY HAZARD MITIGATION PLAN.

WHEREAS, the Oglala Sioux Tribe is a sovereign tribal nation that has entered into treaties as the "supreme law of the land" with the United States government pursuant to the U.S. Constitution Article VI, and is a signatory to the Treaty of Fort Laramie of 1851, 1 Stat. 749 (Sept.17, 1851), and the Treaty of Fort Laramie of 1868, 15 Stat. 635 (Apr. 29, 1868) and continues the nation to nation relationship with the federal government, and

WHEREAS, the Oglala Sioux Tribe has adopted its Constitution and By-Laws by referendum vote on December 14, 1935, in accordance with Section 16 of the Indian Reorganization Act of 1934 (25 U.S.C. § 5123), and under Article III of the Oglala Sioux Tribe Constitution, the Oglala Sioux Tribal Council is the governing body of the Oglala Sioux Tribe, and

WHEREAS, the Article XIII, Section 6 of the Tribal Constitution empowers the Executive Committee to "act on behalf of the Tribal Council when the Tribal Council is not in session" and to "be in charge of all routine matters that arise during such recess, including the administration of the land provisions of this constitution, and such other matters as may be delegated to it by the Tribal Council, and

WHEREAS, the Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan was last updated in 2019, and

WHEREAS, on November 21, 2024, during a Regular Finance Committee Meeting, the Finance Committee approved the Plan and recommend approval; now

THEREFORE BE IT RESOLVED, that the Oglala Sioux Tribe Executive Committee hereby approves the attached Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan, and

BE IT FURTHER RESOLVED, that the Tribal President or, in his absence, the Vice-President, is hereby authorized to sign all documents necessary to execute this action.

C-E-R-T-I-F-I-C-A-T-I-O-N

I, as undersigned Secretary of the Executive Committee of the Oglala Sioux Tribe, hereby certify that this Resolution was adopted by the vote of: 4 For; 0 Against; 0 Abstain; and 0 Not Voting during a REGULAR SESSION held on the 27TH day of NOVEMBER, 2024.

Stacy L Two Lance

STACY L TWO LANCE
Secretary
Oglala Sioux Tribe

A-T-T-E-S-T:

Frank D. Star Comes Out

FRANK D. STAR COMES OUT
President
Oglala Sioux Tribe

RECEIVED
NOV 22 2024
BUREAU OF INDIAN AFFAIRS
OFFICE OF THE SUPERINTENDENT

Oglala Lakota County Resolution #2024-09

Adoption of Oglala Sioux Tribe and Oglala Lakota County 2024 Hazard Mitigation Plan

Whereas, the Federal Disaster Mitigation Act of 2000 was signed into law on October 20, 2000, placing new emphasis on state and local mitigation planning for natural hazards and requiring communities to adopt a hazard mitigation action plan to be eligible for pre-disaster and post-disaster federal funding for mitigation purposes; and

Whereas, Oglala Lakota County recognizes the threat that natural hazards pose to people and property within our community and identifying the hazards that affect the County and prioritize mitigation strategies and undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, Oglala Lakota County resides within the Planning Area and fully participated in the mitigation planning process to prepare this Hazard Mitigation Plan and the South Dakota Department of Public Safety's Office of Homeland Security and Federal Emergency Management Agency, Region VIII officials have reviewed the Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

Now, therefore, be it resolved, the Oglala Lakota County Commission hereby adopts the Oglala Sioux Tribe and Oglala Lakota County Hazard Mitigation Plan as an official plan; and

Be it further resolved, Oglala Lakota County Emergency Management will submit this Adoption Resolution to the South Dakota Department of Public Safety's Office of Homeland Security and Federal Emergency Management Agency Region VIII officials to enable the Plan's final approval.

Passed and Approved this 11 day of October 2024.

Allyssa Comer, Chairwoman
Oglala Lakota County Commission

ATTEST:

Sue Ganje, Oglala Lakota County Auditor

County Auditor State of SEAL South Dakota Fall River & Oglala Lakota

Appendix B: Hazard Mitigation Planning Committee

Name	Agency/Jurisdiction	Title	Meetings Attended		
			Kick-off /HIRA	Mitigation Strategy	Targeted Interviews
Aaron Smith	Batesland VFD	Chief	✓		
Alicia Mousseau	OST Tribal Vice Presidents Office	Vice President			✓
Alyssa Comer	Oglala Lakota County	Commissioner	✓	✓	
Audrey Thompson	OST Solid Waste	Interim Director	✓	✓	
Bob Pille	Seven Years for Seven Generations	Manager			✓
Carole O'Rourke	Pine Ridge Village	District Chairwoman	✓		
D'Ann Her Many Horses	OST Solid Waste	Office Manager	✓	✓	
Frank Maynard	South West District	Emergency Manager	✓	✓	
Gary Baker	Fall River Co	Assistant EM	✓	✓	
Jacob Cousin	OST Vice President's Office	Policy Advisor & Analyst	✓		✓
James Ainslie	Indian Health Services	Director			✓
Jennifer Franks	Indian Health Services	Safety Officer	✓		
Jerry Bordeau	Pine Ridge Cap	Facility Manager	✓		
Jesse Big Crow	OST Emergency Management	Planning & Coordination Specialist	✓	✓	✓
Johaunna Dreamer	OST Chief of Staff Office	Chief of Staff		✓	
Jon Siedschlaw	OST Emergency Management	Deputy Director	✓	✓	
Jr. Rodriguez	Oglala Lakota County	Sheriff	✓		
Justin Baur	BIA	Module Leader	✓	✓	
Marjoe Janis	BIA	Fire Operations	✓	✓	
Nichol Schultz	Town of Batesland	Board Member	✓		
Orren Provost	Ogalala Sioux Lakota Nursing Home	Maintenance		✓	
Patrick Swallow	OST Health Admin	Communicable Diseases		✓	
Rebecca Lone Elk	Oglala District Executive Board	Vice President	✓		
Reno Red Cloud	OST Water Resources Department	Director	✓	✓	✓
Shaina Johnson	OST Tribal Vice Presidents Office	Senior Advisor			✓
Stephanie Cuny	Tribal Planning	Director	✓	✓	✓
Steve Wilson	OST Emergency Management	Director	✓	✓	✓
Tiffany Shangreau	Ogalala Sioux Lakota Nursing Home	Administrator	✓		

Name	Agency/Jurisdiction	Title	Meetings Attended		
			Kick-off /HIRA	Mitigation Strategy	Targeted Interviews
Tonia Ecoffey	OST DOT	GIS Analyst	✓		
Troy Ferguson	OST DPS	GIS Tech	✓		
Wade Vocu	Ogalala Sioux Lakota Nursing Home	House Keeping	✓	✓	
Wendell Yellow Bull	Oglala Lakota County	Commissioner		✓	
FEMA DTA Team					
Dylan Burkett	CERC	Comms & Engagement	✓		
Felicity Selvoski	FEMA Region 8	Community Planner	✓	✓	✓
Kelsey Schill	FEMA Region 8	Hazard Mitigation Specialist	✓	✓	✓
Mark Petitt	FEMA Region 8	Tribal Support Team Lead	✓		
Megan Main	CERC	Comms & Engagement	✓		
Paige Johnson	FEMA Region 8	Hazard Mitigation Specialist	✓	✓	✓
Patricia Gavelda	FEMA Region 8	Tribal Grants Mgmt. Specialist		✓	
Jeff Brislawn	WSP USA	Project Manager	✓	✓	
Christopher Johnson	WSP USA	Deputy Project Manager	✓	✓	✓

Appendix C: Planning Process Documentation

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Appendix C-1: Project Kickoff Materials

Oglala Sioux Hazard Mitigation Plan Update

DATE: 18, April 2024

Attendees:

Name	Organization or Department	Title
OST Representatives		
Steve Wilson	OST Emergency Management	Emergency Manager
Jon Siedschlaw	OST Emergency Management	Deputy Emergency Manager
Jesse Big Crow	OST Emergency Management	Planning and Coordination Specialist
Audrey Thompson	OST Solid Waste	Interim Director
D'Ann Her Many Horses	OST Solid Waste	Office Manager
Jerry Bordeau	Pine Ridge CAP	Facility Manager
Reno Red Cloud	OST Water Resources Department	Director
Stephanie Curry	OST Tribal Planning	Director
Tonia Ecoffey	OST Department of Transportation	GIS Analyst
Troy Ferguson	OST Department of Public Safety	GIS Tech
Carole O'Rourke	Pine Ridge Village District	District Chairwoman
Rebecca Lone Elk	Oglala District Executive Board	Vice President
Tiffany Shangreau	Oglala Sioux Lakota Nursing Home	Administrator
Wade Vocu	Oglala Sioux Lakota Nursing Home	Housekeeping
Jennifer Franks	Indian Health Services	Safety Officer

Justin Baur	Bureau of Indian Affairs Wildland Fire Management	Module Leader
Marjoe Janis	Bureau of Indian Affairs Wildland Fire Management	Fire Operations
Oglala Lakota County Representatives		
Alyssa Comer	Oglala Lakota County	Commissioner
Gary Baker	Oglala Lakota County, Fall River County	Assistant Emergency Manager
Frank Maynard	Oglala Lakota County, Fall River County	Emergency Manager
Jr. Rodriguez	Oglala Lakota County	Sheriff
Aaron Smith	Batesland Volunteer Fire Department	Chief
Nichol Schultz	Town of Batesland	Town Board Member, Business Owner

FEMA and contractors: Dylan Burkett, Chris Johnson, Felicity Selvoski, Kelsey Schill, Mark Petitt, Megan Main, Paige Johnson

Action Items:

- The data collection and GIS needs guide will be distributed to the tribe and county to fill out.

FEMA Action Items:

- FEMA will share the Mitigation Action Portfolio with the tribe.

Meeting Notes:

- Jesse asked if we could add "identify" to the third goal? It would become "Identify and reduce the losses to critical facilities, utilities, infrastructure from natural and man-made hazards."
    - Otherwise, the first three goals remained unchanged.

- Steve mentioned that goal 4 should also include cultural sites and resources. Responsibilities related to these sites have changed to another office, so they may have additions. A few new areas have been identified for cultural significance. Steve wants to be sure that a goal around preserving cultural sites is included. In ESFs, the tribe talks about how to protect those sites from specific disasters.

- For goal 5, the BIA recommended including defensible/survivable space, making sure that fuel has been pushed back from homes and properties. This can be a community team within the districts.

- The Oglala Lakota County representative stated that there is a dollar sign behind Goals 5 and 6. The financial capability to accomplish these goals do not exist. Consider adding a goal 7 to find the funding to support previous goals.

    - FEMA stated that they are working to identify potential funding streams that exist for actions to provide those when the tribe or county develops a project.

    - We don't need all the answers today. If there is an issue that needs to be dealt with that does not seem financially feasible, FEMA can help identify funding mechanisms.

- Jesse supported developing a separate goal for protecting cultural and heritage sites and resources.

Are there locations or people that may particularly be vulnerable to the impacts of hazards?

- OST EM stated that Bennet and Jackson County should be involved in the planning process if planning for the entire reservation.

- IHS stated the tribal nursing home is on tribal land but lies in Nebraska.

- OLC mentioned that Bennet County's HMP is out for review.

- The water resource department should be included as a partner.

- Reno Red Cloud is producing a drought plan that can be reviewed to inform this plan.

Are there any opportunities for outreach at scheduled public meetings or events?

- The Sherriff stated that Bennett and Jackson County should be at the table. The survey states "Pine Ridge Reservation" but the other two counties are not at the table. The reservation is three counties in one. Disasters do not care about boundaries.

    - Jesse asked if "a representative of an organization would suffice".

    - The wording of the survey doesn't need to be addressed; they should just be at the table. OLC Sherriff stated, "Our people are our people no matter what county they live in."

    - Surrounding areas need to be involved in planning.

- OLC stated that we can gather information and create a more regional approach to the planning effort.

What are the best ways to communicate information to the public?

- The planning director stated that the Oglala Lakota people have the "ostrich effect". It's hard to find the best way to communicate. An example is the ongoing climate change crisis.
    - FEMA's contractors have a behavioral science that can be involved. They can work on how things can be made more personal/accessible.
- D'Ann stated that a lot of people at the CAP office don't know how to read or write. To get surveys done, the planning team will need to go door to door. Getting people to community meetings is hard. There is always something that stops them. To get an official census, we have to go door-to-door.
    - Phone calls will work too. Some people don't like others in their space.
    - The survey is only one method. We don't have to bring the survey door-to-door and ask the full list of questions. This isn't the only way to receive feedback.
    - Batesland asked if community members did not feel comfortable filling it out and mailing it in, is there a phone number that can be called? Not currently, but FEMA will work with the tribe to set something up.
    - The tribe can set parameters on how they want their feedback incorporated into the final plan.

Are there locations or community members who may be hard to reach and vulnerable to the impacts of hazards?

- The tribe stated, "most people". Many people are off the roads and winter hazards cause issues associated with access.
- The OLC stated that public service announcements are great. Radio stations can be used to be asked for input. Broadcasts don't break down or fail by internet.
    - KILI and KZMS
    - Creates relationships. Social media pages become negative.
    - If there is a way that can be flagged what programs people are listening to, we'd like to tap in wherever we can.
- The end of the year cookout invites all communities. Residents of all age attend.
- Oglala Lakota College has career fairs.
- District bounties.

- Children are often great messengers. They can help relay information to those who may not speak English as a first language.

What plans, reports, or studies may impact mitigation planning and should be reviewed for this process?

- The tribe does not have a lot of the plans. A Dam Safety plan has been updated since the previous plan.
- There are some things that have been updated, but the tribe does not have a lot of other plans to incorporate.
- DOT stated that the tribe has an agricultural resource management plan, but they are unsure who has this. It may be the tribal land office.
- The tribe is not considering the NFIP anytime soon. However, they would like to have tribal lands map to assist in planning for hazards.
- Does the housing department have plans?
    - The answer was unsure.
    - This could be a good place to start for mapping efforts.
    - We need to understand what the primary focus should be versus what we should look at later down the line.
- OLC sheriff stated that each of the plans come with a cost. This is why they do not have many of them.
    - The cost of maintaining is an added deterrent.
    - Having a tribal and county planning department would be nice, but there is a cost.
    - The tribe does not have the ability to fully carry plans out.
- Felicity stated that steps can be broken down into smaller pieces. If it is hard to accomplish or won't happen in five years, phased approaches can help.
- They do not have to be full plans; it can be any document.
- There are meetings on the 23rd of each month to begin reviewing the environmental code from the 1990s. The process is just starting.
- The planning director stated that the tribe does need to review environmental codes due to the climate crisis. People will be moving to the area. The air pollution codes are terrible here. They need to update these codes now to prepare for the next ten years. The tribe expects that more people will be moving to the area.
    - Tribe members only worry about 1-2 years ahead. It's hard for people to know what's coming. Other tribal nations are facing crises, and this one should be prepared for that.

  - The economic development plan is important.
  - Women will be impacted the most. They'll be working more, and mental health will be a crisis related to climate change.

- Fall River does not like planning. They associate it with government overreach. If they do nothing, nothing will happen.
- The tribe does not have a tax base to tax.
  - Creating, enforcing, and implementing plans and codes are all issues the tribe faces.
- How can we tie these kinds of projects to the proper funding sources that can help take these on?
  - FEMA will attempt to create a roadmap type of document that can be used to identify funding sources for each plan/project.
- The planning department was funded by USDA.
  - Buildings are outdated. Building codes would need to come later.

Has the 2019 plan been referenced or integrated into other planning processes or programs? Are there any related planning efforts or projects underway that impact mitigation?

- The transportation department has done work that includes efforts to integrate mitigation into their efforts.

What have challenges been with implementing mitigation projects and actions since 2019?

- Resources and boundaries were answers heard earlier in discussion.
- The planning director stated that when the tribe files for a state of emergency related to the climate, they'll be considered in a lottery system. This deeply impacts the reservation's chances of being selected. They emphasized putting more effort into the mitigation strategy.
- Grants are seen as a black hole that gets the tribe in trouble. It may all look good on paper, but it just hurts the tribe more than anything.
  - A lot of it deals with match.
  - When the planning director submitted the promise zone document, she was notified that it can't be used as a federal match.
  - There are many hurdles and issues associated with grants.
- For the sheriff, the biggest challenge is knowing what you can use the grant for. Every grant comes with restrictions on what can be done with it. Additionally, it's made harder to get the grant.

- The emergency manager responded with a reason that we've partnered with DTA is knowing what needs to be in place to use get and use the grants.
- The emergency operations plan contained all nine districts. DTA can help identify grant opportunities and whether they're worth applying for.
- The BIA folks are emergency managers, they just focus on wildfire. They do some of this and can offer technical assistance as well just on a smaller scale. If there is a need for technical assistance, they can help as needed.

The emergency manager stated that some of the questions being asked get into whether the tribe want to cover specific hazards that may have sensitivities available to the general public. Think of what hazards belong in what plans. This plan should not contain information sensitive to anyone's position.

DOT asked where the animals would fit in? Many animals have diseases that may impact hunting of animals on the reservation.

Hazards Discussion

AGRICULTURAL PEST

- Due to the climate crisis, a lot of people depend on picking and selling berries/crops. Variable temperatures are going impact the growing of crops and vegetables.
- Rising commodity prices also impacts the growing of agriculture.
- Choke cherry trees are being killed by "worms" related to climate change. Trees by the river grow black fungus that is killing them. The fungus causes trees to snap and break in high winds.
- High winds and hail can impact traditional plants and gathering practices. Buildings, infrastructure, and farms are being destroyed by high winds and storms.
    - Thunder Valley
    - Wounded Knee
- A lot of the tribe's nonprofit organizations are being hit hard. There is no insurance to protect many against hail.
- There are issues with beavers building dams.
- In 2019, ponderosa pines looked stressed, then a forester found a fungus. The BIA monitors this, and there are some ways to mitigate this. The BIA did a timber improvement project in the Eagle Nest area. It pulls a lot of water out of the ground, but the result is a strong tree.
- There are invasive species in the area.

- It was agreed upon that agricultural pest should be changed to animal, plant, and crop disease.

BOMBING RANGE

- The emergency manager stated that this is not necessarily a hazard right now. It's in the Badlands area where erosion and flooding happen. Hiking and farming happen a lot in these areas. This hazard shouldn't be excused just because it hasn't happened. Those that don't know the difference between practice rounds and live munitions are more at risk.
- Wildland fires can impact this area which can make this more dangerous. Cleanup has been attempted a few times, but it is a large effort that will likely not happen soon.
- The BIA stated that there is a plan in place for a fire in the bombing range area because it is not known what is there.
- DOT stated that this area also has a cultural, paleontological, and tourist resource.
- The emergency manager stated that Shawn Swallow would be the person to see on this hazard for Stephanie.

CIVIL DISORDER

- Online discourse – how can this fuel civil disorder?
- The Indian health representative stated that if first responders are put in danger, the health systems can see a surge of patients.
- With Covid, people kind of disregarded did what they wanted to do. This caused more people to need testing/medical care. This is not disorder, but people did not follow regulations.
- Would drugs and gun violence fall into this category?
    - Three days ago, Pine Ridge School was locked down due to an active shooter.
    - Violence has skyrocketed.

COMMUNICABLE DISEASE

- The tribe does have a large population with underlying health issues. They knew they couldn't stop Covid but wanted to curb it so they wouldn't get overrun.
- They did use field hospitals. Tribal officials YouTubed how to build ventilators because they knew they couldn't get them.
- A mobile morgue was purchased but luckily not used.
- Heart disease, cancer, and diabetes are common for many older tribe members.

- An Emergency Support Function (ESF) will include how to decipher everything that has been put together ordinance-wise. There are things that have been put together that will show future tribe members what the tribe went through, what worked/what didn't, and how many were lost.
- HIS and Native Women's Guild are partner organizations that other tribes wanted to sell their portions of. This strains the healthcare network.

DAM/LEVEE INCIDENT

- For the Oglala community there are six houses in a lower settled area that would be flooded when the dam releases floodwater.
- This also could flood the main ways into the area.
- Reno stated that in 2019, there were emergency action plans implemented. The BIA does have emergency action plans, but they should be updated. Many contacts in the plans are no longer active. He shared experience of an emergency response plan that he was required to update every so often.
- The tribe will be looking at climate change issues from now on.
- There are four updated plans for dams on the Reservation that the emergency manager will obtain for this plan.
- Red Jacket stated that when she was little, she'd play at the creek outside of Oglala. Back then there was only one creek, but there are now two creeks after the sewer was installed. It smells like poop every day. Kids fish in this creek that is literal sewage. Nothing will be done with it. Now, a rancher has cattle in the are so now there is cow feces on top of human feces. The entire area used to be enjoyable but now it's nothing but a hazard.
- Fish had e. coli. and were drained through the reservation.
- The OLC stated that the last plan stated the notification protocol wasn't stable. The county asked if this protocol had changed.
    - The tribe stated that they had not heard anything.
    - Those that are within flood areas receive notices as according to the BIA plan.
    - The safety of dams is put under BIA Fire. They have hired two individuals for safety of dams now.
    - It has likely changed now because there are people hired to do this job.

DROUGHT

- Reno stated that the tribe does have a drought adaptation plan that they follow. It contains a vulnerability and risk assessment. All vulnerabilities were identified. They received a tribal resilience grant from BIA this year. Wells that were made ineligible for public drinking water due to an update in requirements will be converted to

fill stations for fire suppression, cattle water, irrigation, etc. It was originally a public water system but cannot be used anymore.

- Reno is also working on a weather station setup. South Dakota Mesonet operates in Oglala but 7 more will be added in the next two years. In the past, the tribe has depended on BIA, NWS, and NOAA equipment to monitor historic weather events.
    - The stations don't currently have alerts with them but that is something that is being explored.
- Change language to extreme wildfire behavior. If we're in drought, everyone is in drought, so the availability of resources is suppressed.

EARTHQUAKE

- Attendees confirmed that they have experienced shaking.
- 3 miles from Manderson-White Horse Creek there is a crack in the planning director's mom's ceiling. Some houses have cracks in their walls and even their basements.
- Some of this could be caused by expansive soils - caused by changes in moisture and differing soil types. These can increase vulnerability meaning earthquakes that would normally not cause damage, will.

EXTREME HEAT

- There are issues trying to keep buildings cool as temperatures rise. Brown outs are more common as associated with extreme heat.
- Extreme cold is another issue.
- Deciding where power loss is going to be is an issue. EM has had to shut power off because the state is not prepared.
- Agricultural disease should be its own hazard.
- Rattlesnakes are adapting to not rattle their rattles when under threat.
- An electric vehicle charging station was turned down because of extreme heat. One exploded in Rapid City
- Road from Manderson to Rocky Fort is still damaged due to extreme heat.

FLOODING

- Contamination from flood waters is a concern and happens a lot.

- Flooding for offroad residents is a problem. There is 12 miles of dirt roads where roads wash out completely. Little Grass Creek residents couldn't get to Oglala. These residents didn't see the community for about thre weeks. Elders, including a heart patient were a part of the community.
- Contaminants wash downstream and kids play in the contaminated water.
    - White River
- There are 58 communities. Poor roads and infrastructure lead to more damage.
- There is help but a lot of residents don't know about it or can't get it.

GRASS/WILDFIRE

- Last year there were only 72-75 starts which isn't a lot in the "land of a thousand fires".
- The year before last, the BIA got their asses kicked. 75,000 acres burned.
- Oglala and Casino water towers are drained to try and put out fires. People had a lot of pools that year that were drained to help fight fires.
- This year, already over 1,000 acres have burned and its still April. Fire season is getting longer, and it is drought and fuel driven.
- There is more of a timber component in the fires.
- Last fire jumped a creek which isn't normal. Batesland also saw odd fire behavior in which it jumped a baren area. They are experiencing more extreme and odd behavior. The flames are high and there really is no amount of water outside of an aircraft that can control them.
- The BIA will work with Reno on how to do burns using his drought study.
- Mitigation efforts include removal of dead and dry trees. The soil just makes it to where fire will eat through anything.
- Decreased water is a real issue for the BIA.
- New equipment is coming in. Older equipment is being replaced.
- Why doesn't BIA answer to structure fires?
    - Even with the training, we do not have the gear and equipment. The BIA lost a member of their team due to improper gear on a structure fire (he retired).
    - BIA can't breathe the materials in a lot of house construction due to their improper equipment.

- Many people get upset seeing BIA sit in on structure fires without helping, but their job is just to make sure it doesn't become a wildfire or spread.
- Evergreen had no working fire hydrants. Crazy Horse had a brand-new hydrant but nothing comes out. Some are hooked up and some aren't.
- Batesland uses an app to call their people out so they can direct them to hydrants that they know work.
- Reno stated that he worked for a water department years ago where water sources were designated for specific uses.
- The tribe needs to update a wildfire plan.
- Kevin Killer was the president when there was a drought declaration. The tribe was trying to address each federal agency's requirements. Each agency has different requirements.
- Nation to nation sovereignty – Pine Ridge has relationships with federal agencies, but funding made it to every surrounding county but this one. A tribal policy should be created on appropriations for funding for emergency disaster relief.
- The tribe hates to see people die just to get disaster relief. There needs to be a longer-term solution where governments sit down and develop proper policies.
- The BIA has agreements with South Dakota Forest Service, Nebraska National Forest Service, Hot Springs Forest Service, etc… to get resources that can help fight fires when needed.
    - They are trying different things with different people to help fight fires.
- The Pine Ridge Chairwoman stated that a structural fire department is needed on the reservation.
- Pine Ridge Village is getting a new building that is not going to be big enough. It will only fit 75 people, but it was built based on funding.
- White Clay Dam had cows near the dam, is it the cattle owner's or tribe's responsibility to remove them?
- East Dam should be reopened.
- Territorial issues exist.
- The Pine Ridge Chairwoman stated that structural fires are a big community concern.
- You have to see the hardships that the tribe goes through to understand them.
- Dam safety does hold responsibility for the dams currently. Oglala is being rebuilt and Pine Ridge comes after. 30-60 head of cattle went into the ice a few years ago.

- There has never been any discussion about a government fire department. It's always a voluntary fire department (VFD). Batesland only has one volunteer fire fighter that lives in town. Others are farmers and ranchers around the area. Any money that the department makes goes back into improving equipment. It is not an easy time keeping a VFD going.
- Tribal emergency management is good at finding places for displaced people to stay, but they would love to see Pine Ridge have its own VFD.
- If Batesland didn't have a BIA contract for the wildland fire that they do, they would be severely limited in what they could do.
    - The contract is a setup where the BIA rents the trucks while using their volunteer staff and only pay for truck hours.
- The tribe has resources for wildland fire but not as much for structure fire. Therefore, structure fire should be added as its own profile.
- FEMA asked if building codes were something that the tribe wanted to consider related to fire.
    - BIA is seeing mobile/modular houses being put out in the Wildland Urban Interface.
        - The tribe would like pursue education and outreach more than code.
            - The BIA fire does have a prevention program. They do fire mitigation and visits homeowners and speak on the importance of cleaning the vegetation around houses.
- Some grants are so stringent that it may end up hurting people on the reservation. In a FireWise community, there are actions that can be taken.
- Many people can't afford to buy a newer house or insurance, then it's just a cycle of the housing crisis and what can or can't be afforded.
- Yellow Bear Canyon area is the biggest fear of the BIA. It is forested and has a lot of houses throughout the area.

HAIL

- There was no discussion.

HAZARDOUS MATERIALS

- Rapid City hazards
- There are hazardous materials in every fire. Can they be linked?
    - Landfill fires with tires

  - Salvage yards

- There should be a scale that discusses hazardous materials.
- This should include the built environment in general.

HIGH WINDS

- Some of our power lines are crooked. The planning director has called about them but has been told they're okay. A few more straight-line winds will likely take them down and lead to a fire.
- Power lines and fiber options will be underground at some point in the future.

SEVERE STORMS

- Residents of mobile homes do not have the option to take shelter in a designated area.
- It's not just EMS that are stifled, it's all first responders. The BIA isn't allowed to be out in severe thunderstorms.

SEVERE WINTER WEATHER

- The planning director worked on the community plan. They worked with the Oglala Tribal College to purchase a 65,000-dollar drone. The drone showed heat loss from buildings during the winter which is a maintenance issue.
- Wood became scarce because it was used up during Storm Elliot. D'Ann's district used to give out large bundles of wood but was not able to due to this storm.
- Last winter there were problems getting heat. There were children and elders in the country that went without heat for 3-4 days. They ended up burning random items to keep warm which presents its own hazard.
- Most mobile homes don't have proper heating for their water pipes which causes them to burst during the cold.

TORNADOES

- Many shelters do not have a crawl space to avoid tornadoes.
- People don't seem to hear sirens anymore because sirens are used for pretty much everything now.
- Encouraging weather radios is a good way to keep people informed for incoming weather.
- The public does not want the government to try to help them. They should just be more responsible for themselves.
- People still have landlines. How do you get them text message information? Can you do a poll to see what the majority communication method is?

Are there any other hazards that should be explored?

- Structure Fire
- Combine extreme heat and cold.
- Change agricultural disease to plant, animal, and crop disease.

Hazard Mitigation Plan Update

Oglala Sioux Tribe | April 18, 2024



SIGN-IN SHEET

OGLALA SIOUX TRIBE and OGLALA LAKOTA COUNTY

HAZARD MITIGATION PLAN UPDATE

Kickoff Meeting

Thursday April 19, 2024 9:00 am—4:00 pm MT

	Name	Organization and Department	Title	Phone	E-mail
/	Nichol Schultz	Town of Batesland	Board Member	[redacted]	[redacted]
/	Mark Pettitt	FEMA		[redacted]	[redacted]
/	Paige Johnson	FEMA		[redacted]	[redacted]
/	Feliaty Selvoski	FEMA			[redacted]
/	Audrey Thompson	OST Solid Waste Mgmt	Admin Asst/ Interim Director	[redacted]	[redacted]
✓	Gary Baker	Fall River Co EMC	Asst. EM	[redacted]	[redacted]
/	Christopher Johnson	WSP Deputy	Project Manager	[redacted]	[redacted]
/	Dylan Bartlett	FEMA Contractor	Comms/Engagement	[redacted]	[redacted]
/	Kelsey Schill	FEMA			[redacted]
/	Tiffeny Shangreau	OSLNH	Administrator	[redacted]	[redacted]
/	Justin Bear	SDPRA - BIA	Modwe	[redacted]	[redacted]
/	Stephanie Cuny	Tribal Planning	Director	[redacted]	[redacted]
/	Frank Maynard	South West District &	Emergency Manager	[redacted]	[redacted]

SIGN-IN SHEET
OGLALA SIOUX TRIBE and OGLALA LAKOTA COUNTY
HAZARD MITIGATION PLAN UPDATE
Kickoff Meeting
Thursday April 19, 2024 9:00 am—4:00 pm MT

	Name	Organization and Department	Title	Phone	E-mail
1	Aaron Smith	Batesland VFD	Chief	[redacted]	[redacted]
1	DAnn Herrmann	OST Solid Waste	Office Mgr	[redacted]	[redacted]
	Jon Siedschlaw	OST EM	Deputy Director	[redacted]	[redacted]
1	megan main	FEMA contractor	Comms & Engagement	[redacted]	[redacted]
1	Rebecca Lone Elk	Oglala District ELS	Vice President	[redacted]	[redacted]
1	Alyssa Comer	Oglala Lakota County	commissioner	[redacted]	[redacted]
1	Jesse BigCrow	OST EM	Planning & coordination	[redacted]	
1	Troy Ferguso	OST DPS	GIS Tech	[redacted]	
1	Wade Voun	OSLNH	[redacted] Housekeeping	[redacted]	[redacted]
1	Jennifer Franks	Safety - IHS	Safety Officer	[redacted]	[redacted]
1	Tonia Ecoffey	OST DOT	GIS Analyst	[redacted]	[redacted]
1	Jr Rodriguez	OLCS	Sheriff	[redacted]	
1	Marjon Janis	BIA Fire	Operations	[redacted]	[redacted]

Name	Organization and Department	Title	Phone	E-mail
Steve Wilson	OSTEM	Director	[redacted]	[redacted]
Jay Z Ryan	Pine Ridge CAP	Farm Mgr	[redacted]	[redacted]
Reno L. Red Cloud	OST Water Resources Dept	Director	[redacted]	[redacted]
Carole O' Rourke	PR Village	Dist Chairwoman	[redacted]	[redacted]

Appendix C-2: Targeted Outreach Interviews

Outreach Interview with OST Planning Office

OST 2024 HMP Update

Date: June 3, 2024

Time: 10:00-11:00 AM (MST)

Attendees:

- Stephanie Cuny – OST Tribal Planning Director
- Jesse Big Crow – OST Emergency Management Planning and Outreach Coordinator
- Christoper Johnson – FEMA DTA HMTAP Project Manager
- Felicity Selvoski – FEMA R8 Community Planner (Tribal)
- Paige Johnson – FEMA R8 Community Planner

Interview Questions for 1-on-1 Conversation and Response Notes

- I want to get a sense for your scope of work and the role you can play in mitigation. I understand you're spread very thin, so we don't want to add to your plate, but get a sense for maybe things you're already working on and see where we can potentially leverage anything we're doing for mitigation that could also support your goals. What would you say are the main tenants of your job duties? What all is, officially speaking, under your purview?
    - Tribal Planning Director – provide technical assistance for 56 Tribal Programs
        - Including programs that are 638
            - HHS committees, Land committee, education committee, law and order committee, economic committee
        - Grant writer for OST
        - Working with Housing Authority to build community models that are climate resistant for planned and future homes
        - Temporary utility commissioner for OST
        - Volunteering to support environmental health tech team
        - Personal time/interest: youth advisory board

- Are there any ongoing or upcoming planning initiatives you're working on? Housing Plan, climate adaptation, etc? (According to meeting notes, there has been a Dam Safety Plan completed since previous plan update. There is *possibly and Agricultural Resource Management Plan. Meetings occurring to review the 1990s environmental code. Drought Adaptation Plan in place)
    - Environmental Codes: wrapped up last session of updating these w/ Environmental Health Tech Team
    - Water Codes: updated through Reno Red Cloud

    - When these codes are updated, have to go through process with the Land Committee, to Council for approval, then sent D.C. for review
        - "Good to go now, just in a process of waiting"
        - Planning office is working to develop a website for "one stop shop" for codes but not in place yet
        - New codes not available yet – have the older ones
    - Working on getting an Economic Development Plan in place (hopefully soon)
    - Floodplain Management

- What would be your "wish list" for planning projects? (For example, developing a comprehensive plan for the tribe)
    - Stormwater Master Plan (and potentially ordinance in the future) to help manage stormwater from increased precipitation, rain
    - Financial Capabilities Plan
    - Jesse: Still waiting for EOP plan to get approved and to get the Districts Involved with the implementation, getting everyone on board with ICS training, being able to record outreach events, etc.

- We've discussed quite a bit in the kickoff meeting how sustained staffing/management of projects and initiatives for the tribe is difficult. So, I think it would be good in the mitigation strategy to emphasize mitigation activities that are sustainable in the long term and/or are more one-off actions, such as a wetland restoration or green infrastructure project that sustains itself. Are there any such actions you can think of? Perhaps any specific area or location on the reservation that we could focus on? (i.e. the area Rebecca mentioned with water pollution)
    - Water!
        - More training is a need for water resources, increased testing
        - Recently failed the EPA
        - Water code violations is a concern
    - Dam cleanups (Jesse)
        - Each district has their own spots of concern
    - Food Sovereignty
        - Existing efforts to build gardens
    - Flooding Concerns and Access to Community Members (revisit from April meetings)
        - Reservation has many older homes that are in floodplains – concerns and desire to move homes out of the floodplain
            - Planning office: wanting to relocate communities out of floodplain
            - In Pine Ridge: ~20 homes in floodplain - Consider: 15-20 people per home in some cases
            - Wounded Knee: May need to be completely relocated for other environmental concerns, but also concerns due to floodplain (~15 homes)

- Climate Change – Obviously goes without saying this is a major concern, it's something we heard from you several times in the meeting, specifically impacting things like agriculture and crops but also pollution, migration, and health impacts. It's also something that will impact the severity/frequency/effects of all hazards on the reservation. Perhaps there are certain environmental restoration/protection actions that can be taken? Kind of ties into earlier question, but again maybe a climate adaptation plan would be something to pursue?
    - Food and Cultural Sovereignty – elevate these efforts
        - Native Tree Planting Efforts – chokecherries, plums, grapes, cedar
            - Natural Resources brining in these trees for distribution
            - Increased tree planting and gardening initiatives
        - Medicines – sage, sweetgrass
        - Year-round availability of access to these resources
            - Building structures that can produce these year-round (greenhouses, etc.)
        - Training and Education is a high priority for EM office (Jesse)
            - Some communities are more active than others so finding a way to level this
            - Mitigate hazards in/around own home and in community
    - Mental Health needs are high for dealing with these risks, issues
        - Elders: grief over loss of resources, cultural assets to climate
    - Revisit "ostrich effect" of Tribal members
        - Would climate-focused education and/or mental health resources be helpful with this?

Additional Notes

- Stephanie Background:
    - Used to do planning work at Thunder Valley CDC and long focus on climate crisis
    - Tribal community members have "ostrich effect"
- Districts
    - Nine (9) Districts, 56 communities, ~3 million acres
        - Population size increased during COVID, at least 50,000 Tribal Members on Reservation
        - These members tend to go to the District anyway
    - Political structure: New Executive Boards (grassroots, on-the-ground representation) > District Council > Executive Presidents for Each District = Crazy Horse Planning Commission > Council
        - Executive Boards for districts can be hugely helpful for identifying hazards, problems and concerns, etc.
        - Wounded Knee District: focus on getting people prepared for fire hazards, Yellow Bear Dam. Lack of fire hydrants. If Yellow Bear Dam were to catch on fire, would burn down (no hydrants)

- Water is biggest concern, priority
    - Old water infrastructure across the reservation, need to replace/update for health, safety
        - Main water pipeline comes from Miniwichone from Missouri River
    - Permafrost melting into rivers and streams – will this impact Reservation water?
- Political Climate or Cultural Considerations to know about?
    - Leaders have seen impacts of state of emergencies in the past and understand the need
    - Cultural considerations are definitely something to flag – have different cultural protocols that need to be considered
- **For July Meeting: Include District Service Centers? (Jesse and Stephanie)**
    - Consider inviting from Stephanie's office (Chief of Staff can help make it mandatory)
    - For July Meeting: Include District Service Centers? (Jesse and Stephanie)
    - Stephanie Phone: 605-407-7113

Outreach Interview with OST Water Programs
OST 2024 HMP Update
Date: July 9, 2024
Time: 9:00-10:00 AM (MST)

Attendees:

- Steve Wilson – OST Emergency Manager
- Reno Red Cloud – OST Water Resource Department (surface and ground water)
- Jacob Cousin – OST Vice President's Office Policy and Advisory Staff
- Alicia Mousseau – OST Tribal Vice President
- Bob Pille – Previous Director of Water Program, Currently Managing OST's Seven Years for Seven Generations Projects (managing water construction project by wounded knee)
- James Ainslie – Indian Health Services, Sewer Program
- Shaina Johnson – OST Vice President's Office, Senior Advisor
- Ernie – Water and Sewer Programs
- Chuck Jacobs – XX (arrived late)
- Felicity Selvoski, FEMA R8 Community Planner (Tribal)
- Kelsey Schill, FEMA R8 Hazard Mitigation Specialist

Discussion and Response Notes:

- For each OST water program, touch on discussion below:
    - What is the scope and/or roles within different programs, divisions, departments, offices, etc. as it pertains to OST water (water access, water quality, water resources and conservation, infrastructure, etc.)?

        - **Bob Pille** – Each department needs a true assessment to be completed in order to understand their capacity, gaps, evaluate the program to ensure they are headed in the right direction. The Tribe will be responsible for maintaining systems (water and sewer) built after 2015.
        - **Alicia**- The 7 years for 7 generations program is working to upgrade water systems.
        - **Reno Red Cloud** – Drought Adaptation Plan (BIA) discusses water resources and drought implementation protocol. OST currently has 1 weather station, Reno has funding to build 5 more this year and 2 more next year.
        - **Steve Wilson** – We need mitigation efforts to make sure water supplies don't run out. Need to talk about ordinances/ priorities, rules, and regulations to make sure water systems are not threatened. Consider drafting ordinances to enforce allowable uses.
        - **Bob Pille** – Sometimes at the tribe there are great rules but no enforcement. We can't police our own if we don't enforce our own people. Need to understand,
            - Available wells
            - Water quality process
            - Enforcement process.
        - **Steve Wilson** – 5 plan issues – run under the Missouri river, have those plan included in the EOP and HMP

- **Reno Red Cloud** - There are ordinances currently in place –
    - Minnewachoni Act – states that tribal members have water rights that provide free access to water (I think only supplied from the Missouri River).
    - Water Conservation Plan is needed.
    - Drought Adaptation Plan complete.
    - Water Codes – Reno updated codes from 1985 to 2015; he would like to revise again because of climate change.
    - Environmental Protection Program – have great policies
    - Each district has their own emergency response plan; important to include the districts and governments in this effort
- **Bob Pille** - The environmental protection program has rules but can't enforce them, and the districts have their own EOPs and programs – there needs to be coordination.

o What are some of the challenges facing your program(s) regarding water access, availability, conservation, quality, or infrastructure?

- **Alicia** – Water should be set up as a utility, so the tribe can charge users to preserve water and to obtain more resources.
    - As a utility there would be different parameters
        - Charge entities for water use; example a county school built their own water tower on tribal land and don't pay for their water.
        - Tribe owes the Missouri River, non-tribal people upstream (ranchers, residents, etc.) use the water.
- **Chuck Jacobs** - People have mapped OST water systems and resources, but OST doesn't have the maps. OST needs to have access to the maps. Mapping agency or company is unclear.
- **Bob Pille** – The Tribe has water rights, policy and enforcement should executed so anywhere the water system reaches, they need to be charged.
    - Need subsidy to change the water system over to a utility to charge users and entities.
    - There are major issues with solid waste, water quality, and land use.
- **Reno Red Cloud** – A legal review is needed to move in the direction of becoming a utility.
- **Alicia** – Legal review is already in process.
- **Reno Red Cloud** – We could create a Water Management Board.
- **Bob Pille** – We need to properly exercise our water rights, and we need a way to enforce them.
- **Chuck Jacobs** – Years ago Tom Allen tried to organize water into a utility but that effort died out.
    - There was a Board, should be reenacted.
    - Minnewachoni Act – says free water to the tribe; does that means the tribal/county schools can't be charged. We need a legal review.
- **Alicia** - The General Utility Board has been reenacted.
    - Looking into different tribal tax avenues

        - 2% charge from paychecks will go to the tribe
        - 3% charge for solid waste
    - **Steve Wilson** - Passed ordinances (not sure if it's an ordinance or resolution) about floodplains; giving out permits for living in the floodplains.
    - **Chuck Jacobs** - Currently there is a BIA project that is moving a home out of the floodplain and to the dam
    - **Bob Pille** – There was a Dam Safety table top exercise (BIA) – BIA mapped the inundation area around the dam.
    - **Group** – Don't think other flood maps are available.
    - **Chuck Jacobs** – FEMA mapped the reservation road system (DR 4548? 2019)
        - **Steve Wilson** – PA evaluated the damage after the 2019 floods.
    - **Reno Red Cloud** - Next meeting the Environmental Protection Program should be invited. They can discuss Environmental Review Code
    - **Bob Pille** - USDA currently has funding available for – generators, pumps, system redundancy, etc.

- What goals do you have for your program(s) that the Hazard Mitigation Planning team should keep in mind when developing this plan?
    - **[NOTES]**

- Are there any upcoming or ongoing planning initiatives, outreach and education programs, infrastructure projects, or other things that you're working on that the HMP could support, reference, or build off of?
    - **[NOTES]**

- Are there any facilities, structures, or resources that you know are particularly vulnerable to natural hazards and would like to have called out in the plan or considered for mitigation actions?
    - **[NOTES]**

- Are there any projects, actions, or programs that should be considered for the HMP update that would support common goals between these programs?
    - **[NOTES]**

Name	Organization and Department
Steve Wilson	OST Emergency Management
Jesse Big Crow	OST Emergency Management
Jon Siedschlaw	OST Emergency Management
Johaunna Dreamer	OST Chief of Staff Office
Jacob Cousin	OST Vice President's Office
Audrey Thompson	OST Solid Waste
D'Ann Her Many Horses	OST Solid Waste
Reno Red Cloud	OST Water Resources Department
Stephanie Cuny	Tribal Planning
Wade Vocu	Oglala Sioux Lakota Nursing Home (OSLNH)
Orren Provost	Oglala Sioux Lakota Nursing Home (OSLNH)
Patrick Swallow	OST Health Admin
Justin Baur	BIA
Marjoe Janis	BIA
Frank Maynard	Oglala Lakota County, Fall River County
Gary Baker	Oglala Lakota County, Fall River County
Alyssa Comer	Oglala Lakota County
Wendell Yellow Bull	Oglala Lakota County
Chris Johnson	FEMA HMTAP
Felicity Selvoski	FEMA Region 8
Paige Johnson	FEMA Region 8
Kelsey Schill	FEMA Region 8
Patricia Gavelda	FEMA Region 8

Title	Phone	Email
Director	[redacted]	[redacted]
Planning & Coordination Specialist	[redacted]	
Deputy Director	[redacted]	[redacted]
Chief of Staff	[redacted]	[redacted]
Policy Advisor/Analyst	[redacted]	[redacted]
Interim Director	[redacted]	[redacted]
Office Manager	[redacted]	[redacted]
Director	[redacted]	[redacted]
Director	[redacted]	[redacted]
House Keeping	[redacted]	[redacted]
Maintenance	[redacted]	
Communicable Diseases	[redacted]	[redacted]
Module Leader	[redacted]	[redacted]
Fire Operations	[redacted]	[redacted]
Emergency Manager	[redacted]	[redacted]
Assistant EM	[redacted]	[redacted]
Commissioner	[redacted]	[redacted]
Commissioner	[redacted]	
Project Manager		[redacted]
Community Planner, Tribal		[redacted]
Hazard Mitigation Specialist		[redacted]
Hazard Mitigation Specialist		[redacted]
Grants Management Specialist, Tribal		[redacted]

Appendix C-3: Mitigation Strategy Workshop

Oglala Sioux Hazard Mitigation Plan Update

DATE: 17, July 2024

Attendees:

Name	Organization or Department	Title
OST Representatives		
Steve Wilson	OST Emergency Management	Emergency Manager
Jon Siedschlaw	OST Emergency Management	Deputy Emergency Manager
Jesse Big Crow	OST Emergency Management	Planning and Coordination Specialist
Johaunna Dreamer	OST Chief of Staff Office	Chief of Staff
Jacob Cousin	OST Vice President's Office	Policy Advisor/Analyst
Audrey Thompson	OST Solid Waste	Interim Director
D'Ann Her Many Horses	OST Solid Waste	Office Manager
Reno Red Cloud	OST Water Resources Department	Director
Stephanie Cuny	OST Tribal Planning	Director
Wade Vocu	Oglala Sioux Lakota Nursing Home	Housekeeping
Orren Provost	Oglala Sioux Lakota Nursing Home	Maintenance
Patrick Swallow	OST Health Admin	Communicable Diseases
Justin Baur	Bureau of Indian Affairs Wildland Fire Management	Module Leader

Marjoe Janis	Bureau of Indian Affairs Wildland Fire Management	Fire Operations
Oglala Lakota County Representatives		
Frank Maynard	Oglala Lakota County, Fall River County	Emergency Manager
Gary Baker	Oglala Lakota County	Assistant Emergency Manager
Alyssa Comer	Oglala Lakota County	Commissioner
Wendell Yellow Bull	Oglala Lakota County	Commissioner

FEMA and contractors: Chris Johnson (HMTAP), Felicity Selvoski, Kelsey Schill, Paige Johnson, Patricia Gavelda

Meeting Notes:

Plan Goals Discussion

- Water conservation, quality, and/or supply should be its own goal and priority in the plan. Comments included:
  - Water conservation is a big concern with climate change and low water supply challenges
  - Does the Tribe/region have the capability and capacity to bring in more water? System upgrades may be needed.
  - Studies may need to be done to assess water availability/supply, use, and population changes – this has likely changed since the current system was built.
  - Reservation is struggling to get enough water for wildfires – "pumping mud" in some areas
  - Consider bringing all water departments and providers together to develop a holistic plan for addressing challenges - perhaps expanding/updating the 2020 Drought Adaptation Plan
- Goals 5/6 – expand funding sources to include non-federal funding supplies as well

Hazard Significance Review and Discussion

- Consider upgrading Hazardous Materials Incident to "Medium Significance"
  - Jon (OST Assistant EM): The Tribe receives 5-6 calls each week for home propane leaks

Prior Mitigation Actions – Status Updates

Not Started	Work has not begun
In Progress	Work has begun but is not completed
Completed	The action has been finished
Annual Implementation	Ongoing with no specific end date
Deleted	The action is no longer relevant or canceled due to changing priorities, lack of funds, etc.

Anchor Mobile Homes (OST, OLC)

- **OST Status:** Completed but interested in carrying forward in the new plan.
  - ~150 homes were anchored (leveling, skirting, anchoring for high winds and cold temperatures). Actions completed using inmate labor to help with developing workforce skills.
  - Housing Authority asked to be removed as responsible agency – focusing on new stick-built housing and choosing not to pursue additional grant funding to support anchoring projects (i.e., HUD PRICE Grant)
  - Housing projects are a challenge for the EM office to implement due to lack of funds, capacity
  - Future considerations: Look at programs to remove and dispose of old units/mobile homes and options for replacing with similar (modular or prefab) instead of only focusing on retrofits.
  - ~13,000 mobile homes on Reservation need rehab, around 1,000-2,000 per district (Stephanie, Tribal Planning Office)

Conduct Emergency Tabletop Exercise (OST)

- **OST Status:** Annual Implementation – some progress but more wanted
  - OST EM has hosted some tabletop exercises on certain topics in the past but would like to keep working on this/expand (Dept of Public Safety, IHS Programs, Interagency and County/State groups).

Develop and Implement Building Codes and Zoning (OST, OLC)

- **OST Status:** In Progress but stalled
  - OST received a BRIC grant in FY21 for the TERO office to scope code development and implementation, and support compliance officer and inspector training and hiring. The OST staffer that led this effort is no longer with the Tribe.
  - General mood was that this is still important and want to keep this in but maybe start with refreshing FY21 project and break additional steps into sub-actions that support aging homes/home quality and safety as a final goal (are there other things that can be done without or before codes enacted).
- **Other Comments:**

○ Regional Equity Initiative and Thunder Valley created building codes for the Tribe but Council did not want to adopt – concern about impacts on housing and future buildings (Stephanie, Tribal Planning Office) ○ Cost is a concern – if they make housing too cost-prohibitive, will lose political will to enact (housing is a major concern) ○ Consider starting with Tribal and commercial buildings first, then applying to housing and look at what's already enacted for Tribal Council resolutions re: building safety and standards that may open doors for developing more regulation/standards around – where is there political will already (Reno, Water Resources)
Education and Disaster Preparation (OST, OLC) • **OST Status:** In progress, continue action ○ Jesse (OST EM office) conducts outreach and education in Tribal Districts, CAP Offices, etc.
Education on Mitigation Measures (OST/OLC) • **OST Status:** In progress, continue action ○ Jesse (OST EM office) conducts outreach and education in Tribal Districts, CAP Offices, etc.
Emergency Operations Center (OST) • **OST Status:** In Progress ○ Edit action to "Complete Emergency Operations Center" ○ Building still under construction, working to complete utilities hookup, building access, etc.
Establish Shelter Locations (OST, OLC) • **OST Status:** Ongoing ○ There is an ongoing need to inventory existing buildings on the Reservation and identify where meets shelter requirements vs. where shelters are needed (Steve, OST EM) ○ There is an ongoing effort by the Tribe to construct multi-purpose buildings within each District to be used for services and community resources (CAP Buildings). There has been discussion that these should have shelters in/near them, but cost has been a prohibiting factor (Reno, Water Resources)
Improve Emergency Communications Systems (OST) • **OST Status:** Ongoing ○ A new OST Telecommunications group (638 tribal program) is constructing cell phone towers over the next 5 years to provide fiberoptics across the Reservation
Improve Emergency Transportation System (OST) • **OST Status:** Ongoing
Improve Warning Systems (OST) • **OST Status:** Ongoing

○ 511 system has been initiated, ongoing implementation ○ Hospitals and all districts received or updated sirens. ○ Interested in using GIS data to identify locations for additional sirens – 9 right now, considering 24 total. Need to identify resources for maintenance and repair (Steve, OST EM) ○ Consider how residents will be contacted across multiple methods ▪ Concerns/challenges exist when not everyone has cell phones/internet. Used to have a radio station to broadcast (needs to be updated?). Also spreading the word to surrounding regions – issues with broadcasting when roads are closed during winter storms. ○ OST Telecoms group (OST 638 Program) constructing cell towers and wiring with fiberoptics over next few years. Aiming to be no longer reliant on cell towers and investing in new tech is the priority. ▪ Future concern: what is the plan for redundancy if/when the systems go down? ○ EOP for communications specifically?
Infrastructure Hardening (OST) • **OST Status:** In progress ○ ~150 homes anchored (leveling, skirting, anchoring for high winds and cold temps)
Inventory all Assets for Critical Facilities Protection (OST) • **OST Status:** Ongoing ○ Current GIS analysis for HMP update will help to provide a list of identified/analyzed critical facilities ○ Future updates to add existing/new CAP offices to this list will be helpful for adding District facilities to the list ○ Cross reference critical facilities with opportunities for infrastructure hardening.
Mapping of Flood Risk Areas (OST) • **OST Status:** Not started? ○ Update to add Land Office to this as lead agency or support agency/dept (Johaunna, Chief of Staff Office)
Mutual Aid Agreements for Emergency Response (OST, OLC) • **OST Status:** follow up with OST EM
Protect Critical Facilities in Flood Zones (OST) • **OST Status:** follow up with OST EM
Provide Backup Generators for Critical Facilities (OST) • **OST Status:** follow up with OST EM
Provide Emergency Supply Kits (OST, OLC) • **OST Status:** follow up with OST EM

Review of Possible Mitigation Actions and Alternatives - Comments

- Wildfire
  - FireWise Communities
    - BIA Wildland Fire set a goal to get one community to FireWise
    - Long-term goal to get all communities to become FireWise
  - BIA and Solid Waste collaborating to manage vegetation and biomass
    - Fuels and biomass removal stored/piled in central location (near baseball field) and burned occasionally to help reduce wildfire risk
- Building Safety
  - Solid Waste has helped with removing old and dilapidated mobile homes
    - Lots of interest and co-benefits for health in some mobile home courts with poor health outcomes, disease (Health Admin, VP Office)
    - OST EM has looked at mobile home acquisition and relocation projects for mobile homes in problem areas but cost-prohibitive, hard to implement with capacity
- Water Quality
  - Agriculture poses challenges to water quality on the Reservation (Wendell Yellow Bull, OLC)
    - Tribe has no jurisdiction over private ag land and use of pesticide/herbicides are a huge concern. Contaminating water resources and water sources and ag practices contributing to erosion
    - Regulation is challenging w/ different land types (fee, trust, etc.)

Actions Brainstorming Breakouts

- Civil Disorder Mitigation
  - Actions:
    - Better security, police to support public safety
    - Develop a Tribal Homeland Security Plan
  - Agency: Dept of Public Safety
  - Funding: Homeland Security Grants
- Building Safety Actions
  - Actions:
    - Explore dome homes as an alternative to mobile home retrofits/anchoring

        - Expand anchoring and infrastructure hardening to support businesses and economic development assets
- Hazardous Materials Mitigation
    - Actions:
        - Establish and train a formal hazmat response team to respond to residential propane leaks and commercial spills
        - Develop a policy for hazmat procedures on tribal and state highways
        - Develop a policy for residential propane tanks requiring suppliers to supply up-to-date tanks and holding suppliers/installers accountable for old tanks and poor installation
    - Agency: OST EPP
    - Timeline: Ongoing (as regulations change)
    - Cost: Moderate (legal research, policy development and implementation) + cost absorbed by vendors
    - Funding: DOT, EPA?
- Severe Weather Mitigation
    - Actions:
        - Plant natural snow barriers adjacent to roadways and transportation routes in highly vulnerable areas to reduce barriers for response teams getting in/out and delivering services and resources
        - Identify structures on the reservation that meet shelter designation requirements. Identify gaps/communities lacking shelter options and inventory of needed shelters.
- Drought, Wildfire, Water Supply
    - Actions:
        - Develop an enforcement mechanism for burn ban and fireworks regulations and educate on the wildfire dangers/risks posed by burning and fireworks
        - Develop programs and education o support combatting/removing invasives (Eastern Red Cedars, Russian Olives) and propagating natives (chokecherries, etc.)
        - Identify decommissioned, high production wells considered non-potable for wildfire water supply needs (already ongoing w/ Reno/Water Resources)
            - Incorporate these wells/locations into fire safety plan(s)
    - Agencies: BIA Wildland Fire, Emergency Management, Water Resources
    - Timeline: Annual Implementation
- Agriculture and Food Sovereignty
    - Actions:

        - Host community workshops and training on home mitigation activities and native foods, medicines, gardening and horticulture
    - Agencies: Environmental Resources, Emergency Management, District Service Centers
    - Timeline: 3-5 years, annual implementation/programming
    - Funding: BRIC, Agriculture Programs
- Communicable Disease
    - Actions:
        - Add an appendix in EOP that helps create procedures for pandemic responses or communicable diseases
        - Use the plan to homage to what the Tribe went through in 2020 and highlight experiences/lessons learned in the plan
            - Follow up with Patrick Swallow to get this insight
- Education
    - Action: DIY in-home air filters with safety kits
    - Action: Home mitigation and learning guides (what can be done in/around the home to mitigate)
- Other/General Mitigation
    -

General Meeting Notes and Comments

- OST Chief of Staff Office offered to support identifying lead and support agencies for Mitigation Actions
- Two earthquakes recorded in SD since April meeting (Steve, OST EM)
- Broad interest from participants in mitigation actions that center partnership building activities
    - Consider the complexity of agencies working on reservation and build actions and plan implementation and maintenance steps that support ongoing collaboration and partnership (OLC and counties, OST staff and elected officials, BIA and federal agencies, etc.)
    - Spell out specific steps for Plan Maintenance and Implementation that center OST and OLC communication and sharing with various agencies (Reno, Water Resources)
- Lots of comments highlighting the challenges of having to navigate/work with different standards and priorities of federal agencies (FEMA, BIA, IHS, USDA, EPA, etc.) who have control over various tribal resources (facilities, utilities and resources, funding, etc.). This can impact Tribal projects and departments directly.
- Look at long-term, sustainable funding sources for mitigation work as a potential action
- Consider what kinds of metrics could be looked at for each action in plan update (Gary, OLC EM)

  - Develop data collection, metrics and monitoring steps that might help programs gather data on each action and help support future funding and grants requests (if actions aren't collecting data, it can be hard to ask for continued funding at the local and grant level)
- Spend some time conceptualizing a plan implementation/maintenance system that develops a multi-jurisdictional team emphasizing collaboration.

Appendix C-4: Public Survey Results

From: Jesse Big Crow <[redacted]>
Sent on: Wednesday, June 19, 2024 5:34:22 PM
To: Johnson, Paige <[redacted]>; Schill, Kelsey <[redacted]ov>; Selvoski, Felicity <[redacted]ov>; Johnson, Christopher <[redacted]n>; Steve Wilson <[redacted]>
Subject: Summary of survey out reach

Recognizing the importance of reaching as many community members as possible, I enlisted an additional person to assist in spanning the reservation. Together, we engaged with residents directly, explaining the survey's purpose and encouraging their participation. We provided both electronic and paper versions of the survey to accommodate different preferences and ensure accessibility for all participants.

While collecting the completed surveys, we made ourselves available to answer any questions that arose, offering clarification on the survey's objectives and the types of information being requested. This face-to-face interaction allowed us to address concerns and emphasize the significance of their input in shaping effective hazard mitigation strategies. We took the time to ensure each community member felt their voice was heard and their input valued, fostering a collaborative atmosphere.

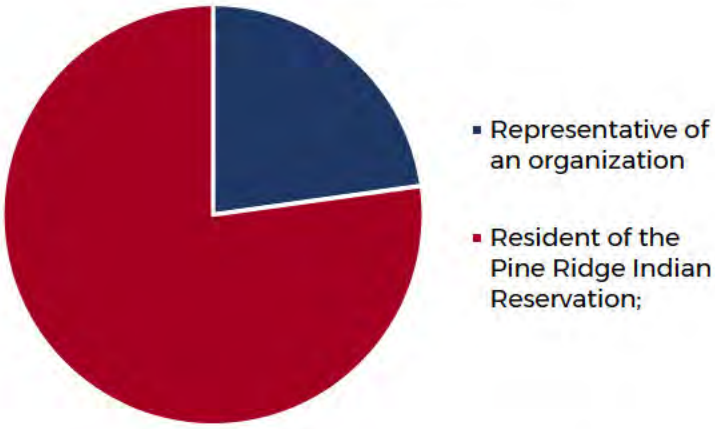
By combining our on-the-ground efforts with electronic communication, we aimed to collect a thorough and inclusive data collection process that would accurately reflect the community's needs and perspectives. Our approach ensured that we reached a diverse cross-section of the population, providing a solid foundation for the development of the Hazard Mitigation Plan. Through this comprehensive outreach, we are confident that the collected data will contribute significantly to creating effective and responsive hazard mitigation strategies for the Oglala Sioux Tribe.

--
Jesse Big Crow
Planning & Coordination Specialist

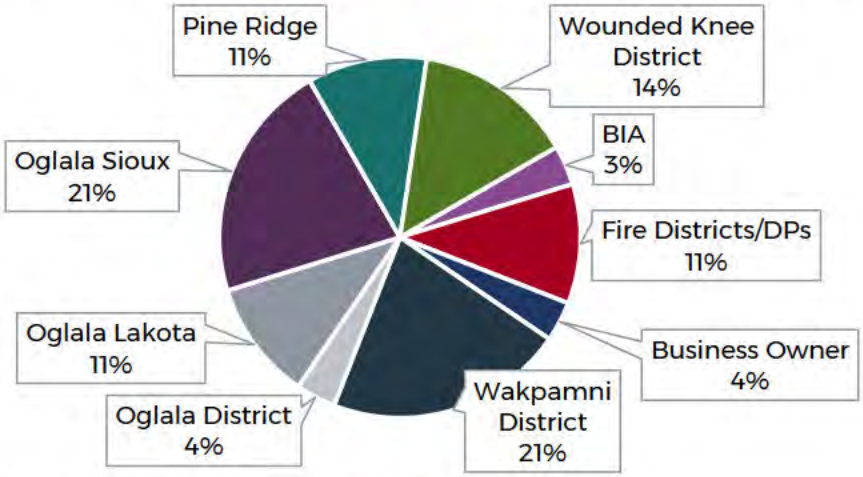
Oglala Sioux Tribe-Emergency Management
P.O. Box 2070
Pine Ridge, SD 57770
Phone: 605-867-5011
Fax: 605-867-5003

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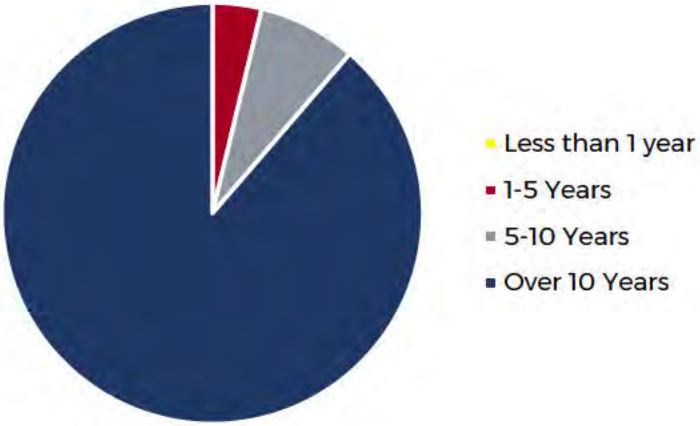
1. Who are you representing in your survey answers? (Select all that apply)



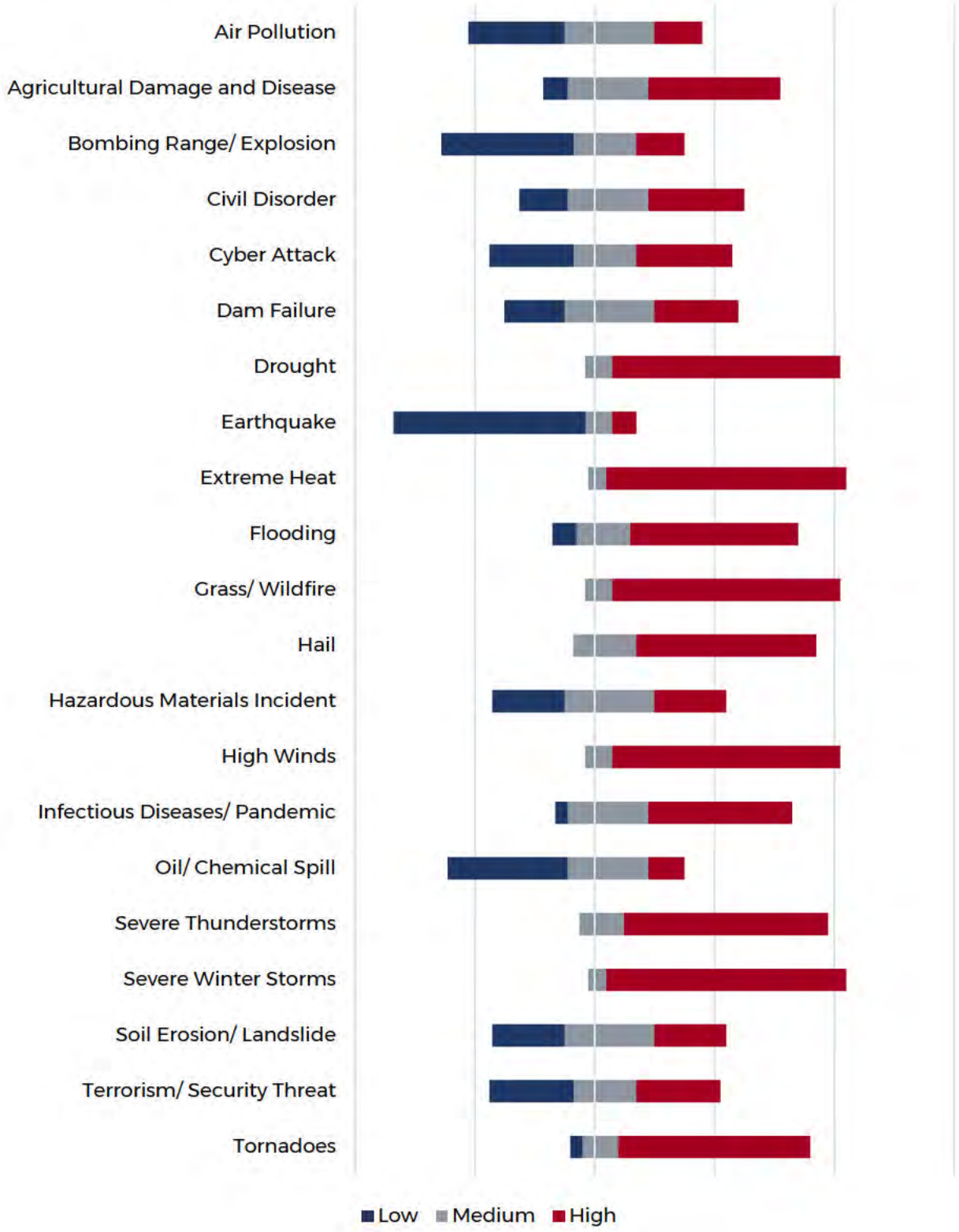
2. Provide Organization Name, or the district, county, entity you represent (Tribal Program, BIA, Non-Profit, Business Owner, Community/District Member) below.



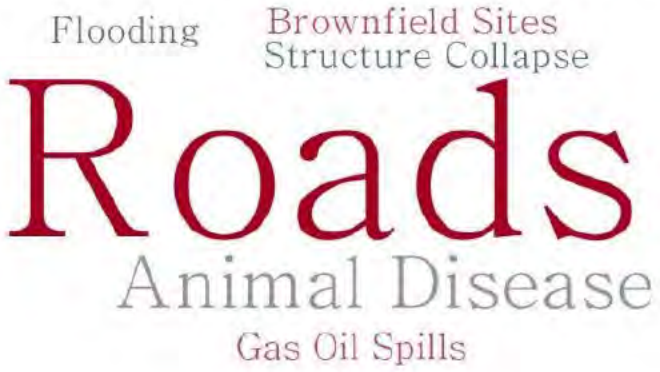
3. How long have you lived in this community?



4. Please indicate the level of significance that you perceive on the Pine Ridge Indian Reservation for each hazard listed below.



5. Are there any hazards not listed above which you feel should be addressed in the Plan?



6. Of the hazards listed above, why did you rank the high hazards as your greatest concern? (For example: My family or I have been personally affected by this hazard in the past, etc.):

Weather Hazards Experienced:

- Severe thunderstorms, tornadoes, high winds
- Severe winter storms
- Snow, wildfire, extreme heat
- Flooding (e.g., Nursing Home flood in 2021)

Personal Impact:

- Damage to home and road
- Witnessed damages, injuries, and hardships
- Family and community affected
- Unimproved road conditions causing vehicle damage
- Tornado in 2020 left homes unrepaired, worsening future impacts

Community Impact:

- Pine Ridge Indian Reservation residents affected by these hazards
- Loss due to severe weather events
- High frequency of extreme weather events (drought, fires, high winds, flooding)

Infrastructure Issues:

- Brownfield sites
- Illegal semitrailers damaging roads
- Gas oil spill on BIA 33 gravel road

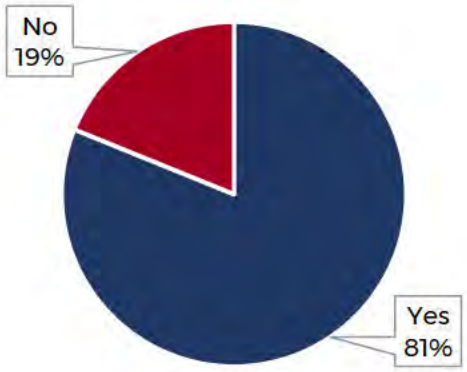
Emergency Preparedness and Response:

- Lack of emergency response and disaster plans
- Winter storms causing potential isolation and lack of access to essentials

General Observations:

- Extreme weather hazards and poor road conditions significantly impact daily life and safety
- No established emergency management programs for disaster response and evacuation

7. Have there been notable hazard events in the past which impacted you and your community?



8. If yes, what were these impacts and where did they occur? (For example: flood, high winds damaged home, evacuated due to weather, fire, etc.).

Weather Hazards:

- High winds, severe thunderstorms (2016)
- Flooding (2019, 2021, and past events)
- Drought (2021)
- Tornadoes, high winds, winter storms, hail (Batesland, SD)
- Wildfires, blizzards, severe snowstorms

Impact on Pine Ridge Reservation:

- 2016: Damaged homestead, mobile home moved off foundation
- 2019: Flood with evacuation response plan
- 2021: Drought with mitigation actions
- Frequent issues: Flooding, high winds, wildfires, water line breaks, road damage
- Past events: Fires and floods in 2010, second flood 5-6 years ago, severe snowstorms
- **Infrastructure and Maintenance Issues:**
- Poor road maintenance due to winter storms and funding
- Brownfield sites, road damage from illegal semitrailers
- Flooding caused widespread damage to homes and access roads
- Erosion exposed buried gas station barrels

Emergency Preparedness and Response:

- Lack of plans for tornadoes, high-wind fires, and winter storms
- No evacuation plans for wildfires or high-wind fires like Slim Buttes fire
- Limited response for medical needs during severe winter storms

Personal and Community Observations:

- Severe winter storms causing road impassability for weeks, food access issues
- High winds and flooding damaging homes, unpaved roads worsening conditions
- Firefighting with low resources and multiple structures threatened
- Power outages and unplowed roads during winter storms

9. Please use the space below to tell us about specific issues or areas (locations) negatively impacted by hazards (for example, floods, drought, windstorms, etc.). If possible, provide detailed information about the location or issues you've seen impacted by these hazards.

Severe Weather and Natural Disasters:

- 2016: Severe weather/thunderstorm damaged homes and property
- Wildland fires: Damaged vegetation, land, wildlife, and home properties
- 2019: Flood caused White Clay Dam and Oglala Dam to breach, damaging infrastructure
- 2020: Drought caused the White River to dry up, leading to a water emergency with drinking and livestock water hauled in
- Reservation-wide high winds, grass/wildfires

Infrastructure and Road Conditions:

- Roads within Wounded Knee District require paving
- Batesland (homes) and Wakpamni Lake (roads) face severe weather impacts
- Roads and bridges across the reservation are low-maintenance, with many access roads being dirt, limiting accessibility
- Flooded roads due to sudden rainstorms and snowmelt

Environmental and Community Challenges:

- Reduced snowfall each winter, with more extreme weather events
- Underground hazards exposed by rain and wind
- Multiple dams in disrepair with no resources for repair
- Lack of community support and external resources for wildfire fuels reduction

Impact on Western Half of the Reservation:

- This area experiences nearly all mentioned hazards, including tornadoes, hail, and blizzards
- Significant property damage and major impact on roads and travel
- Rural area with many people living miles off the main highway or road system

10. What should Oglala Sioux Tribe and Oglala Lakota County focus on to reduce disruption of services and to protect the people of the reservation from the hazards listed above? (For example, education, warning sirens, shelters, backup power, etc.)

Infrastructure and Public Works:

- Check for contamination on BIA 33 road and address BIA Hot Springs deeds
- Department of Public Works is needed for the reservation
- More work required on structures and debris removal within communities
- Roads across the reservation need snow plowing to ensure accessibility

Education, Training, and Preparedness:

- Educate and train communities on hazard preparedness, prevention, and mitigation strategies
- Provide decentralized training and preparedness kits across all districts
- Use multiple platforms (KILI Radio, Facebook, Snapchat, schools, public presentations) for education, surveys, and hazard information dissemination
- Emergency management programs should include education on evacuation routes, shelter locations, and post-hazard actions

Emergency Infrastructure and Support:

- Install more warning sirens and shelters with backup power across all communities
- Increase weather stations, stream gauges, and media responses through OST Emergency Management and related programs
- Provide emergency housing, backup power, potable water, and PSAs
- Ensure LaCreek Electric continues supporting power restoration

Community and Personnel Development:

- Hire personnel who are dedicated to tribal welfare, not just paychecks
- Enhance the role of experts in community planning, particularly in alternative water sources
- Encourage community and district-level engagement in hazard response and preparedness

Hazard Notification and Response:

- Establish reliable warning systems for pending hazards and post-hazard assistance
- Increase awareness and resources at OST District Service Centers
- Ensure tornado warning equipment is available in Batesland, Wakpamni Lake, and Rainbow Valley communities

11. What specific cultural or community assets across the Pine Ridge Reservation are important to protect from hazards? Please identify specific examples (community centers, cultural sites, schools, etc.).



12. Any additional information you would like the hazard mitigation planning team to know or consider when drafting this update?

- Address wildlife issues, such as testing the deer population for diseases like Chronic Wasting Disease (CWD) due to its potential impact on humans, especially for those who hunt to feed their families.
- Establish a fast response process for state emergencies, including pre-disaster awareness and guidance on application procedures.
- Ensure follow-up communication after hazards with readily available contact information.
- Incorporate all entities within Reservation boundaries to clearly define responder coverage areas.
- Share plans with communities for input before finalizing.
- Create posters with guidelines for handling emergencies such as grease fires, electrical fires, tornadoes, winter storms, flooding, and droughts.
- Set mitigation strategies instead of completely shutting down operations during hazards.
- Update the Tribal Contact List and conduct emergency response exercises (e.g., tornado drills, flood, and drought preparedness).
- Work with Elders and incorporate Lakota language and knowledge into emergency planning.

APPENDIX D: Acronyms, Definitions, and References

Acronyms

ACS	American Community Survey
AIM	American Indian Movement
BBR	Badlands Bombing Range
BIA	Bureau of Indian Affairs
BRIC	Building Resilient Infrastructure and Communities
BVD	Bluetongue virus
CA-MRSA	Community-associated Methicillin-resistant *Staphylococcus aureus*
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
COVID-19	Coronavirus Disease 2019
CRS	Community Rating System
DHSEM	Division of Homeland Security and Emergency Management
DMA	Disaster Mitigation Act
DME	Durable Medical and Assistive Equipment
DOE	US Department of Energy
DOH	South Dakota Department of Health
DOT	Department of Transportation
DR	(Major) Disaster Declaration
EAP	Emergency Action Plan
EF	Enhanced Fujita
EHD	Epizootic Hemorrhagic Disease
EM	Emergency Declarations
EMA	Emergency Management Agency
EM	Oglala Sioux Emergency Management
EMPG	Emergency Management Performance Grant
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
ESHMP	Enhanced State Hazard Mitigation Plan
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency

FIRM	Flood Insurance Rate Map
FM	Fire Management Assistance Declaration
FMCSA	Federal Motor Carrier Safety Administration
FMAG	Fire Management Assistance Grants
GIS	Geographic Information System
GTD	Global Terrorism Database
HAZMAT	Hazardous Materials
Hazus-MH	Hazards, United States-Multi Hazard
HI	Heat Index
HIV/AIDS	Human immunodeficiency virus/Acquired immunodeficiency syndrome
HPRCC	High Plains Regional Climate Center
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HIRA	Hazard Identification and Risk Assessment
IHS	Indian Health Services
LEPC	Local Emergency Planning Committee
MPH	Miles per Hour
NCEI	National Centers for Environmental Information
NDMC	National Drought Mitigation Center
NIDIS	National Integrated Drought Information System
NIFC	National Interagency Fire Center
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NIMS	National Incident Management System
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPMS	National Pipeline Mapping System
NRC	U.S. Coast Guard's National Response Center
NRI	National Risk Index
NWS	National Weather Service
PDM	Pre-Disaster Mitigation
PDSI	Palmer Drought Severity Index
PHSMA	The Pipeline and Hazardous Materials Safety Administration

RCP	Representative Concentration Pathway
RMA	Risk Management Agency
RMP	Risk Management Program
DANR	South Dakota Department of Natural Resources
SERC	State Emergency Response Commission
SFHA	Special Flood Hazard Area
STAPLEE	(Social, Technical, Administrative, Political, Legal, Economic, Environmental)
STI	Sexually Transmitted Infection
SPI	Standardized Precipitation Index
TEPC	Tribal Emergency Planning Committee
TERC	Tribal Emergency Response Commission
TORRO	Tornado and Storm Research Organization
TPT	Tribal Planning Team
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
UV	Ultraviolet
WUI	Wildland Uban Interface

Definitions

100-Year Flood: The term "100-year flood" can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1% chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1% annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Asset: An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the "100-year" or "1% chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the NFIP are protected to the same degree against flooding.

Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds" and "drainage basins."

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit/cost analysis of proposed mitigation measures, benefits are limited to specific, measurable risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Critical Area: An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility: Facilities and infrastructure that are critical to the health and welfare of the population. These become especially important after any hazard event occurs. For the purposes of this plan, critical facilities include:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic or water reactive materials.
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for disaster response before, during, and after hazard events.
- Public and private utilities, facilities and infrastructure that are vital to maintaining or restoring normal services to areas damaged by hazard events.
- Government facilities.

Dam: A man-made barrier, together with appurtenant structures, constructed above the natural surface of the ground for the purpose of impounding water.

Dam Failure: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Dam Incident: Situations at dams that require an immediate response by dam safety engineers. These are episodes that without intervention will likely result in a dam failure.

High Hazard Dam: Dams where failure or operational error will probably cause loss of human life.

Significant Hazard Dam: Dams where failure or operational error will result in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities, or can impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure.

Low-Hazard Dam: No probable loss of human life and low economic or environmental losses; losses are principally limited to the owner's property.

Low Head Dam: Engineered structures built into and across stream and river channels for a variety of purposes. Water flows over the dams continuously, as they span from one riverbank to the other. Low head dams generally range in height from 1-15 feet.

Debris Flow: Dense mixtures of water-saturated debris that move down-valley; looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

Debris Slide: Debris slides consist of unconsolidated rock or soil that has moved rapidly down slope. They occur on slopes greater than 65%.

Disaster Mitigation Act of 2000 (DMA): The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP) were established.

Drainage Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as watersheds or basins.

Drought: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. A hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, well-being, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

Earthquake: A sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy.

Epicenter: The point on the earth's surface directly above the hypocenter of an earthquake. The location of an earthquake is commonly described by the geographic position of its epicenter and by its focal depth.

Fault: A fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other.

Focal Depth: The depth from the earth's surface to the hypocenter.

Hypocenter: The region underground where an earthquake's energy originates.

Liquefaction: Loosely packed, water-logged sediments losing their strength in response to strong shaking, causing major damage during earthquakes.

Emergency Action Plan: A document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency.

Epidemic: An infectious disease outbreak affecting a large number of people in a given population in a short period of time.

Erosion: The removal and simultaneous transportation of soil or other earth materials from one location to another by water, wind, waves, or moving ice. Deposition is the placing of eroded material in a new location.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent: The extent is the size of an area affected by a hazard.

Extreme Heat: Summertime weather that is substantially hotter or more humid than average for a location at that time of year.

Fire Behavior: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

Flood: The inundation of normally dry land resulting from the rising and overflowing of a body of water.

Flash Flood: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's FIRM. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A FIRM identifies most, but not necessarily all, of a community's floodplain as the SFHA.

1% Annual Chance Floodplain or 100-Year Floodplain: The area flooded by a flood that has a 1% chance of being equaled or exceeded each year. This is a statistical average only; a 100-year flood can occur more than once in a short period of time. The 1% annual chance flood is the standard used by most federal and state agencies.

0.1% Annual Chance Floodplain or 500-Year Floodplain: The area flooded by a flood that has a 0.1% chance of being equaled or exceeded each year. This is a statistical average only; a 500-year flood can occur more than once in a short period of time.

Floodway: Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Floodway Fringe: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Freeboard: Freeboard is the margin of safety added to the base flood elevation.

Freezing Rain: The result of rain occurring when the temperature is below the freezing point. The rain freezes on impact, resulting in a layer of glaze ice up to an inch thick. In a severe ice storm, an evergreen tree 60 feet high and 30 feet wide can be burdened with up to 6 tons of ice, creating a threat to power and telephone lines and transportation routes.

Frequency: For the purposes of this plan, frequency refers to how often a hazard of specific magnitude, duration, or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1% chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Fujita Scale of Tornado Intensity: Tornado wind speeds are sometimes estimated on the basis of wind speed and damage sustained using the Fujita Scale. The scale rates the intensity or severity of tornado events using numeric values from F0 to F5 based on tornado wind speed and damage. An F0 tornado (wind speed less than 73 miles per hour [mph]) indicates minimal damage (such as broken tree limbs), and an F5 tornado (wind speeds of 261 to 318 mph) indicates severe damage.

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Geographic Information System (GIS): GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A hazard is a source of potential danger or adverse condition that could harm people or cause property damage.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

Hazards U.S. Multi-Hazard (Hazus-MH) Loss Estimation Program: Hazus-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The Hazus-MH software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. Hazus-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. Hazus-MH has also been used to assess vulnerability (exposure) for other hazards.

Hydrology: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Landslide: Landslides can be described as the sliding movement of masses of loosened rock and soil down a hillside or slope. Fundamentally, slope failures occur when the strength of the soils forming the slope exceeds the pressure, such as weight or saturation, acting upon them.

Lightning: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000°F. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100

Americans are struck and killed by lightning each year (see http://www.fema.gov/hazard/thunderstorms/thunder.shtm).

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude: Magnitude is the measure of the strength of an earthquake, and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Mass Movement: A collective term for landslides, debris flows, falls and sinkholes.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Initiatives (or Mitigation Actions): Mitigation initiatives are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Mudslide, Mudflow, or Debris Flow: A river of rock, earth, organic matter, and other materials saturated with water.

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal.

Pandemic: An epidemic that has spread across multiple continents or worldwide, affecting a substantial number of individuals.

Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Return Period (or Mean Return Period): This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

Riparian Zone: The area along the banks of a natural watercourse.

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Risk: Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Robert T. Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Severe Local Storm: Small-scale atmospheric systems, including tornadoes, thunderstorms, windstorms, ice storms, and snowstorms. These storms may cause a great deal of destruction and even death, but their impact is generally confined to a small area. Typical impacts are on transportation infrastructure and utilities.

Special Flood Hazard Area: The base floodplain delineated on a FIRM. The SFHA is mapped as a Zone A in riverine situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

Thunderstorm: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Tornado: A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

Vulnerability: Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Watershed: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Wildfire: Wildfire refers to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography, and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. Topography includes both slope and elevation. Air mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use, and arson.

Wildland Urban Interface (WUI) Area: An area susceptible to wildfires and where wildland vegetation and urban or suburban development occur together. An example would be smaller urban areas and dispersed rural housing in forested areas.

Windstorm: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

Winter Storm: A storm having significant snowfall, ice, or freezing rain; the quantity of precipitation varies by elevation.

Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

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APPENDIX E: Sample Annual Progress Meeting Agenda and Report

Oglala Sioux Tribe & Oglala Lakota County Hazard Mitigation Plan Annual Progress Meeting Agenda

1. **Discussion on hazard events and impacts that occurred during the performance period**
2. **Review of progress on mitigation action implementation**
3. **Discussion on success stories**
4. **Recommendations for new actions/projects**
5. **Review of funding options and grant opportunities**
6. **Review of changes in plan maintenance or implementation**
7. **Review of continuing public involvement**

Oglala Sioux Tribe & Oglala Lakota County Hazard Mitigation Plan
Annual Progress Report Template

Reporting Period:

Background: The Oglala Sioux Tribe (OST), in partnership with Oglala Lakota County (OLC), developed a hazard mitigation plan to reduce risk from all hazards by identifying resources, information, and strategies for risk reduction. The federal Disaster Mitigation Act of 2000 requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. To prepare the plan, the participating partners organized resources, assessed risks from natural hazards within the County, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from natural hazards. By completing this process, this jurisdictions-maintained compliance with the Disaster Mitigation Act, achieving eligibility for mitigation grant funding opportunities afforded under the Robert T. Stafford Act.

Summary Overview of the Plan's Progress: The performance period for the Hazard Mitigation Plan became effective on ____, 2024, with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before _____, 2029. The *Oglala Sioux Tribe & Oglala Lakota County Hazard Mitigation Plan* has targeted 32 hazard mitigation activities to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

__ out of __ initiatives (__%) reported ongoing action toward completion.

__ out of __ initiatives (__%) were reported as being complete.

__ out of __ initiatives (___%) reported no action taken.

Purpose: The purpose of this report is to provide an annual update on the implementation of the action plan identified in the *Oglala Sioux Tribe & Oglala Lakota County Hazard Mitigation Plan*. The objective is to ensure that there is a continuing and responsive planning process that will keep the hazard mitigation plan dynamic and responsive to the needs and capabilities of the partner jurisdictions. This report discusses the following:

- Natural hazard events that have occurred within the last year
- Changes in risk exposure within the planning area (all of the Pine Ridge Reservation)
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement

The Hazard Mitigation Planning Committee: The Hazard Mitigation Planning Committee, made up of planning partners and stakeholders within the planning area, reviewed and approved this progress report at its annual meeting held on _____, 202_. It was determined through the plan's development process that the HMPC would remain in service to oversee the maintenance of the plan. At a minimum, the HMPC will provide technical review and oversight on the development of the annual progress report. It is anticipated that there will be turnover in the membership annually, which will be documented in the progress reports. For this reporting period, the HMPC membership present at the meeting is as indicated in Table 1.

Table 1		
Name	Title	Jurisdiction/Agency

Hazard Events within the Planning Area: During the reporting period, there were _____ hazard events in the planning area that had a measurable impact on people or property. A summary of these events is as follows:

_____

_____

_____

Changes in Risk Exposure in the Planning Area: *(Insert brief overview of any natural hazard event in the planning area that changed the probability of occurrence or ranking of risk for the hazards addressed in the hazard mitigation plan)*

Mitigation Success Stories: *(Insert brief overview of mitigation accomplishments during the reporting period)*

Review of the Action Plan: Table 2 reviews the action plan, reporting the status of each initiative. Reviewers of this report should refer to the *Oglala Sioux Tribe & Oglala Lakota County Hazard Mitigation Plan* for more detailed descriptions of each initiative and the prioritization process.

Address the following in the "status" column of the following table:

Was any element of the initiative carried out during the reporting period?

If no action was completed, why?

Is the timeline for implementation for the initiative still appropriate?

If the initiative was completed, does it need to be changed or removed from the action plan?

Action #	Action Name & Description	Hazards Mitigated	Jurisdictions	Lead Agency & Partners	Cost Estimate & Potential Funding	Timeline	Priority	Status & Implementation Notes
Oglala Sioux Tribe & Oglala Lakota County Mitigation Actions								

Changes That May Impact Implementation of the Plan:

(Insert brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan. Specify any changes in technical, regulatory, and financial capabilities identified during the plan's development)

Recommendations for Changes or Enhancements: Based on the review of this report by the Hazard Mitigation Planning Committee, the following recommendations will be noted for future updates or revisions to the plan:

_____

_____

_____

_____

_____

Public review notice: The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the governing boards of all planning partners and to local media outlets and the report is posted on the *Oglala Sioux Tribe & Oglala Lakota County Hazard Mitigation Plan* website. Any questions or comments regarding the contents of this report should be directed to:

Insert Contact Info Here

Keeping the Plan Current

Worksheet 9: Action Monitoring Form

Use this form to help identify the status of each action in the plan. This can help you find out if you need other resources to complete it. Completed actions also give you a chance to celebrate the plan's success.

Table 1. Example of Action or Project Evaluation Matrix

Progress Report Period	
Describe the action or project.	
Who is responsible for the action?	
Project status:	☐ Complete ☐ In progress, anticipated completion date: _____ ☐ Not started ☐ Canceled
Has there been any progress with this project so far?	
Are there any obstacles or challenges with this action so far?	
What steps do you need to take to complete this project?	
Other comments:	

Worksheet 10: Plan Update Evaluation Form

For this form, think about the plan as a whole. Think about what has gone well for each part and where it can improve. The plan evaluation process offers a chance to look at the planning process as a whole.

PLANNING PROCESS

Participants

Should new jurisdictions be invited to participate in future plan updates?

How have communities and agencies helped to carry out mitigation actions?

Could anything from the initial planning process be done more efficiently?

Have there been any changes in public support or priorities about hazard mitigation?

Is there anything else you would like to consider?

Public Involvement

Has the public been actively involved in the plan's implementation? How can public participation improve?

Have there been any ongoing public outreach activities for the plan?

Is there anything else you would like to consider?

RISK ASSESSMENT

Hazard History

Have there been any recent disaster events? If so, how did they affect your community?

Should the list of hazards addressed in the plan be updated? If so, which hazards should be added or removed?

Have there been any new issues with hazards in a certain area of your community?

Is there anything else you would like to consider?

New Data

Are any new data sources available (e.g., studies, reports, maps, etc.)?

Do any new critical facilities or infrastructure need to be added to the asset lists?

Have any changes in development trends occurred that could create additional risks?

Does any new development *reduce* risk?

Is there anything else you would like to consider?

MITIGATION STRATEGY

Capabilities

Have jurisdictions adopted new policies, plans, regulations, or reports that could support the plan?

Are there different or new education and outreach programs and resources available for mitigation activities?

Has NFIP participation changed in the participating jurisdictions?

Is there anything else you would like to consider?

Actions

Is the mitigation strategy being carried out as expected? Were the cost and timeline estimates accurate?

Are there new projects to consider?

Should existing mitigation actions be revised or removed from the plan?

Are there new funding sources to consider?

Have parts of the plan been worked into other planning mechanisms?

What challenges were there, and how can those be overcome over time?

Is there anything else you would like to consider?

Appendix F: 2020 OST Drought Adaptation Plan

engineering a better community

JUNE 2020

DROUGHT ADAPTATION PLAN



PREPARED FOR
The People of Oglala Sioux Tribe
Pine Ridge Indian Reservation

PREPARED BY
Great Plains Tribal Water Alliance

BANNER
engineering a better community

Drought Adaptation Plan

PREPARED FOR

The People of Oglala Sioux Tribe
Pine Ridge Indian Reservation



Prepared in collaboration with

Great Plains Tribal Water Alliance

June 2020

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EXECUTIVE SUMMARY

The Great Plains Tribal Water Alliance (GPTWA) consults member tribes on water resources and water related issues. The GPTWA serves as an advisory board to the Great Plains Tribal Chairman's Association. The GPTWA is comprised of four tribes, the Flandreau Santee Sioux Tribe, the Rosebud Sioux Tribe, the Oglala Sioux Tribe, and the Standing Rock Sioux Tribe. The GPTWA assisted in submitting two Bureau of Indian Affairs (BIA) grants to develop a Category 2 Drought Adaptation Plan (DAP) for each member tribe.

The DAP will assist the tribes in developing drought resiliency procedures and was based on research, field visits, questionnaires, surveys, and follow-up meetings. The previous Drought Vulnerability Assessment (DVA) was created to identify sector specific vulnerabilities that are susceptible to drought. The sectors included: legal rights and infringements, Tribal lifeways, water, land, wildlife, agriculture, public health, and Tribal data monitoring. In addition to the DVA, scholarly research and field visits with Tribal leaders were conducted to identify five specific vulnerabilities and mitigation strategies, shown below:

Vulnerabilities

1) General infrastructure is old and outdated (water, wastewater, and roads)
2) Private wells are high in arsenic
3) Volunteer fire departments are few and far between
4) Tree regeneration is significantly reduced
5) There is an increase in invasive plant species.

Mitigation Strategies

1) Identifying all water demands
2) Maintenance and repair programs on distribution infrastructure
3) Catching and use of rainwater
4) Improving efficiency standards in buildings
5) Identifying new water sources before approving proposed development

After preliminary research and field visits, the DAP and drought mitigation projects were created to assist the tribe in planning and mitigation.

The DAP was developed from research on climate and recommended actions during drought, based on the needs of each sector. The DAP requires diligent monthly monitoring of drought conditions using drought indices that track the severity of flash drought and long-term drought. Indices used include the Evaporative Demand Drought Index (EDDI) and the U.S. Drought Monitor (USDM). There are also four categories that detail current drought severity based on both EDDI and USDM:

- Normal (No USDM or EDDI
- Alert (USDM of D0, 1-month EDDI of ED 1-4)
- Warning (USDM of D1-2)
- Emergency (USDM of D3-4)

Each category has a specified set of proactive and reactive actions for the Tribal government to take.

Ten mitigation projects were developed and are based directly on the top five mitigation strategies and range in scope from implementing flood control levees to starting a composting facility and include educational awareness concepts. The mitigation projects are meant to aid the tribe in developing adequate infrastructure that will minimize the effects of drought. Some projects, like those dealing with water demand and restriction, require partnerships with private entities

that are responsible for water distribution. Federal funding opportunities for each of the projects were also identified, detailing both the grant opportunity as well as the federal agency responsible for its distribution.

The success of this DAP depends on the local government effort to make the necessary structural changes to ensure the DAPs diligent enactment. It is recommended that the DAP be updated every five years for successful and continued implementation.

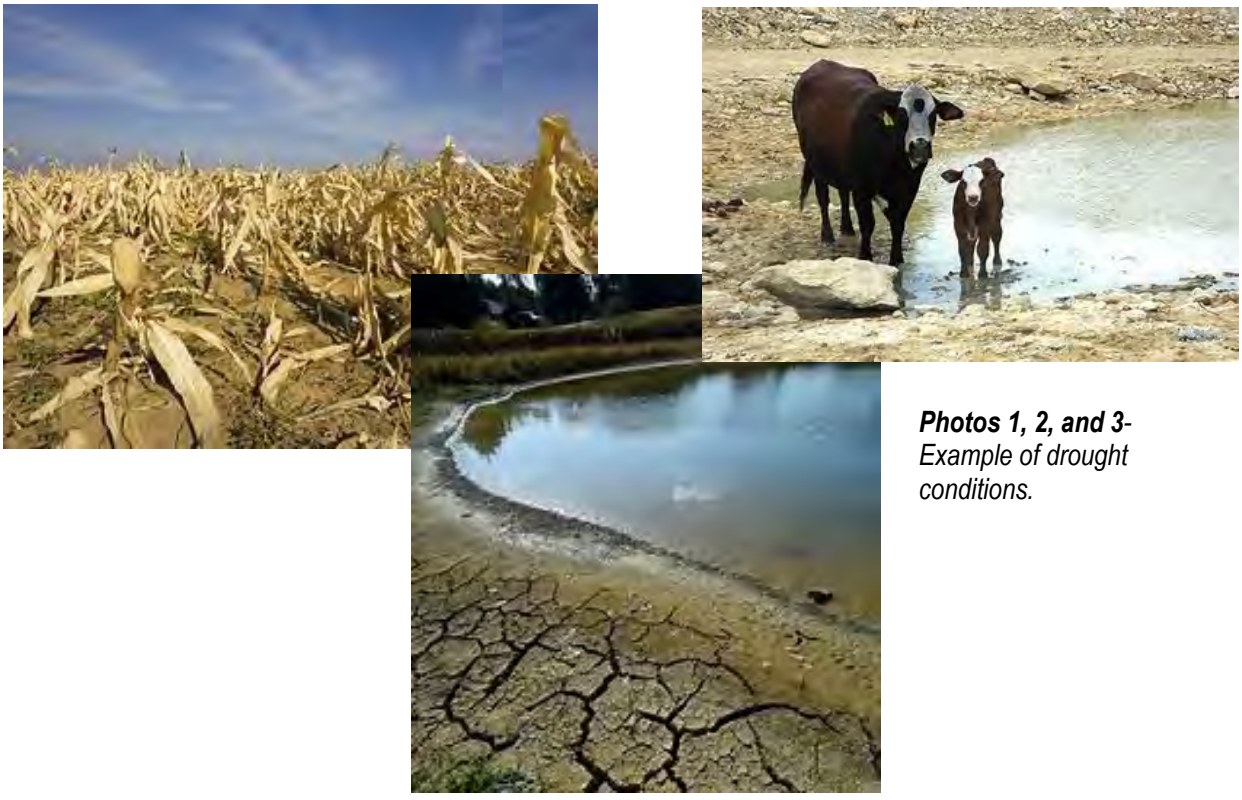
1.0 INTRODUCTION

The Drought Adaptation Plan (DAP) was developed as a planning tool to identify and prioritize Oglala Sioux Tribe (OST) government responses before, during, and after drought. The recommendations in the DAP were created by understanding the important Tribal resources and the vulnerabilities of those resources to drought. Key Tribal program directors, staff, council members, government officials, and members met to identify and prioritize strategies and plans most beneficial for the Tribe.

Three other Tribes, active in the Great Plains Tribal Water Alliance (GPTWA), worked collectively in developing the DAP. The GPTWA Tribes include Flandreau Santee Sioux Tribe, Rosebud Sioux Tribe, and Standing Rock Sioux Tribe. The DAPs were funded by the Bureau of Indian Affairs (BIA) FY17 and FY18 Tribal Resilience Program, Adaptation Planning Grant: Category 2. The Tribes worked collectively in learning about drought adaptation through the joint water conferences and workshops. Although the Tribes worked together on overarching drought adaptation concepts, each Tribe has a unique DAP, tailored for the respective reservation.

The OST DAP is the third resource document in a series, documenting drought vulnerabilities and baseline resource conditions. Each report builds on information and data documented in the previous one.

- *OST Integrated Environmental Management Plan for Cultural, Natural, and Water Resources (IEMP)*
- *OST Drought Vulnerability Assessment (DVA)*

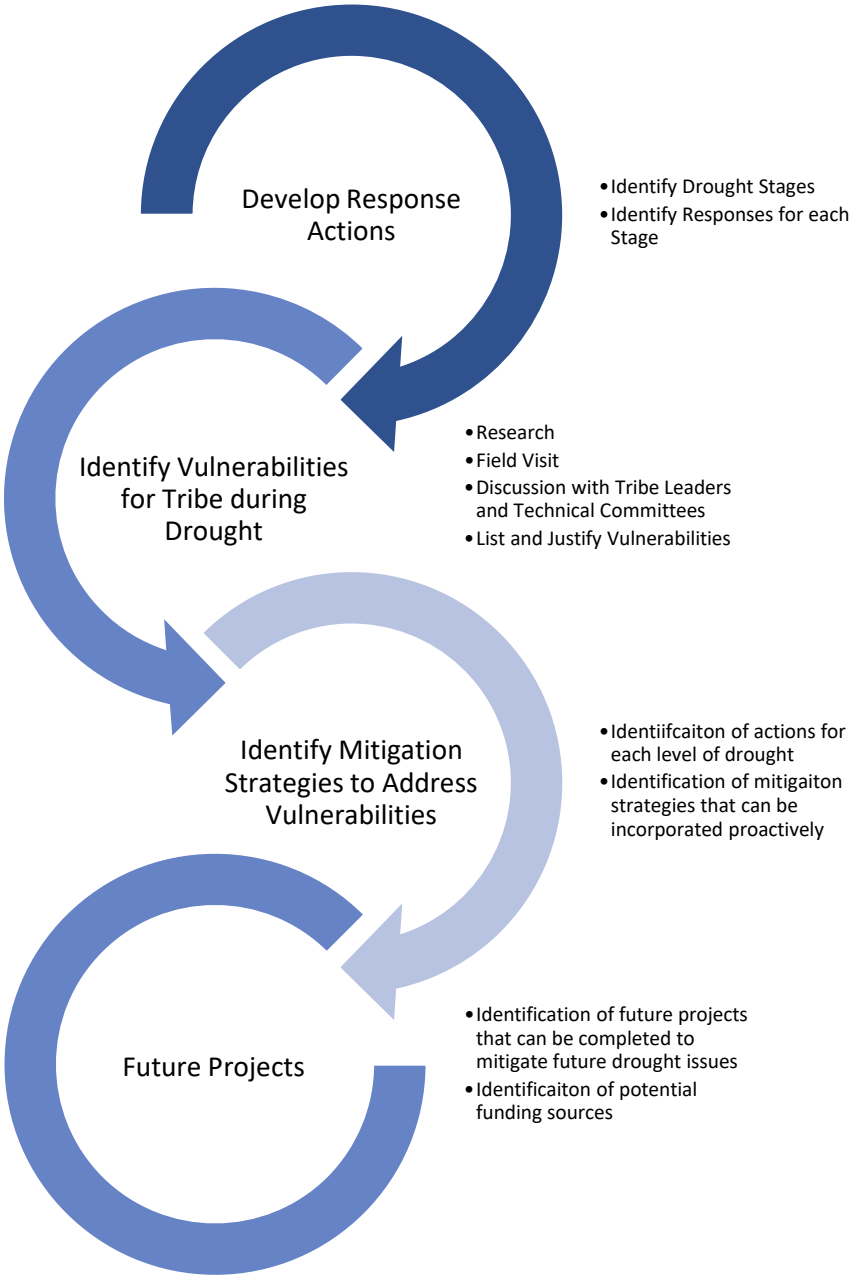


***Photos 1, 2, and 3**- Example of drought conditions.*

The objectives of this DAP are to:

- Coordinate with Tribal leaders to develop a list of drought vulnerabilities, previously determined from the DVA, that need to be addressed immediately,
- Identify drought mitigation strategies that would best resolve the vulnerabilities, and
- Identify the projects that would meet the mitigation strategy and identify potential funding sources for the top two priority projects.

The process to achieve the objectives for this DAP is shown in the flow chart.

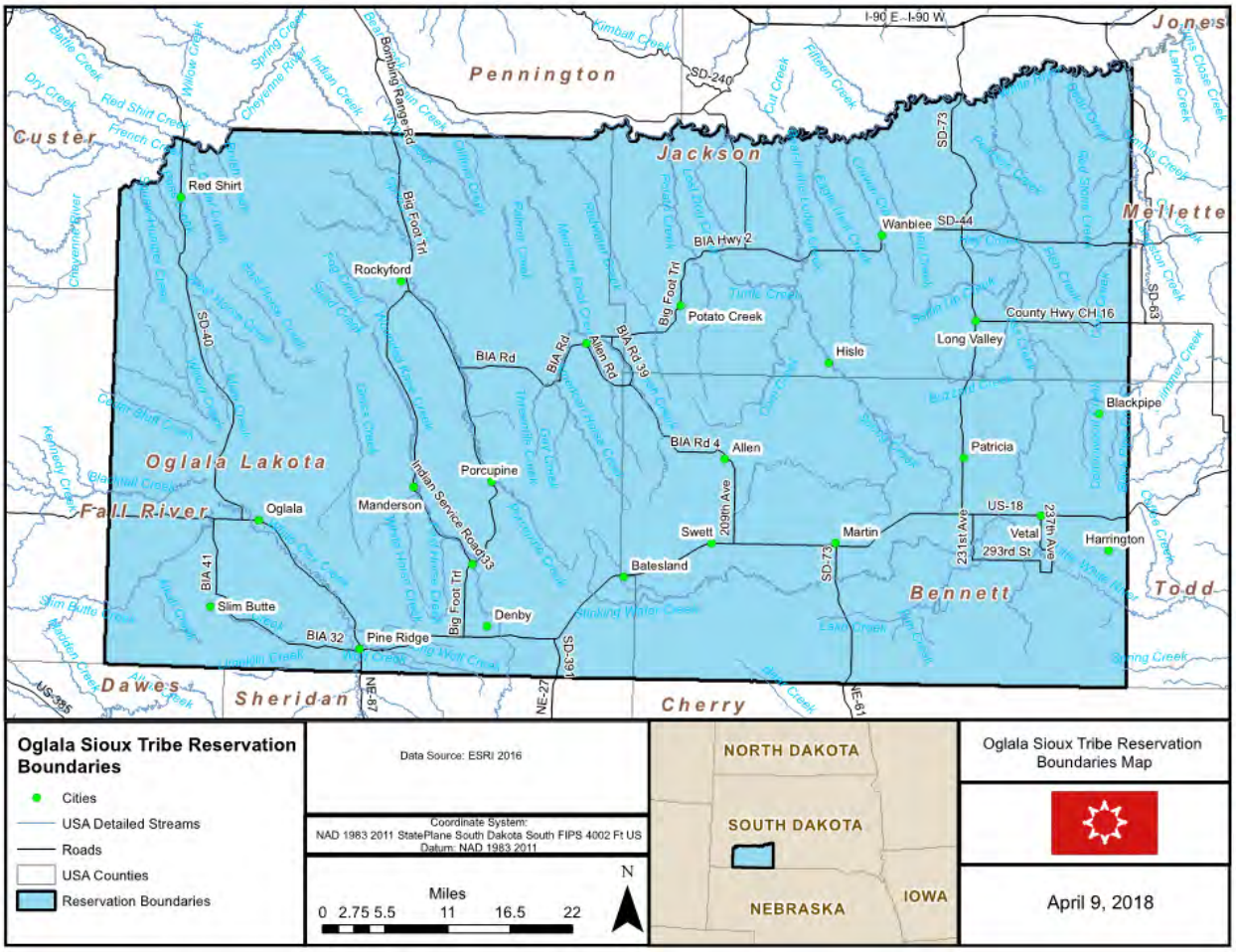


1.1 Pine Ridge Reservation Location

The OST reside on the Pine Ridge Indian Reservation (Reservation). The Reservation lies in southwestern South Dakota along the Nebraska state line, primarily in Oglala Lakota, Bennett, and the southern half of Jackson Counties. This area of South Dakota is semi-arid, with Oglala Lakota County generally more arid than Bennett or Jackson Counties (Wikipedia 2020). The Pine Ridge Reservation is a partition of the Great Sioux Reservation, which was established by the Fort Laramie Treaty of 1868.

The Reservation is 3,469 square miles in size and has nine designated districts throughout the Reservation, including Eagle Nest, Pass Creek, LaCreek, Wounded Knee, Porcupine, Wakpamni, Medicine, Pine Ridge, and Oglala. The Tribal Headquarters are located in Pine Ridge, South Dakota, near the southern border of the Reservation, less than two miles from the Nebraska state line. A map of the current reservation trust lands can be seen in *Figure 1.*

Figure 1. *Pine Ridge Indian Reservation Boundaries*



1.1.1 OST Government

The OST's government is comprised of a council with 20 elected officials, four of which are officers. There is one elected official for every 1,000 tribal members. Sixteen of the 20 officials directly represent a specific community within the boundaries of the reservation. The communities represented include the districts of Eagle Nest, LaCreek, Medicine Root, Oglala, Pass Creek, Pine Ridge, Porcupine, Wakpamni, and Wounded Knee. Two-year terms are set for all council members. The four officers are elected at large, meaning any tribal member living within the boundaries of the

reservation can vote for and elect officers. The elected officer positions include the Tribal president, vice president, secretary, and treasurer.

1.1.2 OST Land Description

The Reservation is the entirety of Oglala Lakota and Bennett Counties. Oglala Lakota County lies on the south side of South Dakota. Its south boundary line abuts the north boundary line of the state of Nebraska. The Cheyenne River flows northeastward along the northwest boundary of Oglala Lakota County. The White River flows northeastward through the central part of the county. The county terrain is composed of arid rolling hills spotted with small mountain crests, oriented northeast to southwest. The terrain slopes to the northeast; its highest point is on the south boundary line, close to the southwest corner. Bennett County lies on the south line of South Dakota. Its south boundary line abuts the north boundary line of the state of Nebraska. The Little White River flows eastward through the lower central part of the county. The highest point on the county's terrain is the southwest corner. The terrain consists of rolling hills cut with drainage gullies, sloping to the east-northeast (Wikipedia 2020).

1.1.3 Climate

The western half of South Dakota is semi-arid. The Reservation annually receives between 19 and 24 inches of precipitation and has an average annual temperature is 47.05°F. With high temperatures and low rainfall, the soil's moisture content decreases causing low forage production. The Reservation commonly experiences drought, wildfires, and flooding (Weather Underground 2020).

1.1.4 OST Demographics

The demographics of Pine Ridge were estimated by the Census Bureau and published in 2016 and can be found on Black Hills Knowledge Network website (Black Hills Knowledge Network 2020). The population of Pine Ridge is estimated to be 19,698 people. It is important to note that Tribal nations are regularly misrepresented by the Census due to multiple factors. The factors include residential mobility, language and literacy barriers, concealment of information because of a disbelief in census confidentiality, fear of retribution from authorities for violation of housing codes or other regulations, irregular and complex household arrangements, and resistance as a strategy for dealing with outsiders, particularly government representatives (NBC News 2019). Although this research was completed for the Rosebud Sioux Tribe, the same conclusions can apply to the OST as well. The average annual income in Pine Ridge is estimated at $30,908. When compared to South Dakota's overall average annual income of $54,126, 42.4% of Pine Ridge's population is estimated to live below the poverty line as compared to South Dakota's overall percentage of 14% (Black Hills Knowledge Network 2020).

1.1.5 DAP Partners

The grant proposal that was submitted by the OST had identified project partners that would be participating in the work. The partners included GPTWA and their interns, each Tribe, the National Drought Mitigation Center, and the National Oceanic and Atmospheric Administration. Banner Associates was hired to complete the DAP. The partners and their specific roles are described below and can also be found in *Table 1.*

- **Oglala Sioux Tribe**- The OST is the project lead. Helping project participants coordinate field visits, interviews, and offering guidance and feedback on the DAP throughout the project. The OST team is led by the Reno Red Cloud. Reno has worked with the Tribe for nearly 30 years and brings a variety of experience including previously working for Oglala Sioux Water System.

- **Great Plains Tribal Water Alliance-** The GPTWA is the original founding coalition for preserving the prior reserved water rights of the Missouri River under aboriginal title, the 1851 Fort Laramie Treaty, the 1868 Fort Laramie Treaty, and other judicially established territories in North Dakota, South Dakota, and Nebraska. The

GPTWA was established in 2006 by the Standing Rock Sioux Tribe, Oglala Sioux Tribe, and the Rosebud Sioux Tribe, and now includes the Flandreau Santee Sioux Tribe. All Tribes within the Great Plains Region are welcome to participate in the GPTWA. The public outreach, research, and education offered by GPTWA is dedicated to protecting and preserving the Great Sioux Nation Indian Water Rights for the use of water in the Missouri River, tributaries, and all aquifers and ground water sources located within the exterior boundaries of the Great Plains Region. As its sacred obligation, the GPTWA will provide technical and policy recommendations for the protection of all water resources for the next seven generations.

The GPTWA serves as the organizing vehicle to collaborate with the Tribes, BIA, and relevant federal and state agencies to develop DAPs in a phased approach. This multi-Tribal approach follows the model for the Mni Wiconi Rural Water System (MWRWS), where federal and state governments worked with several Tribes to build, monitor, and maintain their water infrastructure. This partnership builds on historical and cultural networks to support and sustain water resource planning efforts after the grant period.

- **GPTWA Interns-** The project team worked with the South Dakota School of Mines and Technology and Oglala Lakota College in Rapid City, South Dakota, to identify two engineering or science students entering their upperclassmen years to work on this project. The students that were hired for the project are enrolled members of South Dakota Tribes. Their goal was to work with the Tribe's technical staff and other key resource personnel to assist in the development of a DAP for each Tribe. The interns acted as a team, sharing important methods and processes that helped them tailor plans for the Tribes. These students developed important skills and acquired knowledge about drought vulnerabilities and mitigation strategies to assist the Tribes in the future.

- **National Drought Mitigation Center-** The National Drought Mitigation Center's primary task was to offer professional and technical guidance to the GPTWA Interns, offer insight on field visit coordination, participate in field visits and surveys, and to offer guidance on development of the DAP.

- **National Oceanic and Atmospheric Administration-** NOAA was tasked to participate as a conference speaker and to offer information to the partnering Tribes of the GPTWA. Concurrently two of their interns accompanied GPTWA Interns and Banner Associates on field visits. NOAA had also included cost-match with $10,000 for Tribal Technical Team Members to travel to the GPTWA Fall Conference.

Table 1. *Drought Adaptation Partners*

Agency	Partners
Great Plains Tribal Water Alliance	Oglala Sioux Tribe Rosebud Sioux Tribe Flandreau Santee Sioux Tribe Standing Rock Sioux Tribe
GPTWA Interns	Amanda Booton-Popken Elisha Yellow Thunder
National Oceanic and Atmospheric Administration	Doug Kluck, Central Region Climate Services Director Emily Bamford, Graduate Student Marianne Shiple, Graduate Student
National Drought Mitigation Center	Cody Knutson, Water Resource Scientist
Oglala Sioux Tribal Leaders	Reno Red Cloud, Water Resources Amos Young Dog, Water Management

Agency	Partners
	Mike Catches Enemy, Presidential Legislative Liaison Louis R. Janis, OST Utilities Office Steve Pourier, OST Utilities Office Delaine Killeback, Environmental Protection Program Tracy Zacher, Bureau of Land Management Robert Pille, OST Water and Sewer

1.2 Method to Identify Vulnerabilities and Mitigation Strategies

To identify the vulnerabilities and mitigation measures, research, field visits, and coordination with OST and other identified experts and stakeholders was completed. The sections below discuss each further. During the original research effort, several online sources were used to develop the mitigation strategies list. The DVA was used to identify the vulnerabilities for each Tribe and tailor the mitigation strategies to these. The IEMP was also used in preliminary research. The mitigation strategies were gained through the work of other Tribes and through sources based in arid areas of the world. The field visit data that was gathered was primarily the viewpoints of Tribal leaders and their professional opinions on the Tribe's needs. The project partners also provided online articles, sources, background documents, and more.

1.2.1 Research

Preliminary research was completed for the OST for both an IEMP and DVA. The DVA utilized available research and became a guide on how to conduct adaptation planning for drought conditions. Extensive scholarly research was also completed using the databases ProQuest, EBSCO, and Google Scholar. Journals, publications, government documents, and articles regarding climate change, drought mitigation and planning, and Tribal, federal, and state political land interactions were read, notated, and cited in an annotated bibliography. This research was conducted to establish baseline information on types of drought adaptation and mitigation management practices that have been done in the past. This research allowed for specific practices and other methods to be considered for the Great Plains Tribes.

Climate change resilience and adaptation research were completed to establish base knowledge regarding how Tribal councils, programs, and members are building resilience and adapting to extreme weather events caused by current climate change trends. The drought mitigation and planning research was completed to obtain examples of how other areas, such as Tribal nations and states, are identifying drought vulnerabilities within their communities. It was also conducted to see how indigenous nations are using drought mitigation to prepare and alleviate potential threats to their ancestral territories and cultural resources. Land and legal interactions, both historical and current, were examined to better understand the environment Tribal nations must navigate to develop and implement a drought adaptation plan.

1.2.2 Field Visits

An initial field visit was made to Rosebud to present potential drought vulnerabilities and mitigation strategies to Tribal leaders and closely associated government officials. Interviews with key Tribal program directors, staff, Tribal council, government officials, and Tribal members were scheduled ahead of time, with confirmation calls and reminder emails made the week before appointments. The interviews were conducted at the Justice Center Building in Pine Ridge and used questionnaires created prior to the field visit. Meeting in this central location ensured access and availability for Tribal leaders, members, GPTWA project leaders, and interns. If interviewees were not able to meet at the Justice Center Building, the project team met them at a desired location. The goal of the field visit was to gain Tribal input on drought vulnerabilities and preferred mitigation strategies to help determine potential future drought mitigation projects.

A follow up visit was scheduled during the OST Environmental Health Technical Team Annual Conference to further discuss ranked vulnerabilities and mitigation strategies. The visit took place in Rapid City, SD at the Ramkota Hotel and Conference Center. Scheduling the second field visit during the annual conference resulted in a higher attendance with more feedback regarding preferred projects and their ranking.

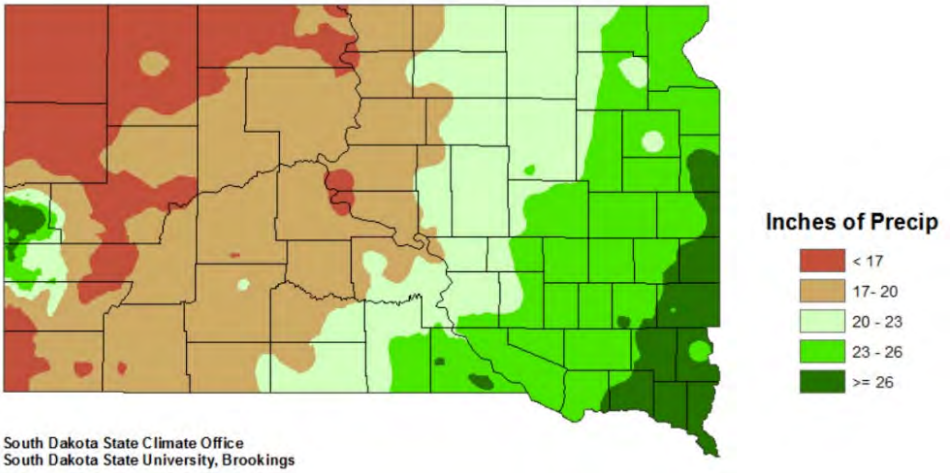
DAP update meetings occur every third week of the month during the Tribe's Technical Health Tech-Team Meetings, allowing DAP updates to be presented and feedback received. The meeting locations are in Pine Ridge or Rapid City, with attendees varying between Reservation department personnel, Banner employees, Tribal leaders, and residents. The goals of the meetings are to move projects forward and to address issues or items of importance.

2.0 Drought Occurrence Assessment for OST

2.1 Drought Concern

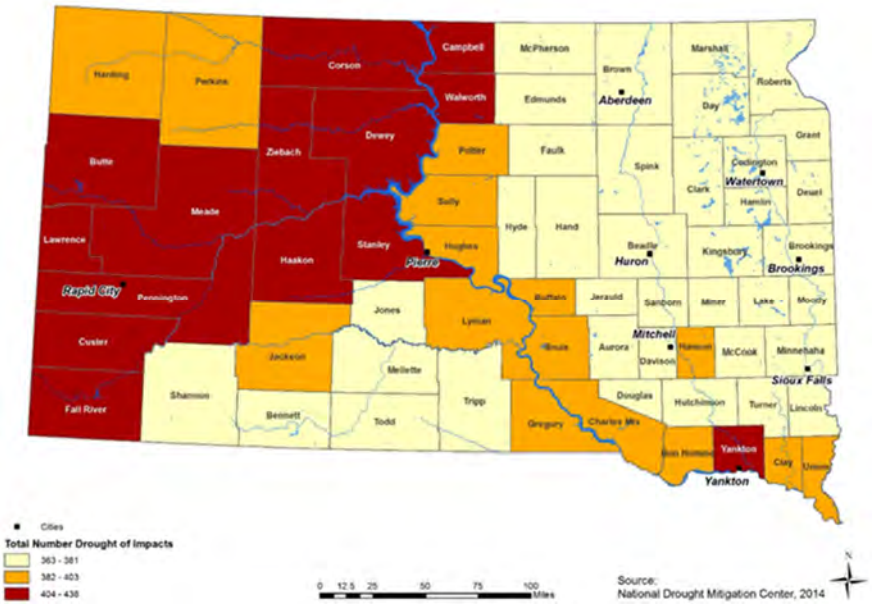
The OST often experiences issues with drought and flood in cycles and experiences less precipitation than Eastern South Dakota, as shown in *Figure 2*. The OST is in the south-west region and receives approximately 17-20 inches of precipitation per year (South Dakota Department of Emergency Management 2015).

Figure 2. *Average Annual Precipitation for South Dakota*



South Dakota's Drought Mitigation Plan also provides a Drought Impact Reporter, shown in *Figure 3*. The Drought Impact Reporter indicates that the Reservation (comprised of Oglala Lakota (Shannon), Bennett, and Jackson Counties) is one of the areas that experiences drought less frequently than other areas of the state. Over 35 years, there have been somewhere between 360 and 400 recorded incidents of drought (South Dakota Department of Emergency Management 2015).

Figure 3: *Drought Impact Reporter for South Dakota*



2.2 Drought Prediction and Identification

Drought impacts are typically spread over large areas. There are many parameters and indices to choose from when predicting and identify drought. Some measurable parameters include temperature, precipitation, soil moisture, reservoir/lake levels, streamflow, groundwater, snowpack, snow water equivalent, evapotranspiration, vegetation health/stress, and environmental and socioeconomic impacts. Indices exist that utilized the parameters noted to show the drought's severity. Common indices include the percent of normal precipitation, deciles, Standardized Precipitation Index (SPI/SPEI), Palmer Drought Severity Index (PDSI, SC-PDSI), and Aridity Index. Hydrologic drought indices include the Palmer Hydrological Drought Index (PHDI) and Surface Water Supply Index (SWSI) (World Meteorological Organization & Global Water Partnership 2016).

Drought indices play an important role in understanding drought. They simplify complex relationships and provide good communication tools for diverse audiences/users. They are a quantitative assessment of anomalous climatic conditions: intensity, duration, and spatial extent. They provide a historical reference showing the probability of recurrence, assisting in planning and design applications.

It is important to take careful consideration into choosing indicators and triggers for drought. Droughts are very dynamic and are not specific to one indicator. Precipitation alone is only part of the equation when assessing drought conditions. Soil moisture, humidity, and temperature also have a huge impact on drought and can exacerbate drought conditions. Indices, like the PDSI, estimate the movement of water in in the air, ground, and on the surface. However, calibrating a PDSI to a desired location is a process that requires extensive knowledge of soil properties and statistical analysis. Indices, like the PDSI, also come with a lag in data that could be weeks, or even months, meaning that actual notification of a drought may come too late. So, when choosing drought indices or indicators, it is imperative that its risk, lag, and ease of use are all considered.

For drought, it is important to start with creating adaptation plans. Once adaptation plans have been developed, the plan components should be followed and monitored to confirm an early warning system is initiated. Ideally, the early warning system is initiated before the drought occurs. After the drought occurs, an assessment should be done to develop the best response possible. The response initiated will eventually lead to a recovery of the situation. Reconstruction and mitigation follow recovery and allow for better preparation for the next situation. Once the cycle is complete, planning must start again to prepare for the next drought.

2.3 Drought Hazard Profile

A drought hazard profile is a way to analyze the various aspects of drought. For the drought hazard profile of the OST, the history of drought and related impacts were assessed, along with the probability of recurrent drought. Drought history (in the form of drought severity) can be obtained from the United States Drought Monitor (USDM). Drought severity is displayed on a scale of no drought, D0 (Abnormally Dry), D1 (Moderate Drought), D2 (Severe Drought), D3 (Extreme Drought), and D4 (Exceptional Drought). The data are also normalized by the percent area of the selected location that is affected by drought. For OST, Oglala Lakota County was selected. The USDM has been made available on the internet on a weekly basis since January 4, 2000.

Along with the USDM, drought history can also be obtained using a PDSI and SC-PDSI. The PDSI is an effective index at determining long term drought. It uses precipitation, temperature, as well as evaporation and transpiration data to create an index that numerically represents the severity of a drought. However, when this index was created, soil conditions in Kansas and Iowa were utilized, which creates error for other parts of the country. The SC-PDSI corrects for different local conditions so that values below -3, which represent extreme drought, occur roughly 10 percent of the time. SC-PDSI data is available from a period of 1936 to 2014 for the community of Long Valley, located approximately 75 miles northeast from the town of Pine Ridge.

2.4 Drought Hazard Profile

The drought history for the OST has been developed by using the USDM, Drought Risk Atlas, and the Drought Impact Reporter. The data used were from the weather station located in Long Valley, South Dakota. *Table 2* shows the station information from the weather station in Long Valley.

Table 2. *Drought Risk Atlas Station Data for Long Valley, South Dakota*

394983: LONG VALLEY	Latitude: 43.46	Longitude: -101.496
Elevation: 2470 ft.	State: South Dakota	County: Jackson
Climate Division: 5	Time Period: 1936 - 2014	Years on Record: 76

Figure 4 shows the SC-PDSI history for the Long Valley station from the Drought Risk Atlas.

Figure 4: *Drought Risk Atlas SC-PDSI History for Long Valley, South Dakota*

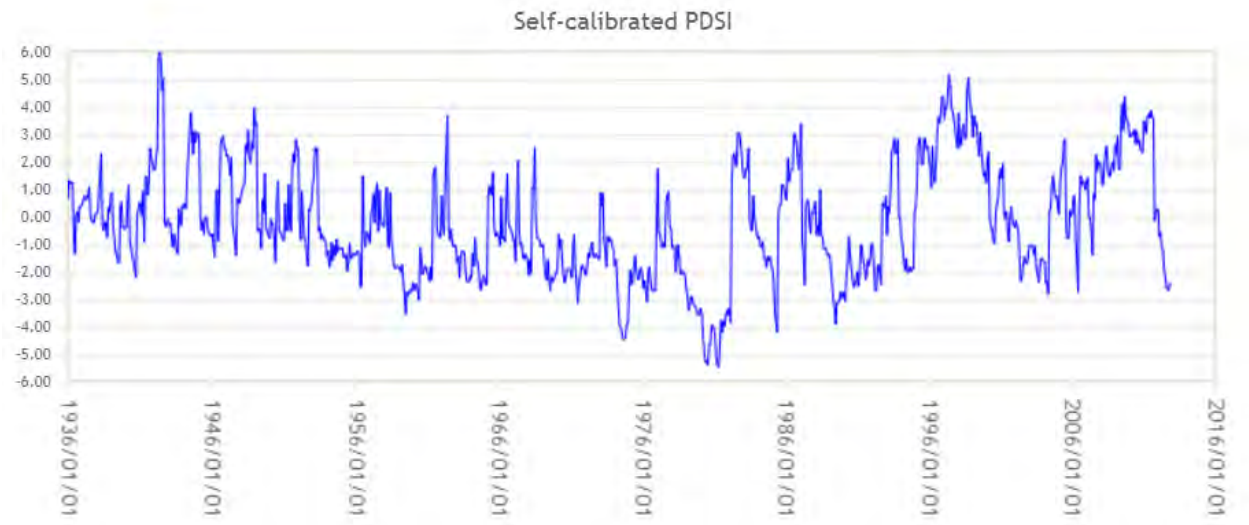
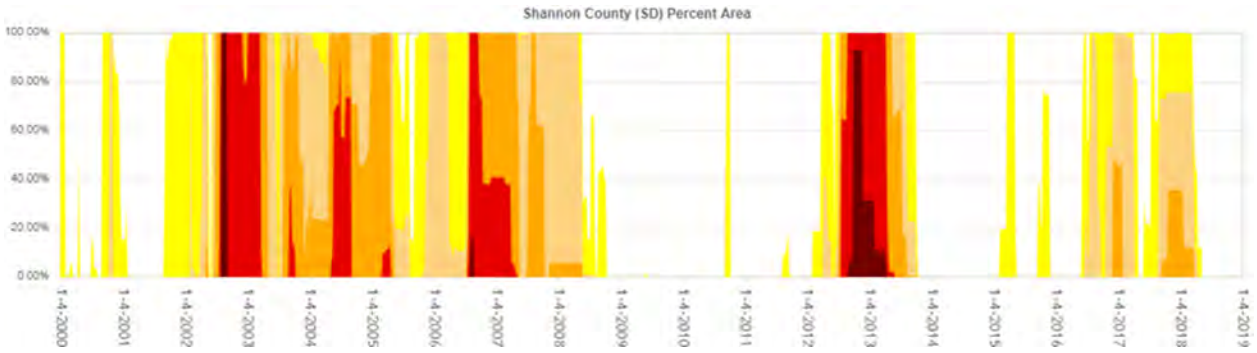


Figure 5 shows the USDM percent area statistics for each category of the instances of recorded drought for Oglala County, South Dakota from 2000 to 2019.

Figure 5: United States Drought Monitor SC-PDSI History for Oglala Lakota County



Historical occurrences of drought in Oglala Lakota County have also been documented in the following years:

- **1958–1961-** The first recorded drought of significance had a Self-calibrated Palmer Drought Severity Index (SC-PDSI) of -3.57, measured in August of 1959.

- **1968–1972-** The second recorded drought of significance had a SC-PDSI of -4.48 in November of 1974.

- **1978–1982-** The third recorded drought occurred in the fall of 1978 and lasted until 1982. It was the worst recorded drought in the area's history with the lowest recorded SC-PDSI of -5.41 in April of 1981.

- **1987–1992-** The second worst drought on record with a SC-PDSI of -3.91 during November of 1989.

- **2001–2008-** A drought occurred between 2001 and 2008 with a recorded SC-PDSI of -3.94 and resulted in many impacts. As a result, emergency programs were developed by the State of South Dakota, including the Drought Relief Hay Exchange. The exchange was developed to help farmers in need of hay locate farmers with available hay. The counties most in need of hay during the 2001–2008 drought were Oglala Lakota, Fall River, and Custer. The service focused on aiding farmers in counties west of the Missouri River and operated with the support of west river county extension offices. The exchange accepted hay listings from across the state.

- **2002-** Fireworks were banned over the Fourth of July weekend for much of western South Dakota because of the danger for drought-induced wildfires across the region. In 2002, Governor Janklow requested a drought disaster designation for all but two South Dakota Counties, which created low-interest emergency loan opportunities for South Dakota farmers and ranchers affected by continued drought conditions.
  USDA Secretary Mike Johanns declared a disaster for 24 counties in South Dakota because of drought, frost, high winds, insect damage, and hail. As a result, farmers and ranchers in those counties were eligible for low-interest emergency loans. In addition, 24 adjoining counties also qualified for relief. South Dakota received $4.3 million from the Livestock Assistance Grant Program to help producers who lost forage due to drought. Eligible producers that applied for the grant received $3 per head for cattle and about 50 cents per head for sheep (USDA 2020).

- **2003-** Governor Rounds announced that the USDA designated 55 South Dakota counties as primary or contiguous disaster areas because of persistent drought during 2003. The following counties were designated as primary disaster areas: Beadle, Bennett, Bon Homme, Brule, Buffalo, Butte, Campbell, Charles Mix, Corson, Deuel, Dewey, Grant, Gregory, Haakon, Hamlin, Hand, Harding, Hughes, Hyde, Jackson, Jones, Meade, Mellette, Perkins, Potter, Oglala Lakota, Spink, Stanley, Sully, Todd, Tripp, Walworth and Ziebach. The following counties were included as contiguous disaster areas: Aurora, Brookings, Brown, Clark,

Codington, Custer, Day, Douglas, Edmunds, Fall River, Faulk, Hutchinson, Jerauld, Kingsbury, Lawrence, Lyman, McPherson, Miner, Pennington, Roberts, Sanborn, and Yankton.

- **2012–2013-** The data from the Drought Impact Reporter aligns directly with the data produced by the USDM and shows the severe, but short drought, during 2013. Secondary impacts of this drought included many cattle being sold at auction when water supplies were low, and pastures were bare.
  Entering the 2013 growing season, the U.S. Department of Agriculture began declaring counties as primary and secondary disaster areas related to drought in January. Farmers in affected counties had eight months from the date of the declaration to apply for low-interest emergency loans. Laura Edwards, the State Climatologist, said that much of the southern South Dakota corn crop during these years was affected by drought, leading farmers to cut it for silage.

- **2017-** In 2017, another severe drought occurred across the Reservation. In 2017, the Governor of South Dakota declared a state of emergency and activated the South Dakota Drought Task Force. Ponds and creeks were low, as was grass and crop production. USDA authorized early haying of Conservation Reserve Program acres beginning on July 16, 2017, to help farmers and ranchers in the Dakotas and Montana. Farmers and ranchers in counties experiencing drought severity of D2 or greater on the USDM or within 150 miles of a county in D2 were eligible for early haying. Conservation Reserve Program contract holders who hayed their acreage were able to donate their hay or take a 25 percent loss to their annual Conservation Reserve Program payment if they chose to sell it (FEMA 2017).

  On Friday June 16, 2017, Governor Dennis Daugaard announced a statewide drought emergency as crops and livestock continued to suffer without enough rain. Transport restrictions were eased, allowing the movement of oversized loads of hay and feed with proper signage and reflectors. Landowners adjacent to highways were able to mow and bale hay along state highways. The governor also activated the state Drought Task Force to monitor rapidly developing drought in South Dakota. Task force members monitored drought information relating to agriculture, fire, and water supplies.

  The sectors that demanded the largest uses of water were firefighting, human consumption, and agriculture. During this time, the MWRWS system was not able to meet demands during peak water use, and 30 percent reductions on water use were issued to all communities connected to the system.

2.4.1 Probability of Future Droughts

The National Climate Assessment of the Northern Great Plains includes Nebraska, South Dakota, North Dakota, Montana and Wyoming. The basis of the assessment to analyze current available resources and the use of modeled projections determine what will happen to those resources over the next half century. The assessment is analyzed in various sections: water, agriculture, recreation and tourism, energy, as well as indigenous peoples. These analyses discuss the increased probability of extreme events, like flooding and drought, through 2050 (National Climate Assessment2014).

The National Climate Assessment states that changes in precipitation in the winter and spring months will have an impact on the current climate. In the winter and spring, more precipitation is projected, with an increase in extreme events, in both volume and intensity. In the summer, no change precipitation is projected. Agriculturally, the growing season will be extended, and spring will begin earlier. However, higher temperatures are also projected for the region and more extreme daytime highs and nighttime lows will stress crops. Increased temperatures will result in higher evaporative demand, which is a measure of how thirsty the atmosphere is. This increase will result in more frequent drought and heatwaves across the region, which will reduce crop yields and quality of livestock forage. Additionally, increased temperatures will increase the range of pests within the region (National Climate Assessment 2018).

The key message of the assessment is that rising temperatures are leading to increased demand for water and energy. In parts of the region, this increase in temperatures is expected to constrain development, stress natural resources, and increase competition for water among communities, agriculture, energy production, and ecological needs. Changes to crop growth cycles due to warmer winters, and alterations in the timing and magnitude of rainfall events have already been observed; as these trends continue, they will require new agriculture and livestock management practices.

Additionally, landscape fragmentation is increasing in the context of energy development activities in the northern Great Plains. A highly fragmented landscape will hinder adaptation of species when climate change alters habitat composition and timing of plant development cycles. Communities that are already the most vulnerable to weather and climate extremes will be stressed even further by more frequent extreme events occurring within an already highly variable climate system (National Climate Assessment 2018).

The magnitude of expected changes will exceed those experienced in the last century, resulting increased strain on available water resources. This strain may signal increased competition for communities struggling to meet water demand. Existing adaptation and planning efforts are often inadequate to respond to these projected impacts. Although projections suggest more frequent and more intense droughts, heavy downpours, and heat waves, people can reduce vulnerabilities with new technologies, community-driven policies, and the judicious use of resources. Changing extremes in precipitation are projected across all seasons, including higher likelihoods of both increasing heavy rain and snow events and more intense droughts. Winter and spring precipitation and heavy downpours are both projected to increase in the north, leading to increased runoff and flooding that will reduce water quality and erode soils (National Climate Assessment 2018).

Projected climate change will have both negative and positive consequences for agricultural productivity in the Northern Plains. Increases in winter and spring precipitation will benefit productivity by increasing water availability through soil moisture reserves during the early growing season; however, this can be offset by fields too wet to plant. Also, rising temperatures will lengthen the growing season, possibly allowing a second annual crop when and where feasible. A goal of planning will be to capitalize on positive aspects and minimize negative impacts of future climate variability.

3.0 Drought Vulnerability Analysis

The vulnerability, or risk, of a society to drought may be defined generally as the extent to which it will be affected by periods of natural water shortages. The DVA that was previously completed determined the drought vulnerabilities specific to OST. The DVA utilized a division of vulnerabilities regarding the following sectors: Legal Rights and Infringements, Tribal Lifeways, Water, Land, Wildlife, Agriculture, Public Health, and Data Monitoring. This information from the DVA and further coordination completed for this project was utilized to analyze the existing water sources and uses of water by the OST. The following further discusses the water sources for the OST and water uses of the OST. This analysis is followed by the determination of the main drought vulnerabilities for the OST.

3.1 Water Sources

In 2017, South Dakota experienced a major drought that directly affected the water supplies of the Reservation, Lower Brule Reservation, and Rosebud Reservation. In 1988, Congress approved the Mni Wiconi Project Act of 1988 which allocated funds to build the Mni Wiconi Rural Water System (MWRWS) (Govtrack 2020). The MWRWS is a wholesale operation, pumping the water directly out of the Missouri River. It is chemically treated and distributed through the core system supplying three Tribal reservations and one non-Tribal entity, Oglala Sioux Tribe Rural Water System, Lower Brule Sioux Tribe Rural Water System, Rosebud Sioux Tribe Rural Water System, and West River/Lyman-Jones Rural Water Systems. They in turn, deliver and maintain their systems, on an individual basis with their customers (Oglala Sioux Rural Water Supply System 2020). In addition to pumping from the Missouri River, the MWRWS also has wells in the High Plains Aquifer, which includes the Ogllala and Arikaree Aquifers (The Guardian 2019).

Currently, the MWRWS's total service area is approximately 12,500 square miles, with a total of 4,200 pipeline miles. It serves a total population of approximately 52,000 with the primary objective of bringing water to the Tribal communities of OST, Rosebud Sioux Tribe, the West River/Lyman Jones, Inc. Rural Water users, and the Lower Brule Sioux Tribe. The system has an intake capacity of 14 million gallons/day (MGD) and can treat up to 13.4 MGD (Oglala Sioux Rural Water Supply System 2020).

Much of the Reservation is underlain by the Arikaree and Ogllala Aquifers. Due to the dispersed population base, many people on the Reservation relay on groundwater through both private wells and rural water system supply. Volcanic ash within the geological strata in the Arikaree Group acts as a source of uranium and arsenic, causing elevated levels of both in the groundwater on the Reservation. Heavy-metal contamination in groundwater is typically attributed to activities such as mining operations and their industrial use. However, groundwater contamination can also occur by natural mineral dissolution, leaching, and transport in areas with localized high concentrations of uranium or arsenic in bedrock and/or soils. Elevated levels of these metals can have adverse health effects on the liver, heart, and kidneys, and are carcinogenic (Swift Bird 2018).

The Ogallala aquifer extends from southern South Dakota to northern Texas, covering an area of 179,000 square miles. Water-level declines began in parts of this aquifer soon after the onset of substantial irrigation with groundwater (about 1950). In response to water-level declines, Congress directed the USGS to monitor water levels since 1987 (USGS 2017). In 2020, results of a baseline future forecast indicated groundwater levels declined overall for this aquifer. By 2049, the amount of groundwater in storage in the aquifer would be 2,372 million acre-ft, or 56 million acre-ft less than the 2000 to 2009 average (USGS 2020).

In addition to the groundwater resources noted on the Reservation, the surface water resources include the White River watershed. The Reservation is primarily within the White River watershed, with a small portion occurring in the Niobrara River watershed. The White River basin is the southernmost of the five major west-river drainages in SD. The total drainage area of the basin with SD is 8,246 square miles. USGS has water quality monitoring sites in the basin. SD Department of Environment and Natural Resources (SDDENR) continue to sample uranium, and other parameters associated with uranium mining, at one location on the White River near Oglala. This location was selected due to the

in-situ uranium mining upstream in Nebraska and the naturally occurring uranium in the highly erodible soils in the White River basin. The basin receives the majority of the runoff and drainage from the western Badlands. The exposed Badlands a major natural source of both suspended and dissolved solids to the river. Severe erosion and leaching of soils occur in the Badlands and throughout the entire length of the basin. The river is listed as impaired for *E.Coli* and SAR (SDDENR 2020).

A Water Code (Code), as designed by the Oglala Sioux Tribal Council, also provides provide guidance and technical assistance in the assertion of treaty and reserved rights with regard to compliance with Tribal law in the protection, conservation management, and preservation of health, diversity, and productivity of the Oglala Sioux Tribe's natural and water resources to meet the needs of present and future generations. The purposes of this Code are as follows:

(1) To secure water for the permanent homeland for the Oglala Sioux Tribe for present and future generations;
(2) To protect the health, welfare, and economic security of the citizens of the Reservation;
(3) To develop, manage, and preserve the water resources of the Pine Ridge Indian Reservation;
(4) To secure a just and equitable distribution of the use of water within the exterior boundaries of the Reservation through a uniform and coherent system of regulations;
(5) To protect from over-appropriation, degradation, contamination, and any acts injurious to the quantity, quality, integrity, or rights of the Oglala Sioux Tribe's water resources;
(6) To ensure that the Oglala Sioux Tribe has sufficient water quantity and quality, now and into perpetuity, for cultural, domestic, fisheries, economic development, agricultural, stock, ecological flow, municipal, industrial, and other uses;
(7) To ensure equitable and culturally appropriate water allocation in a time of water shortage; and
(8) To provide for the exercise of the inherent sovereign power of self-government by the Oglala Sioux Tribe with regard to water rights and regulation.

The Code notes the beneficial uses noted by the OST for the tribal waters. All waters of the Reservation are the property of the OST and the right of the use of that water may be acquired by appropriation as provided for in this Code. Beneficial use refers to a reasonable quantity of water applied to a non-wasteful use. Beneficial uses for water of the OST are as follows:

(1) Domestic (including drinking, sanitary, and limited irrigation);
(2) Livestock watering;
(3) Industrial;
(4) Commercial;
(5) Agriculture irrigation;
(6) Sand and gravel extraction;
(7) Fishery;
(8) Wildlife maintenance and enhancement;
(9) Recreational;
(10) Fire protection; and
(11) Dust suppression.

Beneficial uses reserved for the OST are as follows:

(1) Preservation of environmental and aesthetic values;
(2) Cultural; and
(3) All other uses compatible with the goals and priorities of the Oglala Sioux Tribal Counsel.

Water shall be appropriated for and the use of such water shall be permitted for only these beneficial uses (OST 2020).

3.2 Water Use

3.2.1 Domestic and Municipal

Water system infrastructure is critical to the success of the OST. Native American tribal populations are known to face greater health concerns compared to other population groups in the US. Part of this disparity is access to safe drinking water. 8.9 percent of tribal homes lack access to safe drinking water, compared to 0.6 percent of non-Native American homes (Swift Bird 2018). Two issues for OST water distribution are critical and include the lack of a safe water distribution system and lack of connection to safe drinking water to each residence.

For the distribution system, the MWRWS provides water to the communities, from that point the distribution is part of the Oglala Sioux Tribe Rural Water System and is the responsibility of the OST and communities. Portions of the water distribution system on the Reservation has been replaced, but the other half is the original, outdated system. Parts of the water supply system still in use also have cement pipes that contain asbestos. Asbestos is a known carcinogen and can leach into the drinking water from the pipes (Mesothelioma Center 2020). The residents of the Reservation have a 40% higher cancer mortality rate than the rest of the US population (Swift Bird 2018). Although the mortality rate cannot be completely attributed to the metal contamination in the groundwater and cement pipelines, both are concerns for safe drinking water and public health.

Most of the Reservation is now connected to the MWRWS. Due to the population dispersed across the Reservation, there are still families that are not connected on waiting lists for non-profits organizations to hopefully help to connect to the rural water system or afford a private well. In the Reservation, the towns and villages receive water from MWRWS pipeline, but it feeds into old community water systems. Many of these systems date to the 1960s, which pipes were made of potentially hazardous asbestos-cement. In the MWRWS service area, 53 community water systems need replacement across three reservations. In 2014, the Bureau of Reclamation estimated the cost to replace all the systems at $42 million (The Guardian 2019).

Due to the reliance on the MWRWS, any water quality issues on the Missouri River would cause a major shortage of water supply to the tribes. Major water restrictions and large transportation hauling of water would need to occur, and the Tribe would need to rely upon the two aquifers present.

3.2.2 Tribal Lifeways

Water is the lifeblood of the living and holy Earth and a vital link between all natural and living systems, requiring the utmost care in the allocation of use and protection from pollution to sustain the natural communities and ecosystems and provide for the basic needs of the OST. Inherent in this care and protection is the need to control and regulate the use of the scarce water resources of the OST through the OST's sovereign right to the use and protection of these water resources (OST 2020).

3.2.3 Agricultural Practices

> "The American Indian is of the soil, whether it be the region of forests, plains, pueblos, or mesas. He fits into the landscape, for the land that fashioned the continent also fashioned the man for his surroundings. He once grew as naturally as the wild sunflowers; he belongs just as the buffalo belonged . . ."
>
> - Luther Standing Bear, Oglala Sioux Chief, 1905-1939

The most recent USDA Census of Agriculture was completed in 2017. The census definition of a farm is any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold. The census reported 1,416,104 acres of farm on the Reservation. A total of 380 farms are located on the Reservation, with 223 of those operated by natives (USDA 2017).

According the USDA 2012 Census of Agriculture for American Indian Reservations, the market value of agricultural commodities produced on reservations in 2012 totaled $87 million. Yet, less than 1/3 ($24 million) of that income went to Native American producers (SAHC). Agriculture on OST is a contentious issue when it comes to water. Livestock producers that use Tribal range units rely on the water that comes from the MWRWS, which has played an important role in water supply during times of drought. However, some believe the water should be prioritized for human consumption before livestock or agricultural use. This prioritization has always been the goal of the MWRWS, but when the system started to have restrictions, some users were unable to use it as a water source.

Drought impacts to agriculture also include poor or no crop growth, low yields, thefts of hay, increases in invasive species, and disease. In cases where excess water is needed to fight large fires, the Tribe will take water from stock dams with permission. In these situations, there is no reimbursement for the water or land losses to the leaseholders.

The land-use patterns on reservations today are the result of historical lending practices, disjointed and discontinuous land ownership, and federal policies over the last century that have excluded native land owners from the ability to use their lands, while opening them up to non-native farmers and ranchers. Court discriminatory lending practices, as argued, in court cases such as Keepseagle vs. Vilsack, demonstrated that Native Americans have been denied roughly $760 million (Cohenmilstein 2018). Another significant obstacle to jurisdictional definitions is the high degree of fractioning of reservation lands caused by the General Allotment Act of 1887. More than a century of unplanned inheritance by the BIA has created a situation where reservation lands have become severely disjointed and discontinuous, leaving the landowners with few options other than leasing their lands as part of the federal government's leasing program (Village Earth).

These land-use patterns leave Tribal members at a disadvantage during droughts if non-native producers declare bankruptcy and abandon a lease mid-term. When non-native producers are not leasing lands from Tribal members, these members and their allottee heirs lose money. In addition, carrying capacities for the range units do not change during droughts, leaving the pastures overgrazed during a vulnerable time.

3.2.4 Fish and Wildlife/Recreation

Some of the big game animal species native to the Reservation include elk, mule and white-tailed deer, buffalo, wild turkeys, antelope, and mountain lion. Small game animal species include pheasants, prairie grouse, geese, prairie dog, bobcat, and coyote. Fish species on the Reservation include minnows, trout, bass, crappie, walleye, perch, and paddlefish.

Drought impacts to wildlife on the reservation include Epizootic Hemorrhagic Disease (EHD) and bluetongue (BVD) in wildlife populations, increasing abundance of nonnative plants, reduced forage production and impacts to wildlife and buffalo, fire, plague in prairie dog towns, and degraded water quality leading to reduced fish populations. Additionally, mild winters may be increasing the risk of EHD and Bluetongue. Drought alters plant communities and increases the abundance of non-native and invasive plant species to the detriment of environmentally and culturally significant plants.

Drought also reduces plant growth, reducing forage production available to wildlife, buffalo, and livestock. Lower forage production often leads to buffalo and cattle sales, which reduce producer's incomes.

Tree regeneration is stunted by several things including lack of water, lack of nutrients, and increased damage due to drought. During times of drought on the reservation, hailstorms can be even more devastating, destroying the protective layering on trees that retains moisture and keep trees alive when water is scarce. Cottonwoods are of high cultural importance to tribal members on Pine Ridge and grow best in marshy wetlands, which tend to dry up during drought periods causing a lack of cottonwood regeneration. Trees and root systems serve as a wind buffers, help to prevent soil erosion, and provide shelter for wildlife. For these reasons, tee loss has negative impacts on agricultural lands and wildlife population sustainability.

Invasive plants are an issue throughout the reservation. During drought, native plants struggle to absorb enough water to sustain themselves, while invasive species are often heartier in times of drought. On the Reservation, people have noticed that native plants are becoming more difficult to find. When found, native plants tend to be drastically smaller and less healthy than what they typically are. Invasive plants are a major issue for the reservation as they may outcompete and prevent culturally significant plants from growing.

3.2.5 Fire Suppression

There are limited structural fire departments operating on or near the Reservation. The Kyle Volunteer Fire Department, located in Kyle, SD is a two-bay structure with two (2) small fire response vehicles, each having water tanks and tool storage (SDSMT 2020). A station in Batesland, SD is listed in the fire station directory on firedepartment.net, though no other information about it is provided. Long Valley, SD, Interior, SD, and Rushville, NE all have stations that lay outside of the Reservation boundaries. However, each one provides fire response to nearby areas of the reservation. Other fire stations located throughout the reservation belong to the Bureau of Indian Affairs (BIA) and are strictly limited to fighting wildland fires. *Figure 4* shows the fire response coverage the BIA supplies for wildfire suppression. Each red plus (+) outlines an operating BIA station, and the areas highlighted in green are where the BIA can reach and fight wildfires within an adequate response time of 14 minutes (SDSMT 2020).

Figure 6. *Fire Department Response Time*

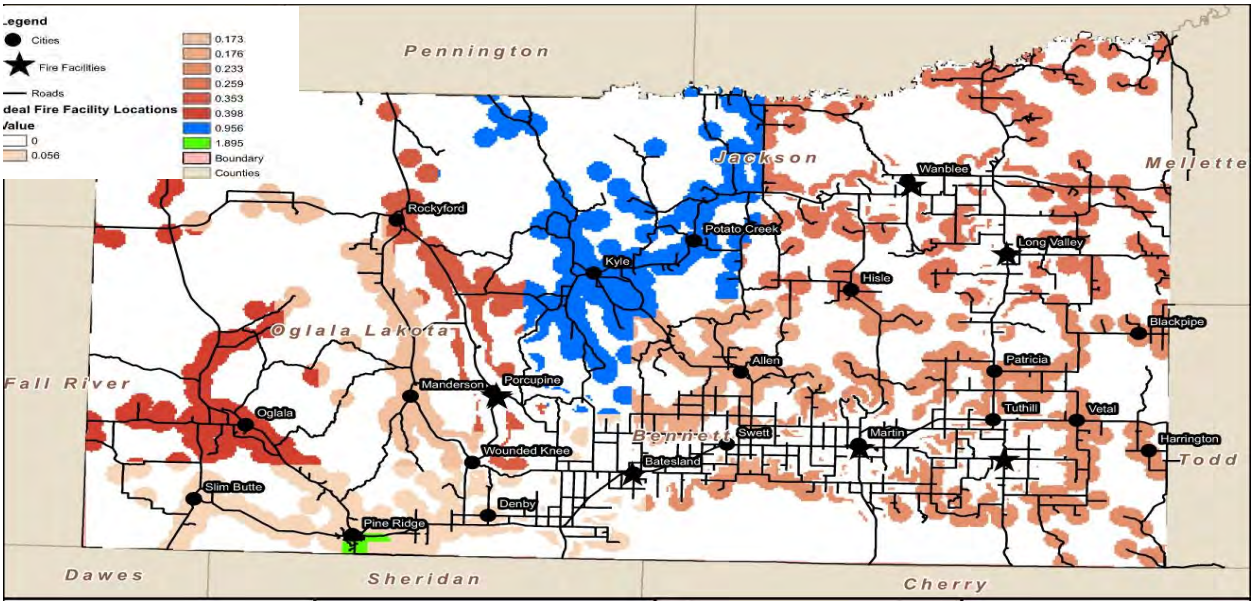


Table 3. *Fire Department Response Time*

Water Use Sector	Surface Water Supply	Groundwater Supply	Water Management	Drought Risk
Domestic and Municipal	MWRWS serves the Reservation. Water supply from Missouri River and Ogallala Aquifer.	MWRWS serves the Reservation. Water supply from Missouri River and Ogallala Aquifer. Private wells utilize Arikaree and Ogallala Aquifers.	MWRWS provides potable water to Oglala Sioux Tribe Rural Water System. Communities and cities with jurisdiction over water supply systems. Private well owners.	HIGH RISK- For quantity, aging infrastructure in communities and remaining population in rural areas that needs to connect to MWRWS or be able to HIGH RISK- Quality is a concern with uranium and arsenic contamination known in the Arikaree Aquifer. So back up options to MWRWS can be contaminated.
Tribal Lifeways	Surface waters across the Reservation water vegetation that has significance to the Tribe.	Groundwater seepages can water vegetation that has significance to the Tribe.	Not applicable.	MEDIUM RISK for loss of plants that are significant for ceremonies and medicinal.
Agriculture	Potential for ranchers to pull water from surface water systems; the number of systems that do is unknown.	Some ranchers do utilize rural water to provide water to livestock herds.	Managed by individual ranchers.	MEDIUM RISK for quantity- the Reservation is in a more arid area, so ranching is limited by water sources for the herds. Water sources are even more limited during droughts.
Fish and Wildlife/Recreation	Rivers, tributaries, lakes, stock ponds, oxbows and wetlands in the area.	Springs and wells, in some cases livestock water sources pumped from wells is utilized by wildlife.	OST Natural Resources Department manages the natural resources on the Reservation. Recreation areas managed by cities and communities.	MEDIUM RISK- water is available at many sources for fish and wildlife.
Fire Suppression	Not applicable.	MWRWS can be utilized, limited during times of drought and water use restrictions.	BIA manages the current wildland and non-structural fire station on the Reservation. The source of water was not located. OST is currently proposing a fire station in Pine Ridge, the water source has not been identified.	HIGH RISK- Several sources need to be identified due to limited water from MWRWS and the potential for large fires.

4.2.6 Priority Drought Vulnerabilities

Drought vulnerabilities were identified in the previous DVA. Please refer to *Appendix A.* The appendix shows the results of the responses, as well as their specified rank. A lower score represented what interviewees perceived to be the biggest vulnerabilities. In addition to this ranking process of the previous vulnerabilities, additional coordination occurred during the finalization of this report with RST. The information previously gathered in the DVA, research, and coordination for this project identified the following vulnerabilities as priorities for RST to focus upon:

Vulnerability #1: Inventory of Water System and Sources on the Reservation

Vulnerability #2: Conservation of Water Sources

Vulnerability #3: Contamination of Aquifers

Vulnerability #4: Lack of Water Supply for Fire Suppression

Vulnerability #5: Lack of Water Supply for Agricultural Practices

4.0 Drought Monitoring and Response Actions

There are various methods and indices that track current drought conditions across the country. Many include different variables, like precipitation, soil moisture, and humidity. For FSST, two monitoring indices will be utilized, the US Drought Monitor (USDM) and the Evaporation Demand Drought Index (EDDI).

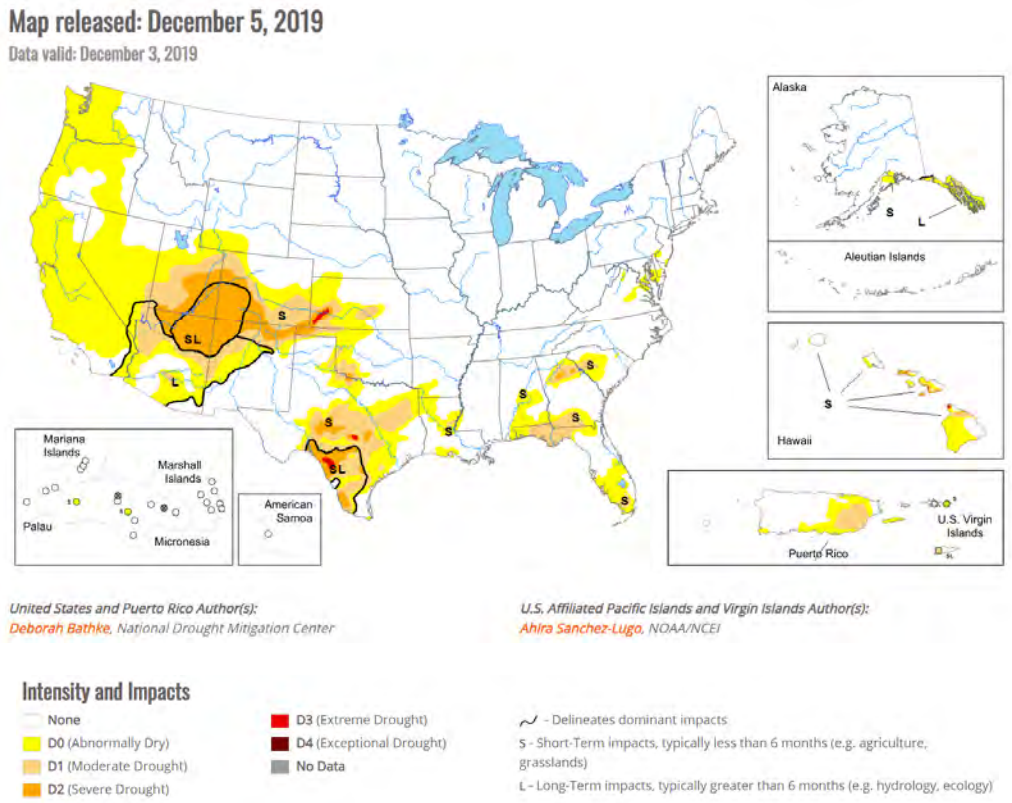
4.1 Drought Monitoring

4.1.1 USDM

The USDM is a semi-objective drought index that brings together several experts from the National Drought Mitigation Center, National Oceanic and Atmospheric Administration, U.S. Department of Agriculture, and the National Integrated Drought Information System. Using a variety of different tools, including indices like the PDSI, they determine current drought conditions throughout the U.S. There are four levels of intensity to which they classify: D0 (abnormally dry), D1 (moderate drought), D2 (severe drought, D3 (extreme drought), and D4 (exceptional drought). *Figure 7* shows the USDM for the continental U.S (USDM 2020). The online USDM map has been available since January 4, 2000.

A potential downside to using the USDM is the lack of data in areas like Pine Ridge. If there is little to no data recorded for Pine Ridge, the USDM can interpolate data from surrounding areas, but this becomes an estimate rather than a recorded observation, leaving room for error in the interpolation. Because of this, it is important to take considerations beyond the USDM, whether it be self-observations by residents of the area, or using other available drought indices to more accurately determine the state of the region in question.

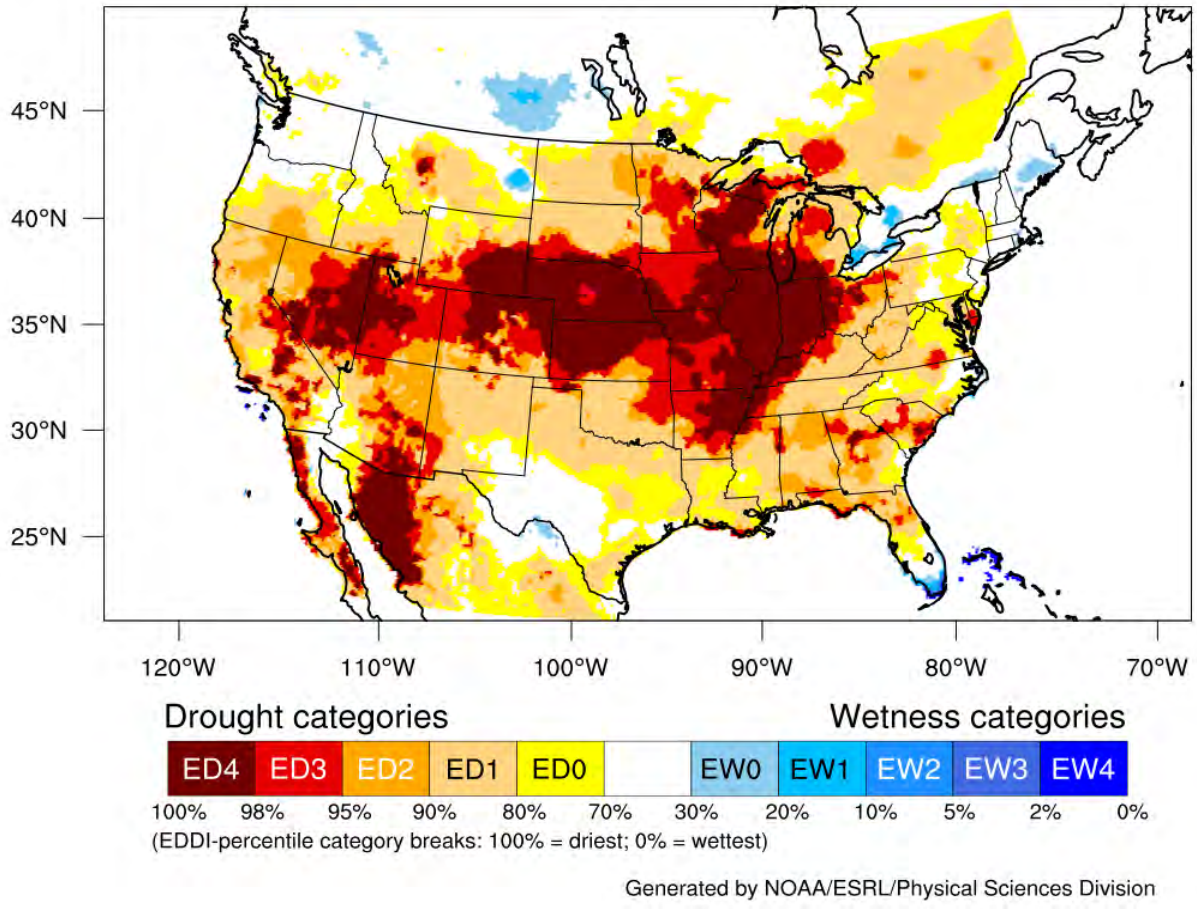
Figure 7. *USDM for the United States (December 5, 2019)*



4.1.2 Evaporative Demand Drought Index

The EDDI is an experimental drought monitoring tool developed by climate scientists at NOAA. It is an index based on "evaporative demand", which is basically a measure of how thirsty the atmosphere is. It uses measurements of temperature, humidity, windspeed, and solar radiation; all of which both contribute to and reflect the dying out of soil and vegetation. It is measured at different levels of intensity, similar to the USDM to the effect that: ED0 = D0, ED1 = D1, ED2 = D2 etc. However, it is not equivalent to the USDM because it does not measure soil conditions. What makes EDDI unique compared to the USDM is that it can measure "flash droughts", which are short, intense periods of drying that can take a major toll on crop yields when they occur. EDDI can also show the early signs of a developing long term term drought. This is due to the fact that EDDI only has a 5-day lag in data compared to the USDM, which has a lag of over a month. *Figure 8* provides a sample map showing the drought versus wetness categories across the United States (NOAA 2020)

Figure 8. *EDDI Map Example*



4.2 Drought Conditions Monitoring

Drought monitoring should occur after the end of each month and should show both the final 1-month EDDI conditions and USDM conditions for that month. Current conditions should be classified in four different categories with the criteria shown in *Table 3*. Both current EDDI and USDM conditions can be found at the links below.

USDM: https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?SD

EDDI: https://www.esrl.noaa.gov/psd/eddi/

4.3 Drought Adaptation Actions

With each set of drought conditions, certain actions are suggested to be taken by local governments. Drought response actions are meant to allow local governments to adjust to the impacts of a drought. Even during a normal or wetter period, actions can be taken to further prepare for a potential drought. *Table 4* shows recommended drought adaptation actions under normal, alert, warning, and emergency conditions. All actions are broken down into each water use sector.

Table 4. *Drought Monitoring Conditions and Response Actions*

	Normal (No Drought)	Alert (Mild Drought)	Warning (Moderate Drought)	Emergency (Severe to Extreme Drought)
Drought Stage Parameters	No USDM Classification	D0 USDM Classification or one-month ED3-ED4 EDDI Classification	D1 and D2 USDM Classification	D3 and D4 USDM Classification
All Water Use Sectors	- Identify agencies that will head actions and plans. - Identify all water demands - Monthly or quarterly report detailing current drought conditions to be made public.	- Coordinate with fire management regarding wildfire response. - Establish fire restrictions Monthly or quarterly report detailing current drought conditions to be made public. - Monthly or quarterly report detailing current drought conditions to be made public.	- Prepare Drought Emergency Declaration. - Prepare letters to secretaries for drought determination. - Monthly or quarterly report detailing current drought conditions to be made public.	- Establish water use restrictions - Declare Drought Emergency. - Send letters to secretaries for drought determination and assistance. - Support actions and resolutions for drought assistance funding. - Monthly or quarterly report detailing current drought conditions to be made public.
Domestic and Municipal Use	- Identify voluntary and non-voluntary restrictions to be implemented by drought stage. - Identify current water capacity in existing system. - Identify water sources for residences that are currently not connected to MWRWS. Identify if residences should have a private well, options for well infrastructure, or if a MWRWS connection is feasible. - Continue to identify ways to update water systems in communities. - Continue to issue permits regularly.	- Monitor water use within the system, voluntary restrictions requested. - Continue to issue permits regularly.	- Monthly or quarterly report detailing current drought conditions to be made public. - Monitor water use within the system, restrictions implemented. - Wait to issue new permits.	- Monthly or quarterly report detailing current drought conditions to be made public. - Monitor water use within the system, restrictions implemented. - Wait to issue new permits.
Tribal Lifeways	- Identify methods to maintain traditional plants and foods during drought.	- Identify methods to preserve traditional plants for times during drought. - Community gardens or plots to grow traditional plants.	- Community gardens or plots to grow traditional plants. Utilized efficient watering methods such as drip irrigation.	- Community gardens or plots to grow traditional plants. Utilized efficient watering methods such as drip irrigation.
Agriculture	- Develop individual ranch/bison herd drought plans. - Identify water sources for livestock. - Encourage use of planting drought resistance grasses.	- Encourage use of planting drought resistance grasses. - Encourage drought resistant landscaping. - Encourage pasture rotation for cattle. - Develop individual ranch drought plans.	- Graze livestock on rangeland to trim fuels. - Encourage drought resistant landscaping. - Encourage utilizing individual ranch/bison herd drought plans to make decisions on reduction of livestock.	- Graze livestock on rangeland to trim fuels. - Encourage drought resistant landscaping. - Encourage utilizing individual ranch/bison herd drought plans to make decisions on reduction of livestock. - Encourage federal disaster assistance programs for livestock.
Fish and Wildlife/Recreation	- Develop wildlife habitat management plan - Continue management of hunting and fishing licenses.	- Monitor conditions for fish wildlife. - Monitor drought common disease outbreaks in big game. - Continue management of fishing and hunting licenses.	- Monitor conditions for fish wildlife. - Monitor drought common disease outbreaks in big game. - Adjust hunting licenses to increase harvest, reducing impact on available forage. - Encourage prairie dog control to reduce competition for rangeland.	- Monitor conditions for fish wildlife. - Monitor drought common disease outbreaks in big game. - Adjust hunting licenses to increase harvest, reducing impact on available forage. - Encourage prairie dog control to reduce competition for rangeland.
Fire Suppression	- Identify sources of water for structural fire and wildfire response. - Check availability of water carrying equipment.	- Coordinate with fire management regarding wildfire response. - Limit firework displays. - Graze livestock on rangeland to trim fuels.	- Coordinate with fire management regarding wildfire response. - Establish fire restrictions	- Coordinate with fire management regarding wildfire response. - Establish fire restrictions.

5.0 Drought Mitigation Strategies and Potential Future Projects

The purpose of this plan component is to develop mitigation strategies for this implementing long-term measures to reduce drought risk. As in dealing with any type of disaster, this type of strategic approach is referred to as risk management. *Table 4* shows the vulnerabilities identified and the mitigation strategy that addresses those vulnerabilities to reduce the risk to FSST during drought. Several projects are identified for each mitigation strategy and potential project funding.

The following sections discuss the mitigation strategies and the potential projects identified.

5.1 Identification of Sustainable Water Sources for all Residences on the Reservation

Many different resources and studies have been completed on the Reservation. Currently, many different departments and entities are gathering information. OST needs the information compiled to be able to understand their current status of the water sources, quality of those sources, and the water system infrastructure. The first recommended project is to create a GIS database that contains all this information. Coordination would occur to request data from all departments and entities on the Reservation. The database would then be created having many different layers, including water quality sampling and water system infrastructure. For water system infrastructure, an updated database could be utilized to identify failing system that need replacement. The system would be updated as each project occurs, so replacement projects can be identified easily.

Another recommended project is conducting a water capacity study of the MWRWS, allowing the identification of the current water capacity and demands, allowing for future planning of water sources. It is important to know what the Reservation's current water capacity and demands are, as it will provide a better insight into what the current water system can handle before new developments are approved of and constructed. This could also provide proof that a new water source would be needed to sustain the reservation during drought periods, especially if new development is desired.

Identifying new water sources before approving future development would require the accurate accounting of the current water demands. Once the current demands have been identified and the budget is complete, Identification of new water sources could begin. New water sources could include any unused waterways and potential wells (private and public) that may be sources for additional water. Current residential water use should be quantified, and future use should be estimated with a new development taken into consideration to determine the feasibility of an adequate water supply. It is recommended that all water rights be filed through OST and the State of South Dakota to ensure water budgets will allow for the amount of water requested.

A groundwater monitoring program is needed to take samples of the aquifers throughout the Reservation. In addition, OST should have a weather station installed, there is currently no station on the Reservation.

5.2 Improving Water Use Efficiency in Buildings

Poor efficiency standards are a major problem for buildings and the environment. Low efficiency buildings allow more water use. To improve efficiency standards for Tribal buildings and homes, it is recommended to start with focusing the construction of future buildings towards sustainability. Suggestions include high efficiency appliances such as dishwashers, toilets, etc, and capturing and reusing rainwater and grey water. Once all future buildings are focused

on sustainability, updating old tribal buildings to higher efficiency appliances can be explored, followed by home renovations for efficiency. Existing homes should be the last focus due to the number of upgrades needed.

5.3 Catching and Utilizing Rainwater and Grey Water

Rainwater is an excellent source of non-potable water. Catching and using rainwater could be excellent for use in activities outside of the home, including watering a garden, grass, or for livestock use. To approach this project, it is recommended to seek funding through the EPA. Once funding is secured, educational classes, brochures, posters, etc. would be recommended. It is also recommended to use the funding to provide rain barrels to low income residents who are interested, as well as making rain catching methods available for government buildings to water and maintain their landscaping.

Setting up educational programs about reusing gray water for other applications stems from the third ranked mitigation strategy: catching and using rainwater. There is potential conflict with capturing rainwater due to a lack of legislation stating that it is a tribe-endorsed activity. An alternative to capturing rainwater that does not interfere with legal rights is the reuse of gray water. Gray water is considered lightly used water that isn't contaminated with potentially harmful or hazardous substances, such as urine or feces. Gray water may have been used to wash hands, wash dishes, bathe, etc. Learning how to capture and safely reuse this water in other applications such as wastewater systems, plant irrigation, and livestock watering can help reduce the overall demand of water across the reservation and may help reduce the impact of water restrictions during drought conditions.

5.4 Replace Water Systems, Prioritizing Asbestos-Cement Pipelines.

The current maintenance and repair unit for the OST is underfunded and understaffed. The future of the maintenance and repair program depends upon hiring more staff and skilled workers. From the interviews with tribal leaders, it was learned that the maintenance and repair program doesn't have skilled workers for repairing the pumps for distribution and does an excellent job of repairing large leaks, but not small ones. Funding should be sought for training of OST Tribal Members to increase technical capacity and to create permanent jobs for maintenance of the pumps and for replacement of old piping. Some areas are using cement piping that is known to contain asbestos which should be replaced as soon as possible.

Detecting water losses and leaks in pipes is part of the second mitigation strategy: maintenance and repair programs on distribution infrastructure. With outdated pipe networks and water infrastructure, leaks are a source of major water loss, reducing the overall capacity for the Reservation. A method for detecting leaks, especially major leaks, would be beneficial in reducing water loss.

5.5 Protection of Groundwater Recharge Zone and Focus on Quality Drinking Water

Due to the reliance on limited water sources, protection of those sources from pollutants needs to continue. OST is active in commenting on future projects and noting their concerns for projects such as uranium mining. This coordination and noting concerns should continue. OST could also look for opportunities to incorporate best management practices at recharge zones to the aquifers and at waterways. For example, a riparian buffer to a stream that is approximately 50 foot of vegetation can provide filtration of pollutants. Many programs exist that would provide financial assistance for taking those areas out of production.

In addition, OST could implement education programs on the protection of aquifer recharge zones by producing informational materials, coordinating with the Tribal leaders to distribute information, and coordinating with schools for education opportunities.

5.6 Identification of Water Sources for Fire Suppression

As noted, OST is currently working on setting up fire departments. As these departments and stations are designed, a consideration for the water sources should be completed. Water could be pulled from MWRWS but during large fire events, additional sources should be utilized. Sources can include streams, wells specifically for fire suppression, oxbows, irrigation wells, and any other identified water sources. OST can work to put agreements in place with landowners to prepare for drought.

5.7 Livestock Management

Drought can affect the amount of forage available. A specific drought plan for each ranch/rancher can be completed by local NRCS, Conservation District or Extension. Solutions such as working planted forage resources into the feeding strategy can be established. In addition, an evaluation of the reduction options to your herd can also be considered. This might create a better balance of the forage available and keep the herd healthy. The herd reduction strategies can include: 1) Selling feeder animals early, 2) Selling replacement breeding animals, 3) Reduce breeding animal numbers, 4) Selling the herd and ceasing production, and 5) Selling the heard and restocking later (National Drought Mitigation Center 2020). In addition, water sources to the herd need to be considered. A private or water line from MWRWS can also be provide for water to encourage options for watering. In addition, a review of any stock dams could be completed and if any maintenance activities (i.e. removing sedimentation) can be completed. OST can encourage or require the ranchers to complete these pasture improvement assessments and analyze the different water sources provided.

***Table 5**. Vulnerabilities, Mitigation Strategies, Potential Projects, and Potential Funding*

Vulnerabilities	Mitigation Strategy	Potential Project	Potential Funding
#1: Inventory of Water System and Sources on the Reservation	Identification of sustainable water sources for all residences on the Reservation	GIS database that notes the water sources, water quality information, and water system infrastructure.	DHHS Community Services Block Grant (CSBG) Rural Community Development Program (RCD) Water and Wastewater Treatment Systems Training and Technical Assistance Project. (HHS 2020) Rural Community Development (RCD) discretionary grant funds. RCD funds must be used to provide training and technical assistance to: Increase access for low-income families to water supply and waste disposal services, preserve affordable water and waste disposal services in low-income rural communities, increase local capacity and expertise to establish and maintain needed community facilities, increase economic opportunities for low-income rural communities by ensuring they have basic water and sanitation, utilize technical assistance to leverage additional public and private resources, and promote improved coordination of Federal, state, and local agencies and financing programs to benefit low-income communities. SD DENR Water and Waste Funding Program Small Community Planning Grant. This program provides small communities with funds to hire an engineering consultant to develop a project specific engineering report. The engineering report's level of detail will be on par with the facilities plan required for SRF projects, The project sponsor must be an entity of government (county, municipality, or township), or a special purpose district with the authority to construct a water or wastewater project (sanitary, water user, watershed, or water project). Nonprofit organizations are also eligible provided they were formed for the primary purpose of supplying water or sanitary service. Nonprofit water systems applying for this grant must meet the definition of a community water system (a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents). Department of Interior - Bureau of Reclamation (DOI-BOR) – WaterSMART Drought Response Program: Drought Resiliency Projects. (DOI BOR 2020) The objective is to invite states, tribes, irrigation districts, water districts, and other organizations with water or power delivery authority to leverage their money and resources by cost sharing with Reclamation on D4rought Resiliency Projects that will increase the reliability of water supplies: improve water management and
		Develop a long-term strategic plan for future development. Identify areas that has access to water.	
		Study to identify the residences of the Reservation that are not served by MWRWS. Identify sustainable water source for those residences. Provide resources (well construction) for these residences to access the groundwater.	
		Update the MWRWS water capacity study. Identify potential shortages and current capacities. Determine plan for sustainability of water supply.	
		Review of permitting jurisdiction for new wells within the Reservation. Enforcement of water codes.	
		Groundwater monitoring to monitor pollutant levels in the aquifers.	
	Improving water use efficiency in buildings	Promote green construction – water and material conservation, passive energy.	
		Implement green certification into all new developments.	
	Catching and utilizing rainwater and grey water	Set up educational programs about reusing gray water for other applications.	
		Update legislation to include rainwater catchment as a Tribal-endorsed activity.	
		Implement a reforestation of cottonwood tree project utilizing rainwater as a water source.	

***Table 5**. Vulnerabilities, Mitigation Strategies, Potential Projects, and Potential Funding*

Vulnerabilities	Mitigation Strategy	Potential Project	Potential Funding
			provide benefits for fish, wildlife, and the environment to mitigate impacts caused by drought. US EPA Water Pollution Control Section 106 Supplemental Grant. Provides support for state, interstate and eligible tribal recipients of Section 106 grants for Water Pollution Control Programs. Covers activities, water quality standards, water quality monitoring, impaired waters listing and total maximum daily loads development, National Pollutant Discharge Elimination System permitting and enforcement and compliance. (US EPA 2020)
#2: Conservation of Water Sources	Replace water systems, prioritizing asbestos-cement pipelines. Maintain existing systems.	Identify system losses and replace those systems with upgrades. Prioritize the systems that have asbestos-cement pipelines. Establish a work force to inspect, repair, and maintain pipe networks.	Department of Interior - Bureau of Reclamation (DOI-BOR) – WaterSMART Drought Response Program: Drought Resiliency Projects. (DOR BOR 2020) The objective is to invite states, tribes, irrigation districts, water districts, and other organizations with water or power delivery authority to leverage their money and resources by cost sharing with Reclamation on Drought Resiliency Projects that will increase the reliability of water supplies: improve water management and provide benefits for fish, wildlife, and the environment to mitigate impacts caused by drought.
#3: Contamination of Aquifers	Protection of Groundwater Recharge Zone and Focus on Quality Drinking Water	Advocate with local agencies, state agencies and federal agencies to protect the recharge areas for the aquifer. Education on protection of water sources and aquifer recharge zones.	US EPA-Wetland Program Development Grant. The primary focus of these grants is to develop/refine state and tribal wetland programs. A secondary focus is to develop/refine local (e.g. county or municipal) programs.
#4: Lack of Water Supply for Fire Suppression	Identification of water sources for fire suppression	Connect to MWRWS for source. Construct water towers for storage. Identify stock ponds, oxbows, or wetlands that could be available for water source for fire suppression. Creating or determining locations and putting agreements in place with landowners.	USDA NRCS Conservation Innovation Grants (CIG)-The purpose of CIG is to stimulate the development and adoption of innovative conservation approaches and technologies in conjunction with agricultural production.

***Table 5**. Vulnerabilities, Mitigation Strategies, Potential Projects, and Potential Funding*

Vulnerabilities	Mitigation Strategy	Potential Project	Potential Funding
#5: Lack of Water Supply for Agricultural Practices	Livestock Management	Complete individual rancher or tribal herd drought plans.	Department of Interior, Bureau of Land Management Montana/Dakotas Rangeland Resource Management Funding opportunity to better support land management decisions regarding grazing and other range management treatments, soils management, and invasive species, the BLM will place a priority on collecting data through the use of consistent, comparable, and common indicators, consistent methods, and an unbiased sampling framework which will allow for analyses that are repeatable and comparable across a region, and decisions based on science and data that are legally defensible.
		Identify alternative water sources for livestock.	

6.0 Drought Adaptation Plan Maintenance

It is recommended that the Tribe continuously update the Drought Adaptation Plan. The updates should come every 5 years and it is recommended that the OST Natural Resources Department monitor the consistent updates. This will confirm that the Drought Adaptation Plan is consistently up-to-date and is beneficial during major droughts. To facilitate consistent updating on major plans, such as the Drought Adaptation Plan, the Federal Emergency Management Agency (FEMA) has funding sources available.

The Tribal department that oversees this plan can change based on both the needs of the Tribe and the most applicable projects to complete. It is also recommended that once a project is complete, a note or updated page be written to reflect the project completion and to ensure that one project is not repeated unnecessarily.

The Drought Adaptation Plan is written to be used to update the Tribe's Hazard or Multi-Hazard Mitigation Plan.

7.0 Data/Process Gaps and Needs

The most important developmental tool for a DAP is a response from the affected people, the government leaders, and the experts of the area. To create a well-rounded plan, the differences in responses and professional opinions develop a solid understanding of the goals and needs of the Tribe. In a perfect scenario, all Tribal program directors, staff, Tribal council, government officials, and Tribal members invited would be able to attend and determine the exact projects and plans that the Tribe should pursue.

The DAP had excellent responses and follow-up responses, but the quantity of responses was low. When the DAP is updated, it is recommended that more time be dedicated to retrieving responses and seeking follow-up from the Tribal program directors, staff, Tribal council, government officials, and Tribal members. The original DAP was created to only use a two-day meeting to receive feedback, but because of the availability of Tribal program directors, staff, Tribal council, government officials, and Tribal members, it would've been more beneficial to meet individually with each person.

In addition, future version of this DAP could include drought projections, further modeling and consideration of how often the Reservation experiences drought. Modeling should also look at potential durations and how natural resources would be affected by the different durations. The projections could be utilized to expand the response plan in Table 3 to show the longer effects of a longer in length drought. The response intensity could be increased.

8.0 Conclusions and Next Steps

The information contained within this Drought Adaptation Plan should be implemented and used to seek funding for identified projects. *Table 5* notes the specific funding that can be utilized by project. Each project had specific grants noted that OST can pursue. The projects that are in this report were identified through the leadership of the Tribe. The future of the Tribe's resiliency to drought is dependent on the use of this report to work on the identified adaptation plan and projects. Subsequent action steps to the DAP should be seeking funding sources and pursuing the completion of each project outlined within.

Two priority projects were selected for OST to coordinate:

1. *GIS System and Database*- Create a GIS system that includes water system infrastructure and water quality information. Create an interface that OST officials can view and utilized for planning and infrastructure projects. The GIS program has free resources through the company, ESRI, for tribes:

In addition, funding may be available through the MidAmerican GIS Consortium, through their grant program. The following site has additional information: https://www.magicgis.org/GRANTS

2. *Study to identify the residences of the Reservation that are not served by MWRWS. Identify sustainable water source for those residences. Provide resources (well construction) for these residences to access the groundwater*- Utilize the GIS database to identify the residents on the Reservation, the MWRWS and Oglala Rural Water System connections, and private wells. Having this information will allow OST to identify needed water sources for residents that currently do not have either a rural well or connection to MWRWS.

For future, attempts should be made to reach all Tribal leaders. In the next iteration of the Drought Adaptation Plan, it is recommended to have longer field visits and individual meetings with each Tribal leader to better understand every leader's perspective.

9.0 Resources

Resources for information, outside of online sources, books, articles, journals, etc., was primarily interviews and discussions with Tribal program directors, staff, Tribal council, government officials, and Tribal members. The following sections describe the interviews and the interviewees. The interview questions section describes the field visit and follow-up interviews and the Tribal leaders interviewed identifies the specific leaders that were asked for their professional opinions.

9.1 Tribal Leaders Interviewed

OST's field visit yielded excellent responses and had most of the invited tribal leaders in attendance. The tribal leaders and federal government employees that attended were: Reno Red Cloud (Water Resources), Amos Young Dog (Water Management), Mike Catches Enemy (Presidential Legislative Liaison), Louis R. Janis (OST Utilities Office), Steve Pourier (OST Utilities Office), Delaine Killeback (Environmental Protection Program), Tracy Zacher (Bureau of Land Management), and Robert Pille (OST Water and Sewer). All the tribal leaders who were in attendance had many ideas and thoughts on drought and drought mitigation strategies.

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Appendix A. Field Visit Agendas, Sign-In Sheets and Feedback

AGENDA
OGLALA SIOUX TRIBE
Great Plains Tribal Water Alliance: Drought Adaptation Planning
Thursday and Friday, June 26 & 27, 2019
Justice Center Building

Wednesday, June 26th

8:30 AM – Welcome/Opening Prayer

9:00 AM – Identify Key Drought Vulnerabilities from 2017 Drought Vulnerability Assessment

12:00 AM – Lunch

1:00 PM – Identify Mitigation Actions, Action Plan, and Funding Sources

4:00 PM – Adjourn

Thursday, June 27th

8:00 AM – Locate and Interview Department Directors Missed

10:00 AM – Meet with Tribal Leaders and Program Directors

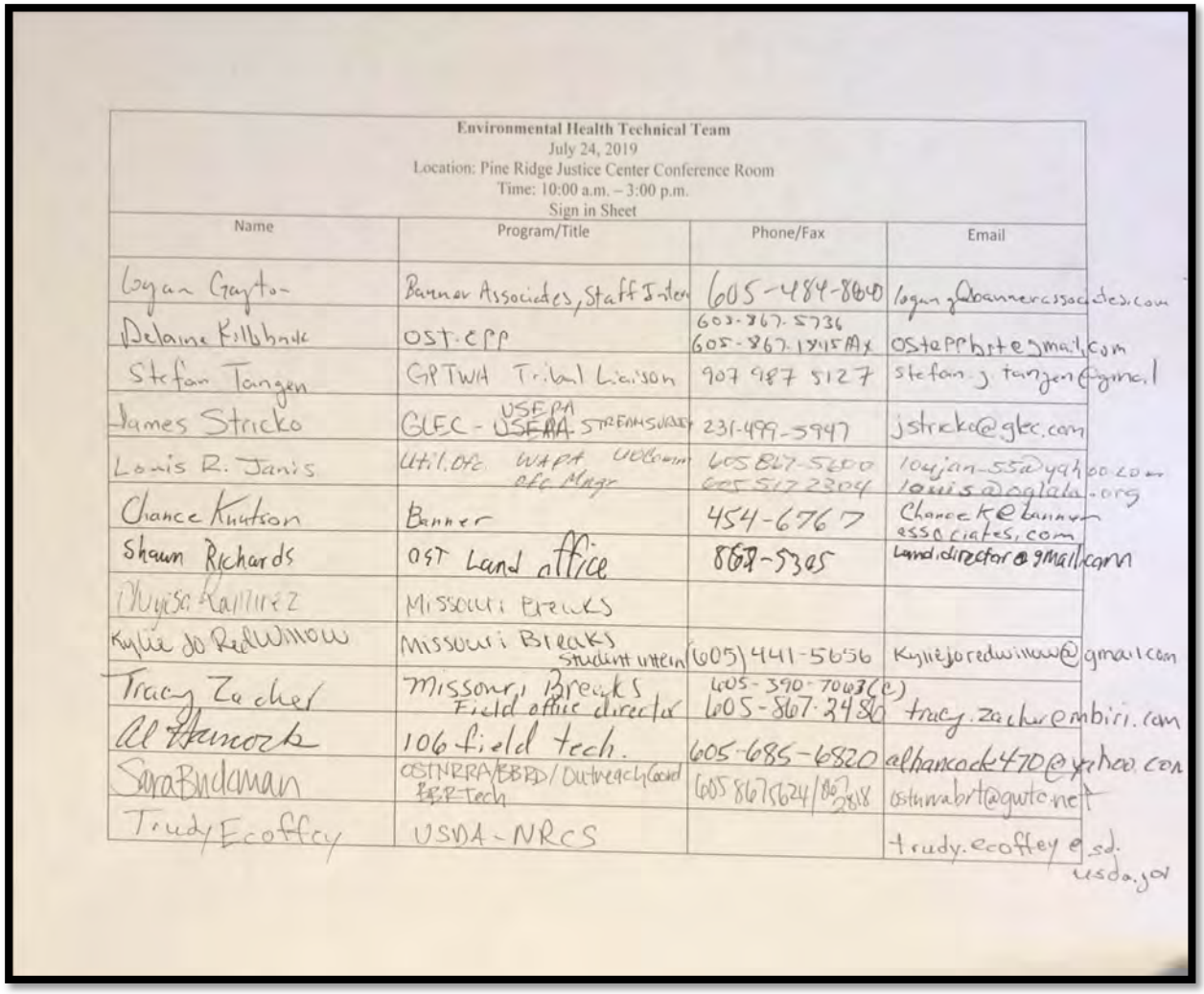
12:00 AM – Lunch

1:00 PM – Interview with Tribal Leaders

2:00 PM – ADJOURN

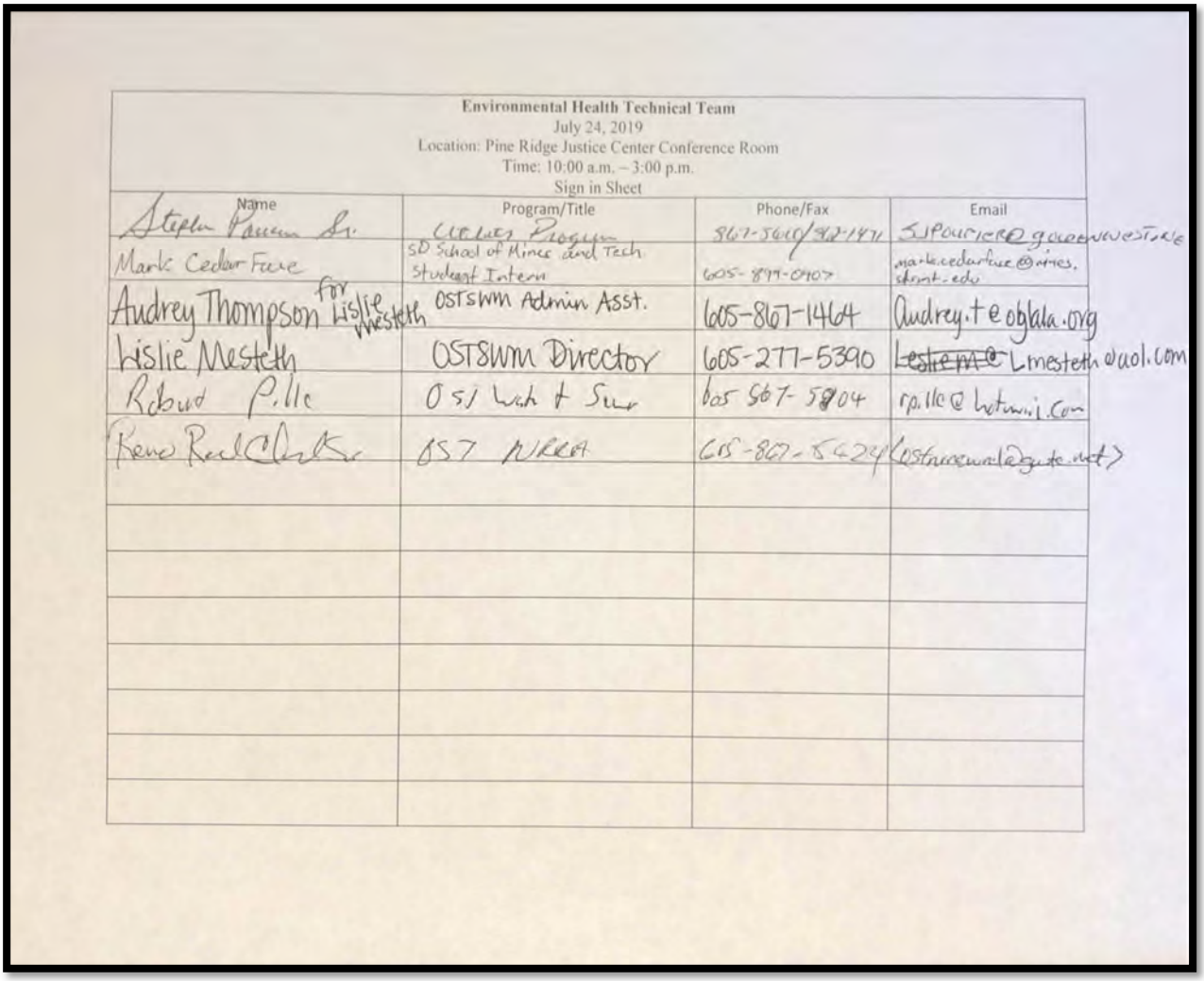
Next Steps:

- Develop STAPLEE Survey
- Draft Drought Adaptation Plan
- Tribal Review for Comments
- Develop Final Draft Plan



Environmental Health Technical Team
July 24, 2019
Location: Pine Ridge Justice Center Conference Room
Time: 10:00 a.m. – 3:00 p.m.
Sign in Sheet

Name	Program/Title	Phone/Fax	Email
Logan Grayton	Banner Associates, Staff Intern	605-484-8640	logan@bannerassociates.com
Delaine Killsback	OST-EPP	605-867-5736 605-867-1915 Fax	ostepphites@gmail.com
Stefan Tangen	GPTWA Tribal Liaison	907 987 5127	stefan.j.tangen@gmail
James Stricko	GLEC - USEPA STREAMSURVEY	231-499-5947	jstricko@glec.com
Louis R. Janis	Util. Dir. WAPA Welcome ofc Mngr	605 867-5600 605 517 2304	loujan-55@yahoo.com louis@oglala.org
Chance Knutson	Banner	454-6767	Chance@bannerassociates.com
Shawn Richards	OST Land office	867-5305	Landdirector@gmail.com
Alyssa Ramirez	Missouri Breaks		
Kylie Jo RedWillow	Missouri Breaks student intern	(605) 441-5656	Kyliejoredwillow@gmail.com
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Al Hancock	106 field tech.	605-685-6820	alhancock470@yahoo.com
Sara Buchanan	OSTNRRA/EBBRD/Outreach Coord R&R Tech	605 867 5624/867 2818	ostnrabrt@gwtc.net
Trudy Ecoffey	USDA-NRCS		trudy.ecoffey@sd.usda.gov



Environmental Health Technical Team
July 24, 2019
Location: Pine Ridge Justice Center Conference Room
Time: 10:00 a.m. – 3:00 p.m.
Sign in Sheet

Name	Program/Title	Phone/Fax	Email
Stephen Pourier Sr.	CEDARS Program	867-5610/382-1471	SJPourier@gracenet.net
Mark Cedar Face	SD School of Mines and Tech Student Intern	605-877-0907	mark.cedarface@mines.sdsmt.edu
Audrey Thompson for Lislie Mesteth	OSTSWM Admin Asst.	605-867-1464	Audrey.t@oglala.org
Lislie Mesteth	OSTSWM Director	605-277-5390	~~Lesliem@~~ Lmesteth@aol.com
Robert Pille	OSJ Water & Sewer	605 867-5804	rp.lle@hotmail.com
Rene Real Chief	OST NRRA	605-867-5429	(ostnrraenv1@gwtc.net)

Suggested Vulnerabilities Not Included in Questionnaire:	Suggested Mitigation Strategies Not Included in Questionnaire:
- Dam and Tree Damage/Regeneration	- Public Outreach
- Implementation of Hemp Industry	- Education
- Hemp Soil Health	- Training
- Lagoons	- Funding for Climate Change Projects
- Wells high in Radium	- Spring Wells Updated Study
- Hail Damage to Trees Encourages Beetles	- West Nile Study
- Overgrown Forests - More Fire Fuel	- Solid Waste/Waste Water Updated Report
- Dust During Droughts Affecting Human Health	- Rangeland Dam Permits and Ground Water Regeneration
- Pollen Travels Further During Drought - Increased Allergies	- Recycling
- Identifying Recharge Sites	- Implementing Natural Insect Competition
- TCP - Traditional Plants	- Reusing Irrigated Water w/ Ditch Recollection
- TCP - Animal Habitats and Riperian Areas	- Weather Stations to Record and Warn Residents of Weather Related Issues
	- Land Use Controls
	- Incentives for Reusing and Recycling
	- Wastewater Repairs

Drought Vulnerability Survey

Vulnerabilities	Rank
General infrastructure is old and outdated (water, wastewater, and road)	
Less fish available in streams	
Mni Wiconi reached capacity in 2017 during the drought	
Tree regeneration is significantly reduced	
Reservation has developed a spring fire season	
Volunteer fire departments are few and far between	
Animals exposed to Epizootic Hemorrhagic Disease and Bluetongue disease during drought	
Increased invasive plants	
Reduced forage production	
Plague in prairie dog towns	
Overselling of hunting licenses and animal tags could cause overharvest of animal species	
Agricultural producers unable to implement long-term mitigation strategies to remediate effects of drought due to having temporary leases	
People stealing hay	
Private wells are high in arsenic	
High concentration of *E.coli* in water source	
Fire hydrants do not have enough pressure to work during emergency situations	

Mitigation Strategy Survey

Mitigation Strategies	Rank
Encouragement of crops that need less water	
Encourage drought resistant landscaping	
Water use restrictions	
Encourage dry land farming	
Maintenance and repair programs on distribution infrastructure	
Improving efficiency standards in buildings	
Catching and use of rainwater	
Encouraged use of water efficient appliances	
Use of a plastic-like material to keep moisture near plants	
Drip irrigation	
Incentive pricing on water use	
Peer pressure (sending comparisons of water use)	
Using cover crops (like barley)	
Irrigation scheduling	
Grazing management plans	
Cross fencing	
Reduce water use in food production (full washers, low flow)	
Display water use to encourage low usage	
Composting	
Weatherizing homes and buildings	
Putting wastewater into the ground to encourage groundwater replenishment	
Reservoir augmentation	
Identifying new water sources before approving proposed development	
Identifying all water demands	
Update the wastewater drinking plant	
Stormwater management – retaining basin or dry basin	

OST Drought Vulnerability Survey Results

Drought Vulnerablilities	Total Score	Rank
General infrastructure is old and outdated (water, wastewater and roads)	24	**1**
Private wells are high in arsenic	31	**2**
Volunteer fire departments are few and far between	33	**3**
Tree regeneration is significantly reduced	34	**4**
Increased invasive plants	34	**4**
Agricultural producers are unable to implement long-term mitigation strategies to remediate effects of drought due to having temporary leases	34	**4**
Reduced forage production	43	**7**
Mni Wiconi reached capacity in 2017 during drought	44	**8**
High concentration of E. Coli in water source	47	**9**
Fire hydrants do not have enough pressure to work during emergency situations	50	**10**
Less fish available in streams	50	**10**
Reservation has developed a spring fire season	52	**12**
Plague in prairie dog towns	53	**13**
Animals exposed to Epizootic Hemorrhagic Disease and Bluetongue disease during drought	54	**14**
People stealing hay	57	**15**
Overselling of hunting licenses and animal tags could cause overharvest of animal species	61	**16**

To identify mitigation strategies that would be most helpful for the OST to pursue, a list of mitigation strategies was presented to Tribal leaders and other field visit attendees. The Tribal leaders were asked which mitigation strategies were most helpful and if there were any mitigation strategies that were missed. *Error! Reference source not found.* shows the top five strategies selected from the survey. A lower score represented what interviewees perceived to be the most important mitigation strategy.

OST Mitigation Strategy Rankings

Mitigation Strategies	Total Score	Rank
Identifying all water demands	27	1
Maintenance and repair programs on distribution infrastructure	25	2
Catching and use of rainwater	31	3
Improving efficiency standards in buildings	24	4
Identifying new water sources before approving proposed development	29	5
Weatherizing homes and buildings	31	6
Drip Irrigation	32	7
Grazing management plans	32	7
Water use restrictions	35	9
Stormwater management – retaining basin or dry basin	33	10
Encourage the use of water efficient appliances	39	11
Composting	39	11
Display water use to encourage low usage	40	13
Encourage dryland farming	43	14
Putting wastewater into ground to encourage groundwater replenishment	42	15
Cross fencing	42	16
Irrigation scheduling	44	17
Updated the wastewater drinking plant	47	18
Use of plastic-like material to keep moisture near plants	46	19
Reduce water use in food production	48	20
Reservoir augmentation	49	21
Encouragement of crops that need less water	50	22
Using cover crops (like barley)	50	22
Encourage drought resistant landscaping	51	24
Incentive pricing on water use	54	25
Peer pressure water use comparisons	54	25

Appendix G: Oglala Sioux Tribe Water Code

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OGLALA SIOUX TRIBE WATER CODE

ORDINANCE #15-18

OST NATURAL RESOURCES REGULATORY AGENCY

OST Ordinance No. 15- ___

ORDINANCE OF THE OGLALA SIOUX TRIBE
(An Unincorporated Tribe)

ORDINANCE RESCINDING THE OGLALA SIOUX TRIBAL WATER CODE, OST ORDINANCE NO. 85- 25, AND ENACTING WITH THIS ORDINANCE ENTITLED OGLALA SIOUX TRIBE WATER CODE.

WHEREAS, the Oglala Sioux Tribe has adopted its Constitution and By-Laws by referendum vote on December 14, 1935, in accordance with Section 16 of the Indian Reorganization Act of 1934 (25 U.S.C. 476), and under Article IV of the Constitution, the Oglala Sioux Tribal Council is governing body of the Pine Ridge Indian Reservation, and

WHEREAS, the Oglala Sioux Tribal Council is the governing body of the Oglala Sioux Tribe under Article III, Section 1 of the Tribal Constitution, and

WHEREAS, the Oglala Sioux Tribe asserts their prior, exclusive and paramount rights in ownership of, and jurisdiction over all Waters of the Pine Ridge Indian Reservation for all purposes, and

WHEREAS, the Oglala Sioux Tribe is a member of the Great Sioux Nation pursuant to the Fort Laramie Treaty of 1868, and is committed to protecting and preserving its valuable rights to the beneficial use of water flowing into and on the surface and under the ground of the Pine Ridge Indian Reservation, and

WHEREAS, water is the vital link between all natural and living systems, requiring the utmost protection and care in the allocation of use and protection from pollution to sustain the natural communities and ecosystems and provide for the basic needs of the Oglala Sioux Tribe, and

WHEREAS, the Oglala Sioux Tribe has a vested interest to protect and ensure that water of sufficient quality and quantity is available to meet the present and future needs of the Oglala Sioux Tribe and its members, and

WHEREAS, inherent in this protection and care is the need to control and regulate the use of the water resources of the Oglala Sioux Tribe through the Oglala Sioux Tribe’s sovereign rights to the use and protection of these water resources, and

WHEREAS, the Oglala Sioux Tribe seeks to provide guidance and technical assistance in the assertion of Treaty and reserved rights with regards to the compliance with Tribal Laws in the protection,

conservation management, and preservation of health, diversity, and productivity of the Tribal Water Resources to meet the needs of present and future generations, and

WHEREAS, the Oglala Sioux Tribe Natural Resources Regulatory Agency has researched and prepared a Water Code to provide the Tribe with the necessary tools to protect the Waters of the Tribe, and

WHEREAS, the Oglala Sioux Tribe has published the Draft Water Code from September 3, 2014 to September 18, 2014 to provide an opportunity for the members of the Tribe to comment on the code, and that no comments have been received for incorporation into the code, now

THEREFORE BE IT ORDAINED that the Oglala Sioux Tribal Council rescind the Oglala Sioux Tribal Water Code adopted on November 4, 1985 with the Oglala Sioux Tribe Water Code, therein attached.

BE IT FURTHER ORDAINED that the Oglala Sioux Tribal Council provides its full support for the enactment and implementation of the Oglala Sioux Tribe Water Code, to include funding, training, and enforcement for the protection of the Waters of the Oglala Sioux Tribe.

C-E-R-T-I-F-I-C-A-T-I-O-N

I, as the undersigned Secretary of the Oglala Sioux Tribe, hereby certify that the Ordinance was adopted by the vote of:
Yes; _____ No; and _____ Not Voting during a Regular/Special
Session held on the _____ day of _____ 2015.

Rhonda Two Eagle, Secretary
Oglala Sioux Tribe

ATTEST:

_____

John Yellow Bird-Steele
President
Oglala Sioux Tribe

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OGLALA SIOUX TRIBE WATER CODE

CHAPTER 1
General Provisions

Part 1
Purpose and Authority

1-1-101 Declaration of Purpose

Water is the lifeblood of the living and holy Earth and a vital link between all natural and living systems, requiring the utmost care in the allocation of use and protection from pollution to sustain the natural communities and ecosystems and provide for the basic needs of the Oglala Sioux Tribe. Inherent in this care and protection is the need to control and regulate the use of the scarce water resources of the Oglala Sioux Tribe through the Oglala Sioux Tribe's sovereign right to the use and protection of these water resources.

This Water Code (Code), as designed by the Oglala Sioux Tribal Council, will provide guidance and technical assistance in the assertion of treaty and reserved rights with regard to compliance with Tribal law in the protection, conservation management, and preservation of health, diversity, and productivity of the Oglala Sioux Tribe's natural and water resources to meet the needs of present and future generations. The purposes of this Code are as follows:

(1) To secure water for the permanent homeland for the Oglala Sioux Tribe for present and future generations;
(2) To protect the health, welfare, and economic security of the citizens of the Pine Ridge Indian Reservation;
(3) To develop, manage, and preserve the water resources of the Pine Ridge Indian Reservation;
(4) To secure a just and equitable distribution of the use of water within the exterior boundaries of the Pine Ridge Indian Reservation through a uniform and coherent system of regulations;
(5) To protect from over-appropriation, degradation, contamination, and any acts injurious to the quantity, quality, integrity, or rights of the Oglala Sioux Tribe's water resources;
(6) To ensure that the Oglala Sioux Tribe has sufficient water quantity and quality, now and into perpetuity, for cultural, domestic, fisheries, economic development, agricultural, stock, ecological flow, municipal, industrial, and other uses;
(7) To ensure equitable and culturally appropriate water allocation in a time of water shortage; and
(8) To provide for the exercise of the inherent sovereign power of self-government by the Oglala Sioux Tribe with regard to water rights and regulation.

1-1-102 Assertion of Ownership and Authority

(1) The Oglala Sioux Tribe hereby asserts their prior, exclusive, and paramount rights in ownership of, and jurisdiction over, all waters of the Pine Ridge Indian Reservation, as defined herein, for all purposes.
(2) The Oglala Sioux Tribe is the owner of the full equitable title to the rights to the use of all waters of the Pine Ridge Indian Reservation, defined herein, and that title resides undiminished in the Oglala Sioux Tribe. The United States hold only the legal title to those waters solely as trustee for the Oglala Sioux Tribe.

(3) All rights to the use of the waters of the Pine Ridge Indian Reservation, defined herein, are held by the Oglala Sioux Tribe in perpetuity, for the use and benefit of the Oglala Sioux Tribe and the lands and other resources of the Pine Ridge Indian Reservation. No right or privilege of any kind, from whatever source, shall be recognized or granted unless the same shall be subject to the overriding, prior, and supreme right and interest of the Oglala Sioux Tribe, and the policy and provisions contained in this Code, amendments hereto, and administrative regulations and determinations hereunder. No agent of the Oglala Sioux Tribe, the Oglala Sioux Tribal Council, or the United States shall take any action or grant or recognize any right affecting the water and water resources of the Pine Ridge Indian Reservation that in any way decreases or threatens to decrease the prior and paramount rights and interests of the Oglala Sioux Tribe.

1-1-103 Waters of the Oglala Sioux Tribe Defined

(1) All waters located within the exterior boundaries of the Pine Ridge Indian Reservation, whether flowing or stationary, whether surface or subsurface, and whether diffused or contained within a defined water source or water body of any kind;
(2) All waters reserved at any time to the Oglala Sioux Tribe and the Pine Ridge Indian Reservation, by the United States and the Oglala Sioux Tribe and through treaty rights of the Great Sioux Nation, as defined in Section 3-1-101; and
(3) All water that, in the course of nature or as the result of artificial works, flows into or otherwise enhances such water.

Part 2
Administrative Provisions

1-2-101 Definitions

(1) **Aquifer** means a water-bearing bed or stratum of permeable rock, sand, or gravel capable of storing, transmitting, or yielding water.
(2) **Construction Contractors** means any individual, including Indian or non-Indian, partnership, corporation, association, or business entity that conducts business activities or provides services, including but not limited to the construction of buildings, roads, oil and gas wells, and all other activities that use and/or consume water within the exterior boundaries of the Pine Ridge Indian Reservation.
(3) **Domestic Use** means any use of water for individual personal needs or for household purposes, such as drinking, bathing, heating, cooking, or sanitation, and irrigation of family gardens of less than 0.5 acres.
(4) **Exterior Boundaries of the Pine Ridge Indian Reservation** means all lands located in Shannon County, Bennett County, and Jackson County south of the White River.
(4) **Fee Lands** are lands, the ownership of which is held in fee simple absolute by the owner under South Dakota State law. Fee Lands are not held in trust for a Tribal member by the United States government.
(5) **Hazardous Waste** includes any naturally occurring/organic matter, radioactive, toxic, or other hazardous waste, whether in liquid, solid, gaseous, or explosive form, that may be discharged, deposited, generated, or disposed of and that will or may pose adverse effects to the air or the surface or subsurface land, including existing rivers, streams, lakes, reservoirs, groundwater, aquifers, minerals, and energy resources, as well as the human environment.
(6) **Injection Wells** include industrial waste disposal, salt water disposal, or wells used to improve recovery of oil and gas, as well as injection wells used for solution mining, fracking, and in-situ mining.

(7) **Municipal Use** means all reasonable water uses necessary in carrying out the functions of municipal government, district government, and growth centers or towns.

(8) **NRRA** means the Natural Resources Regulatory Agency, the lead agency whose duties include but are not limited to administration, regulation, and protection of the water resources of the Oglala Sioux Tribe through the enforcement of the this Code.

(9) **Nonpoint Source** means a contributing factor to water pollution that cannot be traced to a specific spot, such as agricultural fertilizer runoff.

(10) **Person** includes an individual, a partnership, a corporation, whether public or private; or a governmental entity, unit, or agency, whether Tribal or non-Tribal, local, state, or federal.

(11) **Point Source** means any discernible, confined, and discreet conveyance or facility, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissures, containers, rolling stock, concentration animal feeding operation, vessel, or other floating craft, from which pollutants are or may be discharged.

(12) **Pollution** means such artificial or induced natural contamination or other alteration of the physical, chemical, biological, radiological, or thermal properties of any water of the Pine Ridge Indian Reservation, or such discharge of any liquid, gaseous, or solid substance into any waters of the Pine Ridge Indian Reservation as will create a nuisance or render such waters harmful, detrimental, or injurious to public health, safety, welfare, or to domestic, commercial, industrial, agricultural, traditional, cultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish, or other aquatic life.

(13) **Public Water System** is a system that serves at least 10 service connections used by year• round residents or regularly serves at least 25 year-round residents. Such term includes (l) any collection, treatment, storage, and distribution facilities under control of the operator of the system and used primarily in connection with such system; and (2) any collection or pretreatment storage facilities not under such control that are used primarily in connection with the system.

(14) **Supersedeas Bond** means a bond that is required of a person who petitions to set aside a judgment or execution and from which the other party may be made whole if the action is unsuccessful.

(15) Territorial Jurisdiction means the areas included in the:
a) External Boundaries of the Pine Ridge Indian Reservation,
b) All areas from which water originates and flows in to the External Boundary, and
c) The areas from which all waters, including implied and granted to the Tribe, flows.16)**Water Administrator** means a person(s) designated by the NRRA to monitor, inspect, and draft periodically written reports about the volumes and/or rates of flow of rivers, streams, dams, lakes, aquifers, and groundwater within the exterior boundaries of the Pine Ridge Indian Reservation. Said activities shall be conducted to help ensure that quantity and quality of water resources and water needs of the Oglala Sioux Tribe are maintained pursuant to this Code through a collaborative effort with other Tribal environmental programs.

1-2-102 Public and Confidential Records

(1) Except as otherwise provided in subsections (2) and (3) of this Section 1-2-102, information acquired by the NRRA under this Code will be subject to the information and privacy provisions of this Code.

(2) (a) Any information concerning sources of pollution and data describing the physical, chemical, biological, radiological, or thermal properties of waters within the jurisdiction of the Tribe, including wastewaters, discharges, and runoff, that is furnished to the NRRA or obtained by it is a matter of public record and is open to inspection and copying, except as provided in subsection (3) of this Section 1-2-102.

(b) The NRRA may use any information in compiling or publishing analyses or summaries relating to water quantity, quality, and pollution if such analyses or summaries do not identify any owner or operator of a source of pollution or reveal any information that is otherwise made confidential by subsection (3) of this Section 1-2-102.

(3) Any information unique to the owner or operator of a source of pollution that would, if disclosed, reveal methods or processes entitled to protection as trade secrets shall be maintained as confidential if so determined by the Tribal Court. The owner or operator shall file a declaratory judgment action to establish the existence of a trade secret if he wishes such information to enjoy confidential status. The NRRA shall be served in any such action and may intervene as a party therein.

(4) Nothing herein shall be construed to waive any rights of the Tribe to any confidentiality related to cultural or historical sites or other confidential locations as determined by the Oglala Sioux Tribal Historic Preservation Office.

1-2-103 Severability

If any provision of this Code or the application thereof, to any person or circumstances is held to be invalid, the Code will be given effect without the invalid provision; to this end, the provisions of this Code are declared to be severable.

1-2-104 Construction

This Code shall be liberally construed to effectuate its objectives, policies, guidelines, purposes, provisions, and to protect the rights of the Oglala Sioux Tribe.

1-2-105 Application of Code

Upon the effective date of this Code, it shall be unlawful for any person within the territorial jurisdiction of the Pine Ridge Indian Reservation, as defined herein, to impound, divert, withdraw, or otherwise make any use of, or take any action of whatever kind affecting the use of water within the territorial jurisdiction of the Oglala Sioux Tribe unless the applicable provisions of this Code, and the regulations and determinations made hereunder, have been complied with. No right to use water, from whatever source, shall be recognized, except use rights obtained under and subject to this Code.

1-2-106 Effective Date

This Code and each provision hereof according to its terms shall take effect ninety (90) days after its enactment by the Oglala Sioux Tribal Council.

Part 3
Enactment and Effect

1-3-101 Notice Required

To ensure that all persons and entities affected by this Code are given adequate notice of the enactment and effect of this Code, the NRRA shall, within thirty (30) days after the enactment date of this Code, provide for public notice of its enactment and effect in accordance with the provisions of this Chapter.

1-3-102 Contents of Notice

(1) Such public notice shall contain the following statement, prominently displayed and in large, boldface type:

NOTICE: AFTER _____, NO PERSON OR PUBLIC OR PRIVATE ENTITY OF ANY KIND SHALL BE ENTITLED TO TAKE ANY ACTION EITHER WITHIN THE TERRITORIAL JURISDICTION OF THE PINE RIDGE INDIAN RESERVATION OR THAT AFFECTS THE USE OF WATER WITHIN THE EXTERIOR BOUNDARIES OF THE PINE RIDGE INDIAN RESERVATION, UNLESS SUCH ACTION IS AUTHORIZED BY A PERMIT AS PROVIDED FOR BY THE OGLALA SIOUX TRIBAL WATER CODE. NO OTHER WATER USE RIGHTS OF ANY KIND, FROM WHATEVER SOURCE, SHALL BE RECOGNIZED. THE NECESSARY FORMS MAY BE PROCURED FROM THE NRRA, POST OFFICE BOX 320, PINE RIDGE (OGLALA SIOUX TRIBE), SOUTH DAKOTA 57770, (605) 867-5624. COMPLETE COPIES OF THE OGLALA SIOUX TRIBAL WATER CODE ARE ALSO AVAILABLE AT THE ABOVE ADDRESS.

(2) In addition to the foregoing statement; the Director of the NRRA may include in such public notice additional information deemed necessary in order to assure adequate notice of the enactment and legal effect of this Code.

1-3-103 Notice – How Given

The Director of the NRRA shall give notice of the provisions of this Code as follows:

(1) The notice provided above shall be placed in the local newspaper (such as the *Lakota Country Times)* at least once each week over a six-week period, and on the Oglala Sioux Tribe website.
(2) The notice provided above shall be placed in a prominent and conspicuous location at the Oglala Sioux Tribal Office, the Bureau of Indian Affairs Offices, U.S. Post Offices, Indian Health Service Hospitals and Clinics, and in such other locations as are deemed necessary or appropriate.
(3) The Director of the NRRA may take any other steps and post any other notices as is deemed necessary to provide notice of the provisions of this Code.

CHAPTER 2
Administration

Part 1
Organization

2-1-101 Natural Resources Regulatory Agency

The NRRA was established in 1979 through the Oglala Sioux Tribe Ordinance 79–12 to protect, manage, develop, and regulate the natural resources on the Pine Ridge Indian Reservation. The NRRA is implemented through a contract with the Bureau of Indian Affairs under Public Law 638.

(1) The specific duties presented herein are the responsibility of the Water Resource Department (WRD) within the NRRA, to administer and manage this Code. The NRRA/WRD, through Tribal ordinance, is designated to represent the interests of the Tribe for administration, management, protection, and water-related studies and monitoring of Tribal resources.

The NRRA/WRD office is responsible for:

(1) Enforcement of the Tribal Water Code and regulations to assert sovereignty;
(2) Investigation of complaints of non-compliance with the Water Code and regulations;
(3) Assisting the Environmental Review Permitting Process;
(4) Education outreach to districts, schools, programs, and the general public on water resources protection and conservation; and
(5) Research and input on water resources issues on the Pine Ridge Indian Reservation.
(6) Preparation of an Annual Water Report.

2-1-102 General Powers and Duties

In administering this Code, the NRRA/WRD shall, in addition to other actions:

(1) Enter appropriate orders;
(2) Recommend to the Oglala Sioux Tribal Council for consideration, adoption, modification, or amendment of such regulations as are deemed necessary to implement this Code;
(3) File or intervene in any lawsuit, at the direction of the Oglala Sioux Tribal Council, or the Tribal President;
(4) Make determinations of water availability and need as provided for in Chapter 5 of this Code;
(5) Enter into administrative agreements, exchange information, and otherwise cooperate with governmental agencies both on and off the Pine Ridge Indian Reservation lands, for appropriate purposes, including the administration of interstate streams and groundwater in accordance with established Tribal policies for approval;
(6) Determine existing and foreseeable uses of and needs for water applicable to this Code;
(7) Designate Water Management Areas;
(8) Establish surface and subsurface Water Reserves;
(9) Monitor the volumes, flows, and quality of waters within the jurisdiction of the Tribe;
(10) Inspect, from time to time, records of Water Use Permit owners or operators of water facilities to assess compliance with Water Use Permit conditions;
(11) Establish reasonable fees for water use and permits;

(12) Monitor the volumes, flow, and quality of waters entering the Tribal boundaries and take necessary actions to protect and ensure compliance with federal laws and regulations, such as the Clean Water Act; and
(13) Take other actions as provided for in this Code.
(14) Contract with engineering consultants to assist the NRRA/WRD with performing the requirements of this code.

2-1-103 Water Code Coordination

The Oglala Sioux Tribe has assigned the protection of the Oglala Sioux Tribe's water resources to the NRRA/WRD. In order to fully perform these duties, the NRRA/WRD coordinates with the other Oglala Sioux Tribal programs and federal agencies. Coordination with other Oglala Sioux Tribal programs is accomplished through the Environmental Health Technical Team. An overview of the organization of the Environmental Health Technical Team and the relationship of the NRRA to the other Tribal programs and federal agencies is presented in Appendix B. Coordination with Tribal programs under the Environmental Health Technical Team umbrella includes, among other things:

(1) Referral of Water Use Permit applications for review and comment by the appropriate programs prior to making recommendations and conditions on the Water Use Permit application;
(2) Consultation on water quality matters affecting the usability of or the impact to available surface and groundwater supplies; and
(3) Coordination on water quality standards and protection, as described in Section 8-1-101.

In addition, in the performance of its duties, the NRR/WRD coordinates with agencies and organizations outside of the Pine Ridge Indian Reservation. This coordination includes the following:

(1) In planning and implementing plans for the use, preservation, and protection of Tribal water resources, the NRRA/WRD may exchange information and cooperate with all agencies with responsibilities affecting flows, volumes, and quality of waters upstream and downstream of waters within the jurisdiction of the Oglala Sioux Tribe.
(2) The NRRA/WRD may participate in the activities of any intergovernmental organization producing or implementing water management plans affecting the flow, volumes, and quality of the rivers and streams and their tributaries, and coordinate and harmonize its proposed water management plans with any regional management plan heretofore or hereafter adopted by such intergovernmental organization.
(3) As necessary, the NRRA/WRD will report to the Oglala Sioux Tribe Technical Team and Tribal Council on developments, progress, and problems in the process of intergovernmental cooperation, coordination, and information exchange.

2-1-104 Designated Water Management Area

The NRRA/WRD may, from time to time, evaluate the need for and, if needed, establish water management areas in which additional rules and regulations will apply in the permitting of additional water uses in these areas. This may include source water protection, conservation designations, or other protections as needed to preserve and/or protect the quantity and quality of the water resources in the designated water management area.

2-1-105 Code Enforcement

Whenever the NRRA/WRD determines, after investigation, that any person is engaged in an activity causing, threatening, or allowing a use of water outside of the provisions of the Water Use Permit, or is using water without a Water Use Permit that, in the opinion of the NRRA/WRD, constitutes a clear, present, and immediate danger to human health or to the livelihood of residents within the Tribe's jurisdiction, the NRRA/WRD shall enforce this Code as provided for in Chapter 8 of this Code.

2-1-106 Emergencies

Whenever the NRRA/WRD determines that insufficient water flows within any area within the exterior boundaries of the Pine Ridge Indian Reservation are resulting in insufficient water supplies to meet the demands of the Water Use Permits and/or exempt water uses in those areas, the NRRA/WRD shall present such information to the Tribal Council for consideration of declaring a water emergency. If a water emergency is declared, either by the Tribal Council or through an Oglala Sioux Tribe presidential declaration, the NRAA/WRD shall immediately take all actions necessary to reduce the use of water in the emergency areas to such levels as needed to meet the priority of demands as provided for in Section 2-3-101(7) of this Code. The United States shall assist the Oglala Sioux Tribe as required pursuant to the responsibilities of the United States as Trustee for the Oglala Sioux Tribe water rights.

Part 2
Water Administrator

2-2-101 Information Functions

It shall be the duty of the Water Administrator to gather, compile, and file for Tribal use and for submission to the NRRA information related to the waters administered under this Code. To this end, the Water Administrator shall:

(1) Collect, organize, and catalog existing information and studies available from all sources, both public and private, pertaining to the Waters of the Oglala Sioux Tribe;
(2) Develop such additional data and studies pertaining to water availability, quality, and use as are necessary to accomplish the objectives of this Code;
(3) Solicit public comment, consult the Chapters herein, and obtain expert advice when appropriate;
(4) Investigate water uses and other activities affecting the Waters of the Oglala Sioux Tribe to determine compliance with this Code and with applicable regulations, orders, determinations, and permits, including water quality standards, issued pursuant to this Code;
(5) Investigate water quality and quantity when appropriate; and
(6) Develop standards and regulations concerning water quality, quantity, and allocation and submit them for recommendation by the Land & Resource Committee and for consideration and approval by the Oglala Sioux Tribal Council.

2-2-102 Enforcement Functions

It shall be the duty of the Water Administrator to enforce compliance with this Code, with conditions of all permits, determinations, orders, regulations, plans, and other actions taken under this Code, as well as the policies and guidelines expressed throughout the Code. To this end, the Water Administrator may:

(1) Remove, render inoperative, shut down, close, seal, cap, modify, or otherwise control methods of diversion, withdrawal, impoundment, obstructions to the flow of water, and other activities adversely affecting water quality or quantity;

(2) Initiate, by means provided herein, proceedings for violations of this Code and the actions taken under this Code;
(3) Enter upon land, including Fee Lands, when accompanied by the appropriate county sheriff, to inspect methods of diversion, withdrawal, impoundment, and other activities affecting water quality and quantity, install and monitor measuring and recording devices when necessary, and compel testimony and data by Oglala Sioux Tribal Court subpoena, if necessary, concerning actions affecting the quality or quantity of the waters administered under this Code; and
(4) Use all legal remedies available under Tribal, state, and federal laws to enforce the Water Code provisions on Fee Lands.

2-2-103 Advisory Functions

The Water Administrator may, from time to time, make proposals to the NRRA concerning the following:

(1) The advisability of establishing water management areas as provided for in Chapter 3 of this Code;
(2) The advisability of making determinations of availability and need as provided for in Chapter 5 of this Code;
(3) The advisability of taking other actions and adopting other plans and methods in order to optimize available water supplies and to minimize pollution and thermal degradation;
(4) The advisability of participating in administrative proceedings, lawsuits, and other legal proceedings;
(5) The advisability of entering in to administrative agreements and other cooperative ventures with Tribal, local, state, or federal agencies outside of the Oglala Sioux Tribal Council and the NRRA for appropriate purposes, including the administration of interstate streams and groundwater, and artificial and natural recharge sources;
(6) The advisability of amending or otherwise changing sections of this Code or adding new sections; and
(7) The advisability of taking other actions that will further the policies and purposes contained herein and increase the effectiveness of this Code.

2-2-104 Administrative Functions

In administering this Code, the Water Administrator may:

(l) Grant, deny, modify, and revoke Water Use Permits;
(2) Make determinations of water use rights;
(3) Initiate proceedings to enforce this Code;
(4) Take administrative actions, in coordination with other appropriate agencies or Tribal programs, to provide for adequate water levels in streams, rivers, ponds, and lakes to protect Oglala Sioux traditional religious practices, wildlife conservation, and other values; and
(5) Enter appropriate verbal and written orders.

2-2-105 Administrative Immunity

In the performance of the Water Administrator's duties, the Water Administrator is required to make decisions based upon the information provided and the requirements of this Code. As long as the Water Administrator is basing decisions on the facts and information presented as applied to the requirements of this Code, the Water Administrator shall be immune from legal action from the resulting conclusions and recommendations. Additionally, as a Tribal program, the Water Administrator and all of his or her attendant staff shall be protected by the Tribe's sovereign immunity from suit.

Part 3
Policies and Guidelines

2-3-101 Policies

In taking any action under this Code, the NRRA shall be guided by the following policies:

(l) The NRRA shall hold the inherent and sovereign rights of the Oglala Sioux Tribe in highest regard in the administration and enforcement of this Code.

(2) Whenever practicable, actions taken shall benefit the Pine Ridge Indian Reservation and members of the Oglala Sioux Tribe and further the objective for which the Pine Ridge Indian Reservation was created: to provide a permanent home and abiding place for the members of the Oglala Sioux Tribe, both now and in the future.

(3) Alternatives to existing and proposed uses are to be considered whenever practicable in order to achieve the goal in (1) above. Included in those alternatives shall be the option to restrict or prohibit entirely any further use of water for the benefit of the Oglala Sioux Tribe.

(4) If a conflict between water users is presented to the NRRA and one is for the benefit of the Pine Ridge Indian Reservation or any members of the Oglala Sioux Tribe, and the other for non-Tribal projects or uses, the NRRA may grant such preference as may be required by this Code, and lie in the best interest of the Oglala Sioux Tribe and its members.

(5) In taking any action under this Code that may impose substantial economic hardship on persons or entities presently using water, or that threatens degradation of other economic, cultural, religious, historic, aesthetic, natural, or environmental values, the NRRA or the Water Administrator shall, in reaching their decision, carefully consider and weigh:
   (a) The economic dislocation and hardship that will be imposed by such actions;
   (b) The investment in time, money, and other resources made by the parties affected in reliance upon any previous system of distribution and use of water;
   (c) Any other burdens as may be imposed by such actions; and
   (d) The nature and extent of degradation of other economic, cultural, religious, historic, aesthetic, natural, or environmental values.

(6) The NRRA or the Water Administrator, when considering a proposed action, shall balance the adverse effects against the benefits to the Oglala Sioux Tribe and other interests that are advanced as justifying the proposed action. They shall consider alternatives to the proposed action that will lessen adverse effects, and shall shape any final action so that its adverse effects will be minimized to the greatest extent possible, to protect the water resources.

(7) When insufficient water supplies caused by insufficient water flows result in a water emergency declaration through the Oglala Sioux Tribal Council or presidential declaration, for whatever reason or term, the following priority of uses shall be considered in the order in which they are listed:
   (a) Domestic and municipal uses;
   (b) Stock watering uses;
   (c) Agricultural uses;
   (d) In-stream needs for fish, wildlife conservation, and recreational uses;
   (e) Economic development uses, including industrial and power uses; and
   (f) Other uses.

(8) Rivers, streams, lakes, and ponds within the exterior boundaries of the Pine Ridge Indian Reservation are to be retained substantially in their natural conditions, with the base flows and water levels necessary to provide for preservation of traditional, religious, recreation, wildlife, fish, scenic, aesthetic, and other environmental values. Withdrawals of water that would conflict with these interests should be authorized only where it is clear that overriding

considerations of the public interest will be served. Minimum in-stream flows shall be established and shall be assessed periodically to promote and protect these values.

(9) Multiple-purpose impoundment structures are to be preferred over single-purpose structures. Due regard shall be given to means and methods for protection of recreation, fish, and wildlife resources in the planning for and construction of water impoundment structures and other artificial obstructions.

(10) All individuals, corporations, groups, associations, and other entities shall be required to carry out reasonable practices of water and resource conservation and environmental protection as they relate to the use of waters within the exterior boundaries of the Pine Ridge Indian Reservation.

(11) The NRRA, in consultation with other Tribal programs and agencies, shall consider the reservation of water of certain areas for a definite or indefinite term of years to further the goals and values of the Tribe.

(12) Mandatory water conservation measures will be enforced for domestic, municipal, industrial, and commercial purposes upon identification and declaration of water shortages.

2-3-102 Guidelines for Making the Most Effective Use of Available Resources

In addition to the policies contained in Section 2-3-101, the NRRA and the Water Administrator should take appropriate action to:

(1) Ensure adequate water supplies;
(2) Maintain water levels for diversion and withdrawal systems;
(3) Maintain head and pressure in groundwater;
(4) Prevent or reduce obstruction of surface water flows;
(5) Increase efficiency of conveyance systems, increase efficiency in water application, increase return flow, prevent waste, and maximize use of this available supply;
(6) Create and enhance the efficiency of natural and artificial surface and underground storage;
(7) Enhance natural and artificial recharge of aquifers;
(8) Define and control interbasin transfers of both surface and groundwaters;
(9) Provide for some degree of overdraft from aquifers when short-term recharge is not possible;
(10) Minimize interference between competing users of water sources, whether above or below ground;
(11) Minimize water quality degradation and the adverse effects of water pollution, whether from point source or nonpoint sources;
(12) Minimize thermal degradation or the adverse effects of thermal degradation;
(13) Minimize interaquifer communication;
(14) Plan for long-term water development;
(15) Penalize misuse; and
(16) Otherwise ensure conformity with the policies and provisions of this Code.

CHAPTER 3
Water Rights

Part 1
Sovereign Rights

3-1-101 Ownership

The Oglala Sioux Tribe is the owner of the full equitable title to the rights to the use of all waters originating and flowing into the exterior boundaries of the Pine Ridge Indian Reservation, as defined herein, and all other waters, including implied and granted to the Tribe, and that title resides undiminished in the Oglala Sioux Tribe. The United States hold only the legal title to those waters solely as trustee for the Oglala Sioux Tribe pursuant to the rights and responsibilities included in the following treaties and acts: The Portage des Sioux Treaty (July 1815); the Treaty of Ft. Laramie, 11 Stat. 749 (September 17, 1851); the Treaty with the Omaha, 10 Stat. 1043 (March 16, 1854); the Treaty of Ft. Laramie, 15 Stat. 635 (April 29, 1868); Title VI–Cheyenne River Sioux Tribe, Lower Brule Sioux Tribe, and State of South Dakota Terrestrial Wildlife Habitat Restoration Act of the Omnibus Consolidated and Emergency Appropriations Act of 1999, PL 105-277, 112 Stat. 2681, 2861-660-670 (October 21, 1988), as amended by Title IV of the Water Resources Development Act of 1999, PL 106-53, 113 Stat. 269, 385-397 (August 17, 1999), and as otherwise amended; and any other treaty or right. These water rights include Tribal reserved water rights, treaty rights, and water rights administered by the Oglala Sioux Tribe, including the "Winters' Doctrine," Winters v. United States, 207 U.S. 564 (1908).

3-1-102 Water Right Required

All surface and groundwater on, entering, and below the exterior boundaries of the Pine Ridge Indian Reservation is the property of the Oglala Sioux Tribe and the right to the use of that water is recognized through obtaining a water right pursuant to the provisions of this Code. A water right is needed for all uses of water except certain exempt uses (see Section 3-2-108) and is administered through a water use permitting system. Water within the exterior boundaries of the Pine Ridge Indian Reservation is allocated based upon proof of need, availability of water, and application to a beneficial use provided for in Section 3-2-103.

Part 2
Requirements

3-2-101 Tribal Waters

All waters of the Pine Ridge Indian Reservation are the property of the Oglala Sioux Tribe and the right of the use of that water may be acquired by appropriation as provided for in this Code.

3-2-102 Right to Use Tribal Waters Through Appropriation

A water appropriation is an authorization granted by the Oglala Sioux Tribe to make a beneficial use of the waters of the Pine Ridge Indian Reservation. An approved appropriation authorizes use of either ground or surface water and is issued as a Water Use Permit and such use is subject to the priority of use provided for in Section 3-2-105. The Oglala Sioux Tribe recognizes the need to allow the use of waters of the Pine Ridge Indian Reservation for basic domestic and sanitary needs of Tribal members as well as for

other minor and temporary uses that promote the health, education, safety, and welfare of the Oglala Sioux Tribe. Therefore, water diverted or pumped for certain basic domestic and other minor and temporary purposes defined in Section 3-2-108 are exempt from obtaining a Water Use Permit. However, a well construction permit is still required for those exempt purposes whose water source is from groundwater, as described in Sections 5-3-101 and 102, and all such uses must be registered in the office of the NRRA/WRD. The NRRA/WRD may issue temporary Water Use Permits for those persons or entities not wanting or needing the protection of an appropriative Water Right and Water Use Permit.

3-2-103 Beneficial Uses

Beneficial use refers to a reasonable quantity of water applied to a non-wasteful use. Beneficial uses for water of the Oglala Sioux Tribe are as follows:

(1) Domestic (including drinking, sanitary, and limited irrigation);
(2) Livestock watering;
(3) Industrial;
(4) Commercial;
(5) Agriculture irrigation;
(6) Sand and gravel extraction;
(7) Fishery;
(8) Wildlife maintenance and enhancement;
(9) Recreational;
(10) Fire protection; and
(11) Dust suppression.

Beneficial uses reserved for the Oglala Sioux Tribe are as follows:

(1) Preservation of environmental and aesthetic values;
(2) Cultural; and
(3) All other uses compatible with the goals and priorities of the Oglala Sioux Tribal Counsel.

Water shall be appropriated for and the use of such water shall be permitted for only these beneficial uses.

3-2-104 Non-Beneficial Uses

The following are considered to be non-beneficial uses for water of the Oglala Sioux Tribe and are prohibited from obtaining a water right, a Water Use Permit, and an exemption from the need for a Water Use Permit:

(1) Water for oil and gas production;
(2) Mining;
(3) Any other non-beneficial uses of water as declared by the Tribal Council; and
(4) Confined livestock feeding operations.

3-2-105 Minimum In-Stream Flows

Minimum in-stream flows are not available for appropriation but rather are maintained for the health of the fish, wildlife, and aquatic life, as well as for the cultural, aesthetic, and recreational use of the Tribal members.

(l) Under this article, minimum in-stream flows for cultural and traditional uses, fish and aquatic life, recreation, and aesthetic purposes are recognized and legitimate beneficial uses.

(2) Parties proposing to de-water major perennial streams must demonstrate to the Tribe that the proposed activities will not interfere with the minimum in-stream flow established for that reach or reaches of the stream that will be affected by the proposed activity, including those reaches located downstream of the activity. Until studies are performed to determine the needed minimum in-stream flow to protect the beneficial uses in (l) above, a minimum in-stream flow no less than 10 cubic feet per second (cfs) is established in all major perennial streams within the jurisdiction of the Oglala Sioux Tribe. Applicants whose activities may interfere with this pre-established in-stream flow must perform a stream study as directed by the NRRA/WRD to determine the minimum in-stream flow required to support the health of the stream and protect the beneficial uses in (1) above. This resulting in-stream flow study may result in a finding that a flow rate of more than 10 cfs is needed, which shall then be used as the minimum in-stream flow for evaluation of the applicant's proposed activity.

(3) A minimum in-stream flow of 10 cfs shall be retained in all other perennial streams at all times, unless the natural flow, due to natural conditions, is less than 10 cfs. In those cases, the minimum in-stream flow shall be the flow of the stream unless an applicant demonstrates through an in-stream flow study that the beneficial uses in (1) above can and will be protected with an in-stream flow of less than 10 cfs.

3-2-106 Reservation of Water

The Oglala Sioux Tribe has determined that certain areas of streams and aquifers may need to be reserved for future use by the Tribe or other needs. Those areas of streams and aquifers that have been reserved shall not be available for appropriation until such time that the reserved water is released for appropriation.

3-2-107 Water Use Permit

A Water Use Permit issued under this Code constitutes Oglala Sioux Tribal permission to appropriate the use of water within the exterior boundaries of the Pine Ridge Indian Reservation, subject to the terms and conditions of the Water Use Permit, to this Code, and to actions taken pursuant to this Code. No Water Use Permit issued hereunder shall be construed as creating or recognizing any right other than Oglala Sioux Tribal permission to use water, nor shall any Water Use Permit ripen into any interest other than such limited permission. A Water Use Permit to appropriate and use water is needed for all water uses from within the exterior boundaries of the Pine Ridge Indian Reservation, except for certain basic domestic and other minor and temporary water uses (as defined in Section 3-2-108). Basic domestic uses are the highest priority of water use and such use takes precedence over all other appropriative and exempt uses.

3-2-108 Exemptions from Appropriation

The Oglala Sioux Tribe has determined that certain water uses are exempt from appropriation and obtainment of a Water Use Permit due to their nature, duration, and/or volume of the water use. However, these water uses will require the registration of such use with the office of the NRRA/WRD. The water uses that are exempt from appropriation and the need to obtain a Water Use Permit are as follows:

(1) Basic domestic uses (not exceeding either 25,920 gallons per day (gpd) or a peak pumping rate of 25 gallons per minute (gpm) for:
   (a) drinking, washing, sanitary, and culinary uses by an individual or household;
   (b) irrigation of a noncommercial garden, trees, etc. not exceeding one acre in size;

(c) stock watering;

(2) Minor uses not exceeding 18 gpm for:
   (a) use in schools, parks, and public recreation areas;
   (b) use in cemeteries;

(3) Fire protection systems;

(4) One-time use of water for construction purposes; such use shall not exceed one year. However, a Temporary Water Use Permit will be required;

(5) Temporary water uses for testing and research that do not exceed 18 gpm nor extend for more than one year. However, a Temporary Water Use Permit will be required;

(6) Public Water Systems which provide water to rural developments and municipalities through a unified water distribution system that is supplied water from one or more wells or treatment facilities. These systems are not required to obtain a Water Use Permit as long as the cumulative water use of the system does not exceed 18 gpm. Public Water System owners are required to register their systems with the Office of the NRRA/WRD and obtain a Water System Use Permit.

CHAPTER 4
Water Use Permits

Part 1
Application for Water Use Permit

4-1-101 Application for Permit

On the effective date of this Code, all persons desiring to initiate new uses of or take other actions within the jurisdiction of the Pine Ridge Indian Reservation affecting the waters therein shall file an application for a Water Use Permit as required by this Chapter. After such date, it shall be unlawful for any person to make any new use or take any other action within the jurisdiction of the Oglala Sioux Tribe affecting the waters therein, except as authorized by this Code.

4-1-102 Requirements and Status of Applicant

An applicant to appropriate water of the Oglala Sioux Tribe within the exterior boundaries of the Pine Ridge Indian Reservation shall meet the following minimum requirements:

(1) Must be an owner of the land upon which the appropriation will be located or possess a legal and valid consent from the property owner to appropriate water from the applied upon location as long as appropriation does not infringe upon OST rights;
(2) Must not be in arrears in any debt to the Oglala Sioux Tribe; and
(3) Must not be serving out a criminal conviction.

4-1-103 Application Form

An application for a Water Use Permit shall be submitted on the form and in the format as designated by the Water Administrator

4-1-104 Application Contents

Applications for Water Use Permits shall be on forms provided by the NRRA and shall include the following information:

(1) The name and mailing address of the applicant;
(2) The name, if available, or a description of the source(s) from which water is or will be diverted or withdrawn;
(3) The purpose(s) for which water is or will be used;
(4) The quantity of water (both annual volume and peak rate) that is or will be used;
(5) A legal description and other descriptions reasonably describing the point(s) of diversion, withdrawal, or impoundment;
(6) A description of the method(s) of diversion, withdrawal, or impoundment. The description of the method(s) of groundwater withdrawals shall be provided on the Well Permit on a form approved by the NRRA;
(7) A description of how water is or will be applied or consumed, including acreage and crop if the water is for irrigation; the kind and number of stock if the water is for stock watering; the number of people and/or homes to be served if the water is for domestic or municipal use, or square feet of building area served if the water is for municipal use in an office, commercial, or

industrial building, or other measure of water demand and consumption for other categories of beneficial uses (for example, water use for oil and gas drilling and production);

(8) The best estimate reasonably possible of return flow to the source(s), including how, when, at what point(s), and changes in quality and temperatures;

(9) The estimated date on which the use(s) began or will be commenced;

(10) If any pre-existing use is claimed, a description and copy of any legal documents, statute(s), or regulations upon which the use is based, and any pertinent litigation creating or affecting the use;

(11) The water user's plan for future development of the water use(s) and related activities; and

(12) Any other information deemed necessary by the NRRA.

4-1-105 Application Submission and Fee

Each application for a Water Use Permit shall be submitted to the office of the NRRA and be accompanied by a filing fee and a review fee as provided in Appendix A to this Code; however, the NRRA or the Water Administrator may waive payment of such filing and review fee in cases of demonstrated financial hardship.

4-1-106 Incomplete Applications

Each application for a Water Use Permit will be evaluated for completeness by the Water Administrator. No action will be taken on a Water Use Permit until the application is complete. An applicant shall be advised not more than forty-five (45) days after the receipt of an application by the Water Administrator if, and in what respects, the application is incomplete. If additional information is requested by the Water Administrator within the 45-day period, the Water Administrator shall have fifteen (15) days from the date the additional information is submitted to determine whether the additional information satisfies the request and to advise the applicant if, and in what respects, the additional information does not satisfy the request. A decision that an application is not complete is appealable, as provided by this Code. A petition for review of such decision shall be given administrative and judicial priority.

4-1-107 Non-Standard Applications

The Water Use Permit application form is to be used for all water uses. For non-standard water uses, the applicant shall consult with the Water Administrator to determine what additional information will be required in order for the Water Administrator to perform an informed review of the proposed water use.

Part 2
Application Processing and Determinations

4-2-101 Water Use Permit Application Process

The impact of a proposed use of water will vary significantly based upon the facts specific to the application. One of the most important factors is the rate and amount of the proposed water use. Applications to appropriate small amounts of water or flow rates are more likely to have minimal impacts than water applications that propose uses of large volumes of water and rates of flow. Larger applications also have the potential to affect more individuals, who may desire to review the application to determine for themselves whether such an application has a risk of causing injury to existing water rights and the natural environment. Such a process has a risk of significantly increasing the cost and time to process applications for small water uses, which typically have little impacts. In order to facilitate the processing of small water appropriations and Water Use Permits, the NRRA has divided the processing into two processes, which are illustrated in Appendix C and detailed in this Chapter. Applications that propose to

use water at a rate of 50 gpm or less and use a yearly volume of water less than 100 acre-feet will be reviewed only by the Water Administrator, who will determine whether to issue or deny a water appropriation and Water Use Permit. Applications to appropriate water at rates exceeding 50 gpm or an annual appropriation of more than 100 acre-feet will be reviewed by the Water Administrator and will also be subject to a public hearing before the Land Committee, where affected persons can testify about the merits and issues of the proposed appropriation.

4-2-102 Evaluation of Application

Once an application for a Water Use Permit is accepted as being complete, the Water Administrator shall commence the review of the merits of the application. The application will also be referred to appropriate programs of the Tribe for review and comment and will be reviewed for compliance with this Code. Upon receipt of the referral comments and completion of review of the application, the Water Administrator shall make findings on the following merits of the application, as described in this Chapter:

(1) Finding of Need;
(2) Finding of Water Availability;
(3) Finding of Financial Adequacy;
(4) Finding of Compliance with Tribal Programs, Requirements, Ordinances, and Codes; and
(5) Finding of Compliance with this Code.

4-2-103 Other Investigations

In addition to gathering information from the Water Use Permit application and referrals, the Water Administrator may make any reasonable investigation of the facts and circumstances surrounding the application; may solicit comments and information from the public and from appropriate governmental agencies; and may otherwise gather information that will assist in making the decision to issue or deny a Water Use Permit in accordance with the provisions of this Chapter.

4-2-104 Finding of Need

The Water Administrator shall make a finding as to whether the applicant has demonstrated the need for the amount of water claimed for the specified beneficial purposes. This finding of need shall be based upon the criteria in Section 5-1-101 of this Code and the policies and guidelines in Sections 2-3-101 and 2-3-102 of this Code.

4-2-105 Finding of Water Availability

The Water Administrator shall make a finding as to whether the applicant has demonstrated that there is water available in the amount and locations claimed for the specified beneficial purposes. This finding of water availability shall be based upon the criteria in Chapter 5 of this Code and the policies and guidelines in Section 5-2-101 of this Code.

4-2-106 Finding of Financial Adequacy

The Water Administrator shall make a finding as to whether the applicant has satisfactorily demonstrated the adequacy of financial capability to develop and construct the necessary facilities to put the claimed water to use for the specified beneficial uses. This finding of financial adequacy shall be based upon the policies and guidelines in Sections 2-3-101 and 2-3-102 of this Code.

4-2-107 Finding of Compliance with Tribal Programs, Requirements, Ordinances, and Codes

The Water Administrator shall make a finding as to whether the applicant has satisfactorily complied with the Tribal programs, requirements, ordinances, and codes of the Oglala Sioux Tribe. These other programs include biological, cultural, environmental, historical, and other requirements from the Tribal Historic Preservation Officer and the associated Tribal programs. This finding of compliance with other Tribal programs and requirements shall be based upon the requirements of those other programs and the policies and guidelines in Sections 2-3-101 and 2-3-102 of this Code.

4-2-108 Finding of Compliance with this Code

The Water Administrator shall make a finding as to whether the applicant has satisfactorily complied with this Code. This compliance finding shall include compliance with all Tribal programs and requirements of the Oglala Sioux Tribe, whether referenced in this Code or determined through referrals to other Tribal programs and agencies. The Water Administrator shall also determine whether the proposed water appropriation and Water Use Permit, if granted, would be in the best interests of the Tribe.

4-2-109 Water Administrator's Report – Conclusions and Recommendations

The Water Administrator shall prepare a written report on the proposed water appropriation and Water Use Permit application, which include the application, evaluations, findings, conclusions, and recommendations as to whether the appropriation and permit shall be unconditionally granted, granted with conditions, or denied.

4-2-110 Applicant's Acceptance or Rejection of Water Administrator's Report

Within thirty (30) days of issuance of the Water Administrator's report, the applicant shall, in writing, either accept or reject the recommendations contained in the Water Administrator's report to approve or deny the water appropriation and Water Use Permit. If the applicant accepts the Water Administrator's denial of the application, the application case shall be closed and no further action is needed. If the applicant accepts the Water Administrator's approval of the application, the Water Administrator will issue a Water Use Permit within fifteen (15) days of the applicant's acceptance letter.

4-2-111 Applicant's Rejection of Water Administrator's Permit Denial or Permit Conditions

If the applicant rejects the Water Administrator's denial of the water appropriation and Water Use Permit or the conditions placed upon an approved water appropriation and Water Use Permit, the Water Administrator's report and conclusions will be reviewed by the Director of the NRRA. The Director will then either (a) accept the report and recommendations of the Water Administrator as written, (b) modify the conditions of a proposed permit approval, or (c) overturn the denial of the proposed water appropriation. The applicant may then either accept the Director's determination or appeal said decision to the Land Committee after proper public notice.

4-2-112 Permit Conditions

Each Water Use Permit issued pursuant to this Code shall contain whatever conditions are necessary to ensure adequate quality and quantities of water; to otherwise further the purposes, policies, and guidelines contained within this Code; and to assist in the effective administration of this Code. These may include but are not limited to conditions and limitations concerning:

(1) The source from which water may be diverted, withdrawn, or impounded;

(2) The quantity of water that may be diverted, withdrawn, or impounded during any particular time;
(3) The point(s) of diversion, withdrawal, or impoundment;
(4) The method(s) of diversion, withdrawal, or impoundment;
(5) The purpose for which water will be used;
(6) The method of application;
(7) The location and purpose of application, including acreage for crops and number of livestock for livestock watering;
(8) The quantity and quality of return flow;
(9) The time period during which water may be used;
(10) Schedules for diversion, withdrawal, or impoundment, including optional rotation schedules;
(11) Provisions for surface or groundwater storage of surplus flows;
(12) Provisions for increasing the efficiency of diversion, withdrawal, or impoundment and application;
(13) Provisions for maintaining minimum pools and streamflows for fish, wildlife, recreation, aesthetic, and Oglala Sioux religious values;
(14) Provisions for ensuring minimum pumping and diversion levels with respect to both surface and underground water;
(15) Provisions designed to maintain head and pressure in groundwaters;
(16) Provisions designed to prevent or reduce obstruction of surface water flows;
(17) Provisions designed to minimize point and nonpoint source pollution, water quality degradation, and thermal degradation;
(18) Provisions designed to enhance recharge of aquifers;
(19) Provisions designed to define and control interbasin transfers of surface and groundwaters;
(20) Provisions for some degree of overdraft from aquifers when short-term recharge is not possible;
(21) Provisions designed to prevent or reduce interference between competing users or water sources, whether above or below ground;
(22) Provisions to minimize interaquifer communication;
(23) Provisions to ensure long-term water development; and
(24) Any other provisions necessary to ensure conformity with the policies and provisions of this Code and actions taken pursuant to this Code.

4-2-113 Entry on Land

No person shall be authorized to use or otherwise take any action affecting the waters administered under this Code unless he or she shall consent to reasonable entry upon his or her land by Oglala Sioux Tribal employees engaged in the administration of this Code. Every permit issued under this Code shall contain the condition that no use or other action affecting the waters in question may be made unless the applicant consents to such reasonable entry upon his or her land. (By applying for permit, you are granting the Director of the NRRA or his designee permission to enter upon the land to investigate/monitor/inspect, as required, for compliance with the Code.)

Part 3
Public Notification and Hearing

4-3-101 Public Notice and Comment

All applications to appropriate water and obtain a Water Use Permit for flow rates of greater than 50 gpm or annual volumes of more than 100 acre-feet or applications appealed from the determination of the Director of the NRRA shall require a public notification and hearing before the Oglala Sioux Tribe Land Committee. The applicant shall then publish a copy of the Water Use Permit application in the local

newspaper at least once each week for two successive weeks, and shall submit satisfactory proof of publication to the Land Committee. Posting at the site and/or mailing in the affected area may be required at the discretion of the Water Administrator. The applicant shall also post a copy of the Water Use Permit application.

4-3-102 Filing of Formal Objections

Any person or entity whose interests are or may be affected by a water use described and/or applied for may, within thirty (30) days from the date of publishing and posting of notice that such use has been described and/or applied for, file a formal objection to the issuance of the permit applied for. All objections shall be made in writing and may be made on forms prepared and made available by the Water Administrator and shall include the name and mailing address of the party objecting; the name of the applicant whose application is objected to; a description of the water use objected to; and a short and plain statement of reasons why a permit should be issued or should not be issued.

Part 4
Hearing

4-4-101 Hearing on Application

Any applicant directly affected or any party objecting in accordance with this Chapter may request a hearing on such objection. In addition, the Water Administrator or the NRRA may schedule a hearing concerning the issuance of a permit or permits on their own motion whenever they determine that such hearings are needed. Whenever possible, hearings concerning proposed or existing uses in a particular basin or area shall be consolidated to promote efficiency, minimize expense or hardship, and prevent duplication. Any person or entity may comment in writing upon the proposed issuance of any permit under this Code. It is the policy of the Oglala Sioux Tribe that all interested parties be given the opportunity to participate in the decision-making process as set forth in this Code.

4-4-102 Time and Place of Hearing

Whenever possible, hearings shall be held in the affected area at a date, time, and place that is convenient for a majority of the parties affected. If such a hearing is not possible, then the NRRA shall choose a location within a reasonable commuting distance of the parties' locations where the hearing will be held. Every party to the conflict shall receive written notice that contains the following details:

(1) The time and place of the hearing;
(2) A deadline by which to submit exhibits, if any, for NRRA review prior to the hearing;
(3) A statement that the hearing is informal, open to the public, and that the normal rules of evidence do not apply; and
(4) A statement that the burden of proof is on the challenger to the NRRA decision, and that burden of proof is clear and convincing evidence that the NRRA committed an error in denying the application.

4-4-103 Continuance

Continuances shall not be freely granted unless and only when the ends of justice so require and in order to ensure adequate notice and opportunity to be heard. All continuances must be in writing and served on the NRRA office within forty-eight (48) hours of the scheduled hearing. Any requests for continuances that are submitted within twenty-four (24) hours of the scheduled hearing shall either be denied or granted at the discretion of the presiding officer.

4-4-104 Presiding Officer

The NRRA shall designate a qualified and impartial Hearing Officer to preside over hearings provided for in this Chapter.

4-4-105 Forms of Evidence

Evidence may be submitted in any practical form, including oral testimony, written evidence, and descriptive evidence. The ordinary rules of evidence shall not apply but, in the opinion of the Hearing Officer, evidence that is irrelevant, cumulative, unduly prejudicial, or would otherwise be unfairly admitted may be excluded or admitted only under special conditions or stipulations.

4-4-106 Consolidation of Hearings

Whenever possible, hearings concerning proposed or existing actions in a particular watershed or area shall be consolidated to promote efficiency, minimize expense or hardship, and to prevent duplication.

4-4-107 Recording

Hearings shall be recorded by mechanical means, provided that any person may provide at his or her own expense for a stenographic record.

4-4-108 Decision

Whenever a decision is required in accordance with the provisions of this Code following a public hearing, the Hearing Officer shall prepare written findings of fact and conclusions of law and shall recommend a proposed decision to the Water Administrator. The Water Administrator may make such modifications as are clearly warranted by the evidence and applicable law and shall issue a final decision, including an explanation for any changes made in any recommendation. Such decision shall be published and served upon the parties in the same manner as provided in Section 4-3-101 governing notice of hearings.

4-4-109 Appeals

There shall be no appeal from actions taken under this Code, except as provided herein. Appeals from the Land Committee decisions shall be made to the Supreme Court of the Oglala Sioux Tribe.

4-4-110 Notice of Appeal – Jurisdiction

Any party aggrieved by any final action taken under this Code may, by filing a Notice of Appeal with the Supreme Court of the Oglala Sioux Tribe, obtain review of such final action. The Supreme Court shall have no jurisdiction to hear any appeal initiated pursuant to this Code unless the Notice of Appeal is filed with the Supreme Court Clerk within thirty (30) days after the date of the final action. "Final action" means any action taken under this Code for which no further consideration by the Water Administrator or the NRRA is required.

4-4-111 Notice of Appeal

Upon filing of the Notice of Appeal, the party appealing the final action shall forthwith, and no more than ten (10) days after filing of the Notice of Appeal, cause the Notice of Appeal to be served on all parties to

the proceeding being appealed. Service may be by e-mail, certified mail (return receipt requested), or personal service through the Oglala Sioux Tribe Department of Public Safety or the Tribal Court Process Server.

4-4-112 Transmittal of Record

(1) Upon receipt of the Notice of Appeal, the Water Administrator and the NRRA shall cause all pertinent documents in their possession, and any other articles of evidence in their possession, to be transmitted to the Supreme Court Clerk.
(2) Any party to an appeal may, at his or her own expense, cause a transcript of any hearings or other proceedings below to be prepared and transmitted to the Supreme Court Clerk; however, the Water Administrator, in his or her discretion, shall bear the final financial burden of preparing such transcript when it appears, after good cause shown, that a party is financially unable to do so.

4-4-113 Oral Argument

Upon receipt of the Notice of Appeal, the Supreme Court shall, as soon as practicable but in no event more than fifteen (15) days after receipt thereof, notify the NRRA, the Water Administrator, the appealing party, and the other parties to the proceedings of a date certain for full hearings before the Supreme Court.

4-4-114 Briefs

Parties may, at their own option or shall, when requested to do so by the Supreme Court, file briefs in support of their appeal. Briefs shall be due on dates set by the Supreme Court and no less than thirty (30) days after receipt of the notice provided for in Section 4-4-111.

4-4-115 Scope of Review

The Supreme Court, in reviewing the final action appealed from, shall limit its review to the issues and the evidence that were before the Water Administrator or the NRRA at the time of the final action. The Supreme Court may affirm, reverse, modify in whole or in part, or remand for further consideration any final action appealed from, provided final actions appealed from may only be reversed, modified, or remanded when they are arbitrary, capricious, unsupported by substantial evidence, not in substantial conformity with this Code, or otherwise contrary to law.

4-4-116 Supreme Court – Additional Powers

(1) The Supreme Court may, either on its own motion or upon motion of any party, dismiss an appeal for want of prosecution, gross procedural irregularity, or mootness when the ends of justice so require.
(2) In addition, the Supreme Court may stay the operation of final actions appealed from, in whole or in part, and may, when the ends of justice require, provide for a supersedeas bond or other security from the parties of the appeal.

Part 5
Requirements of Permit Holders

4-5-101 Compliance with Permit Conditions

The permittee shall comply with all conditions of the Water Use Permit. Failure to follow those conditions will subject the permittee to fines, penalties, and potential loss of the water right.

4-5-102 Time Allowed for Completion of Appropriation

Appropriative Water Uses: For appropriative water uses, the applicant shall have a period of 2 years in which to put the water rights included in the Water Use Permit to beneficial use. Failure to complete the appropriation in the 2-year time frame will subject the Water Use Permit to abandonment and revocation proceedings.

4-5-103 Times Allowed for Temporary Water Uses

The Oglala Sioux Tribe shall permit the temporary use of water necessary to complete a water or construction project for a defined period not to exceed 1 year. The permittee agrees to abide by the time frame stated in the Temporary Water Use Permit. The duration of this project shall remain within the project dates approved by the NRRA. Any extension of time for project completion must be submitted in a new application by the permittee prior to the extension time request.

4-5-104 Modifications

Water Use Permits are modifiable in accordance with the procedures in this Code.

4-5-105 Transfers

Water Use Permits issued under this Code shall not be subject to transfer, assignment, descent, distribution, or creation of any security interest without the express written consent of the Water Administrator. Applications for transfer, assignment, or creation of a security interest shall be made on forms prepared and made available by the Water Administrator. Such forms shall be designed to solicit information concerning any substantial changes that will or may occur as a result of the transfer, assignment, or creation of a security interest in a Water Use Permit. Heirs and successors in interest of permittees shall apply for new Water Use Permits in their own names; however, such substitute Water Use Permits shall be freely granted unless changing hydrological conditions clearly warrant a modification and/or reanalysis of the prior Water Use Permits.

Part 6
Revocation/Loss of Water Rights

4-6-101 Revocation

Unless otherwise indicated, Water Use Permits issued under this Code are revocable by the Water Administrator in accordance with the policies, purposes, guidelines, and procedures established in this Code.

4-6-102 Loss of Water Rights

Any permitted right to use or otherwise affect in anyway water within the territorial jurisdiction of the Pine Ridge Indian Reservation, regardless of its origin, shall become void and revert, to the extent of the abandonment or non-use, to the Oglala Sioux Tribe when the holder of such use right wholly or partially abandons the same, or voluntarily fails without sufficient cause to use all or a portion of the water available under such use right for a period of 5 consecutive years. “Sufficient cause” may include:

(1) Drought or other unavailability of water;

(2) Active service in the armed forces of the United States;
(3) The operation of legal proceedings;
(4) The application of any laws restricting water use;
(5) Incarceration in a penal institution;
(6) Confinement in a mental institution, whether voluntary or involuntary;
(7) Incompetence by reason of age or mental incapacity;
(8) Provisions for future use, as provided in this Code; or
(9) Other causes of non-use beyond the control of the holder(s) of the use right claimed.

Before such rights to use water may be deemed lost by non-use or abandonment, the Water Administrator shall serve notice to the holders of such use rights to appear at an administrative review hearing to be held before the NRRA not less than thirty (30) days after the mailing or personal service of such notice and show cause why their use rights should not be deemed void. Such notice and hearing shall be in the manner provided for in this Code.

4-6-103 Loss by Adverse Possession, Prescription, Estoppel, or Acquiescence

No right to use or otherwise affect the quantity, level, flow, pressure, quality, or temperature of water may be acquired by adverse possession, prescription, estoppel, or acquiescence.

4-6-104 Water Administrator's Continuing Authority

The Water Administrator shall have continuing authority to review and monitor the uses made of the water from a Water Use Permit and, if necessary, require additional conditions on the use of water if the use of water is resulting in water quantity or quality conditions substantially different from those used to evaluate the water use application as originally considered.

4-6-105 Violations

Violations of the provisions of the Code and/or the Water Use Permit shall be addressed pursuant to the provisions of Chapter 8 of this Code.

CHAPTER 5
Engineering Investigations and Standards

Part 1
Determination of Need

5-1-101 Standards for Need Determination

The applicant shall submit documentation on the volume and flow rate of water needed for the proposed beneficial use. For the standard categories of use, standard water use values have been presumed as a basis of the evaluation of the applicant's water demands. If the applicant believes that his or her specific water use will exceed the standard values or if the proposed water use is a non-standard use, the applicant shall provide documentation to justify the applicant's proposed water use demands. The presumed water use demands for standard beneficial uses are as follows:

(1) Agricultural Irrigation: 1 cfs per 70 acres and 2 acre-feet per acre;
(2) Domestic Use: 25 gpm per residential unit and 0.25 acre-feet per residential unit per year; and
(3) Livestock Watering: 8 gallons per head per day and 0.009 acre-feet per year.

These standards are subject to change and will be reviewed and revised if necessary every five (5) years.

Part 2
Determination of Water Availability

5-2-101 Standards for Water Availability Determination

The purposes of a proceeding to determine availability shall be to compute with reasonable certainty the characteristics of a particular supply, including quantity, surface and groundwater levels, rates and directions of flow, rates of recharge, out-of-basin sources, water quality and pollution, thermal degradation, and other characteristics, at particular locations and times. Information that is currently available upon which a water availability determination can be conducted is limited. Therefore, the applicant shall consult with the Water Administrator prior to submitting an application for a Water Use Permit to evaluate the existing water availability information and data and determine the level of additional data and information needed to support the application. The water availability analysis shall include the following:

(1) A geographic and geologic description of the area studied, setting out as precisely as possible the boundaries of the area;
(2) A general description of the water supply in that area, from all sources;
(3) A description of the various characteristics of the water supply that are relevant to present and proposed uses and other actions;
(4) A computation of the water supply available at particular times and places;
(5) A description of the present and other proposed uses (if any) and other actions affecting the water supply in question;
(6) A description and evaluation of the need for each such present or proposed use or other action;
(7) Amount of water within the particular supply, which is required to meet minimum in-stream flow as provided in Section 3-2-105 of this Code. If such determination isn't made, the applicant will be required to make a determination; and
(8) Amount of water within the particular supply, which is subject to a reserve as provided in Section 3-2-106 of this Code.

Part 3
Well Construction and Abandonment Standards

5-3-101 Well Construction Standards

(1) Well Construction: The drilling and construction of wells within the exterior boundaries of the Pine Ridge Indian Reservation shall be in accordance with the Well Construction Standards of Indian Health Services, as amended from time to time, and shall require a Well Permit from the NRRA/WRD. The well permit owner and/or well driller will be subject to enforcement actions pursuant to Chapter 8 of this Code for wells that are not constructed in accordance with the provisions of Section 5-3-101.

(2) Well Yield Testing: All wells shall be pump tested to determine their expected yield over the life of the well. The well yield test-pumping requirements vary with the size of the well and the nature of the aquifer being pumped. Therefore, prior to initiating well yield testing, the well driller shall consult with the Water Administrator to obtain the testing requirements (both procedures and documentation) for the specific well being tested.

(3) Well Log, Yield Test Results, and Water Quality Test Results: All wells drilled shall submit a well log, well yield test results, and water quality testing results to the NRRA/WRD upon well completion. Failure to submit this information or submittal of inadequate information will subject the well to shut-off by the NRRA/WRD until the required information is provided.

(4) Water Quality: If the results of the water quality tests identify that the well water quality is unsuitable to meet the use for which the well water will be placed, then the well shall either be abandoned pursuant to Section 5-3-102 or shall only be used with an approved water treatment process.

5-3-102 Well Abandonment Standards

Abandonment of wells within the exterior boundaries of the Pine Ridge Indian Reservation shall be in accordance with the Well Abandonment Standards of Indian Health Services, as amended from time to time, and shall require filing of a Well Abandonment Report with the NRRA/WRD.

CHAPTER 6
Regulations for Stream, Lake, and Reservoir Modifications

Part 1
Permits and Requirements

6-1-101 Permits Required

Any activity that will disturb any streambed, lakeshore, damshore, or wetland or will obstruct the passage of fish as described in this Chapter shall require a Construction Permit from the NRRA. Because these activities are unique in nature and location, the submittal and analysis requirements will need to be determined on a case-by-case basis. The applicant shall meet with the Water Administrator prior to preparation of the permit application to determine the extent and amount of data and analysis required for review of the permit application. In all cases, all construction projects permitted under this Chapter shall have prepared plans for such work and shall submit said plans to the NRRA for review, comment, and approval prior to initiating any construction directly related to the proposed project.

6-1-102 Streambed Alteration Requirements

(l) Alteration work shall not be permitted within the normal high water mark of any stream without receiving a permit from the NRRA.
(2) There shall be no heavy equipment allowed within the confines of any stream. In-stream work shall be completed with equipment situated out of the stream channel.

6-1-103 Lakeshore and Damshore Management

(1) A Construction Permit is required by any person who proposes to do any work that will alter or diminish the course, current, or cross-sectional area of a lake, its lakeshore, a dam, or its damshore. Without limitation, the following activities are, when conducted below mean annual high water elevation, examples of work for which a permit is required:
    (a) Construction of channels and ditches;
    (b) Dredging of lake bottom areas to remove muck, silt, or weeds;
    (c) Lagooning;
    (d) Filling; and
    (e) Constructing breakwaters or pilings, wharves, and docks.
(2) Any person proposing work within a lakeshore or damshore area shall submit a work plan to the NRRA for review with the Construction Permit application. The NRRA will make the final decision on whether and how any work will be accomplished. Factors to be considered during the review process are that the work will not, during either its construction or utilization:
    (a) Materially diminish water quality;
    (b) Materially diminish habitat for fish or wildlife;
    (c) Interfere with navigation or other lawful recreation;
    (d) Create a public nuisance;
    (e) Create a visual impact discordant with natural scenic values, as determined by the NRRA, where such values form the prominent landscape elements; or
    (f) Materially impair cultural or traditional uses of lakes, lakeshore areas, dams, and damshore areas.
(3) A person who performs work in a lake or dam without a Construction Permit for that work shall, if required by the NRRA, restore the lake to its condition before it was disturbed and is subject to the provisions for violations, remedies, and penalties under this Code.

6-1-104 Obstructions to Fish Passage

(1) No object may be built in or across a stream that will block or inhibit the free passage of fish past that point.
(2) Any person proposing such work must submit a written project proposal with the permit application to be reviewed by the NRRA at a public meeting. If approval is received and a permit granted, permit conditions that facilitate the passage of fish must be adhered to.

6-1-105 Issuances or Denial of Construction Permit

The Water Administrator, after considering all facts, drawings, means of construction, project goals, and other pertinent information, shall either approve or deny said Construction Permit.

6-1-106 Appeals

Appeals to the denial of a Construction Permit or the conditions attached to the construction permit shall follow the review and appeals process provided for in Section 4-2-111.

CHAPTER 7
Water Use Requirements, Public Water Systems, and Fees

Part 1
Water Use Requirements

7-1-101 Waste of Water Prohibited

(1) It is prohibited for any person to knowingly and/or willfully misuse, waste, or cause to be misused or wasted, water uses authorized by a valid Water Use Permit or exempt from such Water Use Permit. For purposes of this Section 7-1-101, the following are specifically determined to constitute flagrant misuse and waste:
   (a) Any irrigation of lawns or plants that, due to excess application of water, results in an excessive and/or prolonged flow of water off the property being irrigated; and
   (b) Use of any plumbing system, irrigation system, connection, or fixture that by reason of misuse, damage, disrepair, inadequate maintenance, or dilapidation wastes water.

7-1-102 Water Conservation

Water resources within the exterior boundaries of the Pine Ridge Indian Reservation are provided by the Earth, are needed to meet the needs of the natural communities and ecosystems as well as the needs of the Oglala Sioux Tribe, and are of limited supplies. Recognition of this requires all water users who use water from the Pine Ridge Indian Reservation to conserve water to the maximum extent practicable.

7-1-103 Determination of Source of Construction Water

Upon application for a use of water for construction purposes, the NRRA shall determine what source(s) of water will be allowed to be used for the proposed construction purpose.

7-1-104 Water Measurement and Charges

All water use shall be metered, recorded daily, and submitted weekly or as requested by the NRRA/WRD. Any water use found not to have been metered shall be subject to the enforcement provisions of Chapter 8 of this Code. Water use charges shall be applied pursuant to Parts 2 and 3 of this Chapter.

Part 2
Public Water Systems

7-2-101 Public Water Systems

Public Water Systems are water systems that typically provide water to rural developments and municipalities through a unified water distribution system that is supplied water from one or more wells or treatment facilities. These systems do not require a Water Use Permit if their total system flow rate does not exceed 18 gpm or if their source of water is other than waters of the Oglala Sioux Tribe. Even though a Water Use Permit may not be required, the presence of Public Water Systems in providing water within the Pine Ridge Indian Reservation must be monitored and administered for the protection of the health, safety, and welfare of the Oglala Sioux Tribe. Therefore, all Public Water Systems must obtain a

Water System Use Permit from the NRRA/WRD and comply with the provisions of that permit, including payment of any engineering review, administration fees, and water use fees as determined to be necessary by the Water Administrator. These fees allow the Water Administrator to perform the analysis and investigations necessary to protect the health, safety, and welfare of the Oglala Sioux Tribe.

Part 3
Fees

7-3-101 Basis of Fees

The administration and regulation of water use within the exterior boundaries of the Pine Ridge Indian Reservation is required to protect the natural resources of the Tribe through the NRRA. These efforts require staff time and materials to conduct the necessary studies, reviews, and recommendations on water use within the exterior boundaries of the Pine Ridge Indian Reservation. All Tribal members contribute to the overall wellbeing of the Oglala Sioux Tribe; thus, the charges to the Tribal members are set at a nominal rate. For non-Tribal members who do not contribute directly to the Tribal wellbeing, the rates are set to help defray a portion of the cost of water administration, regulation, and review of the specific water use. Larger rates and volumes of water use require additional efforts to ensure that such water use is within the terms and conditions of the Water Use Permit. Larger water uses are charged rates related to these added efforts and risks.

7-3-102 Water Use Fees

Reasonable charges may be imposed by regulations of the Oglala Sioux Tribe through the NRRA for the use of all waters of and within the exterior boundaries of the Pine Ridge Indian Reservation and for the operation and maintenance of Public Water Systems and water use by construction contractors. Waivers of charges may be granted by the NRRA if the use is shown to be of benefit to the Oglala Sioux Tribe. The NRRA is granted the authority to impose administrative costs on Public Water Systems where water use fees have been waived, not collected, or discounted, including water use by contractors from Public Water Systems.

7-3-103 Past-Due Fees

Water users that are in arrears in payment of fees and charges may be subject to additional charges and revocation of the Water Use Permit.

CHAPTER 8
Code Enforcement

Part 1
General

8-1-101 Applicability

(1) The enforcement of this Code shall apply to all Indian Persons violating its provisions within the territorial jurisdiction of the Tribe, regardless of Tribal affiliation.
(2) The enforcement of this Code shall apply to non-Indians to the extent not inconsistent with Federal Law and to the extent that any non-Indian found to have violated any provision of this Code may be removed from the reservation in a civil proceeding brought by the Tribal Attorney General or other attorney designated by the Oglala Sioux Tribal Council. The non-Indian, in such cases, shall have all the procedural rights of a criminal defendant, as provided in the 1968 Indian Civil Rights Act (25 USC §1301 et seq.), and such cases shall be tried by the rules of criminal procedure.

Part 2
Civil Violations

8-2-101 Purpose

(1) A civil violation of this Code shall be a civil offense in which the remedy involved is a civil fine or penalty that has been pre-determined by the Oglala Sioux Tribe as provided in this Code. Except as provided for in Part 3 of this Chapter, a violation of this Code is not a crime and the punishment imposed shall, therefore, not be deemed for any purpose a penal or criminal punishment and shall not affect or impair the credibility of a witness or otherwise of any person convicted thereof.
(2) These procedures are intended to be remedial and not punitive and should compensate the Oglala Sioux Tribe for the damage done to the peace, security, health, welfare, and natural resources of the Pine Ridge Indian Reservation and for the actions taken by the Oglala Sioux Tribe to protect the Pine Ridge Indian Reservation, its resources, and its people.

8-2-102 Application and Procedure

Unless otherwise provided by specific language elsewhere, this Code shall apply to any violation, bond procedure, or forfeiture action listed in this Code or regulation adopted thereunder.

8-2-103 Authority to Seek Enforcement

(1) The Director of the NRRA and the Water Administrator are authorized, in addition to any other powers provided by this Code, and with or without the Tribal Attorney's assistance, to issue a Cease and Desist Order, Compliance Order, or other similar order as the Director or Water Administrator shall deem necessary to enforce this Code, including seeking in the Oglala Sioux Tribal Court any remedy otherwise available under Tribal law, including but not limited to an order that the unpermitted activity be stopped and/or an order for monetary damages in an amount necessary to remedy any adverse effects caused by the unpermitted activity.

(2) Whenever the Water Administrator determines that a violation of a provision of this Code, any provisions of an approved permit, or control regulation issued or promulgated under the authority of this Code has occurred, including the lack of or untimely payment of water use fees, the Water Administrator shall issue a notice in writing describing the nature of the violation (including the amount of any civil penalty imposed) and serve the notice by either certified mail (return receipt requested) or personally to the alleged violator. The notice shall state the provision alleged to be violated and the facts alleged to constitute a violation, and it may include the nature of any corrective action proposed to be required.

(3) Each Cease and Desist Order or Compliance Order issued pursuant to Sections 8-2-105 or 8-2-103(1) shall be accompanied by or have incorporated in it the notice provided for in Section 8-2-103(2), unless such notice of any corrective action has been given prior to issuance of such Cease and Desist Order or Compliance Order.

8-2-104 Enforcement

(1) The Water Administrator shall be responsible for enforcing the provisions of this Code; the compliance with the conditions of all permits, determinations, and orders; the regulations and other actions taken under this Code; the policies and guidelines expressed throughout this Code; and rules and regulations adopted pursuant to this Code. To this end, the Water Administrator and his or her staff shall have right of access to all land and water use facilities and are authorized to:

(a) Investigate water uses and other activities affecting water resources to determine whether they are in compliance with this Code and with applicable regulations, orders, determinations, permits, and the Water Quality Standards issued under this Code;

(b) Inspect methods of water diversion and withdrawal, inspect other activities affecting water quality and quantity, and install and monitor measuring and recording devices;

(c) Issue warnings, stop work orders, abatement orders, compliance orders, stop use orders, and citations, as provided by this Code, and any other action authorized by this Code; and

(d) Remove, render inoperative, shut down, close, seal, cap, modify, or otherwise control methods of water diversion and withdrawal, obstructions to the flow of water, and other activities that are in violation of this Code.

(2) The Oglala Sioux Tribal Police Department and the Tribal Prosecutor shall provide assistance to the Water Administrator in the enforcement of this Code.

8-2-105 Non-Judicial Enforcement

(1) Cease and Desist Orders: If the Water Administrator has denied, revoked, or suspended a Water Use Permit, a Well Permit, or a Temporary Water Use Permit under this Code, the Water Administrator may issue an order for the person whose permit has been denied, revoked, or suspended to cease and desist his or her unauthorized activities or water use. The order shall be in writing, describe the unauthorized activity or water use, and advise the person of his or her right to appeal the Water Administrator's decision denying, revoking, or suspending the subject permit as provided for in this Code and to show cause why the person should not be ordered to cease and desist from the activity or water use. If the person continues the violation after the Water Administrator issues a Cease and Desist Order, the Water Administrator, within five (5) days, may issue an emergency restraining order and/or apply to the Tribal Court for a temporary restraining order or preliminary injunction.

(2) Emergency Restraining Orders: Upon receiving evidence that a person is engaging in any on-Reservation activity regulated by this Code and that the activity may endanger or cause damage to the public health, safety, welfare, Oglala Sioux Tribal water, or the environment, the Water Administrator may issue an emergency restraining order and/or apply to the Tribal Court for a

temporary restraining order or preliminary injunction. Every emergency or temporary restraining order or preliminary injunction order shall:

(a) Be in writing, endorsed with the date and hour of issuance, and filed with and entered on the records of the Oglala Sioux Tribal Court within three (3) days of its issuance;

(b) Define the injury; and

(c) Expire within such time as is specified therein, not to exceed ten (10) days, unless within that time the Water Administrator requests from the Tribal Court and is granted a preliminary or permanent injunction. For good cause shown, the Tribal Court may extend the emergency restraining order until the Tribal Court rules on the Water Administrator's request for a temporary or permanent injunction.

With at least two (2) days' written notice to the Water Administrator, the person whose activities are subject to the emergency restraining order may appeal the Water Administrator's action to the Tribal Court and seek the dissolution or modification of the emergency restraining order. In that event, the Tribal Court shall hear the appeal in accordance with the procedures set forth in this Code and as expeditiously as the ends of justice require.

(3) Tribal Enforcement: Nothing in this Code shall prevent the enforcement of the provisions of this Code by other Tribal Committees or the Tribal Council as needed to protect the water resources of the Oglala Sioux Tribe. Cooperation with other Tribal committees and enforcement through other Tribal codes and regulations will be sought to protect the water resources of the Oglala Sioux Tribe.

8-2-106 Judicial Enforcement

(1) Tribal Court Jurisdiction: Except as otherwise provided in this Code, the Oglala Sioux Tribal Court shall have exclusive jurisdiction over all matters concerning the administration and enforcement of this Code; however, nothing in this Code is intended nor shall it be interpreted to preclude prosecution or enforcement of Tribal Court judgments in either state or federal court pursuant to any applicable state or federal law.

(2) Civil Enforcement and Remedies: The NRRA is authorized to enforce the provisions of this Code by filing a civil action in the Tribal Court in the name of the Oglala Sioux Tribe against any person engaged in an activity or activities prohibited by this Code or the regulations promulgated thereunder, and may recover monetary damages, civil penalties, restitution, injunctive or declaratory relief, affirmative remedial action, court costs, investigatory and enforcement costs, attorney's fees, and/or any other relief that is just and equitable under the circumstances, including but not limited to orders for the person:

(a) To perform community service and to become informed about the need for compliance with this Code;

(b) To pay a civil penalty not exceeding Five Thousand Dollars ($5,000) per day per each prohibited act for failing to comply with any order of the Water Administrator or the Tribal Court issued pursuant to this Code;

(c) To make restitution to the Oglala Sioux Tribe and to affected persons for the cost of damages and restoration of water or other resources; or

(d) To pay the Oglala Sioux Tribe any monetary benefit derived from the violation of this Code.

(3) Preliminary or Permanent Injunctions: Upon the filing of a motion for a preliminary or permanent injunction by the Water Administrator or any other person designated by the Oglala Sioux Tribe, or upon its own initiative, the Tribal Court shall issue a preliminary or permanent injunction on the following grounds:

(a) When an emergency restraining order has been issued by the Water Administrator under this Code, the Water Administrator has moved for a preliminary or permanent injunction,

and it appears by the pleadings or affidavits on file that the Water Administrator is entitled to the relief requested;

(b) When it appears by the pleadings or affidavits on file that the commission or continuance of some act would produce great or irreparable injury to the public health, safety, or welfare or to the environment;

(c) When it appears that the person sought to be restrained is doing, threatening to do, or is about to do, or is procuring or suffering to be done, some act in violation of this Code or a federal or Oglala Sioux Tribe law, regulation, ordinance, order, or permit; or

(d) In all cases where an injunction would be proper in equity. The Tribal Court's rules of civil procedure shall govern the procedures for issuing preliminary or permanent injunctions.

(4) Exclusion: For good and sufficient cause found, the Tribal Court may exclude from the Pine Ridge Indian Reservation any person who engages in an activity or activities prohibited by this Code or the regulations promulgated hereunder to the extent such exclusion is not inconsistent with applicable federal and Oglala Sioux Tribe laws.

8-2-107 Civil Fines and Penalties

The system of civil fines and penalties for violations of this Code, the regulations promulgated hereunder, and the permits issued hereunder may be established by the NRRA, subject to approval by the Oglala Sioux Tribal Court; provided that no fine shall exceed five thousand dollars ($5,000) per day per violation and that the imposition of a fine shall constitute a final decision by the Director of the NRRA and be subject to the appeal procedures set forth in this Code. A person who violates this Code or a rule, permit, or order issued under the provisions of this Code shall be subject to civil penalties as established by NRRA for each provision violated. Each day of violation constitutes a separate violation. Action under this Part 2 does not bar enforcement of this Code or rules or orders issued under it by injunction or other appropriate remedy.

Part 3
Criminal Violations

8-3-101 Purpose

A criminal violation of this Code shall be a criminal offense in which the remedy involved is a fine and/or jail time, as provided for in this Code and/or in the Oglala Sioux Tribe Criminal Offenses Code.

8-3-102 Application and Procedure

All criminal violations shall be enforced and prosecuted following the procedures specified in the Oglala Sioux Tribe Criminal Offenses Code. When the NRRA and/or the Water Administrator become aware, either through direct observation or by notice from other Tribal officials, committees, or a third party or parties, of a potential criminal act or violation, the NRRA and/or Water Administrator shall, within a reasonable time, contact the appropriate police authority to request assistance in the investigation and potential apprehension of the party or parties responsible for the crime. Once notified, the appropriate police authority shall lead the investigation and prosecution of the crime. The NRRA shall provide any necessary assistance to the appropriate police authority in the preservation of evidence and in the remediation of the criminal offence. Cooperation of other Tribal committees and enforcement through other Tribal codes and regulations will be sought in the prosecution of such criminal acts or violations.

8-3-103 Criminal Violations

The following shall be considered criminal violations of the Code:

(1) Water offenses as stated in Section 566 of the Oglala Sioux Tribe Criminal Offenses Code;
(2) Pollute or befoul any water (surface or groundwater) in any way that renders the water unusable for the beneficial purposes for which the water has or could be used;
(3) Unpermitted and willful and wonton discharge of water into the surface and groundwater of the Oglala Sioux Tribe that causes an exceedance of the water quality standards of Part 2 of Chapter 9 of the Code; and
(4) Criminal violations of other Oglala Sioux Tribe codes and regulations regarding water use and water quality.

CHAPTER 9
Water Quality

Part 1
General

9-1-101 Water Quality Requirements

No action under this Code resulting in a significant adverse effect to the Tribal drinking, streams, or groundwater water quality will be permitted. In all cases, the minimum Tribal standards for water quality shall be maintained. The Tribe is exercising its Sovereignty by complying with federal law and regulations through the Environmental Protection Agency's Safe Drinking Water Act and Clean Water Act, as applicable to the Tribe.

The protection of the quality of the surface streams and groundwater within the exterior boundaries of the Pine Ridge Indian Reservation for beneficial uses is the responsibility of the Environmental Protection programs under the umbrella of the Environmental Technical Team. The NRRA cooperates and coordinates with the Environmental Technical Team to ensure that the issues and concerns of these programs are addressed in the water adjudication process. The organization of the Environmental Technical Team is as presented in Appendix B. All applicants for adjudication of water and Water Use Permits must address water quality issues of these programs as part of the application review process. The stream standards established under the Clean Water Act, as administered by the Environmental Technical Team, form the basis upon which the impact of a proposed water use on the water quality of the existing stream systems and groundwater will be judged. Similarly, the quality of water required by the Safe Drinking Water Act for potable water supplies will be a consideration in the determination of whether a proposed water source for potable water use (whether domestic, municipal, industrial, or commercial) will likely be suitable for the proposed use, considering that some amount of water treatment will be required to meet Safe Drinking Water Act requirements. The NRRA will rely on the findings of the Environmental Technical Team umbrella organization in regards to the suitability and impact of a proposed water use on the proposed source supply. In this manner, the NRRA is not duplicating efforts of the other programs but rather is coordinating with these programs in the evaluation of the proposed water appropriation and Water Use Permit. The NRRA reserves the right to deny a water adjudication and Water Use Permit if the findings of the Environmental Technical Team programs indicate impairment on the quality of the source water and/or that the source water is not suitable for the proposed use without proper treatment, unless treatment is included in the financial evaluation of the application.

9-1-102 Water Quality Standards – Safe Drinking Water Act

In the application and use of water for potable water supplies under this Code, the minimum Primary and Secondary Safe Drinking Water Standards of the United States Environmental Protection Agency will be required to be followed for issuance and continued use of waters of the Oglala Sioux Tribe. These standards will be required to be met at the point of use and may be met through the use of a water treatment devise or facility. If stricter standards are adopted by the Oglala Sioux Tribe as part of this or other Oglala Tribal codes or regulations, those stricter standards shall govern.

9-1-103 Water Quality Standards – Clean Water Act

It is imperative that the quality of the waters of the Oglala Sioux Tribe be maintained at levels that allow for the full beneficial use of these waters, including the beneficial uses as defined in this Code. Therefore,

the minimum surface and groundwater quality standards for the waters of the Oglala Sioux Tribe shall be the surface and groundwater quality standards as set by the United States Environmental Protection Agency until otherwise revised and/or amended by other codes and/or regulations of the Oglala Sioux Tribe. If stricter water quality standards are adopted by the Oglala Sioux Tribe as part of this or other Oglala Tribal codes or regulations, those stricter water quality standards shall govern.

APPENDICES

Appendix A
Water Fees

A. Water Use Permit Application Fees:

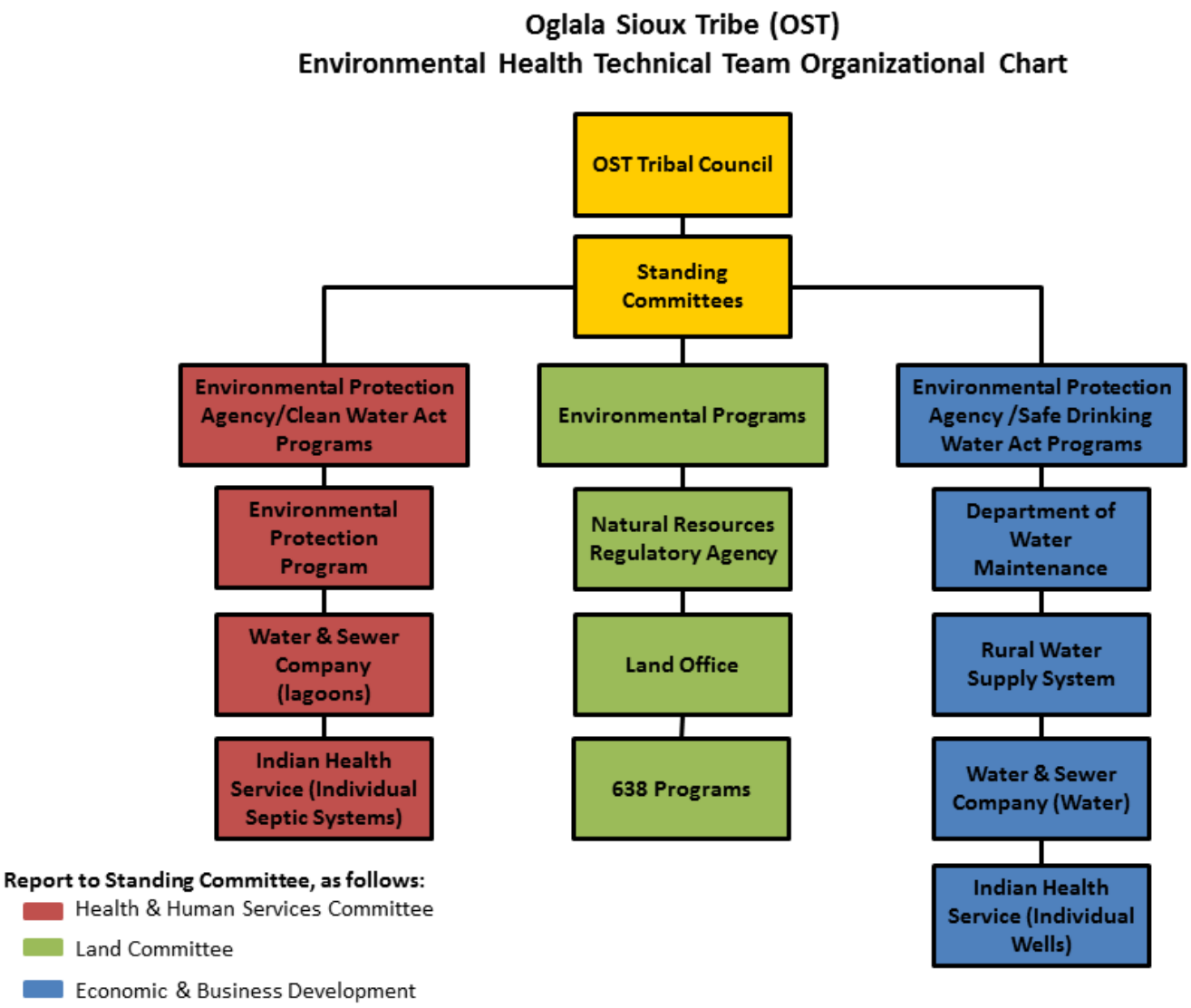
(1) General Filing Fee
  (a) Tribal Members – $50.00
  (b) Non-Tribal Members – $250.00
(2) Review and Processing Fee
  (a) Tribal Members – $0.00
  (b) Non-Tribal Members – $10.00 per acre-foot of proposed appropriation

B. Water Use Fees*:

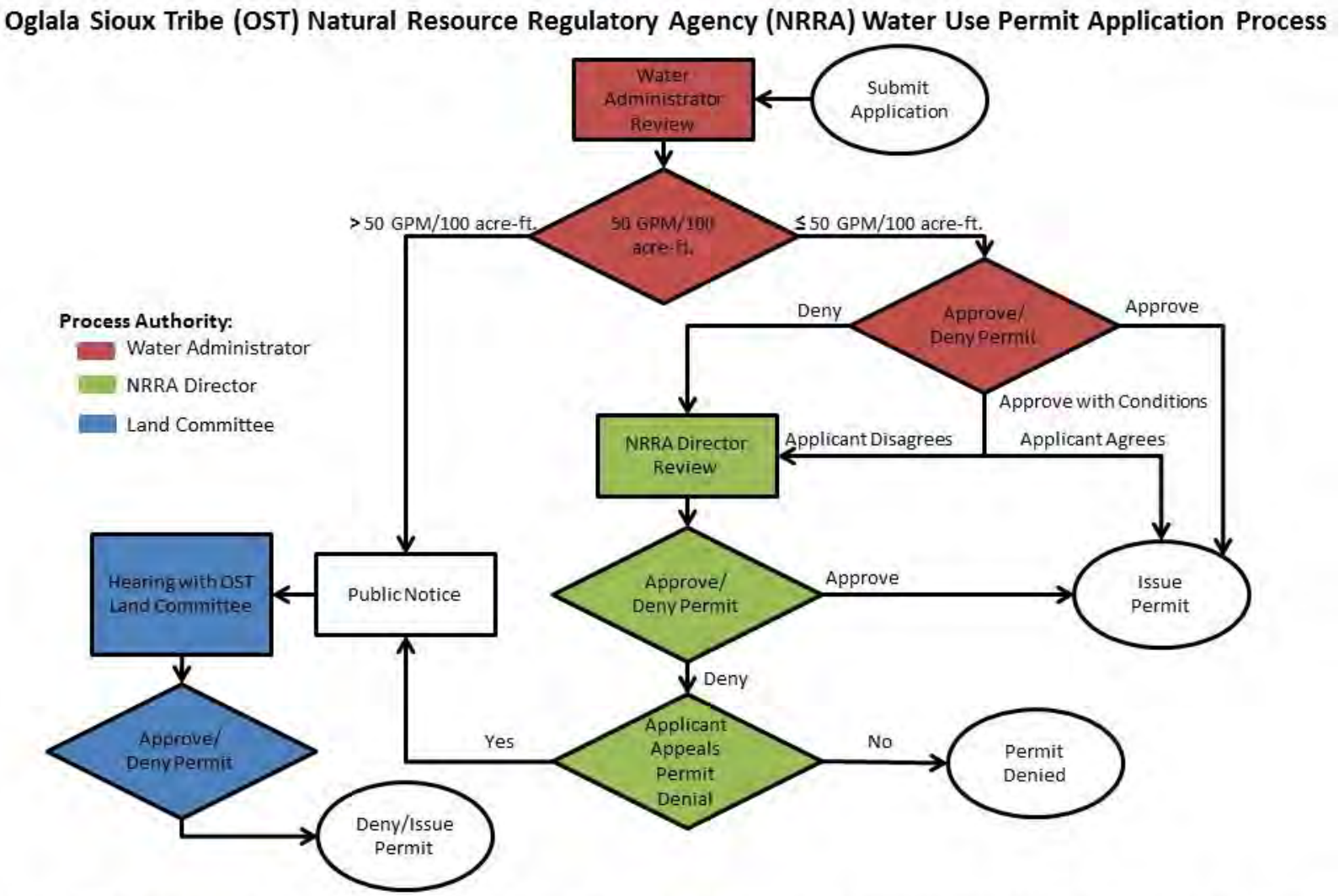
(1) Public Water Systems: $5.00 monthly administration fee plus $10.00 per 1,000 gallons of water use
(2) Individual Wells and Springs: $7.50 per 1,000 gallons of water use
(3) Streams, Creeks, and Rivers: $8.00 per 1,000 gallons of water use
(4) Ponds, Lakes, and Reservoirs: $8.00 per 1,000 gallons of water use
(5) Other Water Sources: Rate as determined on a case-by-case basis and established at the time the use is permitted

* Daily meter readings of water use shall be maintained and submitted weekly or upon request to the NRRA/WRD. Water use fees shall be paid monthly or upon another schedule approved by the NRRA/WRD.

Appendix B
Environmental Technical Team Organizational Chart



Appendix C
Water Use Permit Application Process Chart



Note: Hearings and Appeals are held with the OST Land Committee. Appeals to the hearing process are made to the Tribal Council. The Water Administrator will make recommendations to the NRRA Director and the Land Committee or other committees as designated by the Tribe.

Appendix D
Forms