

PART FOUR: SECONDARY NATURAL HAZARDS

The following hazards are possible, but have not been prioritized among the top three natural hazards in Sibley County; they will be summarized accordingly.

WILDFIRE

A wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated.

While some wildfires start by natural causes like lightning, humans cause four out of every five wildfires. Debris burns, arson or carelessness are the leading causes of wildfires. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The dangers from wildfire include the destruction of timber, property and wildlife, and injury or loss of life to people living in the affected area or using the area for recreational facilities.



Wildfire is a naturally occurring part of the environment. While we often think of wildfires as being “bad”, it is just one way of nature eliminating dead vegetation – sort of an environmental house cleaning. However, as humans settled this country and began clearing land and building homes, roads, railroads, and campgrounds, new artificial causes of wildfire arrived on the scene.

As mentioned earlier, people burning debris cause most wildfires in Minnesota. However, wildfires are also caused by vehicle exhaust, sparks from trains and heavy equipment, camping, smoking, and lightning.

Causes of wildfires will vary from state to state. For example, in Florida, lightning ignites approximately half of all wildfires, while in Minnesota lightning causes less than 5 percent of all wildfires. These variations are due to climate, vegetation, topography, and weather.

Topography affects the movement of air and fire over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity and wind affect the severity and duration of wildfires.

Homes threatened by wildfire are primarily those located in the “wildland-urban interface”. This is the zone where homes and subdivisions have been located in wildland areas where natural wildfires can have an impact. While wildfires in themselves are not necessarily bad, they burn whatever fuel is in their path, whether it is vegetation or buildings.

Wildfire can destroy or damage a home in many ways although applying simple practices can protect any home.

One of the most common causes of a home being damaged or destroyed is due to radiant heat. In a wildfire, radiant heat is the heat given off by burning vegetation. The high temperatures of some wildfires can cause the deck, siding or roof of a home to ignite, just because the fire was too near the home. Especially in areas of solid conifers (pines, spruces, junipers, and other conifers), radiant heat can be very hot. Studies have shown that when solid stands of conifers exist, a minimum of 30 feet of “defensible space” should be provided between the vegetation and the home. Studies in western wildfires have shown that approximately 85 percent of those homes

surviving a major wildfire had 30-50 feet of defensible space around the home, coupled with fire-resistant roofing.

Wildfire has not been identified as a priority because there has not been an occurrence of wildfire reported in Sibley County over the past 50 years.

Sibley County Wildfire Hazard Risk Assessment

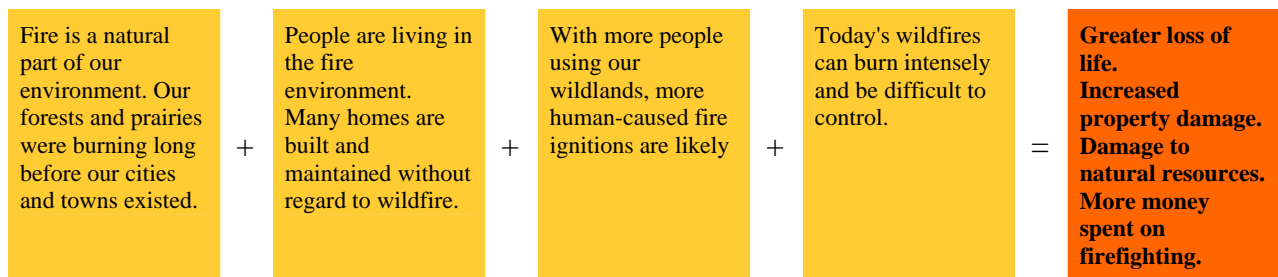
Hazard:	Wildfire
Location	Countywide, particularly in dry natural areas with lots of vegetation
Historic Events	None on record
Likely to happen now?	Unlikely
How often?	Very infrequently
Where would event occur?	Natural areas with high amounts of vegetation
Severity of event?	Not likely to be severe
When would hazard likely occur?	Spring/Summer
What other hazards could occur at the same time?	Structural fire if wildfire moves into populated areas
Economic impacts	Could be significant, particularly if damage to agricultural operations occurs
Loss of life impacts	Not likely to occur
Risk Level VH – Very High H – High L – Limited M – Minimal	Citizens/People: M Animals/Livestock: M Housing: L Critical Structures: M Infrastructure: M Total: M
<u>Risk Assessment</u>	
Unlikely – 1 Occasional – 2 Likely – 3 Highly Likely – 4	<u>Frequency of Occurrence</u> 1
More than 12 hours – 1 6-12 hours – 2 3-6 hours – 3 Minimal-None – 4	<u>Warning Time</u> 1
Limited – 1 Minor – 2 Major – 3 Substantial – 4	<u>Potential Severity</u> 2
Minimal – 1 Limited – 2 High – 3 Very High – 4	<u>Risk Level</u> 1
(Total divided by 4) Very Low – 1 Low – 2 Moderate – 3 High – 4	<u>Overall Priority</u> 1.25 Very Low

Vulnerability to Wildfire

Minnesota has about 2,200 wildfires every year. Wildfires occur throughout the spring, summer and fall, however, most wildfires in Minnesota take place in March, April, and May. During this period, much of the existing vegetation has been killed due to winter temperatures and most of the vegetation is dead and combustible. Also, there is little green vegetation to serve as a barrier for a moving wildfire.

Although wildfires could occur anywhere throughout Sibley County, there are several areas with steeper slopes and suitable vegetation poses a higher risk potential. While the probability of a wildfire occurring in these areas is greater, there still is a relatively low concern because of the sparse population and lack of infrastructure. Larger cities like Gaylord have high populations, larger housing stocks and essential utilities. However, they also have an adequate fire department, which would minimize any damages caused by wildfires before they reach the city.

Wildfire Concern Summary Chart



History of Wildfire

Wildfires occur throughout Minnesota. According to the Minnesota State Fire Marshal, there are more than 2,200 annual wildfires with an estimated loss of more than \$13 million dollars.

Region Nine staff has researched wildfire events in Sibley County extensively during the development of this document, and has been in contact with county officials, the State of Minnesota Fire Marshall's office, and several online government databases. None of these sources were able to turn up any officially reported wildfire events. It is possible, and indeed likely, that there have been and will continue to be small wildfire events such as grass fires, but due to the relatively small impact these have events may have had to date and the efficiency with which such events are resolved by local firefighting personnel, wildfire has been deemed to be a low-priority hazard for Sibley County.

Potential Impacts and Cascading Effects

The most significant impacts from wildfire are the economic impacts that can be caused by damage to natural resources or agricultural areas, as well as damages incurred to buildings or infrastructure that may be in the path and affected by wildfire. Likewise, as is the case with all fires, wildfire also poses a threat to human life and safety, particularly for those who are dispatched to contain it (firefighters).

Wildfire Gaps and Deficiencies

- Some fire departments within the county may not have the adequate equipment (such as off-road grass rigs) to properly fight a wildfire.
- Since there are state-owned lands within Sibley County, the issue of who is responsible for clearing debris to prevent a wildfire, or fighting a wildfire should one occur, must be clarified. This is of particular concern in the City of Green Isle, which has noted that there are approximately 1200 acres of DNR land adjacent to the city limits.
- The City of New Auburn has noted concern that there are wetland areas around the town which are vulnerable to wildfires, and that there are a limited number of firefighters which live in the town itself and can respond immediately, while the rest live nearby and need additional time to respond.
- The City of Henderson has indicated concern with wildfires being ignited by ATVs traveling in vulnerable, dry areas. The City has already undertaken steps to limit and control ATVs operating in such areas.

ACTIONABLE MITIGATION STEPS

Actionable Mitigation Steps are more elaborately explained with project, timeframe, responsible jurisdictions/staff, possible funding sources, and priority level in the Action Plan section of this document.

1. Control ATV Traffic (Henderson) – The City of Henderson has already taken measures to control ATV traffic in areas vulnerable to wildfires.
2. Focus on Vulnerable Areas (New Auburn) – City staff and firefighters in New Auburn should identify ways to reduce the risk of wildfire in vulnerable areas, particularly dried-up wetland areas, nearby the community.
3. Proper Equipment (Countywide) – Wildfires often occur on rough terrain and in fairly remote locations, and many Sibley County fire departments are not adequately equipped with the off-road capabilities (such as grass rigs) to properly deal with wildfire occurrences. Those jurisdictions that do not have their own wildfire equipment may want to make arrangements with nearby departments that do so they are prepared for a wildfire occurrence.
4. DNR Training (Countywide) – Encourage fire department participation in annual wildfire training classes that are offered by the Minnesota Department of Natural Resources Forestry Department. Participation in any other relevant training exercises is also recommended.
5. Participation in FireWise (Countywide) – The DNR participates in a national wildfire education program that is known as FireWise, which provides tools for risk assessment/reduction for interested communities. Some small grants may be available to offset the costs of participation in the program.

6. State Land Management (Countywide, particularly Green Isle) – The DNR is responsible for regulating and operating all state lands within Sibley County. Thinning brush and vegetation in the areas before they reach a point where they are likely to be a wildfire hazard can minimize wildfires in state-owned areas. Clarification of who is responsible for dealing with wildfires on state-owned land (i.e. local city departments or state/DNR teams) should also be addressed.
7. Fire Districts, Departments (Countywide) – Fire departments respond to any wildfires that are in their own fire district, and are also available to assist other departments or districts in the event of a large fire.
8. Zoning (Countywide) – Sibley County, as well as city staff in individual communities, should review zoning ordinances to ensure that adequate distances (setbacks) are being maintained between structures and areas that may be prone to wildfire.
9. Evacuation Plan (Countywide) – Cities should maintain a plan describing and depicting routes out of the community in the event of a large fire that poses an imminent threat to the community.

EXTREME TEMPERATURES

Sibley County History and Definitions

Located in the center of the continent, Minnesota and Sibley County experience the extremes of summer heat and winter cold. Summer temperatures in Sibley County have reached 109° F on occasions while winter temperatures have been as cold as 36° below zero. Both extreme heat and extreme cold pose risks for people, animals, equipment and infrastructure. Sibley County has experienced seven reports of extreme heat related events between 1950 and 2006, while there were six occurrences of extreme cold reported during the same period.

Extreme Heat - In recent years a heat index has been developed that combines humidity and temperature to better reflect the risk of warm weather to animals and people. The index measures the apparent temperature in the shade. People exposed to the sun would experience an even higher apparent temperature. A heat index of 105 is considered dangerous. With prolonged exposure it could result in heat stroke, heat exhaustion and heat cramps. People are reminded to use extreme caution when the heat index is between 95 and 105. A heat index of 95 occurs when the temperature is 90 degrees and the relative humidity is 50 percent. Sibley County can expect these kinds of conditions on 8 to 10 days each summer. This is more of a problem when these conditions are present for several days in a row. This allows buildings to become hotter and hotter as the conditions persist.

HEAT INDEX	Affects on the Human Body
130 or above	heat stroke highly likely with continued exposure
105 to 130	heat stroke likely with prolonged exposure
90 to 105	heat stroke possible with prolonged exposure

Extreme Cold - Dangerously cold weather is that which produces relatively cold temperatures with strong winds, creating low wind chills that put both people and livestock at risk. Wind chills of -19 and lower can present significant risk, particularly if people are not properly clothed or protected. A 5° F air temperature with wind speeds of 30 mile per hour creates a wind chill of 19° below zero. In the open under these conditions, frostbite will occur in 15 minutes or less on exposed skin.

Vulnerability to Extreme Temperatures

While summers are typically warm but pleasant in Sibley County, it is not uncommon to get extended warm spells with high dew points and temperatures in the 90's for several days in a row. Extended periods of warm, humid weather can create significant risks for people, particularly the elderly who may lack air conditioning or proper insulation or ventilation in their homes. Animals are also at risk during extended periods of heat and humidity.

New Wind Chill Chart

		Wind (mph)												
		Calm	5	10	15	20	25	30	35	40	45	50	55	60
Temperature (°F)	40	36	34	32	30	29	28	28	27	26	26	25	25	25
	35	31	27	25	24	23	22	21	20	19	19	18	17	17
	30	25	21	19	17	16	15	14	13	12	12	11	10	10
	25	19	15	13	11	9	8	7	6	5	4	4	3	3
	20	13	9	6	4	3	1	0	-1	-2	-3	-3	-4	-4
	15	7	3	0	-2	-4	-5	-7	-8	-9	-10	-11	-11	-11
	10	1	-4	-7	-9	-11	-12	-14	-15	-16	-17	-18	-18	-19
	5	-5	-10	-13	-15	-17	-19	-21	-22	-23	-24	-25	-26	-26
	0	-11	-16	-19	-22	-24	-26	-27	-29	-30	-31	-32	-33	-33
	-5	-16	-22	-26	-29	-31	-33	-34	-36	-37	-38	-39	-40	-40
	-10	-22	-28	-32	-35	-37	-39	-41	-43	-44	-45	-46	-48	-48
	-15	-28	-35	-39	-42	-44	-46	-48	-50	-51	-52	-54	-55	-55
	-20	-34	-41	-45	-48	-51	-53	-55	-57	-58	-60	-61	-62	-62
	-25	-40	-47	-51	-55	-58	-60	-62	-64	-65	-67	-68	-69	-69
	-30	-46	-53	-58	-61	-64	-67	-69	-71	-72	-74	-75	-76	-76
-35	-52	-59	-64	-68	-71	-73	-76	-78	-79	-81	-82	-84	-84	
-40	-57	-66	-71	-74	-78	-80	-82	-84	-86	-88	-89	-91	-91	
-45	-63	-72	-77	-81	-84	-87	-89	-91	-93	-95	-97	-98	-98	

Frostbite occurs in 15 minutes or less

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T = Air Temperature (°F)
V = Wind Speed (mph)

According to the State Climatologist, there is some evidence that current dew points are not only higher but are occurring with greater frequency than was true in the past. If that is the case, Sibley County residents can expect an increasing number of hours with heat indexes in the danger category.

Sibley County Extreme Temperature Risk Assessment

Hazard:	Extreme Temperature
Location	Countywide
Historic Events	Record high of 109 degrees Fahrenheit, record low of -36 degrees Fahrenheit
Likely to happen now?	Yes
How often?	Extreme heat (heat index 95 degrees or above) 8-10 days per year, one day over 100 degrees every 2 years, extreme cold 2-3 days per year
Where would event occur?	Anywhere in County
Severity of event?	Depends on temperatures and duration
When would hazard likely occur?	Winter/Summer
What other hazards could occur at the same time?	Utility failure (water/wastewater plants, power outages) due to increased demand on system
Economic impacts	Crops/agricultural losses during extreme heat
Loss of life impacts	Potential due to hypothermia or heatstroke
Risk Level VH – Very High H – High L – Limited M – Minimal	Citizens/People: L Animals/Livestock: L Housing: M Critical Structures: M Infrastructure: M Total: M/L
<u>Risk Assessment</u>	
Unlikely – 1 Occasional – 2 Likely – 3 Highly Likely – 4	<u>Frequency of Occurrence</u> 2
More than 12 hours – 1 6-12 hours – 2 3-6 hours – 3 Minimal-None – 4	<u>Warning Time</u> 1
Limited – 1 Minor – 2 Major – 3 Substantial – 4	<u>Potential Severity</u> 1
Minimal – 1 Limited – 2 High – 3 Very High – 4	<u>Risk Level</u> 1
(Total divided by 4) Very Low – 1 Low – 2 Moderate – 3 High – 4	<u>Overall Priority</u> 1.25 Very Low

Statewide History of Extreme Temperatures

Extreme Heat: A heat wave began on July 30th of 2001 and persisted until August 1. Temperatures on July 30th soared into the upper 80's and lower 90's across a large portion of central and southern Minnesota, while dew points climbed into the middle 70's to lower 80's, resulting in triple digit heat indexes during the afternoon and evening. A noteworthy index included 111 in Mankato. During the early morning hours of the 31st, dew points remained in the 70's, therefore nighttime heat indexes only dropped to the upper 70's and lower 80's. In fact, from 1000 CST July 30 to 1600 CST July 31 inclusive, Minneapolis-St. Paul (MSP) set a record with 31 consecutive hours during which the dew point was equal to or greater than 74 (the previous record was 25 hours in July 1977). On July 31 temperatures climbed slightly higher while dew points remained in the middle 70's to lower 80's. Heat index values reached triple digits prior to noon in most areas. The heat wave expanded eastward into Wisconsin on the 31st and continued into August 1 over both Minnesota and Wisconsin. Korey Stringer, a professional football player for the Minnesota Vikings of the NFL, practiced during the late morning of the 31st in Mankato. He collapsed shortly after practice and was taken to the hospital. Mr. Stringer died on August 1, 2001.

Extreme Cold: Extreme cold temperatures also affect the county nearly every year. Extremely cold air settled over the area on January 31st of 1996, and remained entrenched through February 4th. A new record low temperature for Minnesota was set in the town of Tower on February 2, 1996. Numerous record low temperatures were set during the period at St. Cloud, Rochester and the Twin Cities. Minneapolis/St. Paul set three new record low temperatures as well as recording the second coldest day on record on February 2, 1996. A mean temperature of 25 degrees below zero was measured that day with a high of 17 below and a low of 32 degrees below zero in the Twin Cities. This was within two degrees of tying the all-time record low temperature set in the Twin Cities and the coldest temperature recorded this century. Many central and southern Minnesota locations set new record low temperatures the morning of the 2nd. The governor closed all schools that day.

Potential Impacts and Cascading Effects

The most pressing threat from extreme temperature is the impact on human life and safety. Extreme temperatures make many people more prone to suffering the effects of heat stroke or exhaustion in extreme heat, or frostbite and hypothermia for extreme cold. This is particularly important for those who have jobs that require that they be outside and exposed to the elements. Some economic impacts may be involved as well if businesses or government institutions close to ensure the public safety, or as farmers may lose some livestock due to temperature extremes. In addition, dry, hot conditions that occur for a prolonged amount of time can phase into a drought as well as increasing the risk of wildfires. Increased demand on electricity providers (for heating and air conditioning) can also lead to power outages.

Extreme Temperature Gaps and Deficiencies

- Local radio, television, and print media provide information on current heat and cold advisories, but they are effective only if paid attention to. Since broadcasts are nearly entirely in English, language barriers may exist for non-English speaking residents. This is of particular concern to the City of Gaylord, which has a large Hispanic population.

- The City of Gaylord has indicated that they also have a large elderly population that may have a more difficult time staying safe during an extreme temperature event.

ACTIONABLE MITIGATION STEPS

Actionable Mitigation Steps are more elaborately explained with project, timeframe, responsible jurisdictions/staff, possible funding sources, and priority level in the Action Plan section of this document.

1. Ensure the Safety of Elderly Residents (Countywide, particularly Gaylord) – Communities should undertake efforts to promote the safety of elderly residents in times of extreme temperatures when they may be more susceptible to the effects of extreme heat and cold. This is of particular importance in Gaylord, which has a large elderly population.
2. Undertake Steps to Eliminate Language Barriers (Countywide, particularly Gaylord) – Communities should identify ways to communicate potential dangerous temperatures to populations that are not English-speaking, particularly the City of Gaylord which has a large Hispanic population.
3. Heat Advisories (Countywide). The local radio and TV media in concert with the National Weather Service issues a heat advisory when the combination of temperature and humidity create risks for people and animals. A heat index of 105° to 114°F warrants a heat advisory. This occurs when air temperature reaches 95 ° F and the relative humidity is 50 percent. An excessive heat warning is issued when the heat index reaches 115°F. This occurs with an air temperature of 95°F and relative humidity of 60 percent. An index of 115°F or higher creates severe risk for both humans and animals.
4. Wind Chill Warnings (Countywide). The local radio and TV media in concert with the National Weather Service issues a wind chill warning when temperatures are 30°F or lower. Severe wind chill warnings are provided when conditions warrant and when severe risk and safety is a factor. Wind chills of 40°F below or lower frequently prompt the closing of schools to protect children, particularly in rural areas.
5. School Closings (Countywide) – Sibley County school districts may close schools in instances of extreme temperatures to ensure the safety of students and staff. This is generally more likely to occur during times of extreme cold, since many schools are not in session during the summer months when extreme heat events are prone to occurring. School closures should be publicly announced through local radio and television stations.