

Multi-Hazard Mitigation Plan

St. Louis County, Minnesota, 2020



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Multi-Hazard Mitigation Plan

St. Louis County, Minnesota

2020

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Section 1 – Introduction

1.1 Introduction

Hazard mitigation is defined as any sustained action to reduce or eliminate long-term risk to human life and property from hazards. The Federal Emergency Management Agency (FEMA) has made reducing hazards one of its primary goals; hazard mitigation planning and the subsequent implementation of resulting projects, measures and policies is a primary mechanism in achieving FEMA's goal.

From 1980-2018, the cost of damages due to natural disasters in the U.S. has exceeded \$1.6 trillion. 2017 was a record year with \$306 billion in damage (NOAA, n.d.). While the costliest disasters may occur in the coastal states, in 2018, wildfires, hailstorms, drought, and tornadoes caused many billion-dollar disasters across the nation.

Hazard mitigation planning and preparedness will be the most effective instrument to diminish losses by reducing the impact of disasters upon people and property. Although mitigation efforts will not eliminate all disasters, each county shall endeavor to be as prepared as possible for a disaster.

The Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). The development of a local government plan is required in order to maintain eligibility for federal hazard mitigation grant funding programs. In order for communities to be eligible for future mitigation funds, they must adopt an MHMP.

Researchers at the National Institute of Building Sciences looked at the results of 23 years of federally funded mitigation grants provided by the Federal Emergency Management Agency (FEMA), U.S. Economic Development Administration (EDA) and U.S. Department of Housing and Urban Development (HUD) and found mitigation funding can save the nation \$6 in future disaster costs, for every \$1 spent on hazard mitigation (National Institute of Building Sciences, 2017).

St. Louis County is vulnerable to a variety of potential natural disasters, which threaten the loss of life and property in the county. Hazards such as tornadoes, flooding, wildfires, blizzards, straight-line winds, ice storms and droughts have the potential for inflicting vast economic loss and personal hardship. In 2013, Minnesota had some of the highest weather-related disaster claims in the country (MN Environmental Quality Board, 2014).

This Multi-Hazard Mitigation Plan represents the efforts of St. Louis County and its local governments to fulfill the responsibility for hazard mitigation planning. The intent of the plan is to reduce the actual threat of specific hazards by limiting the impact of damages and losses.

1.1.1 Scope

The St. Louis County Emergency Management Coordinator and U-Spatial@UMD have combined efforts to update the 2013 St. Louis County Multi-Hazard Mitigation Plan. U-Spatial@UMD contracted with Hundrieser Consulting LLC for additional emergency management planning expertise and facilitation.

This Multi-Hazard Mitigation Plan evaluates and ranks the major natural hazards affecting St. Louis County as determined by frequency of event, economic impact, deaths and injuries. Mitigation recommendations are based on input from state and local agencies, public input and national best practices.

U-Spatial@UMD performed the hazard risk assessment for 1% annual chance floods using the FEMA Hazus GIS tool. The Minnesota Homeland Security and Emergency Management (HSEM) office has determined that Hazus should play a critical role in Minnesota's risk assessments.

This is a multi-jurisdictional plan that covers St. Louis County, including the cities of Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton. The St. Louis County risks and mitigation activities identified in this plan also incorporate the concerns and needs of townships, school districts and other entities participating in this plan.

Members from each of these jurisdictions actively participated in the planning process by attending workgroup meetings, providing information, suggesting mitigation strategies and reviewing the plan document. *Appendix K – Local Mitigation Survey Report* includes jurisdictionally-specific input. The information in these forms was used to help identify mitigation actions for local implementation (see also Section 2.2). Each jurisdiction will adopt the plan by resolution after approval by FEMA. County and local city resolutions will be added by St. Louis County after final approval by FEMA, in Appendix D in the back of the plan.

St. Louis County has specified the following goals for this Multi-Hazard Mitigation Plan update:

- Include more recent data documenting the critical infrastructure and hazards faced by St. Louis County.
- Reformat and reorganize the plan to reflect definitions of hazards as expressed in the 2014 State of Minnesota Multi-Hazard Identification and Risk Assessment Plan.
- Reflect current hazard mitigation priorities in St. Louis County.

1.1.2 Hazard Mitigation Definition

Hazard mitigation may be defined as any action taken to eliminate or reduce the long-term risk to human life and property from natural hazards. Following are examples of hazard mitigation measures that fall within one of five types of mitigation strategies:

- *Planning* – Development of mitigation standards, regulations, policies and programs.
- *Structure and Infrastructure Projects* – Structural retrofits, property acquisition, local flood reduction projects and safe room construction.
- *Natural Systems Protection* – Sediment and erosion control, stream corridor restoration, forest and vegetative management, and floodplain and stream restoration.
- *Education and Awareness Programs* – Outreach programs, hazard awareness campaigns, real estate disclosure and promotion of family/personal emergency preparedness.

- *Mitigation Preparedness & Response Support* – Emergency planning and services such as warning siren systems, mass notification systems and installing generators for critical facilities.

1.1.3 Benefits of Mitigation Planning

The benefits of hazard mitigation planning include the following:

- Saving lives, protecting the health of the public, and reducing injuries
- Preventing or reducing property damage
- Reducing economic losses
- Minimizing social dislocation and stress
- Reducing agricultural losses
- Maintaining critical facilities in functioning order
- Protecting infrastructure from damage
- Protecting mental health
- Reducing legal liability of government and public officials

1.2 State Administration of Mitigation Grants

FEMA currently has three mitigation grant programs that are administered by the State of Minnesota: the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation program (PDM) and the Flood Mitigation Assistance (FMA) program. The HMGP, PDM and FMA programs are administered through the state of Minnesota Department of Public Safety, Division of Homeland Security and Emergency Management. All applicants must have or be covered under an approved Hazard Mitigation Plan. Eligible applicants include state and local governments, certain private non-profit organizations or institutions, and tribal communities.

Section 2 – Public Planning Process

2.1 Steering Committee Information

The St. Louis County Multi-Hazard Mitigation Plan steering committee is headed by the St. Louis County Emergency Management Coordinator, who is the primary point of contact. Members of the St. Louis County MHMP steering committee include representatives from the public, private and governmental sectors. Table 1 identifies the steering committee individuals and the organizations they represent.

Table 1. Multi-Hazard Mitigation Steering Committee

Name	Agency/Organization	Participant Title
Dewey Johnson	St. Louis County Sheriff's Office - Emergency Management	Emergency Management Coordinator
John Werner	Rice Lake	Mayor
Allen Lewis	City of Virginia	Fire Chief
Bill Hennis	City of Virginia	Lead Engineer
Bill Manney	City of Chisholm	Administrator
Bob Brown	Chisom Fire	Fire Chief
Chris Clark	Virginia Fire	Fire Marshal
Clark Niemi	Town of White	Foreman
Clayton Cich	Fredenberg Township	Supervisor
Clyde Mortinsen	Canosia Township	Asst. Fire Chief
Daniel Golen	Canosia Township	Supervisor
Dave Marshall	Vermilion College	Director of Facilities
Dave Olds	Hibbing Community College	Director of Facilities
Dave Yapel	SLC Planning / GIS	GIS Manager
Duane Nelson	Wuori Township	Township Supervisor
Gary Oswell	Canosia Township	Road Foreman
Gina Godeen	NHED Colleges	Safety / Emergency Management
Jason Meyer	St. Louis County Land & Min	Dep Land & Min Director
Jeri Bonnette	Alango Township	Clerk
Jesse Anderson	City of Tower	Emergency Management Director
Jim F. Williams	City of Duluth	Director of Public Admin
Jim Foldesi	St. Louis County	Public Works Director
Jim Hofsommer	Colvin Township	Supervisor
Jim Park	Biwabik Township	Supervisor
Jim Ray	Fredenberg Township	Supervisor
John E. Stoessel	City of Meadowlands	City Clerk
Josh Sanders	Enbridge	ER Coordinator
Keith Perrhing	Mesabi Range	Supervisor

Name	Agency/Organization	Participant Title
Lottie Haller	Town of Gnesen	Clerk
Mark Pannuk	St. Louis County	Area Land Manager
Mark Weber	St. Louis County	Land Commissioner
Megan Deslangchamps	Lavell Township	Clerk
Natalie Beck	Town of Colvin	Clerk
Paul Senet	Hermantown	Public Works Director
Phillip Anderson	Vermilion Lake Township	Supervisor
Richelle Cole	City of Virginia Library	Library Clerk
Ron Gajewski	Solway Township	Supervisor
Sandi Nelson	Cotton Township	Dep Clerk
Scott Lesnau	St. Louis County Public Health	PHN Emergency Preparedness Coordinator
Shawn Krizaj	Duluth Fire / Emergency Management Director	Chief
Steve Leslie	St. Louis County	Supervisor - P4
Steven Lotz	Vermillion Lake FD	Chief
Todd Johnson	Lake County Power	Operations Manager
Toni Blomdahl	Rice Lake	Clerk-Treasurer
Vernon VanGuilder	Floodwood Police Dept.	Chief
Vic Lund	St. Louis County	Traffic Engineer
Warren LaPlante	Allete/MN Power	Manager, Security & Emergency Management
Warren Topker	Lavell Township	Supervisor

Jurisdictional representatives participating on the steering committee were contacted throughout the plan update process to help facilitate local participation and provide feedback on the hazards of concern to their community. Information was used to develop local mitigation actions which they would seek to implement upon plan adoption (see Section 5.3.2 and Appendix G Mitigation Actions by Jurisdiction).

2.2 Review of Existing Plans, Capabilities & Vulnerabilities

St. Louis County and its local communities utilized a variety of planning documents to direct community development. These documents include a Comprehensive/Master Plan, Capital Improvements Plan, Emergency Operations Plan, Transportation Plan, Continuity of Operations Plan, etc. (see Appendix J for a full listing of plans and programs in place in St. Louis County). The planning process also incorporated the existing natural hazard mitigation elements from previous planning efforts. In addition, the 2019 Minnesota All-Hazard Mitigation Plan was consulted.

In the development of the St. Louis County Multi-Hazard Mitigation Plan, UMD consultants reviewed and incorporated a variety of planning documents that direct community development and influence land use decisions for the county and its jurisdictions. In addition, UMD consultants worked closely with

the St. Louis County Emergency Management Coordinator, other key county staff and local city officials to collect specific feedback on local mitigation capabilities and vulnerabilities that either support or hinder the ability to mitigate against natural hazards at the county and local level. Following is a summary of the assessment tools used to gather information on local capabilities and vulnerabilities during the planning process:

Capabilities Assessment (hazard specific) – In this assessment, detailed information was collected on current *Plans and Programs in Place* and *Program Gaps or Deficiencies* that currently exist to mitigate destruction caused by each natural hazard addressed in the plan. This information was used to inform where there were current mechanisms in place to incorporate or implement mitigation measures (i.e., existing programs, plans or policies) and where there were areas that needed to be addressed. *Section 4.3 Hazard Profiles* identifies current gaps and deficiencies for mitigation and *Section 5.1.3 Plans and Programs in Place to Address Natural Hazards* describes the mitigation capabilities that are in place to support mitigation.

Local Mitigation Surveys – As part of St. Louis County's 2020 Multi-Hazard Mitigation Plan update, participating jurisdictions and key county personnel were asked to fill out a two-part "Local Mitigation Survey" (LMS) form. *Part A: "Past Events & Vulnerability Assessment"* collected detailed information from each jurisdiction on the following: 1) Severe weather or disaster events & impacts that have occurred within the last five years; 2) Actions taken within the last five years that have helped reduce local vulnerabilities to future disaster events; 3) Any changes within the last five years that have increased local vulnerabilities to future disaster events; and 4) Any concerns or specific ideas for mitigation projects to help reduce or eliminate risk resulting from future severe weather or disaster events. *Part B: "Local Mitigation Capabilities Assessment"* collected detailed information on each jurisdiction's capabilities in place to help support mitigation in the community, including: 1) Plans, authorities, or policies; 2) Staff (organizational capacity); 3) Programs; and 4) Funding or other resources. Information was further collected on what program gaps or deficiencies exist that are a barrier to accomplishing mitigation in the community.

Information from the LMS forms were used to inform Section 4, Risk Assessment and the development of local-level mitigation actions (see *Appendix G: Mitigation Actions by Jurisdiction*).

2.3 Planning Process Timeline and Steps

In order to update the 2013 St. Louis County Multi-Hazard Mitigation Plan, UMD consultants worked in coordination with the St. Louis County Emergency Management Coordinator, and members of the steering committee. The updated plan includes not only new data documenting the types of hazards faced by St. Louis County residents and emergency planning officials, but also new thinking about how to best address these hazards.

2.3.1 St. Louis County Stakeholder Participation

In January of 2019, U-Spatial@UMD hosted a kickoff webinar that was attended by the St. Louis County Emergency Management Coordinator. The webinar included a project overview, U-Spatial@UMD background, the roles and responsibilities of the Emergency Management Coordinator,

contents of the Multi-Hazard Mitigation Plan, planning process and projected timeline (see Appendix E for webinar slides).

On January 15, 2019, St. Louis County issued a news release inviting public feedback and participation for the MHMP update (for complete documentation, see *Appendix F: Public Outreach & Engagement Documentation*).

Two initial steering committee meetings took place in May of 2019: in Virginia, Minnesota, on May 28th, and in Duluth, Minnesota, on May 29th. These meetings included the St. Louis County MHMP steering committee and the UMD planning team. The steering committee was provided with an overview of the purpose, process and timeline for the St. Louis County Multi-Hazard Mitigation Plan update, as well as the role and responsibilities of steering committee members. Appendix E provides documentation of steering committee meeting summaries, including a list of invited stakeholders, participant sign-in sheets and presentation slides.

Steering committee members were engaged in providing feedback on plans and programs in place as they relate to hazards facing the county, and they discussed potential mitigation actions to be added to the plan. This information was used to inform the development of mitigation strategies in the updated plan.

On December 13, 2019, and December 18, 2019, members of the steering committee convened again with the UMD planning team to conduct a review and discussion of the draft mitigation action charts developed for St. Louis County and the city jurisdictions participating in the plan. See Appendix E for a full meeting summary.

In order to provide opportunity for public input, St. Louis County issued a second news release on January 15, 2020, inviting public review and feedback on the draft plan. The news release provided information on where the plan could be viewed and comments submitted. U-Spatial@UMD hosted a webpage to post the full draft St. Louis County MHMP, including excerpts of the St. Louis County Master Mitigation Action Chart, each of the jurisdictional mitigation action charts, and an electronic feedback form.

Appendix F provides documentation of the public outreach for feedback on the draft plan by St. Louis County and jurisdictions. The public feedback period for the draft plan was open from January 15 to January 31, 2020, for a total of 17 days.

Table 2. St. Louis County Hazard Mitigation Update Meetings and Public Outreach

Meeting Type	Date	Location
Kickoff Webinar	1/3/2019	Hosted online by U-Spatial@UMD in Duluth
Public Outreach	1/15/2019	News release inviting public feedback and participation.
Steering Committee	5/28/2019	St. Louis County Public Works Building, Virginia, MN
Steering Committee	5/29/2019	St. Louis County Public Safety Office – EOC, Duluth, MN
Steering Committee	12/13/2019	St. Louis County Public Safety Office – EOC, Duluth, MN
Steering Committee	12/18/2019	Hosted online by U-Spatial@UMD in Duluth

Meeting Type	Date	Location
Public Outreach	1/15/2020 – 1/31/2020	Public review period for draft plan

At the close of the public outreach period, the UMD consultants worked with the St. Louis County Emergency Management Coordinator and members of the steering committee to incorporate comments from the public into the Multi-Hazard Mitigation Plan.

For more information on the planning process, see sections 5 and 6.

2.3.2 Overview of Jurisdictional Participation

Throughout the planning process, St. Louis County requested the participation of city representatives for the provision of local-level information, review and feedback to the plan update. Table 3 provides an overview of the participation of each city that took part in the St. Louis County MHMP update planning process, with reference to the location of supporting documentation.

Table 3. Jurisdictional Participation in Planning Process

Jurisdiction	Local Mitigation Survey, (Appendix K)	Planning Team Mtg. #1 (Appendix E)	Local Mitigation Action Chart Review (Section 5.3.2)	Planning Team Mtg. #2 (Appendix E)	Draft MHMP Review (Appendix F)
St. Louis County	X	X	X	X	X
City of Aurora	X		X		
City of Babbitt	X		X		
City of Biwabik	X		X		X
City of Brookston			X		
City of Buhl	X		X		
City of Chisholm	X	X	X		
City of Cook	X		X	X	
City of Duluth	X	X	X	X	
City of Ely	X		X		
City of Eveleth	X		X		
City of Floodwood	X	X	X	X	
City of Gilbert	X		X		
City of Hermantown	X	X	X	X	
City of Hibbing	X		X		
City of Hoyt Lakes	X		X		
City of Iron Junction	X		X		
City of Kinney			X		
City of Leonidas			X		
City of McKinley			X		
City of Meadowlands	X	X	X		
City of Mountain Iron	X		X		X
City of Orr	X		X		X
City of Proctor	X		X		
City of Rice Lake	X	X	X	X	
City of Tower	X	X	X		

Jurisdiction	Local Mitigation Survey, (Appendix K)	Planning Team Mtg. #1 (Appendix E)	Local Mitigation Action Chart Review (Section 5.3.2)	Planning Team Mtg. #2 (Appendix E)	Draft MHMP Review (Appendix F)
City of Virginia	X	X	X	X	X
City of Winton	X		X		

Section 3 – St. Louis County Profile

This section offers a general overview of St. Louis County to provide a basic understanding of the characteristics of the community, such as the physical environment, population, and the location and distribution of services.

3.1 General County Description

St. Louis County is located in northeastern Minnesota. The county shares its boundary on the north with Canada, on the west side with Koochiching County, Itasca County and Aitkin County, on the east side with Lake County, and on the south side with Carlton County and Lake Superior.

Part of the Fond du Lac Indian Reservation is located in St. Louis County, southwest of the St. Louis River in the Brookston, Stony Brook and Arrowhead area. Part of the Bois Forte Indian Reservation is also located in the county: the Nett Lake Village on Nett Lake, the Indian Point neighborhood on Pelican Lake near Orr, and the Vermilion Reservation on Lake Vermilion near Tower.

St. Louis County covers 6,859 square miles, making it the largest county east of the Mississippi River. The county's estimated population in 2010 was 200,226. There are 24 cities, 73 townships and 12 unorganized territories within the county. The three primary population centers in the county are the Duluth area, the Iron Range and Northern Lakes.

The largest employment sectors in St. Louis County are education and health services, comprising approximately 34% of jobs in the county workforce. The percent of the county's population living below the poverty level was 15.4%, compared to a 10.5% average for the state of Minnesota.

3.2 Environmental Characteristics

St. Louis County is known for its natural beauty, including the Superior National Forest, Voyageurs National Park, the Boundary Waters Canoe Area, five state parks and 1,040 lakes.

The lowest elevation point in Minnesota is in Duluth by Lake Superior. It is at 602 feet above sea level, with the terrain rising steeply from there to an altitude of 1,428 feet above sea level at the Duluth International Airport.

The highest elevation point in St. Louis County is Pike Mountain on the Laurentian Divide northeast of Virginia, at 1,950 feet above sea level.

3.3 Geology

St. Louis County contains the majority of Minnesota's iron mines, which produce 85% of the country's domestic iron (St. Louis County, 2019).

3.4 Hydrography

Surface water is one of the county's primary assets. According to the county's Comprehensive Water Management Plan, approximately 22.6% of the county is covered by wetlands (bog/marsh/fen) and

another 8.7% is covered by lakes, streams and rivers. The city of Duluth has 42 named streams, 16 of which are designated trout streams. Several lakes in the county are among the most popular for fishing in the Midwest. In addition, the county borders Lake Superior, the largest freshwater lake in world by surface area. The plan notes that it is critical to protect these resources so as to maintain the recreation, aesthetic, ecological and economic value they hold for citizens of St. Louis County.

Three of the state's drainage basins are located in St. Louis County, including:

- **Upper Mississippi Basin** (water flows west and southward) which is located in the southwest corner of the county around Prairie Lake and the Hibbing area near the Itasca County line;
- **Lake Superior Basin** (water flows east and southward) which includes the Mesabi Iron Range on the northern portion of the basin and the Duluth area;
- **Rainy River Basin** (water flows north and westward) which includes the cities of Orr, Cook, Tower and Ely, Boundary Waters Canoe Area and Voyageurs National Park.

Each of the basins are divided into major watersheds. These watersheds include: Mississippi-Grand Rapids, St. Louis, Lake Superior South, Cloquet, Little Fork, Vermilion River, Rainy Lake and Rainy River Headwaters.

Impaired waters are an increasing problem as St. Louis County currently has various water bodies that are on the Minnesota Pollution Control Agency Impaired Waters list, including Lake Superior, Island Lake, Boulder Lake, East Vermilion Lake, Trout Lake, Lac la Croix, Namakan Lake, Kabetogama Lake, Pelican Lake, St. Louis River, Whiteface River and Little Fork River, among others (Minnesota Pollution Control Agency, 2019). Impaired waters have become a priority issue because they do not meet state water quality standards, they affect growth and health of communities and economies, and the Clean Water Act has a mandate requiring every state to address impairments. Impairments found in St. Louis County waters include E. coli, mercury in fish tissue, PCB in fish tissue, mercury in water column and turbidity.

Basic hydrography in St. Louis County is mapped in Figure A - 1 in Appendix A.

3.4.1 *Groundwater*

The groundwater resources of St. Louis County are dominated by the extensive areas in which the underlying bedrock is exposed or is less than 30 feet from the surface soils. Fully three-fourths of the county has bedrock within 30 feet of the surface. This means that groundwater is being extracted from either shallow surficial-drift aquifers or from fractures within the crystalline bedrock aquifer. The one exception is the sedimentary sandstone aquifer band beginning near Buhl and running southwest along the southern edge of the Iron Range.

Notes on St. Louis County's bedrock aquifers include:

- Much of the county is underlain by a Precambrian undifferentiated aquifer consisting of igneous and metamorphic rocks. Well depths range from 30 to 450 feet deep. The common yield is 5-25 gallons per minute (gpm) but may exceed 100 gpm. The water is usually "hard".

- Along the North Shore lies the North Shore Volcanic aquifer. Water comes from interflow sediments and joints and fractures in the basalt. Wells are typically 20-930 feet deep. Yields are low, at 5-25 gpm with some wells exceeding 100 gpm. Some areas will contain noticeable levels of salt.
- A thin band of the Biwabik Iron-Formation aquifer stretches from just east and north of Babbitt across the entire range past the county line near Nashwauk. The aquifer is generally confined but some local areas are unconfined. Common well depths fall in the 170-600 foot range. This is the most productive source of groundwater on the Iron Range with typical yields ranging 250-750 gpm, and some exceeding 1,000 gpm. Localities will evidence hard water and large iron concentrations.
- The Mesabi, and to a lesser extent, the Vermilion Iron Range, have extensive areas of mine pit lakes which formed after mining and associated pumping activity ceased. These pit lakes are primarily ground water and are the source of drinking water for several cities. There are also numerous mine tailing basins and overburden piles throughout the range.
- The lone sedimentary bedrock lies along the southern edge of the range running from Buhl in an increasingly wider band to the western county line. Although some test holes in the Hibbing area have penetrated the Cretaceous and some bedrock wells may be open to the base of the Cretaceous, no water wells on record use the Cretaceous as a sole aquifer.
- The southwestern quarter of the county has a generally deeper depth to bedrock and is underlain by the Proterozoic aquifer. Wells range from 30-500 feet deep and yield 5-70 gpm; some will exceed 250 gpm. Quality is generally good with small levels of dissolved solids. It is commonly used in conjunction with the underlying Biwabik Iron Formation aquifer for public and industrial supplies.

Surficial-drift aquifers are exposed at the land surface while buried drift aquifers are located beneath a confining layer. Overall, one-third of Minnesota is covered by surficial-drift aquifers. Notes on both types in St. Louis County include:

- Surficial drift aquifers generally consist of sand and gravel deposits located at or near the land surface. Generally, they are unconfined aquifers. Well depths will range from 30-240 feet. Common yields will be from 100-800 gpm with some wells exceeding 2,000 gpm. Water quality is generally good but can be contaminated by nearby sources such as septic systems, feedlots and chemical activities.
- Surficial-drift aquifers are limited in St. Louis County with the most productive areas being two small outwash plains south of Hibbing and near Keewatin. Larger, but less productive, areas are found in a southwest-northeast band north of Duluth and in a series of bands north of the Iron Range.
- A low to moderate yielding buried drift aquifer is situated in a broad band across the Iron Range running from Aurora to the western county line. Commonly, well depths in this type of aquifer will range from 80-380 feet. Yields will vary from 100-600 gpm with some wells exceeding 1,500 gpm. Usually the water will be hard with large iron, sulfate and chloride concentrations being possible in some areas. Numerous mine pit lakes and tailings basins are in this area.

- Most of St. Louis County is covered with a thin to moderately deep layer of glacial till. The southwestern and far northwestern sections possess clay and silt lake deposits. All these areas generally have poor sustained yield ratings.

Groundwater sensitivity to pollution is measured by flow rate and soil permeability. For near surface materials, areas with a high sensitivity to pollution are areas where it takes hours to a week for a contaminant to reach the aquifer; areas with very low sensitivity to pollution are areas where it takes months to years for a contaminant to reach the aquifer. For the bedrock aquifers, areas with a high sensitivity to pollution are areas where it takes hours to months for a contaminant to reach the aquifer; areas with very low sensitivity to pollution are areas where it takes a century or more for a contaminant to reach the aquifer. The buried sand and gravel aquifer is relatively shallow and has many areas of moderate to high pollution sensitivity.

Figure A - 28 in Appendix A maps pollution sensitivity of near-surface materials from the transmission time of water through three feet of soil and seven feet of surficial geology, to a depth of 10 feet from the land surface.

3.4.2 Lakes

There are over one thousand lakes in St. Louis County. The coast of Lake Superior creates part of the county's southern border, and the lake is the largest freshwater lake in the world by surface area. The freshwater port in Duluth is an important economic hub for the region.

Rainy Lake forms part of the boundary with Canada on St. Louis County's northern edge. It covers a total of 210,200 acres. Its primary outflow is the Rainy River, while its primary inflows are Namakan Lake, Kabetogama Lake and the Seine River.

Lake Vermilion is a major lake in the county, covering 39,271 acres. It is the seventh largest lake in Minnesota, stretching 37 miles end-to-end. Portions of its northern shore and some of its islands are part of the Superior National Forest, while on the northern shore there is also an entry point into the Boundary Waters Canoe Area Wilderness (MN DNR, n.d.).

3.4.3 Rivers

The major rivers in the county include the St. Louis River, Cloquet River, Vermilion River and Little Fork River.

The St. Louis River begins near Hoyt Lakes before flowing through the Superior National Forest and eventually reaching Lake Superior. The river's watershed covers 3,650 square miles. Whitewater rafting is possible in the lower portion of the river (MN DNR, n.d.).

The Cloquet River flows from Katherine Lake in the central region of Lake County to its confluence with the St. Louis River. The uppermost 32 miles are not regarded as canoeable since there is rarely enough flow for paddling (MN DNR, n.d.). The river is 104 miles in length.

The Vermilion River flows between Crane Lake and Lake Vermilion. The Little Fork River flows north into the Rainy River.

3.4.4 Dam & Levee Inventory

Dams and levees are artificial barriers that have the ability to impound water, wastewater, or any liquid material for the purpose of storage or control and are an important part of St. Louis County's infrastructure. Dams maintain lake levels and impound water for flood control, power production and water supply. A complete listing of dams in the county is provided in Table 4.

Levees are used to increase cultivation in agriculture and to protect population and structures from floods. However, there are no levees in St. Louis County.

Table 4. Dams in St. Louis County

Name	Owner	Waterway	Primary Type	NID Height (ft)	Primary Purpose
Boulder Lake	MN Power and Light	Boulder Creek	Concrete, Multi-Arch, Earth	20	Hydroelectric, Recreation
Burntside Lake	MNDNR	Burntside River	Unknown	Unknown	Unknown
Bear Island	USFS	Bear Island River	Unknown	Unknown	Unknown
Buhl Detention	MNDNR-Wildlife	McQuade Creek	Earth	15	Fish and Wildlife Pond
Canosia WMA	MNDNR-Wildlife	Cloquet River-TR	Earth	14	Other
Canosia WMA 6	MNDNR-Wildlife	Cloquet River-TR	Earth	7	Other
Canosia WMA 78	MNDNR-Wildlife	Cloquet River-TR	Earth	8	Other
Chez Pond	Dudderar, Frederick A Jr	Talmadge River-TR	Earth	26	Fish and Wildlife Pond
Daniels Pond	Daniels, Russel	Vermilion River-TR	Earth	12	Other
Donna Lake	County of St. Louis and MNDNR-Fisheries	Spring Creek	Earth	10	Fish and Wildlife Pond
Douglas Tailings	County of St. Louis (partial ownership)	Dempsey Creek-TR	Earth	40	Tailings
Elephant Creek	USDA FS	Elephant Creek	Concrete, Gravity	7	Fish and Wildlife Pond, Recreation
Ely Lake	MNDNR	Ely Creek	Gravity	8	Recreation
Erie Basin 1	Cliffs Natural Resources to sell to Polymet Mining Company	Embarrass River-TR	Earth	200	Tailings
Erie Basin 2	Cliffs Natural Resources to sell to Polymet Mining Company	Embarrass River-TR	Earth	250	Tailings
Erie Pier Dike	Duluth Port Authority	Lake Superior	Earth	11	Other
Esquagama Lake	MNDNR	Embarrass River	Gravity	12	Other

Name	Owner	Waterway	Primary Type	NID Height (ft)	Primary Purpose
Eveleth Taconite Tailings	United Taconite - Cliffs	St. Louis River-TR	Earth	50	Tailings
Fish Lake	MN Power and Light	Beaver River	Concrete, Gravity, Earth	25	Hydroelectric, Recreation
Floodwood Lake	MNDNR	Floodwood River	Gravity	8	Other
Fond du Lac	MN Power and Light	St. Louis River	Gravity, Earth, Arch	80	Hydroelectric
French River Headwaters	MNDNR-Fisheries	French River	Earth	18	Fish and Wildlife Pond
Hartley Pond	City of Duluth	Tischer Creek	Gravity, Earth	14.5	Flood Control
Hibbing Taconite Starter No. 1	Hibbing Taconite Company	Day Brook	Earth	100	Tailings
Hibbing Taconite Starter No. 2	Hibbing Taconite Company	Day Brook	Earth	100	Tailings
Hibbing Taconite Starter No. 3	Hibbing Taconite Company	Shannon River-TR	Earth	100	Tailings
Hibbing Taconite Starter No. 4	Hibbing Taconite Company	Shannon River	Earth	100	Tailings
Inland Steel Tailings	ArcelorMittal Minorca Mine	Wouri Creek-OS	Earth	44	Tailings
Island Lake	MN Power and Light	Cloquet River	Concrete, Gravity, Earth	57	Hydroelectric, Recreation
Kettle Falls	Boise Cascade Corp	Rainy River	Buttress	26	Recreation
Hibbing Taconite Stockpile	Unknown	Unknown	Unknown	Unknown	Unknown
Laskin Energy	MN Power and Light	Partridge River - Offstr	Earth	19	Other
Little Stone Lake	County of St. Louis	Pine Creek-TR	Earth	20	Recreation
Minntac Tailings	US Steel	Closed System-OS	Earth	50	Tailings
Minorca Pit South	ArcelorMittal Minorca Mine	Silver Lake Outlet	Earth	30	Tailings
NSPC Initial Tailings	US Steel	Swan River-OS	Earth	45	Tailings
NSPC Stage 2 Tailings	US Steel	Hay Creek-OS	Earth	30	Tailings
Pelican Lake	County of St. Louis - Hwy	Pelican River	Gravity	10	Other
Pike River	MNDNR-Fisheries	Pike River	Gravity	30	Recreation

Name	Owner	Waterway	Primary Type	NID Height (ft)	Primary Purpose
Pioneer Clarification	City of Ely	Lonsdorf Creek	Earth	25	Tailings
Pioneer Tailings	City of Ely	Lonsdorf Creek	Earth	25	Tailings
Plant Site Settling	ArcelorMittal Minorca Mine	Sand River-OS	Earth	15	Tailings
Poly Met HRF Dam	Poly Met Mining	<i>Unknown</i>	Earth	111	Tailings
Polymet-LTV	Cliffs Natural Resources to sell to Polymet Mining Company	Embarrass River-TR	Earth	69	Tailings
Rice Lake	MN Power and Light	Beaver River	Concrete, Gravity, Earth	11	Hydroelectric, Recreation
Lake Vermilion	MNDNR-Fisheries	Vermilion River	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>
Prairie Lake	MNDNR	Prairie River	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>
Sauntry Creek Settling	ArcelorMittal Minorca Mine	Sauntry Creek	Earth	32	Tailings
Schweiger Pond	Schweiger, Burt	Cloquet River-TR	Earth	14	Fish and Wildlife Pond
Sherman Group Tailings	RGGS	Dempsey Creek-OS	Earth	48	Tailings
Sherman Mine Wastewater	US Steel	Dempsey Creek-TR	Earth	20	Tailings
Smith Lake	MNDNR	Little Cloquet River	Gravity	9	Recreation
Wabigone Tailings	Hanna Mining Company Age	Dempsey Creek-TR	Earth	10	Tailings
St. Louis River	Oglebay Norton Co	St. Louis River	Other, Gravity	28	Water Supply
Sturgeon Lake	MNDNR	Sturgeon River	Gravity	8	Recreation
Upland Cell II Interior	ArcelorMittal	Wouri Creek-OS	Earth	60	Tailings
West Two Rivers	US Steel	West Two River	Earth	40	Water Supply
Western Hibtac	Hibbing Taconite Company	Rock Lake Creek	Earth	100	Tailings
Whiteface Lake	MN Power and Light	Whiteface River	Concrete, Earth	39	Hydroelectric, Recreation
Whitewater Reservoir	Minnesota Power	St. Louis River-TR	Earth	40	Water Supply
Whitewater Reservoir Saddle Dam	Minnesota Power	St. Louis River	Earth	36	Water Supply
Whitney Clearwater	Hanna Mining Company Age	Closed System - Offstream	Earth	25	Tailings
Whitney Tailings	Hanna Mining Company Age	Closed System - Offstream	Earth	37	Tailings

Name	Owner	Waterway	Primary Type	NID Height (ft)	Primary Purpose
Wolf Lake	MNDNR	Wolf Creek	Gravity	16	Recreation
Wynne Lake	MNDNR	Embarrass River	Gravity	15	Other
Whiteface Lake Section 2	MN Power and Light	Whiteface River	Unknown	Unknown	Unknown
Whiteface Lake Section 3	MN Power and Light	Whiteface River-TR	Unknown	Unknown	Unknown

3.4.5 Wetlands

St. Louis County is estimated to have 31% of its total area (1,109,903 acres) in wetlands (Figure A - 1). The most common wetland type in the county is bog, with an estimated 822,817 acres, followed by shrub swamp, with an estimated 274,204 acres.

The Minnesota Board of Water and Soil Resources recognize that St. Louis County has more than 80% of its original pre-settlement wetlands.

Important benefits of wetlands include storage area for excess water during flooding; filtering of sediments and nutrients before they enter lakes, rivers and streams; and fish and wildlife habitat.

The towns with the highest percentage of wetlands are located in the area west of Highway 53 and south of the area from Hibbing to Fayal, and this is the area of highest concentration of bogs and shrub swamps.

Invasive plants have spread throughout many wetlands in Minnesota. These plants can take over entire native communities and threaten wetland ecosystems. Eurasian watermilfoil, spiny waterfleas, white perch and zebra mussels have been documented in St. Louis County (MN DNR, 2019).

3.5 Climate

The climate of St. Louis County is classified as a continental climate regime, characterized by wide variations in temperature. The climate of the county, especially along the North Shore, is greatly influenced by Lake Superior. The presence of the lake results in cooler summer temperatures and warmer winter temperatures. The lake also affects winter precipitation as heavy lake-effect snowfall generally occurs five to seven miles inland from Lake Superior.

January is the coldest month on average in St. Louis County, with an average monthly minimum temperature of 3°F (based on data from 1895-2018). The coldest month on record for the county was January 1912, with a month-long average minimum temperature of -14°F (MN DNR, n.d.). The record cold temperature for all of Minnesota was -60°F, set in Tower on February 3, 1996.

July is the hottest month on average in St. Louis County, with an average monthly maximum temperature of 65°F (based on data from 1895-2018). The hottest month on record for the county was July 1916, with a month-long average maximum temperature of 71°F (MN DNR, n.d.).

3.5.1 Climate Change

Minnesota's climate is currently changing in ways that are pushing us to adapt to weather patterns and extreme events that pose major threats to our health, homes, environment and livelihoods. These events cost our state millions in property loss, damaged infrastructure, disrupted business, medical care and support services, and put residents and responders at risk. Understanding how our weather is changing now and into the future will help planners and decision-makers in emergency management and supporting fields extend our progress in climate adaptation and lead to more resilient communities (MDH, 2018).

The National Climate Assessment suggests that infrastructure planning (particularly water resources infrastructure) should "be improved by incorporating climate change as a factor in new design standards and asset management and rehabilitation of critical and aging facilities, emphasizing flexibility, redundancy, and resiliency" (Georgakakos, et al., 2014).

Federal, state, and tribal governments are increasingly integrating climate change adaptation into existing decision-making, planning, or infrastructure-improvement processes (Georgakakos, et al., 2014). Definite predictions are difficult to make, as changes may vary depending on geographical location, even within Minnesota. Intense study of these topics is ongoing.

In August 2018, the Minnesota Department of Health Climate & Health Program published "Planning for Climate & Health Impacts in Northeast Minnesota: Emergency Management Considerations for HSEM Region 2." This report is one of a series of custom climate profile reports produced for each of the six HSEM regions in the state for reference to climate change projection data, impacts, and considerations for emergency management and preparedness professionals in this HSEM region.

Climate Data Trends

Over 50 years of storm data on record document that Minnesota has experienced an increase in the number and strength of weather-related natural disasters, particularly those related to rising temperatures and heavy downpours.

According to the 2015 Minnesota Weather Almanac,

During the three most recent decades, the Minnesota climate has shown some very significant trends, all of which have had many observable impacts...Among the detectable measured quantity changes are: (1) warmer temperatures, especially daily minimum temperatures, more weighted to winter than any other season; (2) increased frequency of high dew points, especially notable in mid- to late summer as they push the Heat Index values beyond 100°F; and (3) greater annual precipitation, with a profound increase in the contribution from intense thunderstorms (Seeley M. , 2015).

Temperature and precipitation projections below are taken from the Minnesota Department of Health Region 2 profile. Appendix L provides the full MDH profile for Region 2, which includes St. Louis County. The information in this report was used to help inform the updated risk assessments in Section 4 – Risk Assessment of this plan for natural hazards and their relationship to climate change.

Temperature

The continued rise in winter temperatures will result in less snow pack, which will increase chances for grassland/wildfires as well as drought. The warmer winter temperatures will also have major consequences for our ecosystems, including native and invasive species, whose growth, migration, and reproduction are tied to climate cues. The increase in Lyme disease across Minnesota is also likely influenced in part by the loss of our historical winters, due to a longer life-cycle period for ticks. Freeze-thaw cycles are likely to increase as well, damaging roads, power lines and infrastructure, and causing hazardous travel conditions. By mid-century our average summer highs will also see a substantial rise, coupled with an increase in more severe, prolonged heat waves that can contribute to drought and wildfires and pose a serious health threat, particularly to children and seniors (MDH, 2018).

Precipitation

There has been an increase in total average as well as heavy precipitation events, with longer periods of intervening dry spells. Our historical rainfall patterns have changed substantially, giving rise to larger, more frequent heavy downpours. Minnesota's high-density rain gauge network has captured a nearly four-fold increase in "mega-rain" events just since the year 2000, compared to the previous three decades. Extreme rainfall events increase the probability of disaster-level flooding. However, there is also an increased probability that by mid-century heavy downpours will be separated in time by longer dry spells, particularly during the late growing season. Over the past century, the Midwest hasn't experienced a significant change in drought duration. However, the average number of days without precipitation is projected to increase in the future, leading Minnesota climate experts to state with moderate-to-high confidence that drought severity, coverage, and duration are likely to increase in the state. Modeling future precipitation amounts and patterns is less straight-forward compared to temperature. Some climate models do a better job than others representing rainfall for the Midwest, and available data sources only provide average estimates on a monthly scale, masking the spikes in extremes that trigger flood and drought disasters (MDH, 2018).

3.6 Demographics

Duluth is the largest city in St. Louis County (pop. 86,265) and the designated county seat. There are 24 cities, 73 townships and 12 unorganized territories within the county.

Table 5 summarizes the population by community according to the 2010 U.S. Census. Figure 1 shows St. Louis County population density by census block.

Table 5. St. Louis County Population by Community, 2010

Community	2010 Population	% of County
Babbitt	1,475	0.74
Biwabik	969	0.48
Brookston	141	0.07
Buhl	1,000	0.50

Community	2010 Population	% of County
Chisholm	4,976	2.49
Cook	574	0.29
Duluth	86,265	43.08
Ely	3,460	1.73
Eveleth	3,718	1.86
Floodwood	528	0.26
Gilbert	1,799	0.90
Hermantown	9,414	4.70
Hibbing	16,361	8.17
Hoyt Lakes	2,017	1.01
Iron Junction	86	0.04
Leonidas	52	0.03
McKinley	128	0.06
Meadowlands	134	0.07
Mountain Iron	2,869	1.43
Orr	267	0.13
Proctor	3,057	1.53
Tower	500	0.25
Virginia	8,712	4.35
Winton	172	0.09
Alango Township	258	0.13
Alborn Township	460	0.23
Alden Township	213	0.11
Angora Township	249	0.12
Arrowhead Township	223	0.11
Ault Township	109	0.05
Balkan Township	832	0.42
Bassett Township	41	0.02
Beatty Township	372	0.19
Birch Lake UT	505	0.25
Biwabik Township	804	0.40
Breitung Township	605	0.30
Brevator Township	1,269	0.63
Camp 5 Township	35	0.02
Canosia Township	2,158	1.08
Cedar Valley Township	195	0.10
Cherry Township	860	0.43
Clinton Township	1,015	0.51
Colvin Township	317	0.16

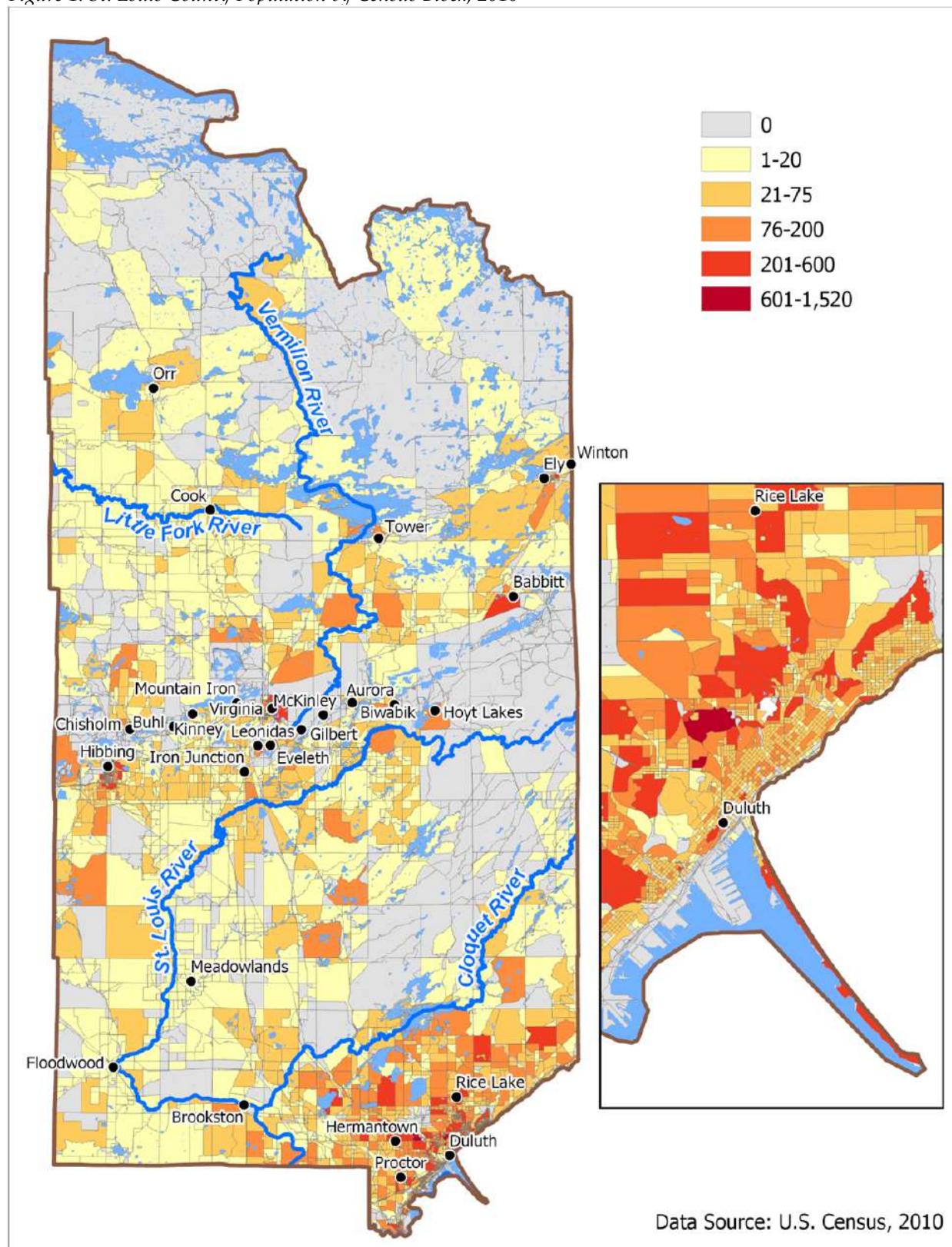
Community	2010 Population	% of County
Cotton Township	445	0.22
Crane Lake Township	82	0.04
Culver Township	294	0.15
Duluth Township	1,941	0.97
Eagles Nest Township	242	0.12
Ellsburg Township	219	0.11
Elmer Township	151	0.08
Embarrass	607	0.30
Fairbanks Township	63	0.03
Fayal Township	1,809	0.90
Field Township	391	0.20
Fine Lakes Township	134	0.07
Floodwood Township	280	0.14
Fredenberg Township	1,337	0.67
French Township	567	0.28
Gheen UT	18	0.01
Gnesen Township	1,683	0.84
Grand Lake Township	2,779	1.39
Great Scott Township	561	0.28
Greenwood Township	939	0.47
Halden Township	129	0.06
Hay Lake UT	83	0.04
Industrial Township	800	0.40
Janette Lake UT	295	0.15
Kabetogama Township	135	0.07
Kelsey Township	140	0.07
Kugler Township	175	0.09
Lakewood Township	2,190	1.09
Lavell Township	303	0.15
Leiding Township	400	0.20
Linden Grove Township	145	0.07
McCormack UT	209	0.10
McDavitt Township	459	0.23
Makinen UT	1,310	0.65
Meadowlands Township	304	0.15
Midway Township	1,399	0.70
Morcom Township	94	0.05
Morse Township	1,213	0.61

Community	2010 Population	% of County
Ness Township	62	0.03
Nett Lake UT	319	0.16
New Independence Township	299	0.15
Normanna Township	796	0.40
Northeast St. Louis UT	248	0.12
Northland Township	169	0.08
North Star Township	190	0.09
Northwest St. Louis UT	301	0.15
Owens Township	263	0.13
Pequaywan Township	130	0.06
Pike Township	417	0.21
Portage Township	170	0.08
Potshot Lake UT	74	0.04
Prairie Lake Township	50	0.02
Rice Lake Township*	4,095	2.05
Sand Lake UT	1,066	0.53
Sandy Township	356	0.18
Solway Township	1,944	0.97
Stoney Brook Township	332	0.17
Sturgeon Township	140	0.07
Toivola Township	170	0.08
Van Buren Township	189	0.09
Vermilion Lake Township	278	0.14
Waasa Township	249	0.12
White Township	3,229	1.61
Whiteface Reservoir UT	473	0.24
Willow Valley Township	126	0.06
Wuori Township	572	0.29
Total	200,226	

Source: U.S. Census Bureau, 2010

* Rice Lake was founded as a township in 1870, but became a city in October of 2015.

Figure 1. St. Louis County Population by Census Block, 2010

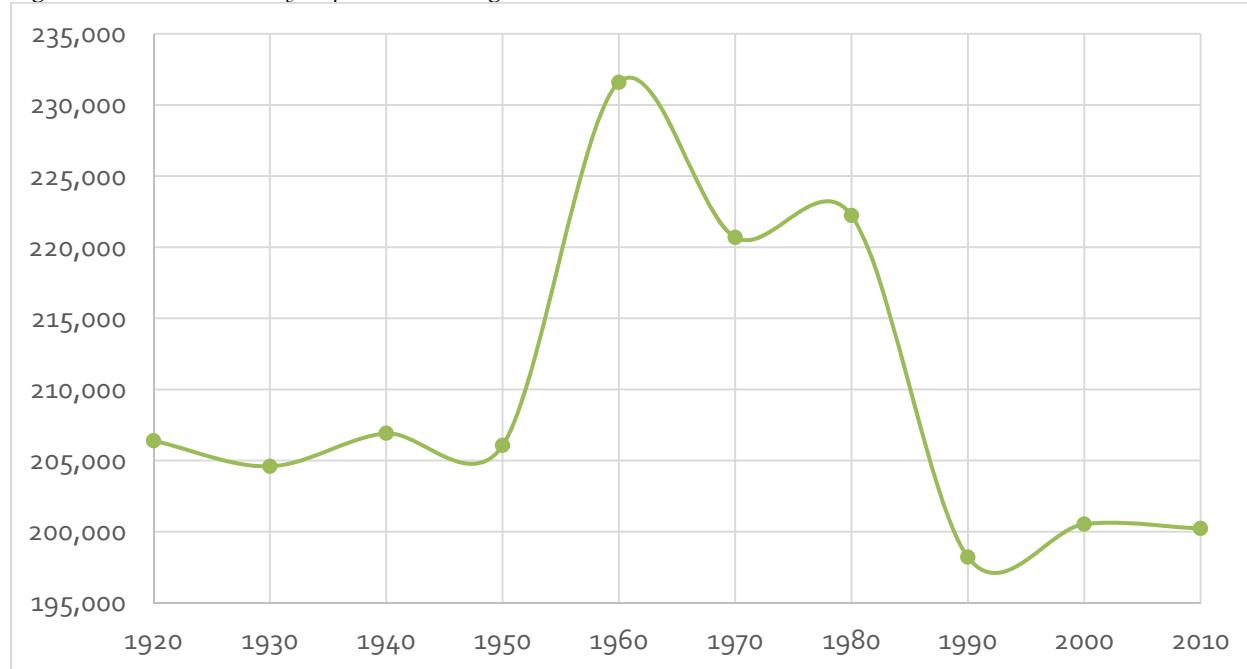


Population growth trends have an important influence on the needs and demands of a variety of services such as transportation, law enforcement and emergency response. An understanding of population trends and location of population concentrations is important for making projections regarding potential impacts in the event of a disaster.

In 2010, St. Louis County had a population of 200,226 residents, averaging 32 persons per square mile of land area. Duluth, the largest city in the county and the county seat, had a population of 86,265.

St. Louis County's population has fluctuated during the past century, reaching a high of 231,588 people in 1960, before decreasing to 198,213 people in 1990 (Figure 2).

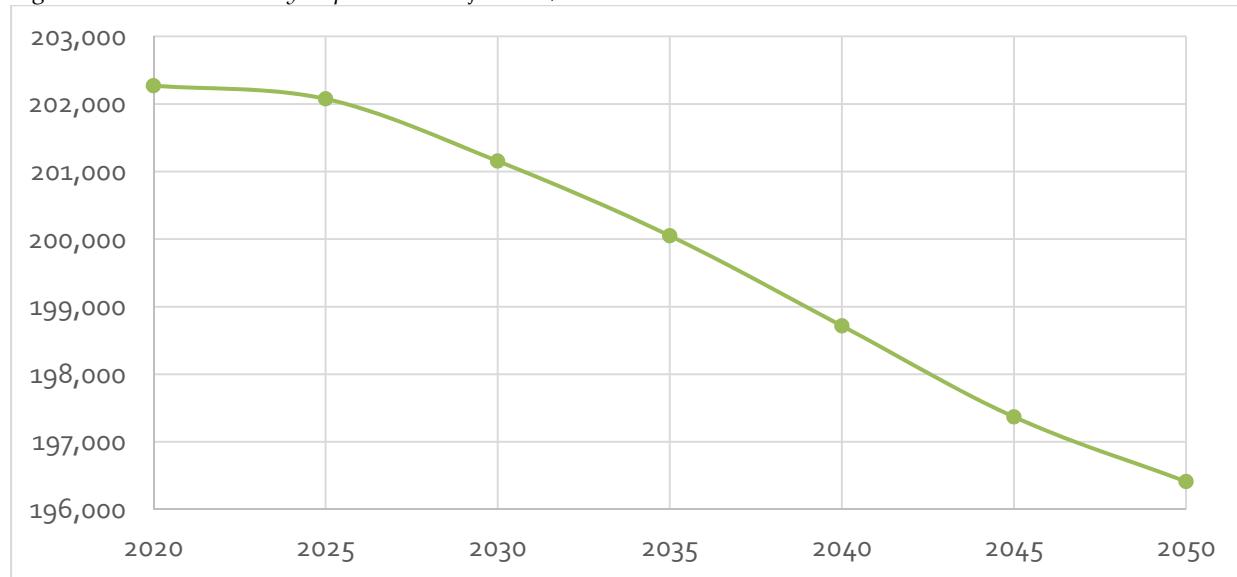
Figure 2. St. Louis County Population Change, 1920-2010



Source: U.S. Census Bureau

St. Louis County's population is projected to slowly decrease, reaching a low of 196,412 in 2050 (Figure 3).

Figure 3. St. Louis County Population Projections, 2020-2050



Source: Minnesota State Demographic Center, Minnesota Planning, March 2017 release

3.6.1 Population Vulnerability

The degree to which a person is vulnerable to the impacts of a hazard depends on how well they are able to react before, during, and after a hazardous event. The Centers for Disease Control and Prevention (CDC) Agency for Toxic Substances & Disease Registry (ATSDR) defines social vulnerability as "...the resilience of communities when confronted by external stresses on human health, stresses such as natural or human-caused disasters, or disease outbreaks" (2018). These stressors now increasingly include the more extreme weather events and longer-term impacts of Minnesota's changing climate.

Reducing social vulnerability can decrease both human suffering and economic loss. The ATSDR Social Vulnerability Index (SVI) uses U.S. Census variables at the tract-level to help local officials identify communities that may need support in preparing for hazards or recovering from disaster. Certain social conditions, such as high poverty, low percentage of vehicle access, or crowded households can increase a community's social vulnerability (ATSDR, 2018).

The ATSDR SVI ranks census tracts on 15 social factors which are grouped into four themes (Table 6).

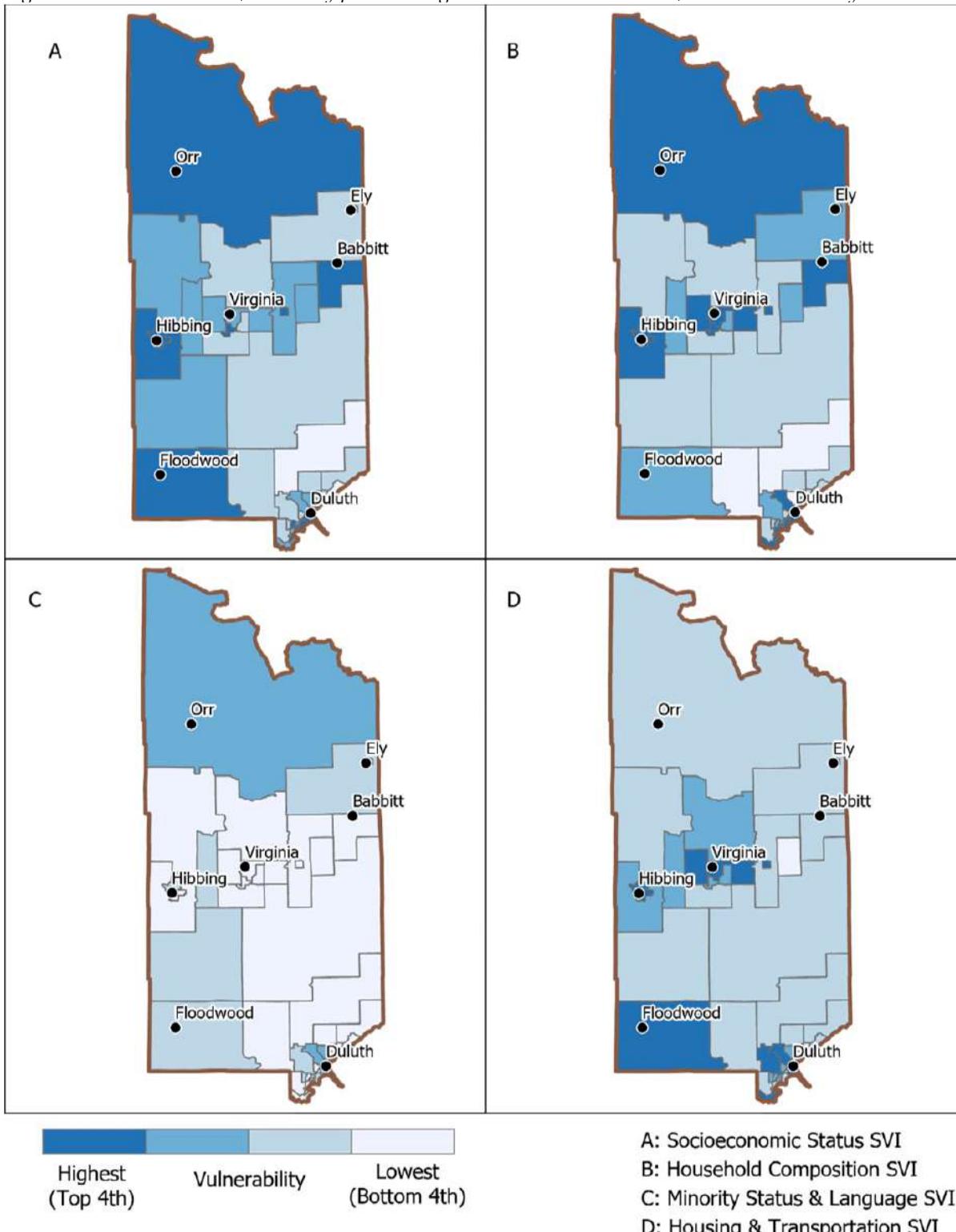
Table 6. Social Vulnerability Index (SVI) Variables

Theme	Social Factors
Socioeconomic Status	<ul style="list-style-type: none"> • Proportion individuals below poverty level • Proportion civilians unemployed 16+ yrs • Per capita income in 1999 • Proportion persons with no high school diploma 25+ yrs
Household Composition & Disability	<ul style="list-style-type: none"> • Proportion persons 65 years or older • Proportion persons 17 years or younger • Proportion persons with disability 5+ yrs • Proportion single-parent HH with children under 18 yrs
Minority Status & Language	<ul style="list-style-type: none"> • Proportion minority • Proportion persons 5+ yrs who speak English less than 'well'
Housing & Transportation	<ul style="list-style-type: none"> • Proportion housing with 10+ units • Proportion mobile home • Proportion HH with more people than rooms • Proportion HH with no vehicle access • Proportion of persons who are in institutional & non-institutional group quarters

Source: (CDC, 2019)

Census tracts within Minnesota were ranked and given a percentile value from 0 to 1, with higher values indicating greater vulnerability. Theme-specific percentile rankings were generated by summing the percentiles of the variables comprising each theme and ordering the summed percentiles for each theme. For more information about the SVI methodology, visit <https://svi.cdc.gov/>. A map of each SVI theme for Saint Louis County is displayed in Figure 4.

Figure 4. 2016 SVI Themes, ranked by percentile against all MN census tracts, Saint Louis County



Source: CDC ATSDR 2016 SVI

- A: Socioeconomic Status SVI
- B: Household Composition SVI
- C: Minority Status & Language SVI
- D: Housing & Transportation SVI

3.7 Economy

St. Louis County is dominated by the education/health service industries. Trade/transportation/utilities and leisure/hospitality are also major components of the county's economy.

The number of jobs in the county rose by only 1% between 2008 and 2018. Table 7 provides an overview of the annual average employment by major industry sector in St. Louis County.

Table 7. Annual Average Employment by Major Industry Sector, St. Louis County

Industry	Number of Jobs (2008)	Number of Jobs (2018)
Natural Resources and Mining	3,184	3,565
Construction	3,900	4,462
Manufacturing	5,521	4,812
Trade, Transportation, Utilities	18,051	17,793
Information	NA	1,053
Financial Activities	4,543	4,335
Professional /Business Services	7,559	6,503
Education and Health Services	32,075	33,914
Leisure and Hospitality	11,341	12,164
Public Administration	5,668	6,067
Other Services	3,228	3,767
Total Number of Jobs:	97,117	98,437

Source: Minnesota Dept. of Employment and Economic Development. Note: data discrepancies between segment values and totals exist due to data suppression for confidentiality.

According to the 2013-2017 American Community Survey five-year estimates, the median household income in St. Louis County was \$50,936, compared to a Minnesota average of \$65,699. The median household income in St. Louis County increased by 13% since the 2006-2010 estimates. The percent of the county's population living below the poverty level was 15.4%, compared to a 10.5% average for the state of Minnesota.

3.8 Critical Infrastructures

Critical infrastructures are among the most important assets of a community. While the purpose of these infrastructures differ in nature, their continued operations are integral to the health, safety, economic and cultural well-being of the residents of St. Louis County.

Critical infrastructures have been identified based on FEMA guidelines (FEMA, 2013) as well as input from St. Louis County. Critical infrastructures have been classified into the following groups: emergency and shelter facilities; infrastructure systems; high potential loss structures; and significant county assets. For the complete list of critical infrastructures in St. Louis County, see Appendix B.

3.8.1 Emergency & Shelter Facilities

Emergency and shelter facilities are vital to the health and welfare of entire populations, providing services and functions essential to communities, especially during and after a disaster (FEMA).

Emergency and shelter facilities include: healthcare facilities, emergency services, evacuation centers/shelters, and schools (which are often used as evacuation centers/shelters).

Figure A - 3 displays the locations of the emergency and shelter facilities within St. Louis County.

Healthcare Facilities

Healthcare facilities are located throughout the county, including a boarding care home, dialysis centers, hospice centers, hospitals, nursing homes and supervised living facilities. Hospitals are located in Duluth, Ely, Cook, Hibbing, Virginia and Aurora.

Emergency Services

Law Enforcement: The Babbitt, Chisholm, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Proctor, and Virginia Police Departments are administered at the city level. The City of Biwabik contracts with the Gilbert Police Department for services.

The St. Louis County Sheriff's Office is responsible for all law enforcement activity in the unincorporated areas of St. Louis County and some cities contract with the county for law enforcement services. Offices are kept in Duluth, Buhl, Cook, Virginia, and Mountain Iron. State Patrol Offices are in Duluth and Virginia. The Bois Forte Reservation law enforcement is administered at the reservation level in Orr.

Duluth hosts a U.S. Marshals Service and U.S. Customs and Border Protection Services. National Park Services are stationed in Crane Lake and Kabetogama.

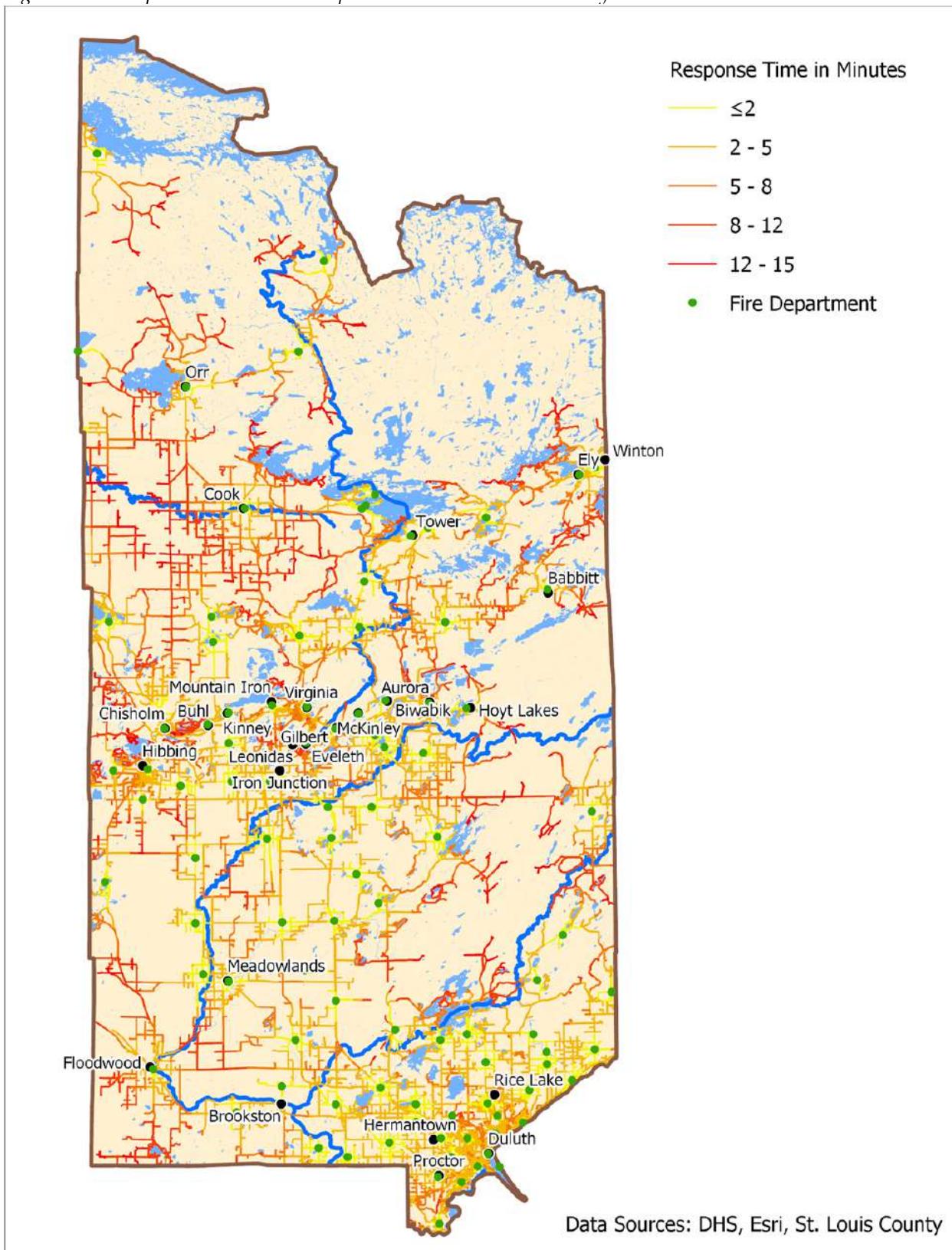
There are 10 emergency operations centers (EOCs) throughout the county. All are located in cities with populations greater than 1,000 residents.

Fire & Rescue Services: There are 87 fire departments located throughout St. Louis County.

The St. Louis County Rescue Squad responds to calls involving wilderness search and rescue; boat and water safety; first aid; and public safety. Squad members are trained in specialized skills above and beyond the basic skills of first aid, cross country navigation, wilderness survival, emergency driving, and small boat handling. Since the Rescue Squad was founded in 1958, the total call load has been approximately 40% wilderness-related, 25% public safety-related, and 35% split between water and miscellaneous calls (St. Louis County, n.d.).

Figure 5 shows fire departments and fire response times in St. Louis County. These drive times were created using the ArcGIS Network Analyst extension and Esri's Business Analyst. The user may note discrepancies between MnDOT road data and the map in this document; Network Analyst requires a seamlessly-connected data source in order to perform the calculations for drive times, which Business Analyst provides but MnDOT does not. The Business Analyst data was used for this reason. According to this model, all of the county is within 15 minutes of a fire department.

Figure 5. Fire Departments and Fire Response Times in St. Louis County



Schools & Evacuation Centers/Shelters

There are 93 schools located in St. Louis County.

FEMA and the American Red Cross have designated 64 facilities within St. Louis County as shelters to be used in the event of an issued evacuation (Figure A - 3).

3.8.2 Infrastructure Systems

Infrastructure systems include the transportation systems and utility systems which are fundamental to the functioning of communities. These systems allow for emergency facilities to operate and connect to residents; they are the lifelines for communities.

Figure A - 6 displays St. Louis County's transportation systems.

Transportation Systems

Roadways: The St. Louis County Public Works Department is responsible for the maintenance and snow removal of over 3,000 miles of county-state aid highways (CSAH), county roads and unorganized township roads. The department is also responsible for the inspection and maintenance of over 600 state bridges over 10 feet in length, 300 bridges less than 10 feet in length, and approximately 40,000 traffic signs. There are a total of 17 tool houses located within the county's four maintenance districts.

Railways: A railroad network runs throughout the county. All railways are mapped in Appendix A (Figure A - 6).

Navigable Waters: This plan only references navigable waterways which are included in the U.S. Department of Transportation/Bureau of Transportation Statistics' National Transportation Atlas Database. A general definition of navigable waterways is defined by the US Army Corps of Engineers as, "...waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce..." (Code of Federal Regulations, n.d.).

According to this definition, there are three navigable waterways in St. Louis County: Lake Superior, Rainy Lake and the Pigeon River.

Airports: There are airports located throughout the county, including the Duluth International Airport. All airports are mapped in Appendix A (Figure A - 6).

Utility Systems

The infrastructure of utility system networks facilitates the process of moving utilities from their source to the consumer. A map of the utilities systems in St. Louis County is displayed in Figure A - 5.

Water & Sewer: There are 141 wastewater treatment plants in the county.

Energy: There are 58 electrical substations in St. Louis County in addition to various electric transmission lines (Figure A - 5).

Communication: Established in 2004, the Allied Radio Matrix for Emergency Response (ARMER) Program, administered in coordination with the Minnesota Statewide Radio Board, manages the implementation of a 700/800 megahertz (MHz) shared digital trunked radio communication system capable of servicing the radio communication needs of every public safety entity operating in Minnesota (MN Department of Public Safety, n.d.). There are 36 ARMER towers in St. Louis County (Figure A - 5).

3.8.3 High Potential Loss Structures

High potential loss structures are structures which would have a high loss or negative impact on the community if they were damaged or destroyed (FEMA). These structures include dams, levees and facilities storing hazardous materials.

A map displaying the locations of these structures is in Figure A - 16.

Dams & Levees

As described in Section 3.4.4, there are 67 dams and no levees in St. Louis County.

Hazardous Materials Facilities

Hazardous materials facilities contain extremely hazardous materials that would threaten the public if released. The inventory of these facilities in St. Louis County includes those required to submit a Tier II report to the EPA (due to the quantity of hazardous chemicals being stored). There are 232 Tier II facilities in St. Louis County (see Appendix B for a complete list).

3.8.4 Significant County Assets

Significant county assets include larger employers which represent a primary economic sector of a community; buildings of government services deemed to be significant; and cultural or historic assets that are deemed important to a community. An inventory of St. Louis County's significant county assets are listed in Appendix B.

Leading Employers

While every employer is an important asset to a community, the loss or disruption of certain employers, or the primary economic sector of a community, will have a large negative impact on the respective communities. St. Louis County identified 16 leading employers in the county.

Government Buildings

Government buildings deemed to be significant is at the discretion of the communities, but often include: city halls, courthouses, public works garages, libraries, etc. Previously mentioned government emergency services (police and fire) are not included in this list.

Cultural Resources

St. Louis County did not identify any cultural resources in the county for the purposes of this analysis.

3.9 Land Use and Ownership

St. Louis County covers a total of 6,859 square miles (4,389,760 acres). Land characteristics vary greatly throughout the county. The majority of the county's population lives in the city of Duluth, the adjacent cities of Hermantown and Proctor, and the surrounding townships. The next greatest population concentration is in the Iron Range communities, including Hibbing, Chisholm, Mountain Iron, Virginia, Eveleth and Hoyt Lakes.

St. Louis County has over 1,000 lakes with significant development on them. This includes year-round homes, seasonal cabins and resorts. There are large areas in St. Louis County that have very low-density development and are primarily used for forestry, wildlife habitat and recreation.

The county's public lands include: Voyageurs National Park, Boundary Waters Canoe Area Wilderness, Superior National Forest, four state parks and off road vehicle park, Giants Ridge Recreation area, state forests and tax forfeited lands.

In 2017, 779 farms existed in the county, covering 138,753 acres (3% of the county). Of this farming land, 48% is cropland, 32% is woodland, 12% is pastureland, and the rest is classified as "other." The number of farms in the county increased by 14% between 2012 and 2017, while the number of acres farmed increased by 9%. The average size of each farm is 178 acres (Census of Agriculture, 2017).

According to Minnesota DNR data, the number of feedlots in St. Louis County is 40. Feedlots in St. Louis County are mapped in Figure A - 26 (*Appendix A: St. Louis County Maps*).

Land ownership categories from the 2008 U.S. Geological Survey GAP (Gap Analysis Program) are shown in Figure A - 8 (*Appendix A: St. Louis County Maps*). Land cover is mapped in Figure A - 7.

3.9.1 Facility Replacement Costs

St. Louis County-specific building data was sourced from the parcel tax databases and parcel polygon data included building valuations and occupancy class. Structure values for each parcel were aggregated within each parcel and assigned to the parcel centroid point. Records were aggregated to the relevant census administrative boundaries for the flood hazard analysis. This process also provided total facility replacement costs and total building exposure by general occupancy class (defined by Hazus tools). The total estimated building exposure for St. Louis County is shown in Table 8.

Table 8. St. Louis County Total Building Exposure

General Occupancy	Estimated Total Buildings	Total Building Exposure (Building + Contents)
Residential	143,231	\$10,285,546
Commercial	4,250	\$121,445
Other	8,181	\$517,265
Totals	155,662	\$10,924,257

Section 4 – Risk Assessment

The goal of mitigation is to reduce or eliminate the future impacts of a hazard including loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation practices must be based on sound risk assessment. A risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure and people.

Basing risk assessments on the best information available is important in developing effective mitigation actions that benefit communities. Geographic Information System (GIS) tools are not only helpful in producing maps, but they also show structures at risk and may determine damage estimates for potential hazard scenarios. MN Homeland Security and Emergency Management (HSEM) mitigation staff encourages the use of GIS tools in risk assessments because they produce good information to use in the risk assessment process.

This assessment identifies the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of three components — hazard identification and prioritization, risk profile and vulnerability profile.

4.1 Hazard Identification/Profile

4.1.1 Hazard Identification

The cornerstone of the risk assessment is identification of the hazards that affect jurisdictions. To facilitate the planning process, several sources were employed to ensure that the natural hazards are identified prior to assessment.

Natural hazards are identified in the FEMA publication “Multi-Hazard Identification and Risk Assessment – A Cornerstone of the National Mitigation Strategy,” also known as MHIRA. FEMA Region V developed a list based on state mitigation plans in the region.

Table 9 lists the natural hazards included in the 2019 Minnesota State Hazard Mitigation Plan.

Table 9. Natural Hazards in the 2019 Minnesota State Hazard Mitigation Plan

Flooding	Hail	Drought
Dam/Levee Failure	Lightning	Extreme Heat
Wildfire*	Winter Storms	Extreme Cold
Windstorms	Erosion/Landslides/ Mudslides	Earthquakes
Tornadoes	Land Subsidence (Sinkholes & Karst)	Coastal Erosion & Flooding

*Addressed in the State Mitigation Plan because Minnesota is a heavily forested state compared to other states in Region V.

4.1.2 Hazard Prioritization and Vulnerability Assessment by Jurisdiction

Prioritization of Hazards

As part of the plan update process, the steering committee reviewed, updated and prioritized the hazards faced by residents of St. Louis County, updated the existing mitigation actions published in the 2013 Multi-Hazard Mitigation Plan, and proposed new mitigation actions.

To engage in this process, the committee drew on a number of data sources. First, the committee examined the natural hazards identified in the 2013 Multi-Hazard Mitigation Plan (Table 10). The natural hazards that pose risk to St. Louis County were discussed and adjusted to reflect the definitions of natural hazards used in the 2019 Minnesota State Hazard Mitigation Plan. This was done in order to assure that the risks faced by St. Louis County were categorized the same way as the priority hazards established by the State of Minnesota.

Table 10. Natural hazards identified in the 2013 St. Louis County Multi-Hazard Mitigation Plan

Natural Hazards			
Drought	Earthquakes	Extreme Temperatures (Summer and Winter)	Flooding
Hailstorms	Heavy Rainfall	Lightning	Solar Storms
Thunderstorms	Tornadoes	Wildland Fires	Windstorms
Winter Storms (Blizzards, Snow, Ice Storms)			

While the focus of this MHMP is on natural hazards, planning took place with the understanding that many non-natural hazards could occur as a result of natural disasters (i.e. disruption in electrical service due to downed power lines from heavy snow, ice storms or high wind events).

This plan draws on a variety of data sources including the State of Minnesota and Homeland Security Emergency Management Critical Infrastructure Strategy for the State of Minnesota (2010), FEMA's Local Mitigation Planning How-to Guide Integrating Manmade Hazards into Mitigation Planning (2003), and the State of Minnesota Multi Hazards Identification Risk Assessment.

The prioritization of hazards for the St. Louis County MHMP update (Table 11) was based upon group review and discussion of the natural hazards that pose risk to the county during the MHMP kick-off steering committee meetings on May 28-29, 2019. In the review of each hazard, the group was asked to consider if the risk to severe natural hazards had increased or decreased since the last plan, and if this affected their priority level to mitigate against that hazard. The group agreed that since the 2013 plan, their prioritization of hazards had not changed, with the exception of coastal flooding and coastal erosion which was moved in priority from moderate to high for the coastal areas in southern St. Louis County along Lake Superior. Severe winter storms and severe summer storms continued to be high priority hazards to address countywide as previously in 2013. Wildfire continued to be a high priority in the northern part of St. Louis County while it remained moderate in the southern part of the county. Extreme temperatures remained moderate countywide, and drought and dam failure remained low

countywide. *Appendix E: Steering Committee Meetings* provides the steering committee discussion notes from the May 28-29, 2019 meetings.

Table 11. Prioritization of Hazards for St. Louis County

Natural Hazards	Risk Severity (North St. Louis County)	Risk Severity (South St. Louis County)
Severe Summer Storms (Thunderstorms, Lightning, Hailstorms, Windstorms, Tornadoes)	High	High
Severe Winter Storms (Blizzards, Heavy Snow, Ice Storms)	High	High
Flash Flood, Riverine Flood, Coastal Flood	Moderate	Moderate/High* (Coastal Flood – High)
Extreme Heat/Extreme Cold	Moderate	Moderate
Landslides/Soil Erosion/ Coastal Erosion	Moderate	Moderate/High* (Coastal Erosion – High)
Wildfire	High	Moderate
Drought	Low	Low
Dam/Levee Failure	Low	Low

Vulnerability Assessment by Jurisdiction

Jurisdictions in St. Louis County have varying vulnerabilities to and concerns about impacts to their communities. Interviews with jurisdictional representatives in addition to the Local Mitigation Survey resulted in some specific concerns. Participants were asked to provide feedback on how they felt vulnerability to natural hazards had either increased (due to changes such as development) or decreased (due to local mitigation efforts) over the past five years. Following is an overview of responses related to noted local vulnerabilities (see Appendix K for the full Local Mitigation Survey Report). This information was used to help tie local vulnerability back to the exposure of people, buildings, infrastructure and the environment to the natural hazards listed in Table 11, and to assist local governments in development of related local mitigation actions. Cities not listed did not note any change in risk or local vulnerability to hazard events.

City of Chisholm

- A couple of senior assisted living housing developments have been built, therefore creating a challenge with a large number of senior citizens needing assistance during a disaster event.
- The implementation of detention and retention ponds would be beneficial to handle the runoff from large storms. We plan to continue our annual goal of at least one street reconstruction per year which includes new storm sewer and catch basins.

City of Duluth

- New development does create additional impervious surfaces and may create additional stormwater runoff.
- No zoning changes have been made that increase vulnerability to future severe weather events. Additional development pressure in areas susceptible to severe weather or disaster events has continued, including along Park Point and near certain rivers and streams; zoning rules have sought to minimize risk.
- After four declared storm-related disasters in a little over two years from 2016 to 2018, Duluth is already seeing the more frequent and severe storms that are projected for the area in association with climate change. More powerful storms are producing larger precipitation amounts, higher wind speeds, larger waves, and more coastal flooding and, at times, coming in such quick succession that the city is unable to complete repair work from one disaster before another disaster occurs. In the 12 months from October 2017 to October 2018, Duluth saw three declared coastal storm surge disasters, each of which hit the same public assets in the same way, each compounding the damage from prior storms before repairs could be completed.
- A sustained surge in new development has added significant impermeable surfaces in the last five years. That development has been offset to an unknown degree by green and gray stormwater infrastructure projects that have mitigated flood hazards. With significant ongoing development anticipated, the city of Duluth will need to continue to aggressively pursue smart flood mitigation projects to ensure that we at least do not lose ground.
- The arrival of Emerald Ash Borer to Duluth's extensive ash forests makes Duluth more vulnerable to wind events that will more easily take down dead, dying, and brittle ash trees, and to floods which may be worse if black ash wetlands convert to grassy wetlands with diminished floodwater retention capacity.

City of Hermantown

- New development certainly increases the costs of damages associated with tornadoes, windstorms, hail, floods, etc. We have many assisted living facilities within the city that support more vulnerable populations.

City of Hoyt Lakes

- The Polymet mining project is within our city limits and is essentially in our backyard. We have been working with Polymet on what their needs may be now and in the future. The construction phase up to completion and into operation will present many challenges for emergency response to the site.

City of Proctor

- The school has constructed a new multi-use hockey facility which at times could have a large concentration of individuals in the building during a disaster event. Drainage may be undersized for the facility.
- The city still has a need for additional storm sewer upgrades, purchase of additional pumps, and sand bags in the event of flooding.
- Proctor has Kingsbury Creek running through the middle of town and large stormwater pipes under Highway 2. Both of these could not handle the water during the June 2012 flood. We would encounter the same problems in another similar event.

4.1.3 Hazard Profiling Concept of Planning

The risk assessments identify the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of three components—hazard identification, risk profile and vulnerability profile.

4.1.4 GIS and Risk Assessment

The risk analysis step in this assessment quantifies the risk to the population, infrastructure and economy of the community. Hazards that can be geographically identified (wildland fires, windstorms, tornadoes, hail, floods) were mapped.

FEMA's Hazus tool in ArcGIS was used to estimate the damages incurred for a 1% annual chance flood and for general asset assessment. Hazus also generates aggregated loss estimates for the entire county due to a 1% annual chance flood. Aggregate inventory loss estimates, which include building stock analysis, are based upon the assumption that building stock is evenly distributed across each census block. Therefore, it is possible that overestimates of damage will occur in some areas while underestimates will occur in other areas. With this in mind, total losses tend to be more reliable over larger geographic areas (groups of many blocks) than for individual census blocks. It is important to note that Hazus is not intended to be a substitute for detailed engineering studies.

4.1.5 National Centers for Environmental Information (NCEI) Records

Historical storm data was compiled from the National Centers for Environmental Information (NCEI). NCEI records are estimates of damage reported to the National Weather Service (NWS) from various local, state and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to given weather events.

The NCEI data included 1,438 reported events in St. Louis County between 1950 and July of 2019. However, some weather event categories only had available data going back as recent as 1996. No records before 1950 were available. A summary table of events related to each hazard type is included in the hazard profile sections that follow. A full table listing all events, including additional details, is included in Appendix C. NCEI hazard categories used in this plan are listed in Table 12.

Table 12. National Centers for Environmental Information Historical Hazards

Hazard	
Tornado	Hail
Thunderstorm Wind	Flood/Flash Flood
Winter Weather/ Winter Storm/Blizzard	Cold/Wind Chill
Excessive Heat/Heat	Lightning

4.1.6 FEMA Declared Disasters

Another historical perspective is derived from FEMA-declared disasters. Nine major disaster and two emergency declarations in St. Louis County have been made between 1957 and June 2019 (Figure 6).

Figure 6. FEMA Disaster Declaration by County

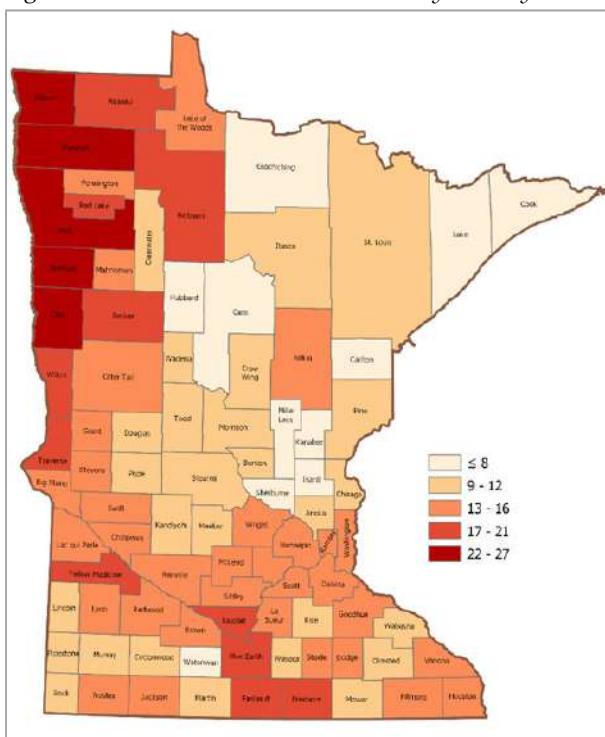


Table 13 and Table 14 show the details of the disasters including payments for Public Assistance (PA) and Individual Assistance (IA), listed under the flooding and severe storm profiles. No declarations were made for the other storms listed in the NCEI database. Reviewing the federal payments for damages from the declared disasters is a way of correlating the impact from the NCEI report.

Table 13. FEMA-Declared Major Disasters in St. Louis County (1957-June 2019)

Incident	Declaration Date and Disaster Number	Incident Period	Total PA Obligated by FEMA for Disaster in Minnesota	Total PA Obligated by FEMA for Disaster in St. Louis County	Individual Assistance in Minnesota	Individual Assistance in St. Louis County
Severe Storms, Flooding	2/1/2019 DR-4414	10/9/2018 – 10/11/2018	Yes, Amount Unknown	Yes, Amount Unknown	None	None
Severe Storms, Tornadoes, Straight-line Winds, Flooding	9/5/2018 DR-4390	6/15/2018 – 7/12/2018	\$13,018,824*	Yes, Amount Unknown	None	None

Incident	Declaration Date and Disaster Number	Incident Period	Total PA Obligated by FEMA for Disaster in Minnesota	Total PA Obligated by FEMA for Disaster in St. Louis County	Individual Assistance in Minnesota	Individual Assistance in St. Louis County
Severe Storms, Flooding	7/6/2012 DR-4069	6/14/2012 – 6/21/2012	\$42,656,571*	Yes, Amount Unknown	None	None
Severe Winter Storms, Flooding, Tornadoes	5/16/2001 DR-1370	3/23/2001 – 7/3/2001	\$36,227,572*	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown
Severe Storms, Winds, Flooding	7/28/1999 DR-1283	7/4/1999 – 8/2/1999	\$11,679,939*	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown
Severe Flooding, High Winds, Severe Storms	4/8/1997 DR-1175	3/21/1997 – 5/24/1997	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown
Severe Thunderstorms, Winds, Flooding, Tornadoes, Heat	8/18/1995 DR-1064	7/9/1995 – 7/14/1995	Yes, Amount Unknown	Yes, Amount Unknown	None	None
Severe Storms, Flooding	8/25/1972 DR-350	8/25/1972	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown
Heavy Rains, Flooding	7/22/1970 DR-291	7/22/1970	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown	Yes, Amount Unknown

Source: Data downloaded from <https://www.fema.gov/openfema-dataset-disaster-declarations-summaries-v1> on 4/3/2019.

Values are estimates collected at the time of the disaster. *According to <https://www.fema.gov/disasters/state-tribal-government/o/MN> as of 6/18/2019.

Table 14. FEMA-Declared Emergencies in St. Louis County (1957-June 2019)

Incident	Declaration Date and Disaster Number	Incident Period	Individual Assistance in Minnesota	Public Assistance (all affected areas)
Hurricane Katrina Evacuation	9/13/2005 EM-3242	8/29/2005 – 10/1/2005	None	Yes, Amount Unknown
Drought	6/17/1976 EM-3013	6/17/1976	None	Yes, Amount Unknown

* Data downloaded from <https://www.fema.gov/openfema-dataset-disaster-declarations-summaries-v1> on 4/3/2019. Values are estimates collected at the time of the disaster.

St. Louis County has been part of several state disaster declarations (Table 15). The State Disaster Program was signed into state law in 2014. It is ½ the threshold of the federal/FEMA public assistance (only) program threshold.

Table 15. State Disaster Declarations in St. Louis County

Incident	Declaration Date and Disaster Number	Incident Period	Obligated Assistance
Severe Winter Storms, Flooding	5/25/2018 SD-025	4/13/2018 – 5/4/2018	\$675,000
Severe Winter	11/27/2017	10/27/2017	\$2,834,840

Incident	Declaration Date and Disaster Number	Incident Period	Obligated Assistance
Storm	SD-024		
Severe Thunderstorms, High Winds, Flooding	10/4/2016 SD-010	7/19/2016 -7/21/2016	\$3,526,511

Table 16 depicts the historical projects in St. Louis County resulting from hazard mitigation funding.

Table 16. Historical Hazard Mitigation Funding (HMGP and PDM) in St. Louis County

Year	Project Description	Sub-Grantee	Funding Type	Federal Share
2012	City of Duluth Acquisitions	Duluth	HMGP	\$538,599
2010	St. Louis County Plan Update	St. Louis County	PDM	\$68,967
2009	City of Ely Power Line Conversion	Ely	HMGP	\$480,007
2008	Arrowhead Fire Mitigation Project Sprinkler Installation	Cook County/Lake County/St. Louis County	PDM	\$450,000
2007	St. Louis County Wildfire Sprinkler Retrofit Project	St. Louis (County)	HMGP	\$417,615
2001	ARDC Mitigation Plan	Arrowhead Regional Development Comm.	HMGP	\$77,987
1999	City of Biwabik, Sewer project	Biwabik	HMGP	\$189,675
1999	St. Louis County NOAA Transmitters	St. Louis (County)	HMGP	\$83,589
1998	Backup Generator	City of Hibbing	HMGP	\$30,035
1998	Hibbing-Brooklyn Addition Sewer Project	City of Hibbing	HMGP	\$215,892
1998	Hibbing-Sargent Addition Sewer Project	City of Hibbing	HMGP	\$98,250
1998	Culvert Upsize	St. Louis County	HMGP	\$245,304
1998	Hibbing-Park Addition Sewer Project	City of Hibbing	HMGP	\$113,700
1998	Virginia-Storm Water Runoff Project	City of Virginia	HMGP	\$43,313
1998	Hibbing Storm Water Catch Basin	City of Hibbing	HMGP	\$11,839
1998	Hibbing-Bunker Road Sewer Project	City of Hibbing	HMGP	\$72,375
1998	Hibbing-By Pass Sanitary Sewer- 169/37	City of Hibbing	HMGP	\$395,075
1997	MNDOT -Living Snow fence	Minnesota Department of Transportation-District-7	HMGP	\$247,952
1997	MNDOT (St. Louis) -Living Snow Fence	MN Department of Transportation - District 1	HMGP	\$15,000
1997	Overhead To Underground Power Line Conversion	Lake County Cooperative Light & Power Association	HMGP	\$44,667
Total HMGP/PDM Funding – St. Louis County				\$3,839,841

* Data provided by MN HSEM in March 2019

4.2 Future Development

Because St. Louis County is vulnerable to a variety of natural hazards, the county government—in partnership with the state government—must make a commitment to prepare for the management of

these events. St. Louis County is committed to ensuring that county elected and appointed officials become informed leaders regarding community hazards so that they are better prepared to set and direct policies for emergency management and county response.

At the local jurisdictional level, several communities did note an increase in development over the last five years as a factor for an increase in vulnerability to severe weather or disaster events (see Section 4.1.2, *Vulnerability Assessment by Jurisdiction*). In the development of local mitigation actions, all jurisdictions were encouraged to consider hazard mitigation strategies that would reduce risk in relation to future development, such as the update of local comprehensive plans, enforcement of ordinances and incorporation of infrastructure improvements to reduce local vulnerabilities (see *Appendix G Mitigation Actions by Jurisdiction*).

St. Louis County Emergency Management will work to keep the jurisdictions covered by the Multi-Hazard Mitigation Plan engaged and informed during the plan's cycle. By keeping jurisdictional leaders involved in the monitoring, evaluation and update of the MHMP, they will keep their local governments aware of the hazards that face their communities and how to mitigate those hazards through planning and project implementation.

Section 6 of this plan further outlines the process by which St. Louis County will address the maintenance of this plan, including monitoring, evaluation, and update of the plan, as well as implementation and continued public involvement.

4.3 Hazard Profiles

As part of the risk assessment, each natural hazard that poses risk to the county was independently reviewed for its past hazard history, relationship to future trends, and jurisdictional vulnerability to future events. A capabilities assessment was also conducted by the county to review the plans and programs that are in place or that are lacking (program gaps or deficiencies) for the implementation of mitigation efforts, as related to each natural hazard. An assessment was also conducted for local jurisdictions to identify the plans, policies, programs, staff and funding they have in place in order to incorporate mitigation into other planning mechanisms (see Section 5.1 Community Capability Assessments and *Appendix K: Local Mitigation Survey Report*).

4.3.1 Tornadoes

Tornadoes are defined as violently-rotating columns of air extending from thunderstorms to the ground, with wind speeds between 40-300 mph. They develop under three scenarios: (1) along a squall line; (2) in connection with thunderstorm squall lines during hot, humid weather; and (3) in the outer portion of a tropical cyclone. Funnel clouds are rotating columns of air not in contact with the ground; however, the column of air can reach the ground very quickly and become a tornado.

Since 2007, tornado strength in the United States is ranked based on the Enhanced Fujita scale (EF scale), replacing the Fujita scale introduced in 1971. The EF scale uses similar principles to the Fujita scale, with six categories from zero to five, based on wind estimates and damage caused by the tornado. The EF Scale is used extensively by the NWS in investigating tornadoes (all tornadoes are now assigned an EF Scale number), and by engineers in correlating damage to buildings and techniques with

different wind speeds caused by tornadoes. To see a comparative table of F and EF scales, see <http://www.spc.noaa.gov/faq/tornado/ef-scale.html>.

In Minnesota, the peak months of tornado occurrence are June and July. The typical time of day for tornadoes in Minnesota ranges between 4:00 p.m. and 7:00 p.m. Most of these are minor tornadoes, with wind speeds under 125 miles per hour. A typical Minnesota tornado lasts approximately 10 minutes, has a path length of five to six miles, is nearly as wide as a football field, has a forward speed of about 35 miles an hour, and affects less than 0.1% of the county warned.

Tornado History in St. Louis County

According to the NCEI, 36 tornadoes were reported in St. Louis County between 1950 and July of 2019, causing three deaths, 37 injuries, and over \$6 million dollars in property damage. Tornado classification ranged from F0/EF0 to F3 on the Fujita Scale/Enhanced Fujita Scale.

The most recent tornado occurred in June 2016, with what started as a severe thunderstorm creating large hail and damaging winds across the area. The tornado developed east of the Burlington Northern Santa Fe Railroad near the St. Louis River and tracked east-northeast for approximately 3.1 miles. The EF1 tornado resulted in damage to roofs and structures as well as uprooting several trees, traveling a total of 7.23 miles. No deaths or injuries were reported.

In August of 2015, an EF1 tornado occurred near Moilan Lake, uprooting several trees, with winds up to 95 miles per hour.

A waterspout formed on Lake Superior in August of 2012, making landfall on Park Point before crossing into St. Louis Bay. While no damage was reported, two floats, each weighing approximately 500 lbs., were lifted and rotated.

On August 6, 1969, a number of tornadoes were reported in the county, reaching a scale of F3. Two deaths and 32 injuries were recorded within St. Louis County. Figure 7 below shows tornado touchdown points and tracks in St. Louis County. Historic tornado events in the county are listed in Table 17.

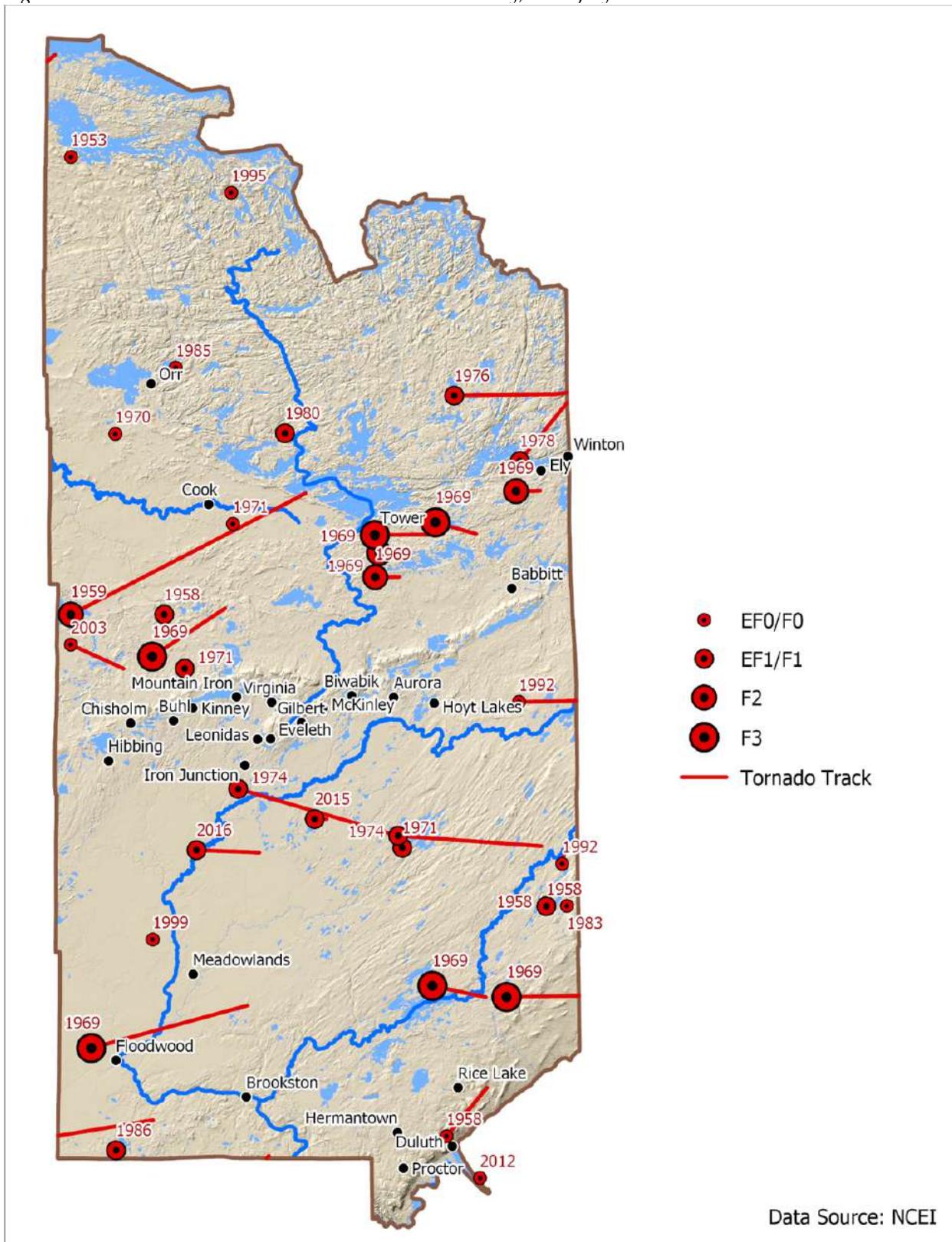
Table 17. Historic Tornado Events in St. Louis County, 1950-July 2019

Location or County	Date	Magnitude	Deaths	Injuries	Property Damage
Casco	6/19/2016	EF1	0	0	unknown
Central Lakes	8/8/2015	EF1	0	0	unknown
Duluth Sky Harbor Apt	8/9/2012	EF0	0	0	unknown
Side Lake	7/14/2003	F0	0	0	unknown
Toivola	7/27/1999	F0	0	0	unknown
Crane Lake	8/22/1995	F0	0	0	unknown
Central Lakes	7/12/1995	F0	0	0	\$2,000
St. Louis County	9/16/1992	F0	0	0	\$25,000
St. Louis County	9/16/1992	F0	0	0	unknown
St. Louis County	6/21/1986	F1	0	0	\$2,500

Location or County	Date	Magnitude	Deaths	Injuries	Property Damage
St. Louis County	7/20/1985	F ₀	0	0	\$2,500
St. Louis County	6/30/1983	F ₀	0	0	\$30
St. Louis County	6/12/1980	F ₁	0	0	\$25,000
St. Louis County	8/14/1978	F ₁	0	2	\$250,000
St. Louis County	4/14/1976	F ₁	0	0	\$25,000
St. Louis County	8/25/1974	F ₁	0	0	<i>unknown</i>
St. Louis County	8/25/1974	F ₁	0	0	\$250,000
St. Louis County	8/9/1971	F ₁	0	1	\$2,500
St. Louis County	6/30/1971	F ₀	0	0	<i>unknown</i>
St. Louis County	6/19/1971	F ₁	0	0	\$25,000
St. Louis County	9/20/1970	F ₀	0	0	\$2,500
St. Louis County	8/6/1969	F ₃	0	0	\$2,500
St. Louis County	8/6/1969	F ₃	2	3	\$250,000
St. Louis County	8/6/1969	F ₂	0	0	\$25,000
St. Louis County	8/6/1969	F ₃	0	0	\$250,000
St. Louis County	8/6/1969	F ₂	0	0	\$25,000
St. Louis County	8/6/1969	F ₃	0	20	\$2,500,000
St. Louis County	8/6/1969	F ₃	0	0	\$250,000
St. Louis County	8/6/1969	F ₂	0	0	\$25,000
St. Louis County	8/6/1969	F ₃	0	9	\$2,500,000
St. Louis County	9/6/1959	F ₂	0	0	\$25,000
St. Louis County	7/1/1958	F ₁	1	2	\$30
St. Louis County	5/26/1958	F ₀	0	0	<i>unknown</i>
St. Louis County	5/26/1958	F ₁	0	0	<i>unknown</i>
St. Louis County	5/26/1958	F ₀	0	0	<i>unknown</i>
St. Louis County	6/20/1953	F ₀	0	0	<i>unknown</i>

Source: National Centers for Environmental Information

Figure 7. Tornado Touchdowns and Paths in St. Louis County, 1950-July 2019



Tornadoes and Climate Change

Tornadoes and other severe thunderstorm phenomena frequently cause as much annual property damage in the U.S. as do hurricanes, and often cause more deaths. Although recent research has yielded insights into the connections between global warming and the factors that cause tornados and severe thunderstorms, such as atmospheric instability and increases in wind speed with altitude (Del Genio, Yao, & Jonas, 2007), these relationships remain mostly unexplored, largely because of the challenges in observing thunderstorms and tornadoes and simulating them with computer models (National Climate Assessment Development Advisory Committee, 2013).

According to Harold Brooks of NOAA's National Severe Weather Laboratory, there is increasing variability in the "start" of tornado season. The number of days with more than 30 EF1 or greater tornadoes is increasing, while the number of days with at least one EF1 or greater tornadoes is decreasing. Thus, tornadoes are occurring on fewer days, but *more* are occurring on outbreak days.

The earliest reported tornado in Minnesota occurred on March 6, 2017, when two tornadoes touched down in southern Minnesota, which was 12 days earlier than the previous record. The Zimmerman tornado occurred 115 miles further north than the previous record from 1968. According to State Meteorologist Paul Huttner, "Those records fit seasonally and geographically with longer term climate trends pushing weather events earlier in the season and further northward" (Huttner, 2017).

The state of Wisconsin has recorded three tornadoes in January and six in December during the period of 1844-2013 (National Weather Service Weather Forecast Office, 2014), including a January tornado in 2008.

Vulnerability

The county has experienced tornadoes in 20 of the 68 full years on record, or in 29% of the years on record.

The likelihood of a tornado does not vary geographically in St. Louis County. However, certain populations may be more vulnerable and less resilient to the impacts of a tornado. Because communication is so important before a tornadic event, citizens that are living in rural areas, have limited mobility, do not live near an outdoor warning siren or do not use social media may be more affected. According to the Social Vulnerability Index results in Figure 4 citizens with social factors that make up the household composition and disability theme may be greatest in the northern portion of the county and in the Duluth area. As with all summer storms, those who work outdoors or do not have permanent housing are also at greater risk.

People living in mobile home parks are particularly vulnerable to tornadoes. While Minnesota law requires most mobile home parks to have storm shelters, many do not (Sepic, 2017). Figure A - 9 displays the locations of the 21 mobile home parks in St. Louis County.

St. Louis County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to summer storms (includes tornadoes) and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Aboveground Power Lines – A majority of the power lines in the county are aboveground and subject to damage from high winds and falling tree limbs from severe summer storms. Power lines that are aboveground are susceptible to coming down during severe storms, resulting in power outages. St. Louis County is very large and encompasses very rural areas.

Backup Power – Following the 2016 blowdown and prolonged power outage, it was quickly learned that not all county facilities had backup power to continue operations during the outage. St. Louis County started to evaluate all critical buildings and services. Many cities and townships do not have adequate backup power to their facilities.

Communications – Not all residents have opted in to the Northland Alert notification system for cell phones. St. Louis County has recently created a Facebook page but that is currently our only social media.

Warning Sirens – Not all areas have outdoor warning sirens. Due to the vast area of St. Louis County, having sirens to cover the entire county isn't feasible.

Storm Shelters / Community Safe Rooms – Additional storm shelter areas would enhance public safety. Construction or retrofit of facilities to serve as community safe rooms for severe wind events should also be evaluated for areas where there are vulnerable populations, such as campgrounds, mobile home parks and schools.

4.3.2 Windstorms

FEMA defines winds in excess of 58 miles per hour, excluding tornadoes, as windstorms. Straight-line winds and windstorms are used interchangeably in the plan. This hazard is treated as a different category than tornadoes (which may also include high winds). Windstorms are among the nation's most severe natural hazards in terms of both lives lost and property damaged.

Severe winds can damage and destroy roofs, toss manufactured homes off their pier foundations, and tear light-framed homes apart. There are several different types of windstorms. A "downburst" is defined as a strong downdraft with an outrush of damaging winds on or near the earth's surface. Downbursts may have wind gusts up to 130 mph and are capable of the same damage as a medium-sized tornado. A "gust front" is the leading edge of the thunderstorm downdraft air. It is most prominent near the rain-free cloud base and on the leading edge of an approaching thunderstorm and is usually marked by gusty, cool winds and sometimes by blowing dust. The gust front often precedes the thunderstorm precipitation by several minutes. Straight-line winds, when associated with a thunderstorm, are most frequently found with the gust front. These winds originate as downdraft air reaches the ground and rapidly spreads out, becoming strong horizontal flow.

When wind speeds are not able to be measured, they are estimated. Part of the process to determine wind speed is observing the damage. Table 18 lists the expected effects of increasing wind speeds.

Table 18. Effects of Wind Speed

Wind Speed	Effects
26-38 knots (30-44 mph)	Trees in motion. Lightweight loose objects (e.g., lawn furniture) tossed or toppled.
39-49 knots (45-57 mph)	Large trees bend; twigs, small limbs break; and a few larger dead or weak branches may break. Old/weak structures (e.g., sheds, barns) may sustain minor damage (roof, doors). Buildings partially under construction may be damaged. A few loose shingles may be removed from houses. Carports may be uplifted; minor cosmetic damage may occur to mobile homes.
50-64 knots (58-74 mph)	Large limbs break; shallow-rooted trees may be pushed over. Semi-trucks may be overturned. More significant damage to old/weak structures occurs. Shingles, awnings may be removed from houses; damage to chimneys and antennas occurs; mobile homes and carports incur minor structural damage.
65-77 knots (75-89 mph)	Widespread damage to trees with trees broken/uprooted. Mobile homes may incur more significant structural damage; Roofs may be partially peeled off industrial/commercial/warehouse buildings. Some minor roof damage may occur to homes. Weak structures (e.g., farm buildings, airplane hangars) may be severely damaged.
78+ knots (90+ mph)	Many large trees broken and uprooted. Mobile homes may be severely damaged; moderate roof damage to homes may occur. Roofs may be partially peeled off homes and buildings. Moving automobiles may be pushed off dry roads. Barns and sheds may be demolished.

Source: (National Weather Service, 2018)

Windstorm History in St. Louis County

St. Louis County frequently experiences winds blowing over 50 knots (Figure 8). According to NCEI records, there were 464 thunderstorm/high wind events reported between 1950 and July 2019, with wind speeds of up to 88 knots. These winds can inflict damage to buildings and in some cases overturn high-profile vehicles.

On July 21, 2016, straight-line winds of 60-80 mph occurred in the region. Duluth was one of the hardest-hit areas, with multiple wind gusts recorded of 100 mph, and power outages for 75,000 people. Some homes were without power for as long as a week. Minnesota Power described the storm's devastation as the worst in at least half a century.

In June of 2016, winds of up to 52 knots occurred, injuring two campers when a tree fell onto their tent in Voyageurs National Park.

On July 21, 2014, two campers were injured by a falling tree on Loon Lake. Wind speeds reached 70 knots. The following day, two more campers were injured when a tree fell on their campsite on Lac La Croix Lake.

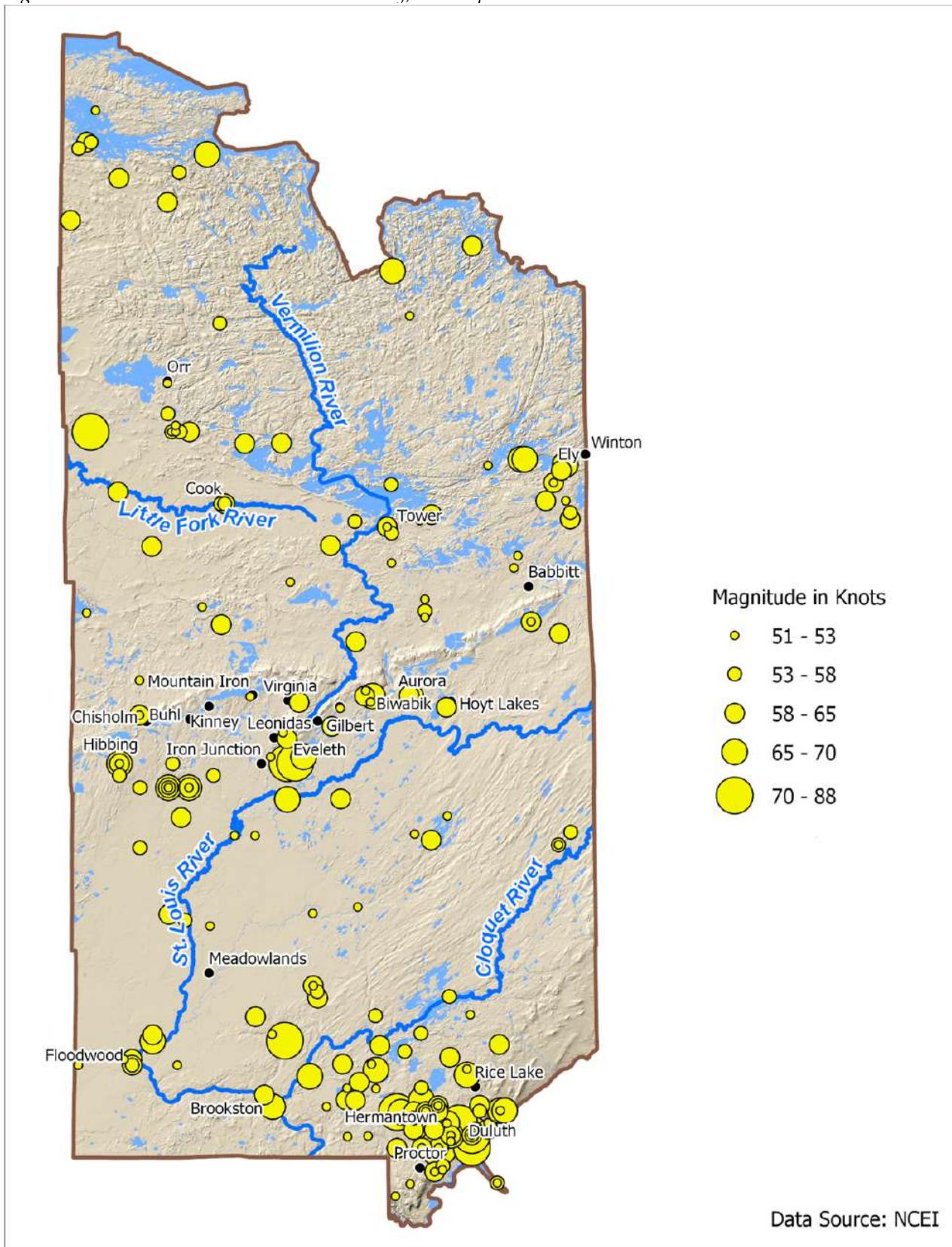
Winds of up to 50 knots blew down trees on Echo Trail, and two campers were injured when a tree fell on their tent.

Windstorms and Climate Change

Lack of high-quality long-term data sets make assessment of changes in wind speeds very difficult (Kunkel, et al., 2013). One analysis generally found no evidence of significant changes in wind speed

distribution. Other trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

Figure 8. Severe Windstorms in St. Louis County, 1955-April 2019



Vulnerability

Vulnerability to injury from all kinds of windstorms decreases with adequate warnings, warning time, and sheltering in a reinforced structure. Vulnerability to structures depends upon construction of the building and infrastructure. Residents of mobile homes are more vulnerable to fatality or injury from windstorms because mobile homes are not able to withstand high winds as well as other structural dwellings. Wind in excess of 50 mph (43.4 knots) is the lower limit of wind speeds capable of damaging mobile homes (American Meteorological Society, 2004). Steps to mitigate these vulnerabilities have been taken but have not proven sufficient. For example, mobile home parks with 10 or more homes that received their primary license after March 1, 1998, are required to provide storm shelters that meet standards specified by the commissioner of administration (Minnesota Department of Health, 2018). However, mobile home parks often do not provide the required storm shelters. Building codes have also changed to improve the strength of new mobile home construction, but there are still many older mobile homes in use that do not meet these new standards.

According to NOAA's Storm Prediction Center, from 1985-2002, 49% of tornado fatalities in the United States were people who remained within or attempted to flee from mobile homes (American Meteorological Society, 2004). Given the vulnerability of mobile home residents to windstorm events, it is important to have a general understanding of where mobile homes are located. Figure A - 9 displays the locations of the 21 mobile home parks in St. Louis County.

The likelihood of a windstorm event does not vary geographically in St. Louis County. Because communication is so important before a windstorm event, citizens that are living in rural areas, have limited mobility, do not live near an outdoor warning siren or do not use social media may be more affected. According to the Social Vulnerability Index results in Figure 4, citizens with social factors that make up the household composition and disability theme may be greatest in the northern portion of the county and in the Duluth area. As with all summer storms, those who work outdoors or do not have permanent housing are also at greater risk.

St. Louis County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to summer storms (includes windstorms) and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Aboveground Power Lines – A majority of the power lines in the county are aboveground and subject to damage from high winds and falling tree limbs from severe summer storms. Power lines that are aboveground are susceptible to coming down during severe storms, resulting in power outages. St. Louis County is very large and encompasses very rural areas.

Backup Power – Following the 2016 blowdown and prolonged power outage, it was quickly learned that not all county facilities had backup power to continue operations during the outage. St. Louis County started to evaluate all critical buildings and services. Many cities and townships do not have adequate backup power to their facilities.

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4.3.3 *Lightning*

Lightning typically occurs as a by-product of a thunderstorm. In only a few millionths of a second, the air near a lightning strike is heated to 50,000°F, a temperature hotter than the surface of the sun. The hazard posed by lightning is significant. High winds, rainfall, and a darkening cloud cover are the warning signs for possible cloud-to-ground lightning strikes. While many lightning casualties happen at the beginning of an approaching storm, more than half of lightning deaths occur after a thunderstorm has passed. Lightning can strike more than 10 miles from the storm in an area with clear sky above.

Lightning strikes the ground approximately 25 million times each year in the U.S. According to the NWS, the chance of an individual in the U.S. being killed or injured by lightning during a given year is 1 in 240,000 (NOAA National Severe Storms Laboratory, n.d.).

Lightning is the most dangerous and frequently encountered weather hazard that most people in the United States experience annually. Lightning is the second most frequent killer in the U.S., behind floods and flash floods, with nearly 100 deaths and 500 injuries annually. The lightning current can branch off to strike a person from a tree, fence, pole, or other tall object. In addition, an electrical current may be conducted through the ground to a person after lightning strikes a nearby tree, antenna, or other tall object. The current may also travel through power lines, telephone lines, or plumbing pipes to damage property or cause fires.

Lightning History in St. Louis County

The NCEI has recorded 20 lightning events between 1996 and July 2019, resulting in one death, 12 injuries, and over \$1.3 million in property damage.

On June 28, 2015, lightning strikes resulted in three people being injured in the county. A 12-year old boy was critically injured after being struck by lightning at the Enger Park Golf Course in Duluth. At a baseball field in Cherry, MN, a 51-year-old father and his 4-year old daughter were struck by lightning. The man suffered a heart attack and was hospitalized for many days.

In August of 2012, a group of people was sailing near Park Point in Duluth. As the storm approached they rushed to shore. However, lightning struck them, killing a 9-year old boy and injuring four others.

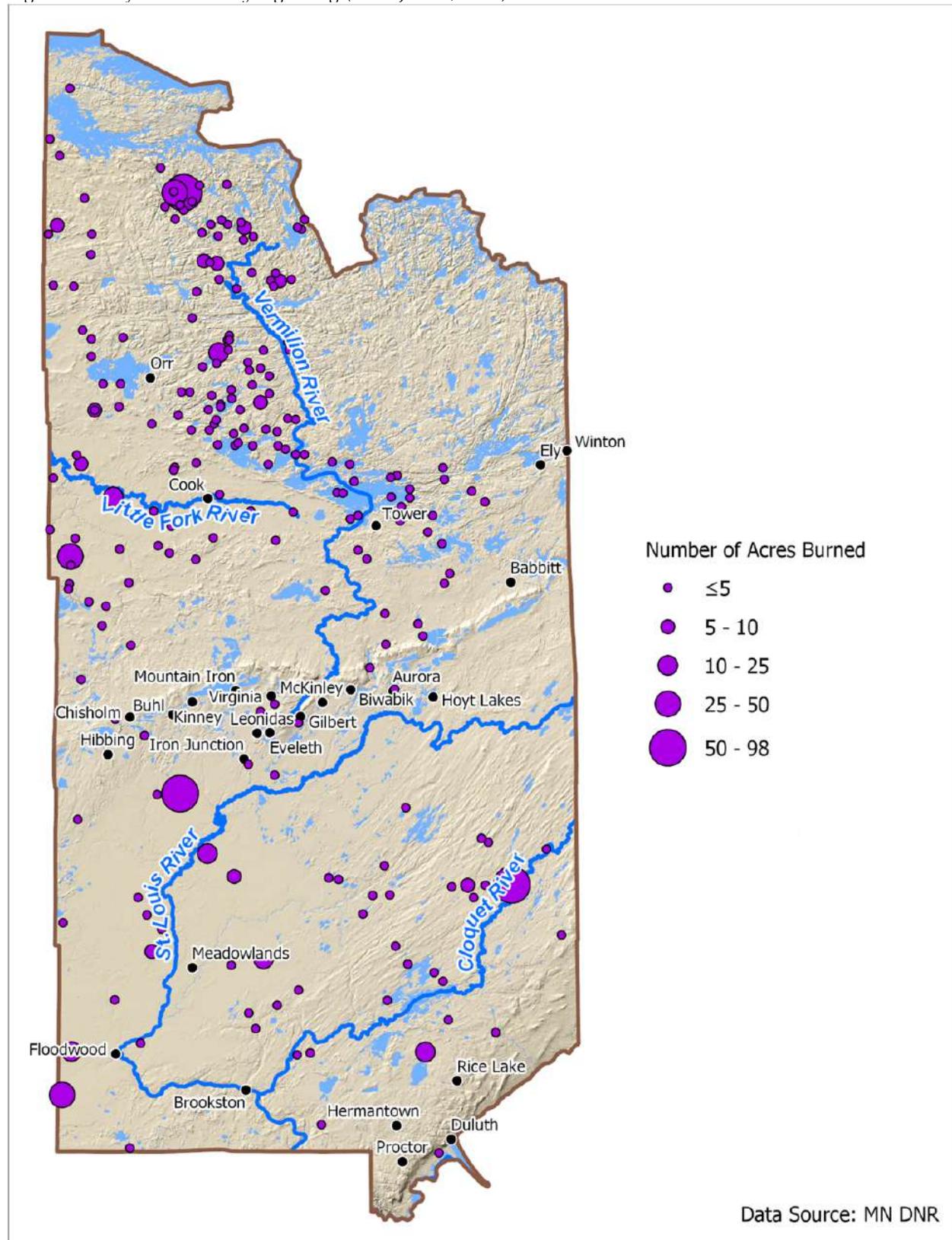
A 16-year old boy was struck by lightning along West Skyline Parkway in Duluth in July of 2010. He was knocked unconscious, and sustained third-degree burns.

In July of 1998, lightning struck a wooden church in Mountain Iron, destroying the building. Property damage was estimated at \$400,000.

Lightning in Hibbing in August of 1996 toppled a power line, which ignited a fire in a local restaurant, resulting in \$400,000 of damage.

Lightning is also the cause of many wildfires in St. Louis County. Between 1985 and June 4, 2019, there were 225 wildfires initiated by lightning in the county, burning a total of 665 acres (Figure 9).

Figure 9. Wildfires Caused by Lightning (1985-June 4, 2019)



Lightning and Climate Change

The projected possible intensity and frequency of tornadoes, hail, and damaging thunderstorm winds, the conditions associated with lightning, are uncertain (National Climate Assessment Development Advisory Committee, 2013). Severe rain events are becoming more common and may include an additional risk of lightning.

Vulnerability

The magnitude of summer storms each year is unpredictable and within St. Louis County the vulnerability of jurisdictions to lightning does not vary geographically. As with all summer storms, those who work outdoors or do not have permanent housing are most at risk.

St. Louis County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to summer storms (includes lightning) and should be addressed with new mitigation efforts to reduce vulnerability. They include:

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4.3.4 Hail

Hailstorms are a product of severe thunderstorms. Hail forms when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger, until their weight can no longer be supported by the winds. Hailstones can vary in size, depending on the strength of the updraft. The NWS uses the following descriptions when estimating hail sizes: pea size is $\frac{1}{4}$ -inch, marble size is $\frac{1}{2}$ -inch, dime size is $\frac{3}{4}$ -inch, quarter size is 1-inch, golf ball size is $1\frac{3}{4}$ -inches, and baseball size is $2\frac{3}{4}$ -inches. Individuals who serve as volunteer "storm spotters"

for the NWS are located throughout the state, and are instructed to report hail dime size (3/4-inch) or greater. Hailstorms can occur throughout the year; however, the months of maximum hailstorm frequency are typically between May and August. Although hailstorms rarely cause injury or loss of life, they can cause significant property damage.

Hail History in St. Louis County

Hail is a common occurrence in St. Louis County (Figure 10). Since 1950, the NCEI has reported over \$50 million in property damage due to hail in the county.

In July of 2006 a hailstorm in Babbitt caused thousands of dollars of damage to vehicles, while also damaging the local building center and greenhouse.

A hailstorm with hail reaching 3.5 inches in West Duluth occurred in August of 1998, causing extensive damage to vehicles, roofs, gardens and patio furniture. The NCEI estimated there was \$50 million in property damage, based on insurance claims.

On August 3, 1989, three people were injured when hail of 4.5 inches in size occurred in Voyageurs National Park. Boats, vehicles and windows sustained severe damage as well.

Table 19 shows storms producing hail greater than one inch diameter in St. Louis County.

Figure 10. Severe Hailstorms in St. Louis County, 1955-April 2019

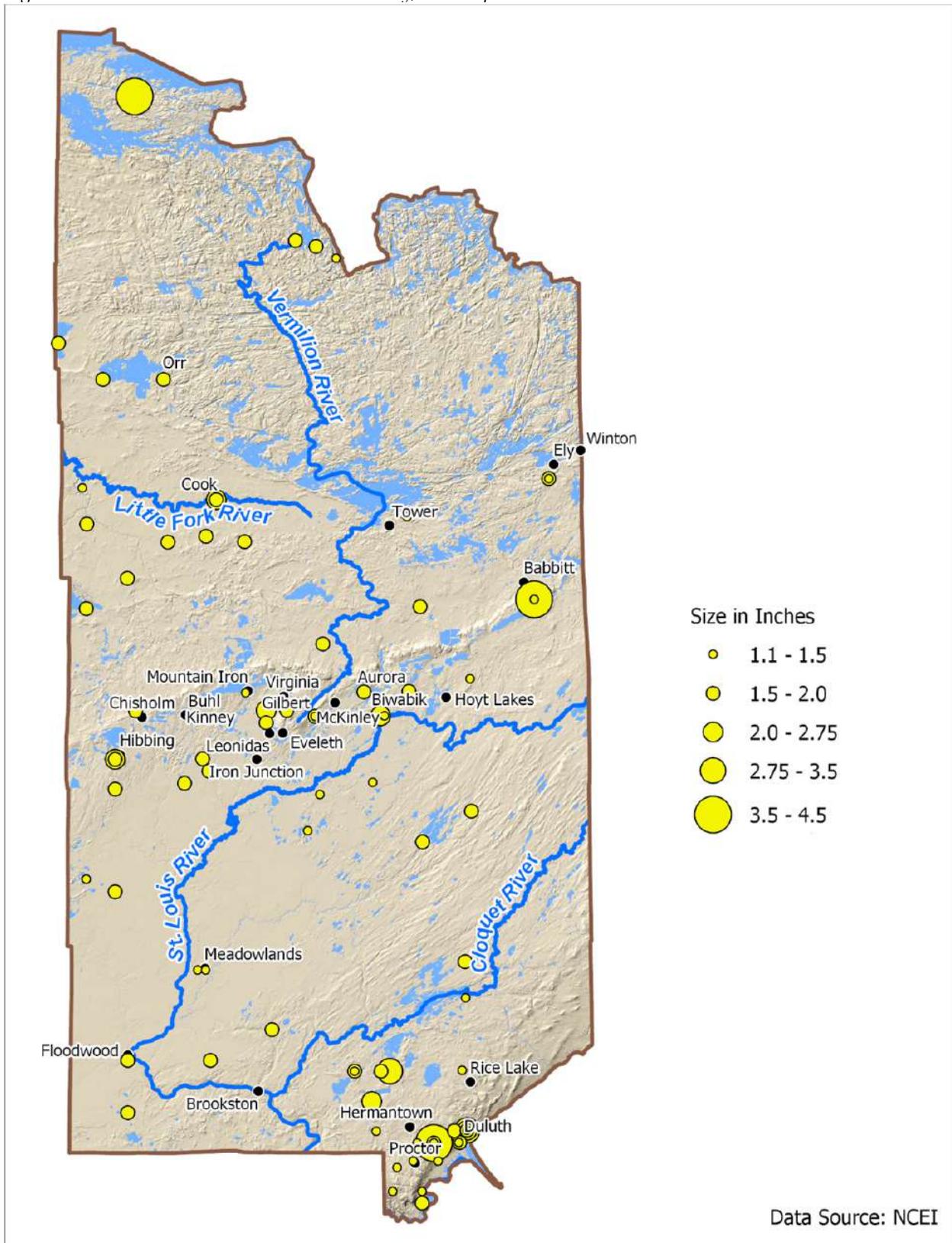


Table 19. Storms producing hail of greater than 1-inch diameter in St. Louis County, 1950-July 2019

Date	Hail Size (inches)	Injuries	Date	Hail Size (inches)	Injuries	Date	Hail Size (inches)	Injuries
7/26/2019	1.25	0	5/14/2007	2	0	8/27/1994	1.75	0
7/26/2019	1.25	0	5/14/2007	2	0	9/11/1990	1.25	0
9/12/2018	1.25	0	5/14/2007	2	0	6/29/1990	2	0
7/2/2018	1.75	0	5/14/2007	2	0	8/3/1989	4.5	3
9/14/2017	2	0	5/14/2007	1.75	0	8/3/1989	1.75	0
9/14/2017	1.75	0	5/14/2007	1.75	0	8/8/1984	1.75	0
9/14/2017	1.75	0	5/14/2007	1.75	0	8/8/1984	1.75	0
9/14/2017	1.75	0	5/14/2007	1.5	0	8/8/1984	1.5	0
9/14/2017	1.5	0	5/14/2007	1.5	0	7/12/1982	2	0
7/17/2017	2.5	0	7/28/2006	1.5	0	7/12/1982	2	0
7/17/2017	1.75	0	7/28/2006	1.5	0	7/12/1982	2	0
7/17/2017	1.25	0	7/16/2006	4	0	5/10/1982	1.75	0
6/19/2016	1.25	0	5/28/2006	1.75	0	5/10/1982	1.75	0
6/5/2016	1.5	0	5/5/2005	1.75	0	5/10/1982	1.75	0
3/8/2016	1.5	0	4/18/2004	2	0	8/29/1980	1.5	0
8/8/2015	1.5	0	4/18/2004	1.75	0	7/10/1980	2.75	0
5/7/2014	1.5	0	4/18/2004	1.25	0	7/4/1980	1.75	0
7/22/2012	1.75	0	7/19/2003	1.75	0	6/25/1979	1.5	0
7/2/2012	1.75	0	9/2/2002	2.75	0	7/16/1977	2.5	0
7/2/2012	1.5	0	9/2/2002	2	0	7/16/1977	1.75	0
7/2/2012	1.25	0	8/1/2002	1.75	0	8/12/1975	1.75	0
5/28/2012	1.75	0	6/22/2002	1.75	0	6/3/1974	1.75	0
5/28/2012	1.5	0	6/22/2002	1.75	0	8/17/1971	1.25	0
8/8/2011	1.5	0	7/1/2000	1.75	0	5/21/1970	1.75	0
7/27/2010	1.5	0	9/7/1999	1.25	0	8/12/1968	1.75	0
6/24/2010	1.75	0	8/23/1998	3.5	0	8/12/1968	1.75	0
5/24/2010	1.5	0	8/23/1998	1.5	0	7/16/1965	1.5	0
9/26/2008	1.5	0	8/23/1998	1.25	0	7/1/1965	1.75	0
8/28/2008	1.25	0	9/18/1997	2	0	5/4/1964	1.5	0
7/11/2008	1.25	0	7/11/1996	2.5	0	9/8/1958	4	0
8/27/2007	1.75	0	7/11/1996	1.75	0	5/26/1958	2.5	0
6/7/2007	1.75	0	8/22/1995	2.75	0			
5/14/2007	3	0	7/21/1995	1.75	0			
5/14/2007	2.5	0	8/27/1994	2.5	0			

Source: National Centers for Environmental Information

Hail and Climate Change

According to the Federal Advisory Committee Draft National Climate Assessment (NCA), trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail,

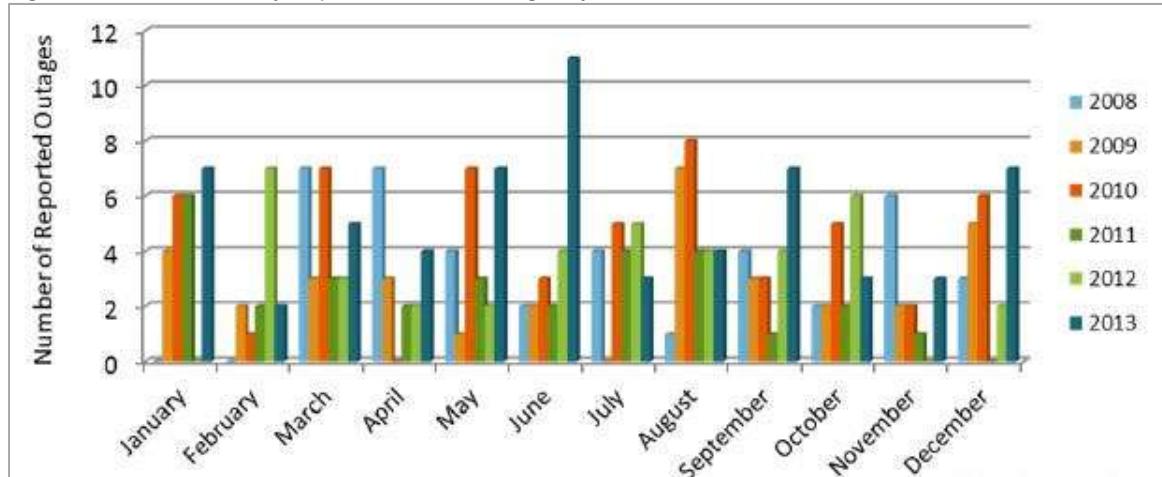
and damaging thunderstorm winds are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

The occurrence of very heavy precipitation has increased in Minnesota in recent decades and future projections also indicate this will continue (International Climate Adaptation Team, 2013). While it is unknown if this precipitation will occur during severe storms that produce hail, the possibility has not been ruled out.

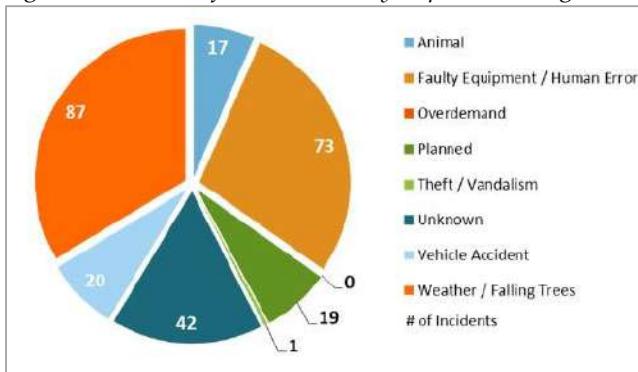
Severe Summer Storms and Electrical Outages

According to NOAA data, the natural hazards that caused the greatest overall property loss in Minnesota between 1996 and 2014 were thunderstorms and lightning, at \$86.3 million per year. The state also experienced 23 electric transmission outages from 1992 to 2009, five of which were due to heat waves and thunderstorms. On average, the number of people affected annually by all electric outages during 2008 to 2013 in Minnesota was 449,995, with a high of 1,460,810 in 2011 (U.S. Department of Energy, 2015). Figure 11 below shows the seasonality of electric outages by month for the years 2008-2013, and Figure 12 shows the causes of outages in the state between 2008 and 2013, with the largest cause being weather/falling trees.

Figure 11. Electric Utility Reported Power Outages by Month in Minnesota (2008-2013)



Source: U.S. Department of Energy, 2015

Figure 12. Causes of Electric-Utility Reported Outages in Minnesota (2008-2013)

Source: U.S. Department of Energy, 2015

Vulnerability

Summer storms affect St. Louis County each year, so there is a 100% probability that the county and its jurisdictions will be affected. According to the 68-full-year NCEI record, there is a 75% chance of a significant hailstorm any year in St. Louis County and a 54% chance in each year that there will be a hailstorm that produces hail greater than one inch in size.

The magnitude of summer storms each year is unpredictable and within St. Louis County the vulnerability of jurisdictions to summer storms does not vary geographically. As with all summer storms, those who work outdoors or do not have permanent housing are at greater risk.

St. Louis County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to summer storms (includes hail) and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Aboveground Power Lines – A majority of the power lines in the county are aboveground and subject to damage from high winds and falling tree limbs from severe summer storms. Power lines that are aboveground are susceptible to coming down during severe storms, resulting in power outages. St. Louis County is very large and encompasses very rural areas.

Backup Power – Following the 2016 blowdown and prolonged power outage, it was quickly learned that not all county facilities had backup power to continue operations during the outage. St. Louis County started to evaluate all critical buildings and services. Many cities and townships do not have adequate backup power to their facilities.

Communications – Not all residents have opted in to the Northland Alert notification system for cell phones. St. Louis County has recently created a Facebook page but that is currently our only social media.

Warning Sirens – Not all areas have outdoor warning sirens. Due to the vast area of St. Louis County, having sirens to cover the entire county isn't feasible.

Storm Shelters / Community Safe Rooms – Additional storm shelter areas would enhance public safety. Construction or retrofit of facilities to serve as community safe rooms for severe wind events should also be evaluated for areas where there are vulnerable populations, such as campgrounds, mobile home parks and schools.

4.3.5 Flash Flood and Riverine Flood

Flooding is the most significant and costly natural hazard in Minnesota. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel. Flash floods generally occur in the upper parts of drainage basins and are typically characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another 18 inches might carry off a car. Generally, flash floods cause damage over relatively localized areas, but they can be quite severe. Flash floods in urban areas involve the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Flash floods can occur at any time of the year in Minnesota, but they are most common in the spring and summer. St. Louis County frequently experiences flash floods.

Riverine floods refer to floods on large rivers at locations with large upstream catchments. Riverine floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and the flood peak is much longer for riverine floods than for flash floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage.

Nationwide, floods caused 4,586 deaths from 1959 to 2005 while property and crop damage averaged nearly \$8 billion per year (in 2011 dollars) from 1981-2011 (Georgakakos, et al., 2014).

During the past several decades, agencies have used the “100-year floodplain” as the design standard for projects funded by the federal government. However, today floods of that magnitude are occurring far more often than once per century (Natural Resources Defence Council, 2015). In recognition of increasing risks, in January of 2015 the President issued an executive order that updates flood protection standards that guide federally-funded projects in or near floodplains or along coastlines. These new standards require federally-funded projects to either build two feet above the 100-year flood elevation for standard projects and three feet above for critical buildings like hospitals and evacuation centers; or build to the 500-year flood elevation (The White House, 2015).

Flood History in St. Louis County

St. Louis County has experienced many floods and flash floods, some resulting in severe property damage.

Thunderstorms in June of 2016 resulted in flooding west of Cook, after more than 4.5 inches of rain fell. A road washed out near the intersection of Highway 5 and Lender Road.

In July of 2014 water levels on Rainy Lake rose to levels not seen since 1950, following weeks of heavy rains over the Rainy Lake Basin. High water levels on Lake Kabetogama inundated docks, in addition to damaging and destroying lakeshore property.

In June of 2012, the region's most damaging flood on record severely impacted St. Louis County, resulting in the declaration of a state of emergency in Duluth, Hermantown, Cloquet, Barnum, Moose Lake and Superior, WI.

According to the United States Geological Survey report *Floods of June 2012 in Northeastern Minnesota* (USGS),

During June 19–20, 2012, heavy rainfall, as much as 10 inches locally reported, caused severe flooding across northeastern Minnesota. The floods were exacerbated by wet antecedent conditions from a relatively rainy spring, with May 2012 as one of the wettest Mays on record in Duluth. The June 19–20, 2012, rainfall event set new records in Duluth, including greatest 2-day precipitation with 7.25 inches of rain. The heavy rains fell on three major watersheds: the Mississippi Headwaters; the St. Croix, which drains to the Mississippi River; and Western Lake Superior, which includes the St. Louis River and other tributaries to Lake Superior. Widespread flash and river flooding that resulted from the heavy rainfall caused evacuations of residents, and damages to residences, businesses, and infrastructure. In all, nine counties in northeastern Minnesota were declared Federal disaster areas as a result of the flooding... Flood-peak streamflows in June 2012 had annual exceedance probabilities estimated to be less than 0.002 (recurrence interval greater than 500 years) for five streamgages, and between 0.002 and 0.01 (recurrence interval greater than 100 years) for four streamgages.

Table 20 below lists St. Louis County's historical floods as recorded by the NCEI. No deaths or injuries were recorded with these floods.

Table 20. St. Louis County Historical Floods, 1996–July 2019

Location or County	Date	Type	Deaths	Injuries	Property Damage
Side Lake	9/15/2018	Flash Flood	0	0	unknown
Cook	7/12/2018	Flash Flood	0	0	unknown
Palmers	7/8/2018	Flash Flood	0	0	unknown
Cook	6/16/2018	Flash Flood	0	0	unknown
Cook	6/16/2018	Flash Flood	0	0	unknown
Missabe Jct	6/15/2018	Flash Flood	0	0	unknown
Missabe Jct	6/15/2018	Flash Flood	0	0	unknown
Markham	9/14/2017	Flash Flood	0	0	unknown
Markham	9/14/2017	Flash Flood	0	0	unknown
Polo	9/14/2017	Flash Flood	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Polo	9/14/2017	Flash Flood	0	0	unknown
Makinen	9/14/2017	Flash Flood	0	0	unknown
Central Lakes	9/14/2017	Flash Flood	0	0	unknown
Bear River	6/13/2016	Flood	0	0	\$1,000
Crane Lake	7/1/2014	Flood	0	0	\$1,000
Kabetogama	6/14/2014	Flood	0	0	unknown
Kabetogama	6/14/2014	Flood	0	0	unknown
Mahoning	4/30/2013	Flood	0	0	unknown
Pequaywan Lake	6/21/2012	Flood	0	0	unknown
Pequaywan Lake	6/21/2012	Flood	0	0	unknown
Duluth Hgts	6/20/2012	Flash Flood	0	0	unknown
Duluth Intl Arpt	6/20/2012	Flash Flood	0	0	unknown
Saginaw	6/20/2012	Flash Flood	0	0	unknown
Hermantown	6/20/2012	Flash Flood	0	0	unknown
Missabe Jct	6/20/2012	Flash Flood	0	0	unknown
Duluth Hgts	6/20/2012	Flash Flood	0	0	unknown
Fond Du Lac	6/20/2012	Flash Flood	0	0	unknown
Floodwood	6/20/2012	Flash Flood	0	0	unknown
Duluth Hgts	6/19/2012	Flash Flood	0	0	unknown
Duluth Hgts	6/19/2012	Flash Flood	0	0	unknown
Hunters Park	6/19/2012	Flash Flood	0	0	unknown
Hermantown	6/19/2012	Flash Flood	0	0	unknown
Duluth Hgts	6/19/2012	Flash Flood	0	0	unknown
Duluth Hgts	6/19/2012	Flash Flood	0	0	unknown
Hermantown	6/19/2012	Flash Flood	0	0	unknown
Duluth Hgts	5/28/2012	Flash Flood	0	0	unknown
Fond Du Lac	8/8/2011	Flash Flood	0	0	unknown
Sturgeon	6/27/2011	Flash Flood	0	0	unknown
Smithville	8/7/2010	Flash Flood	0	0	unknown
North Hibbing	8/1/2010	Flash Flood	0	0	unknown
Kabetogama	7/1/2010	Flash Flood	0	0	unknown
Duluth	10/18/2007	Flood	0	0	unknown
Gheen	5/21/2007	Flash Flood	0	0	unknown
Southern St. Louis / Carlton (Zone)	6/25/2002	Flood	0	0	unknown
Southern St. Louis / Carlton (Zone)	6/24/2002	Flood	0	0	unknown
Southern St. Louis / Carlton	6/23/2002	Flood	0	0	unknown

Location or County (Zone)	Date	Type	Deaths	Injuries	Property Damage
Virginia	6/22/2002	Flash Flood	0	0	unknown
Central Portion	7/5/1999	Flash Flood	0	0	unknown
Southeast Portion	7/5/1999	Flash Flood	0	0	unknown
Duluth	6/24/1997	Flash Flood	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/6/1997	Flood	0	0	\$160,800
Duluth	7/6/1996	Flash Flood	0	0	\$300,000

Source: National Centers for Environmental Information

The National Oceanic and Atmospheric Administration (NOAA) Advanced Hydrologic Prediction Service provides information from gauge locations at points along various rivers across the United States. Five USGS gauging stations are located in St. Louis County, listed in Table 21 below, along with data on their highest-recorded gauge heights.

Table 21. Historical Flood Crests for USGS Gauging Stations in St. Louis County

Historical Flood Crests for Vermilion River near Crane Lake		Historical Flood Crests for St. Louis River near Skibo		Historical Flood Crests for Knife River near Two Harbors		Historical Flood Crests for Stoney Brook near Brookston		Historical Flood Crests for Superior Bay, Duluth	
Date	Height (Feet)	Date	Height (Feet)	Date	Height (Feet)	Date	Height (Feet)	Date	Height (Feet)
4/25/1985	15.20	6/24/2012	20.79	6/20/2012	12.81	5/2/2013	8.62	N/A	N/A
Apr. 1979	15.15	4/25/2016	20.22	7/5/1999	12.14	5/2/2014	8.08	N/A	N/A
4/14/2011	14.76	5/9/2013	19.97	5/10/1979	11.16	3/17/2016	8.08	N/A	N/A
5/26/2001	14.19	4/23/2017	19.57	6/24/1997	10.29	4/27/2008	7.70	N/A	N/A
4/26/2008	14.01	9/7/2015	19.51	6/29/1991	9.82	5/18/2017	7.53	N/A	N/A
5/4/2013	13.98	N/A	N/A	7/4/1993	9.53	3/25/2009	6.49	N/A	N/A
6/4/2014	13.96	N/A	N/A	9/24/1977	8.94	3/25/2012	6.49	N/A	N/A
4/26/1996	13.38	N/A	N/A	5/29/1978	8.43	4/4/2006	5.91	N/A	N/A
8/24/1988	13.23	N/A	N/A	8/25/1995	8.19	5/18/2015	5.65	N/A	N/A
4/25/1982	13.04	N/A	N/A	9/4/1980	8.09	8/21/2010	5.52	N/A	N/A

Source: USGS

Flooding and Climate Change

As Minnesota's climate changes, the quantity and character of precipitation is changing. Average precipitation has increased in the Midwest since 1900, with more increases in recent years. The Midwest has seen a 45% increase in very heavy precipitation (defined as the heaviest 1% of all daily events) from 1958 to 2011 (National Climate Assessment Development Advisory Committee, 2013). This precipitation change has led to amplified magnitudes of flooding. Increased precipitation may also

show seasonal changes, trending toward wetter springs and drier summers and falls. An example of a recent year with this character was 2012, when many MN counties were eligible for federal disaster assistance for drought, while others were eligible for flooding, and seven were eligible for both in the same year (Seeley M., 2013). In 2007, 24 Minnesota counties received drought designation, while seven counties were declared flood disasters. In 2012, 55 Minnesota counties received federal drought designation at the same time 11 counties declared flood emergencies. In addition, the yearly frequency of the largest storms – those with three inches or more of rainfall in a single day – has more than doubled in just over 50 years. In the past decade, such dramatic rains have increased by more than 7% (MN Environmental Quality Board, 2014).

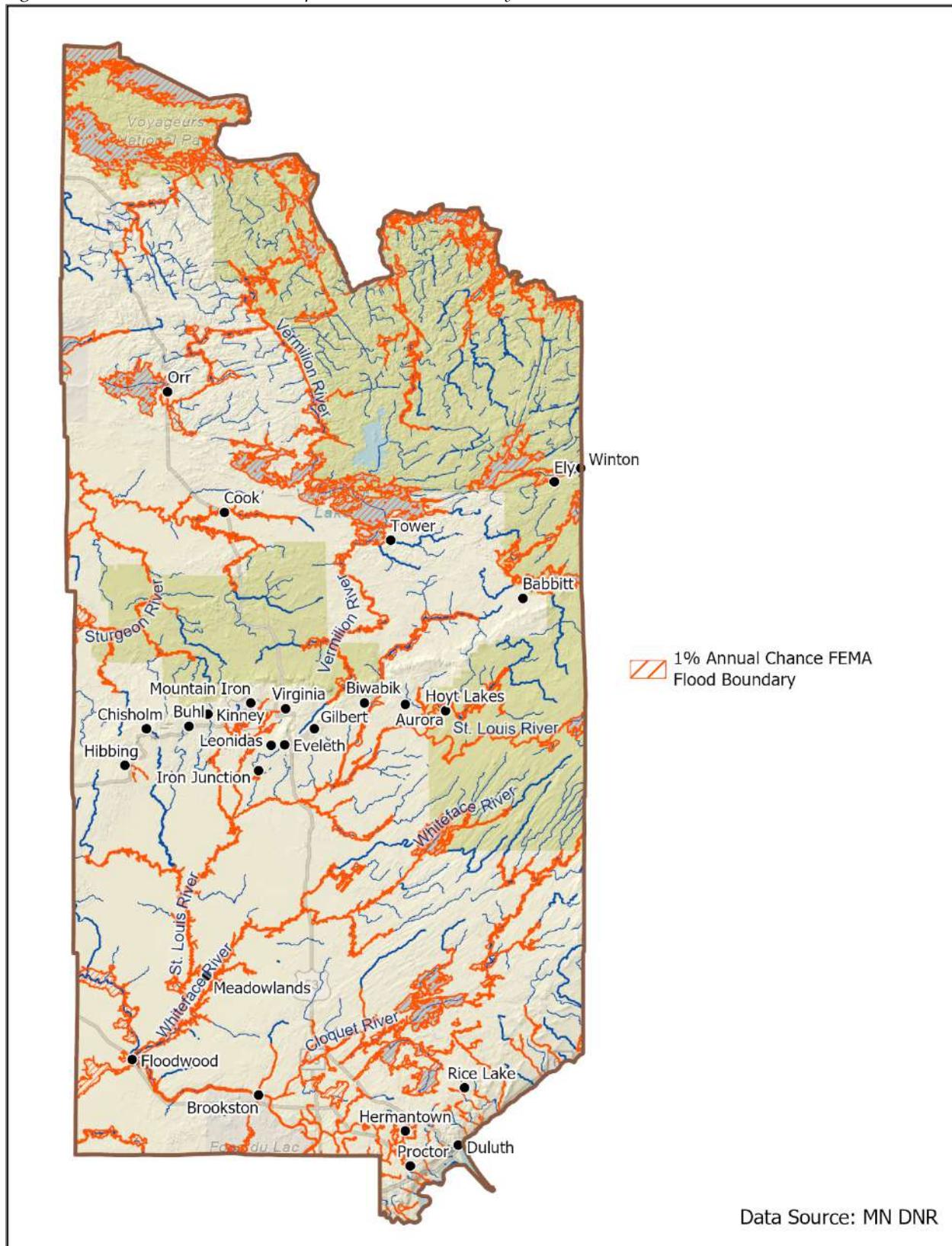
Southeastern Minnesota has experienced three 1000-year floods in the past decade: in September 2004, August 2007, and September 2010 (Meador, 2013). The 2004 flood occurred when parts of south-central Minnesota received over eight inches of precipitation. Faribault and Freeborn counties received over 10 inches in 36 hours. The deluge led to numerous reports of stream flooding, urban flooding, mudslides, and road closures (MN DNR, 2004). During the 2007 event, 15.10 inches fell in 24 hours in Houston County, the largest 24-hour rainfall total ever recorded by an official National Weather Service reporting location. The previous Minnesota record was 10.84 inches in 1972. The resulting flooding from the 2007 rainfall caused seven fatalities (MN DNR, 2007). In September 2010, a storm on the 22-23rd resulted in more than six inches of rain falling over 5,000 square miles in southern Minnesota. Rainfall totals of more than eight inches were reported in portions of 10 counties. The heavy rain, falling on soils already sodden from a wet summer, led to numerous reports of major rural and urban flooding. For many monitoring locations in southern Minnesota, stream discharge resulting from the deluge was the highest ever seen during an autumn flood (Minnesota Climatology Working Group, 2010).

June 2014 was the wettest month on record in Minnesota, with a state-averaged rainfall of 8.03 inches. This broke the previous record of 7.32 inches, which occurred in both July 1897 and June 1914. Rainfall totals for much of the state ranked above the 95th percentile when compared with the historical record; in some cases the totals tripled that of the historical rainfall average for June. A presidential disaster declaration was declared due to the severe storms, winds, flooding, landslides, and mudslides (DR-4182), which included 37 Minnesota counties and three Indian Reservations.

Vulnerability and Hazus Flood Risk Analysis

A potential risk and economic loss analysis for a 1% annual chance flood was performed using a FEMA tool, Hazus for ArcGIS. A preliminary Digital Flood Insurance Rate Map (DFIRM) defined the 1% annual chance flood boundary and a 10-meter Digital Elevation Model (DEM) was used to create a flood depth grid. Some sections of St Louis County are being updated, however those data were not available at the time of this analysis. The resulting Hazus 1% annual chance floodplain output is shown in Figure 13.

Figure 13. 1% Annual Chance Floodplain in St. Louis County



Losses were based on St. Louis County-specific building data. St. Louis County provided parcel tax and spatial databases that included building valuations, occupancy class, square footage, year built, and number of stories. The quality of the inventory is the limiting factor to a Hazus flood model loss estimation. Best practices were used to use local data and assumptions were made to populate missing (but required) values.

Hazus reports the percent damage of each building in the floodplain, defined by the centroid of each building footprint polygon derived using LiDAR data. After formatting the tax and spatial data, 155,662 points were input to Hazus to represent buildings with a total estimated building plus contents value of \$9.5 billion. Approximately 92% of the buildings (and 70% of the building value) are associated with residential housing.

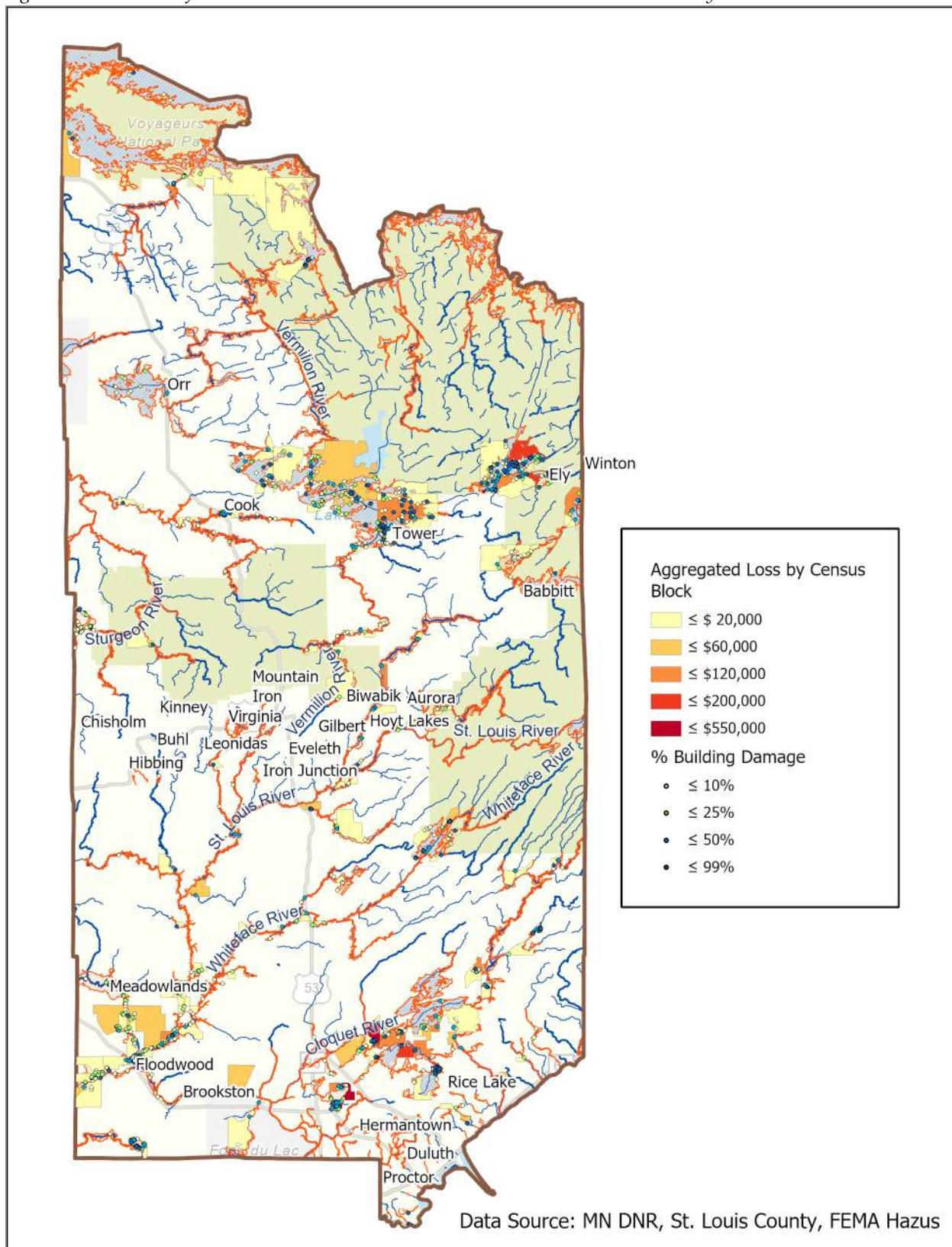
The estimated loss by occupancy class for the whole county is shown in Table 22.

The distinction between the building attributes within a parcel was not known. The maximum damage to a building in that parcel was used to calculate loss estimates. The sum of all the losses in each census block were aggregated for the purposes of visualizing the loss. An overview of these results with the percent damage of buildings is shown in Figure 14. It is possible for a point to report no loss even if it is in the flood boundary. For example, if the water depth is minimal relative to 1st-floor height, there may be 0% damage.

Table 22. Summary of 1% Annual Chance Flood Loss Estimation by Occupancy Class

General Occupancy	County Total Buildings	County Building + Contents	Buildings In Floodplain	Floodplain Building + Contents Value	Buildings with Damage	Building + Contents Loss
Residential	143,231	\$17,740,213,616	1486	\$115,337,861	873	\$10,285,546
Commercial	4,250	\$2,974,159,224	37	\$2,376,886	25	\$121,445
Other	8,181	\$4,515,299,639	184	\$8,141,624	84	\$517,265
Totals	155,662	\$25,229,672,479	1,707	\$125,856,371	982	\$10,924,257

Figure 14. Overview of 1% Annual Chance Flood Loss Estimation in St. Louis County



The sum of all the losses in each census block were aggregated to the census county subdivision units for the purpose of summarizing losses by jurisdiction. Estimated losses by jurisdiction are shown below in Table 23. Those jurisdictions with the greatest losses are mapped in Figure 15 and Figure 16.

Table 23. Loss Estimates by Jurisdiction in St. Louis County

Name	Parcels	Buildings	Estimated Loss
Ault township	4	5	\$74,385.49
Beatty township	17	21	\$598,346.15
Birch Lake UT	12	13	\$306,455.54
Biwabik city	1	1	\$270,341.08
Biwabik township	3	5	\$117,375.29
Breitung township	67	98	\$2,020,229.54
Brookston city	1	1	\$46,568.40
Canosia township	1	1	\$15,812.40
Cedar Valley township	5	12	\$107,909.79
Cherry township	1	1	\$399.76
Colvin township	10	11	\$202,356.97
Cook city	52	69	\$1,268,553.02
Cotton township	6	8	\$130,914.60
Crane Lake township	15	20	\$1,317,880.82
Culver township	1	2	\$113,743.96
Duluth city	4	8	\$298,232.24
Ellsburg township	3	3	\$657.79
Elmer township	7	21	\$118,691.92
Ely city	5	5	\$40,259.38
Embarrass township	3	4	\$37,062.35
Field township	1	1	\$548.40
Fine Lakes township	36	39	\$577,900.64
Floodwood township	9	21	\$177,548.01
Fredenberg township	19	20	\$1,262,004.56
French township	28	32	\$373,422.91
Gnesen township	12	12	\$1,445,134.21
Grand Lake township	65	104	\$2,898,184.93
Greenwood township	63	69	\$1,686,416.27
Halden township	10	21	\$352,251.22
Hay Lake UT	2	2	\$758.67
Hermantown city	2	2	\$136,568.30
Hoyt Lakes city	2	2	\$0.84
Kabetogama township	2	2	\$111,596.55

Name	Parcels	Buildings	Estimated Loss
Kelsey township	3	3	\$21,853.78
Lakewood township	2	2	\$171,803.38
Lavell township	2	2	\$64,940.50
Leiding township	4	4	\$45,263.30
Linden Grove township	1	1	\$2,482.96
Makinen UT	10	18	\$301,909.50
McDavitt township	3	3	\$7,817.69
Meadowlands township	6	12	\$28,199.73
Morse township	110	118	\$8,672,514.16
Ness township	3	5	\$15,480.63
North Star township	3	3	\$114,425.47
Northeast St. Louis UT	7	8	\$13,316.33
Northwest St. Louis UT	16	25	\$605,051.86
Orr city	2	2	\$27,666.54
Owens township	4	4	\$56,335.59
Pequaywan township	12	12	\$308,261.40
Pike township	3	5	\$3,496.89
Portage township	1	1	\$87.70
Potshot Lake UT	9	25	\$321,469.81
City of Rice Lake	27	27	\$3,010,652.54
Sand Lake UT	2	2	\$115,893.75
Solway township	4	4	\$26,368.57
Stoney Brook township	1	1	\$20,428.00
Toivola township	1	1	\$27,494.52
Tower city	7	23	\$98,885.29
Van Buren township	23	40	\$719,593.54
Vermilion Lake township	5	7	\$50,184.43
White township	7	9	\$25,493.21
Whiteface Reservoir UT	17	17	\$604,696.00
Wuori township	1	4	\$1,768.15
Grand Total	765	1,024	\$31,592,347.19

The townships of Breitung, Greenwood and Morse surrounding the cities of Tower and Ely had numerous building identified in the 1% annual chance flood boundary. These buildings are mostly on Lake Vermilion and Burntside Lake shores and islands, and probably represent mostly residential losses. Likewise, the City of Rice Lake and Grand Lake, Gnesen and Fredenberg townships in the

southern part of the county have numerous buildings that are identified in the 1% annual chance flood zone surrounding Fish Lake, Island Lake, Grand Lake and Wild Rice Lake Reservoir.

Figure 15. Breitung, Greenwood and Morse Townships and the Cities of Tower and Ely

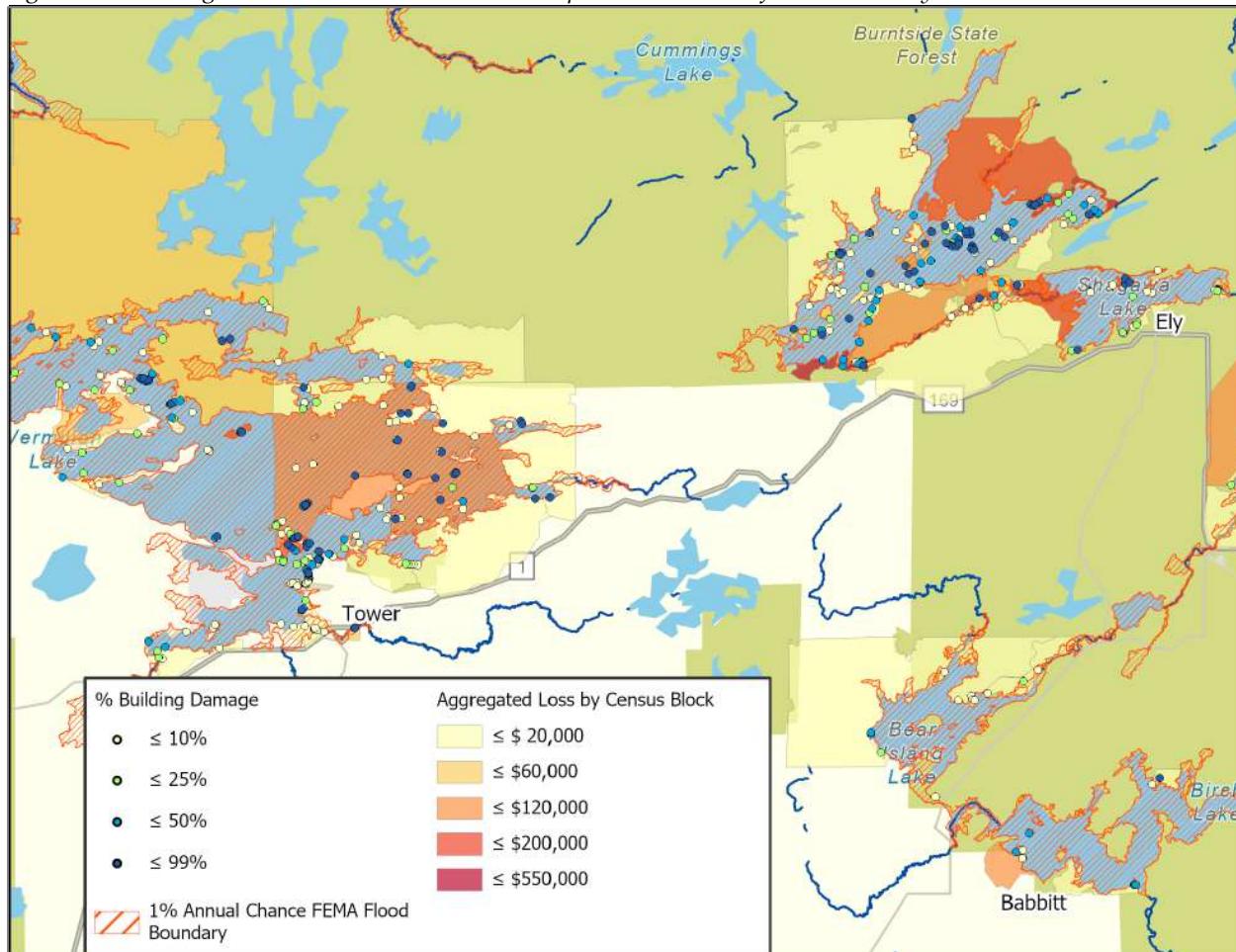
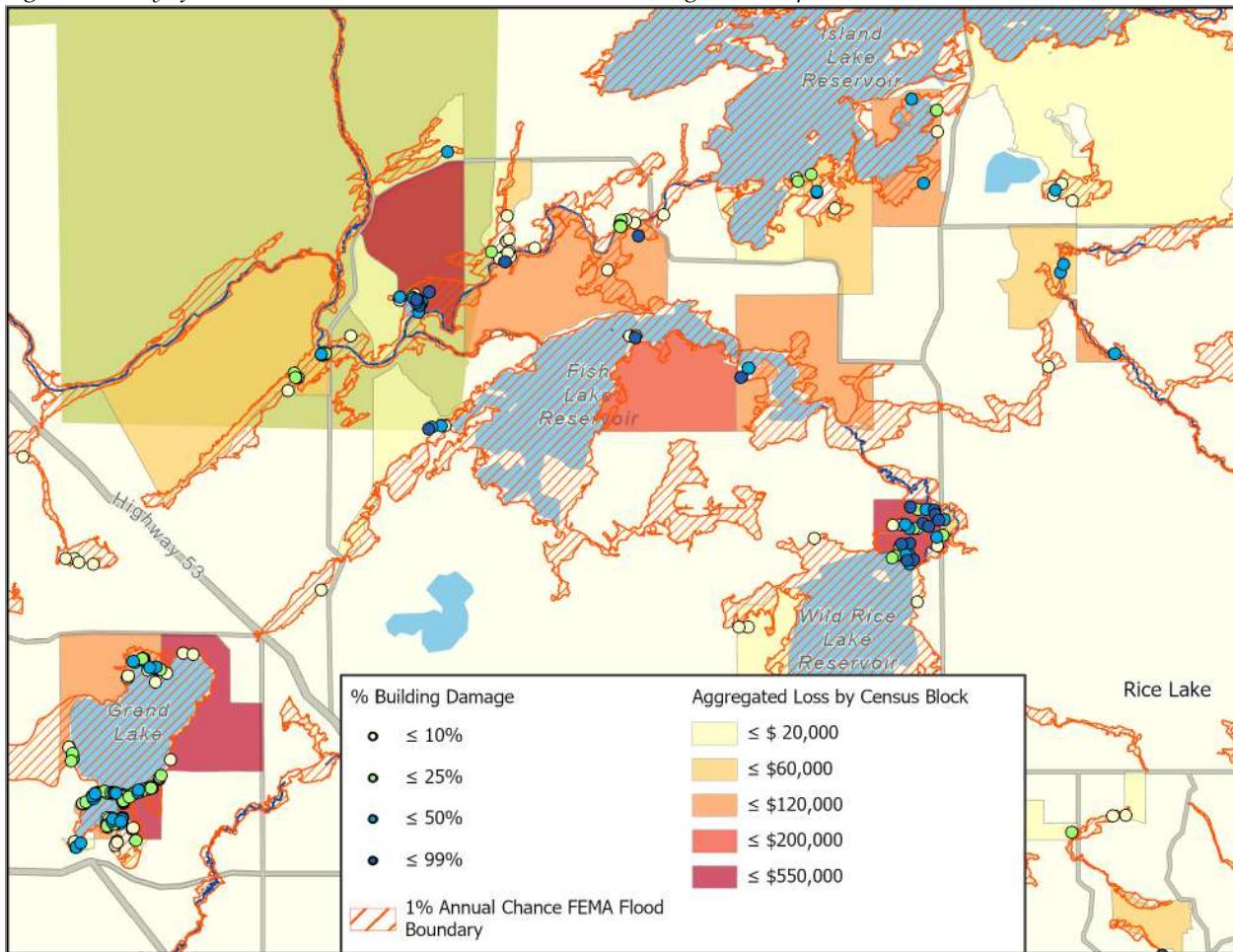


Figure 16. City of Rice Lake, Grand Lake, Gnesen and Fredenberg Townships



Hazus Critical Infrastructure Loss Analysis

Critical facilities and infrastructure are vital to the public and their incapacitation or destruction would have a significant negative impact on the community. These facilities and infrastructures were identified in Section 3.8 and verified by St. Louis County.

Buildings identified as essential facilities for the Hazus flood analysis include hospitals, police and fire stations, and schools (often used as shelters). Loss of essential facilities are vulnerable to structural failure, extensive water damage, and loss of facility functionality during a flood, negatively impacting the communities relying on these facilities' services. Fortunately, none of St. Louis County's essential facilities included in the Hazus flood analysis are located within the floodplain.

It is important to identify if any critical infrastructure within the 1% annual chance floodplain, given the higher risk of the facility or infrastructure being incapacitated or destroyed during a flood. In St. Louis County, the following critical infrastructure point locations were intersected with the 1% annual chance floodplain. Any point intersecting the floodplain was then checked with aerial photos and address to confirm. Two critical facilities were found to be in the 1% annual chance flood boundary (Table 24). The

United States Customs and Border Protection Office in Crane Lake and the Cook Public Library are shown in Figure 17 and Figure 18 respectively.

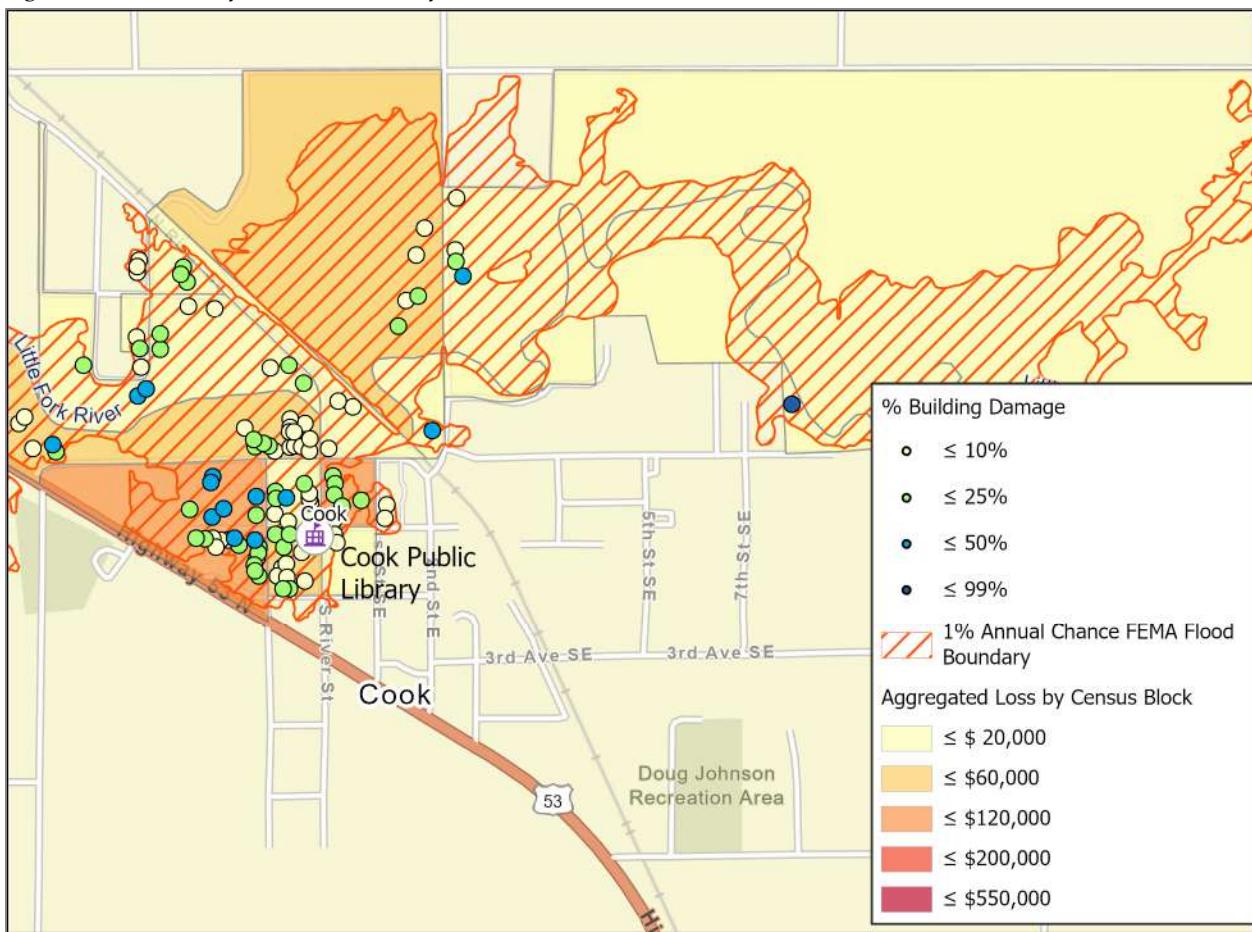
Table 24. Critical Infrastructure Locations Identified in the 1% Annual Chance Flood Zone

Name	Location
United States Customs and Border Protection (Federal Police Services)	7544 Gold Coast Road, Crane Lake
Cook Public Library	103 S River St, Cook

Figure 17. Critical Infrastructure Identified in 1% Annual Flood Zone in Crane Lake



Figure 18. Critical Infrastructure Identified in 1% Annual Flood Zone in Cook



The status of jurisdictional participation in the National Flood Insurance Program and any repetitive loss properties are detailed in Section [Error! Reference source not found.](#).

St. Louis County Emergency Management identified that there are existing program gaps and deficiencies that make its citizens more vulnerable to flooding and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Surface Water Run-off Management – Controlling runoff from various sources continues to be a challenge and priority to control what runs downstream.

Road Infrastructure – Continued culvert replacement to prevent road flooding is a strain on our smaller townships that have limited funding for road infrastructure.

4.3.6 Severe Winter Storms – Blizzards, Ice Storms

Blizzards are storms that contain heavy snowfall, strong winds and cold temperatures. The combination of these elements creates blinding snow with near zero visibility, deep snowdrifts, and life-threatening wind chill temperatures. Blizzards are the most dramatic and destructive of all winter storms that occur within St. Louis County, and are generally characterized as storms bearing large amounts of snow accompanied by strong winds. They have the ability to completely immobilize travel

in large areas and can be life-threatening to humans and animals in their path. According to the National Weather Service (NWS), there is no fixed temperature requirement for blizzard conditions, but the life-threatening nature of low temperatures in combination with blowing snow and poor visibility increases dramatically when temperatures fall below 20°F. Blizzards typically occur between October and April; however, they occur most frequently from early November to late March.

The greatest numbers of blizzards historically have occurred in the months of January, followed by March and November, respectively. St. Louis County, along with all areas of Minnesota, is susceptible to blizzards.

Figure 19. Thanksgiving Weekend Blizzard, 2019



ALEX KORMANN, ASSOCIATED PRESS

Damages from blizzards can range from human and livestock deaths to significant snow removal costs. Stranded drivers can make uninformed decisions, such as leaving the car to walk in conditions that put them at risk. Because of the blinding potential of heavy snowstorms, drivers are also at risk of collisions with snowplows or other road traffic. Drivers and homeowners without emergency plans and kits are vulnerable to the life-threatening effects of heavy snowstorms such as power outages, cold weather, and inability to travel, communicate, obtain goods or reach their destinations. Heavy

snow loads can cause structural damage, particularly in areas where there are no building codes or where residents live in manufactured home parks. The frequency of structural fires tends to increase during heavy snow events, primarily due to utility disruptions and the use of alternative heating methods by residents.

Between the years of 1975 and 1991, there were 49 deaths associated with blizzards statewide, or an average of three deaths per year. Deaths attributable to blizzards have dropped in recent years, primarily due to increased weather awareness and warning capabilities across the state. The economic costs of winter storms are generally not recorded by the NCEI; however, a winter storm in November 2001 resulted in property damage of \$500,000.

Ice storms are described as occasions when damaging accumulations of ice occur due to freezing rain. The terms freezing rain and freezing drizzle warn the public that a coating of ice is expected on the ground and other exposed surfaces. 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 while utility companies work to repair extensive damage. Ice forming on exposed objects generally ranges from a thin glaze to coatings more than one inch thick. Even small accumulations of ice on sidewalks, streets, and highways may cause extreme hazards to St. Louis County motorists and pedestrians. Sleet does not stick to trees and wires, but sleet of sufficient thickness does cause hazardous driving conditions. Heavy sleet is a relatively rare occurrence, defined as an accumulation of ice pellets covering the ground to a depth of ½-inch or more.

Ice and sleet storms typically occur from October through April. The NWS notes that over 85% of ice storm-related deaths are the result of traffic accidents. The NCEI has recorded two ice storms in St. Louis County: in January of 1996 and November of 1996. No deaths or injuries were reported.

Observing winter storm watches and warnings and adequate preparation can lessen the impact of blizzard events in Minnesota. Technical advances made in transportation, including safer vehicles and improved construction and maintenance of roads, have also contributed to the decline in deaths related to blizzards. Historical estimates of dollar losses associated with blizzards were not available for the purposes of this analysis. However, costs incurred by state and local government for snow removal associated with disaster declaration DR-1158 (January 1997) totaled over \$27,300,000 dollars. Blizzards rank 9th out of the 10 natural hazards economically impacting Minnesota according to the statewide risk analysis. The chance that another winter storm affecting St. Louis County will occur is highly probable.

Severe Winter Storm History in St. Louis County

The total of notable events defined as heavy snows, blizzards, lake-effect snow, winter weather, ice storms and winter storms in St. Louis County recorded by the NCEI from 1996 to July 2019 is 346. An overview of some of the most notable winter storm events is provided in Table 25 below.

Table 25. Notable Winter Weather Events in St. Louis County

Date	Type	Deaths	Injuries	Property Damage	Description
12/1/2019	Winter Storm, Blizzard, Freezing Rain	0	Unknown	Unknown	The Duluth International Airport reported 11 straight hours of heavy snow, with winds gusting as high as 51 mph and visibilities as low as 1/16 of a mile. Duluth reported 19 straight hours of visibilities limited to a half-mile or less. Snowfall total was 21.7 inches.
4/15/2018	Winter Storm	0	0	\$9,000,000	A severe spring snowstorm resulted in 15-foot waves on Lake Superior, causing high surf that led to coastal flooding in Duluth. The Duluth Lakewalk was heavily damaged, with an estimated \$9 million in property damage.
10/27/2017	Winter Storm	0	0	Unknown	An early winter storm brought gusts over 50 mph, causing waves up to 16 feet. Portions of the Duluth Lakewalk, Brighton Beach, Canal Park and Park Point were damaged. The Minnesota Governor authorized a disaster declaration, with \$2.12 million from the state and \$1.38 million from local governments for repairs and cleanup.
2/29/2012	Blizzard	0	0	\$1,000,000	Blizzard conditions occurred from the Duluth Airport eastward throughout the city and along Lake Superior. Heavy winds damaged the roof of a 157,000 square foot building belonging to the Seaway Port Authority. Damage was estimated at \$1 million.

Date	Type	Deaths	Injuries	Property Damage	Description
11/26/2001	Winter Storm	0	0	\$500,000	Winds gusting over 50 mph occurred in the Duluth Harbor, resulting in 16-foot waves that obliterated parts of the Duluth shoreline and tore apart 5% of the Duluth Lakewalk, causing \$500,000 in damage.
4/22/2001	Ice Storm	0	0	\$4,200,000	Freezing rain fell in the higher elevations inland from Lake Superior, resulting in inch-thick ice on trees, power lines and roadways. Downed power lines caused power outages up to three days in length, affecting approximately 22,000 homes and business. Many homes and vehicles were damaged by collapsing trees and branches.

Severe Winter Storms and Climate Change

Historically, winter storms have had a large impact on public safety in Minnesota. This will continue, with a possible increase in snowstorm frequency and annual total snowfall. Winter weather is often a cause of power outages. Pressures on energy use, reduced reliability of services, potential outages and the potential rise in household costs for energy are major climate change risks to public health.

According to the 2015 Minnesota Weather Almanac, a recent study of seasonal snowfall records across the state from 1890-2000 showed that 41 of 46 climate stations recorded an increase in average annual snowfall, by as much as 10 inches. Higher snowfall levels can result in greater runoff potential during spring snowmelt, and many watersheds in Minnesota have shown more consistent measures of high-volume flows during spring, often at or above flood stage (Seeley M., 2015).

Severe Winter Storms and Electrical Outages

The leading cause of electric outages in Minnesota during 2008 to 2013 was weather/falling trees. Between 2008 and 2013, the greatest number of electric outages in Minnesota occurred during the month of March (U.S. Department of Energy, 2015).

Vulnerability

The number of heavy snowfall years for the Midwest has fluctuated between 1900 and 2006. The periods of 1900-1920 and 1960-1985 had numerous years with snowfall totals over the 90th percentile. In the past three decades, the number of heavy seasonal snowfall totals has been much lower. Despite these generally lower seasonal snowfall totals, some areas of the Midwest have still experienced significant snow totals in the most recent decade. The 100-year linear trends based on decadal values show that the upper Midwest had statistically significant (1% level) upward linear trends in snowstorm frequency from 1901 to 2000 (Kunkel, et al., 2013).

Winter storms affect St. Louis County each year, so there is a 100% probability that the county and its jurisdictions will be affected annually. The amount of snow and ice, number of blizzard conditions, and days of sub-zero temperatures each year are unpredictable and within St. Louis County the

vulnerability of jurisdictions to winter storms does not vary geographically. Citizens living in climates such as these must always be prepared for situations that put their lives or property at risk. It is not always the size of the storm or the depth of the cold, but an unprepared individual with a vehicle breakdown or lack of a personal winter safety kit that are at risk. Rural citizens are more vulnerable to issues with deep snow.

St. Louis County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to severe winter storms and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Aboveground Power Lines – A majority of the power lines in the county are aboveground and subject to damage from ice storms, wind, and falling tree limbs. Power lines that are aboveground are susceptible to coming down during severe winter storms, resulting in power outages. St. Louis County is very large and encompasses very rural areas.

Backup Power – Following the 2016 blowdown and prolonged power outage, it was quickly learned that not all county facilities had backup power to continue operations during the outage. St. Louis County started to evaluate all critical buildings and services. Many cities and townships do not have adequate backup power to their facilities.

Communications – Not all residents have opted in to the Northland Alert notification system for cell phones. St. Louis County has recently created a Facebook page, but that is currently our only social media.

4.3.7 Extreme Cold

Winter in St. Louis County can be severe, and especially dangerous for disabled citizens and outdoor workers. Record temperature lows and arctic-like wind chills can cause cold-related illnesses such as frostbite and hypothermia, which can be deadly. Hypothermia is the greatest and most life-threatening cold weather danger.

In St. Louis County, cold winter weather can have severe or fatal impacts. Hypothermia occurs when the core body temperature drops below 96°F. Anyone who is exposed to severe cold without enough protection can develop hypothermia. Frostbite occurs when skin tissue and blood vessels are damaged from exposure to temperatures below 32°F. It most commonly affects the toes, fingers, earlobes, chin, cheeks, nose, and other body parts that are often left uncovered in cold temperatures. The NWS issues “Extreme cold” warnings when it feels like -30°F or colder across a wide area for several hours. Extreme cold watches are issued a day or two before the conditions are expected.

The Wind Chill Index is a calculation that can be made with wind speed to communicate the dangers to bare skin from winter winds and freezing temperatures. The [NWS has produced a chart](#) to simplify this calculation. The classification zones are delineated in terms of time to frostbite on bare skin and are due to the lowering of body temperature due to the passing-flow of lower-temperature air. Criteria for issuing official NWS wind chill warnings are set locally.

Medical costs related to extreme heat and cold can be enormous: in 2005 the total was \$1.5 billion nationwide, or more than \$16,000 per patient (Union of Concerned Scientists, 2009).

Below zero temperatures occur almost every winter in Minnesota. January is the coldest month, with daytime highs averaging 20°F and nighttime lows averaging 2°F. However, these averages do not tell the whole story. Maximum temperatures in January have been as high as 61°F and minimums as low as 36°F below zero.

Extreme cold temperatures affect the county nearly every year. Extremely cold air settled over Minnesota 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, at -60°F. 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 2nd coldest day on record on February 2, 1996. A mean temperature of -25°F was measured that day with a high of -17°F and a low of -32°F 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.

In February of 2014, nearly all of Minnesota was between 10-15°F colder than normal (1981-2010 period) (High Plains Regional Climate Center, 2014). The winter of 2013-2014 was the sixth coldest on record in Minnesota (The Weather Channel, 2014), with schools in the Twin Cities canceling five times in January due to dangerous wind chills. It was the coldest winter in the Twin Cities in 35 years, with an average temperature for December-February of 9.7°F (MN DNR, 2014). Many areas in the state also experienced higher than average precipitation through the winter and spring months.

Extreme Cold History in St. Louis County

January is the coldest month on average in St. Louis County, with an average monthly minimum temperature of 3°F (based on data from 1895-2018). The coldest month on record for the county was January 1912, with a month-long average minimum temperature of -14°F (MN DNR, n.d.).

The National Centers for Environmental Information (NCEI) has recorded 153 extreme cold/wind chill events since 1996, resulting in 10 deaths and two injuries.

On January 12, 2017, a 29-year-old man was found dead in an Eveleth park after succumbing to hypothermia. Temperatures had fallen to -28°F.

Another death due to hypothermia occurred in central St. Louis County in January of 2016, when a man was found deceased outside. The low temperature was 5°F.

In January of 2015, a woman was found dead on a walking/biking trail. The official cause of death was hypothermia, secondary to alcohol intoxication. The temperature had fallen to teens below zero overnight.

Three deaths were attributed to severe cold in St. Louis County in 2014. In February, a Hibbing man was found dead in a snowbank near a driveway, after temperatures reached 16°F. In mid-January a woman from Embarrass was discovered frozen to death on her driveway. Nearby temperatures of -8°F were reported. On January 2, a Virginia man froze to death after leaving a bar around midnight. The man was intoxicated and crawled under a porch, where he perished.

Extreme Cold and Climate Change

Although climate research indicates that Minnesota's average winter lows are rising rapidly, and our coldest days of winter are now warmer than we have ever recorded (NCEI, 2018), cold temperatures have always been a part of Minnesota's climate and extreme cold events will continue. An increase in extreme precipitation or storm events such as ice storms as the climate changes could lead to a higher risk of residents being exposed to cold temperatures during power outages or other storm-related hazards during extreme cold.

Vulnerability

Extreme cold temperatures affect the county nearly every year. The amount of snow and ice, number of blizzard conditions, and days of sub-zero temperatures each year are unpredictable.

Within St. Louis County the risk of extreme cold does not vary geographically. Citizens living in climates such as these must always be prepared for situations that put their lives or property at risk. It is not always the depth of the cold, but an unprepared individual with a vehicle breakdown or lack of a personal winter safety kit that are at risk. Rural citizens not connected to city gas lines are more vulnerable to issues with extreme cold.

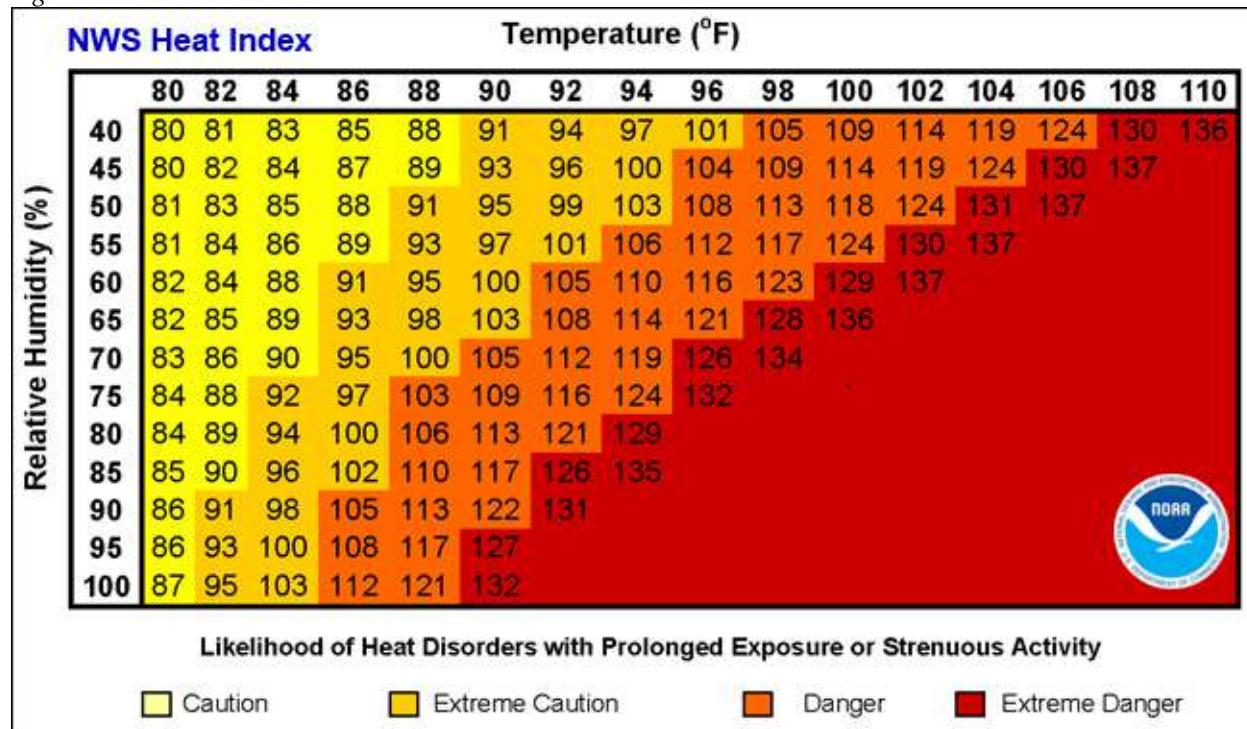
St. Louis County Emergency Management identified that there are program gaps and deficiencies that make its citizens more vulnerable to extreme cold and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Generators for Backup Power to Healthcare Facilities – Not all assisted living, long term care and nursing facilities have backup generator power.

4.3.8 Extreme Heat

Extreme heat is the combination of very high temperatures and exceptionally humid conditions. When the atmospheric moisture content is high, the rate of perspiration from the body decreases and the human body feels warmer. Heat stress can be indexed by combining the effects of temperature and humidity. The National Weather Service's (NWS) Heat Index (Figure 20) is a measure of how hot the body feels when relative humidity is factored in with actual air temperature. The heat index values are for shady locations - exposure to direct sunlight may increase these values by up to 15°F. The NWS will initiate alert procedures when the Heat Index is expected to exceed 105°-110°F for at least two consecutive days.

Figure 20. NWS Heat Index



Source: (National Weather Service, n.d.)

Figure 21 describes the effects increasing levels of heat has on the body during prolonged exposure and/or physical activity.

Figure 21. Heat Effects on the Body

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Source: (National Weather Service - Amarillo, TX, n.d.)

Extreme heat events are linked to a range of illnesses, even death, and can exacerbate pre-existing chronic conditions such as cardiovascular, respiratory, liver, and neurological diseases, endocrine disorders, and renal disease or failure. Populations who are most vulnerable to extreme heat include persons over 65 or under five years old; living alone, without air-conditioning, or residing on the topmost floor of a building; and with an income at or below the poverty line. People who are exposed to heat because of recreational or job-related activities are also more vulnerable, including athletes,

construction workers, and landscape/agricultural workers (Adapting to Climate Change in Minnesota: 2013 Report of the Interagency Climate Adaptation Team, 2013).

Medical costs related to extreme heat and cold can be enormous: in 2005 the total was \$1.5 billion nationwide, or more than \$16,000 per patient (Union of Concerned Scientists, 2009).

Extreme Heat History in St. Louis County

July is the hottest month on average in St. Louis County, with an average monthly maximum temperature of 65°F (based on data from 1895-2018). The hottest month on record for the county was July 1916, with a month-long average maximum temperature of 71°F (MN DNR, n.d.).

The National Centers for Environmental Information have recorded severe heat in St. Louis County in July of 2016, July of 2011, and August of 2001. The August event was a two-day heat wave with heat indices of 101. Five people died due to the heat in the Duluth area, ranging from age 47 to 73. All of these victims were found in rooms with poor ventilation and without air conditioning.

In July of 2016, heat indices reached 100 degrees in southern St. Louis County. No deaths or injuries were reported.

Extreme Heat and Climate Change

Minnesota's average temperature has increased more than 1.5°F since recordkeeping began in 1895, with increased warming happening in recent decades (International Climate Adaptation Team, 2013). Annual temperatures in the Midwest have generally been well above the 1901-1960 average since the late 1990s, with the decade of the 2000s being the warmest on record (Kunkel, et al., 2013). Seven of Minnesota's 10 warmest years occurred in the last 15 years. Projected increases are 2°F to 6°F more by 2050 and 5°F to 10°F by 2100 (MN Environmental Quality Board, 2014). The Midwest has experienced major heat waves and their frequency has increased over the last six decades (Perera, et al., 2012). For the U.S., mortality increases 4% during heat waves compared with non-heat wave days (Anderson & Bell, 2011). During July 2011, 132 million people across the U.S. were under a heat alert – and on July 20 the majority of the Midwest experienced temperatures in excess of 100°F. Heat stress is projected to increase as a result of climbing summer temperatures and humidity (Schoof, 2012). On July 19, 2011, Moorhead Minnesota set a new state record for the hottest heat index ever, at 134°F. That same day, Moorhead also recorded a new state record for the highest dew point at 88°F. It was the hottest, most humid spot on the planet that day (Douglas, 2011).

Recent statistics from NOAA show that there are more human fatalities each year due to heat waves than from floods, lightning, tornadoes and winter storms. Many cities have responded by creating Heat Wave Response Plans to ensure that those in marginal health without air conditioning can obtain the relief and care they need, and the Minnesota Department of Health developed the Extreme Heat Toolkit to help educate at-risk populations on how to reduce risks associated with heat waves (Seeley M., 2015).

Increasing temperatures impacts Minnesota's agricultural industry. Agriculture is highly dependent on specific climate conditions. As a result of increasing temperature, crop production areas may shift to

new regions of the state where the temperature range for growth and yield of those crops is optimal. According to the National Climate Assessment, the Midwest growing season has lengthened by almost two weeks since 1950 due in large part to earlier timing of the last spring freeze. This trend is expected to continue. While a longer growing season may increase total crop production, other climate changes, such as increased crop losses and soil erosion from more frequent and intense storms, and increases in pests and invasive species, could outweigh this benefit. There may also be higher livestock losses during periods of extreme heat and humidity. Losses of livestock from extreme heat lead to a challenge in the disposal of animal carcasses. Currently there are only two rendering facilities in Minnesota available for livestock disposal. If a rendering facility is not available, lost livestock must be composted on an impervious surface. If losses are high, finding an impervious surface large enough is a challenge. In an attempt to adapt to increased temperatures, livestock areas in Minnesota may shift farther north. As a result of new livestock areas and the resulting manure production, farmers may transition to manure-based fertilizer applications in areas where traditionally only commercial fertilizers have been used, with accompanying environmental advantages and disadvantages (Adapting to Climate Change in Minnesota: 2013 Report of the Interagency Climate Adaptation Team, 2013). In order to minimize the detrimental effects of heat stress on animal metabolism and weight gain, Minnesota farmers have also begun redesigning and retrofitting dairy, hog, and poultry barns with better watering, feeding, and ventilation systems (Seeley M. , 2015).

Vulnerability

Within St. Louis County the risk of extreme heat does not vary geographically. However, those who work outdoors or do not have permanent housing are at greater risk.

St. Louis County Emergency Management identified that there are program gaps and deficiencies that make its citizens more vulnerable to extreme heat and should be addressed with new mitigation efforts to reduce vulnerability. They include:

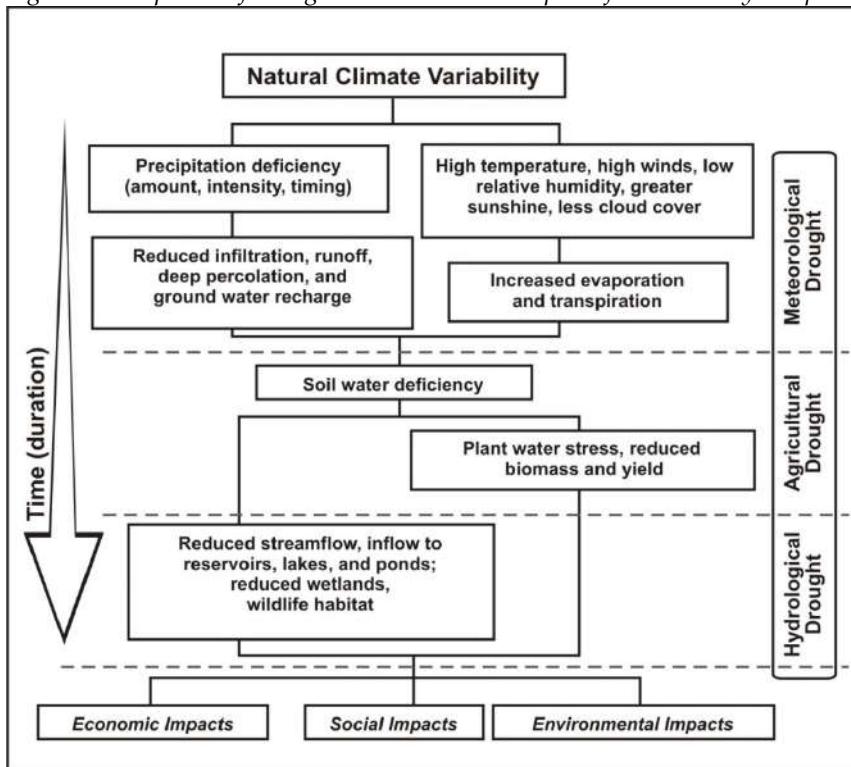
Generators for Backup Power to Healthcare Facilities – Not all assisted living, long term care and nursing facilities have backup generator power.

4.3.9 Drought

Within the broad domain of natural hazards that comprise disaster science, drought is unequivocally the most difficult to define. This is primarily due to its insidious nature, and because the parameters that typically control it vary both spatially and temporally. For instance, the hydro-meteorological conditions that constitute drought in one location, may not necessarily qualify as drought in a contrasting climate. Even in regions that share a statistically similar climate, other factors such as soil type, antecedent moisture conditions, ground cover and topography all play a vital role in dictating drought emergence. To further complicate matters, drought is associated with a diverse number of climatic and hydrological stressors, which come with a unique set of collective impacts that affect nearly every corner of our economy and environment. Subsequently, there are over a hundred and fifty different definitions of drought, not just because it is difficult to define, but precisely on the grounds that drought affects different regions in different ways (Fu, Svoboda, & Tang, 2013). When one attempts to merge and understand these various definitions and impacts, it is evident that drought can

be integrated into five principal categories. These include: meteorological, agricultural, hydrological, ecological and socio-economic drought (Figure 22).

Figure 22. Sequence of drought occurrence and impacts for commonly accepted drought types



Source: (National Drought Mitigation Center, 2018)

Meteorological drought is qualified by any significant deficit of precipitation. The term agricultural drought indicates an extended dry period that results in crop stress and harvest reduction. Hydrological drought is manifest in noticeably reduced river and stream flow and critically low groundwater tables. Ecological drought occurs when the combined effects of meteorological and/or hydrological drought begin to impact the delicate balance of a given ecosystem. Socioeconomic drought refers to the situation that occurs when water shortages begin to affect people and their lives. It associates economic goods with the elements of meteorological, agricultural and hydrological drought. Many supplies of economic goods (e.g., water, food grains, and hydroelectric power) are greatly dependent on the weather.

Quantifying Drought Conditions

There are numerous approaches to assessing drought conditions. The current gold standard for accurate drought conditions in the United States is the United States Drought Monitor (USDM) Map. Established by the National Drought Mitigation Center (NDMC) in 1999, the Drought Monitor is a weekly map that depicts drought conditions in all 50 states and Puerto Rico. Each weekly map is produced by a NDMC assigned author. Though drought map authors utilize a broad domain of geospatial, climatic data and drought indices that cover every aspect of drought, perhaps their most valuable resource is the input they receive each week from hundreds of drought experts throughout the

country. The drought monitor map is thus a collective synthesis of the best quantitative and the most reliable qualitative information available (National Drought Mitigation Center, 2018). Figure 23 displays an example map and statistics table prepared by the U.S. Drought Monitor for Minnesota on November 20, 2012. In total, there are four drought categories: moderate (D1), severe (D2), extreme (D3), and exceptional (D4). A fifth category, abnormally dry (D0) is used to depict areas that are abnormally dry but not yet in drought. Abnormally dry conditions are indicative of the meteorological circumstances that precede drought onset and those that are coming out of drought. D0 is often considered a bellwether of drought but it is also an accurate warning sign that crop growth may be slowed and wildfire risk may be elevated. Table 26 displays these drought categories along with the potential impacts at each level.

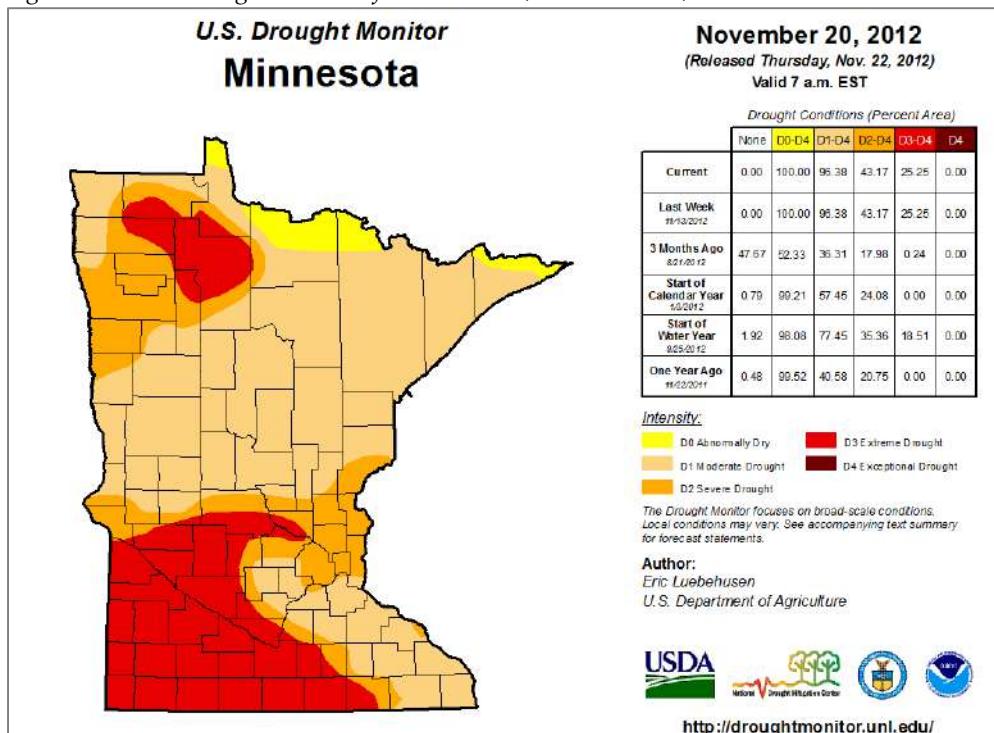
Table 26. USDM Drought Classification

Category	Description	Possible Impacts
D0	Abnormally Dry	<p>Going into drought:</p> <ul style="list-style-type: none"> • Short-term dryness slowing planting, growth of crops or pastures <p>Coming out of drought:</p> <ul style="list-style-type: none"> • Some lingering water deficits • Pastures or crops not fully recovered
D1	Moderate Drought	<ul style="list-style-type: none"> • Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	<ul style="list-style-type: none"> • Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	<ul style="list-style-type: none"> • Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	<ul style="list-style-type: none"> • Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Source: (USDM, n.d.)

The decision to declare or alter a drought category in a given location is dependent upon a comprehensive set of climate products that are specifically manufactured to quantify drought. Many of these products are referred to as drought indices. These indices each serve a specific purpose. There are indices that are designed for measuring short-term drought, and there are indices that are built to reflect long-term drought. Similarly, other indices are useful for sector specific areas such as water resources or agriculture.

Figure 23. U.S. Drought Monitor for Minnesota, November 20, 2012



Source: (National Drought Mitigation Center, 2018)

Drought History in St. Louis County

The NCEI Storm Events Database uses the US Drought Monitor's drought classification system as a guide to determine which droughts to include in the database; for locations east of the Rocky Mountains only drought events categorized as severe (D2) or higher are included (National Weather Service, 2018). The following is a summary of droughts in St. Louis County as reported in the Storm Events Database:

2006

- Mid July – September: Hot dry weather in the southern portion of the county put the area in a severe drought (D2); drought worsened through the summer with rainfall 6-12 inches below normal and rivers running at 10% less of the normal flow. By mid-September, the majority of the county was in an extreme drought (D3).
- October – December: Extreme drought conditions (D3) continued to plague northeastern Minnesota. Precipitation across the region was below normal and lake levels were well below normal levels. Lake Superior was at its lowest level since 1926.

2007

- January – March: A mostly dry winter. A February snowstorm alleviated drought conditions in the central and southern portions of the county, but northern portions of the county remained in extreme drought (D3).

- April – June: The extreme drought conditions (D3) north of the Iron Range and severe conditions (D2) between the Range and Duluth were scaled down when the area received much needed rain in May and June.
- July – October: Severe drought conditions returned across the county and by the end of August much of the Arrowhead was in an extreme drought (D3). August rainfall was 1-3 inches below normal across northeast Minnesota. The latter half of September and into October brought several rounds of rainfall, and by mid-October the county was no longer in a drought.

2010

- April-May: Lack of rain led the central and southern portions of the county to be in severe drought (D2) and by May drought conditions in the southern portion of the county worsened to extreme (D3).

2011

- September – December: Rain deficits of 3-5 inches since the summer caused severe drought (D2) conditions to develop in the northeast portion of the county. November and December saw the severe drought (D2) spread to across greater Ely and the Iron Range.

2012

- January – April: The severe drought (D2) in the eastern portion of the county persisted.
- November – December: The entire county were in a severe drought (D2).

2013

- January – April: Severe drought (D2) conditions remained across the entire county until mid-April.

2015

- April 28 – May 18: The west-central portion of the county was in a severe drought (D2).

In addition to highlighting specific notable droughts the USDM database was examined from January 2000 – August 5, 2019 (1,022 weeks) for any occurrence of drought in the county, regardless of the duration or severity of the drought. According to the weekly reported data, the county experienced drought conditions \geq D1 28% of the weeks and drought conditions \geq D2 15% of the weeks.

When comparing the two most recent five-year timeframes (2014-2018 & 2009-2013) the data shows either a decrease or no change in each drought category \geq D0. Table 27 shows the breakdown of this comparison.

Table 27. Average Percent of St. Louis County's Land Area by Drought Category

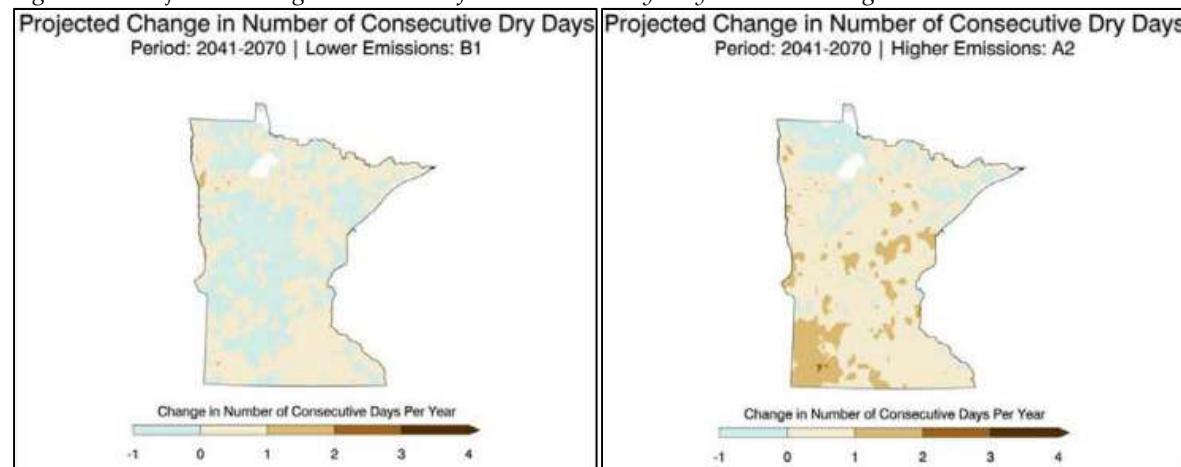
Timeframe	No Drought	DO	D1	D2	D3	D4
2009-2013	48.04%	25.44%	19.80%	6.71%	0%	0%
2014-2018	80.63%	15.70%	3.55%	0.12%	0%	0%
% Change	+67.84%	-38.29%	-82.07%	-98.21%	0%	0%

Drought and Climate Change

In 2007, 24 Minnesota counties received drought designation, while seven counties were declared flood disasters; in 2012, 55 Minnesota counties received federal drought designation at the same time 11 counties declared flood emergencies (MN Environmental Quality Board, 2014); and in May of 2015, over 90% of Minnesota was undergoing severe or moderate drought (MN DNR, 2015). Droughts have been happening throughout Minnesota's history but it is not yet clear the degree at which climate change may impact future droughts (International Climate Adaptation Team, 2013). While there was no apparent change in drought duration in the Midwest over the past century (Dai, 2011), the average number of days without precipitation is projected to increase in the future (National Climate Assessment Development Advisory Committee, 2013).

The climate models used in the 2014 National Climate Assessment projects Minnesota to have an increase in days over 90°F by mid-century; however, the future drought situation is less clear. The climate model run with the lower emissions scenario projects no significant change in the number of consecutive days of no rain, while the higher emissions scenario show an increase in dry periods, increasing Minnesota's drought risk (Minnesota Pollution Control Agency, 2017). These climate models are shown in Figure 24.

Figure 24. Projected Change in Number of Consecutive Dry Days in Low & High Emission Scenarios



Source: (ICAT, 2017)

Even in areas where precipitation does not decrease, projected higher air temperatures will cause increased surface evaporation and plant water loss, leading to drier soils. As soil dries out, a larger proportion of the incoming heat from the sun goes into heating the soil and adjacent air rather than evaporating its moisture, resulting in hotter summers under drier climatic conditions (Mueller & Seneviratne, 2012).

Vulnerability

Drought has impacted St. Louis County numerous times over the years. The National Drought Mitigation Center (NDMC) oversees the Drought Impact Reporter (DIR) - a comprehensive database which gathers drought-related reports from a variety of sources and examines the reports for drought-related impacts. The NDMC (n.d.) defines a drought impact as "An observable loss or change that occurred at a specific place and time because of drought." Drought impacts are categorized based on the sector(s) the drought impacts. A single drought impacting multiple sectors will be categorized into the respective sectors.

DIR records show 40 incidents of drought impacting at least one sector in St. Louis County from 1988 - 2018. Table 28 lists the number of times a drought incident was reported for each sector.

Table 28. Reported Drought Impacts for St. Louis County, 1988-2018

Sector	# of drought incidents reported
Agriculture	4
Business & Industry	1
Energy	0
Fire	12
Plants & Wildlife	8
Relief, Response & Restrictions	16
Society & Public Health	4
Tourism & Recreation	1
Water Supply & Quality	8

Source: (National Drought Mitigation Center)

Note: For additional information about each category/sector, visit:

<https://droughtreporter.unl.edu/help/dir/mapping.aspx>

Since droughts are regional in nature jurisdictions within St. Louis County do not vary in their vulnerability to drought; however, jurisdictions with a greater number of vulnerable residents may be more negatively impacted. For example, droughts can contribute to poor air quality by increasing the risk of wildfires and creating a dustier than normal environment. Populations vulnerable to these conditions include children, older adults, and those with respiratory issues. The Household Composition & Disability SVI theme map (section 3.6.1) is made up of these population groups and should be reviewed to better understand the vulnerability of each jurisdiction.

St. Louis County Emergency Management did not identify any existing program gaps or deficiencies that make its citizens more vulnerable to droughts.

4.3.10 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 developments 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 national and state 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.

While wildfires are often viewed in a negative light, they are a naturally occurring part of the environment. Wildfires are an important component of healthy forest and prairie ecology, and can be beneficial by reducing dangerously high fuel levels and putting nutrients into the ground that spur new growth. In addition, many flora species require fire for seed germination. However, as people settled this country and began clearing land and building homes, roads, railroads and campgrounds, new artificial causes of wildfire emerged and their frequency and level of destruction increased.

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

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 are necessary for healthy ecosystems, they burn whatever fuel is in their path, whether vegetation or buildings.

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, because the fire was too near the home. Studies in western wildfires have shown that approximately 85% of homes surviving a major wildfire had 30-50 feet of defensible space around them, coupled with fire-resistant roofing.

Approximately 1,600 wildfires occurred each year in Minnesota on average from 1976-2011 (MN DNR, 2011). 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 is dead, brown and combustible. Also, there is little green vegetation to serve as a barrier for a moving wildfire.

Wildfire History in St. Louis County

The Minnesota DNR responded to 5,982 wildfires in St. Louis County between 1985 and June 4, 2019, burning a total of 31,655 acres (Figure 25). Of these wildfires, only 225 were initiated by natural causes (i.e. lightning). The largest fire occurred in May of 1992, burning 5,200 acres south of Tower. Its cause was arson.

These include fires not only on state lands, but also rural private lands for which there is not another agency with primary responsibility. Wildfires that are not included in this data are those that occur on federal lands and those that are responded to by local fire departments.

According to St. Louis County Emergency Management, the most recent larger wildfires in the county were the Skibo Fire near Hoyt Lakes and the Foss Lake Fire near Ely. These fires were not included in the DNR dataset. The Skibo Fire occurred in May of 2016, burning over 1,000 acres. The Duluth News Tribune reported that the fire was apparently caused by sparks from a passing train (Duluth News Tribune, 2016). The Foss Lake Fire also occurred in May of 2016. It was started as a prescribed, 78-acre burn by the USFS, and was part of the North Arm Fuels Reduction Project. However, the fire escaped, burning approximately 1,015 acres.

According to data from the MN DNR, there are 630,975 acres of peat in St. Louis County. Peat is partially decayed plant matter found in ancient bogs and swamps. Minnesota has approximately six million acres of peatland, the highest total acreage in the contiguous United States. Peat fires are deep-rooted fires that burn underground, lasting for weeks, months, or even years. They can smolder during winter months beneath the snow, surfacing again in the spring to burn above ground. Peat ignites when its moisture content is low, and then it supports combustion rather than flame. Once started, combustion is persistent because peat contains oxygen and needs little or no outside oxygen to continue burning. Peat's insulating qualities mean the fire loses little heat. As the peat dries, it becomes water repellent. These factors result in long-lasting fires that require extensive operations to extinguish. St. Louis County has not identified peat fires as an issue in the country. However, it was noted that there is a peat farm near Floodwood that burns every few years.

Wildfire and Climate Change

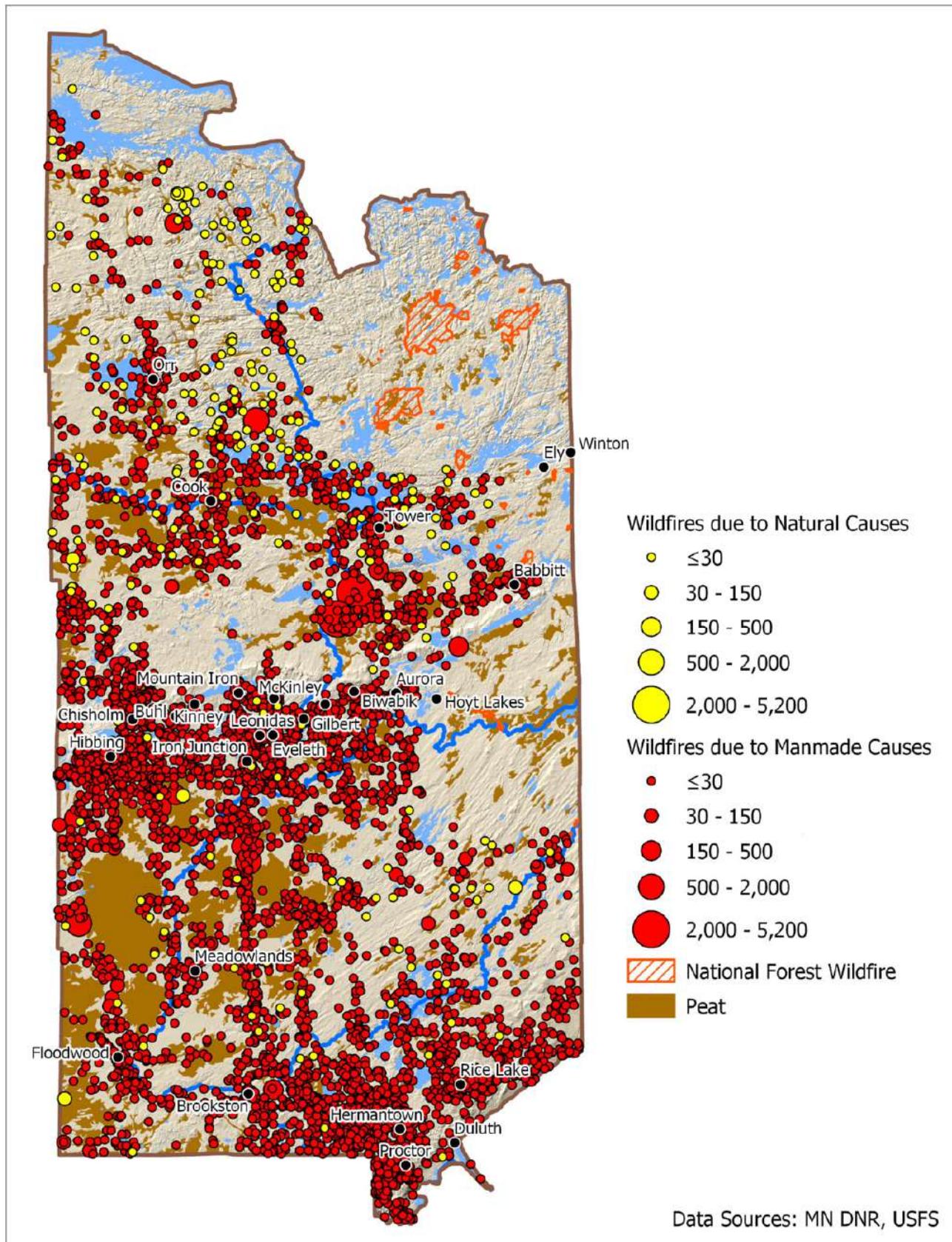
Temperatures are predicted to rise in the state, which could lead to more extreme heat events and associated wildfire risks. As Minnesota's climate changes, weather fluctuations between drought and extreme rain events and increasing temperatures will result in changes to forest composition and/or distribution. These fluctuations can lead to dry conditions that may cause increased fire risk in both grassland and forest environments.

Climate data experts project conditions leading to a higher frequency of late growing season drought conditions, elevated winter temperatures with reduced snowpack, prolonged high heat days, and extended periods of low rainfall. Similar conditions in the past likely contributed to the 2011 Pagami wildfire disaster (*Appendix L, Planning for Climate & Health Impacts in Northeast Minnesota*)

Vulnerability

The northern part of St. Louis County is much more wooded than the southern part of the county. It contains the Superior National Forest and the Boundary Waters Canoe Area Wilderness, in addition to being sparsely populated. These factors make the northern portion of the county more vulnerable to wildfires.

Figure 25. Wildfires by Acres Burned (1985-June 4, 2019) and Peat in St. Louis County



Blowdowns and tree mortality are also big concerns as they lead to increased fuel for wildfire. Vast acreages of blowdown in St Louis County forest occurred after 1999 and 2016 windstorms. Spruce budworm and the resulting mortality from this insect outbreak increases the buildup of standing dead and down fuels, another growing concern.

An analysis of the Pagami Creek Fire and its impacts on public health was done in the neighboring Lake County (*Appendix L, Planning for Climate & Health Impacts in Northeast Minnesota*). The fire burned large portions of the BWCA wilderness, endangering visitors spread throughout a large area and beyond the reach of easy communication. Particulate matter from the fires posed a serious threat to respiratory health, particularly for individuals with asthma, lung disease, heart ailments, and other conditions. Air quality alerts were released across numerous states. Many county and Forest Service roads were closed. Smoke and ash from the fire made land and air travel extremely dangerous. In some areas, visibility was reduced to one-and-a-half miles. (MDH, 2018)

The SILVIS Lab at University of Wisconsin – Madison created a nationwide dataset documenting the 2010 Wildland Urban Interface. With the increase of development in metropolitan fringes and rural areas, the wildland-urban interface (WUI) is increasing. The WUI is defined as the area where structures and other human development meet or intermingle with undeveloped wildland. The expansion of the WUI in recent decades has significant implications for wildfire management and impact. The WUI creates an environment in which fire can readily move between structural and vegetation fuels. Its expansion has increased the likelihood that wildfires will threaten structures and people.

There are two types of WUI: intermix and interface. Intermix WUI are areas where housing and vegetation intermingle; interface WUI are areas with housing in the vicinity of contiguous wildland vegetation. Figure 26 below maps the WUI in St. Louis County. Areas of interface and intermix values are primarily located in the Duluth area, along with smaller segments around the range cities.

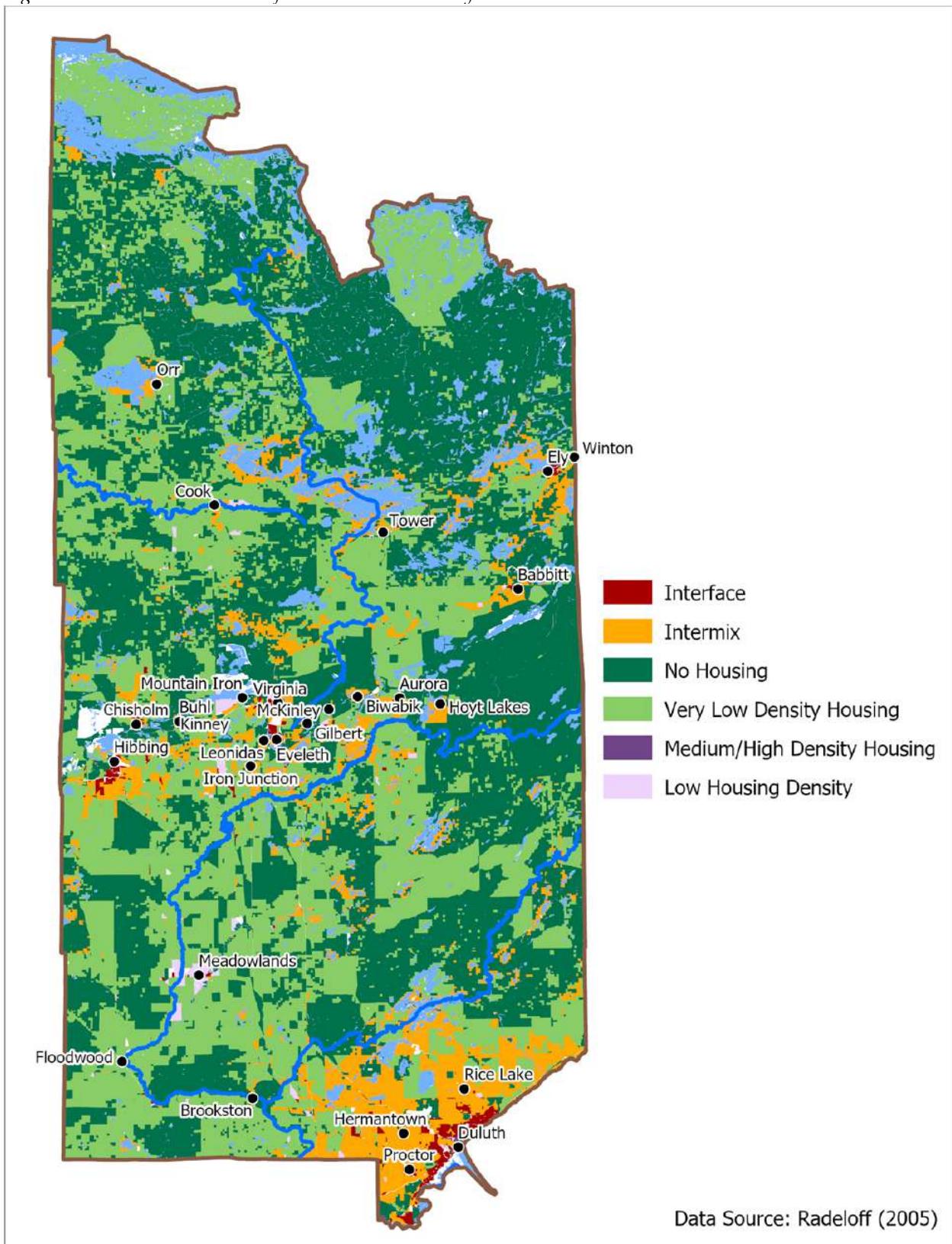
St. Louis County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to wildfires and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Dry Hydrants and Water Access – The CWPP identifies areas within the county where improved water access (such as underground tanks and dry hydrants) are needed for fighting wildfires. These areas are rural and not supported by a municipal water source.

Public Awareness – Raising public awareness of wildfire safety and dangerous conditions is an ongoing effort of St. Louis County Emergency Management, local fire departments, as well as MN DNR Forestry and the U.S. Forest Service. We continue to try and get additional people signed up for the Northland Alert notification system.

Agency Coordination – All St. Louis County Public Safety Agencies utilize an 800mhz statewide radio system called ARMER (Allied Radio Matrix for Emergency Response). The MN DNR and USFS utilize VHF for operations but do have ARMER capabilities for interoperability. Agencies continue to make agency coordination work better.

Figure 26. Wildland Urban Interface in St. Louis County



4.3.11 Landslides and Soil Erosion

Erosion is the wearing away of land, such as the loss of a riverbank, beach, shoreline or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surges and windstorms, but may be intensified by human activities. Long-term erosion is a result of multi-year impacts such as repetitive flooding, wave action, sea level rise, sediment loss, subsidence and climate change. Death and injury are not typically associated with erosion; however, major incidents of erosion, such as landslides, can destroy buildings and infrastructure (FEMA, Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, 2013).

The movement of a mass of rock, debris, or earth down a slope by the force of gravity is considered a landslide. They occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. Potential impacts include environmental disturbance, property and infrastructure damage, and injuries or fatalities (FEMA, Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, 2013).

Landslides and Soil Erosion History in St. Louis County

The South St. Louis SWCD has noted that soil erosion and landslides can be an issue with severe storms; however, a database is not maintained. It was also noted that many problematic areas were fixed after the flooding of June 2012. However, it remains an issue for Lake Superior shoreline landowners.

Landslides/Soil Erosion and Climate Change

The increased magnitude and frequency of flooding events and storm activity that may result from climate change may in turn increase the risk of soil erosion and landslides. According to University of Washington geologist Dave Montgomery, "If the climate changes in a way that we get a lot more rainfall you would expect to see a lot more landslides" (Phillips, 2014).

In Minnesota, the wettest days are getting wetter. This can contribute to increased erosion in many locations due to flooding and saturation of soils. Reduced ice cover on lakes and shorelines (due to warmer temperatures) could potentially expose shorelines to increased erosion or damage during weather events when they previously may have been covered with ice (National Climate Assessment Development Advisory Committee, 2013).

According to the 2014 National Climate Assessment, "Increased precipitation intensity also increases erosion, damaging ecosystems and increasing delivery of sediment and subsequent loss of reservoir storage capacity" (Pryor, et al., 2014).

Vulnerability

Figure A - 27 in Appendix A maps soil erodibility in St. Louis County using the Soil Erodibility Factor (K-Factor), which is a quantitative description of soil's inherent erodibility, by measuring the susceptibility of soil particles to shift due to rainfall and runoff. The Soil Erodibility Factor ranges in value from 0.02 to 0.69; however, all areas in St. Louis County are 0.43 or less.

St. Louis County Emergency Management did not identify any existing program gaps or deficiencies that make its citizens more vulnerable to soil erosion or landslides.

4.3.12 Coastal Erosion and Flooding

Coastal erosion is defined as the wearing away of land and the loss of beach, shoreline, or dune material over a period of time as a result of natural coastal processes or human influences. Characteristics such as supply of sand and processes such as sea level change, currents, tides, waves, and wind are natural factors that contribute to the rate of erosion. Human-caused contributors to erosion include dredging tidal entrances, jetty and groin construction, hardening shorelines with seawalls, beach nourishment, and construction of harbors and sediment-trapping dams.

Coastal flooding is primarily caused by storm surge and waves, but many other factors have an influence. On the Lake Superior shoreline, flooding is dependent on anthropogenic activities as well as lake levels, which vary as a result of precipitation, evaporation, and other natural processes. Ice cover also impacts the risk of a flood hazard significantly. These phenomena distinguish the analysis of flood hazards on the Great Lakes from those for ocean coastal areas—as well as from riverine flooding or erosion (FEMA, Great Lakes Coastal Flood Study, 2018).

Northeast Minnesota has 189 miles of Lake Superior shoreline and a coastal population of 216,268 (NOAA OCM, 2018). Section 304(1) of the Coastal Zone Management Act identifies the coastal zone as the coastal waters (including lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches.

Coastal Erosion

Shoreline erosion of St. Louis County's Minnesota Point (aka Park Point) in Duluth has been a studied concern since at least 1970 when the residential population of that area was at a peak. Dredging operations in the Duluth harbor of Lake Superior have benefitted the erosion-prone areas by making the beach slope flatter and slowing the erosion rate (USACE, 1974). Occasional dramatic losses of beach are of great concern to residents of the point, and dredging/beach nourishment projects continue today. In 2019, USACE has another planned dredging operation in the harbor that will provide clean sediment for Minnesota Point (City of Duluth, 2019).

A survey of St Louis County's Minnesota Point residents showed that 88% rated long-term lake level fluctuations as very important to extremely important in the cause of coastal flooding and erosion problems (Rasid, 1992). The results suggest residents perceive the hazards of coastal erosion from their

own personal experience, in that Minnesota Point has experienced fluctuating water levels more than high wave impact.

Results from a 1998 survey questionnaire of Minnesota Point residents showed that 54% of the residents experienced either flooding of basements due to a rise in the water table or direct inundation of water to yards and buildings, such as garages and storage sheds, during the reported average of 18 years spent on Minnesota Point. Beach erosion, loss of land, and landscaping, destruction or damage of shore protection devices, and damage to buildings and related structures were the common types of reported erosion issues (Rasid, 1992).

Small lakes can experience shoreline erosion due to wind and wave action as well, particularly where native upland vegetation has been replaced with turf or aquatic vegetation has been removed. Excessive and/or chronic recreational activity too close to the shore can also make shorelines vulnerable to erosion (MN DNR, 2018).

Coastal Erosion History

The most extensive study of coastal erosion on the North Shore of Lake Superior was conducted in 1988, using aerial photographs taken in the 1930s, 1975, and 1988/89 (Johnson, 1995) (Johnston, Sales, Bonde, Aunan, & Raby, 1989). This research showed that the North Shore of Lake Superior is variable in its geology and geometry, and these variations result in varying rates of erosion. The study showed that non-bedrock areas at or near the shoreline receded at an average rate of .46 ft. /yr., and a maximum of 1.1 ft. /yr.

Major storm winds and waves come from the northeast, with a greater impact on the north and northeast-facing shores. (Johnson, 1995). These differences in coastal aspects indicate areas of higher and lower susceptibility among Lake Superior coasts.

A corresponding mapping project and report were produced with the research, (Johnston, Sales, Bonde, Aunan, & Raby, 1989) that cited growing concerns for reducing the economic and environmental losses along the shores of Lake Superior that arose from increases in development pressures and water levels of the mid-1980s.

Coastal Flooding

Severe flood events on the Lake Superior occur when high lake levels are combined with strong winds that drive water and waves onshore. When large waves are paired with elevated lake levels, the waves are able to reach farther onshore, eroding the backshore, and potentially reaching developed lakefront areas. Whether wave hazards reach development depends on local conditions—for instance, in many areas the bluffs are high enough to limit the wave effects to the bluff face. However, in other areas, the bluff or shore protection structures may be overtapped or waves may pass over inundated, low-lying areas. Waves can cause dramatic structural damage to buildings, including splintering walls and causing homes to float off foundations or even to collapse (Great Lakes Coastal Flood Study, 2018). In addition, periods of high water levels have plagued the city of Duluth's sanitary sewer collection system with flooding (Berg, 1985).

Coastal Flooding History

Coastal communities face flood risks from a combination of increased water levels and/or high-energy waves. When storms affect the coast, communities can face serious threats to human safety, extensive damage to infrastructure and the built environment, and negative economic impacts. To help protect against these impacts, more stringent building practices and flood insurance are required in the hazardous areas along the coast.

In October 2018, winds of 64 mph were reported at the Duluth harbor. Waves reached as high as 14 to 18 feet, causing the Canal Park business district near Lake Superior to close due to standing floodwater and the City's very popular Lakewalk to be closed.

During the Thanksgiving Blizzard of 2019, Canal Park in Duluth again experienced some flooding. Lake Superior produced waves of 10-15 feet and access to Park Point was closed to non-residents.

Coastal Erosion and Flooding and Climate Change

Heavy, extreme precipitation is expected to be a primary symptom of climate change in northern Minnesota. Erosion is exacerbated during storm events. At an average increase of two degrees per decade, Lake Superior's rising water temperatures are leading to more storm events. Storm events which have also increased in recent years, further intensify with high water levels. Increased wave action due to high water levels are evidenced in the Great Lakes Coastal Flood Study 2018 draft for Lake Superior from the FEMA and partners.

Vulnerability

Continued shoreline development is inevitable, and it contributes to erosion problems. Erosion rates can accelerate with increases in impervious surfaces, changing and eliminating vegetation cover, and alterations to beach makeup. Serious situations are rare but massive/fast erosion can occur during one storm event leaving houses dangling from cliffs or beginning to slide down hillsides. The effective management of areas with high erosion potential is necessary to protect property owners and provide measures for reducing erosion.

Natural processes of deep-water waves and swells determine Lake Superior water fluctuation. These natural processes are further modified by International Joint Commission (IJC) navigation control structures. IJC strives to keep Lake Superior's monthly mean water level between 593.36 and 601.97 feet, but because meteorological conditions greatly affect lake levels, attempts to balance the system can be difficult (Rasid, 1992).

Low elevation beaches and sandspits, such as that of Park Point in St. Louis County, are vulnerable to even minor fluctuations in lake levels, which may induce significant coastal flooding and erosion problems. Park Point frequently experiences dangerous rip currents, commonly associated with warm days and high off-lake winds and waves. According to the NWS, there is an average 12 fatalities and twice that many rescued on the Great Lakes each year.

St. Louis County Emergency Management and the city of Duluth (a Lake Superior coastal community) identified that there are several program gaps and deficiencies that make its citizens more vulnerable

to coastal erosion and coastal storms and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Public Education & Awareness – There is a need to increase public education and outreach about flooding events and being safe during a flood. There is also a need to increase public education about the FEMA National Flood Insurance Program (NFIP).

Climate Change Impact Studies to Inform Coastal Mitigation Planning – To mitigate coastal storm hazards, St. Louis County and the city of Duluth need to improve its understanding of how climate change is likely to impact coastal storm hazards and vulnerable coastal infrastructure and how such infrastructure can be cost-effectively protected from harm in its current location, eliminated altogether, or relocated to a less vulnerable location. Future studies should focus on the areas of Park Point closest to the Duluth canal entry and the Superior entry where the loss of land mass is most pronounced.

Demolition of Relocation of Vulnerable Coastal Infrastructure – When possible, there is a need to demolish vulnerable infrastructure close to the shoreline, relocating inland where necessary. When demolition is not possible, we need to improve the ability of coastal infrastructure to withstand coastal storm damage by constructing shoreline armoring to contemporary coastal engineering standards.

4.3.13 Dam & Levee Failure

Dams are structures that retain or detain water behind a large barrier. When full or partially full, the difference in elevation between the water above the dam and below creates large amounts of potential energy, allowing the chance for failure. Dams can fail due to either 1) water heights or flows above the capacity for which the structure was designed; or 2) deficiencies in the structure such that it cannot hold back the potential energy of the water. If a dam fails, issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (transportation routes and utility lines required to maintain or protect life), and environmental damage. Dams require constant monitoring and regular maintenance to insure their integrity.

Dam & Levee Regulation

The agencies with regulatory authority of dams in Minnesota are:

- The MN DNR Dam Safety Program has the mission of protecting the life and safety of people by ensuring that dams are safe. Minnesota's program sets minimum standards for dams and regulates the design, construction, operation, repair, and removal of dams. Both privately and publicly owned dams are regulated.
- The U.S. Army Corp of Engineers (USACE) maintains the lock and dam system on the Mississippi River and has regulatory authority over the flood control dams that it owns. USACE also participates with local communities in all phases of flood control that includes dams, levees, or other means.
- The Federal Power Act (FPA) authorizes the Federal Energy Regulatory Commission (FERC) to issue exemptions or licenses to construct, operate and maintain dams, water conduits, reservoirs, and transmission lines to improve navigation and to develop power from streams and other bodies of water over which it has jurisdiction. 16 U.S.C. § 797(e). Regulatory tools

include the Federal Power Act, Public Utility Regulatory Policies Act, the Electric Consumers Act of 1986 and the Energy Policy Act of 1992.

Dam & Levee Failure History in St. Louis County

According to the State Dam Safety Engineer at the MN DNR, there have been 10 cases of dam failure in St. Louis County. A brief description of these events based on MN DNR data is provided below.

At the Hibbing Taconite stockpile a rotational failure of a stockpile road embankment occurred in July of 2017. There was a bulldozer on site at the time of failure, but no injuries as there were indications it was failing. The dam was replaced.

The western embankment at the Inland Steel Tailings Basin failed in April of 2014. The cause was likely piping due to high water flowing through coarse roadway material. High water was likely due to spring snowmelt. In addition, excessive ice in the reclaim pond prevented flow from the Upland II decant from flowing to the main reclaim pond. The dam was repaired.

In March of 2010, the Minorca Pit South Dam had an interior dike failure at an earthen weir, causing water to flow into Higgins Pit. All of the water from the breach was contained within the pit, though it raised 8-10 feet.

The Minntac Dam experienced an interior dike failure in 2010, approximately 20 feet deep.

In January of 2007 the Hibbing Taconite Internal Weir failed, causing the plant to be shut down for two months.

The LTV Ash Pond is included in the dam failure database, noting a year of 2002; however, no other details were available.

The Finstad Dam suffered an earthen embankment breach in 1994 due to animal burrowing. The dam was removed.

On March 23, 1989, the LTV Steel 1W Dam had an interior dam failure likely due to piping below ice. Layered ice formed at the outlet culvert, reducing outflows and causing water levels to rise. Water started piping under the ice and along the culvert, causing the culvert and dam to fail. Two attempts at blasting the ice were made in the days prior to the dam failure. The dam was rebuilt, but subsequently buried when cells 1W and 2W were merged.

The Schweiger Dam failed in 1981 when the owner was attempting to perform repairs on the spillway. The dam was rebuilt.

In September of 1972, the Hartley Dam had its left earthen embankment washed out due to overtopping by floodwaters resulting from a heavy rainfall. The dam was rebuilt.

There are no levees in St. Louis County.

Dam Failure and Climate Change

Dams are designed based on assumptions about a river's annual flow behavior that will determine the volume of water behind the dam and flowing through the dam at any one time. Changes in weather patterns due to climate change may change the expected flow pattern. It is conceivable that bigger rainfalls at earlier times in the year could threaten a dam's designed margin of safety, causing dam operators to release greater volumes of water earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

While climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures. Minnesota had a dam failure due to a large storm event in June 2012. The Forebay canal in Carlton County had operated as designed for nearly 100 years. The intensity of the 2012 rain event caused a failure of the canal wall, which caused significant damage. Climate change is adding a new level of uncertainty that needs to be considered with respect to assumptions made during dam construction.

Vulnerability

Although dam regulatory authorities vary between various federal and state agencies, all authorities attempt to classify dams according to the potential impacts from a dam failure or mis-operation. In response to the numerous classification systems, FEMA's Interagency Committee on Dam Safety created a hazard potential classification system that is adaptable to any agency's current system.

Table 29 provides an overview of the main criteria agencies consider when determining a dam's hazard potential classification. This classification system does not imply that the dam is unsafe, but rather categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests (2004).

Table 29. Hazard Potential Classification Criteria

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable - one or more expected.	Yes (but not necessary for this classification)

Source: (US Army Corps of Engineers, 2008)

Minnesota's hazard classifications for dams are as follows:

- **High (Class I)** - loss of life or potential serious hazards; damage to health, main highways, high-value industrial or commercial properties, or major public utilities; or serious direct or indirect economic loss to the public;
- **Significant (Class II)** - possible health hazard or probable loss of high-value property; damage to secondary highways, railroads or other public utilities; or limited direct or indirect economic loss to the public other than that described in Class III (Low); and

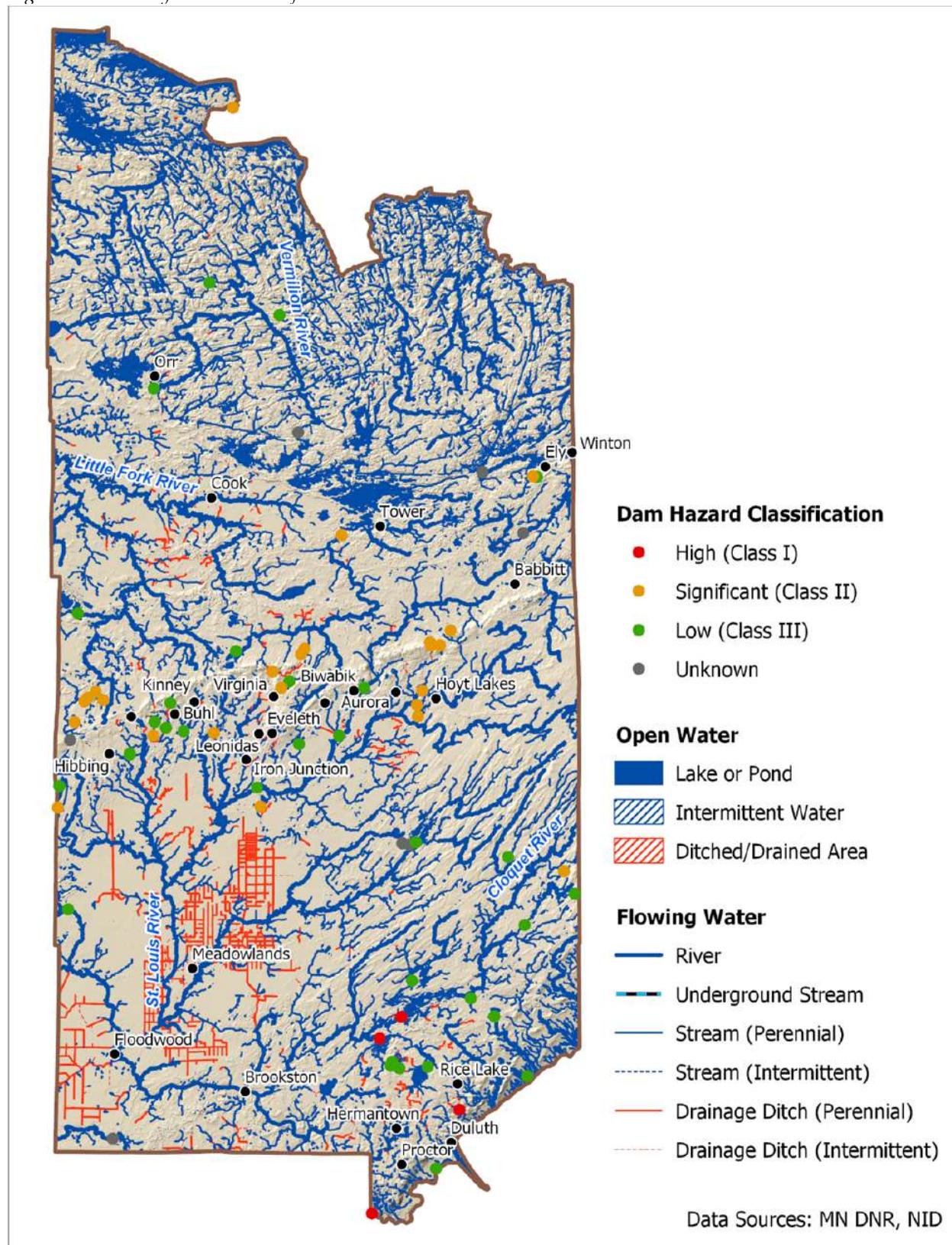
- **Low (Class III)** - property losses restricted mainly to rural buildings and local county and township roads that are an essential part of the rural transportation system serving the area involved.

Class I dam owners are required to have an Emergency Action Plan (EAP) on file, notifying individuals whose lives, property, or health may be endangered by failure, mis-operation, or other circumstances affecting the dam (Minnesota Legislature - Office of the Revisor of Statutes, 2008).

Dams for which a hazard potential (as defined above) has not been designated, or is not provided, are classified as "Undetermined".

Figure 27 below maps the dams in St. Louis County by hazard classification. Four dams in the county are listed as a high hazard (Fish Lake, Fond du Lac, Hartley Pond and Island Lake), all of which have their own Emergency Action Plans (EAPs). In addition, the Laskin Energy and Rice Lake dams also have EAPs.

Figure 27. Dams by Hazard Classification



In addition to dams being classified by their hazard potential, the physical condition of dams are inspected and given a condition ranking. The condition of a dam is categorized into one of the following classifications:

- **Satisfactory** - No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.
- **Fair** - No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.
- **Poor** - A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. "Poor" may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.
- **Unsatisfactory** - A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.
- **Not Rated** - The dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated (US Army Corps of Engineers, 2008).

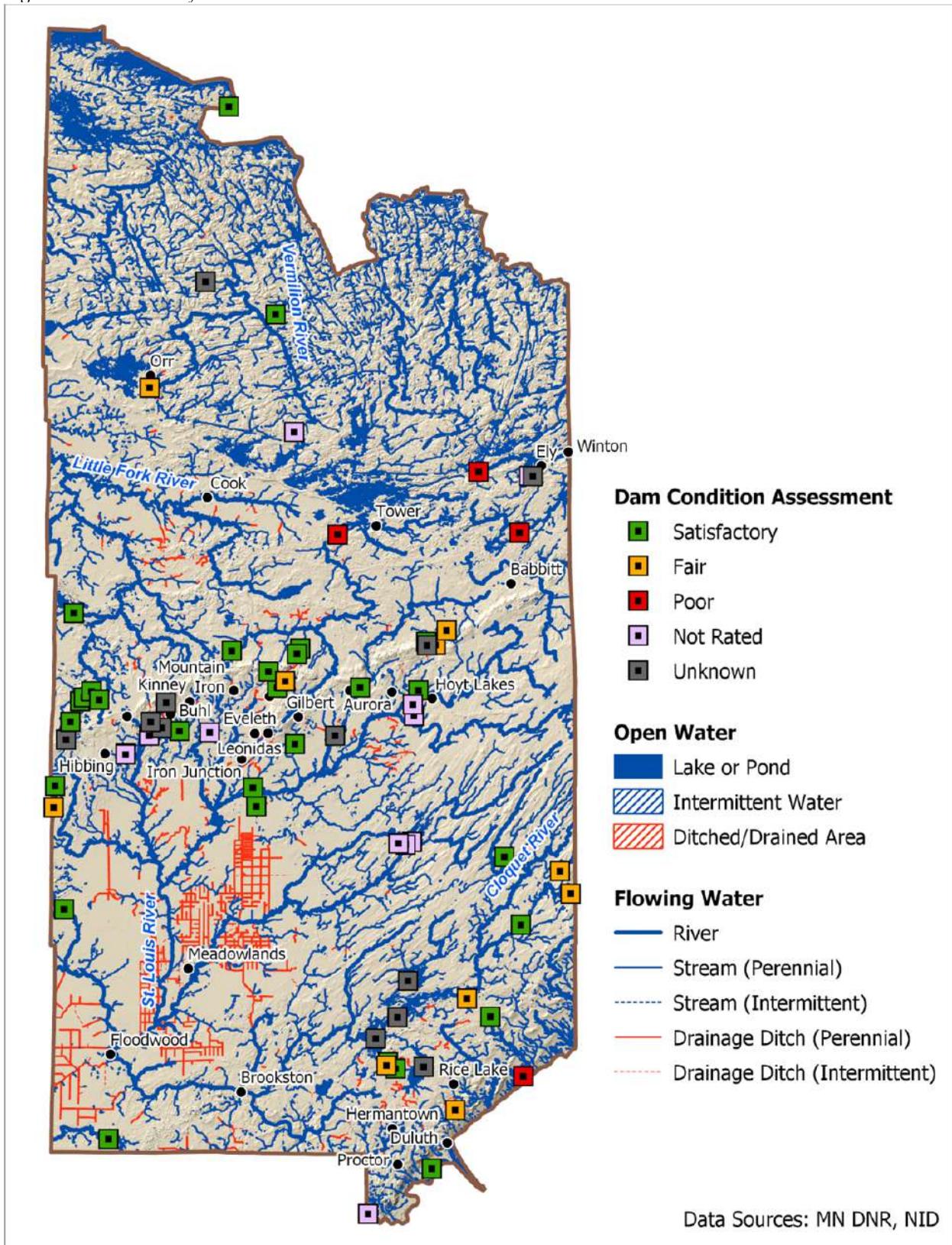
Dams in "Poor" or "Unsatisfactory" condition are more vulnerable to failure and pose a greater threat to the surrounding community and infrastructure. There are four dams in the county with conditional assessments ranked as "poor": Chez Pond, Bear Island, Pike River and Burntside Lake (Figure 28).

Levees are used to increase cultivation in agriculture and to protect population and structures from floods. However, there are no levees in St. Louis County.

St. Louis County Emergency Management identified that there are program gaps and deficiencies that make its citizens more vulnerable to dam failure and should be addressed with new mitigation efforts to reduce vulnerability. They include:

Emergency Notification Improvements – Program gaps identified during the last exercise dealt with notifications within Minnesota Power structure and also with resident notification. St. Louis County will now use Everbridge to try and close the public notification gap.

Figure 28. Condition of Dams



Section 5 – Mitigation Strategy

The goal of mitigation is to protect lives and reduce the future impacts of hazards including property damage, disruption to local and regional economies, the amount of public and private funds spent to assist with recovery, and to build disaster-resistant communities. Mitigation actions and projects should be based on a well-constructed risk assessment, provided in Section 4 of this plan. Mitigation should be an ongoing process adapting over time to accommodate a community's needs.

5.1 Community Capability Assessments

The capability assessment identifies current activities and existing planning tools used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs and projects that contribute to the lessening of disaster damages. The assessment also provides an evaluation of these capabilities to determine whether the activities can be improved in order to more effectively reduce the impact of future hazards. The following sections identify existing plans and mitigation capabilities within all of the communities:

- *Appendix J*: Lists the plans and programs in place in St. Louis County as related to hazard mitigation.
- *Appendix K*: As part of the St. Louis County MHMP update, the county, its cities and its townships were asked to participate in filling out a “Local Mitigation Survey” (LMS) form to report on their current mitigation capabilities and program gaps. Appendix K lists the LMS reports gathered for St. Louis County.

Information from the capability assessments was used to support development of local mitigation actions for implementation over the next five years (see column J *Comments on Implementation, Administration & Integration into Local Planning Mechanisms*).

5.1.1 National Flood Insurance Program (NFIP)

The NFIP is a federal program created by Congress to mitigate future flood losses nationwide through sound, community-enforced building and zoning ordinances and to provide access to affordable, federally-backed flood insurance protection for property owners. The NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the federal government that states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), the federal government will make flood insurance available within the community as a financial protection against flood losses.

Table 30 below lists St. Louis County participation in the NFIP.

Table 30. St Louis County Participation in the NFIP

Community Name	Participation in the National Flood Insurance Program (NFIP)?		Initial FIRM Date
City of Aurora	Participating in NFIP	Map date 1976	04/05/1974
City of Biwabik	Participating in NFIP	No FEMA Mapped High Risk Areas	05/17/1974
City of Brookston	Participating in NFIP	05/01/1987	08/02/1974
Canosia Township	Participating in NFIP	Map date 1992	12/20/1974
City of Cook	Participating in NFIP	Map date 12/06/2001	03/29/1974
City of Duluth	Participating in NFIP	Map date 11/04/1992	08/16/1974
Duluth Township	Participating in NFIP	Map date 02/19/1992	12/20/1974
Fayal Township	Participating in NFIP	Map date 02/19/1992	12/20/1974
City of Floodwood	Participating in NFIP	Map date 07/17/1978	03/29/1974
Gnesen Township	Participating in NFIP	Map date 02/19/1992	12/20/1974
Greenwood Township	Participating in NFIP	Map Date of 02/19/1992	12/16/1977
City of Hermantown	Participating in NFIP	Map date 11/18/1981	01/13/1978
City of Hibbing	Participating in NFIP	Map date 09/27/1991	01/24/1975
City of Iron Junction	Participating in NFIP	Map date 10/25/1974	12/25/1974
Lakewood Township	Participating in NFIP	Map date 01/19/1992	12/20/1974
Midway Township	Participating in NFIP	Map date 01/19/1992	12/20/1974
City of Mountain Iron	Participating in NFIP	Map date 02/23/1979	11/16/1976
City of Orr	Participating in NFIP	Map date 12/13/1974	12/13/1974
City of Proctor	Participating in NFIP	Map date 05/04/1989	04/05/1975
City of Rice Lake	Participating in NFIP	Map date 02/19/1992	12/20/1974
St. Louis County	Participating in NFIP	Map date 02/19/1992	12/20/1974
City of Tower	Participating in NFIP	Map date 08/11/1978	12/13/1974
City of Virginia	Participating in NFIP	No FEMA Mapped High Risk Areas	05/17/1974
City of Winton	Participating in NFIP	Map date 07/02/1976	08/02/1974

Source: MN DNR (data current as of 10/1/2018)

Repetitive loss properties are defined as properties that have had two or more flood insurance claims of \$1,000 or more in any rolling 10-year period. Property owners are asked to consider mitigation activities such as acquisition, relocation, or elevation, among other options. FEMA's Repetitive Loss (RL) properties strategy is to eliminate or reduce the damage to property and the disruption to life caused by repeated flooding of the same properties. Property owners are notified of their status by FEMA. St. Louis County has eight repetitive loss properties, as described in Table 31.

Table 31. Repetitive Loss Properties in St. Louis County

Location	Total Losses	Number of Properties	Property Type	Total Building Payments	Total Contents Payments	Total Payments
Duluth	6	3	2 single family residences, ¹ 'other – non-residential'	\$14,360	\$41,440	\$55,800
Floodwood	5	2	Single family	\$20,237	\$0.00	\$20,237
Proctor	3	1	2-4 family	\$28,380	\$10,268	\$38,649

Location	Total Losses	Number of Properties	Property Type	Total Building Payments	Total Contents Payments	Total Payments
			residence			
St. Louis County	5	2	Single family	\$62,895	\$4,414	\$67,310

Source: MN DNR (data current as of 3/31/2019)

No properties are classified as "Severe Repetitive Loss" (SRL). An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.
- For both (a) and (b) above, at least two of the referenced claims must have occurred within any 10-year period, and must be greater than 10 days apart.

For more on the areas that flood repeatedly in St. Louis County, see Section 4.4.5 *Flash Flood and Riverine Flood*.

5.1.2 Plans and Ordinances

St. Louis County and its incorporated communities have a number of plans and ordinances in place to ensure the safety of residents and the effective operation of communities, including an Emergency Operations Plan, Capital Improvements Plan, Comprehensive/Master Plan and Economic Development Plan.

5.1.3 Plans and Programs in Place to Address Natural Hazards

St. Louis County has numerous plans and programs in place to address natural hazards from warning to response. Some of these programs are specific to a hazard and others address impacts and human safety for many types of events. The natural hazard(s) the plan or program is most relevant to is highlighted.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

Emergency Operations Plan – St. Louis County maintains an all-hazards Emergency Operations Plan which details key emergency management functions (i.e. public information and warning, evacuation, mass care sheltering, etc.) that may be necessary in advance of, during and following hazard events that pose risk to life safety. It is intended to assist key county/city officials and emergency organizations to carry out their responsibilities for the protection of life and property under a wide range of emergency conditions. This includes events such as severe summer and winter storm events, extreme temperatures, flooding and wildfire.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

Public Warning and Notification – In the event of emergencies or hazardous conditions that require timely and targeted communication to the public, St. Louis County utilizes the Everbridge Emergency Notification System termed Northland Alert, the county website, and local news media. The county

promotes the use of NOAA weather radios by critical facilities and the public to receive information broadcast from the National Weather Service. Local newspaper & radio stations and their websites may assist with sharing public information. St. Louis County has a procedure in place to alert fire and EMS agencies of severe weather warnings through paging when certain warnings are issued.

Summer Storms **Winter Storms** **Floods** **Erosion** **Extreme Temps** **Drought** **Dam Failure** **Wildfire**

Backup Power – The St. Louis County Emergency Operations Center, Government Services Center, Duluth, Hibbing and Virginia Court Houses, Northland Office Building, Jail & two temporary lock-ups and the St. Louis County Public Safety Building have generator backup power.

Summer Storms **Winter Storms** **Floods** **Erosion** **Extreme Temps** **Drought** **Dam Failure** **Wildfire**

Severe Weather Warnings – Severe weather warnings are issued by the National Weather Service office in Duluth, MN. St. Louis County has an Emergency Conditions Policy in place.

Summer Storms **Winter Storms** **Floods** **Erosion** **Extreme Temps** **Drought** **Dam Failure** **Wildfire**

School Closings – All school districts within the county have a school closing policy and communications plan in place if inclement weather or extreme temperatures create a hazardous situation for students or staff.

Summer Storms **Winter Storms** **Floods** **Erosion** **Extreme Temps** **Drought** **Dam Failure** **Wildfire**

Mass Care Shelter Facilities – St. Louis County works with local jurisdictions to be ready to activate shelter facilities if people are displaced due to severe storms, extreme temperatures, flooding, wildfire or other hazard events. St. Louis County Public Health has recently taken over shelter responsibility and has been training on shelter setup and operation. Red Cross is an assisting partner and will assist when resources are available. From January through March, 2019, St. Louis County and the city of Duluth conducted a pilot project for a warming shelter in West Duluth when the temperature fell below zero degrees Fahrenheit. The pilot project operated for 29 days, and provided 599 “bed-nights” to 164 individuals. The Duluth Transit Authority provided free transportation between the Transit Center and the Warming Center. During the winter of 2019-2020, Gloria Dei Lutheran Church has volunteered to be a Warming Center and CHUM has changed its overnight policies to allow unlimited entry to the Drop-In Center overnight. A third site in Lincoln Park is under consideration.

Summer Storms **Winter Storms** **Floods** **Erosion** **Extreme Temps** **Drought** **Dam Failure** **Wildfire**

Snow Removal – The St. Louis County Public Works Department is responsible for the removal of snow and ice from county roads, as well as some township roads and city streets based on interagency agreements. The department completes its snow removal process in accordance with the St. Louis County Public Works Department Snow Removal Policy. MNDOT removes snow from state highways as well as disperses salt/sand as needed.

Summer Storms **Winter Storms** **Floods** **Erosion** **Extreme Temps** **Drought** **Dam Failure** **Wildfire**

Outdoor Warning Sirens – There are outdoor warning sirens located in the cities of Duluth, Proctor, Floodwood and Gilbert in St. Louis County. St. Louis County 9-1-1 Communications activates the sirens per their standard operating procedure. Sirens are also activated when a city or county public safety official (police, fire) requests activation due to imminent danger to life and/or property.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

Severe Weather Awareness Weeks – St. Louis County helps promote and participates in the National Weather Service’s “Severe Weather Awareness Week” held in April each year and the “Winter Hazard Awareness Week” in November each year. Each week-long event seeks to educate residents on the dangers of severe storms and highlights the importance of preparing for severe weather before it strikes.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

SKYWARN Program – St. Louis County, through the National Weather Service (NWS), has trained SKYWARN weather spotters throughout the county. St. Louis County has a Radio Amateur Civil Emergency Services (RACES) group of which many members work with the NWS during severe weather.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

National Flood Insurance Program – St. Louis County and all city jurisdictions participate in the National Flood Insurance Program (NFIP).

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

Floodplain & Shoreland Ordinances – St. Louis County participates in many plans and programs to regulate development and setbacks on shoreline to enforce state floodplain and shoreland standards. These plans and programs include: North Shore Management Plan, Coastal Barrier Resource System, Road Drainage, Duluth National Pollutant Discharge Elimination System Storm Water Management Permit, Flood Mitigation Assistance, Repetitive Flood Claims and Severe Repetitive Loss.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

Stormwater Management Ordinance & Plans – The St. Louis County Water Plan addresses ground and surface water, public water supply and wastewater management.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

Local Fire Departments – There are 87 fire departments located in St. Louis County. Fire departments work wildfires in cooperation with the MN DNR and U.S. Forest Service. Many departments in northern St. Louis County have contracts to assist the MN DNR with wildfires. Non-organized townships have fire coverage through contracts with St. Louis County and the closest fire department.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

Mutual Aid Agreements – St. Louis County has a countywide Fire Chief’s Association and they participate in a countywide automatic mutual aid program. There are other mutual aid associations in St. Louis County that have written agreements for mutual aid. The associations are Lakehead Fire Department Mutual Aid Association, East Range Fire Coalition and the Laurentian Fire Mutual Aid Association.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure Wildfire

St. Louis County Firewise Program – St. Louis County has a contractor serving as the county Firewise Coordinator. The Coordinator works with local fire departments, MN DNR, U.S. Forest Service and land

owners on Firewise projects, such as assisting property owners with removal of bio-fuels (Chipper Days) and conducting Level 1 Firewise Assessments for homeowners.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure **Wildfire**

St. Louis County Community Wildfire Protection Plan (CWPP) – St. Louis County has a CWPP in place from 2008 that is currently being updated. The CWPP identifies and prioritizes the Wildland-Urban Interface (WUI) high-risk wildfire areas within the county and identifies wildfire mitigation activities and projects for implementation, such as: fire prevention & education programs, biomass removal, external wildfire sprinklers and improvement of ingress/egress. The CWPP is developed in collaboration with county and city government, local fire departments, MN DNR, U.S. Forest Service, USDA and local residents.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure **Wildfire**

Burning Permits/Restrictions – The MN DNR regulates when burning permits are available and requires permit holders to register their burning permit online prior to burning. Burning permits are issued by MN DNR Fire Wardens scattered throughout the county. St. Louis County 9-1-1 Communications has access to the statewide burning permit website.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure **Wildfire**

Fire Prevention Week – Fire Prevention Week is held annually each October with the main emphasis on educating youth through visiting schools. Most fire departments participate and provide an opportunity for local residents to learn fire safety with open houses.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure **Wildfire**

Wildfire Public Education & Awareness – St. Louis County Emergency Management works in concert with the MN DNR and U.S. Forest Service to educate the public about wildfire through visitor centers, printed/online information and special events. A “Living with Fire” public event was held by the St. Louis County Firewise Coordinator with Fire Adaptive Communities, MN DNR Forestry, U.S. Forest Service, Emergency Management and local public safety agencies. This event was free and open to the public to raise awareness of wildfire and how they can make their property more wildfire resistant.

Summer Storms Winter Storms Floods Erosion Extreme Temps **Drought** Dam Failure Wildfire

St. Louis County Water Plan – The St. Louis County Water Plan describes both surface and groundwater quantities and quality. It also addresses the county’s water needs and concerns.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure **Wildfire**

Public Awareness – In the event of drought conditions, St. Louis County Emergency Management works with the MN DNR and U.S. Forest Service to raise public awareness of the dry conditions and increased danger of wildfire.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought Dam Failure **Wildfire**

Soil and Water Conservation Districts (SWCD’s) – There are two SWCDs that serve St. Louis County: the South St. Louis County SWCD and the North St. Louis County SWCD. Both SWCDs provide access to natural resource management and conservation services and provide technical, financial, and

educational assistance to landowners to address natural resource concerns. Each SWCD also manages their allocation of the Erosion Control and Water Management Program, or State Cost-Share Program. This program provides funds to Soil and Water Conservation Districts to share the cost of systems or practices for erosion control, sedimentation control, or water quality improvements designed to protect and improve soil and water resources. Through the Cost-Share Program, land owners and/or occupiers can request financial and technical assistance for the implementation of conservation practices. Projects that may be eligible for cost-share funding include projects such as: critical area stabilization, diversions, field windbreaks, grassed waterway, filter strips, sediment basins, streambank, shoreland, and roadside protection, stripcropping, terraces, unused well sealing and forestry conservation practice.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought **Dam Failure** Wildfire

Minnesota Power Dam Safety – The dams in southern St. Louis County are owned and controlled by Minnesota Power. The Minnesota Power Dam Safety Engineer meets with St. Louis County annually to discuss and update all plans.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought **Dam Failure** Wildfire

Emergency Notifications – St. Louis County works with Minnesota Power on emergency notification for all residents that could be directly impacted by a dam failure. St. Louis County 9-1-1 Communications has an Everbridge group built for each area that could be affected by dam failure. The notification process is tested annually.

Summer Storms Winter Storms Floods Erosion Extreme Temps Drought **Dam Failure** Wildfire

Exercises – Minnesota Power conducts tabletop, functional and full-scale exercises regularly to test and improve its current plans. St. Louis County participates in these exercises.

See *Appendix J* for a list of all plans and programs, ordinances and staff in place in St. Louis County, and *Appendix K: Local Mitigation Survey Report* further details each jurisdiction's plans, policies, programs, staff, funding and other resources they have in place in support of hazard mitigation.

5.2 Mitigation Goals

In Section 4 of this plan, the risk assessment identified St. Louis County as prone to a number of natural hazards. The steering committee members understand that although hazards cannot be eliminated altogether, St. Louis County can work toward building disaster-resistant communities.

The goals and strategies developed for the 2019 Minnesota State Hazard Mitigation Plan for natural hazards were adopted for use in the St. Louis County Plan (Table 32). This framework will allow for integration of the mitigation actions that are listed by St. Louis County and its jurisdictions into the state plan. The state will then be able to develop a statewide strategy that will benefit all of Minnesota.

Table 32. Goals from the 2019 Minnesota State Hazard Mitigation Plan

Flooding Goal: Reduce deaths, injuries, property loss and economic disruption due to all types of flooding (riverine, flash, coastal, dam/levee failure).

Wildfire Goal: Reduce deaths, injuries, property loss, natural resource and economic disruption due to wildfires (forest, prairie, grass, and peat bogs).

Windstorms Goal: Reduce deaths, injuries, property loss, and economic disruption due to windstorms.
Hail Goal: Reduce deaths, injuries, property damage, and economic disruption due to hailstorms.
Winter Storms Goal: Reduce deaths, injuries, property loss, and economic disruption due to winter storms (blizzard, ice, and ice storm).
Lightning Goal: Reduce deaths, injuries, property losses, loss of services, and economic disruption due to lightning.
Tornado Goal: Reduce deaths, injuries, property loss, and economic disruption due to tornadoes.
Drought Goal: Reduce economic loss and environmental impacts due to drought.
Extreme Heat Goal: Reduce deaths, injuries, and economic disruption due to extreme heat.
Extreme Cold Goal: Reduce deaths, injuries, and economic disruption due to extreme cold.
Dam/Levee Failure Goal: Reduce deaths, injuries, property loss, natural resource and economic disruption due to dam/levee failure.
Erosion/Landslide/Mudslide Goal: Reduce deaths, injuries, property loss, and economic disruption due to hillside, coastal, bluff: caused primarily by oversaturation of soil.

5.3 Mitigation Action and Project Strategies

The mitigation actions in this plan are summarized into four main strategy types, as described in the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). Also included are the new FEMA Climate Resilient Mitigation Actions (CRMA) released in 2016. Minnesota HSEM recommends the use of these mitigation strategies to be in alignment with the state plan and those recommended by FEMA. A fifth strategy type was determined by Minnesota HSEM for use within the state. They are listed in Table 33 below:

Table 33. Mitigation Strategies and Action Types

Mitigation Strategy	Description	Example Mitigation Actions
Local Planning and Regulations	These actions include government authorities, policies, or codes, that influence the way land and buildings are developed and built.	<ul style="list-style-type: none"> • Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans

Mitigation Strategy	Description	Example Mitigation Actions
Structure and Infrastructure Projects	<p>These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.</p> <p>This type of action also involves projects to construct manmade structures to reduce the impact of hazards.</p> <p>Many of these types of actions are projects eligible for funding through the FEMA Hazard Mitigation Assistance program.</p>	<ul style="list-style-type: none"> • Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
Natural Systems Protection	<p>These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.</p>	<ul style="list-style-type: none"> • Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	<p>These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.</p>	<ul style="list-style-type: none"> • Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • StormReady • Firewise Communities
Mitigation Preparedness and Response Support	<p>This is a State of Minnesota mitigation strategy with the intent of covering preparation and actions that protect life and property during a natural disaster.</p>	<ul style="list-style-type: none"> • Emergency operations plan • Flood fight plans and preparedness • Dam emergency action plans • Warning • Backup power • Emergency capabilities

In the review and discussion of selected mitigation strategies and actions, steering committee members and the public were asked to consider the ranking of mitigation actions by priority for implementation. Table 34 provides criteria that were taken into consideration in the process.

5.3.1 Hazard Mitigation Actions

St. Louis County and its included municipalities share a common Multi-Hazard Mitigation Plan and worked closely to develop it. Local leaders work together with the St. Louis County Emergency Management Coordinator to assure that the hazards and mitigation actions included in this plan are accurate and addressed in their jurisdictions.

The St. Louis County mitigation action chart is provided in Table 35. The St. Louis County risks and mitigation activities identified in Table 35 also incorporate the concerns and needs of townships and other entities participating in this plan. Appendix G contains the jurisdictional mitigation action charts for the cities of Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton.

Following is an overview the mitigation action charts and description of each element of the chart (columns A-K).

Column A – Numbered Item

Each mitigation action is identified by a number.

Column B – Hazard

Each mitigation action is identified by the hazard that it relates to. Actions that fall under "All-Hazards" relate to both natural and non-natural hazards. Other actions are specific to the natural hazards addressed in Section 4.3, Hazard Profiles.

Column C – Mitigation Strategy

Each mitigation action is identified by one of the following five mitigation strategies.

- Local Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs
- Mitigation Preparedness and Response Support

See Section 5.3 and Table 33 for a description of each mitigation strategy and related types of actions.

Column D – Mitigation Action

Each mitigation action provides a concise, action-oriented description of the action or project to be undertaken.

Column E - Reduces Risk to New / Existing Buildings or Infrastructure

Each mitigation action identifies if the activity reduces risk to new or existing buildings and infrastructure. This element of the chart ensures jurisdictions include consideration of actions that address the built environment.

Column F – Status

Each mitigation action identifies the status of implementation. Status categories include:

- New – New actions that have been identified since the last plan.
- Ongoing – Actions from the last plan that require continuing application.
- In Progress – Actions from the last plan that are currently being acted upon.

Mitigation actions that have been completed or deleted from the 2013 St. Louis County Multi Hazard Mitigation Plan are identified and reported on in Appendix H. Completed and deleted mitigation actions are not carried over into the updated mitigation action chart.

Column G – Priority

Each mitigation action identifies the jurisdiction's priority ranking for implementation of the action. See Table 34.

Table 34. Criteria for Mitigation Action Priority Ranking

Ranking	Criteria
High Priority	<ul style="list-style-type: none"> • Methods for reducing risk from the hazard are technically reliable. • The county has experience in implementing mitigation measures. • Mitigation measures are eligible under federal grant programs. • There are multiple mitigation measures for the hazard. • The mitigation measure(s) are known to be cost effective. • The mitigation measures protect lives and property for a long period of time, or are permanent risk reduction solutions.
Moderate Priority	<ul style="list-style-type: none"> • Mitigation methods are established. • The county has limited experience with the kinds of measures that may be appropriate to mitigate the hazard. • Some mitigation measures are eligible for federal grants. • There is a limited range of effective mitigation measures for the hazard. • Mitigation measures are cost-effective only in limited circumstances. • Mitigation measures are effective for a reasonable period of time.
Low Priority	<ul style="list-style-type: none"> • Methods for reducing risk from the hazard are not well-established, are not proven reliable, or are experimental. • The State or Counties have little or no experience in implementing mitigation measures, and/or no technical knowledge of them. • Mitigation measures are ineligible under federal grant programs. • There is a very limited range of mitigation measures for the hazard, usually only one feasible alternative. • The mitigation measure(s) have not been proven cost effective and are likely to be very expensive compared to the magnitude of the hazard. • The long-term effectiveness of the measure is not known, or is known to be relatively poor.

Column H – Expected Timeframe

Each mitigation action identifies the anticipated timeframe for implementation of the action. Most mitigation actions fall within the next 5-year planning cycle. Actions that have a specific timeframe are noted.

Column I – Responsible Party

Each mitigation action identifies what personnel, department or agency will be lead for the administration or implementation of the action.

Column J - Comments on Implementation, Administration & Integration into Local Planning Mechanisms

Each mitigation action provides a description of how the jurisdiction will work to incorporate the mitigation activity into other existing planning mechanisms, such as Capital Improvement Plans, ordinance enforcement, public outreach measures or partnership coordination.

Column K – Possible Funding

Each mitigation action identifies where potential funding may come from to support implementation of the mitigation activity, such as existing county or city funding, state or federal funding. Projects that may be eligible for future FEMA Hazard Mitigation Assistance grant funding are noted.

Table 35. St. Louis County Mitigation Action Chart (2020-2025)

St. Louis County Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New/Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	NORTHLAND ALERT Conduct public outreach to increase public awareness of the county's "Northland Alert" emergency notification system and to sign up for it online.	n/a	New	High	2020-2025	SLC Emergency Mgmt. in cord. with local City & Twp. Govt's	SLC utilizes the Everbridge Emergency Notification system, termed "Northland Alert." The system is administered by SLC Emergency Management. Public outreach is done via the SLC Facebook page and County website. Additional means of conducting public outreach are conducted such news releases to local media across the county.	County funding, MLSCP funding
2	All-Hazards	Mitigation Preparedness & Response Support	SHELTER FACILITIES Work with the American Red Cross to increase the amount of shelter facilities with MOU's in the county.	n/a	Ongoing	Mod.	2020-2025	SLC Public Health Dept.	SLC Public Health is currently working with the American Red Cross on this effort. In the event of an incident that requires temporary evacuation or sheltering, the Red Cross will determine what shelters to use and SLC PH will open and run them.	County funding
3	All-Hazards	Mitigation Preparedness & Response Support	EOP UPDATES Update the SLC County Emergency Operations Plan (EOP) to ensure it adequately details the needed steps to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	SLC Emergency Mgmt.	SLC Emergency Mgmt. maintains an updated EOP to meet MN HSEM MN WALK Requirements for EOP updates. The EOP undergoes an annual cyclical review process that includes reviews by the SLC County Board, HSEM and peer Emergency Managers from HSEM Region 2.	County funding

St. Louis County Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New/Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	GENERATOR BACKUP POWER Identify St. Louis County critical buildings and services that do not have adequate backup power and obtain appropriate generators to install at those locations.	n/a	New	High	2020-2025	SLC Public Works and Property Mgmt. Dept.	SLC Property Mgmt. Dept. maintains an inventory of what county facilities have backup power and is currently evaluating what facilities do not have generator backup power. The county will work to purchase and install either permanent or portable generators based on a case-by-case basis.	County funding, FEMA HMA grant funding
5	Severe Winter & Summer Storms	Education & Awareness Programs	PUBLIC EDUCATION & AWARENESS Provide education and awareness to local residents and visitors on severe winter, spring and summer storms and promote personal and family emergency preparedness.	n/a	Ongoing	High	2020-2025	SLC Emergency Mgmt.	SLC Emergency Management participates in the NWS "Winter Hazard Awareness Week" held in November each year and the "Severe Weather Awareness Week" held in April each year. Information is shared with the public via the County Facebook page and also via local news sources. Cities and townships are encouraged to share the information locally via their own communication channels. Residents are encouraged to be prepared for extended power outages due to severe storm events with their own backup power, food, water and other emergency supplies.	County funding, MLSCP funding

St. Louis County Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New/Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
6	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	NOAA WEATHER RADIOS Promote placement of severe weather radios in schools and county buildings and encourage use by local residents.	n/a	Ongoing	Mod.	2020-2025	SLC Emergency Mgmt.	SLC Emergency Management promotes the use of NOAA weather radios by critical facilities and the public to receive information broadcast from the National Weather Service. The County website, Facebook page and local newspaper and radio stations assist to promote this information.	County funding
7	Severe Winter & Summer Storms	Structure & Infrastructure Projects	POWER LINE FAILURE Work with rural & municipal electrical coops in the County to identify and implement projects to bury or strengthen power lines to mitigate against power failure.	Yes (Power System Infrastructure)	New	High	2020-2025	SLC Public Works Dept. in cord. with rural & municipal electric providers (i.e., Lake Country Power, North Star Electric Coop)	SLC Public Works involvement with this is permitting for work in the road ROW. Rural & municipal electrical providers work to identify and implement measures for the loss of power outages in their service areas. Examples from Lake Country Power and North Star Electric Cooperative include increasing the size of poles to better survive severe storm events; rebuilding aged overhead lines and utilizing underground when advantageous to overhead; developing long-range plans, and annually inspecting all lines & poles for necessary maintenance.	Rural or Municipal Coop funding, FEMA HMA Grant funding

St. Louis County Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New/Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
8	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	SKYWARN TRAINING Work with the National Weather Service to offer SKYWARN training to first responders and the public across the county to have a system of trained storm spotters in place.	n/a	Ongoing	Mod.	2020-2025	SLC Emergency Mgmt. in cord. with NWS	This is an ongoing effort of the SLC Emergency Mgmt. program. On an annual basis we work with the NWS to schedule and promote SKYWARN trainings with First Responders and the public.	County, funding, NWS funding
9	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	WARNING SIRENS Work with cities that own warning sirens to ensure their functionality.	n/a	Ongoing	Mod.	2020-2025	SLC Emergency Mgmt. in cord. with City EM's	SLC Emergency Management keeps track of where all warning sirens are located in the county and encourages the departments that maintain them to keep up with regular testing and maintenance. All sirens are owned by the cities where they are located. During dangerous high wind or tornado events the SLC 9-1-1 Center activates sirens for cities who have them, so ensuring functionality of all sirens is of importance to SLC.	Municipal funding

St. Louis County Mitigation Action Chart										
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#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New/Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
10	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	STORM SHELTERS / SAFE ROOMS Provide technical support to municipalities within the County that may need assistance in the construction or retrofit of storm shelter facilities or tornado safe rooms.	n/a	New	High	2020-2025	SLC Emergency Mgmt. in cord. with municipal gov'ts and other partners	SLC Emergency Management will seek to provide assistance to townships or cities if they request assistance to apply for a FEMA HMA grant for a tornado safe room under the umbrella of the County. Responsibility for such projects will fall under each city or township. There are other governmental subdivisions in St. Louis County that have park systems, including the MN DNR and the City of Duluth. The County will collaborate as needed on any safe room projects pursued by those entities.	FEMA HMA Grant funding, Other funding TBD
11	Extreme Temps	Mitigation Preparedness & Response Support	EXTREME TEMPS OUTREACH Expand information and delivery methods on the risks of extreme heat and extreme cold to county residents, especially the elderly and people who participate in physically strenuous activities.	n/a	Ongoing	High	2020-2025	SLC Emergency Mgmt. in cord. with SLC PH Dept.	During periods of extreme temps SLC Emergency Mgmt. and SLC Public Health work to inform the public on dangerous conditions due to heat/cold, in particular to the elderly or to youth. SLC Emergency Mgmt. will continue to refine and develop products to convey to the public during these incidents through channels such as SLC Facebook and local media sources. We are also working on the new tools at hand to accomplish this such as use of Everbridge.	County funding

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#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New/Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
12	Wildland Fire	Local Planning & Regulations	<p>WOODY DEBRIS PILES</p> <p>Work with local governments, MN DNR, Tribal & County partners to increase the number of disposal sites for woody debris removed by land owners, and assist in maintaining and elimination of these piles.</p>	Yes <i>(New and Existing Buildings)</i>	New	High	2020-2025	SLC Firewise Coordinator in cord with local gov'ts, MN DNR, USFS, tribal and county partners	<p>Through collaborative planning efforts with partner agencies, the FW Coordinator will work to increase the number of disposal sites, create proper signage, install gates where appropriate and maintain consistent hours of operation. Planning efforts will include ways of monitoring piles and eliminating piles through mutual operation agreements with partners. SLC Public Works and Land Departments can provide locations such as gravel pits where property owners can bring downed trees. Note there is an associated cost for the county to grind and remove the trees. In 2016 FEMA reimbursed SLC for some of these costs.</p>	Mutual Operations Agreements with Partners. Possible FEMA HMA grant funding

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13	Wildland Fire	Local Planning & Regulations	HAZARDOUS TREE/WOODY DEBRIS REMOVAL Provide assistance to land owners and local governments with removal of downed trees after a blow-down event, as well as removal of trees killed by insects in order to protect the defensible space zone around structures.	Yes (<i>Existing Buildings</i>)	New	High	2020-2025	SLC Firewise Coordinator in cord with local gov'ts, MN DNR, USFS, tribal and county partners	This is an effort that falls under the St. Louis County Firewise Coordinator, in coordination with local governments, MN DNR, U.S. Forest Service, Tribal and County partners. The issue of downed and insect-killed trees is an increasing and ongoing problem throughout the County and poses a severe wildfire risk. Under the SLC Firewise Program we will work to develop a strategic plan and sustainable way to remove and dispose of these hazardous fuels. This process will need to include all agencies, local governments and private landowners.	County funding, MN DNR, USFS, Tribal & Local Gov'ts, Private Lake / Road Associations
14	Wildland Fire	Local Planning & Regulations	CWPP PLANNING & IMPLEMENTATION Monitor and update the St. Louis County Community Wildfire Protection Plan (CWPP) for the implementation of priority wildfire risk-reduction activities, such as hazardous fuels reduction treatments.	Yes (<i>Existing Buildings</i>)	Ongoing	High	2020-2025	SLC Firewise Coordinator	The last St. Louis County CWPP was updated in 2013 and is currently undergoing a new update under the County's new Firewise Coordinator (completion by early 2020). The CWPP identifies and prioritizes high risk areas within the County for hazardous fuels reduction treatments and additional mitigation measures. The FW Coordinator and FW Committee are responsible for the monitoring and update of the CWPP on an annual basis, as well as the tracking and implementation of projects.	County funding, USFS Stevens Grant, MNDNR Firewise Grant

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15	Wildland Fire	Education & Awareness Programs	FIREWISE OUTREACH & EDUCATION Continue to build and maintain the St. Louis County Firewise program in collaboration with communities and key partners.	Yes (<i>Existing Buildings</i>)	Ongoing	High	2020-2025	SLC Firewise Coordinator	St. Louis County participates in the MN DNR Firewise Program through the program & project activities of the SLC Firewise Coordinator. Examples include conducting Level-1 & Level II Firewise Assessments on private properties, organizing Chipper Days and other public outreach events. Work is done in partnership with key agencies such as the MN DNR, U.S. Forest Service and groups such as area community groups (i.e. lake & road associations).	County funding, USFS Stevens Grant, MNDNR Firewise Grant
16	Wildland Fire	Local Planning & Regulations	NEW DEVELOPMENT: INGRESS/EGRESS PLANNING Promote all new and existing development in rural areas to have adequate access and egress for emergency response vehicles.	Yes (<i>New & Existing Buildings</i>)	Ongoing	High	2020-2025	SLC Planning & Community Development Dept.	This is part of the St. Louis County Subdivision Ordinance #60 and Comprehensive Plan (Ordinance #65), adopted January 22, 2019.	County funding
17	Wildland Fire	Education & Awareness Programs	HOMEOWNER OUTREACH & ASSISTANCE Provide targeted wildfire mitigation information, training, and assistance to homeowners in high-risk WUI areas to increase defensible space and reduce fuels around structures.	Yes (<i>Existing Buildings</i>)	Ongoing	High	2020-2025	SLC Firewise Coordinator	These efforts are under the program direction of the SLC Firewise Coordinator to carry out and report on to the SLC Emergency Management Coordinator and SLC CWPP Committee.	County funding, FEMA HMA Grant funding

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18	Wildland Fire	Structure & Infrastructure Projects	<p>STRUCTURE PROTECTION (NEW DEVELOPMENT OR RETROFITS)</p> <p>Promote the use of building materials (i.e., metal roofs, external wildfire sprinkler systems) in new development or retrofit projects for properties located in high-risk WUI areas that can reduce the chance of property damages from wildfire.</p>	Yes (<i>Existing Buildings</i>)	Ongoing	High	2020-2025	SLC Firewise Coordinator in cord. with SLC Emergency Mgmt.	SLC Firewise actively promotes fire-safe building materials to homeowners. From approximately 2012-2014 SLC Emergency Management worked with property owners on the installation of external wildfire sprinkler systems in high-risk wildfire areas with the help of a FEMA HMA grant. Future sprinkler grants or metal roof grant programs may be pursued in the future based on wildfire activity and need in the next 5 years.	County funding, FEMA HMA grant funding, MN DNR Firewise grant funding
19	Wildland Fire	Natural Systems Protection	<p>RAIL CORRIDOR VEGETATION MANAGEMENT</p> <p>Work with the rail companies that operate trains through St. Louis County (CN, CP and BNSF) to reduce risk of rail-induced grassfires that can spread to become large acreage fires.</p>	Yes (<i>New & Existing Buildings</i>)	Ongoing	High	2020-2025	SLC Emergency Mgmt.	St. Louis County Emergency Management will continue to encourage railway companies to plan for and implement vegetation management programs within the railway right-of-way. It is the responsibility of the respective railway companies to manage vegetation within the railway corridor to reduce risk to wildland fire, but this is largely still an issue.	Railway Company
20	Flood	Local Planning & Regulations	<p>NATIONAL FLOOD INSURANCE PROGRAM</p> <p>Administer and enforce St. Louis County's participation in the National Flood Insurance Program (NFIP).</p>	Yes (<i>NFIP Enforcement</i>)	Ongoing	High	2020-2025	SLC Planning & Community Development Dept.	St. Louis County participates and enforces the regulations of the NFIP. The program is administered by the SLC Planning & Community Development Dept.	County funding

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21	Flood	Structure & Infrastructure Projects	CULVERT MAPPING Complete development of an accurate GIS inventory of all roadway hydraulic structures (culverts, storm sewers, bridges) to 1) Support program for assessment of structure conditions to ensure good condition and hydraulic capacity; 2) Support watershed level system analysis; and 3) Support active monitoring of structures during a flooding disaster.	Yes (Transportation Infrastructure)	New	High	2020-2025	SLC Public Works Dept. in cord. with City and Twp. Gov'ts.	The SLC Public Works Dept. coordinates a transportation plan with MnDOT and local communities. Continued culvert replacement is needed to prevent road flooding. This is a strain on our smaller townships that have limited funding for road infrastructure.	County funding
22	Flood	Structure & Infrastructure Projects	SURFACE WATER RUNOFF MANAGEMENT Control runoff in identified areas where additional runoff sources contribute to downstream flooding to roads or structures.	Yes (Transportation Infrastructure)	New	High	2020-2025	SLC Public Works Dept. in cord. with City and Twp. Gov'ts.	Implementation of this activity will fall under the directive of SLC Public Works Dept. and guidance in the St. Louis County Water Plan. The plan addresses ground and surface water, public water supply and wastewater management. The current plan is good until 2020.	County funding, FEMA HMA Grant funding, Watershed Planning & Implementation grants

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#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New/Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
23	Flood	Local Planning & Regulations	<p>STORMWATER MANAGEMENT GUIDELINES</p> <p>Ensure that current SLC storm water management guidelines are adequate to limit post development run-off and will not result in storm water run-off created flood damages.</p>	Yes (<i>New/Existing Buildings or Infrastructure</i>)	Ongoing	High	2020-2025	SLC Planning & Community Development Dept. in cord. with City and Twp Gov'ts.	The SLC Planning & Community Development Dept. will continue to apply stormwater management guidelines. This is part of Comp Plan Ordinance 65 and Zoning Ordinance 62.	County funding
24	Flood	Structure & Infrastructure Projects	<p>TRANSPORTATION INFRASTRUCTURE</p> <p>Maintain bridge, road, and culvert infrastructure at a level that is capable of sustaining a major storm event and will not be vulnerable to washouts.</p> <p>Identify and address measures for transportation infrastructure impacted by heavy rain events using system analysis including the use of GIS and hydraulic modeling to inform design.</p>	Yes (<i>Transportation Infrastructure</i>)	Ongoing	High	2020-2025	SLC Public Works Dept. in cord with MnDOT, City & Twp. Gov'ts	The St. Louis County Public Works Department coordinates a transportation plan with MnDOT and local communities on an annual basis to maintain and improve existing infrastructure as well as to identify and address new flood damaged areas that require mitigation measures.	County funding, FEMA HMA grant funding, other State funding programs (TBD)

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25	Flood	Local Planning & Regulations	ICE DAMS & BEAVER DAM MANAGEMENT Address ice dams that may impact the road system in a timely manner in order to prevent damage to infrastructure and over-the-road flooding, in particular during the spring thaw. Also monitor and address beaver dams adjacent to roads that may cause localized flooding.	Yes (Transportation Infrastructure)	Ongoing	High	2020-2025	SLC Hwy. Dept. in cord. with City & Twp. Gov'ts.	This is an annual part of the SLC Highway Dept. work plan for roads maintenance and safety of county-owned roads. Public Works needs additional equipment to de-ice culverts and implement new technology. Activities may also include replacing culverts that are frequent problem locations. Beaver dams are addressed on an as-needed basis by the County Hwy. Dept.	County funding
26	Flood	Local Planning & Regulations	NEW DEVELOPMENT Steer development away from areas that may be difficult to serve with reliable road access.	n/a	Ongoing	Mod.	2020-2025	SLC Planning & Community Development Dept. in cord. with City & Twp. Gov'ts	This is included in the Ordinance 65, Comp Land Use Plan, Zoning Ordinance 62 and Subdivision Ordinance 60.	County funding
27	Flood	Local Planning & Regulations	FLOODPLAIN ORDINANCE Administer and enforce the County's Floodplain Ordinance.	Yes (New Development)	Ongoing	Mod.	2020-2025	SLC Planning & Community Development Dept.	The SLC Planning & Community Development Dept. does floodplain checks on all permits and administers the County's Floodplain Ordinance #43.	County funding

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28	Flood	Local Planning & Regulations	COMMUNITY ASSISTANCE Work with cities and townships within the County to identify flood mitigation solutions for high-risk areas.	Yes (<i>New/Existing Buildings</i>)	Ongoing	High	2020-2025	SLC Planning & Community Develop-Dept., SLC Public Works, & SLC Emergency Mgmt.	This is an ongoing programmatic effort of the SLC Planning & Community Development Dept., SLC Public Works and SLC Emergency Management Dept. A current example is working in partnership with the City of Duluth to address coastal flood erosion issues to the downtown Lakewalk and the shoreline of Park Point.	County funding
29	Flood	Local Planning & Regulations	HOMES IN FLOODPLAIN (BUYOUTS) Identify and acquire repetitive flood properties through a buyout process and convert them to open space.	Yes (<i>Property Buyouts</i>)	Ongoing	High	2020-2025	SLC Planning & Develop-ment Dept.	The MN DNR Floodplain Manager reports that there are 2 repetitive loss properties in unincorporated areas of St. Louis County, as well as repetitive loss properties in 3 other cities (Floodwood, Proctor and Duluth). If in the future there are willing sellers for the properties, St. Louis County Planning Dept. will work with the MN DNR to evaluate working with them to sell or encouraging the cities where they are located to do so for buyouts.	County funding, FEMA HMA grant funding, MLSCP funding
30	Flood	Structure & Infrastructure Projects	DRAINAGE DITCH MAINTENANCE Work with right of way owners to address ditch and drainage maintenance concerns.	Yes (<i>Transportation Infrastructure</i>)	Ongoing	Mod.	2020-2025	SLC Hwy. Dept.	This is a regular maintenance effort by the SLC Public Works Dept. in maintaining the County roads system.	County funding

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31	Flood/ Erosion	Local Planning & Regulations	SHORELAND MANAGEMENT Maintain and facilitate an effective zoning process for shoreland management and enforce all shoreland management standards.	Yes (<i>New Development</i>)	Ongoing	Mod.	2020-2025	SLC Planning & Community Development Dept.	Shoreland Management is addressed under St. Louis County Zoning Ordinance 62 and enforced by the SLC Planning & Community Development Department.	County funding
32	Flood/ Erosion	Natural Systems Protection	SHORELINE STABILIZATION Repair, restore and stabilize shorelines of streams, rivers and lakes that experience damaging erosion from heavy rain and flood events.	n/a	New	High	2020-2025	SLC North and South SWCDs	The SWCDs assisted with restoration efforts following the 2012 flood. However, without special funding the SWCDs cannot do such restoration work, as the cost-share programs are limited. FEMA HMA grants would be one funding mechanism to support the SWCD's to assist with specific regional projects as identified by municipalities.	FEMA HMA grant funding, MN DNR Flood Hazard grant program, MLSCP funding
33	Erosion / Land Subsidence	Natural Systems Protection	HILLSIDE STABILIZATION Address existing hillside slumping/slide sites that have the potential to impact road and bridge infrastructure to stabilize and reduce chance of failure.	Yes (<i>Transportation Infrastructure</i>)	New	High	2020-2025	SLC Public Works Dept. in cord with MnDOT, SWCDs, and City & Twp Gov'ts	It is estimated that there are roughly 20 locations throughout SLC impacting county roads. One option is to map known problem sites using GIS, soil maps and other resources to develop a future vulnerability analysis as Winona County did. SLC Public Works will work with key partners to inventory sites, study mitigation alternatives, prioritize measures and then implement stabilization efforts.	County funding, MnDOT, FEMA HMA grant funding, MLSCP funding

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34	Coastal Erosion	Local Planning & Regulations / Natural Systems Protection	LAKE SUPERIOR COASTAL EROSION RESILIENCY Work with key partner agencies and the City of Duluth on planning & project efforts that reduce future coastal erosion damages from Lake Superior storms and addresses current coastal erosion issues threatening infrastructure.	Yes (Coastal Infrastructure)	New	High	2020-2025	SLC Emergency Mgmt. in cord. with City of Duluth, MN DNR & SLC South SWCD	The City of Duluth is lead on this efforts and St. Louis County is a partner in a two-part effort. Part 1: The city of Duluth will first be proposing a FEMA HMA grant application to conduct an assessment study of Lake Superior coastal areas in all of SLC, including a vulnerability assessment and cost benefit analysis. Part 2 is implementation of the approved grant and actions identified.	County funding, MLSCP funding, SWCD Cost Share funding, other State funding programs
35	Dam Failure	Local Planning & Regulations	UPPER STONE LAKE DAM EVACUATION & RESPONSE PLAN Work with the MN DNR Dam Safety Dept. to develop an Evacuation and Response Plan for the Upper Stone Lake Dam.	n/a	New	High	2020-2025	SLC Emergency Mgmt. in cord. with MN DNR Dam Safety Program	St. Louis County Emergency Management will be the lead County department to develop and implement an evacuation & response plan should the dam breach. The MN DNR Dam Safety Program classifies the Stone Lake Dam as a Class II - Significant Hazard Dam. Class 2 dams are not required to have an Emergency Action Plan (EAP) but the MN DNR encourages owners to adopt one. The structure is inspected by the MN DNR Dam Safety Dept. every 4 years with maintenance recommendations sent to the county as a report. Periodic maintenance is also done by SLC Land & Minerals Dept.	County funding

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36	Dam Failure	Mitigation Preparedness & Response Support	EMERGENCY NOTIFICATION IMPROVEMENTS Plan for the effective use of Everbridge to notify residents who live downstream of a dam in the event of dam failure.	n/a	New	High	2020-2025	SLC Emergency Mgmt. in cord. with MN Power	SLC Emergency Management works with Minnesota Power on notification for all residents that could be affected by dam failure. The SLC Everbridge system has a communications group built for each area that could be affected by dam failure. The notification process is tested annually.	County funding

The mitigation activities listed in the **St. Louis County Mitigation Action Chart** were identified for inclusion in the county's 2020 Multi-Hazard Mitigation Plan Update through county staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into county planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of St. Louis County.

5.3.2 *Mitigation Actions by Community*

This plan is a multi-jurisdictional plan that covers St. Louis County, its school districts and the cities of Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton.

Steering committee members, elected government officials and staff from each city jurisdiction actively participated in the development of mitigation action charts for implementation over the next five-years (2020-2025). Identification of local mitigation actions were informed by a community's known high-risk hazards, vulnerabilities and capabilities for mitigation (i.e., policies, programs, staff, funding or other resources).

The following representatives provided review and input to mitigation actions to be included in their respective draft Mitigation Action Chart (MAC) as part of the St. Louis County 2020 MHMP Update.

Table 36. Representatives that reviewed and provided input to Mitigation Action Charts

Name of Jurisdiction	MAC Reviewers
St. Louis County	<p><i>County Staff:</i> Dewey Johnson, SLC EM Coordinator R.C. Boheim, South St. Louis SWCD District Manager Gloria Erickson, SLC Firewise Coordinator Jason Meyer, SLC Deputy Land and Minerals Director David Yapel, SLC GIS Manager Jennifer Bourbonais, SLC Planning Department Mark Weber, SLC Land Commissioner Carol Andrews, SLC Public Works Envr. Project Manager Jim Foldesi, SLC Public Works Director/Highway Engineer Matt Hemmila, SLC Public Works, Deputy Director - Engineering Brian Boder, SLC Public Works Deputy Director - Maintenance Vic Lund, SLC Public Works Traffic Engineer</p> <p><i>Other Stakeholders:</i> Derek Howe, Chief Operating Officer, Lake Country Power Ann Ellis, General Manager, North Star Electric Cooperative</p>
City of Aurora	Becky Lammi, City Administrator
City of Babbitt	Cathy Bissonette, Clerk-Treasurer Tony Chamberlin, Fire Chief
City of Biwabik	Jeff Jacobson, City Administrator Dan Mackey, Fire Chief David Levelwind, Water Operator
City of Brookston	Gene Nelson, City Councilor
City of Buhl	Ryan Pervenanz, City Clerk/Treasurer Dianne Thronson, Finance Manager
City of Chisholm	Bill Manney, City Administrator Bob Brown, City Emergency Manager and City Fire Chief Mandy Galli, City Building Official and Safety Director Larry Folstad, City Public Works Supervisor

Name of Jurisdiction	MAC Reviewers
City of Cook	Theresa Martinson, Administrator/Clerk-Treasurer Dawn Kehoe, Office Assistant
City of Duluth	Shawn Krizaj, Fire Chief/Emergency Management Director Jim Filby Williams, Director of Public Administration Adam Fulton, Deputy Director of Planning & Economic Development Carrie Pederson, Chief Engineer of Transportation
City of Ely	Gloria Erickson, SLC Firewise Coordinator George Burger, Emergency Management Director Harold Langowski, Public Works Director Tom Erchul, Fire Chief
City of Eveleth	Jackie Monahan-Junek, City Administrator Jerry Rosati, Public Works Director Mark Karpen, Assistant Public Works Director Tim Koivunen, Police Chief / EM Director Jesse Linde, Deputy Police Chief Robert Vlaisavljovich, Mayor
City of Floodwood	Jess Rich, City Administrator
City of Gilbert	Ty Techar, Chief of Police James Paulsen, Interim City Clerk
City of Hermantown	Jim Crace, Chief of Police David Bolf, City Engineer
City of Hibbing	Jesse Story, City Engineer/Director of Public Works Erik Jankila, Fire Chief Mary Ann Kepler, City Clerk-Treasurer John Sporer, Public Works Superintendent
City of Hoyt Lakes	Rebecca Burich, City Clerk Tim Soular, East Range Police Chief/Emergency Manager
City of Iron Junction	Van Rioux, City Clerk-Treasurer Travis McDonald, Mayor
City of Kinney	Debra Bachel, City Clerk
City of Leonidas	Mary Beltezore, City Clerk Kyle Andrews, Mayor
City of McKinley	Michelle Tveit, City Clerk Tony Nygaard, Mayor
City of Meadowlands	John Stoessel, City Clerk Betsy Crabb, Mayor Mary Ann Durovec, Deputy Mayor/City Councilor Mike Josephson, City Councilor Donna Perkins, City Councilor Jamie Durovec, City Councilor Marge Dunder, City Treasurer Jesse Otten, Public Works Kathy Matvey, EMT/Ambulance
City of Mountain Iron	Craig Wainio, City Administrator/City EM
City of Orr	Cheri Carter, Clerk-Treasurer
City of Proctor	Mark Casey, City Administrator
City of Rice Lake	Toni Blomdahl, Clerk-Treasurer John Werner, Mayor
City of Tower	Victoria Ranua, City Clerk Treasurer

Name of Jurisdiction	MAC Reviewers
	Steve Altenburg, Fire Chief Tom Gorsma, Public Works Director
City of Virginia	Allen Lewis, Fire Chief Bill Hennis, City Engineer
City of Winton	Anne Jackson, City Clerk Kathy Brandau, Mayor Marlene Zorman, City Councilor Lee Tessier, Council Adam Masloski, Council

Mitigation actions are separated by jurisdiction in Appendix G.

Section 6 – Plan Maintenance

6.1 Monitoring, Evaluation, and Updating the Plan

The St. Louis County Multi-Hazard Mitigation Plan (MHMP) should be considered a living document. The plan should be updated and approved by FEMA a minimum of every five years. The guidance in this section will function as the primary tool when reviewing progress on the implementation of the St. Louis County MHMP.

The St. Louis County Emergency Management Coordinator or their designee is the individual responsible for leading all efforts to monitor, evaluate, and update the hazard mitigation plan within the 5-year window. Since the last plan was updated in 2012, St. Louis County has made great efforts to increase the public's access to information, access to services and opportunities to offer feedback via our website. In 2018 the website was completely redesigned to be more user friendly, and is now also more easily accessed by mobile devices.

Throughout the next five-year planning cycle (2020-2025), St. Louis County Emergency Management will work to continue to engage jurisdictional stakeholders and the public in the monitoring, evaluation, and update of the mitigation efforts outlined in this plan. Our outreach will be done primarily through the use of our county website as well as through other outreach, as appropriate, such as local news media, social media, special events or in-person meetings.

The expansive geography of the county makes it challenging for local governments, residents and other stakeholders to attend meetings in person, and attendance has been consistently very low. Use of technology has become extremely common in all areas of life and business and we have embraced that fact. It is expected that, unless a face-to-face meeting is required, the trend towards using online services will continue, and will likely increase with residents, visitors, agencies, other local governments and businesses.

If there is a need for a face to face meeting due to new developments or a declared disaster occurring in the county, a meeting to update the public on pertinent mitigation strategies may be held. Depending on St. Louis County opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships in collaboration with St. Louis County.

Most of the mitigation actions outlined in this plan will be integrated into other existing planning mechanisms. Monitoring will include the record of how the actions have been implemented in the various jurisdictions via other planning tools.

St. Louis County will continue to review the MHMP goals and objectives to determine their relevance to changing situations in St. Louis County. In addition, state and federal policies will be reviewed to ensure they are addressing current and future/expected conditions. St. Louis County will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The

parties responsible for the various implementation actions will report on the status of their projects, and will include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies should be revised.

Updates or modifications to the MHMP during the five-year planning process will require a public notice and a meeting prior to submitting revisions to the individual jurisdictions for approval. The plan will be updated via written changes, submissions as the committee deems appropriate and necessary, and as approved by county commissioners.

Throughout the five-year window of the plan, each respective county department and jurisdiction will be required to report on the status of mitigation actions in their charts to the St. Louis County Emergency Management Coordinator so that progress notes may be maintained for the next plan update.

6.2 Implementation

St. Louis County and its included municipalities share a common Multi-Hazard Mitigation Plan and work together closely to develop, revise, and implement it. This MHMP provides a comprehensive chart of mitigation actions for St. Louis County and its jurisdictions (see Section 5.3.1, *Hazard Mitigation Actions*). The cities of Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton participated in the MHMP planning process and identified the specific mitigation strategies that they would seek to implement in their communities during the 5-year planning cycle. These mitigation actions are provided in Section 5.3.

A number of implementation tools are available to address hazards. Many of these tools are below, however, in some cases additional discussion is needed in order to identify what strategies are most appropriate to use. This will be part of an ongoing discussion as St. Louis County looks for opportunities for plan implementation. The following tools will be considered:

Education: In many cases, education of residents has been identified as one of the most effective mitigation strategies.

Capital Investments: Capital investments such as fire and ambulance equipment, sprinkler systems and dry hydrants are tools that can limit risks and impacts of natural and man-made hazards.

Data Collection and Needs Assessments: Data collection and needs assessments can aid in gaining a better understanding of threats and allow planning for mitigation strategies accordingly. As resources are limited for this part of the planning process, additional data collection is likely to be an ongoing activity as resources become available.

Coordination: Responsibilities for mitigation strategies run across various county departments, local fire and ambulance departments, city and township governments, and a host of state and federal agencies. Ongoing coordination is an important tool to ensure resources are used efficiently.

Coordination can also avoid duplication of efforts or prevent gaps that are created because of unclear roles and responsibilities. The mitigation plan review process can function as a tool to have an ongoing discussion of roles, responsibilities, and opportunities for coordination.

Regional Cooperation: Counties and public safety services providers throughout the northeastern region of Minnesota often share similar challenges and concerns. In some cases, a regional approach may be warranted as a mitigation strategy in order to save resources. Mutual aid agreements are a tool already in use for a number of services. Needs assessments for fire and ambulance services and development of assistance for volunteer recruiting, training, and retention could benefit from a regional approach. Cooperation among counties could also help in lobbying for certain funding priorities that address concerns relating to challenges in service delivery in rural areas. Organizations such as FEMA Region V and the MN Department of HSEM through the Regional Program Coordinator can offer tools and resources to assist in these cooperative efforts.

Regulation: Regulation is an important mitigation tool for St. Louis County. Regulation plays a particularly important role for land use, access to structures and the protection of water resources and public health.

6.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the Multi-Hazard Mitigation Plan (MHMP). The St. Louis County Emergency Management Coordinator and the St. Louis County Emergency LEPC members will continue to engage new public stakeholders in planning discussions and project implementation during the five-year cycle of this plan.

In order to seek continued public participation after the plan has been approved and during the five-year window of implementation for this plan, St. Louis County will take the following measures:

- The plan will be posted on the St. Louis County Emergency Management website for the public to read and provide feedback. Collected feedback will be reviewed and the plan will be amended as necessary.
- Following any major storms or natural disasters, St. Louis County Emergency Management will seek to gather concerns and new ideas for mitigation from local residents to include in the next update of the plan. This may be done through public meetings, outreach via social media (i.e., Sheriff's Office Facebook Page), or news releases via local media.
- Each community participating in the plan will be responsible to keep their local government, schools and community members updated and engaged in the implementation of their respective mitigation action charts (see *Appendix G: Mitigation Actions by Jurisdiction*). Each respective jurisdiction will be required to report on the status of mitigation actions in their charts to the St. Louis County Emergency Management Coordinator.
- Jurisdictions will use numerous means of public outreach to engage new public stakeholders in providing input on mitigation efforts or concerns on hazards by sharing information at city

council / township board meetings, sharing information at special events, working with local schools and partner organizations, and posting information on relevant local or social media that their communities use to inform and engage the public. As mitigation projects are implemented, jurisdictions will work to keep the public updated and engaged in those local efforts.

APPENDICES

- Appendix A – St. Louis County Maps
- Appendix B – St. Louis County Critical Facilities
- Appendix C – St. Louis County Hazard Events
- Appendix D – Adopting Resolutions
- Appendix E – Steering Committee Meetings
- Appendix F – Public Outreach & Engagement Documentation
- Appendix G – Mitigation Actions by Jurisdiction
- Appendix H – Past Mitigation Action Review Status Report (2013-2019)
- Appendix I – Works Cited
- Appendix J – St. Louis County Plans & Programs In Place
- Appendix K – Local Mitigation Survey Report
- Appendix L – Minnesota Department of Health Climate & Health Report

Appendix A

St. Louis County Maps

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Figure A - 1. Hydrography of St. Louis County

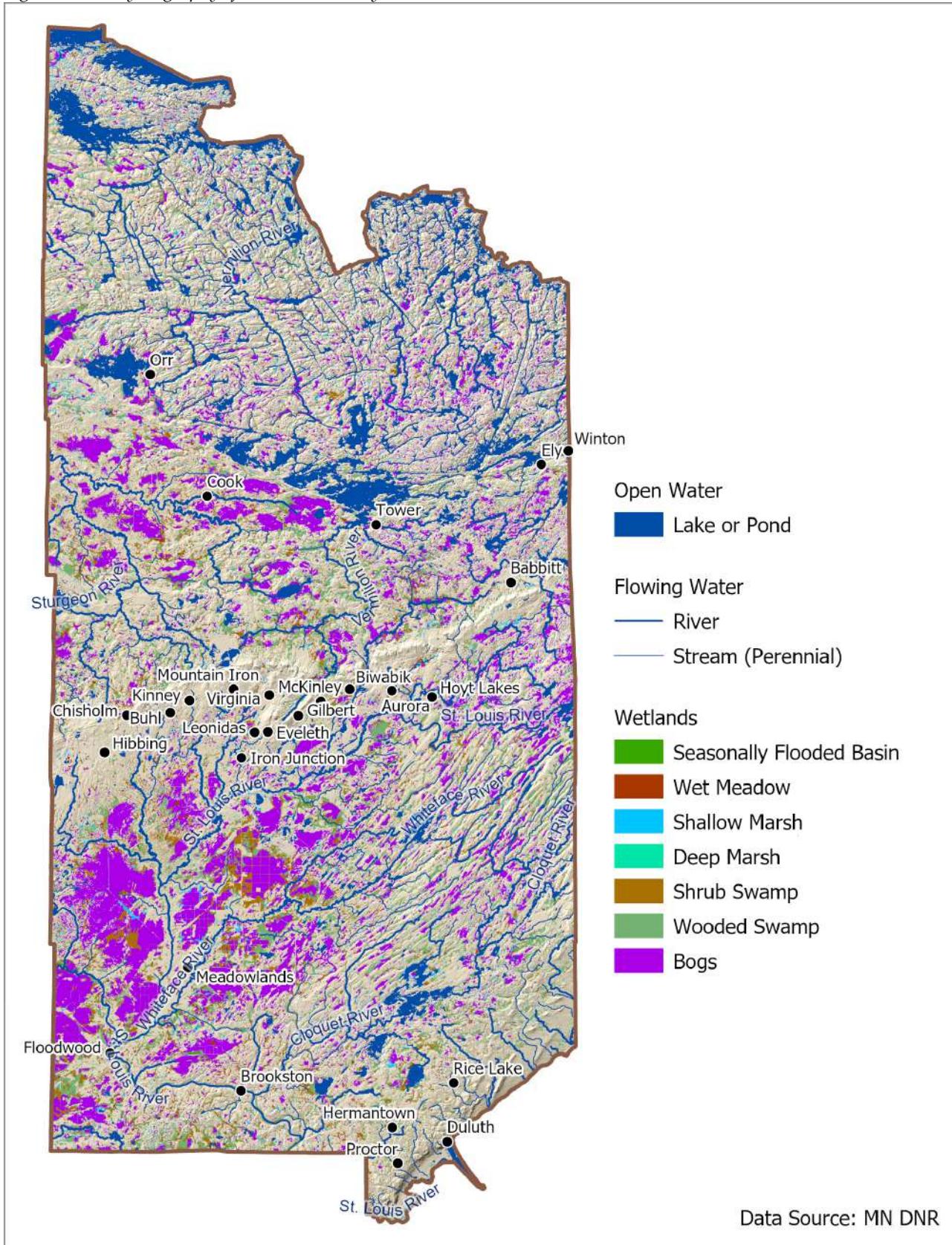


Figure A - 2. St. Louis County Population by Census Block, 2010

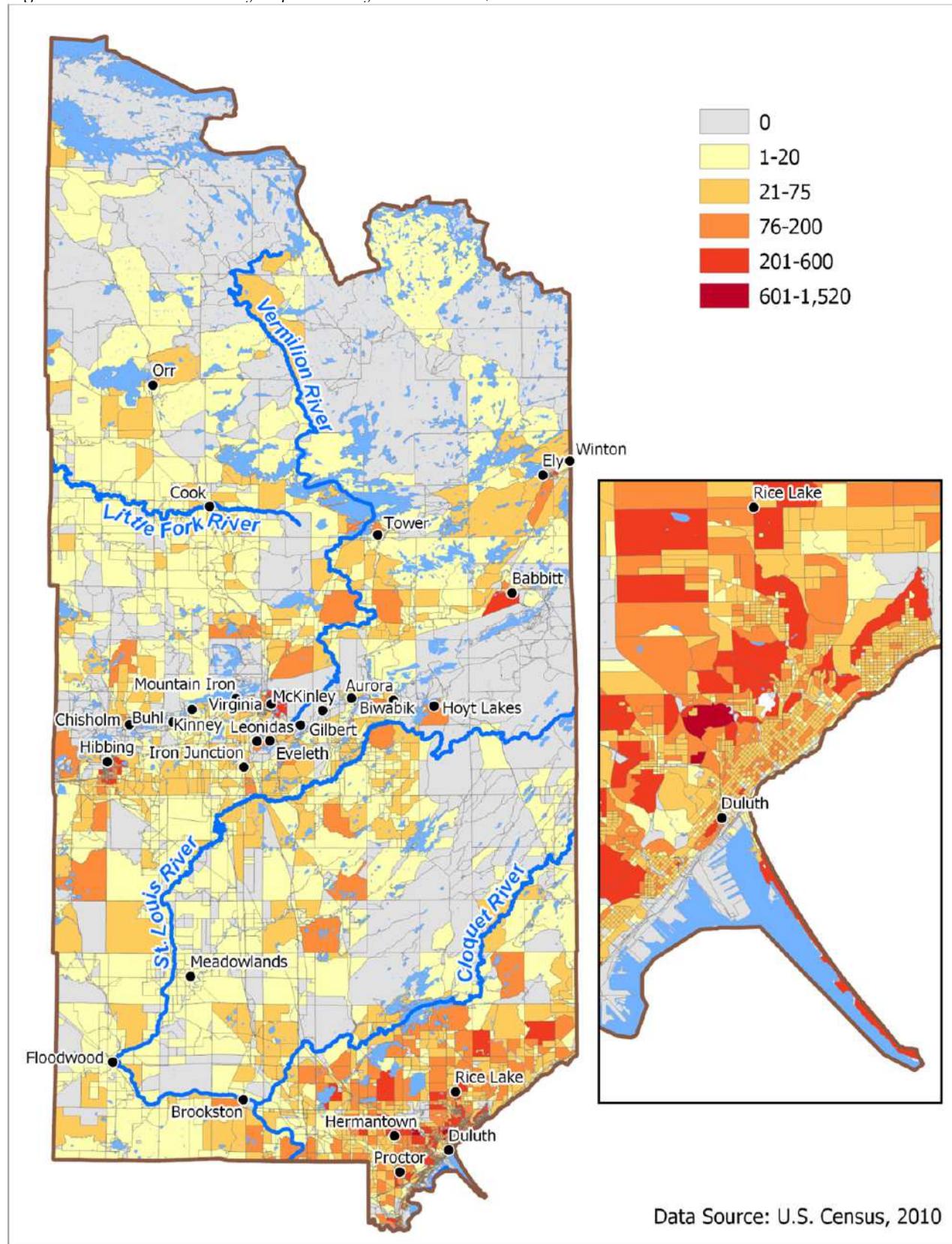


Figure A - 3. Emergency Facilities and Shelters in St. Louis County

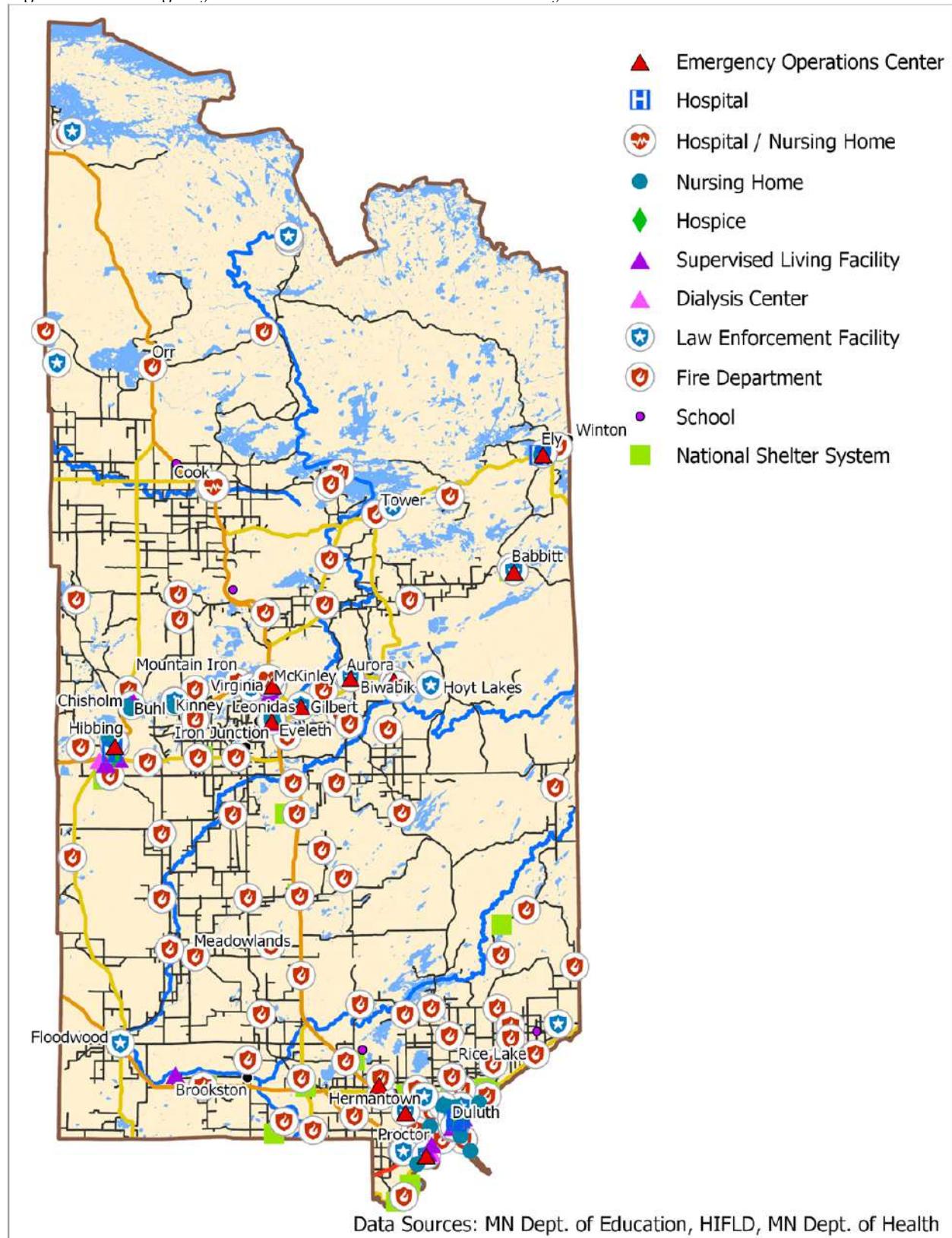


Figure A - 4. Fire Departments and Fire Response Times in St. Louis County

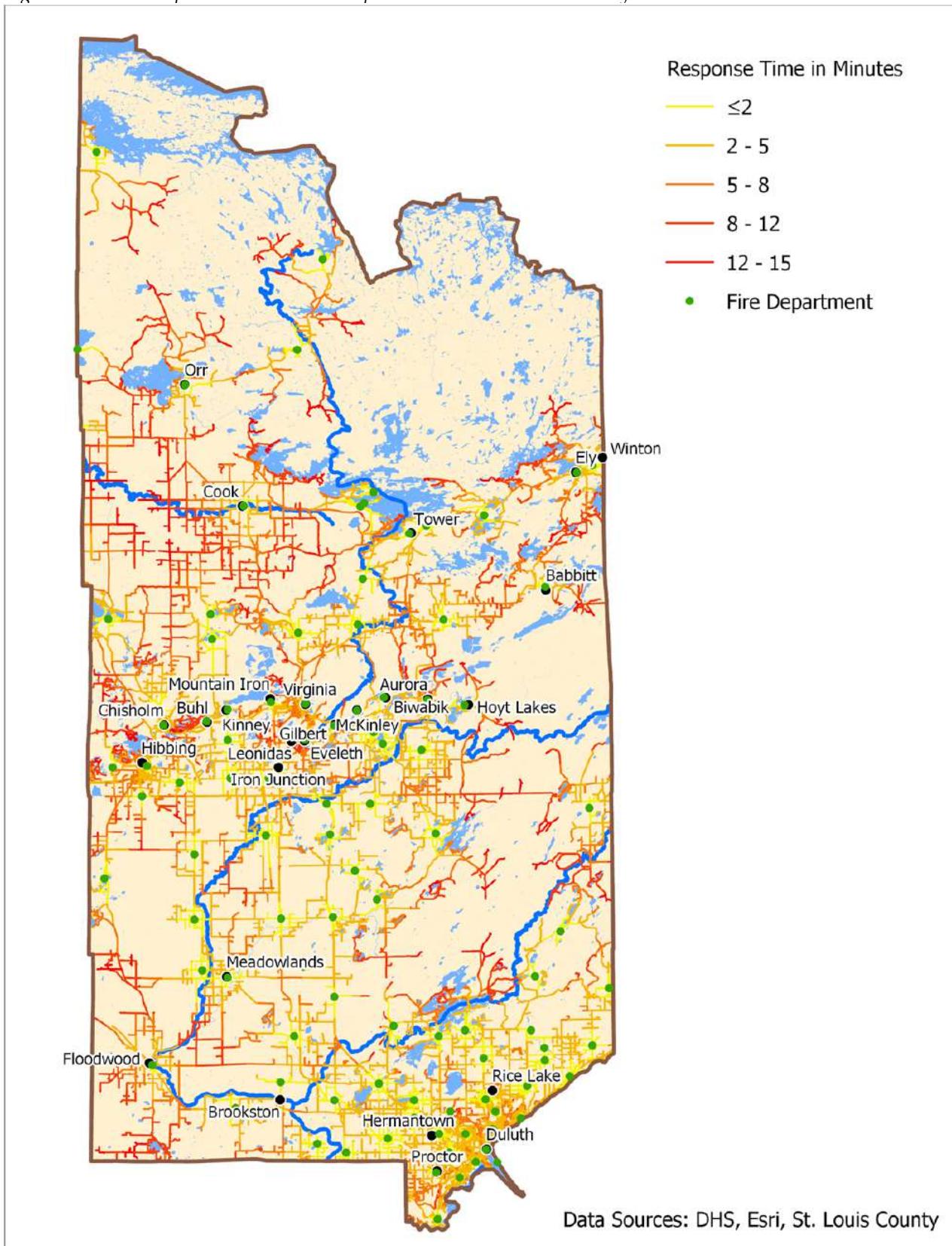


Figure A - 5. St. Louis County Utilities and Communication Infrastructure

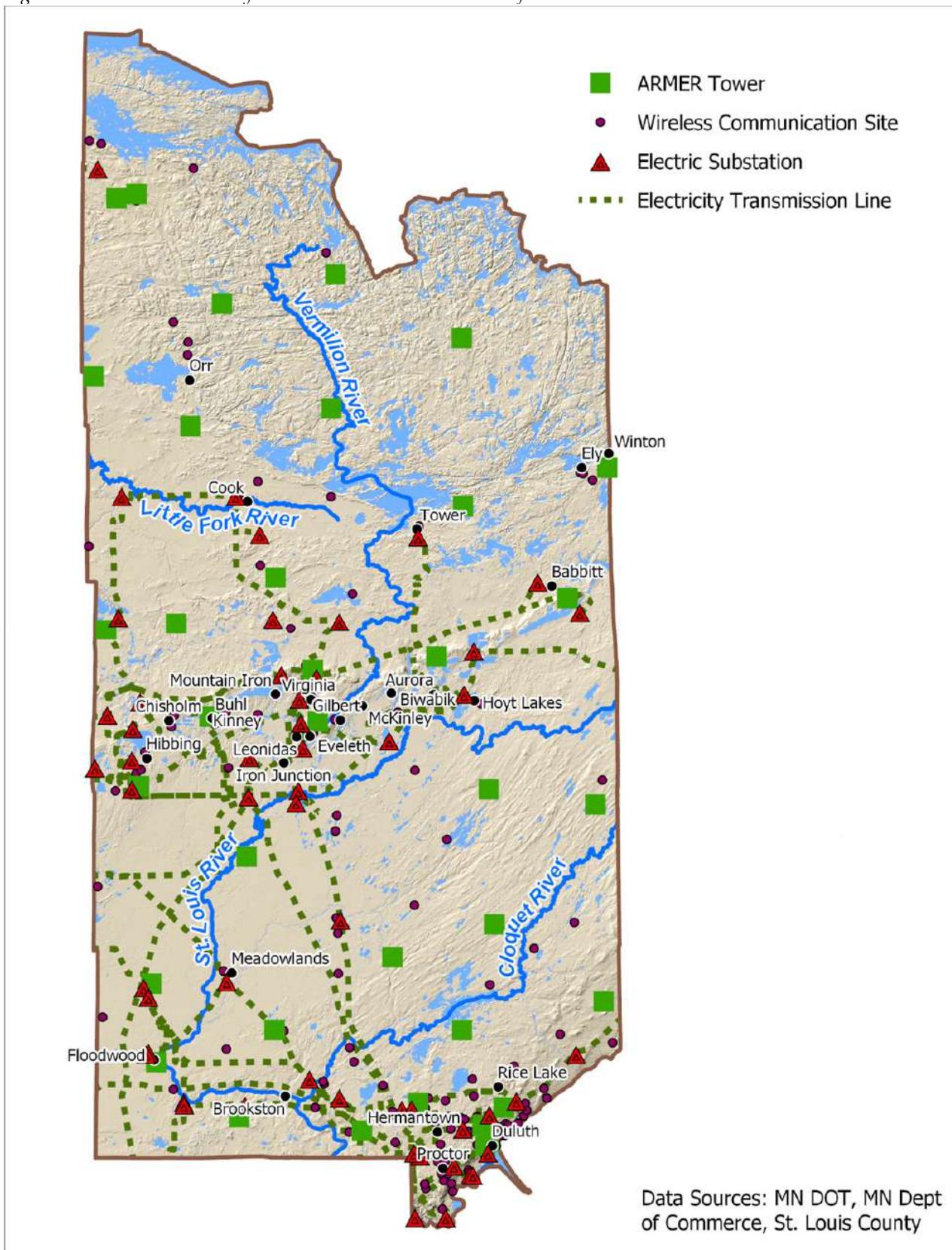


Figure A - 6. St. Louis County Transportation Infrastructure

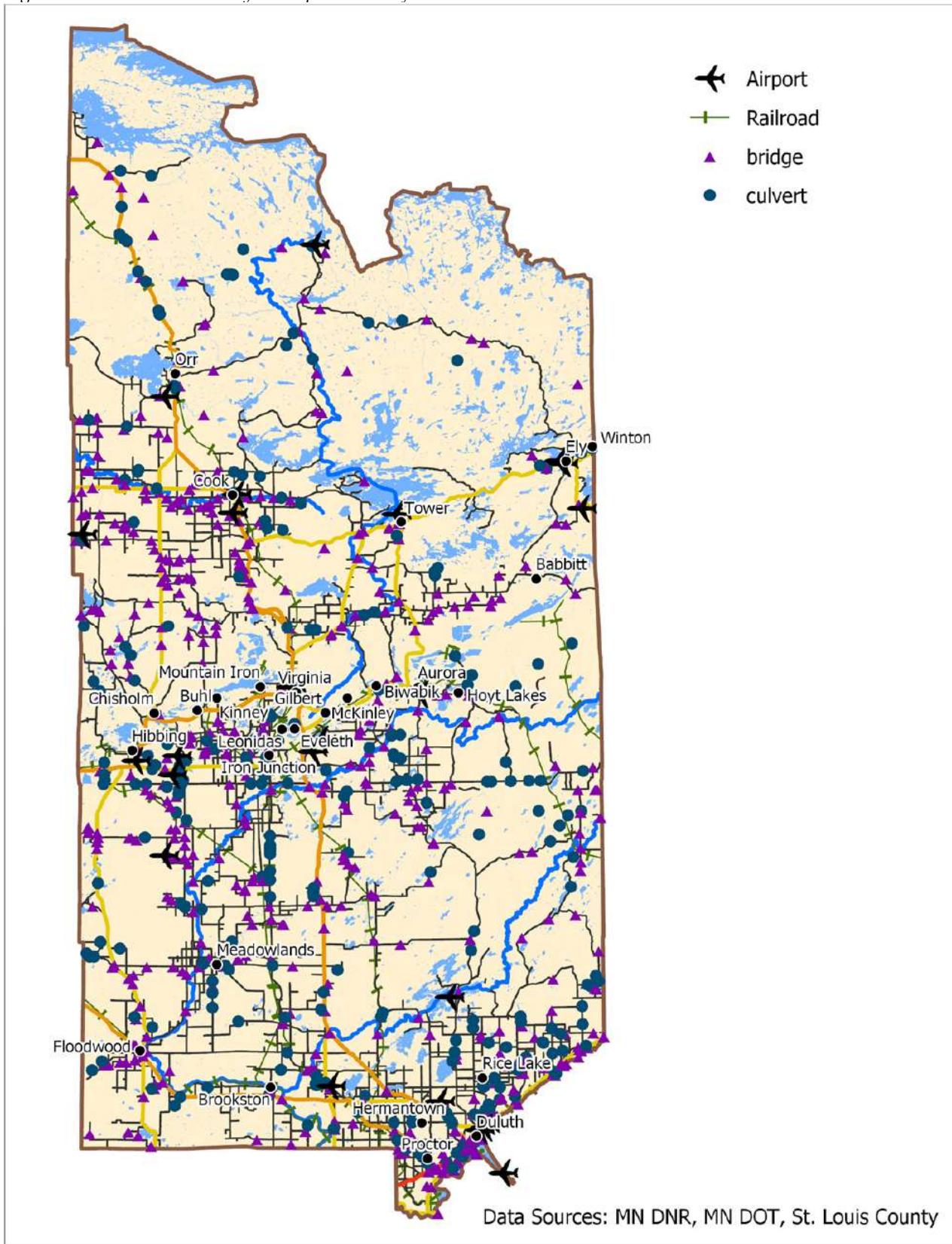


Figure A - 7. St. Louis County Land Cover, National Land Cover Database, 2011

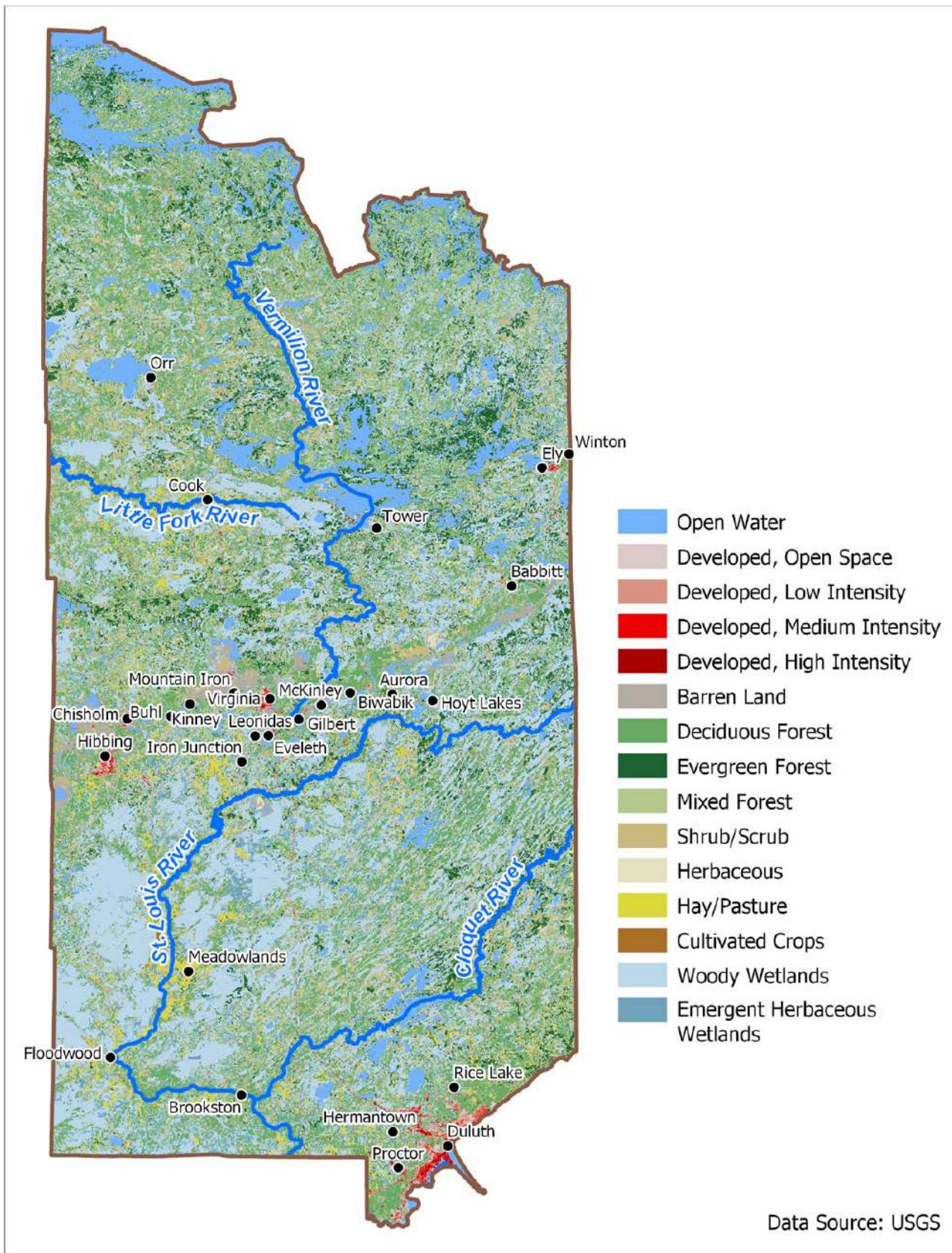


Figure A - 8. St. Louis County Land Ownership by Agency

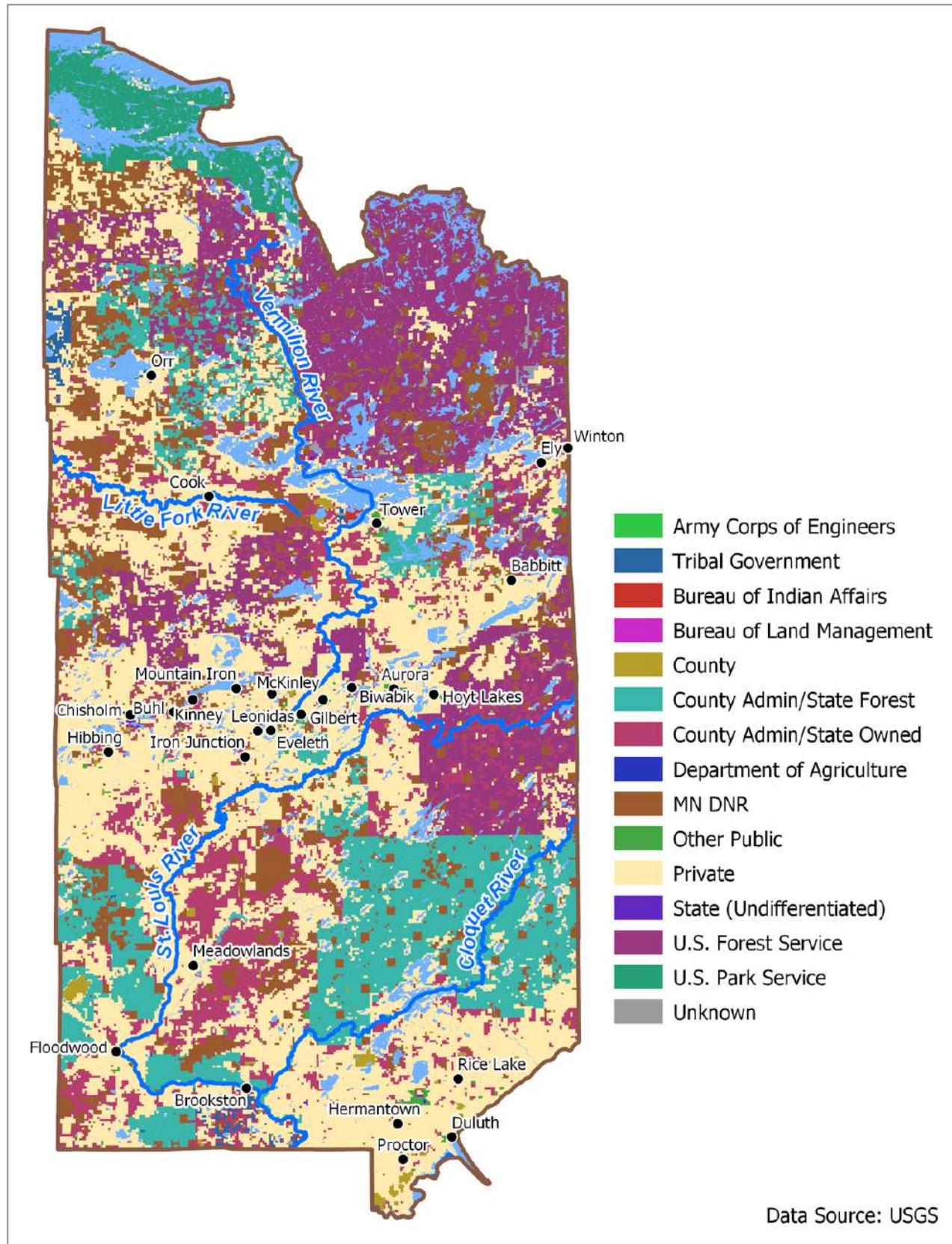
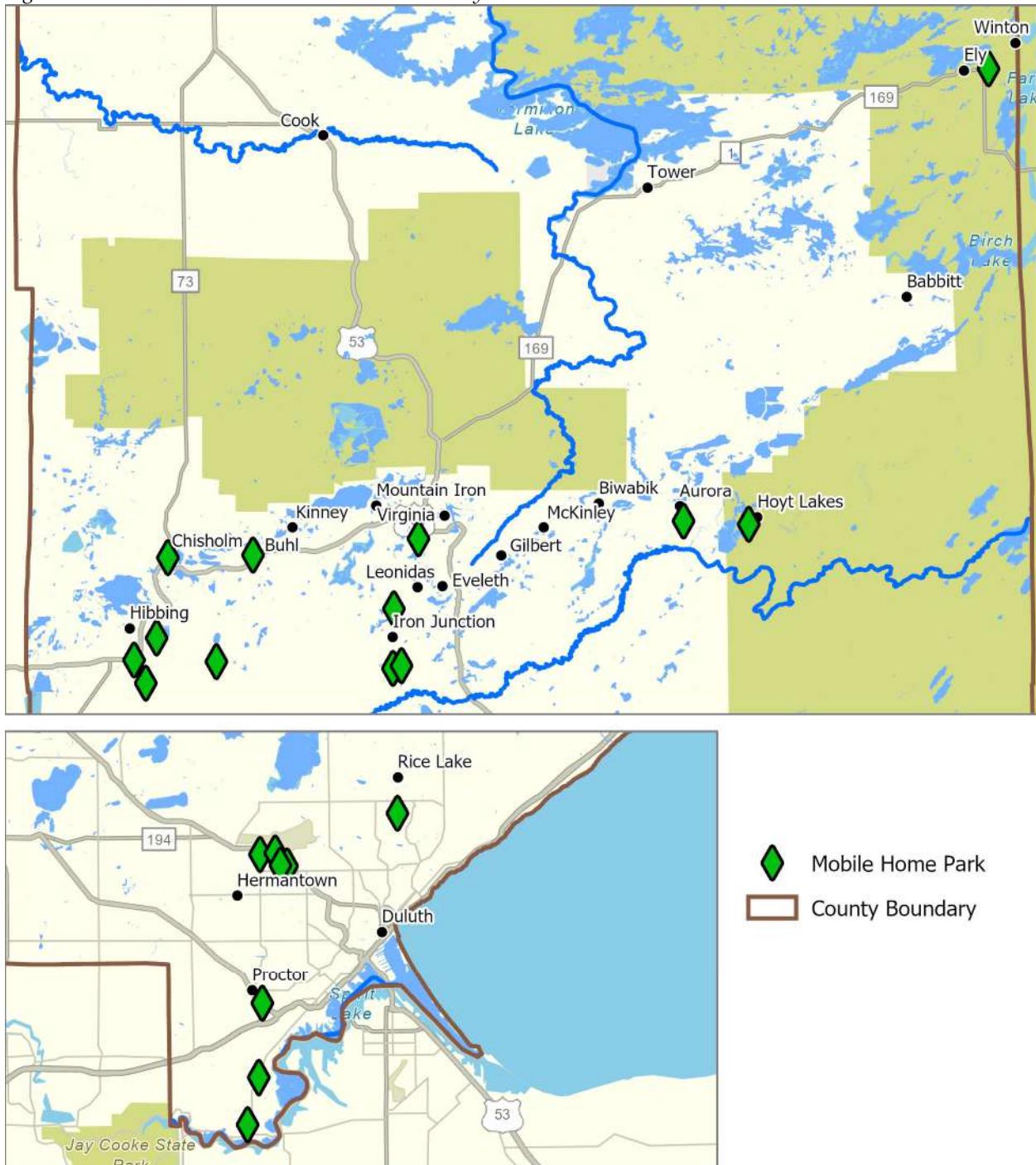


Figure A - 9. Mobile Home Parks in St. Louis County



Data Sources: MN DNR, HIFLD

Figure A - 10. Severe Hailstorms in St. Louis County, 1955-April 2019

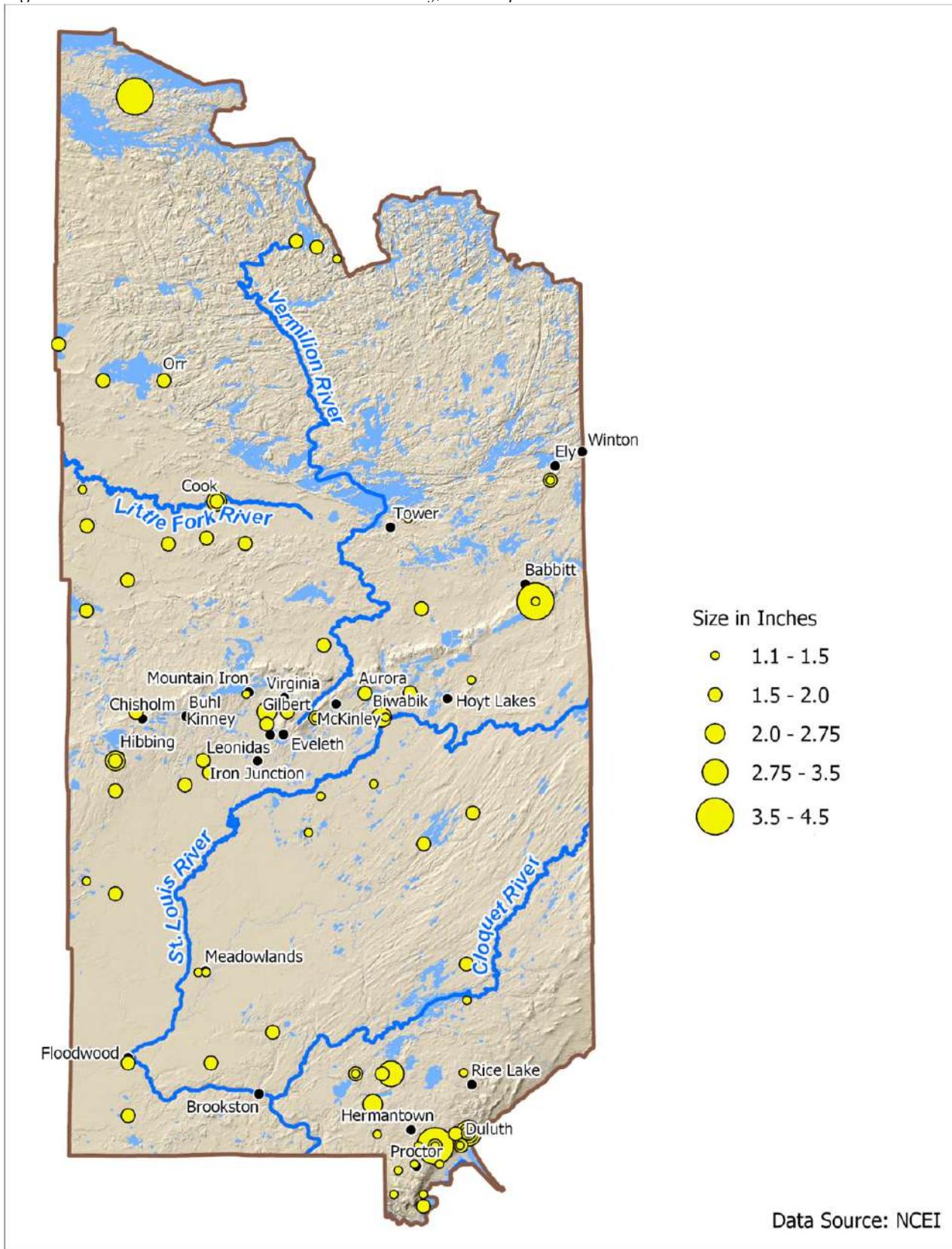


Figure A - 11. Severe Windstorms in St. Louis County, 1955-April 2019

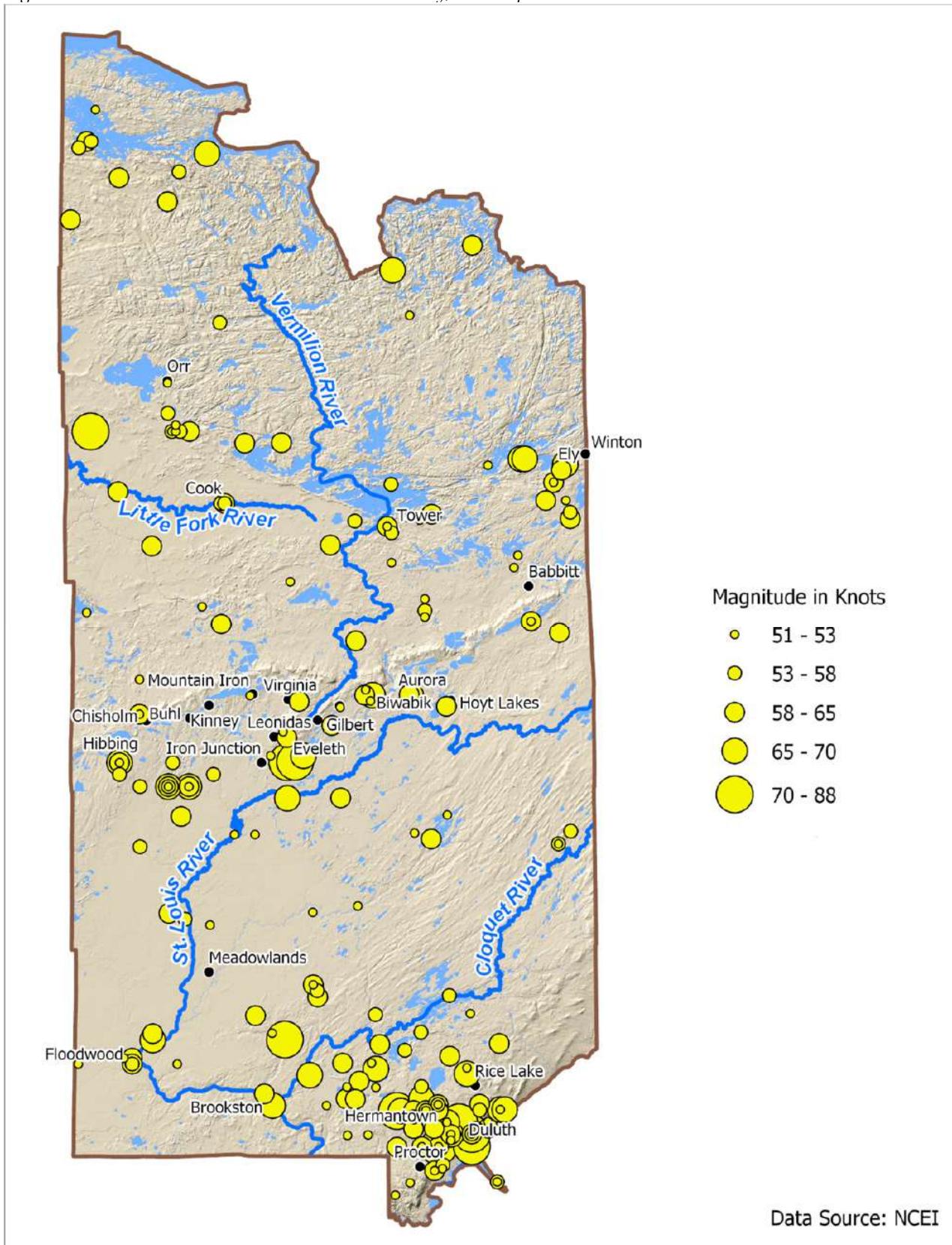


Figure A - 12. Tornado Touchdowns and Paths in St. Louis County, 1950-April 2019

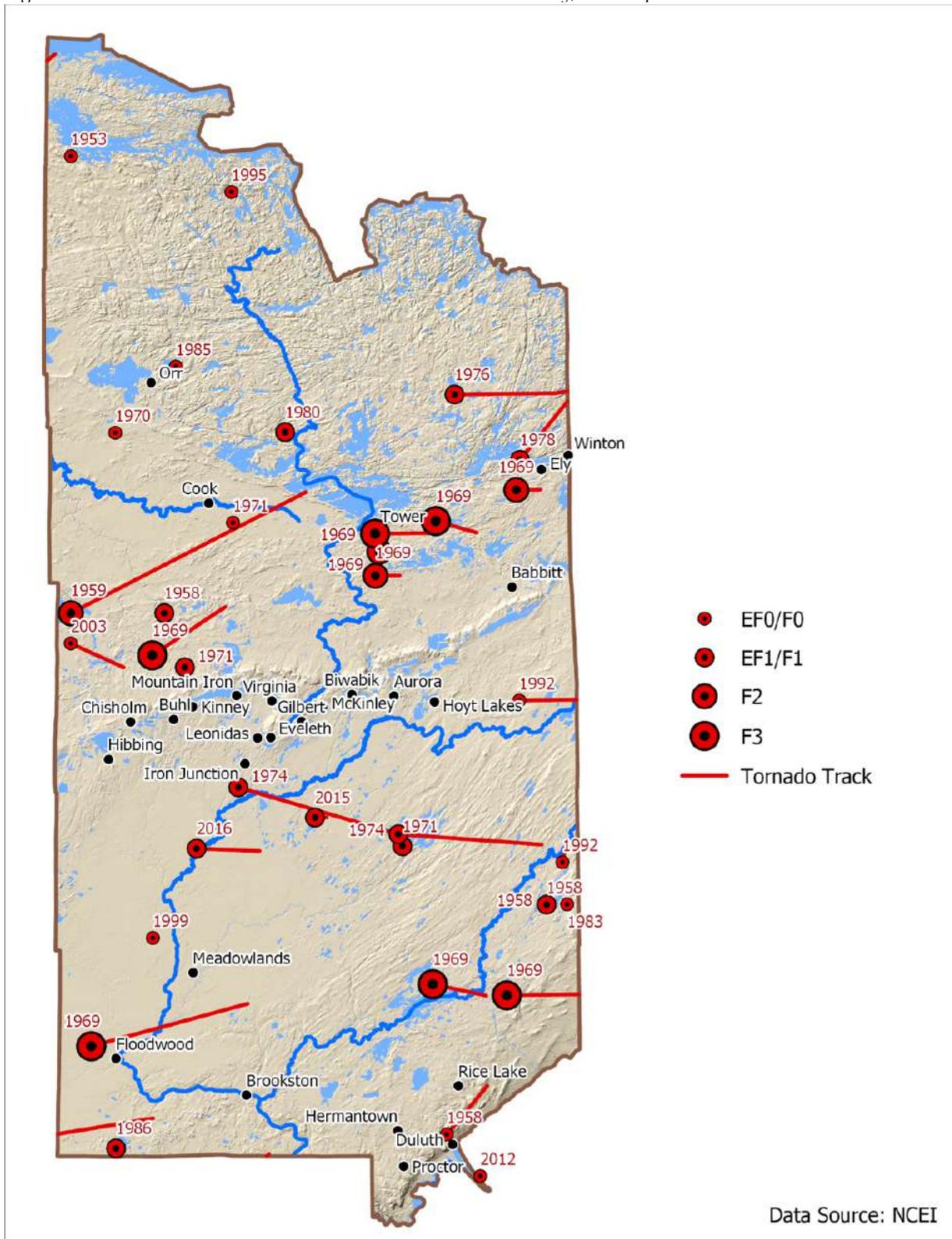


Figure A - 13. Wildfires Caused by Lightning (1985-June 4, 2019)

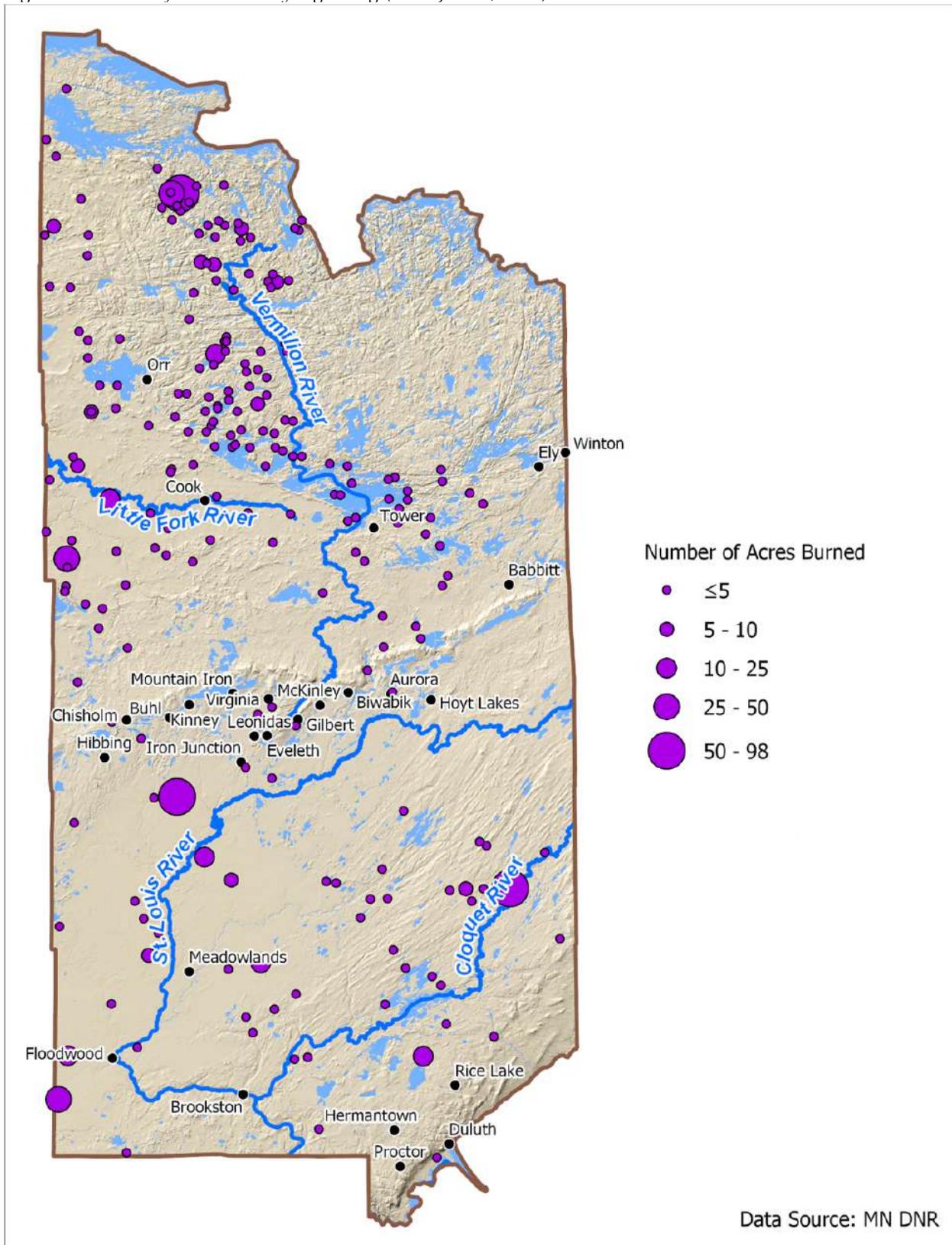


Figure A - 14. Dams by Hazard Classification

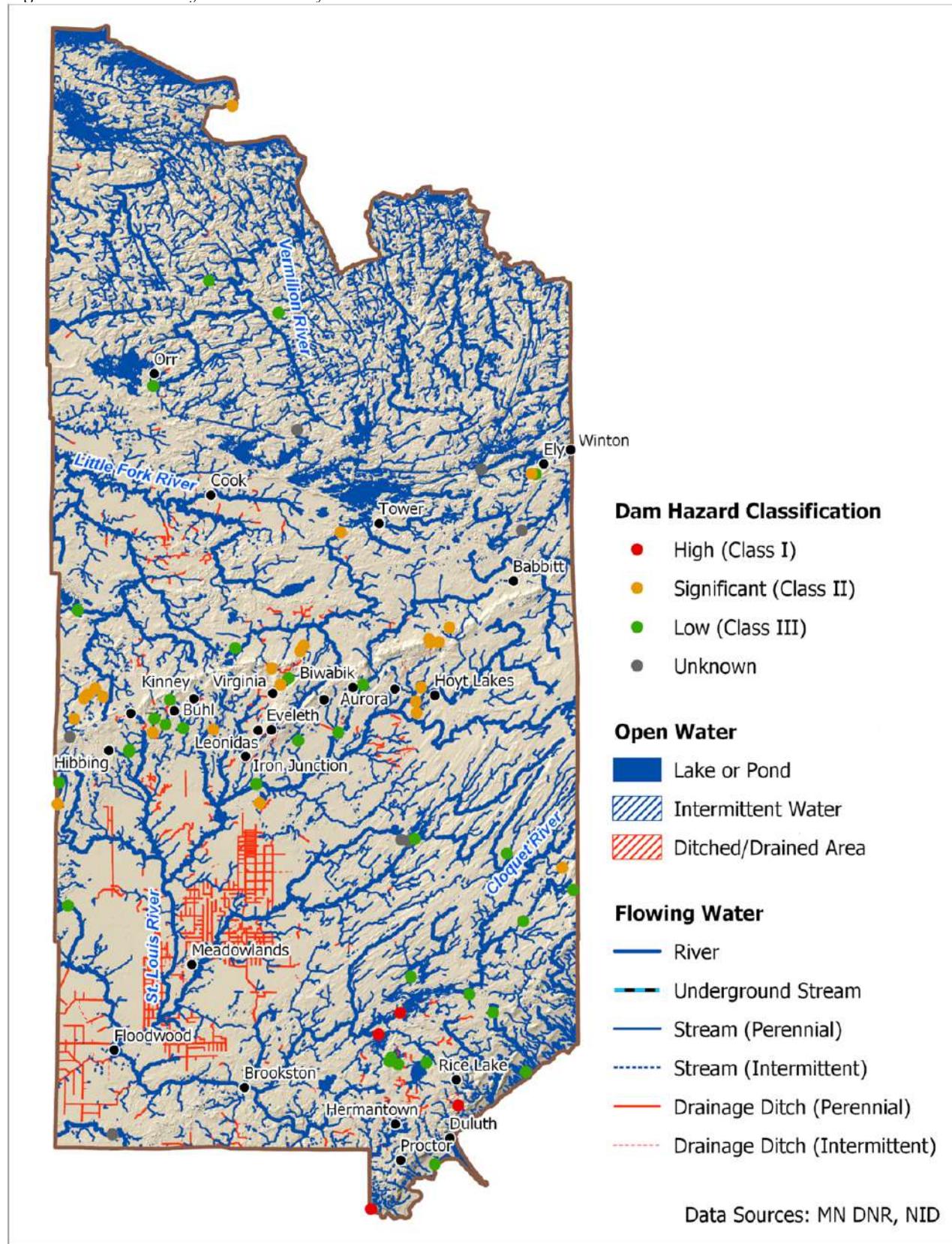


Figure A - 15. Condition of Dams

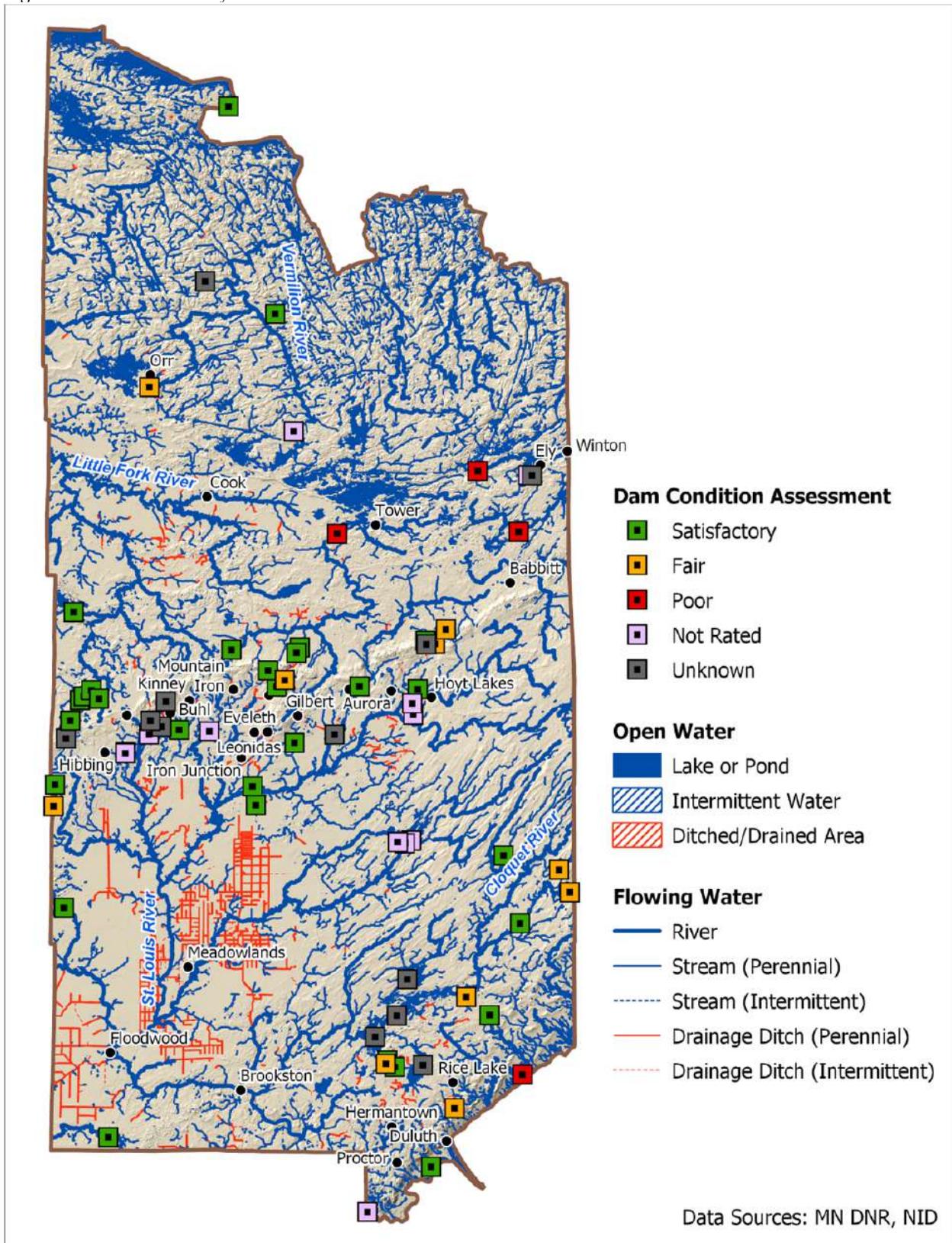


Figure A - 16. High Potential Loss Structures in St. Louis County

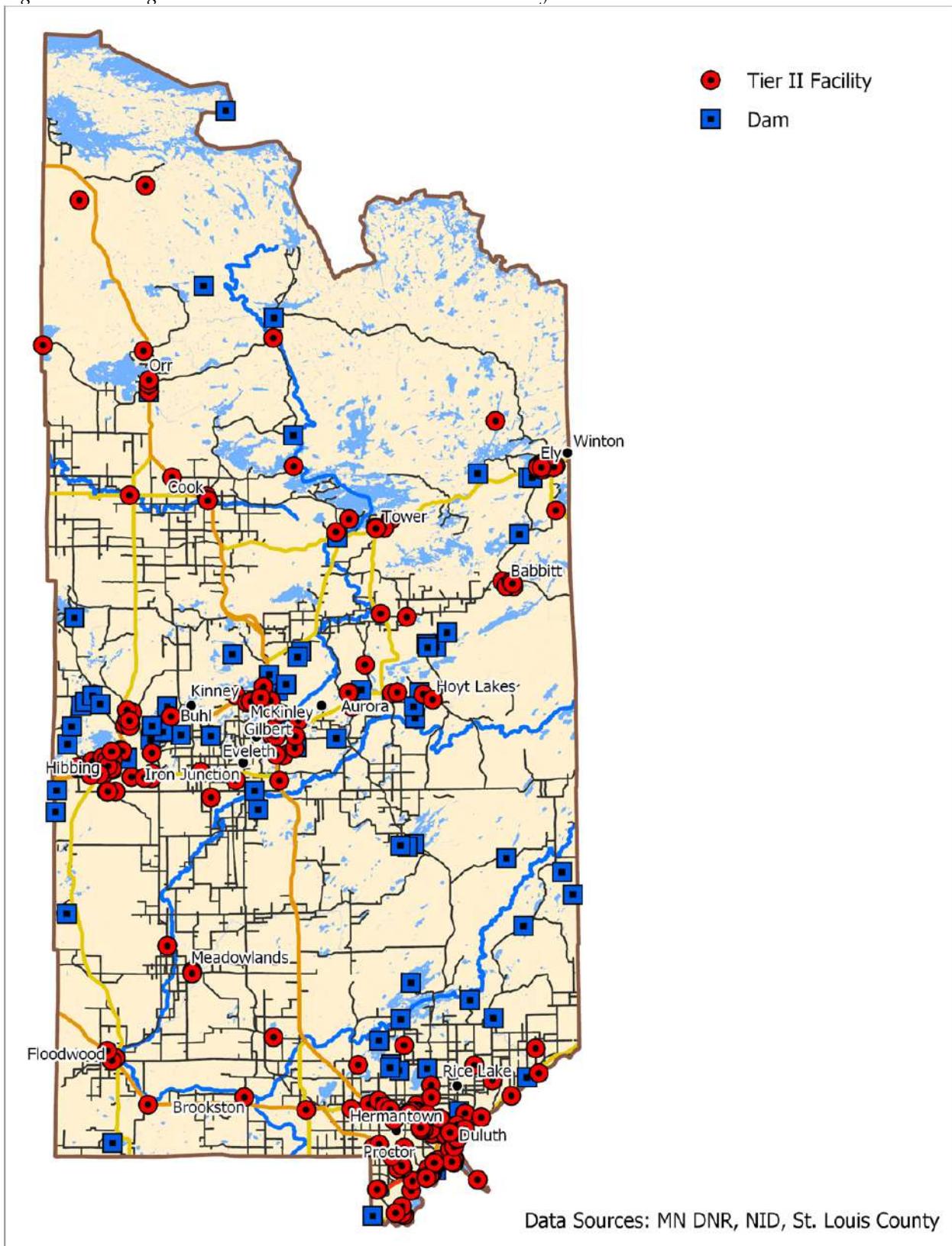


Figure A - 17. St. Louis County Aquifer Vulnerability and Public/Municipal Wells

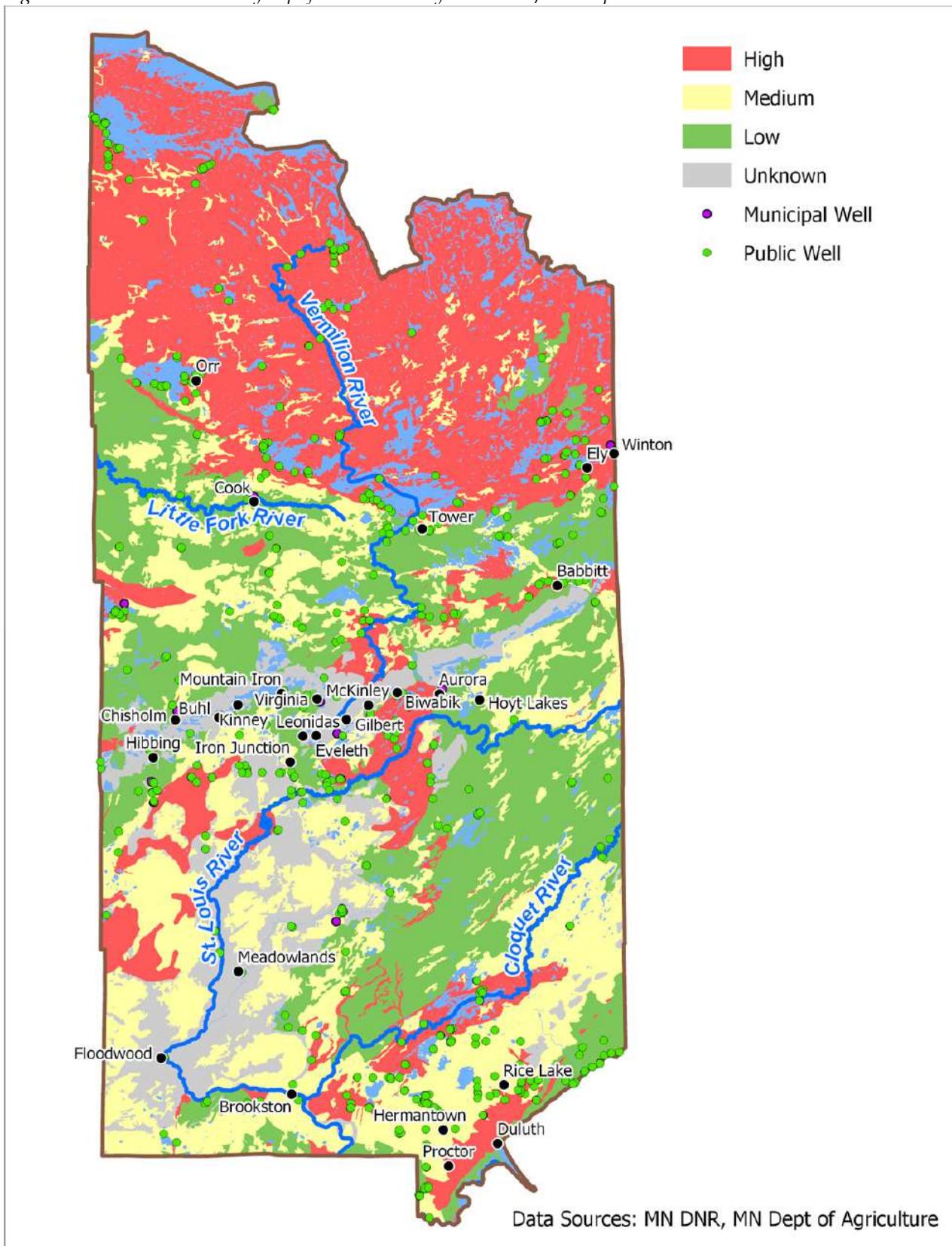


Figure A - 18. Wildfires by Acres Burned (1985-June 4, 2019) and Peat in St. Louis County

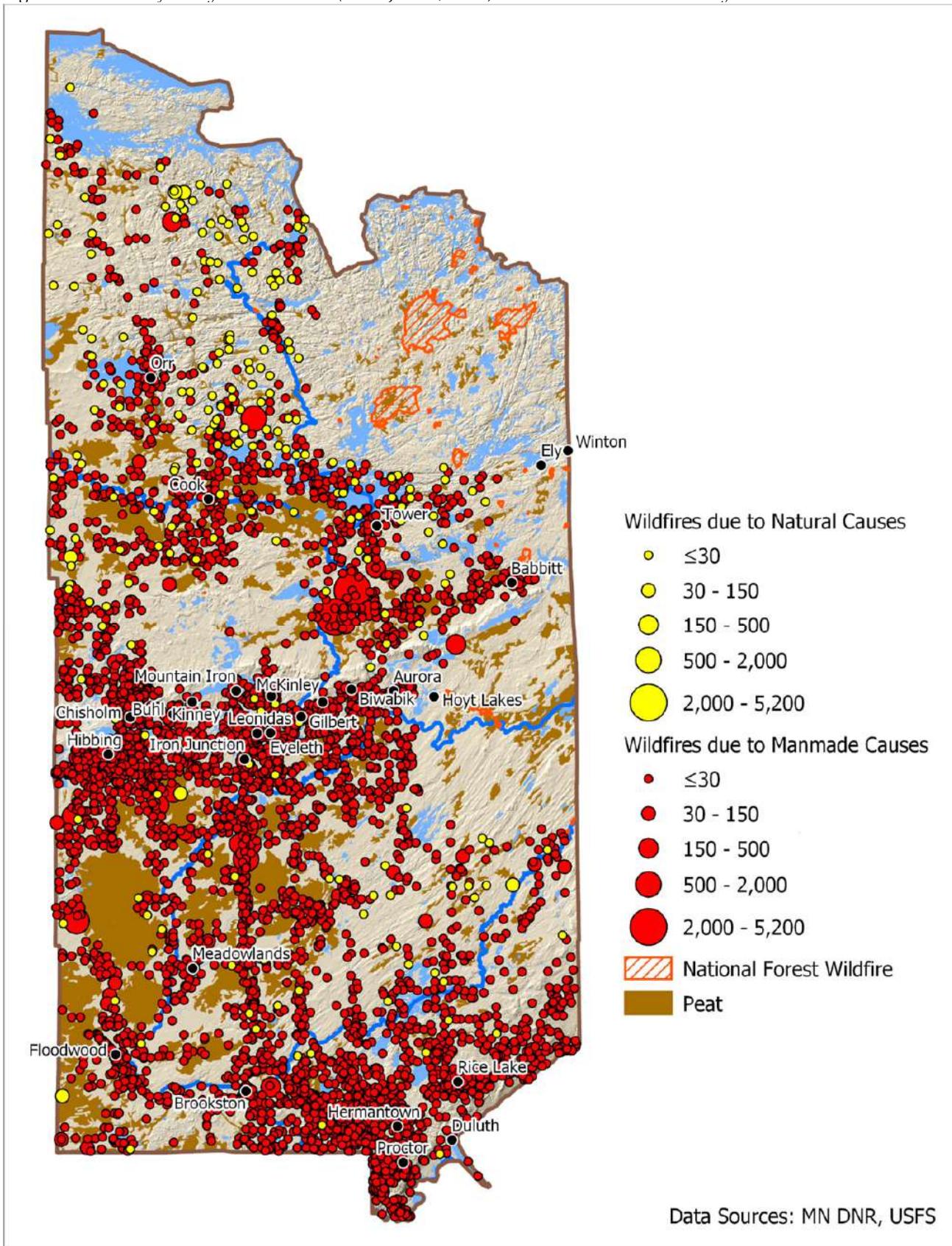


Figure A - 19. Wildland Urban Interface in St. Louis County

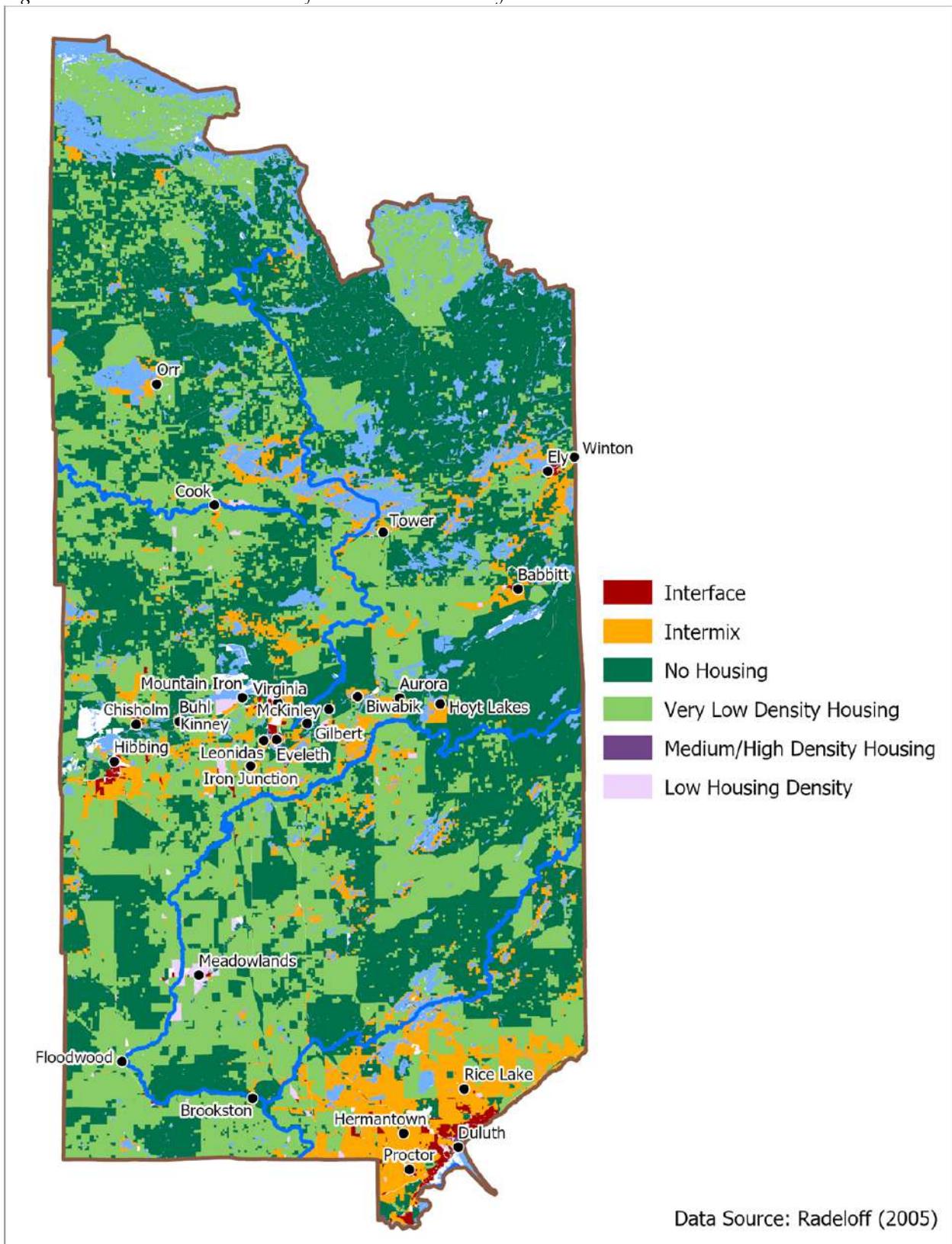


Figure A - 20. 1% Annual Chance Floodplain in St. Louis County

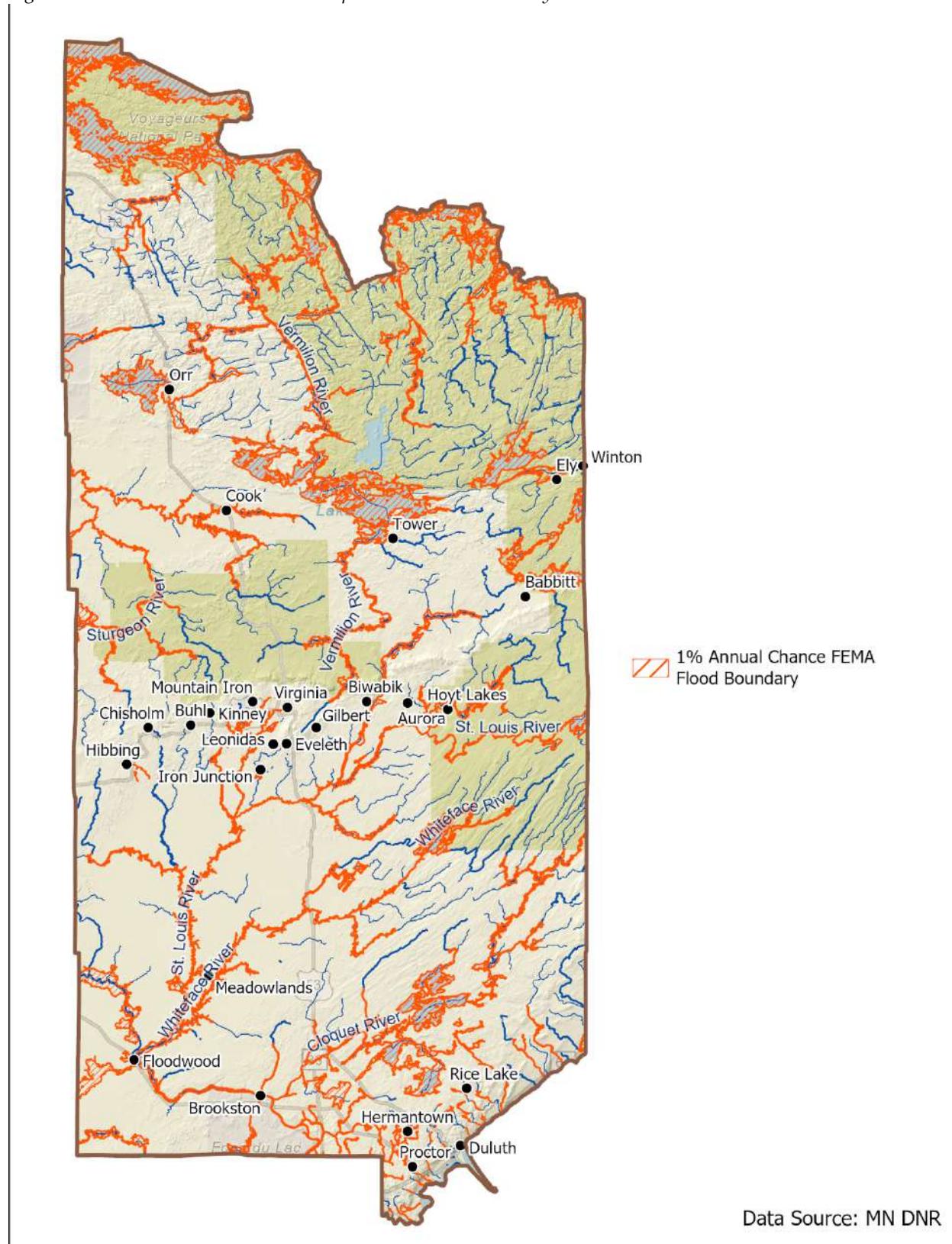


Figure A - 21. Overview of 1% Annual Chance Flood Loss Estimation in St. Louis County

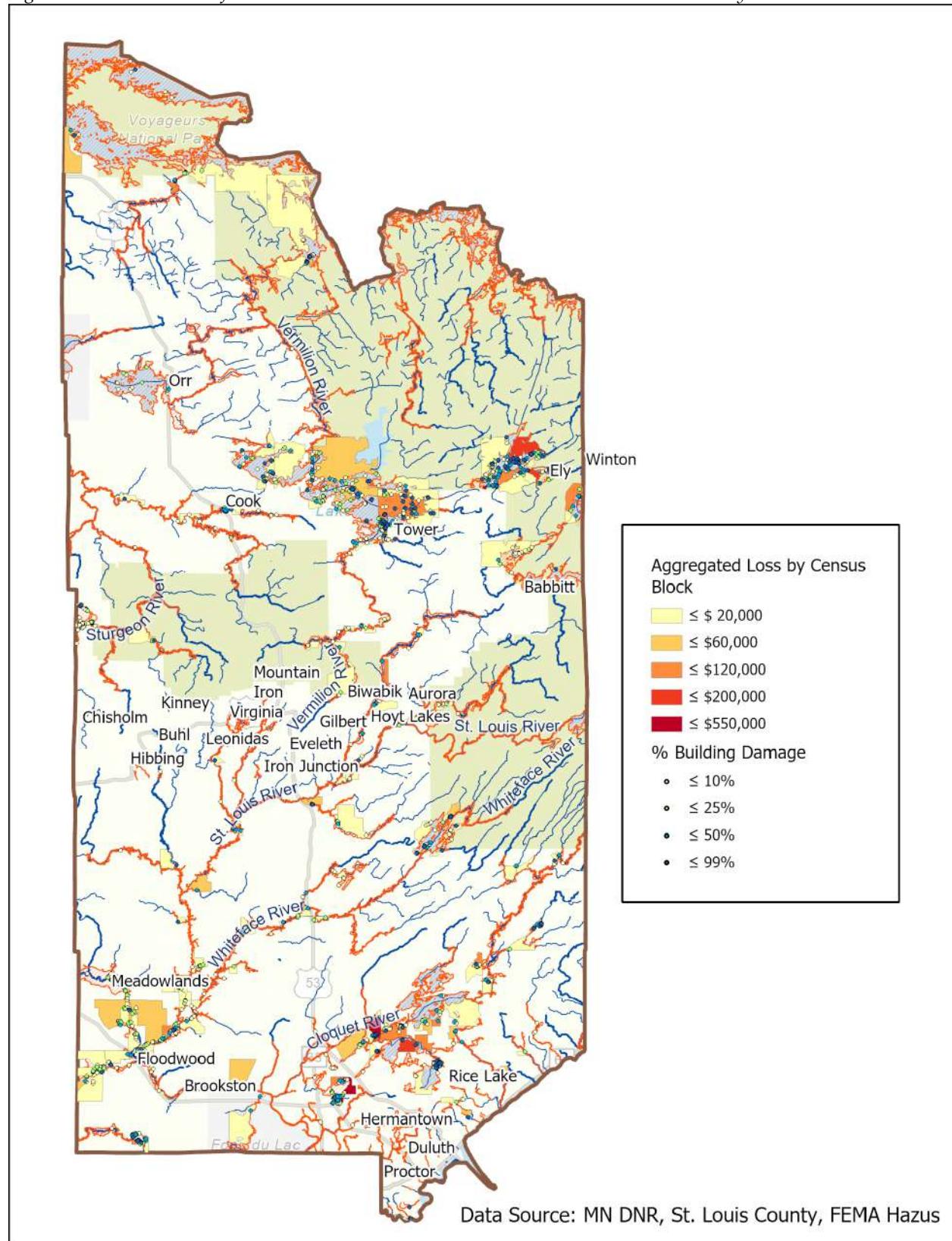


Figure A - 22. Breitung, Greenwood and Morse Townships and the Cities of Tower and Ely

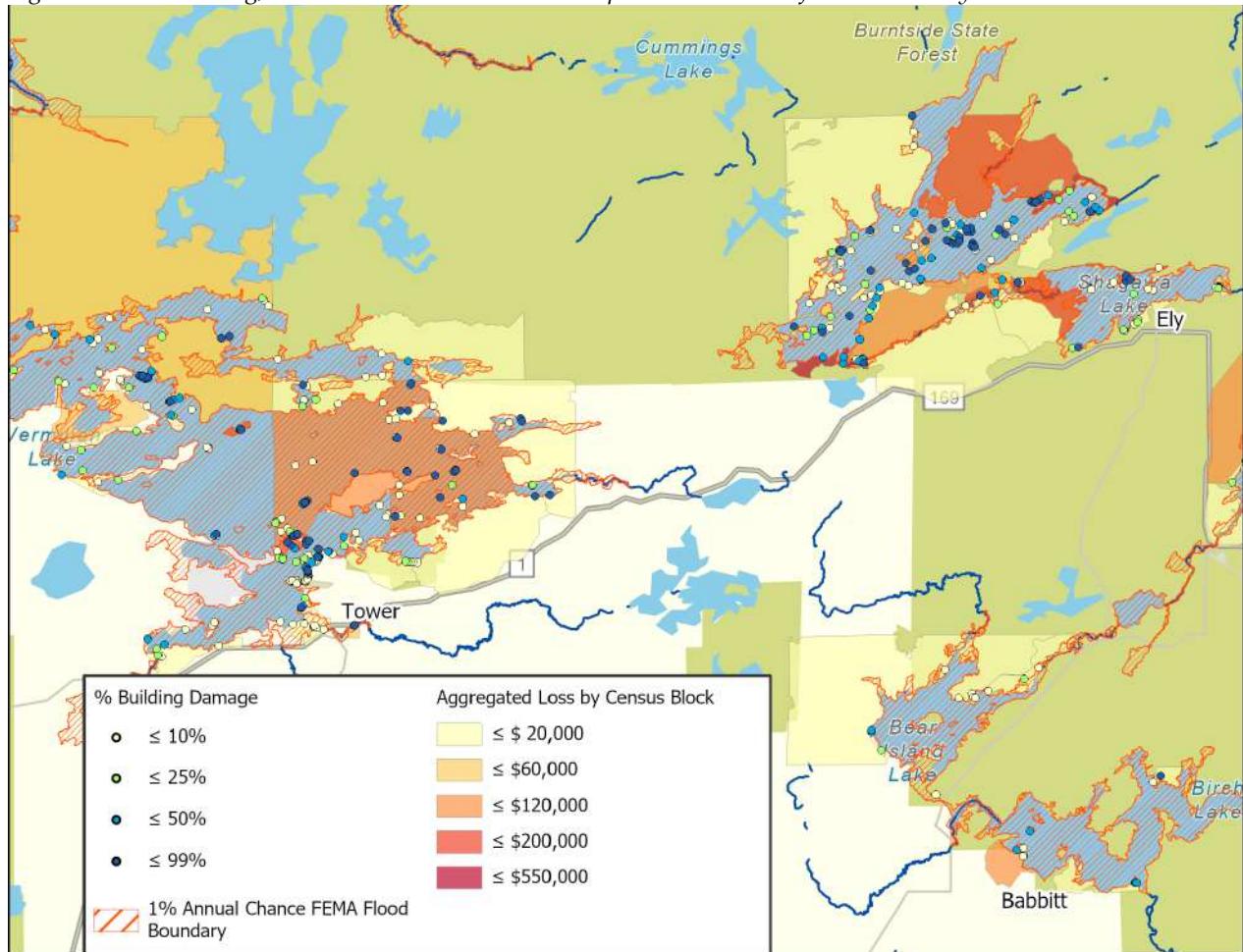


Figure A - 23. City of Rice Lake, Grand Lake, Gnesen and Fredenberg Townships

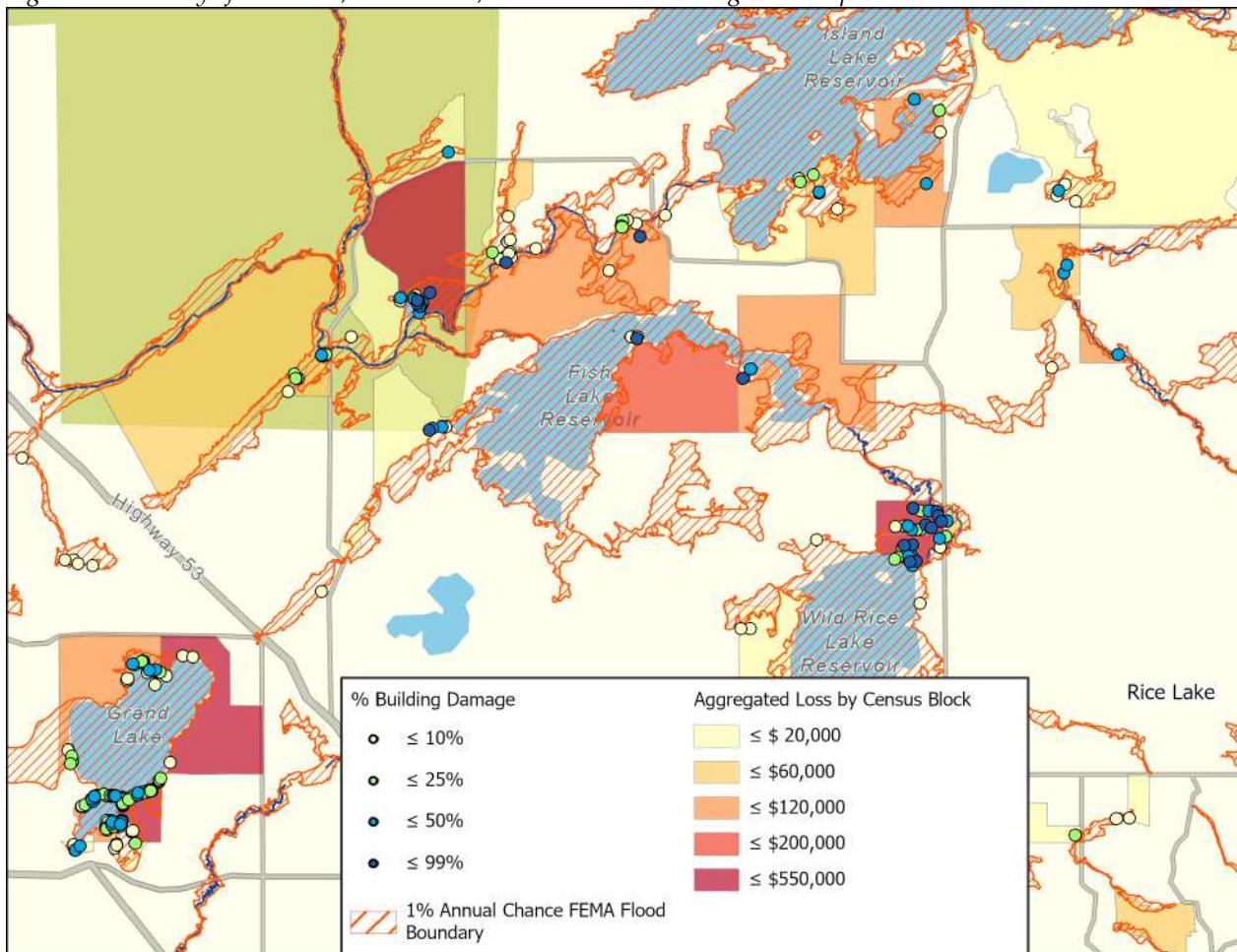


Figure A - 24. Critical Infrastructure Identified in 1% Annual Flood Zone in Crane Lake

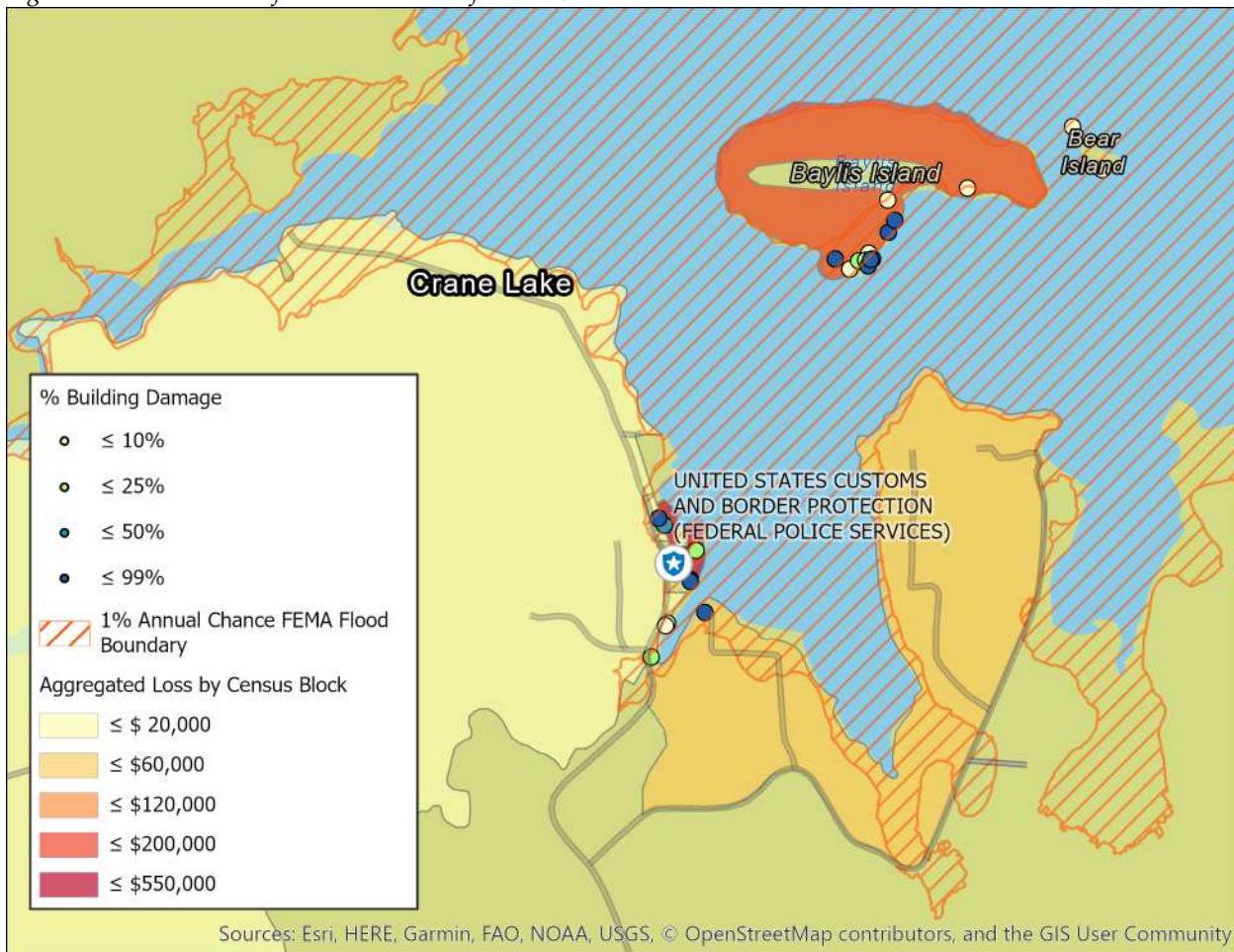


Figure A - 25. Critical Infrastructure Identified in 1% Annual Flood Zone in Cook

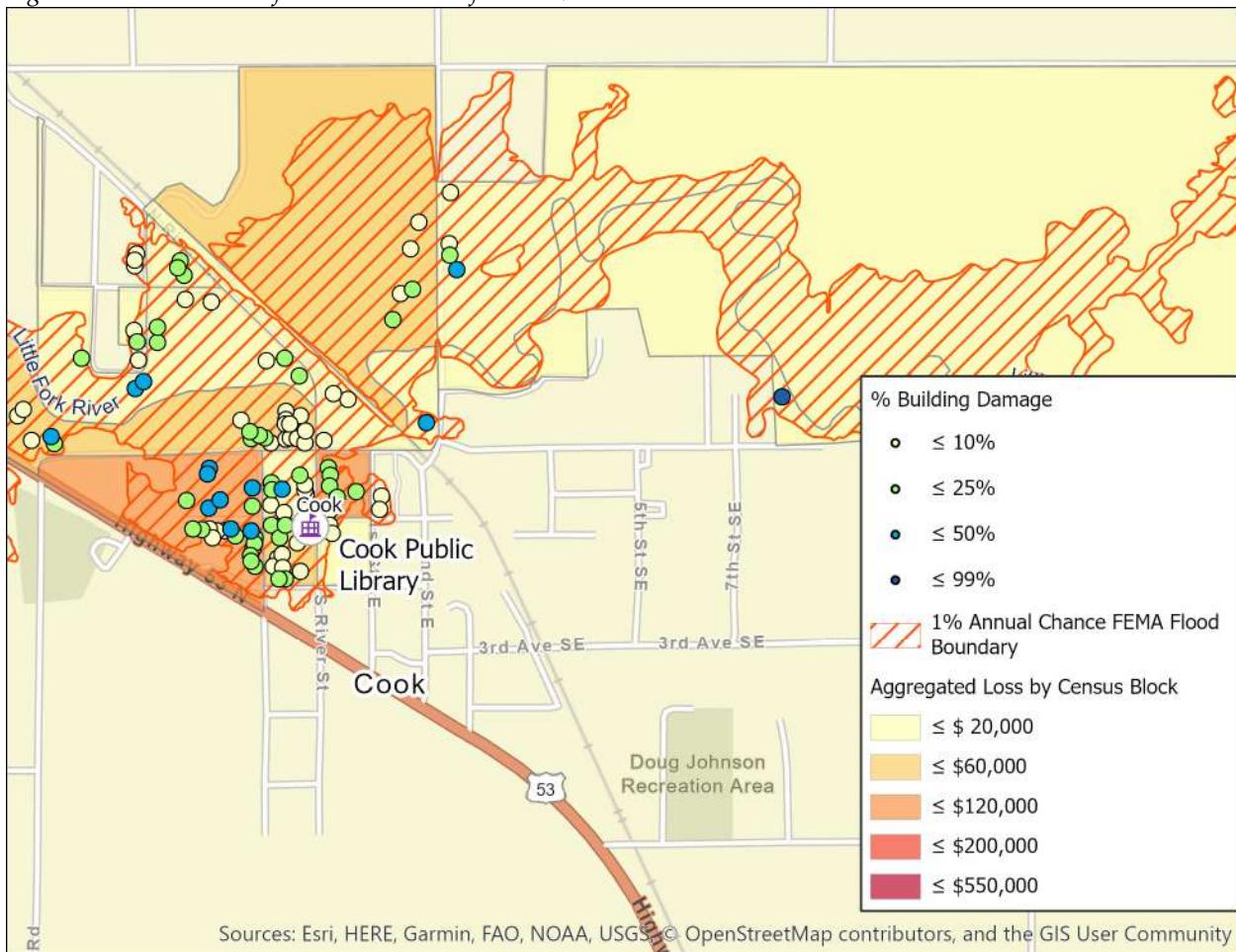


Figure A - 26. Feedlots in St. Louis County

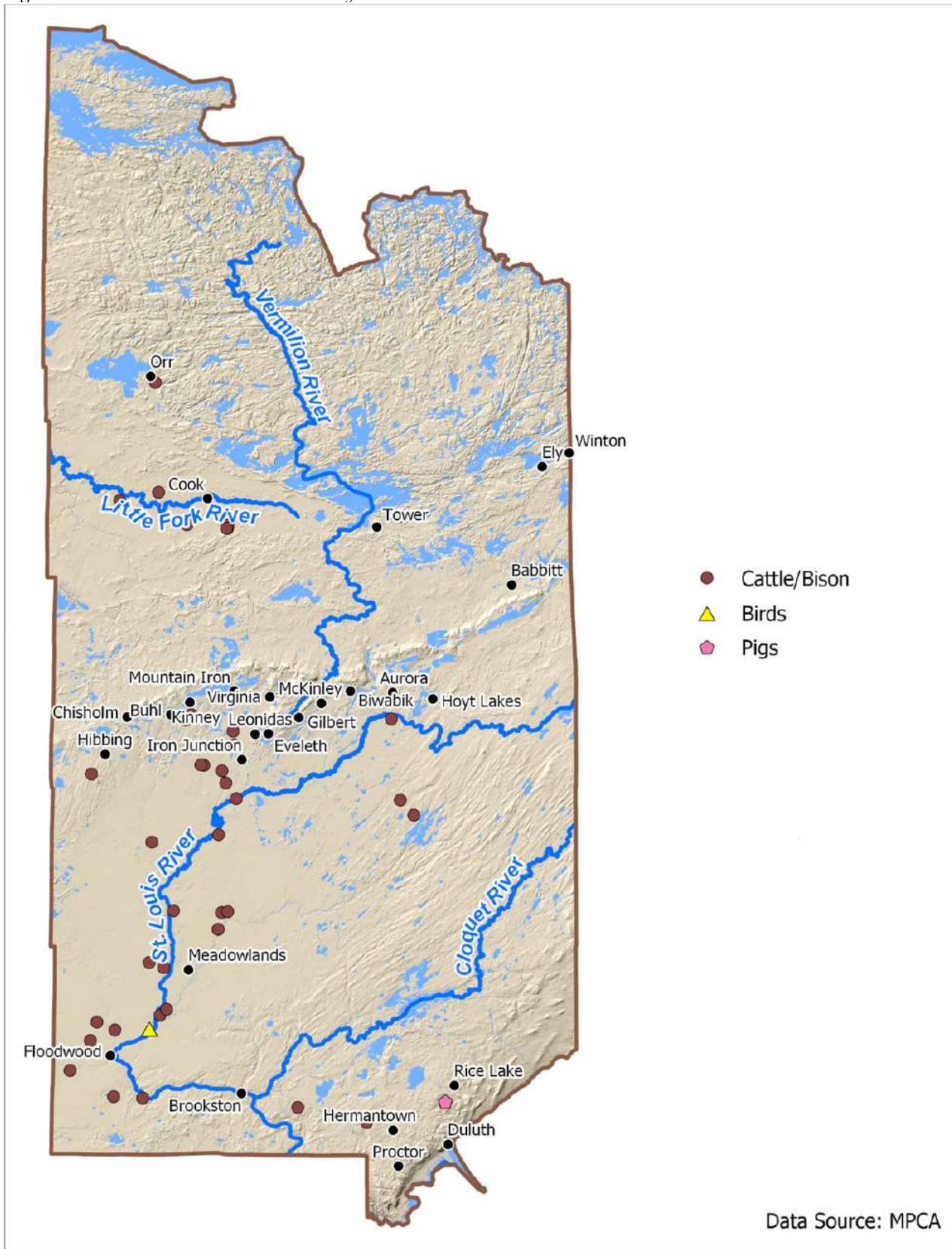


Figure A - 27. Soil Erodibility (K Factor) as Percentage in St. Louis County

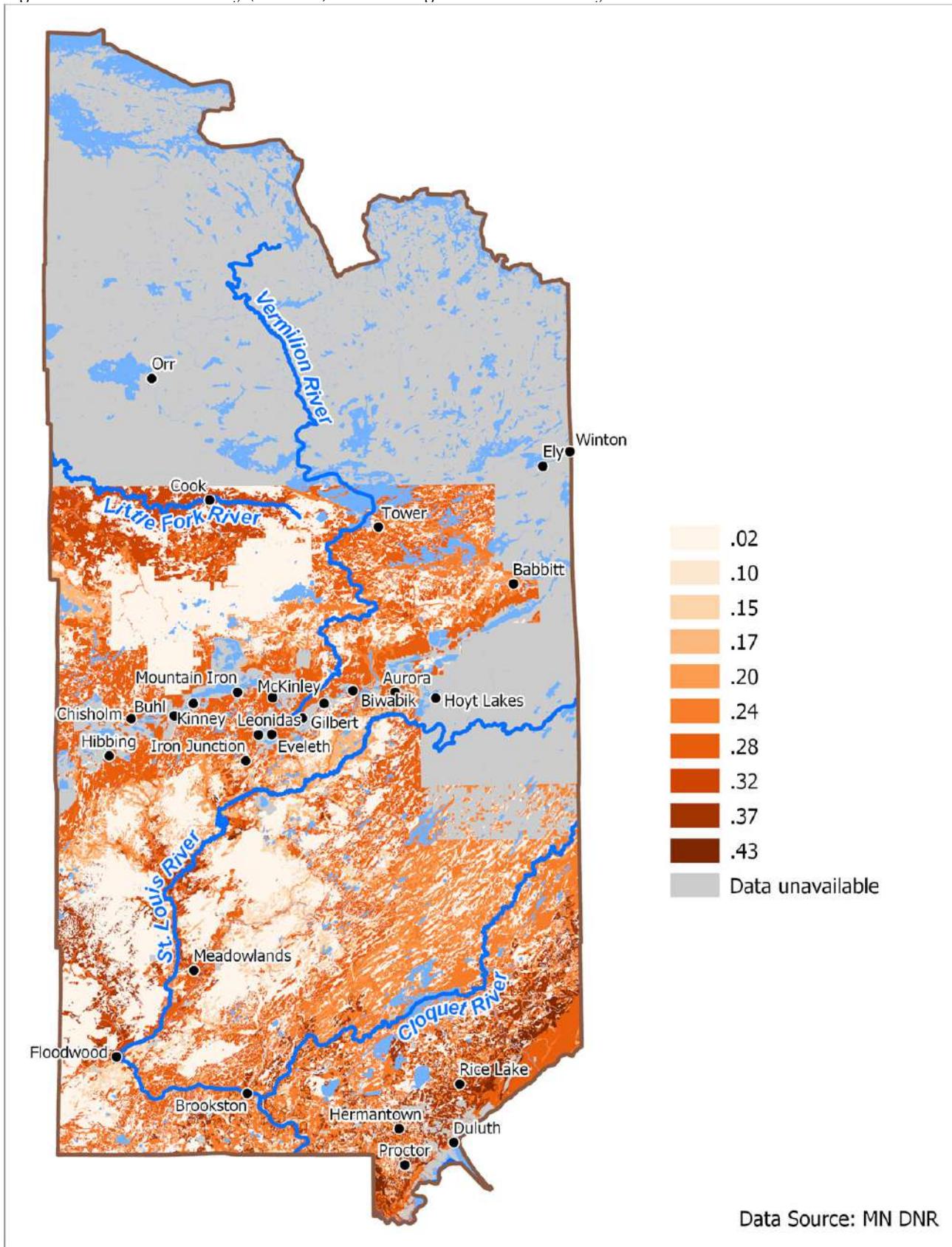
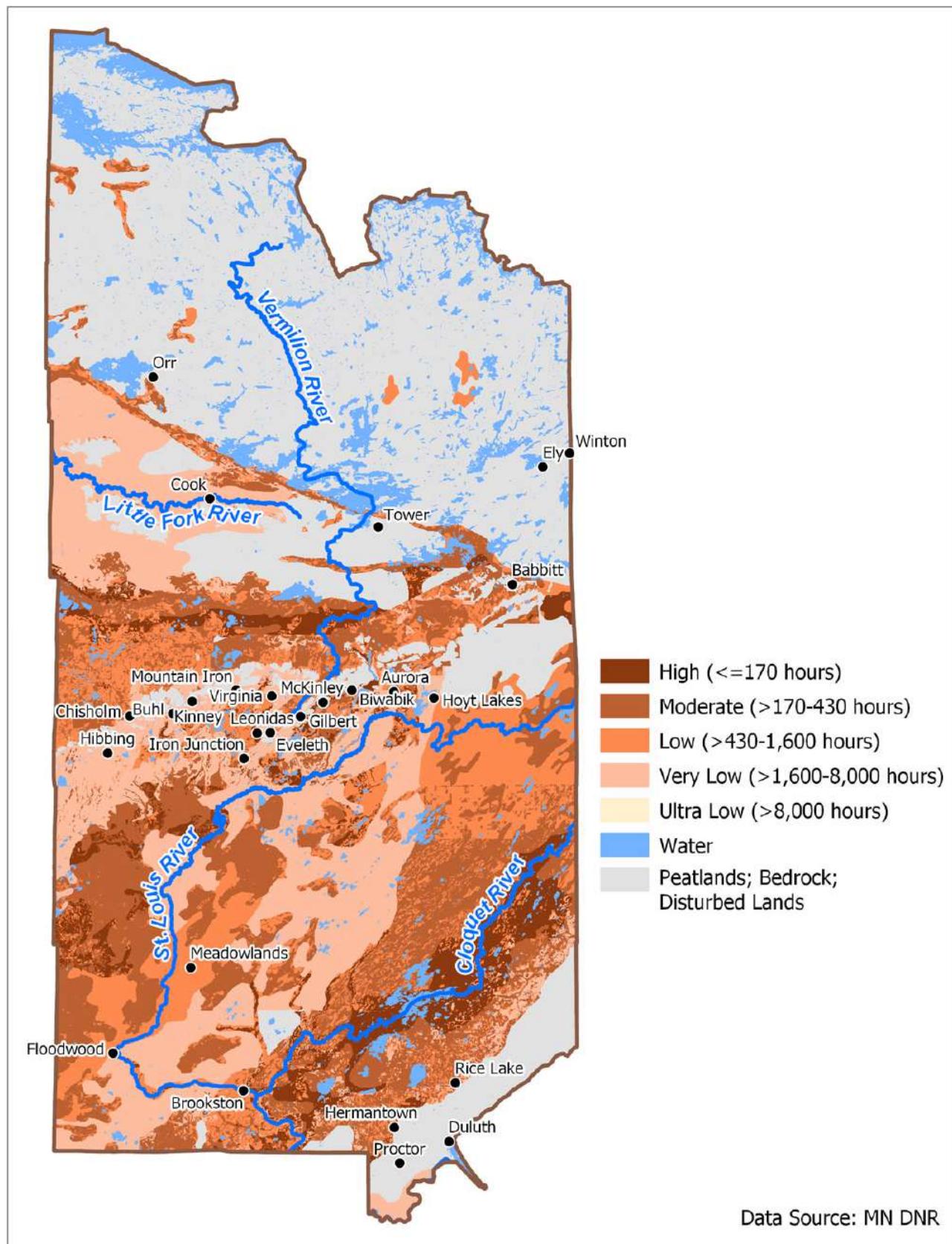


Figure A - 28. Pollution Sensitivity of Near-Surface Materials



Appendix B

St. Louis County Critical Facilities

Healthcare Facilities			
Name	Address	City	Zip
Aftenro Home	510 West College St	Duluth	55811
Bayshore Health Center Rule 80	1601 St Louis Avenue	Duluth	55802
Bayshore Residence & Rehab Ctr	1601 St Louis Avenue	Duluth	55802
Benedictine Health Center	935 Kenwood Avenue	Duluth	55811
Boundary Waters Care Center	200 West Conan St	Ely	55731
Chris Jensen Hlth & Rehab Ctr	2501 Rice Lake Road	Duluth	55811
Cook Hospital	10 5th Street Se	Cook	55723
Cornerstone Villa	1000 Forest Street	Buhl	55713
Donovan Frank Detox Center	626 13th Street South	Virginia	55792
DRCC Aurora	417 South Main Street	Aurora	55705
E B I Incorporated	625 North 56 Avenue West	Duluth	55807
Ely Bloomenson Comm Hospital	328 West Conan St	Ely	55731
Essentia Health Duluth	502 East 2nd Street	Duluth	55805
Essentia Health Northern Pines	5211 Highway 110	Aurora	55705
Essentia Health St Marys Hspic	330 East 2nd Street	Duluth	55805
Essentia Health St Marys Med	407 East 3rd Street	Duluth	55805
Essentia Health Virginia	901 9th Street North	Virginia	55792
Fitzgerald NH and Rehab	227 Mckinley Avenue	Eveleth	55734
FMC Dial Svcs Of Spirit Valley	4700 Mike Colallilo Dr	Duluth	55807
FMC Dialysis Services Duluth	502 East 2nd Street	Duluth	55805
FMC Dialysis Services Eveleth	233 Mckinley Avenue	Eveleth	55734
Franciscan Health Center	3910 Minnesota Ave	Duluth	55802
Fresenius Med Care of Hibbing	3899 Highway 73	Hibbing	55746
Guardian Angels Health & Rehab	1500 3rd Avenue East	Hibbing	55746
Heritage Manor	321 Ne 6th Street	Chisholm	55719
Lake Superior Community Health Center	4325 Grand Avenue	Duluth	55807
Lakeshore Inc	4002 London Road	Duluth	55804
Merritt House	731 3rd Street South	Virginia	55792
North Star Hospice	1101 East 37th Street Ste 27	Hibbing	55746
Northwood Childrens Svs Inc	4000 West 9th Street	Duluth	55807
Range Center Aspenwood Home	1820 East 39th Street	Hibbing	55746
Range Center Legacy	112 9th Street Nw	Chisholm	55719
Range Center Maplevue Home	506 West 47th Street	Hibbing	55746
Res Treatment & Detox Ctr	1402 East Superior St	Duluth	55805
St Lukes Hospice Duluth	220 North 6th Avenue East	Duluth	55805
St Lukes Hospital	915 East 1st Street	Duluth	55805

Healthcare Facilities			
Name	Address	City	Zip
St Michaels Hlth & Rehab Ctr	1201 8th Street South	Virginia	55792
St Raphaels Health & Rehab Ctr	601 Grant Avenue	Eveleth	55734
The North Shore Estates LLC	7700 Grand Avenue	Duluth	55807
Thunderbird Wren House	229 North 4th Avenue West	Duluth	55806
University Medical Ctr Mesabi	750 East 34th Street	Hibbing	55746
Viewcrest Health Center	3111 Church Street	Duluth	55811
Winter Homes Incorporated	4982 Paupores Road	Brookston	55711

Emergency Services			
Name	Address	City	Zip
148th Air National Guard Fire Department	Stebner Road	Duluth	55811
1854 Treaty Authority	4428 Haines Road	Duluth	55811
Alborn Fire Department	6390 County Road 7	Alborn	55702
Arrowhead Fire Department	9798 United States Highway 2	Brookston	55711
Aurora Fire Department	20 West Central Avenue	Aurora	55705
Babbitt Police Department	71 South Drive	Babbitt	55706
Babbitt Volunteer Fire Department	34 North Drive	Babbitt	55706
Biwabik City Police Department	105 3rd Avenue North	Biwabik	55708
Biwabik Township Volunteer Fire Department	6555 Oak Drive	Gilbert	55741
Biwabik Volunteer Fire Department	105 North 3rd Avenue	Biwabik	55708
Bois Forte Police Department	12907 Palmquist Rd	Orr	
Bois Forte Volunteer Fire Department	5301 Saint Mary Drive	Orr	55771
Breitung Fire Department	33 1st Avenue	Soudan	55782
Breitung Township Police Department	39 1st Avenue	Soudan	55782
Brimson Area Volunteer Fire Department	3127 Highway 44	Brimson	55602
Buhl Volunteer Fire and Ambulance Depart	201 Forest Street	Buhl	55713
Buhl Volunteer Fire and Ambulance Depart	219 Jones Avenue	Buhl	55713
Buyck Volunteer Fire Department	8035 Orr-Buyck Road	Buyck	55771
Canosia Volunteer Fire	5694 Martin Road	Duluth	55811

Emergency Services			
Name	Address	City	Zip
Department			
Central Lakes Fire Department and Commun	7562 Murphy Lake Road	Eveleth	55734
Central Lakes Fire Department and Commun	7654 Wilson Road	Eveleth	55734
Cherry Township Fire Department	9831 State Highway 37	Iron	55751
Chisholm Fire Department (Balkan Hall)	5524 Hwy 73		
Chisholm Police Department	301 West Lake Street	Chisholm	55719
Chisholm Volunteer Fire Department	301 West Lake Street	Chisholm	55719
Chisholm-Hibbing Airport Fire Department	11038 State Highway 37	Hibbing	55746
Clifton Fire Department Station 1	2146 Old North Shore Road	Duluth	55804
Clifton Fire Department Station 2	6092 Homestead Road	Duluth	55804
Clifton Fire Department Station 3	Laine Road	Two Harbors	55616
Clinton Volunteer Fire Department	State Highway 37	Iron	55751
Colvin Volunteer Fire Department Inc.	2577 Vermilion Trail	Makinen	55763
Cook Fire Department / Cook Ambulance Se	111 2nd Street Southeast	Cook	55723
Cotton Volunteer Fire Department	7507 Comstock Lake Road	Cotton	55724
County Sheriff's Office - Cook	103 S River St	Cook	
County Sheriff's Office - Mt. Iron	8586 Enterprise Dr S	Mt. Iron	
County Sheriff's Office - Virginia	300 S 5th Ave	Virginia	
Crane Lake Volunteer Fire Department	7400 Handberg Road	Crane Lake	55725
Culver Fire Department	5292 County Road 31	Brookston	55711
Duluth Fire Department Station 1 - Headq	602 West 2nd Street	Duluth	55802
Duluth Fire Department Station 10	1106 Commonwealth Avenue	Duluth	55808
Duluth Fire Department Station 11	3501 Woodland Avenue	Duluth	55803
Duluth Fire Department Station 2	2627 West Superior Street	Duluth	55806
Duluth Fire Department Station 4	425 West College Street	Duluth	55812
Duluth Fire Department Station 5	2138 Minnesota Avenue	Duluth	55802
Duluth Fire Department Station 6	5031 East Superior Street	Duluth	55804
Duluth Fire Department Station 7	1419 West Maple Grove Road	Duluth	55811
Duluth Fire Department Station 8	5830 Grand Avenue	Duluth	55807

Emergency Services			
Name	Address	City	Zip
Duluth PD East Duluth Substation	228 W Michigan St	Duluth	
Duluth PD West Duluth Substation	5723 Roosevelt St	Duluth	
Duluth Police Department	2030 N Arlington Ave	Duluth	55811
Duluth Township Police Department	6092 Homestead Road	Duluth	55804
Eagles Nest Volunteer Fire Department	1552 Bear Head State Park Road	Ely	55731
East Brevator Fire Department	7246 Morris Thomas Rd	Cloquet	55720
East Range Police Department	206 Kennedy Memorial Drive	Hoyt Lakes	55750
Ellsbury Volunteer Fire Department	1767 Melrude Road	Cotton	55724
Ellsbury Volunteer Fire Department - Wes	1102 Mink Road	Cotton	55724
Elmer Volunteer Fire Department	7882 County Road 5	Meadowlands	55765
Ely Fire Department	209 East Chapman St	Ely	55731
Ely Police Department	209 East Chapman St	Ely	55731
Embarrass Region Volunteer Fire Departme	4868 County Road 21	Embarrass	55732
Eveleth Fire Department	425 Jackson Street	Eveleth	55734
Eveleth Police Department	415 Pierce Street	Eveleth	55734
Evergreen Fire Department	County Road 65	Britt	55710
Fayal Fire Department	4375 Shady Lane	Eveleth	55734
Floodwood Police Department	206 East 8th Avenue	Floodwood	55736
Floodwood Volunteer Fire Department	206 East 8th Avenue	Floodwood	55736
Fredenberg Fire Department	6367 Lavaque Road	Duluth	55803
French Township Volunteer Fire Departmen	7485 McCarthy Beach Road	Side Lake	55781
Gilbert Fire Department	18 South Broadway	Gilbert	55741
Gilbert Police Department	16 South Broadway Avenue	Gilbert	55741
Gnesen Volunteer Fire Department	4505 Datka Road	Duluth	55803
Grand Lake Volunteer Fire Department	5297 United States Highway 53	Saginaw	55779
Grand Lake Volunteer Fire Department	Taft Road	Duluth	55803
Greenwood Township Volunteer Fire Depart	3000 County Road 77	Tower	55790
Hermantown Police Department	5111 Maple Grove Road	Hermantown	55811

Emergency Services			
Name	Address	City	Zip
Hermantown Volunteer Fire Department	Midway Road	Hermantown	55811
Hermantown Volunteer Fire Department	5255 Maple Grove Road	Hermantown	55811
Hermantown Volunteer Fire Department	Morris Thomas Road	Hermantown	55811
Hibbing Fire Department Station 1	2320 Brooklyn Drive	Hibbing	55746
Hibbing Fire Department Station 2	Town Line Road	Hibbing	55746
Hibbing Fire Department Station 3	3rd Avenue North	Hibbing	55746
Hibbing Police Department	1810 12th Avenue East	Hibbing	55746
Hoyt Lakes Fire Department	Kennedy Memorial Drive	Hoyt Lakes	55750
Industrial Volunteer Fire Department	7519 Albert Road	Saginaw	55779
Kabetogama Fire Department	9843 Gamma Road	Ray	56669
Kelsey Volunteer Fire Department	8818 County Road 7	Kelsey	55724
Kinney-Great Scott Fire Department	Highway 25	Britt	55710
Kinney-Great Scott Fire Department	Highway 25	Mountain Iron	55768
Kinney-Great Scott Fire Department	512 Spruce Avenue	Kinney	55758
Lake Vermilion Fire Brigade Boathouse 1	4296 Arrowhead Point Rd		
Lake Vermilion Fire Brigade Boathouse 2	2147 Birch Point Rd		
Lakeland Volunteer Fire Department	4667 Vermilion Trail	Gilbert	55741
Lakewood Township Fire Department	5772 Lakewood Road	Duluth	55804
Lakewood Township Fire Department	5195 North Tischer Road	Duluth	55804
Makinen Fire Department	6661 Wilson Road	Makinen	55763
Mcdavitt Fire Department	9042 Zim Road	Zim	55738
Mckinley Volunteer Fire Department	5454 Grand Avenue	Gilbert	55741
Meadowlands Area Volunteer Fire Department	9955 Highway 133	Meadowlands	55765
Minnesota State Patrol - District 2700	1131 Mesaba Avenue	Duluth	55811

Emergency Services			
Name	Address	City	Zip
Minnesota State Patrol - District 3100	101 Hoover Road North	Virginia	55792
Morse Fall Lake Fire Department	1371 Grant McMahan Blvd	Ely	
Mountain Iron Volunteer Fire Department	8866 Slate Street	Mountain Iron	55768
National Park Service - Voyageurs Nation	7577 Gold Coast Road	Crane Lake	55725
National Park Service - Voyageurs Nation	9940 Cedar Lane	Kabetogama	56669
Normanna Volunteer Fire Department	6472 French River Road	Duluth	55804
Normanna Volunteer Fire Department Fire	6166 Lakewood Road	Duluth	55804
North Star Township Fire Department	7700 Pequaywan Lake Road	Duluth	55803
Northland Fire Department Station 1	United States Highway 53	Canyon	55717
Northland Fire Department Station 2	South Shore Drive	Canyon	55717
Orr Volunteer Fire Department	4540 Lake Street	Orr	55771
Palo Regional Volunteer Fire Department	4547 County Road 100	Aurora	55705
Pequaywan Lake Area Fire Department	8765 Pequaywan Lake Road	Duluth	55803
Pike-Sandy-Britt Regional Volunteer Fire	County Road 68	Britt	55710
Pike-Sandy-Britt Regional Volunteer Fire	County Road 68	Embarrass	55732
Proctor Fire Department	225 5th Avenue	Proctor	55810
Proctor Police Department	100 Pionk Drive	Proctor	55810
Rice Lake Volunteer Fire Department Stat	4051 Martin Road	Duluth	55803
Rice Lake Volunteer Fire Department Stat	5844 Howard Gnesen Road	Duluth	55803
Saint Louis County Sheriff's Office	100 North 5th Avenue West	Duluth	55802
Saint Louis County Sheriff's Office - Buh	300 Jones Avenue	Buhl	55713
Saint Louis County Sheriff's Office - Ely	209 East Chapman Street	Ely	55731

Emergency Services			
Name	Address	City	Zip
Silica Volunteer Fire Department And Fir	1659 State Highway 73	Hibbing	55746
Solway Township Volunteer Fire Department	4027 Munger Shaw Road	Cloquet	55720
Toivola Fire Department / Lavell Twp	2189 Hwy 5	Hibbing	
Toivola Volunteer Fire Department	9094 Highway 5	Toivola	55765
Tower Fire Department / Tower Ambulance	402 Pine Street	Tower	55790
United States Customs And Border Protect	7544 Gold Coast Road	Crane Lake	55725
United States Customs and Border Protect	515 West 1st Street	Duluth	55802
United States Marshals Service - Duluth	515 West 1st Street	Duluth	55802
University of Minnesota - Duluth Campus	1049 University Drive	Duluth	55812
Vermillion Lake Fire Department	6703 Wahlsten Road	Tower	55790
Virginia Fire Department	115 North 4th Avenue	Virginia	55792
Virginia Police Department	327 South 1st Street	Virginia	55792
West Brevator Fire Department	Simon Road	Cloquet	55720

Schools			
Name	Address	City	Zip
A.I. Jedlicka Middle	131 9th Ave	Proctor	55810
Academic Excellence Online	215 N First Avenue East	Duluth	55802
Arrowhead Juvenile Center	1918 Arlington Ave N	Duluth	55811
Arrowhead Juvenile Detention Center	1918 Arlington Ave	Duluth	55811
Arrowhead Library System	5528 Emerald Ave	Mountain Iron	55768
Assumption	2310 E 7th Ave	Hibbing	55746
Aurora Public Library	14 West Second Avenue No	Aurora	55705
Babbitt Elem	30 S Dr	Babbitt	55706
Babbitt Public Library	71 South Drive	Babbitt	55706
Bay View Elem	8708 Vinland	Duluth	55810
Bethany Crises Shelter	110 W Redwing St	Duluth	55803
Buhl Public Library	400 Jones Avenue	Buhl	55713
Cherry Elem	3943 Tamminen Rd	Iron	55751

Schools			
Name	Address	City	Zip
Cherry High	3943 Tamminen Rd	Iron	55751
Chester Creek Academy	714 1/2 W College St	Duluth	55811
Chisholm Elem	300 SW 3rd Ave	Chisholm	55719
Chisholm High	301 4th St SW	Chisholm	55719
Chisholm Public Library	300 W Lake St	Chisholm	55719
College Of St. Scholastica	1200 Kenwood Avenue	Duluth	55811
Congdon Park Elem	3116 E Superior St	Duluth	55812
Cook Public Library	103 South River St.	Cook	55723
Denfeld High	401 N 44th Ave W	Duluth	55807
Diocese Of Duluth	2830 E 4th St	Duluth	55812
DPSA ESY	3301 Technology Dr	Duluth	55811
Duluth ALC	215 N 1st Ave E	Duluth	55802
Duluth Business University	4724 Mike Colalillo Dr	Duluth	55807
Duluth ECSE	215 N 1st Ave E	Duluth	55802
Duluth ESY	215 N 1st Ave E	Duluth	55802
Duluth Excell TS	215 N 1st Ave E	Duluth	55802
Duluth Indian Education	215 N 1st Ave E	Duluth	55802
Duluth Montessori	313 Mygatt Ave	Duluth	55803
Duluth Public Library	520 W. Superior St.	Duluth	55802
Duluth Public Schools Academy	3301 Technology Dr	Duluth	55811
Duluth TS	215 N 1st Ave E	Duluth	55802
East High	301 N 40th Ave E	Duluth	55804
East Range Academy Tech Science	2000 Siegel Blvd	Eveleth	55734
East Range Academy Tech Science	2000 Siegel Blvd	Eveleth	55734
East Range Technical Center	601 N 1st St W	Aurora	55705
East Range Technical Center	411 5th Ave S	Virginia	55792
ECSU Region 3	5525 Emerald Ave	Mountain Iron	55768
Education Innovation Partners	1515 East 25th St	Hibbing	55746
Education Innovation Partners	1515 East 25th St	Hibbing	55746
Ely ESY	600 E. Harvey St.	Ely	55731
Ely Public Library	224 E Chapman St	Ely	55731
Eveleth Gilbert Hope Program	801 Jones Street	Eveleth	55734
Eveleth Public Library	614 Pierce Street	Eveleth	55734
Eveleth-Gilbert ESY	801 Jones St	Eveleth	55734
Eveleth-Gilbert High	801 Jones St	Eveleth	55734
Eveleth-Gilbert Jr. High	801 Jones Street	Eveleth	55734

Schools			
Name	Address	City	Zip
Floodwood Alp	115 W 4th Ave	Floodwood	55736
Floodwood Elem	115 W 4th Ave	Floodwood	55736
Floodwood High	115 W 4th Ave	Floodwood	55736
Franklin Elem	602 Fayal Ave	Eveleth	55734
Gilbert Public Library	17 N Broadway	Gilbert	55741
Greenhaven Elem	323 E 37th St	Hibbing	55746
Harbor City International	332 W Michigan Street Ste 300	Duluth	55802
Harbor City International	332 W Michigan St Ste.300	Duluth	55802
Hermantown Alp	4335 Hawk Circle Dr	Hermantown	55811
Hermantown ECSE	5454 Miller Trunk Hwy	Hermantown	55811
Hermantown Elem	5365 W Arrowhead	Hermantown	55811
Hermantown ESY	4307 Ugstad Rd	Hermantown	55811
Hermantown High	4335 Hawk Circle Dr	Hermantown	55811
Hermantown Middle	4289 Ugstad Rd	Hermantown	55811
Hibbing Community College	1515 East 25th Street	Hibbing	55746
Hibbing High	800 E 21st St	Hibbing	55746
Hibbing Public Library	2020 East 5th Avenue	Hibbing	55746
Hibbing Technical College	2900 E Beltline	Hibbing	55746
Holy Rosary School	2802 4th St E	Duluth	55812
Homecroft Elem	4784 Howard Gnesen Rd	Duluth	55803
Hoyt Lakes Public Library	206 Kennedy Memorial Dr	Hoyt Lakes	55750
Kinney Public Library	400 Main Street	Kinney	55758
Lake Superior College	2101 Trinity Road	Duluth	55811
Lakeside Academy	502 E 2nd St	Duluth	55802
Lakeview Christian Academy	155 W Central Entrance	Duluth	55811
Lakewood Elem	5207 N Tischer Rd	Duluth	55804
Laura Macarthur Elem	720 N Central Ave	Duluth	55807
Laurentian Environmental Center	8950 Peppard Rd	Britt	55710
Lester Park Elem	5300 Glenwood Ave	Duluth	55804
Lincoln Elem	1114 E 23rd St	Hibbing	55746
Lincoln Park Middle	3215 W 3rd St	Duluth	55806
Lowell Elem	2000 Rice Lake Rd	Duluth	55811
Many Rivers Montessori	916 E 3rd Street	Duluth	55805
Marquette	311 3rd St S	Virginia	55792
Marshall School	1215 Rice Lake Rd	Duluth	55811
Mckinley Public Library	5454 Grand Avenue	Mckinley	55741

Schools			
Name	Address	City	Zip
Memorial High	600 E Harvey St	Ely	55731
Memorial Middle	600 E Harvey St	Ely	55731
Merritt Creek Academy	4000 W 9th St	Duluth	55807
Merritt Elem	5529 Emerald Ave	Mountain Iron	55768
Mesabi ALC	800 E 21st St	Hibbing	55746
Mesabi East Elem	601 N 1st St W	Aurora	55705
Mesabi East High	601 N 1st St W	Aurora	55705
Mesabi Range CC	1001 Chestnut Street West	Virginia	55792
Mountain Iron Public Library	5742 Mountain Avenue	Mountain Iron	55768
Mt. Iron-Buhl ESY	5720 Marble Ave	Mountain Iron	55768
Mt. Iron-Buhl High	5720 Marble Ave	Mountain Iron	55768
Mt. Royal Branch Library	105 Mt.Royal Shopping Circle	Duluth	55803
Myers-Wilkins Elem	1027 N 8th Ave E	Duluth	55805
NE Regional Correction Center	6102 Abramson Rd	Saginaw	55779
Nelle Shean Elem	801 Jones Street	Eveleth	55734
Nett Lake Elem	13090 Westley Dr	Nett Lake	55772
NLC 010	1201 S 13th Ave	Virginia	55792
NLC 020	1201 S 13th Ave	Virginia	55792
NLC 030	1201 S 13th Ave	Virginia	55792
NLC 040	1201 S 13th Ave	Virginia	55792
NLC 050	1201 S 13th Ave	Virginia	55792
NLC 060	1201 S 13th Ave	Virginia	55792
NLC 070	1201 S 13th Ave	Virginia	55792
NLC Day Treatment	1201 13th Ave S	Virginia	55792
North American Training Institute	314 West Superior Street	Duluth	55802
North Shore Community	5926 Ryan Rd	Duluth	55804
North Shore Community	5926 Ryan Rd	Duluth	55804
North Shore Community ESY	5926 Ryan Road	Duluth	55804
North Star Academy	3301 Technology Dr	Duluth	55811
North Woods Elem	10248 Olson Rd E	Cook	55723
North Woods High	10248 Olson Rd E	Cook	55723
Northeast Range High	30 S Dr	Babbitt	55706
Northeast Service Coop Oll	5525 Emerald Ave	Mountain Iron	55768
Northeast Service Coop Sp Educ.	5525 Emerald Ave	Mountain Iron	55768
Northland Learning Center	1201 S 13th Ave	Virginia	55792
Northwood Childrens Home	714 College Street (Main Campus)	Duluth	55811

Schools			
Name	Address	City	Zip
Northwoods West	4000 9th St W	Duluth	55807
NSCE Transition Prg	411 5th Ave S	Virginia	55792
Ordean-East Middle	2900 E 4th St	Duluth	55812
Park Point Manor	1601 St. Louis Ave	Duluth	55802
Parkview Lc Elem	506 N 9th Ave W	Virginia	55792
Piedmont Elem	2827 Chambersburg Ave	Duluth	55811
Pike Lake Elem	5682 Martin Rd	Duluth	55810
Port Rehabilitation Center For Cd	23 Mesaba Ave	Duluth	55806
Proctor ESY	131 9th Ave	Proctor	55810
Proctor High	131 9th Ave	Proctor	55810
Rails Academy	131 9th Ave	Proctor	55810
Raleigh Prim/Elem Academy	5905 Raleigh St	Duluth	55807
Range Center Inc.	1001 8th Ave Nw	Chisholm	55719
Range Treatment Center	750 E 34th St	Hibbing	55746
Residential Services	707 Arrowhead Rd	Duluth	55811
RMIC-Region 2	5 W 1st Street Ste 300	Duluth	55802
RMIC-Region 2	5 W 1st Street Ste 300	Duluth	55802
Roosevelt Elem	411 5th Ave S	Virginia	55792
School District Office	131 9th Ave	Proctor	55810
School District Office	215 N 1st Ave E	Duluth	55802
School District Office	4307 Ugstad Rd	Hermantown	55811
School District Office	115 W 4th Ave	Floodwood	55736
School District Office	800 E 21st St	Hibbing	55746
School District Office	801 Jones St	Eveleth	55734
School District Office	300 Sw 3rd Ave	Chisholm	55719
School District Office	411 5th Ave S	Virginia	55792
School District Office	5720 Marble Ave	Mountain Iron	55768
School District Office	601 N 1st St W	Aurora	55705
School District Office	1701 N 9th Ave	Virginia	55792
School District Office	600 E Harvey St	Ely	55731
School District Office	13090 Westley Dr	Nett Lake	55772
South Ridge Elem	8162 Swan Lake Rd	Culver	55779
South Ridge High	8162 Swan Lake Rd	Culver	55779
Sp. Ed. Np	215 N 1st Ave E	Duluth	55802
Spirit Of The Lake Community	1346 W Arrowhead Rd	Duluth	55803
St Louis County Schools ESY	1701 North 9th Avenue	Virginia	55792

Schools			
Name	Address	City	Zip
St. James School	715 N 57th Ave W	Duluth	55807
St. Johns School	1 West Chisholm St	Duluth	55803
St. Michaels Lakeside	4628 Pitt St	Duluth	55804
Stone Ridge Christian	115 E Orange St	Duluth	55811
Stowe Elem	715 101st Ave W	Duluth	55808
Superior Academy	215 N 1st Ave E	Duluth	55802
The Bridge	215 N 1st Ave E	Duluth	55802
Tower-Soudan Elem	415 N 2nd St	Tower	55790
U of M Duluth	1049 University Drive	Duluth	55812
Vaughan Elem	1000 Ne 1st Ave	Chisholm	55719
Vermilion CC	1900 East Camp Street	Ely	55731
Vermilion Country School	1 Enterprise Dr	Tower	55790
Vermilion Country School	1 Enterprise Drive	Tower	55790
Victory Christian Academy	206 E 39th Street	Hibbing	55746
Virginia ESY	411 S 5th Ave	Virginia	55792
Virginia High	411 5th Ave S	Virginia	55792
Virginia Public Library	215 5th Avenue S	Virginia	55792
Washington Elem	2100 12th Ave E	Hibbing	55746
Washington Elem	600 E Harvey St	Ely	55731
West Duluth Branch	5830 Grand Ave.	Duluth	55807
Woodland Hills	4321 Allendale Ave	Duluth	55803
Woodland Hills Academy	110 W Redwing St	Duluth	55803
Yoga North	4628 Pitt Street	Duluth	55804
Young Peoples Residential Center	2001 West 3rd St	Duluth	55806

Transportation			
Name	Address	City	Zip
Anderson (Air transportation)		Bear River	55802
Arrowhead Transit bus garage	1001 Broadway St S	Gilbert	55741
BNSF rail yard	201 Garfield Ave	Duluth	55811
Carey Lake (Air transportation)		Hibbing	55792
CN rail yard, Proctor	1052 Railroad Ave	Proctor	55802
Cook Hospital (Air		Cook	55711

Transportation			
Name	Address	City	Zip
transportation)			
Cook Muni (Air transportation)		Cook	55736
DTC (Duluth Transit Center)	228 W Michigan St	Duluth	55811
Duluth Intl (Air transportation)		Duluth	55802
Ely Bloomenson Community Hospital (Air transportation)		Ely	55807
Ely Muni (Air transportation)		Ely	55810
Essentia Health Virginia Hospital (Air transportation)		Virginia	55711
Eveleth-Virginia Muni (Air transportation)		Eveleth	55765
Fond du Lac Transit	28 University Rd		55746
North Country (Air transportation)		Duluth	55750
Northern Pines Medical Center (Air transportation)		Aurora	55731
Orr Rgnl (Air transportation)		Orr	
Passenger ship berth	323 Harbor Dr	Duluth	55802
Range Rgnl (Air transportation)		Hibbing	
Robertson Field (Air transportation)		Hibbing	
Scotts (Air transportation)		Crane Lake	
Sky Harbor (Air transportation)		Duluth	
Sky Harbor (Air transportation)		Eveleth	
St Luke's Hospital (Air transportation)		Duluth	
St Mary's Hospital (Air transportation)		Duluth	
Swan Field (Air transportation)		Saginaw	
The Depot passenger rail	506 W Michigan St	Duluth	
Tower Muni (Air transportation)		Tower	
University Medical Center		Hibbing	

Transportation			
Name	Address	City	Zip
Mesabi (Air transportation)			
USFS Seaplane Base			
Voyageur Bus Co. / Jefferson Lines headquarters	3941 Calvary Rd E	Duluth	

Utilities				
Name	Address	City	Zip	Type
ARMER Tower - Alborn				Communication
ARMER Tower - Argo Lake				Communication
ARMER Tower - Argus Lookout				Communication
ARMER Tower - Arrowhead				Communication
ARMER Tower - Brimson				Communication
ARMER Tower - Buhl				Communication
ARMER Tower - Chisholm N				Communication
ARMER Tower - Crane Lake				Communication
ARMER Tower - Duluth Antenna Farm				Communication
ARMER Tower - Duluth PSAP				Communication
ARMER Tower - Elephant Lake				Communication
ARMER Tower - Elmer				Communication
ARMER Tower - Ely				Communication
ARMER Tower - EOC				Communication
ARMER Tower - Erie Hill				Communication
ARMER Tower - Floodwood				Communication
ARMER Tower - Gheen New				Communication
ARMER Tower - Hibbing				Communication
ARMER Tower - Idington				Communication
ARMER Tower - Kabatogama				Communication
ARMER Tower - Kabetogama				Communication
ARMER Tower - Line Lake				Communication
ARMER Tower - Lookout				Communication
ARMER Tower - Meander Lake				Communication
ARMER Tower - Mirror Lake LO				Communication
ARMER Tower - Molde				Communication
ARMER Tower - Nett Lake				Communication

Utilities				
Name	Address	City	Zip	Type
ARMER Tower - Observation				Communication
ARMER Tower - Palo				Communication
ARMER Tower - Sax				Communication
ARMER Tower - Shaw				Communication
ARMER Tower - Side Lake				Communication
ARMER Tower - Soudan East				Communication
ARMER Tower - Vermillion				Communication
ARMER Tower - Virginia/Midway				Communication
ARMER Tower - Woodland				Communication
Calumet bulk terminal	5746 Old Hwy 61	Duluth	55810	Energy
Duluth steam plant	1 Lake Place Dr	Duluth	55802	Energy
Floodwood pump station	11934 Hwy 2	Floodwood	55736	Energy
Fond du Lac hydro station	14206 Oldenberg Pkwy	Duluth	55808	Energy
Gowan pump station	10912 Rogers Rd	Floodwood	55736	Energy
Great Lakes Gas compressor	3741 Brandon Rd	Cloquet	55720	Energy
Hibbard Energy Center	4913 Main St	Duluth	55807	Energy
Hibbing Public Utilities	1902 6th Ave E	Hibbing	55746	Energy
Knife Falls hydro plant		Cloquet	55720	Energy
Laskin power plant	5699 Colby Lake Rd	Hoyt Lakes	55750	Energy
Monaco Air Duluth fuel storage	4535 Airport Approach Rd	Duluth	55811	Energy
Scanlon hydro plant		Scanlon		Energy
Taconite Ridge wind farm	6547 Hwy 53	Mountain Iron		Energy
Thomson hydro plant				Energy
Virginia power plant	107 S 6th Ave	Virginia		Energy
Winton hydro station	13908 Power Dam Rd			Energy
AJ's Aggregate & Trucking Gravel Pit	7211 Highway 2	Saginaw	55779	Wastewater
Alberta Clipper & Southern Lights Diluent Pipeline		Duluth	55802	Wastewater
ArcelorMittal Minorca Mine Inc	5950 Old Highway 53	Virginia	55792-2787	Wastewater
ArcelorMittal Minorca Mine Inc - Laurentian	5950 Old Highway 53 N	Virginia	55792	Wastewater
Auburn Minerals Security Mine	Address Unknown	Eveleth	55734	Wastewater
Aurora WWTP	5378 Highway 110 W	Aurora	55705	Wastewater
Babbitt Sludge	100 Poplar Dr	Babbitt	55706	Wastewater
Babbitt WTP	39 North Dr	Babbitt	55706	Wastewater
Babbitt WWTP	100 Poplar Dr	Babbitt	55706	Wastewater
Billman Construction Inc	5010 Miller Trunk Hwy	Duluth	55811	Wastewater

Utilities				
Name	Address	City	Zip	Type
Biwabik WWTP	Depot Location	Biwabik	55708	Wastewater
Buhl Kinney WWTP	30 Old Highway 169	Buhl	55713	Wastewater
Caribou Lake WWTP		Saginaw	55779	Wastewater
Central Iron Range Sanitary Sewer District WWTP	10961 Highway 169	Chisholm	55719	Wastewater
Central Lakes Mining Area	Highway 53	Eveleth	55734	Wastewater
Chisholm/Buhl/Kinney/USS Corp WWTP	404 Main St W	Ada	56510	Wastewater
Cliffs - Dunka Mining Area	County Road 666	Babbitt	55706	Wastewater
Cliffs Erie LLC - Mine Area	County Road 666	Hoyt Lakes	55750	Wastewater
Conrad Fafard Inc	10108 Highway 8	Floodwood	55736	Wastewater
Cook WWTP	127 River St S	Cook	55723	Wastewater
Coons Aggregate Supply Co LLC	4607 Canosia Rd	Saginaw	55779	Wastewater
Cooper Industries - Interim Grdh 20 Treatment		Duluth	55807	Wastewater
Crane Lake WWTP	White Pine Way	Crane Lake	55725	Wastewater
Donald H Winter Facility	4982 Paupores Rd	Brookston	55711	Wastewater
Duluth Ready Mix - Canyon	6764 Highway 53	Canyon	55717-8701	Wastewater
Duluth Ready Mix - Saginaw	5671 Highway 53	Saginaw	55779-9415	Wastewater
Duluth Seaway Port Authority	1200 Port Terminal Dr	Duluth	55802-2609	Wastewater
Duluth Steam Plant 1	1 Lake Place Dr	Duluth	55802-2324	Wastewater
Dyno Nobel Inc	5392 Vermillion Trl	Biwabik	55708	Wastewater
Ely WTP	1881 W Shagawa Rd	Ely	55731	Wastewater
Ely WWTP	47 Chandler Rd N	Ely	55731	Wastewater
Enbridge Energy Ltd - Clearbrook	21 Superior St W	Duluth	55802-2067	Wastewater
Eveleth WTP	4411 Miller Trunk Rd	Eveleth	55734	Wastewater
Eveleth WWTP	1 Fayal Rd	Eveleth	55734	Wastewater
Ferweda General Contracting	11325 Highway 22	Angora	55703	Wastewater
Floodwood WWTP	702 Hickory St	Floodwood	55736	Wastewater
Forest Concrete Products Inc	1715 E Sheridan St	Ely	55731	Wastewater
Former Boyer Lumber Site	1504 4th St S	Virginia	55792	Wastewater
Former Morris Oil Bulk Plant	Shagawa Rd	Ely	55731	Wastewater
Gardenwood Motel	5107 N Shore Dr	Duluth	55804-2924	Wastewater
Gerdau Ameristeel - Duluth	800 Garfield Ave	Duluth	55802	Wastewater
Gilbert WWTP	202 Dakota Ave E	Gilbert	55741	Wastewater

Utilities				
Name	Address	City	Zip	Type
Great Lakes Aquarium	353 Harbor Dr	Duluth	55802	Wastewater
Great Lakes Gas Transmission LP	130 Superior St W Ste 813	Duluth	55802	Wastewater
Green Energy & Development	524 Main St S	Winnebago	56098	Wastewater
Harbor Cove Marina		Duluth	55807	Wastewater
Hexion Specialty Chemicals Inc	1507 Southern Dr	Virginia	55792	Wastewater
Hibbing Public Utilities Commission	1902 6th Ave E	Hibbing	55746-2154	Wastewater
Hibbing Public Utilities WTP	11866 Townline Rd	Hibbing	55746	Wastewater
Hibbing Taconite Co	4950 County Highway 5 N	Hibbing	55746	Wastewater
Hibbing Taconite Co - Tails Basin Area	4950 County Highway 5 N	Hibbing	55746	Wastewater
Hibbing WWTP North	1810 N Plant Rd	Hibbing	55746	Wastewater
Hibbing WWTP South Plant	11669 Town Line Rd	Hibbing	55746	Wastewater
Hoyt Lakes WWTP	100 Leeds Rd W	Hoyt Lakes	55750	Wastewater
Inland Steel Mining - Sauntry Creek	5950 Old Highway 53 N	Virginia	55792	Wastewater
Inland Steel Mining - Settling	5950 Old Highway 53 N	Virginia	55792	Wastewater
Inter City Oil Company Incorporated	1921 South St	Duluth	55812-2042	Wastewater
Iracore International Inc	3430 13th Ave E	Hibbing	55746-2352	Wastewater
Iron Junction WWTP	County Highway 7	Iron	55751	Wastewater
ISD 2142 Pre-Kindergarten to Grade 12 N School	10248 Olson Rd E	Cook	55723	Wastewater
ISD 2142 Pre-Kindergarten to Grade 12 S School	8162 Swan Lake Rd	Culver	55779	Wastewater
ISD 704	General Delivery	Duluth	55806-9999	Wastewater
Kennecott Minerals Co - Babbitt Project	Dunka Rd (Mile 3.7)	Babbitt	55706	Wastewater
Kettle Falls Hotel & Guest Villas	Voyageurs National Park	Ray	56669	Wastewater
Kevin Owens	371 Canal Park Dr	Duluth	55807	Wastewater
KGM Contractors Inc	9211 Highway 53	Angora	55703-8239	Wastewater
Kingsbury Bay-Grassy Point Habitat Restoration Project	St. Louis River Estuary	Duluth	55802	Wastewater
Kubena Sand & Gravel	3420 19th Ave E	Hibbing	55746-3506	Wastewater
L & M Radiator Inc	1414 E 37th St	Hibbing	55746-3645	Wastewater

Utilities				
Name	Address	City	Zip	Type
Lake Vermillion Soudan Underground Mine State Park	Vermillion Park Dr	Soudan	55782	Wastewater
Laurentian Aggregate LLC	Shelton Rd	Eveleth	55734	Wastewater
LKO Enterprises Inc	6339 Lavaque Rd	Duluth	55803-9438	Wastewater
Louis Leustek & Sons Inc - Nonmetallic	1715 E Sheridan St	Ely	55731	Wastewater
LTV Steel Corp - Hoyt Lakes - Sewage	County Road 666	Hoyt Lakes	55750	Wastewater
M&C Inc	714 7th St NW	Chisholm	55719	Wastewater
Marine Tech LLC	Duluth-Superior Harbor	Duluth	55803	Wastewater
Mark Kivi Aggregate	6592 Old Highway 2	Cloquet	55720	Wastewater
McKinley WTP	5454 Grand Ave	McKinley	55741	Wastewater
McKinley WWTP	5454 Grand Ave	McKinley	55741	Wastewater
MDNR Soudan State Park	1379 Stuntz Bay Rd	Soudan	55782	Wastewater
ME Global Inc	200 E. Carterett St.	Duluth	55808	Wastewater
Meadowlands WWTP	Andrews Junction Rd	Meadowlands	55765	Wastewater
Mesabi Bituminous Inc - Schley Mine A	Enterprise Dr & Highway 135	Gilbert	55741	Wastewater
Mesabi Mining Area	Highway 666	Hoyt Lakes	55750	Wastewater
Mesabi Nugget Delaware LLC	6500 Highway 135 N	Aurora	55705	Wastewater
Miller Hill Mall	1600 Miller Trunk Hwy	Duluth	55811	Wastewater
Mining Resources LLC	11050 Highway 169	Chisholm	55719	Wastewater
Minnesota Aquafarms Inc	25 Industrial Park Dr	Chisholm	55719	Wastewater
Minnesota Power - Hibbard Renewable Energy Ctr	4913 Main St	Duluth	55807	Wastewater
Minnesota Power - Laskin Energy Center	5699 Colby Lake Rd	Hoyt Lakes	55750	Wastewater
Minnesota Power Inc - Arrowhead HVDC	5818 Morris Thomas Rd	Hermantown	55810-9502	Wastewater
Minnesota Power Inc- General Office	30 W Superior St	Duluth	55802-2093	Wastewater
MNDNR French River State Fish Hatchery	5357 Shore Dr	Duluth	55804-2920	Wastewater
MNDNR Research Center Annex	Babbitt Mine	Babbitt	55706	Wastewater
Monson Trucking	5102 S Cant Rd	Duluth	55804	Wastewater
Mountain Iron WWTP	8808 Grant Dr	Mountain Iron	55768	Wastewater
MPCA Leak 13456	1600 W Knife River Rd	Two Harbors	55616	Wastewater
Nelson's Resort Inc	7632 Nelson Rd	Crane Lake	55725	Wastewater
Nichols Wastewater Ponds	1/4 mi S of Mud Lake Rd & 1/2 mi E of Sainio Rd	Mountain Iron	55768	Wastewater

Utilities				
Name	Address	City	Zip	Type
Northland Constructors of Duluth LLC	4843 Rice Lake Rd	Duluth	55803-1229	Wastewater
Northshore Mining Co - Babbitt	County Road 70	Babbitt	55706	Wastewater
Old Furniture Farm	9899 El Greco Cir	Bonita Springs	34135-6824	Wastewater
Orr WWTP	4447 Highway 53	Orr	55771	Wastewater
Poly Met Mining, Inc.	County Road 666	Hoyt Lakes	55750	Wastewater
Premier Aggregates Inc - Portable Recycl	405 Hoover Rd N	Virginia	55792	Wastewater
Pucks Point Sanitary Sewer District	Waltz Rd	Ray	56669	Wastewater
Radio Tower Bay Restoration	598 Gary St E	Duluth	55808	Wastewater
Railroad Street Properties LLC	1220 Railroad St W	Duluth	55802	Wastewater
SB Son Inc	3565 O'Rourke Rd	Hibbing	55746-8244	Wastewater
SEP Campground	4801 YOU Rd	Orr	55771	Wastewater
Seppi Brothers Concrete Products Corp	718 4th St N	Virginia	55792	Wastewater
Sludge Disposal Site Authority		Virginia	55792	Wastewater
Southern Lights 20-Inch Crude Line	Address Unknown	Duluth	55802	Wastewater
St Louis County Heritage & Arts Center	506 W Michigan St	Duluth	55802	Wastewater
St Louis County Highway Dept		Hermantown	55802	Wastewater
St Louis County Land Department	5713 Old Miller Trunk Hwy	Duluth	55811	Wastewater
Stella-Jones Corp	5020 Lesure St	Duluth	55807	Wastewater
Superior Refining Company LLC - Duluth Petroleum Products	5746 Old Highway 61	Proctor	55810-2193	Wastewater
Tate & Lyle Ingredients Americas LLC	110 Spring St	Duluth	55808-1135	Wastewater
Tower/Breitung WWTP	1347 McKinley Park Rd	Soudan	55782	Wastewater
United Taconite LLC - Fairlane Plant	1200 Highway 16	Forbes	55738-4500	Wastewater
United Taconite LLC - Thunderbird Mine	Old Highway 53	Eveleth	55734	Wastewater
U of M NOvA Far Detector	10709 Bright Star Rd	Orr	55771-8035	Wastewater
US EPA - MED-Duluth	6201 Congdon Blvd	Duluth	55804-2558	Wastewater
US Steel - Minntac Mining Area	County Road 102	Mountain Iron	55768	Wastewater
US Steel - Minntac Tailings Basin Area	County Road 102	Mountain Iron	55768	Wastewater

Utilities				
Name	Address	City	Zip	Type
US Steel Corp - Keetac	1 Mine Rd	Keewatin	55753	Wastewater
US Steel Corp - Minntac	8819 Old Highway 169	Mountain Iron	55768-3013	Wastewater
US Steel Corp - Tailings	1 Mine Rd	Keewatin	55753	Wastewater
Viele Sand and Gravel	4189 Sandy Trl	Duluth	55803	Wastewater
Virginia Department of Public Utilities	620 2nd St S	Virginia	55792	Wastewater
Virginia WWTP	1204 Southern Dr	Virginia	55792	Wastewater
Walmart Supercenter 1757	4740 W Mall Dr	Hermantown	55811	Wastewater
Waterfront Plaza Condominium Association	325 Lake Ave S	Duluth	55802	Wastewater
Waupaca NorthWoods LLC	8402 Highway 5	Meadowlands	55765	Wastewater
Western Lake Superior Sanitary District Administrative Office	2626 Courtland St	Duluth	55806-1813	Wastewater
Winton WWTP	Highway 88	Winton	55796	Wastewater
Wisconsin Central Limited - Duluth Ore Dock	212 37th Ave W	Duluth	55807-2819	Wastewater
Wisconsin Central Ltd Proctor Yard	951 Ugstad Rd	Proctor	55810	Wastewater
WLSSD Biosolids Storage Facility		Carlton	55718	Wastewater
WLSSD/City of Duluth Sanitary Sewer Syst	2626 Courtland St	Duluth	55806	Wastewater

Dams		
Name	Owner	Waterway
Bear Island	USFS	Bear Island River
Boulder Lake	MN Power and Light	Boulder Creek
Buhl Detention	MNDNR-Wildlife	McQuade Creek
Burntside Lake	MNDNR	Burntside River
Canosia WMA	MNDNR-Wildlife	Cloquet River-TR
Canosia WMA 6	MNDNR-Wildlife	Cloquet River-TR
Canosia WMA 78	MNDNR-Wildlife	Cloquet River-TR
Chez Pond	Dudderar, Frederick A Jr	Talmadge River-TR
Colby Lake	MN Power	
Daniels Pond	Daniels, Russel	Vermilion River-TR
Donna Lake	County of St. Louis and MNDNR-Fisheries	Spring Creek
Donora Settling	Steel Dynamics INC.	OFFSTREAM
Douglas Tailings	County of St. Louis (partial ownership)	Dempsey Creek-TR
Duluth Dock 6	Canadian National Railway	
East Stephens Settling	Mesabi Nugget	SECOND CREEK
Elephant Creek	USDA FS	Elephant Creek
Ely Lake	MNDNR	Ely Creek
Erie Basin 1	Cliffs Natural Resources to sell to Polymet Mining Company	Embarrass River-TR
Erie Basin 2	Cliffs Natural Resources to sell to Polymet Mining Company	Embarrass River-TR
Erie Pier Dike	Duluth Port Authority	Lake Superior
Esquagama Lake	MNDNR	Embarrass River
Eveleth Taconite Tailings	United Taconite – Cliffs	St. Louis River-TR
Finstad Pond	Lange, Chris	ECHO RIVER – TRIB
Fish Lake	MN Power and Light	Beaver River
Floodwood Lake	MNDNR	Floodwood River
Fond du Lac	MN Power and Light	St. Louis River
French River Hatchery	MNDNR-Fisheries	FRENCH RIVER
French River Headwaters	MNDNR-Fisheries	French River
Hartley Pond	City of Duluth	Tischer Creek
Hibbing Taconite Starter No. 1	Hibbing Taconite Company	Day Brook
Hibbing Taconite Starter No. 2	Hibbing Taconite Company	Day Brook
Hibbing Taconite Starter No. 3	Hibbing Taconite Company	Shannon River-TR
Hibbing Taconite Starter No. 4	Hibbing Taconite Company	Shannon River
Hibbing Taconite Stockpile		
Inland Steel Tailings	ArcelorMittal Minorca Mine	Wouri Creek-OS
Island Lake	MN Power and Light	Cloquet River
Kettle Falls	Boise Cascade Corp	Rainy River
Lake Vermilion	MNDNR-Fisheries	Vermilion River
Laskin Energy	MN Power and Light	Partridge River – Offstr
Little Stone Lake	County of St. Louis	Pine Creek-TR
Luoma Pond	Wheeler, Robert	Pelican River-TR
McKinley Clearwater	ArcelorMittal	OFFSTREAM
McKinley Tailings	ArcelorMittal	CLOSED SYSTEM – OFFSTREAM
Mesabi Nugget		

Dams		
Name	Owner	Waterway
Minntac SW Sump Pond	MINNTAC	
Minntac Tailings	US Steel	Closed System-OS
Minorca Pit South	ArcelorMittal Minorca Mine	Silver Lake Outlet
NSPC Initial Tailings	US Steel	Swan River-OS
NSPC Stage 2 Tailings	US Steel	Hay Creek-OS
Pelican Lake	County of St. Louis – Hwy	Pelican River
Pequaywan Lake	MNDNR	CLOQUET RIVER
Pike Lake	County of St. Louis	Pine River
Pike River	MNDNR-Fisheries	Pike River
Pioneer Clarification	City of Ely	Lonsdorf Creek
Pioneer Tailings	City of Ely	Lonsdorf Creek
Plant Site Settling	ArcelorMittal Minorca Mine	Sand River-OS
Poly Met HRF Dam	Poly Met Mining	
Polymet-LTV	Cliffs Natural Resources to sell to Polymet Mining Company	Embarrass River-TR
Prairie Lake	MNDNR	Prairie River
Reservoir No. 5	US Steel	Swan River-TR-OS
Rice Lake	MN Power and Light	Beaver River
Sand Lake	MNDNR	
Sauntry Creek Settling	ArcelorMittal Minorca Mine	Sauntry Creek
Schultz Lake	MNDNR	
Schweiger Pond	Schweiger, Burt	Cloquet River-TR
Sherman Group Tailings	RGGS	Dempsey Creek-OS
Sherman Mine Wastewater	US Steel	Dempsey Creek-TR
Smith Lake	MNDNR	Little Cloquet River
St. Louis River	Oglebay Norton Co	St. Louis River
Sturgeon Lake	MNDNR	Sturgeon River
Upland Cell II Interior	ArcelorMittal	Wouri Creek-OS
Wabigone Tailings	Hanna Mining Company Age	Dempsey Creek-TR
West Stephens Settling	Mesabi Nugget	SECOND CREEK
West Two Rivers	US Steel	West Two River
Western Hibtac	Hibbing Taconite Company	Rock Lake Creek
Whiteface Lake	MN Power and Light	Whiteface River
Whiteface Lake Section 2	MN Power and Light	Whiteface River
Whiteface Lake Section 3	MN Power and Light	Whiteface River-TR
Whitewater Reservoir	Minnesota Power	St. Louis River-TR
Whitewater Reservoir Saddle Dam	Minnesota Power	St. Louis River
Whitney Clearwater	Hanna Mining Company Age	CLOSED SYSTEM – OFFSTREAM
Whitney Tailings	Hanna Mining Company Age	CLOSED SYSTEM – OFFSTREAM
Wilson Lake	MNDNR	INDIAN CREEK
Wolf Lake	MNDNR	Wolf Creek
Wynne Lake	MNDNR	Embarrass River

Hazardous Materials Facilities			
Name	Address	City	Zip
148 th Fighter Wing (MN Air	Duluth International Airport	Duluth	55811

Hazardous Materials Facilities			
Name	Address	City	Zip
National Guard)			
AAR-ASD Aircraft Services Duluth	4600 Stebner Rd	Duluth	55803
Airgas USA, LLC	3102 W Michigan St	Duluth	55806
Altec Hiline, LLC	1255 Port Terminal Drive	Duluth	55802
Amerigas Eagle LP #2306	4702 Oneota St	Duluth	55807
ArcelorMittal Minorca Mine Inc.	5950 Old Hwy 53 N	Virginia	55792
Arrowhead 345KV Substation	5816 Morris Thomas Rd	Hermantown	55810
Arrowhead Concrete	5572 Miller Trunk Hwy	Hermantown	55811
Arrowhead HVDC Terminal	5818 Morris Thomas Rd	Proctor	55701
Arrowhead Transit	1001 Arrowhead Dr	Gilbert	55741
AT & T – MN1450	314-316 W 1 st St	Duluth	55701
AT&T – Kinmount (USID95226)	12332 Leslie Road	Orr	55771
AT&T – Maple Grove Relo – (USID106504)	2520 Maple Grove Road Dup 1	Duluth	55810
Azcon Metals	630 Helberg Drive	Duluth	55802
Babbitt Wastewater Facility	100 Poplar Drive	Babbitt	55706
Babbitt Water Plant	39 North Drive	Babbitt	55706
Black Iron Rubber/ Ferrellgas	1701 Scott Road	Embarrass	55732
Blomberg & Sons, Inc.-Bulk Plant	2653 Hwy 70	Babbitt	55706
BNSF Railway Company	421 Rainey Road	Hibbing	55746
Calumet Superior, LLC – Duluth Marine Terminal	1400 Port Terminal	Duluth	55802
Calumet Superior, LLC Duluth Petroleum Products Terminal	5746 CsaH 73, Old Hwy 61	Proctor	55810
Canal Park (ID:217715)	130 West Superior St	Duluth	55802
Cast Corporation	11364 Hwy 37 E	Hibbing	55746
CC VIII Operating, LLC	603 E. Clearwood Dr	Duluth	55811
Central High School	800 E Central Entrance	Duluth	55811
CenturyLink – Biwabik CO	108 3 rd Ave North	Biwabik	55708
CenturyLink – Buhl CO	115 Jones Ave	Buhl	55713
CenturyLink – Calumet ESS	4802 Grand Ave	Duluth	55807
CenturyLink – Chisholm CO	128 W Lake Street	Chisholm	55721
CenturyLink – Cook CO	121 E Vermillion	Cook	55723
CenturyLink – Douglas Digital	1203 Commonwealth Ave	Duluth	55811

Hazardous Materials Facilities			
Name	Address	City	Zip
CenturyLink – Endion Digital	2112 E 1 st St	Duluth	55812
CenturyLink – Eveleth CO	103 Hat Trick Ave	Eveleth	55734
CenturyLink – Hemlock ESS	1202 E 1 st St	Duluth	55812
CenturyLink – Hibbing CO	2105 4 th Ave E	Hibbing	55746
CenturyLink – Hunters Park ESS	2315 Roslyn Ave	Duluth	55812
CenturyLink – Island Lake CDO	6604 Rice Lake Road	Island Lake	55802
CenturyLink – Lakeside CO	4431 Regent	Duluth	55804
CenturyLink – Melrose CO/Admin	322 W 1 st St	Duluth	55802
CenturyLink – Pike Lake CO	5917 Seville Rd	Duluth	55811
CenturyLink – Proctor ESS	216 3 rd Ave	Proctor	55810
CenturyLink – Virginia CO	328 2 nd St S	Virginia	55792
CenturyLink – Kenwood CO	610 W College St	Duluth	55812
Cherry School	3943 Tamminen Road	Iron Junction	55751
Chisholm Sports Arena	501 1 st NW	Chisholm	55719
Chisholm Water Treatment Plant	5357 Mcniven Rd	Chisholm	55719
Chisholm-Hibbing Airport Authority	11038 Hwy 37	Hibbing	55746
Cirrus Design Corp. aka Cirrus Aircraft	4515 Taylor Circle	Duluth	55811
City of Cloquet – Station #2 Pumphouse	8505 Knowlton Creek Boulevard	Duluth	55807
City of Duluth – Water Plant	8130 Congdon Blvd	Duluth	55804
City of Ely Airport	1583 Hwy 1	Ely	55731
City of Ely Tertiary Plant	147 N Chandler	Ely	55731
City of Ely Water Plant	17 Semers Road	Ely	55731
City of Hibbing – South Wastewater Plant	11669 Townline Rd	Hibbing	55746
City of Hibbing Memorial Building	400 East 23 rd St.	Hibbing	55746
City of Orr – Wastewater Treatment Plant	4447 Highway 53	Orr	55771
Coca-Cola Beverages of Duluth LLC	300 S Central Ave	Duluth	55807
Como Lube & Supplies Inc.	1108 Port Terminal Drive	Duluth	55802
Compass Minerals America Inc.	1100 West Railroad Street	Duluth	55802
Curtis Oil	4985 Miller Trunk Hwy	Hermantown	55811

Hazardous Materials Facilities			
Name	Address	City	Zip
DECC	350 Harbor Dr	Duluth	55802
Delta Air Lines, Inc. – Iron Range Customer Engagement Center	601 Iron Drive	Chisholm	55719
Duluth – MN Power Building	30 West Superior Street	Duluth	55802
Duluth #1 TBS	5131 Morris Thomas Rd	Hermantown	55811
Duluth Air Traffic Control Tower	4525 Airport Approach Road	Duluth	55811
Duluth Brass Manufacturing, Inc.	2301 Commonwealth Ave	Duluth	55808
Duluth Energy Systems	1 Lake Place Dr.	Duluth	55802
Duluth French River	5357 North Shore Dr	Duluth	55804
Duluth Mill	100 N Central Ave	Duluth	55807
Duluth Ready Mix	1103 Garfield Ave	Duluth	55810
Dyno Nobel Inc.	5392 Vermilion Trail	Biwabik	55708
East Range Ready Mix, LLC	1 Industrial Park Drive	Biwabik	55708
Edwards Hibbing Bulk Plant	345 W. 41 st St.	Hibbing	55746
Edwards Oil – Cook Bulk Plant	110 East Vermilion	Cook	55723
Edwards Oil – Ely Bulk Plant	400 Sheridan & Hwy 169	Ely	55731
Edwards Oil – Kelly Lake Bulk Plant	302 Rainey Road	Hibbing	55746
Edwards Oil Chisholm- Propane Bulk	5432 Hwy 73	Chisholm	55719
Edwards Oil Virginia Bulk Plant	450 Hoover Road N	Virginia	55792
Edwards Oil, Inc	Chisholm Industrial Park	Chisholm	55719
Ely Lake Seaplane Base	7487 Ely Lake Drive	Eveleth	55734
Ely Public School – ISD No. 696	600 E Harvey St	Ely	55731
Ely-Bloomenson Community Hospital	328 W Conan St	Ely	55731
Enbridge – Gowan Station	40914 Co. Rd 841	Floodwood	55736
Enbridge Floodwood Station	11934 Hwy 2 West	Floodwood	55736
Eveleth-Gilbert Public Schools – ISD #2154	801 Jones Street	Eveleth	55734
Eveleth-Virginia Municipal Airport	4280 Miller Trunk Road	Eveleth	55734
Far West Tool House	2407 Commonwealth Ave	Duluth	55808
Federal Express Corp –	4510 Airport Approach Road	Duluth	55811

Hazardous Materials Facilities			
Name	Address	City	Zip
DLHR			
Federal Prison Camp Duluth	4464 Ralston Drive	Duluth	55814
Federated Co-Ops, Inc	9975 Spruce Street	Meadowlands	55765
Fedex Freight, Inc – DLH	3751 Midway Rd	Hermantown	55810
Ferrellgas/ Aurora Storage	401 E 3 rd Ave N	Aurora	55705
Ferrellgas/Ely Plant	449 W Sheridan St	Ely	55731
Ferrellgas/Hibbing Plant	11625 Hwy 169	Hibbing	55746
Ferrellgas/Lerch Brothers	1600 5 th Ave West	Hibbing	55746
Ferrellgas/Orr Plant	4303 Hwy 53	Orr	55771
Ferrellgas/Rail Site/Mountain Iron	8326 Unity Drive	Mountain Iron	55768
Ferrellgas/Virginia Plant	720 Hoover Rd North	Virginia	55792
Fitgers Brewhouse	600 E Superior St	Duluth	55802
Fleet Wholesale Supply Co LLC	4165 Loberg Avenue	Hermantown	55811
Floodwood School – ISD #698	115 W 4 th Ave	Floodwood	55736
Fortune Bay Casino/Ferrellgas	1430 Bois Forte Road	Tower	55790
Forum Communications Printing	4305 Airpark Blvd	Duluth	55811
Frandsen Bank & Trust	102 E. Sheridan St.	Ely	55731
Frandsen Bank and Trust	415 Main Street	Tower	55790
Gerdau Duluth	800 Garfield Ave	Duluth	55802
Gilbert Water Treatment Plant	4760 Cedar Island Dr.	Eveleth	55741
Grand Ely Lodge	400 N. Pioneer Road	Ely	55731
Hallett Dock Company	303 S 37 th Ave W	Duluth	55807
Harbor City Oil Company	3020 W Superior St	Duluth	55806
Hermantown Community High School	4335 Hawk Circle Drive	Hermantown	55811
Hibbard Renewable Energy Center	4913 Main St	Duluth	55807
Hibbing High School	800 East 21 st St.	Hibbing	56746
Hibbing Public Utilities – Airport Well	3837 South Hughes Road	Hibbing	55746
Hibbing Public Utilities – Beltline Substation	3405 12 th Ave East	Hibbing	55746
Hibbing Public Utilities – Greenhaven Substation	3111 7 th Ave East	Hibbing	55746
Hibbing Public Utilities – Pump Station Substation	11864 Townline Road	Hibbing	55746

Hazardous Materials Facilities			
Name	Address	City	Zip
Hibbing Public Utilities – Scranton Well	501 West 11 th Street	Hibbing	55746
Hibbing Public Utilities – Well 18	10819 Antonelli Road	Hibbing	55746
Hibbing Public Utilities – Y Yard Substation	131 West 41 st Street	Hibbing	55746
Hibbing Public Utilities Plant	1832 6 th Ave East	Hibbing	55746
Hibbing School – Garage	1245 East 23 rd Street	Hibbing	55746
Hibbing School District-Lincoln	1245 East 23 rd Street	Hibbing	55746
Hillside Garden Apts	419 7 th St	Proctor	55810
Hoyt Lakes Water Treatment Plant	Dorchester Drv (Colby Lake)	Hoyt Lakes	55750
Innovative Pine Technology	1102 Port Terminal Drive	Duluth	55802
Involta LLC Duluth 6 th Ave	421 N. 6 th Ave East	Duluth	55805
Involta LLC Duluth Tech Drive	3401 Technology Drive	Duluth	55811
Iracore International, Inc.	3430 13 th Avenue East	Hibbing	55746
Irathane Systems, Inc.	3516 13 th Ave E	Hibbing	55746
Iron Range Resources	4261 Highway 53 S.	Eveleth	55734
Jiffy Lube #1889	115 E Central Entrance	Duluth	55811
Joy Global	4100 P&H Rd	Virginia	55792
Kiewit Infrastructure	1250 Industrial Park Dr.	Eveleth	55734
Kinmount (USID95226)	12332 Leslie Road	Orr	55771
Kivi Brothers Trucking, Inc.	5739 Old Hwy 61	Duluth	55810
Lake Vermilion-Soudan Underground State Park	1379 Stuntz Bay Rd	Soudan	55782
Lakehead Trucking	6035 LaVaque Rd	Duluth	55803
Lakes Gas Co	5406 St. Louis River Rd	Proctor	55810
Lakes Gas Co.	15 River St N	Cook	55723
Lakes Gas Co. #20.1	4535 Highway 53	Orr	55771
Lakes Gas Co. #45	112 N 15 Avenue W	Virginia	55792
Lakes Gas Co. #45.1	401 East 3 rd Avenue N	Aurora	55705
Lakewood Elementary School	5207 N Tischer Rd	Duluth	55804
Laskin Energy Center	5699 Colby Lake Rd	Hoyt Lakes	55750
Legend & Quarry @ Giantsridge	6383 Wynne Creek Dr	Biwabik	55708
Lowe's of Hibbing, MN (2333)	12025 Highway 169 W	Hibbing	55746
Maple Grove Relo –	2520 Maple Grove Road Dup 1	Duluth	55810

Hazardous Materials Facilities			
Name	Address	City	Zip
(USID106504)			
Me Global INC.	200 E Carterett St	Duluth	55808
Merritt Elementary School – ISD #712	5529 Emerald Ave.	Mountain Iron	55768
Mesabi East School District – ISD No. 2711	601 N 1 st St W	Aurora	55705
Miller Hill Mall (ID:24268)	1408 Maple Grove Road	Duluth	55811
Miner's Warehouse	3800 West 2 nd Street	Duluth	55807
Minnesota Twist Drill Acquisition LLC	1 Southwest 7 th Street	Chisholm	55719
Monaco Air Duluth	4535 Airport Approach Road	Duluth	55811
Mpls Oxygen Co Dba Williams Industrial Supply	3801 W Superior St	Duluth	55816
Mt. Iron-Buhl High School – ISD #712	5720 Marble Ave.	Mountain Iron	55768
National Weather Service	5027 Miller Trunk Highway	Duluth	55811
Nett Lake School – ISD #707	13090 Westley Drv	Orr	55772
Nettleton Elementary School	108 E 6 th St	Duluth	55805
North East Range	South Drive	Babbitt	55706
North Shore Community School	5926 Ryan Rd	Duluth	55804
North Woods School	10248 East Olson Road	Cook	55723
Northeast Regional Corrections Center	6102 Abrahamsen Road	Saginaw	55779
Northern Foundry LLC	555 W 25 th St	Hibbing	55746
Northland Constructors	4843 Rice Lake Rd.	Duluth	55803
Northwoods Organics	8402 Cty 5	Meadowlands	55765
NuCO ₂ /DUL Depot	5511 Waseca Industrial Rd	Duluth	55807
Old Castle Materials Cement Holdings, Inc. dba CRH US Inc.	1100 Port Terminal Dr	Duluth	55802
P&H Substation	4100 P&H Rd	Virginia	55792
PetroChoice, LLC, formerly Anderson Chisholm	700 West Drive	Chisholm	55719
Praxair Distribution, Inc.	3800 W Superior St	Duluth	55806
Procotor	5406 St. Louis River Rd	Duluth	55810
Proctor High School	1319 th Ave	Proctor	55810
Proctor Terminal Company	5406 St. Louis River Rd	Duluth	55810
rainy lake oil, Inc	5246 Cusson Loop Rd	Orr	55771
Range LP Gas (Range Coops	102 S Hoover Rd	Virginia	55792

Hazardous Materials Facilities			
Name	Address	City	Zip
Inc.)			
Range LP Gas (Range Coops, Inc.)	1613 East Camp Street	Ely	55731
Rice Lake Road Bulk Plant	5115 Rice Lake Road	Duluth	55803
Rowe Energy Control Center	3215 Person St	Duluth	55811
Saginaw Bulk Plant	4594	Saginaw	55779
Saginaw Propane Plant	6324 Hwy 194	Saginaw	55779
Sam's Club #6320	4743 Maple Grove Rd	Hermantown	55811
Sky Harbor Airport	5000 Minnesota Ave	Duluth	55802
SkyWest Airlines dba Delta Connection	11038 Highway 37	Hibbing	55746
South Ridge School	8162 Swan Lake Road	Culver	55779
St. Louis County – Brookston Garage	4831 Hwy 31	Brookston	55711
St. Louis County – Buyck Garage	5511 Crane Lake Road	Orr	55771
St. Louis County – Cook Garage	9447 Ashawa Rd	Cook	55723
St. Louis County – Embarrass Garage	4892 Hwy 21	Embarrass	55732
St. Louis County – Floodwood Garage	11817 Floodwood Rd	Floodwood	55736
St. Louis County – Hibbing Garage	1425 E 23 rd St	Hibbing	55746
St. Louis County – Jean Duluth Garage	5595 Jean Duluth Road	Duluth	55803
St. Louis County – Linden Grove Garage	11193 Hwy 1	Cook	55723
St. Louis County – Meadowlands Garage	9967 Hwy 133	Meadowlands	55765
St. Louis County – Motor Pool	401 W 2 nd St	Duluth	55802
St. Louis County – Pike Lake Garage	4787 Midway Rd	Duluth	55811
St. Louis County – Tower Garage	2 Marina Drive	Tower	55790
St. Louis County – Virginia Garage/Motor Pool	7823 Hwy 135	Virginia	55792
St. Luke's Hospital	915 E 1 st St	Duluth	55805
St. Mary's Medical Center	407 E 3 rd St	Duluth	55805
Starkman Oil Energy Inc	453 W Sheridan Street	Ely	55731

Hazardous Materials Facilities			
Name	Address	City	Zip
Sunbelt Rentals PC 359	5440 Miller Trunk Hwy	Hermantown	55811
Sunny Hill Distributors, Inc.	4518 Burton Road	Hibbing	55746
Tate & Lyle Ingredients Americas, LLC.	110 Spring Street	Duluth	55808
The C. Reiss Coal Co.	200 S. 50 th Ave W	Duluth	55807
The Home Depot Store #2817	1101 Mall Drive	Duluth	55811
ThompsonGas LLC dba Como Oil and Propane	Northshore Mining	Babbitt	55706
ThompsonGas, LLC DBA Como Oil & Propane	30 th Ave W & Superior St	Duluth	55806
Timbuktu Marina	7401 Oak Narrows Rd	Cook	55723
Tower School	415 North 2 nd St	Tower	55790
Tower-Breitung Water System	Junction Rd Fire No. 5418	Soudan	55782
Trembath Machine & Welding Inc	2110 E Sheridan St	Ely	55731
U of MN – Ash River NovA Laboratory	10709 Bright Star Road	Orr	55771
U of MN – Duluth Campus	1049 University Drv	Duluth	55812
U.S. Steel #1 TBS	Mine Main Road (Minntac Mine)	Mountain Iron	55768
Vermilion Community College	1900 East Camp Street	Ely	55731
Vermilion Houseboats	9482 Angus Road	Tower	55790
Viking Explosives LLC – Hibbing	4469 Hwy 5	Hibbing	55746
Virginia Public School – Technical Building	411 5 th Ave S	Virginia	55792
Virginia Public Utilities	618 2 nd Street South	Virginia	55792
Virginia Wastewater Treatment	1204 Southern Drive	Virginia	55792
Vonco V, LLC	1100 West Gary Street	Duluth	55808
Waste Management – Duluth	3101 W Superior St	Duluth	55806
Water Treatment Plant	11866 Townline Road	Hibbing	55746
WCL – Duluth Ore Docks	212 South 37 th Avenue West	Duluth	55807
WCL – Keenan Yard	3801 Missabe Drive	Clinton	55751
WCL – Proctor Yard	329 2 nd Street	Proctor	55810
Western Lake Superior Sanitary District	2626 Courtland St	Duluth	55806
Xcel Energy – Forbes Substation	3401 Fraser Rd	Eveleth	55751

Hazardous Materials Facilities			
Name	Address	City	Zip
YMCA Camp du Nord	3606 North Arm Road	Ely	55731
YMCA Camp Warren	3726 Miller Trunk Rd	Eveleth	55734

Major Employers			
Name	Address	City	Zip
Air National Guard	4680 Viper St	Duluth	55811
Allete	30 W Superior St	Duluth	55802
Cirrus Aircraft	4515 Taylor Cir	Duluth	55811
City of Duluth	411 W 1 st St	Duluth	55802
Duluth Public Schools	215 N 1 st Ave E	Duluth	55802
Essentia Health	407 E 3 rd St	Duluth	55805
Fairview University Medical Center	3605 Mayfair Ave	Hibbing	55746
Federal Government	515 W 1 st St	Duluth	55802
Hibbing Taconite	4950 Hibbing Taconite Access Rd	Hibbing	55746
KeeTac (US Steel)	1 Mine Rd	Keewatin	55769
Miner's Inc.	5065 Miller Trunk Hwy	Hermantown	55811
MinnTac (US Steel)	8771 Park Ridge Dr	Mountain Iron	55768
St. Louis County	100 N 5 th Ave W	Duluth	55802
St. Luke's Hospital	915 E 1 st St	Duluth	55805
UnitedHealthCare	4316 Rice Lake Rd	Duluth	55811
University of Minnesota, Duluth	1049 University Dr	Duluth	55812
ArcelorMittal Minorca plant			
Hibtac (Hibbing Taconite)	4950 Hibbing Taconite Access Rd	Hibbing	55746
Keetac (Keewatin Taconite, US Steel)	1 Mine Rd	Keewatin	55769
Mesabi Nugget plant	6500 Hwy 135 N	Aurora	55705
MinnTac (US Steel)	8771 Park Ridge Dr	Mountain Iron	55768
Northshore Mining (mine)	1702 Scott Rd	Babbitt	55706
PolyMet plant	6500 Co Rd 666	Hoyt Lakes	55750
United Taconite mine			
United Taconite plant	8470 Town Line Rd	Iron	55751

Government Buildings

Name	Address	City	Zip
AEOA Government Offices		Virginia	55804
Air National Guard		Duluth	55803
Alborn Town Hall	6315 Hwy 7	Alborn	55738
Alden Town Hall	7404 Laine Rd	Two Harbors	
Arrowhead Juvenile Detention Center	1918 N Arlington Ave	Duluth	55781
Arrowhead Library	5528 Emerald Av	Mt. Iron	55781
Arrowhead Town Hall	9798 Hwy 2	Brookston	55781
Ash River Visitor Center			
Ault Community Center	1839 Brimson Rd	Brimson	55736
Aurora City Hall	16 W 2 nd Ave N	Aurora	55736
Aurora Community & Senior Center	15 West 1 st Av N	Aurora	55746
Aurora PW Garage			55746
Babbitt City Garage	35 North Dr Babbitt	Babbitt	55746
Babbitt City Hall	71 South Dr	Babbitt	55746
Balkan PW Garage			55732
Balkan Town Hall	5524 Hwy 73	Chisholm	55732
Bassett Town Hall	1434 Town Line Rd	Brimson	55731
Bear River Community Center	12512 Hwy 22		55706
Beatty Town Hall	8835 Beatty Rd	Cook	55731
Biwabik City Hall	321 Main St	Biwabik	
Biwabik Community Center		Biwabik	55705
Biwabik Emergency Operations Center	105 North 3 rd Avenue	Biwabik	55750
Biwabik PW Garage			55750
Biwabik Town Hall	6555 Oak Dr	Gilbert	55750
Bois Forte Police Department	12907 Palmquist Rd	Orr	55811
Breitung Town Hall	31 1 st Ave	Soudan	55803
Brookston City Hall		Brookston	
Buhl City Hall	300 Jones Ave	Buhl	
Buhl Community Center	Mine St	Buhl	
Buhl Library	400 Jones Ave	Buhl	55765
Buhl PW Garage		Buhl	
Canosia Town Hall	4896 Midway Rd	Duluth	
Central Range PW Garage		Hibbing	55711
Cherry Town Hall	9831 Hwy 37	Iron	55736
Chisholm City Hall	316 W Lake St	Chisholm	55750
Chisholm Library	300 W Lake St	Chisholm	
Chisholm National Guard	900 W Lake St	Chisholm	55746
Chisholm Police Station	301 Lake St	Chisholm	

Government Buildings			
Name	Address	City	Zip
Chisholm Post Office	143 rd Ave NW	Chisholm	55734
Chisholm PW Garage		Chisholm	55734
Chisholm Recreation Center	600 1 st St NE	Chisholm	55758
Clinton Town Hall	8907 Hwy 37	Iron	55758
Colvin Town Hall	2579 Vermilion Trail	Palo	55758
Cook City Hall	127 River St S	Cook	55713
Cook Library	103 River St S	Cook	55713
Cotton Community Center	9087 Highway 53	Cotton	55719
Cotton Town Hall	9087 Highway 53	Cotton	55719
Culver Town Hall	5571 Hwy 31	Culver	55719
DNR Forestry			55768
Duluth City Hall	411 W 1 st St	Duluth	
Duluth Public Library	520 W Superior St	Duluth	55602
Duluth Town Hall	6092 Homestead Rd	Duluth	55602
Eagles Nest Town Hall	1552 Bear Head State Park Rd	Ely	
East Brevator Town Hall	7246 Morris Thomas Rd	Cloquet	55741
Ellsbury Town Hall	1767 Melrude Rd	Melrude	55741
Ely Chamber of Commerce	1600 E Sheridan St	Ely	55741
Ely City Hall	209 E Chapman St	Ely	55790
Ely Post Office	34 S 2 nd Ave E	Ely	55790
Ely PW Garage	50 White St W	Ely	55790
Embarrass PW Garage	7503 Co Rd 364	Embarrass	55731
Embarrass Timber Hall	4855 Hwy 21	Embarrass	55731
Embarrass Town Hall	7503 Co Rd 364	Embarrass	55731
Eveleth City Hall	413 Pierce St	Eveleth	55731
Eveleth Hippodrome	501 Douglas Ave	Eveleth	55731
Eveleth Manual Training	Jackson St	Eveleth	55731
Eveleth Public Library	614 Pierce St	Eveleth	55731
Eveleth Senior Center	206 McKinley Rd	Eveleth	55810
Fairbanks Town Hall	3345 Brimson Toimi Rd	Brimson	55811
Fayal Town Hall	4375 Shady Lane	Eveleth	55811
Federal Prison Camp	4464 Ralston Dr	Hermantown	
Field Town Hall			
Fine Lakes Town Hall	3726 Prairie Lake Rd	Wright	
Floodwood City Hall	206 E 8 th Ave	Floodwood	
Floodwood Senior Center		Floodwood	

Government Buildings			
Name	Address	City	Zip
Fredenberg Town Hall	5104 Fish Lake Rd	Duluth	
French Post Office	7481 McCarthy Beach Rd	Side Lake	
French Town Hall	7548 Hwy 5	Side Lake	
Gilbert City Hall	16 Broadway St S	Gilbert	
Gilbert Library	17 Broadway St N	Gilbert	
Gilbert Municipal Arena		Gilbert	
Gilbert PW Garage		Gilbert	55749
Gilbert Youth Center	19 Broadway St S	Gilbert	55749
Gnesen Community Center	6356 Howard Gnesen Rd	Duluth	55749
Gnesen Town Hall	4011 Pioneer Rd W	Duluth	55749
Grand Lake Town Hall	Hwy 53		55749
Great Scott PW Garage		Kinney	55719
Great Scott Town Hall	Main St	Kinney	55771
Greenwood Town Hall	3000 Hwy 77	Tower	55771
Halden Town Hall	5523 Savanna Rd	Floodwood	55771
Hermantown Arena	4309 Ugstad Rd	Hermantown	
Hermantown City Hall	5105 Maple Grove Rd	Hermantown	55713
Hermantown Community Park & Historical Center	5255 Maple Grove Rd	Hermantown	55713
Hibbing City Hall	401 E 21 st St	Hibbing	55811
Hibbing Emergency Operations Center	2320 Brooklyn Drive	Hibbing	55719
Hibbing Memorial Building		Hibbing	55723
Hibbing Public Library	2020 5 Ave N	Hibbing	55731
Hoyt Lakes Arena		Hoyt Lakes	55790
Hoyt Lakes City Hall	206 Kennedy Memorial Dr	Hoyt Lakes	55792
Hoyt Lakes Community Center		Hoyt Lakes	55616
Hoyt Lakes Police Station	123 1/2 Kennedy Memorial Dr	Hoyt Lakes	55779
Hoyt Lakes PW Garage		Hoyt Lakes	
Industrial Community Center	4707 Independence Rd	Saginaw	55803
Industrial Town Hall	7519 Albert Rd	Saginaw	55771
International Wolf Center	1396 Hwy 169	Ely	55723
Kabetogama Community Building	9707 Gamma Rd	Kabetogama	55768
Kabetogama Visitor Center			
Kawishiwi Ranger Station	1393 Hwy 169	Ely	55761
Kelsey Town Hall	Hwy 29		55802
Kinney City Hall	Main St	Kinney	

Government Buildings			
Name	Address	City	Zip
Kinney Library	Main St	Kinney	55811
Kinney Maintenance Garage		Kinney	55810
Kinney Sports House		Kinney	55810
Kugler Town Hall	9072 Hwy 135		55720
Lake Country Power Garage		Virginia	55720
Lakewood Town Hall	3110 Strand Rd	Duluth	55736
Laurentian Senior Center	Werner Rd	Wuori	55702
Lavell Town Hall	2189 Hwy 5	Hibbing	
Leonidas Community Center		Eveleth	55803
Linden Grove Town Hall	11105 Hwy 1	Cook	55803
McDavitt Town Hall	9042 Zim Rd	Zim	55804
McDavitt Town PW Garage		Zim	55711
McKinley Town Hall	5454 Grand Ave	McKinley	55717
Meadowlands Community Center		Meadowlands	
Meadowlands PW Garage		Meadowlands	
Midway Town Hall	3230 Midway Rd	Proctor	55746
Miner's Memorial Building		Virginia	55766
MN Department of Revenue	760 E Miners Dr	Ely	55705
MN DNR Drill Core Library		Hibbing	55746
MN DNR Forestry Building	7711 Hwy 5	Side Lake	55751
MN DNR Forestry Building		Hibbing	55771
MN DNR Forestry Building		Floodwood	55734
MN DNR Forestry/Wildlife			55602
MN State Patrol – District 2700	1131 Mesaba Ave	Duluth	55750
MN State Patrol – District 3100	101 N Hoover Rd	Virginia	55705
MNDOT Cold Weather Testing			55741
MNDOT District Offices		Virginia	55708
MNDOT Truck Station	Hwy 169	Ely	55741
MNDOT Truck Station			55734
MNDOT Truck Station		Floodwood	55758
Morgan Park/Gary/FDL Police Station	1302 88 th Ave W	Duluth	55758
Morse PW Garage	1777 Lookout Ridge	Ely	55719
Morse Town Hall	Hwy 21	Ely	55792
Mountain Iron City Hall	8586 Enterprise Dr S	Mountain Iron	55706
National Guard Armory		Hibbing	
New Independence Town Hall			55792

Government Buildings			
Name	Address	City	Zip
Normanna Town Hall	6472 French River Rd	Duluth	55703
North Star Town Hall			55790
Northeast Regional Corrections Center	6102 Abrahamson Rd	Saginaw	
Northland Office Building	307 1 st St S	Virginia	55731
Northland Town Hall	7271 Highway 53	Canyon	55731
Orr City Garage		Orr	55782
Orr City Hall		Orr	55723
Orr Information Center		Orr	55802
Orr Town Hall (Leiding)		Orr	55811
Pike Town Hall	6862 Hwy 68		55811
Prairie Lake Town Hall	3693 Jones Rd		
Proctor City Hall	100 Pionk St	Proctor	55802
Proctor PW Garages		Proctor	55792
Public Utilities Garage		Virginia	55792
Public Works Garage		Virginia	55807
Public Works Garage / Wa			55802
PW Garage			55738
PW Garage	221 Mine St	Buhl	55705
PW Storage Garage		Hibbing	
Rice Lake City Hall	4107 W Beyer Rd	Duluth	55741
Rice Lake PW Garage			55734
Richard H. Hansen Public Works & Transportation	4787 Midway Rd	Duluth	55734
Saint Louis County Emergency Operations Center	5735 Old Miller Trunk Highway	Duluth	55734
Saint Louis County Jail	4334 Haines Rd	Duluth	55749
Sandy Town Hall	7580 Hill Rd	Virginia	55749
Silica Community Center	1659 Hwy 73	Hibbing	55758
Solway Town Hall	4029 Munger Shaw Rd	Cloquet	55713
St Louis County Courthouse – Duluth	100 N 5 th Ave W	Duluth	55719
St Louis County Courthouse – Hibbing		Hibbing	55719
St Louis County Courthouse – Virginia	300 S 5 th Ave W	Virginia	
St Louis County Government Services Center	320 W 2 nd St	Duluth	55746
St Louis County Land Dept	5713 Old Miller Trunk Hwy	Duluth	55746
St Louis County Land Dept			55746
St Louis County Land Dept		Virginia	55746

Government Buildings			
Name	Address	City	Zip
St Louis County Public Safety & Communication	2030 N Arlington Ave	Duluth	55736
St Louis County PW Garage	Hwy 1		55736
St Louis County PW Garage	11817 Floodwood Rd	Floodwood	55736
St Louis County PW Garage	4892 Hwy 21	Embarrass	55798
St Louis County PW Garage			
St Louis County PW Garage			55711
St Louis County PW Garage	4631 Highway 31	Brookston	55779
St Louis County PW Garage			55779
St Louis County PW Garage			55765
St Louis County PW Garage			55731
St Louis County PW Garage	7628 Arkola Road	Cotton	55731
St Louis County PW Garage	Hwy 44	Brimson	55731
St Louis County PW Garage	7823 Hwy 135	Virginia	55602
St Louis County PW Garage	Hwy 169	Ely	55792
St Louis County PW Garage			55732
St. Louis County Cook building	2503 Rice Lake Rd	Duluth	55732
Sturgeon Town Hall	9075 Hwy 73	Angora	55731
Tower City Hall	602 Main St	Tower	55790
Tower Civic Center		Tower	
Tower PW Garages		Tower	56669
Tower Seaplane Base		Tower	
US Coast Guard	1201 Minnesota Ave	Duluth	55811
US Customs	1395 Hwy 169	Ely	55779
US Federal Building & Courthouse	515 W 1 st St	Duluth	55811
USFS Lacroix District			55811
USFS Sand Lake Guard Station			55811
Van Buren Town Hall	6557 Hwy 73	Floodwood	55792
Vermilion Lake Town Hall	6703 Hwy 26	Tower	55771
Virginia City Hall	327 1 st St S	Virginia	55746
Waasa Town Hall	Hwy 21	Waasa	55811
West Duluth Police Station	5830 Grand Ave	Duluth	55708
White PW Garage			55731
White Town Hall	3816 Hwy 100	Aurora	55811
Willow Valley Town Hall			55811
Wuori Town Hall	7449 Werner Rd	Virginia	55802

Cultural Resources	
Name	Location
<i>None provided</i>	

Appendix C

St. Louis County Hazard Events

The National Centers for Environmental Information (NCEI) storm events database was queried for all notable events since 1950. However, some categories of events do not have records prior to 1996. Data was available through July of 2019.

Table C - 1. All tornadoes recorded by NCEI, 1950-July 2019

Location or County	Date	Magnitude	Deaths	Injuries	Property Damage
Casco	6/19/2016	EF1	0	0	<i>unknown</i>
Central Lakes	8/8/2015	EF1	0	0	<i>unknown</i>
Duluth Sky Harbor Apt	8/9/2012	EF0	0	0	<i>unknown</i>
Side Lake	7/14/2003	F0	0	0	<i>unknown</i>
Toivola	7/27/1999	F0	0	0	<i>unknown</i>
Crane Lake	8/22/1995	F0	0	0	<i>unknown</i>
Central Lakes	7/12/1995	F0	0	0	\$2,000
St. Louis County	9/16/1992	F0	0	0	\$25,000
St. Louis County	9/16/1992	F0	0	0	<i>unknown</i>
St. Louis County	6/21/1986	F1	0	0	\$2,500
St. Louis County	7/20/1985	F0	0	0	\$2,500
St. Louis County	6/30/1983	F0	0	0	\$30
St. Louis County	6/12/1980	F1	0	0	\$25,000
St. Louis County	8/14/1978	F1	0	2	\$250,000
St. Louis County	4/14/1976	F1	0	0	\$25,000
St. Louis County	8/25/1974	F1	0	0	<i>unknown</i>
St. Louis County	8/25/1974	F1	0	0	\$250,000
St. Louis County	8/9/1971	F1	0	1	\$2,500
St. Louis County	6/30/1971	F0	0	0	<i>unknown</i>
St. Louis County	6/19/1971	F1	0	0	\$25,000
St. Louis County	9/20/1970	F0	0	0	\$2,500
St. Louis County	8/6/1969	F3	0	0	\$2,500
St. Louis County	8/6/1969	F3	2	3	\$250,000
St. Louis County	8/6/1969	F2	0	0	\$25,000
St. Louis County	8/6/1969	F3	0	0	\$250,000
St. Louis County	8/6/1969	F2	0	0	\$25,000
St. Louis County	8/6/1969	F3	0	20	\$2,500,000
St. Louis County	8/6/1969	F3	0	0	\$250,000
St. Louis County	8/6/1969	F2	0	0	\$25,000
St. Louis County	8/6/1969	F3	0	9	\$2,500,000
St. Louis County	9/6/1959	F2	0	0	\$25,000
St. Louis County	7/1/1958	F1	1	2	\$30
St. Louis County	5/26/1958	F0	0	0	<i>unknown</i>
St. Louis County	5/26/1958	F1	0	0	<i>unknown</i>
St. Louis County	5/26/1958	F0	0	0	<i>unknown</i>

Location or County	Date	Magnitude	Deaths	Injuries	Property Damage
St. Louis County	6/20/1953	F0	0	0	unknown
Highest Value Property Damage					\$2,500,000

Table C - 2. All severe hail storm events recorded by NCEI, 1950-July 2019

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Polo	7/26/2019	1	0	0	unknown
Eveleth Municipal Airport	7/26/2019	1.25	0	0	unknown
Angora	7/26/2019	1.25	0	0	unknown
Brookston	6/4/2019	0.75	0	0	unknown
Wahlsten	9/15/2018	0.75	0	0	unknown
Island Lake	9/15/2018	0.88	0	0	unknown
Silica	9/14/2018	1	0	0	unknown
Vermillion	9/12/2018	1	0	0	unknown
Celina	9/12/2018	1.25	0	0	unknown
Duluth Intl Arp	8/31/2018	1	0	0	unknown
Adolph	8/31/2018	1	0	0	unknown
Buyck	7/4/2018	0.88	0	0	unknown
Meadow Brook	7/2/2018	0.75	0	0	unknown
Side Lake	7/2/2018	1.75	0	0	unknown
Embarrass	6/29/2018	0.88	0	0	unknown
North Mitchell	6/29/2018	0.75	0	0	unknown
Mountain Iron	6/29/2018	1	0	0	unknown
Haley	6/27/2018	1	0	0	unknown
Twig	5/29/2018	0.75	0	0	unknown
Central Lakes	9/14/2017	1.5	0	0	unknown
Central Lakes	9/14/2017	0.75	0	0	unknown
Makinen	9/14/2017	1	0	0	unknown
Makinen	9/14/2017	1	0	0	unknown
Biwabik	9/14/2017	1	0	0	unknown
Embarrass	9/14/2017	0.75	0	0	unknown
Britt	9/14/2017	1.75	0	0	unknown
Nett Lake	9/14/2017	1.75	0	0	unknown
Nett Lake	9/14/2017	1.75	0	0	unknown
Crane Lake	9/14/2017	2	0	0	unknown
Kelly Lake	9/2/2017	0.75	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Polo	8/18/2017	0.75	0	0	unknown
Virginia	8/8/2017	0.75	0	0	unknown
Gilbert	8/8/2017	0.75	0	0	unknown
Fraser	7/17/2017	0.75	0	0	unknown
Parkville	7/17/2017	1.25	0	0	unknown
Parkville	7/17/2017	2.5	0	0	unknown
Biwabik	7/17/2017	1	0	0	unknown
Biwabik	7/17/2017	1.75	0	0	unknown
Ely Arpt	7/6/2017	0.75	0	0	unknown
Prosit	5/26/2017	0.75	0	0	unknown
Kelly Lake	5/26/2017	0.75	0	0	unknown
Rainy Jct	9/5/2016	1	0	0	unknown
New Duluth	6/19/2016	0.75	0	0	unknown
Meadowlands	6/19/2016	1.25	0	0	unknown
Meadowlands	6/10/2016	1	0	0	unknown
Smithville	6/5/2016	0.75	0	0	unknown
Smithville	6/5/2016	1.5	0	0	unknown
Duluth Intl Arpt	6/5/2016	0.75	0	0	unknown
Buhl	3/8/2016	1.5	0	0	unknown
Markham	3/8/2016	0.75	0	0	unknown
Robinson	8/29/2015	0.88	0	0	unknown
Burnside	8/28/2015	0.75	0	0	unknown
Orr	8/28/2015	0.75	0	0	unknown
Ely	8/8/2015	1	0	0	unknown
Makinen	8/8/2015	1	0	0	unknown
Makinen	8/8/2015	1.5	0	0	unknown
Gheen	8/2/2015	0.75	0	0	unknown
New Duluth	6/29/2015	0.88	0	0	unknown
Duluth Hgts	6/29/2015	1	0	0	unknown
Bayview	6/29/2015	0.75	0	0	unknown
Kabetogama	6/29/2015	1	0	0	unknown
Duluth	6/22/2015	0.88	0	0	unknown
Duluth Intl Arpt	6/22/2015	0.88	0	0	unknown
Four Corners	6/22/2015	0.88	0	0	unknown
Buyck	7/5/2014	0.88	0	0	unknown
Eldes Corner	6/29/2014	0.75	0	0	unknown
Proctor	6/29/2014	0.75	0	0	unknown
Duluth Intl Arp	6/29/2014	0.88	0	0	unknown
Hunters Park	6/29/2014	0.75	0	0	unknown
Pequaywan	5/7/2014	0.75	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Lake					
Pequaywan Lake	5/7/2014	0.75	0	0	unknown
Arnold	5/7/2014	1	0	0	unknown
Arnold	5/7/2014	1.5	0	0	unknown
Duluth Hgts	5/7/2014	1	0	0	unknown
New Duluth	5/7/2014	0.75	0	0	unknown
Twig	5/7/2014	1	0	0	unknown
Floodwood	5/7/2014	0.75	0	0	unknown
Duluth Hgts	8/29/2013	0.75	0	0	unknown
Missabe Jct	5/31/2013	0.75	0	0	unknown
Saginaw	5/31/2013	0.75	0	0	unknown
Ely	9/4/2012	0.75	0	0	unknown
Cook	9/4/2012	1	0	0	unknown
Vermillion	9/4/2012	1	0	0	unknown
Tower Muni Arpt	9/4/2012	0.75	0	0	unknown
Tower Muni Arpt	9/4/2012	0.75	0	0	unknown
Orr	9/4/2012	0.75	0	0	unknown
Ely Muni Arpt	7/29/2012	1	0	0	unknown
Burnside	7/29/2012	0.88	0	0	unknown
Bear River	7/22/2012	1.75	0	0	unknown
Elcor	7/2/2012	1	0	0	unknown
Elcor	7/2/2012	1	0	0	unknown
Elcor	7/2/2012	1.75	0	0	unknown
Virginia	7/2/2012	1	0	0	unknown
Mountain Iron	7/2/2012	1.25	0	0	unknown
Elcor	7/2/2012	1.5	0	0	unknown
Hunters Park	6/19/2012	0.75	0	0	unknown
Ely Arpt	6/14/2012	0.75	0	0	unknown
Proctor	5/28/2012	0.75	0	0	unknown
Duluth	5/28/2012	1	0	0	unknown
New Duluth	5/28/2012	1.75	0	0	unknown
Eldes Corner	5/28/2012	1	0	0	unknown
Duluth Hgts	5/28/2012	1.5	0	0	unknown
Pequaywan Lake	5/3/2012	0.75	0	0	unknown
Hermantown	10/12/2011	0.88	0	0	unknown
Missabe Jct	9/12/2011	1	0	0	unknown
Hermantown	9/12/2011	0.88	0	0	unknown
Hermantown	9/12/2011	0.88	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Hermantown	9/12/2011	0.88	0	0	unknown
Proctor	8/8/2011	1	0	0	unknown
Duluth Hgts	8/8/2011	0.75	0	0	unknown
Eldes Corner	8/8/2011	1.5	0	0	unknown
Eldes Corner	8/8/2011	1	0	0	unknown
Eldes Corner	8/8/2011	1	0	0	unknown
Eveleth	8/8/2011	0.75	0	0	unknown
Virginia	7/30/2011	0.75	0	0	unknown
Duluth Intl Arpt	6/7/2011	1	0	0	unknown
New Duluth	5/28/2011	0.75	0	0	unknown
Polo	5/10/2011	0.75	0	0	unknown
Polo	5/10/2011	0.75	0	0	unknown
Hibbing	5/10/2011	0.75	0	0	unknown
Hopper	5/10/2011	0.88	0	0	unknown
Eveleth	5/10/2011	0.79	0	0	unknown
Gheen	4/10/2011	0.75	0	0	unknown
Proctor	7/27/2010	1.5	0	0	unknown
Adolph	6/24/2010	1	0	0	unknown
Hermantown	6/24/2010	0.75	0	0	unknown
Saginaw	6/24/2010	1	0	0	unknown
Cook Muni Arpt	6/24/2010	1.75	0	0	unknown
Silica	6/24/2010	1	0	0	unknown
Meadow Brook	6/17/2010	0.88	0	0	unknown
Soudan	5/24/2010	1.5	0	0	unknown
Cotton	7/22/2009	0.75	0	0	unknown
Kirk	5/29/2009	0.75	0	0	unknown
Buhl	5/29/2009	1	0	0	unknown
Duluth	5/5/2009	0.75	0	0	unknown
Duluth	5/5/2009	0.75	0	0	unknown
Duluth	5/5/2009	0.75	0	0	unknown
Duluth Hgts	5/5/2009	0.88	0	0	unknown
Proctor	5/5/2009	0.88	0	0	unknown
Brookston	4/22/2009	0.75	0	0	unknown
Cotton	9/26/2008	0.88	0	0	unknown
Silica	9/26/2008	1.5	0	0	unknown
Kabetogama	9/26/2008	0.88	0	0	unknown
Kabetogama	9/26/2008	0.88	0	0	unknown
Kabetogama	9/26/2008	0.88	0	0	unknown
Kabetogama	9/26/2008	1	0	0	unknown
Duluth	8/28/2008	1.25	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Duluth	8/28/2008	1	0	0	unknown
Duluth	8/28/2008	1	0	0	unknown
Duluth	8/28/2008	1	0	0	unknown
Duluth	8/28/2008	1	0	0	unknown
Duluth	8/28/2008	0.75	0	0	unknown
Hermantown	8/28/2008	0.75	0	0	unknown
Saginaw	8/28/2008	1	0	0	unknown
Floodwood	8/28/2008	0.88	0	0	unknown
Meadowlands	7/14/2008	0.88	0	0	unknown
Buyck	7/11/2008	1.25	0	0	unknown
Kabetogama	7/11/2008	0.75	0	0	unknown
Babbitt	7/9/2008	1	0	0	unknown
Buyck	6/20/2008	1	0	0	unknown
Zim	9/21/2007	0.75	0	0	unknown
Floodwood	8/27/2007	1.75	0	0	unknown
Orr	6/7/2007	0.75	0	0	unknown
Hibbing	6/7/2007	1.75	0	0	unknown
Duluth	5/14/2007	1.5	0	0	unknown
Duluth	5/14/2007	1.75	0	0	unknown
Duluth	5/14/2007	1	0	0	unknown
Duluth Hgts	5/14/2007	2	0	0	unknown
Duluth Hgts	5/14/2007	2	0	0	unknown
Duluth	5/14/2007	1	0	0	unknown
Duluth	5/14/2007	1.75	0	0	unknown
Pike Lake	5/14/2007	2.5	0	0	unknown
Twig	5/14/2007	3	0	0	unknown
Duluth	5/14/2007	1.5	0	0	unknown
Twig	5/14/2007	2	0	0	unknown
Twig	5/14/2007	2	0	0	unknown
Alborn	5/14/2007	1.75	0	0	unknown
Brimson	9/6/2006	0.75	0	0	unknown
Culver	7/31/2006	1	0	0	unknown
West Duluth	7/28/2006	1.5	0	0	unknown
Hermantown	7/28/2006	0.75	0	0	unknown
Duluth	7/28/2006	0.75	0	0	unknown
Duluth	7/28/2006	1	0	0	unknown
Duluth	7/28/2006	1	0	0	unknown
Duluth	7/28/2006	1.5	0	0	unknown
Adolph	7/28/2006	0.75	0	0	unknown
Duluth	7/28/2006	0.88	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Babbitt	7/16/2006	4	0	0	\$50,000
Embarrass	7/16/2006	1	0	0	unknown
Cook	7/1/2006	0.75	0	0	unknown
Saginaw	5/29/2006	0.88	0	0	unknown
Crane Lake	5/28/2006	0.75	0	0	unknown
Orr	5/28/2006	1.75	0	0	unknown
Gilbert	7/17/2005	1	0	0	unknown
Cook	5/5/2005	1	0	0	unknown
Hoyt Lakes	5/5/2005	1.75	0	0	unknown
Hermantown	5/9/2004	1	0	0	unknown
Duluth	5/9/2004	0.75	0	0	unknown
Duluth	5/9/2004	0.88	0	0	unknown
Duluth	5/9/2004	1	0	0	unknown
Duluth	5/9/2004	1	0	0	unknown
Duluth	5/9/2004	0.75	0	0	unknown
Duluth	4/18/2004	1	0	0	unknown
Duluth	4/18/2004	0.75	0	0	unknown
Brookston	4/18/2004	0.75	0	0	unknown
Duluth	4/18/2004	1	0	0	unknown
Duluth	4/18/2004	1.25	0	0	unknown
Embarrass	4/18/2004	1.75	0	0	unknown
Gilbert	4/18/2004	1	0	0	unknown
Duluth	4/18/2004	2	0	0	unknown
Alborn	4/18/2004	0.88	0	0	unknown
Floodwood	4/18/2004	0.88	0	0	unknown
Zim	3/25/2004	0.75	0	0	unknown
Duluth	8/20/2003	0.75	0	0	unknown
Britt	8/20/2003	1	0	0	unknown
Central Lakes	7/19/2003	0.75	0	0	unknown
Hibbing	7/19/2003	1	0	0	unknown
Mountain Iron	7/19/2003	0.75	0	0	unknown
Chisholm	7/19/2003	1	0	0	unknown
Virginia	7/19/2003	0.75	0	0	unknown
Chisholm	7/19/2003	1.75	0	0	unknown
Cook	7/19/2003	1	0	0	unknown
Gheen	7/19/2003	0.75	0	0	unknown
Duluth	7/6/2003	0.75	0	0	unknown
Duluth	7/2/2003	0.75	0	0	unknown
Hibbing	4/14/2003	1	0	0	unknown
Tower	4/14/2003	1	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Duluth	9/2/2002	2.75	0	0	unknown
Duluth	9/2/2002	2	0	0	unknown
Nopeming	9/2/2002	0.88	0	0	unknown
Duluth	8/1/2002	0.88	0	0	unknown
New Duluth	8/1/2002	1	0	0	unknown
Duluth	8/1/2002	1.75	0	0	unknown
Hermantown	8/1/2002	0.88	0	0	unknown
Floodwood	8/1/2002	1	0	0	unknown
Hibbing	6/22/2002	0.75	0	0	unknown
Proctor	6/22/2002	1	0	0	unknown
Cotton	6/22/2002	1	0	0	unknown
Hibbing	6/22/2002	1.75	0	0	unknown
Eveleth	6/22/2002	1.75	0	0	unknown
Hibbing	4/16/2002	0.75	0	0	unknown
Hibbing	4/16/2002	0.75	0	0	unknown
Island Lake	8/8/2001	0.75	0	0	unknown
Brimson	6/13/2001	0.75	0	0	unknown
Floodwood	6/13/2001	1	0	0	unknown
Duluth	5/14/2001	1	0	0	unknown
Nopeming	5/14/2001	1	0	0	unknown
Duluth	5/14/2001	1	0	0	unknown
Duluth	5/14/2001	0.75	0	0	unknown
Saginaw	5/14/2001	1	0	0	unknown
Hibbing	5/1/2001	0.75	0	0	unknown
Floodwood	8/1/2000	0.75	0	0	unknown
New Duluth	7/8/2000	1	0	0	unknown
Fond Du Lac	7/8/2000	0.75	0	0	unknown
Ely	7/1/2000	1	0	0	unknown
Orr	7/1/2000	0.88	0	0	unknown
Nett Lake	7/1/2000	1.75	0	0	unknown
Hibbing	6/30/2000	0.75	0	0	unknown
Hoyt Lakes	9/7/1999	1.25	0	0	unknown
Cook	8/15/1999	0.88	0	0	unknown
Independence	7/4/1999	0.75	0	0	unknown
Hoyt Lakes	6/9/1999	0.75	0	0	unknown
Nett Lake	6/9/1999	0.75	0	0	unknown
Crane Lake	5/20/1999	0.75	0	0	unknown
Duluth	8/23/1998	3.5	0	0	\$50,000,000
Hermantown	8/23/1998	1.25	0	0	unknown
Twig	8/23/1998	1.5	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
Hoyt Lakes	8/23/1998	0.75	0	0	unknown
Aurora	8/23/1998	1	0	0	unknown
Hibbing	8/16/1998	0.75	0	0	unknown
Saginaw	7/14/1998	0.75	0	0	unknown
Hermantown	7/14/1998	0.88	0	0	unknown
Duluth	6/1/1998	0.75	0	0	unknown
Canyon	6/1/1998	1	0	0	unknown
Hibbing	5/15/1998	0.75	0	0	unknown
Brimson	9/18/1997	2	0	0	unknown
Duluth	9/10/1996	1	0	0	unknown
Fredenberg	9/10/1996	0.75	0	0	unknown
Buyck	9/9/1996	0.75	0	0	unknown
Zim	8/13/1996	0.75	0	0	unknown
Gilbert	8/13/1996	1	0	0	unknown
Hibbing	8/13/1996	0.75	0	0	unknown
Cherry	7/11/1996	1.75	0	0	unknown
Hibbing	7/11/1996	2.5	0	0	unknown
Eveleth	6/26/1996	1	0	0	unknown
Hibbing	6/25/1996	1	0	0	unknown
Embarrass	6/12/1996	0.75	0	0	unknown
Whiteface	5/17/1996	0.75	0	0	unknown
Grand Rapids	8/27/1995	0.75	0	0	unknown
Crane Lake	8/22/1995	2.75	0	0	unknown
Beroun	7/21/1995	1.75	0	0	unknown
St. Louis County	8/27/1994	2.5	0	0	unknown
St. Louis County	8/27/1994	1.75	0	0	unknown
Northern St	7/11/1994	0.75	0	0	unknown
Nett Lake	6/14/1994	0.75	0	0	unknown
St. Louis County	9/16/1992	0.75	0	0	unknown
St. Louis County	7/7/1991	0.75	0	0	unknown
St. Louis County	7/5/1991	0.75	0	0	unknown
St. Louis County	9/13/1990	0.75	0	0	unknown
St. Louis County	9/11/1990	1.25	0	0	unknown
St. Louis County	6/29/1990	1	0	0	unknown
St. Louis County	6/29/1990	2	0	0	unknown
St. Louis County	8/3/1989	1.75	0	0	unknown
St. Louis County	8/3/1989	4.5	0	3	unknown
St. Louis County	5/23/1989	0.75	0	0	unknown
St. Louis County	9/1/1988	1	0	0	unknown
St. Louis County	8/16/1988	1	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
St. Louis County	7/29/1988	1	0	0	unknown
St. Louis County	6/18/1988	1	0	0	unknown
St. Louis County	6/15/1988	0.75	0	0	unknown
St. Louis County	8/29/1987	0.75	0	0	unknown
St. Louis County	6/1/1987	1	0	0	unknown
St. Louis County	6/26/1986	1	0	0	unknown
St. Louis County	6/25/1985	1	0	0	unknown
St. Louis County	6/16/1985	1	0	0	unknown
St. Louis County	6/16/1985	0.75	0	0	unknown
St. Louis County	6/16/1985	0.75	0	0	unknown
St. Louis County	6/8/1985	1	0	0	unknown
St. Louis County	8/8/1984	1.5	0	0	unknown
St. Louis County	8/8/1984	1.75	0	0	unknown
St. Louis County	8/8/1984	1.75	0	0	unknown
St. Louis County	7/12/1982	2	0	0	unknown
St. Louis County	7/12/1982	2	0	0	unknown
St. Louis County	7/12/1982	0.75	0	0	unknown
St. Louis County	7/12/1982	2	0	0	unknown
St. Louis County	5/10/1982	1.75	0	0	unknown
St. Louis County	5/10/1982	1.75	0	0	unknown
St. Louis County	5/10/1982	1.75	0	0	unknown
St. Louis County	5/10/1982	1.75	0	0	unknown
St. Louis County	5/10/1982	1.75	0	0	unknown
St. Louis County	6/24/1981	1	0	0	unknown
St. Louis County	6/24/1981	0.75	0	0	unknown
St. Louis County	8/29/1980	0.75	0	0	unknown
St. Louis County	8/29/1980	1.5	0	0	unknown
St. Louis County	7/10/1980	2.75	0	0	unknown
St. Louis County	7/4/1980	1	0	0	unknown
St. Louis County	7/4/1980	1	0	0	unknown
St. Louis County	7/4/1980	1.75	0	0	unknown
St. Louis County	9/5/1979	0.75	0	0	unknown
St. Louis County	8/2/1979	0.75	0	0	unknown
St. Louis County	6/25/1979	1.5	0	0	unknown
St. Louis County	6/14/1979	0.75	0	0	unknown
St. Louis County	7/16/1977	1	0	0	unknown
St. Louis County	7/16/1977	1.75	0	0	unknown
St. Louis County	7/16/1977	2.5	0	0	unknown
St. Louis County	6/12/1976	1	0	0	unknown
St. Louis County	8/12/1975	1.75	0	0	unknown
St. Louis County	8/3/1975	1	0	0	unknown

Location or County	Date	Size in inches	Deaths	Injuries	Property Damage
St. Louis County	6/3/1974	1.75	0	0	unknown
St. Louis County	7/11/1973	1	0	0	unknown
St. Louis County	8/21/1971	1	0	0	unknown
St. Louis County	8/17/1971	1.25	0	0	unknown
St. Louis County	5/21/1970	1.75	0	0	unknown
St. Louis County	8/23/1968	1	0	0	unknown
St. Louis County	8/12/1968	1.75	0	0	unknown
St. Louis County	8/12/1968	1.75	0	0	unknown
St. Louis County	6/19/1966	1	0	0	unknown
St. Louis County	7/16/1965	1.5	0	0	unknown
St. Louis County	7/1/1965	1.75	0	0	unknown
St. Louis County	9/26/1964	0.75	0	0	unknown
St. Louis County	5/4/1964	1.5	0	0	unknown
St. Louis County	6/29/1963	0.75	0	0	unknown
St. Louis County	9/8/1958	4	0	0	unknown
St. Louis County	5/26/1958	2.5	0	0	unknown
Highest Value Property Damage					\$50,000,000

Table C - 3. All severe thunderstorm wind events recorded by NCEI, 1950-July 2019

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Lakewood	7/26/2019	Thunderstorm Wind	50	0	0	unknown
St Michael	7/26/2019	Thunderstorm Wind	50	0	0	unknown
Tower	7/26/2019	Thunderstorm Wind	50	0	0	unknown
(ELO) Ely Muni Arpt	7/25/2019	Thunderstorm Wind	50	0	0	unknown
Island Lake	7/15/2019	Thunderstorm Wind	50	0	0	unknown
Island Lake	7/15/2019	Thunderstorm Wind	50	0	0	unknown
Kirk	7/15/2019	Thunderstorm Wind	50	0	0	unknown
Markham	6/30/2019	Thunderstorm Wind	50	0	0	unknown
Side Lake	9/15/2018	Thunderstorm Wind	50	0	0	unknown
New Duluth	9/15/2018	Thunderstorm Wind	50	0	0	unknown
Smithville	9/15/2018	Thunderstorm Wind	50	0	0	unknown
Smithville	9/15/2018	Thunderstorm Wind	50	0	0	unknown
Proctor	9/15/2018	Thunderstorm Wind	50	0	0	unknown
Proctor	9/15/2018	Thunderstorm Wind	50	0	0	unknown
Smithville	9/14/2018	Thunderstorm Wind	50	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Missabe Jct	8/31/2018	Thunderstorm Wind	50	0	0	unknown
Missabe Jct	8/31/2018	Thunderstorm Wind	50	0	0	unknown
Bayview	8/31/2018	Thunderstorm Wind	50	0	0	unknown
Palmers	7/8/2018	Thunderstorm Wind	50	0	0	unknown
Lakewood	7/8/2018	Thunderstorm Wind	50	0	0	unknown
Cook	7/8/2018	Thunderstorm Wind	50	0	0	unknown
Green Corner	7/8/2018	Thunderstorm Wind	50	0	0	unknown
Orr Public Arpt	7/8/2018	Thunderstorm Wind	50	0	0	unknown
Haley	7/8/2018	Thunderstorm Wind	50	0	0	unknown
Four Corners	7/4/2018	Thunderstorm Wind	78	0	0	unknown
Buyck	7/4/2018	Thunderstorm Wind	50	0	0	unknown
Ely Muni Arpt	6/29/2018	Thunderstorm Wind	56	0	0	unknown
Babbitt	6/29/2018	Thunderstorm Wind	50	0	0	unknown
Ely	6/29/2018	Thunderstorm Wind	50	0	0	unknown
Eveleth	6/29/2018	Thunderstorm Wind	50	0	0	unknown
Iron Jct	6/29/2018	Thunderstorm Wind	50	0	0	unknown
Cook Muni Arpt	6/29/2018	Thunderstorm Wind	50	0	0	unknown
Hibbing	6/29/2018	Thunderstorm Wind	50	0	0	unknown
Haley	6/29/2018	Thunderstorm Wind	50	0	0	unknown
Four Corners	6/15/2018	Thunderstorm Wind	50	0	0	unknown
Duluth Hgts	6/15/2018	Thunderstorm Wind	50	0	0	unknown
Ely	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Aurora	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Embarrass	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Biwabik	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Parkville	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Markham	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Buhl	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Hunters Park	5/29/2018	Thunderstorm Wind	50	0	0	unknown
Southern Lake (Zone)	10/24/2017	High Wind	51	0	0	unknown
Arnold	9/22/2017	Thunderstorm Wind	50	0	0	unknown
Duluth Intl Arp	9/22/2017	Thunderstorm Wind	53	0	0	unknown
Hermantown	9/22/2017	Thunderstorm Wind	50	0	0	unknown
Bayview	9/22/2017	Thunderstorm Wind	50	0	0	unknown
Alborn	9/22/2017	Thunderstorm Wind	52	0	0	unknown
Gowan	9/22/2017	Thunderstorm Wind	52	0	0	unknown
Babbitt	9/20/2017	Thunderstorm Wind	50	0	0	unknown
Soudan	9/20/2017	Thunderstorm Wind	52	0	0	unknown
Jones	9/20/2017	Thunderstorm Wind	50	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Duluth Hgts	9/20/2017	Thunderstorm Wind	52	0	0	unknown
Spruce	9/20/2017	Thunderstorm Wind	52	0	0	unknown
Hibbing	9/20/2017	Thunderstorm Wind	56	0	0	unknown
Central Lakes	9/14/2017	Thunderstorm Wind	50	0	0	unknown
Arnold	7/21/2017	Thunderstorm Wind	50	0	0	unknown
Arnold	7/21/2017	Thunderstorm Wind	52	0	0	unknown
Bartlett	7/21/2017	Thunderstorm Wind	56	0	0	unknown
Island Lake	7/21/2017	Thunderstorm Wind	56	0	0	unknown
Canyon	7/21/2017	Thunderstorm Wind	56	0	0	unknown
Markham	7/17/2017	Thunderstorm Wind	52	0	0	unknown
Hunters Park	7/6/2017	Thunderstorm Wind	52	0	0	unknown
Endion	7/6/2017	Thunderstorm Wind	60	0	0	unknown
Duluth	7/6/2017	Thunderstorm Wind	56	0	0	unknown
Duluth	7/6/2017	Thunderstorm Wind	52	0	0	unknown
Twig	7/6/2017	Thunderstorm Wind	52	0	0	unknown
Southern St. Louis/Carlton (Zone)	3/7/2017	High Wind	52	0	0	unknown
Southern Lake (Zone)	3/7/2017	High Wind	54	0	0	unknown
Biwabik	9/5/2016	Thunderstorm Wind	52	0	0	unknown
Parkville	9/5/2016	Thunderstorm Wind	52	0	0	unknown
Mountain Iron	9/5/2016	Thunderstorm Wind	52	0	0	unknown
Mc Kinley	9/5/2016	Thunderstorm Wind	52	0	0	unknown
Hunters Park	8/4/2016	Thunderstorm Wind	56	0	0	unknown
Duluth Intl Arp	8/4/2016	Thunderstorm Wind	58	0	0	unknown
Duluth Intl Arp	8/4/2016	Thunderstorm Wind	56	0	0	unknown
Bartlett	8/4/2016	Thunderstorm Wind	61	0	0	unknown
Bartlett	8/4/2016	Thunderstorm Wind	52	0	0	unknown
Twig	8/4/2016	Thunderstorm Wind	61	0	0	unknown
Twig	8/4/2016	Thunderstorm Wind	61	0	0	unknown
Duluth Sky Harbor Apt	7/21/2016	Thunderstorm Wind	51	0	0	unknown
Duluth Sky Harbor Apt	7/21/2016	Thunderstorm Wind	58	0	0	unknown
Duluth	7/21/2016	Thunderstorm Wind	55	0	0	unknown
Hunters Park	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Duluth Intl Arpt	7/21/2016	Thunderstorm Wind	60	0	0	unknown
Hunters Park	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Eldes Corner	7/21/2016	Thunderstorm Wind	53	0	0	unknown
Hunters Park	7/21/2016	Thunderstorm Wind	61	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Duluth	7/21/2016	Thunderstorm Wind	87	0	0	unknown
Arnold	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Duluth Hgts	7/21/2016	Thunderstorm Wind	78	0	0	unknown
Duluth Hgts	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Duluth Intl Arp	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Duluth Intl Arp	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Duluth Hgts	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Hermantown	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Duluth Intl Arp	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Hermantown	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Four Corners	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Bartlett	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Burnett	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Canyon	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Prosit	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Alborn	7/21/2016	Thunderstorm Wind	78	0	0	unknown
Floodwood	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Ely	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Ely	7/21/2016	Thunderstorm Wind	65	0	0	unknown
Burnside	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Burnside	7/21/2016	Thunderstorm Wind	70	0	0	unknown
Tower Muni Arpt	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Tower Muni Arpt	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Cook	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Kabetogama	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Kabetogama	7/21/2016	Thunderstorm Wind	61	0	0	unknown
Arnold	7/5/2016	Thunderstorm Wind	62	0	0	unknown
Island Lake	7/5/2016	Thunderstorm Wind	56	0	0	unknown
Toivola	7/5/2016	Thunderstorm Wind	56	0	0	unknown
Orr Public Arpt	6/25/2016	Thunderstorm Wind	50	0	0	unknown
Duluth Hgts	6/25/2016	Thunderstorm Wind	61	0	0	unknown
Kabetogama	6/25/2016	Thunderstorm Wind	52	0	2	unknown
Babbitt	6/10/2016	Thunderstorm Wind	52	0	0	unknown
Babbitt	6/10/2016	Thunderstorm Wind	52	0	0	unknown
Duluth Hgts	6/5/2016	Thunderstorm Wind	52	0	0	unknown
Embarrass	8/29/2015	Thunderstorm Wind	52	0	0	unknown
Murray	8/29/2015	Thunderstorm Wind	52	0	0	unknown
Crane Lake	8/28/2015	Thunderstorm Wind	52	0	0	unknown
Makinen	8/8/2015	Thunderstorm Wind	61	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Gheen	8/2/2015	Thunderstorm Wind	52	0	0	unknown
Burnside	7/5/2015	Thunderstorm Wind	61	0	0	unknown
Murray	7/5/2015	Thunderstorm Wind	61	0	0	unknown
Bayview	6/29/2015	Thunderstorm Wind	52	0	0	unknown
Southern St. Louis/Carlton (Zone)	4/2/2015	High Wind	51	0	0	unknown
Haley	8/24/2014	Thunderstorm Wind	61	0	0	unknown
Duluth Hgts	7/22/2014	Thunderstorm Wind	52	0	0	unknown
Ely Muni Arpt	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Eveleth	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Babbitt	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Embarrass	7/22/2014	Thunderstorm Wind	52	0	0	unknown
Babbitt	7/22/2014	Thunderstorm Wind	52	0	0	unknown
Endion	7/22/2014	Thunderstorm Wind	52	0	0	unknown
Bayview	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Allen	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Arnold	7/22/2014	Thunderstorm Wind	70	0	0	unknown
Aurora	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Biwabik	7/22/2014	Thunderstorm Wind	70	0	0	unknown
Floodwood	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Twig	7/22/2014	Thunderstorm Wind	52	0	0	unknown
Crane Lake	7/22/2014	Thunderstorm Wind	61	0	2	unknown
Eveleth Muni Arpt	7/22/2014	Thunderstorm Wind	78	0	0	unknown
Virginia	7/22/2014	Thunderstorm Wind	61	0	0	unknown
Eveleth Muni Arpt	7/22/2014	Thunderstorm Wind	70	0	0	unknown
Spruce	7/22/2014	Thunderstorm Wind	78	0	0	unknown
Peary	7/22/2014	Thunderstorm Wind	70	0	0	unknown
Crane Lake	7/21/2014	Thunderstorm Wind	70	0	2	unknown
Floodwood	7/21/2014	Thunderstorm Wind	64	0	0	unknown
Pettit	8/21/2013	Thunderstorm Wind	61	0	0	unknown
Tower Muni Arpt	7/25/2013	Thunderstorm Wind	52	0	0	unknown
Ely Muni Arpt	7/18/2013	Thunderstorm Wind	52	0	0	unknown
Robinson	7/18/2013	Thunderstorm Wind	52	0	0	unknown
Endion	6/16/2013	Thunderstorm Wind	52	0	0	unknown
Cook	9/4/2012	Thunderstorm Wind	55	0	0	unknown
Burnside	8/4/2012	Thunderstorm Wind	50	0	0	unknown
Markham	7/22/2012	Thunderstorm Wind	60	0	0	unknown
Idington	7/22/2012	Thunderstorm Wind	60	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Burnside	7/4/2012	Thunderstorm Wind	50	0	0	unknown
Duluth Hgts	7/2/2012	Thunderstorm Wind	50	0	0	unknown
Duluth Hgts	7/2/2012	Thunderstorm Wind	50	0	0	unknown
Brookston	7/2/2012	Thunderstorm Wind	60	0	0	unknown
Elmer	7/2/2012	Thunderstorm Wind	52	0	0	unknown
Hibbing	7/2/2012	Thunderstorm Wind	60	0	0	unknown
Toivola	7/2/2012	Thunderstorm Wind	60	0	0	unknown
Floodwood	7/2/2012	Thunderstorm Wind	60	0	0	unknown
Hermantown	6/19/2012	Thunderstorm Wind	50	0	0	unknown
Southern St. Louis/Carlton (Zone)	6/19/2012	High Wind	51	0	0	unknown
Twig	6/14/2012	Thunderstorm Wind	50	0	0	unknown
Adolph	6/14/2012	Thunderstorm Wind	50	0	0	unknown
Kabetogama	6/10/2012	Thunderstorm Wind	55	0	0	unknown
Duluth Hgts	8/8/2011	Thunderstorm Wind	50	0	0	unknown
Munger	8/8/2011	Thunderstorm Wind	50	0	0	unknown
Gheen	7/4/2011	Thunderstorm Wind	52	0	0	unknown
Side Lake	5/28/2011	Thunderstorm Wind	50	0	0	unknown
Gilbert	5/28/2011	Thunderstorm Wind	50	0	0	unknown
Wahlsten	5/28/2011	Thunderstorm Wind	50	0	0	unknown
Southern St. Louis/Carlton (Zone)	4/15/2011	High Wind	56	0	0	unknown
Cook	4/10/2011	Thunderstorm Wind	50	0	0	unknown
Sturgeon	4/10/2011	Thunderstorm Wind	60	0	0	unknown
Meadow Brook	4/10/2011	Thunderstorm Wind	65	0	0	\$1,000
Proctor	7/14/2010	Thunderstorm Wind	50	0	0	unknown
Proctor	6/24/2010	Thunderstorm Wind	50	0	0	unknown
Adolph	6/24/2010	Thunderstorm Wind	60	0	0	\$8,000
Saginaw	6/24/2010	Thunderstorm Wind	61	0	0	unknown
Grand Lake	6/24/2010	Thunderstorm Wind	50	0	0	unknown
Pike Lake	6/24/2010	Thunderstorm Wind	60	0	0	\$6,000
Gheen	6/24/2010	Thunderstorm Wind	60	0	0	\$1,000
Linden Grove	6/17/2010	Thunderstorm Wind	50	0	0	\$4,000
Side Lake	6/17/2010	Thunderstorm Wind	50	0	0	\$2,000
Silica	9/26/2008	Thunderstorm Wind	50	0	0	unknown
West Duluth	9/23/2008	Thunderstorm Wind	52	0	0	unknown
Floodwood	7/14/2008	Thunderstorm Wind	52	0	0	unknown
Biwabik	7/14/2008	Thunderstorm Wind	52	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Idington	7/14/2008	Thunderstorm Wind	52	0	0	unknown
Brookston	6/12/2008	Thunderstorm Wind	50	0	0	unknown
Side Lake	9/20/2007	Thunderstorm Wind	52	0	0	unknown
Duluth	7/26/2007	Thunderstorm Wind	52	0	0	unknown
Saginaw	7/26/2007	Thunderstorm Wind	52	0	0	unknown
Southern St. Louis/Carlton (Zone)	7/10/2007	High Wind	52	0	0	unknown
Pike Lake	6/7/2007	Thunderstorm Wind	52	0	0	unknown
Eveleth	6/7/2007	Thunderstorm Wind	52	0	0	unknown
Zim	6/7/2007	Thunderstorm Wind	53	0	0	unknown
Chisholm	6/7/2007	Thunderstorm Wind	52	0	0	unknown
Floodwood	6/7/2007	Thunderstorm Wind	62	0	0	unknown
Mountain Iron	7/31/2006	Thunderstorm Wind	50	0	0	unknown
Tower	7/31/2006	Thunderstorm Wind	55	0	0	unknown
Virginia	7/31/2006	Thunderstorm Wind	50	0	0	unknown
Ely	7/31/2006	Thunderstorm Wind	50	0	0	unknown
Gheen	7/31/2006	Thunderstorm Wind	55	0	0	unknown
West Duluth	7/29/2006	Thunderstorm Wind	55	0	0	unknown
Duluth	7/28/2006	Thunderstorm Wind	50	0	0	unknown
Buyck	7/1/2006	Thunderstorm Wind	50	0	0	unknown
Central Lakes	7/1/2006	Thunderstorm Wind	50	0	0	unknown
Crane Lake	7/1/2006	Thunderstorm Wind	50	0	0	unknown
Hibbing Arpt	5/29/2006	Thunderstorm Wind	50	0	0	unknown
Hermantown	8/9/2005	Thunderstorm Wind	60	0	0	unknown
Cook	6/27/2005	Thunderstorm Wind	55	0	0	unknown
Orr	6/27/2005	Thunderstorm Wind	52	0	0	unknown
Orr	6/23/2005	Thunderstorm Wind	55	0	0	unknown
Kabetogama	6/23/2005	Thunderstorm Wind	55	0	0	unknown
Orr	6/5/2005	Thunderstorm Wind	55	0	0	unknown
Zim	10/29/2004	Thunderstorm Wind	52	0	0	unknown
Floodwood	9/23/2004	Thunderstorm Wind	60	0	0	unknown
Ely	7/21/2004	Thunderstorm Wind	61	0	0	unknown
Tower	7/21/2004	Thunderstorm Wind	52	0	0	unknown
Orr	7/21/2004	Thunderstorm Wind	50	0	0	unknown
Gheen	7/10/2004	Thunderstorm Wind	52	0	0	unknown
Cook	7/10/2004	Thunderstorm Wind	50	0	0	unknown
Embarrass	4/28/2004	Thunderstorm Wind	56	0	0	unknown
Aurora	4/28/2004	Thunderstorm Wind	61	0	0	unknown
Floodwood	4/28/2004	Thunderstorm Wind	56	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Little Swan	4/28/2004	Thunderstorm Wind	60	0	0	unknown
Chisholm	8/25/2003	Thunderstorm Wind	60	0	0	unknown
Duluth	8/20/2003	Thunderstorm Wind	60	0	0	unknown
Duluth	8/20/2003	Thunderstorm Wind	55	0	0	unknown
Munger	8/20/2003	Thunderstorm Wind	52	0	0	unknown
Canyon	8/20/2003	Thunderstorm Wind	52	0	0	unknown
Duluth	8/20/2003	Thunderstorm Wind	52	0	0	unknown
Duluth	7/19/2003	Thunderstorm Wind	53	0	0	unknown
Hermantown	7/19/2003	Thunderstorm Wind	50	0	0	unknown
Mountain Iron	7/19/2003	Thunderstorm Wind	50	0	0	unknown
Chisholm	7/14/2003	Thunderstorm Wind	52	0	0	unknown
Chisholm	7/2/2003	Thunderstorm Wind	50	0	0	unknown
Tower	7/2/2003	Thunderstorm Wind	55	0	0	unknown
Duluth	6/22/2002	Thunderstorm Wind	55	0	0	unknown
Hibbing	6/22/2002	Thunderstorm Wind	60	0	0	unknown
Hibbing	4/16/2002	Thunderstorm Wind	50	0	0	unknown
Eveleth	8/8/2001	Thunderstorm Wind	50	0	0	unknown
Hibbing	8/8/2001	Thunderstorm Wind	50	0	0	unknown
Aurora	8/8/2001	Thunderstorm Wind	50	0	0	unknown
Cotton	8/8/2001	Thunderstorm Wind	50	0	0	unknown
Floodwood	8/8/2001	Thunderstorm Wind	50	0	0	unknown
Duluth	8/8/2001	Thunderstorm Wind	56	0	0	unknown
Duluth Intl Arpt	8/8/2001	Thunderstorm Wind	54	0	0	unknown
Brimson	8/8/2001	Thunderstorm Wind	55	0	0	unknown
Orr	8/8/2001	Thunderstorm Wind	52	0	0	unknown
Virginia	8/8/2001	Thunderstorm Wind	50	0	0	unknown
Orr	7/31/2001	Thunderstorm Wind	60	0	0	unknown
Ash Lake	7/31/2001	Thunderstorm Wind	60	0	0	unknown
Ash Lake	7/31/2001	Thunderstorm Wind	55	0	0	unknown
Floodwood	8/14/2000	Thunderstorm Wind	50	0	0	unknown
Virginia	7/1/2000	Thunderstorm Wind	50	0	0	unknown
Ely	7/1/2000	Thunderstorm Wind	50	0	0	unknown
Iron Jct	6/9/2000	Thunderstorm Wind	50	0	0	unknown
Cook	7/29/1999	Thunderstorm Wind	50	0	0	unknown
Duluth	7/25/1999	Thunderstorm Wind	50	0	0	unknown
Duluth	7/25/1999	Thunderstorm Wind	50	0	0	unknown
Duluth	7/25/1999	Thunderstorm Wind	56	0	0	unknown
Mountain Iron	7/25/1999	Thunderstorm Wind	50	0	0	unknown
Floodwood	7/25/1999	Thunderstorm Wind	50	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Hibbing	7/25/1999	Thunderstorm Wind	61	0	0	unknown
Hibbing	7/25/1999	Thunderstorm Wind	52	0	0	unknown
Floodwood	7/23/1999	Thunderstorm Wind	50	0	0	unknown
Gheen	7/15/1999	Thunderstorm Wind	50	0	0	unknown
Island Lake	7/5/1999	Thunderstorm Wind	50	0	0	unknown
Cotton	7/4/1999	Thunderstorm Wind	52	0	0	unknown
Brimson	7/4/1999	Thunderstorm Wind	52	0	0	unknown
Cook	7/4/1999	Thunderstorm Wind	50	0	0	unknown
Whiteface	7/4/1999	Thunderstorm Wind	52	0	0	unknown
Babbitt	7/4/1999	Thunderstorm Wind	50	0	0	unknown
Hibbing	7/4/1999	Thunderstorm Wind	55	0	0	unknown
Biwabik	7/4/1999	Thunderstorm Wind	50	0	0	unknown
Canyon	7/4/1999	Thunderstorm Wind	60	0	0	unknown
Hibbing	7/4/1999	Thunderstorm Wind	61	0	0	unknown
Floodwood	7/4/1999	Thunderstorm Wind	50	0	0	unknown
Tower	7/4/1999	Thunderstorm Wind	55	0	0	unknown
Virginia	7/4/1999	Thunderstorm Wind	56	0	0	unknown
Gheen	7/4/1999	Thunderstorm Wind	56	0	0	unknown
Hibbing	7/4/1999	Thunderstorm Wind	70	0	0	\$80,000
Cook	6/30/1999	Thunderstorm Wind	50	0	0	unknown
Hibbing	6/26/1999	Thunderstorm Wind	50	0	0	unknown
Duluth	6/22/1999	Thunderstorm Wind	50	0	0	unknown
Alborn	6/22/1999	Thunderstorm Wind	50	0	0	unknown
Hibbing	6/9/1999	Thunderstorm Wind	50	0	0	unknown
Central Portion	5/10/1999	Thunderstorm Wind	60	0	0	unknown
Hibbing Arpt	5/10/1999	Thunderstorm Wind	52	0	0	unknown
Duluth	8/23/1998	Thunderstorm Wind	53	0	0	unknown
Tower	8/16/1998	Thunderstorm Wind	50	0	0	unknown
Ely	7/20/1998	Thunderstorm Wind	50	0	0	unknown
Duluth	7/14/1998	Thunderstorm Wind	52	0	0	unknown
Hermantown	7/14/1998	Thunderstorm Wind	52	0	0	unknown
Saginaw	7/14/1998	Thunderstorm Wind	52	0	0	unknown
Ely	5/15/1998	Thunderstorm Wind	50	0	0	unknown
Markham	5/15/1998	Thunderstorm Wind	52	0	0	unknown
Eveleth	5/15/1998	Thunderstorm Wind	52	0	0	unknown
Brimson	5/15/1998	Thunderstorm Wind	55	0	0	unknown
Twig	5/15/1998	Thunderstorm Wind	50	0	0	unknown
Southern St. Louis/Carlton (Zone)	4/12/1998	High Wind	50	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
Hermantown	10/9/1997	Thunderstorm Wind	50	0	0	unknown
Island Lake	7/16/1997	Thunderstorm Wind	55	0	0	unknown
Virginia	7/14/1997	Thunderstorm Wind	50	0	0	unknown
Ely	8/21/1996	Thunderstorm Wind	50	0	2	unknown
Crane Lake	8/21/1996	Thunderstorm Wind	50	0	0	unknown
Duluth	8/6/1996	Thunderstorm Wind	60	0	0	unknown
Duluth	7/21/1996	Thunderstorm Wind	52	0	0	unknown
Saginaw	7/21/1996	Thunderstorm Wind	50	0	0	unknown
Side Lake	7/21/1996	Thunderstorm Wind	52	0	0	unknown
Hermantown	6/29/1996	Thunderstorm Wind	50	0	0	unknown
Lake Vermillion	6/29/1996	Thunderstorm Wind	61	0	0	unknown
Nett Lake	6/29/1996	Thunderstorm Wind	60	0	0	unknown
Gowan	8/18/1995	Thunderstorm Wind	0	0	0	\$20,000
New Duluth	7/24/1995	Thunderstorm Wind	0	0	0	\$3,000
Hinckley	7/21/1995	Thunderstorm Wind	52	0	0	unknown
Floodwood	7/14/1995	Thunderstorm Wind	0	0	0	\$30,000
Virginia	7/13/1995	Thunderstorm Wind	0	0	0	unknown
Duluth	7/13/1995	Thunderstorm Wind	63	0	0	unknown
Duluth	7/13/1995	Thunderstorm Wind	0	0	0	unknown
Buhl	7/13/1995	Thunderstorm Wind	0	0	0	\$10,000
Mt. Iron	7/13/1995	Thunderstorm Wind	0	0	0	\$500
Virginia	7/13/1995	Thunderstorm Wind	56	0	0	unknown
Eveleth	7/13/1995	Thunderstorm Wind	70	0	0	\$6,000
Hibbing	7/13/1995	Thunderstorm Wind	58	0	0	unknown
Pike Lake	7/13/1995	Thunderstorm Wind	0	0	0	unknown
Duluth	7/12/1995	Thunderstorm Wind	0	0	0	unknown
Fayal	7/12/1995	Thunderstorm Wind	0	0	0	unknown
Crane Lake	6/19/1994	Thunderstorm Wind	0	0	0	unknown
Crane Lake	6/19/1994	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/16/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/16/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/16/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/9/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/8/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/8/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/8/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/17/1992	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/15/1991	Thunderstorm Wind	0	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
St. Louis County	9/15/1991	Thunderstorm Wind	52	0	0	unknown
St. Louis County	7/18/1991	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/18/1991	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/29/1991	Thunderstorm Wind	53	0	0	unknown
St. Louis County	6/9/1991	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/13/1990	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/5/1990	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/29/1990	Thunderstorm Wind	52	0	0	unknown
St. Louis County	7/5/1989	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/5/1989	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/5/1989	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/5/1989	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/5/1989	Thunderstorm Wind	0	0	0	unknown
St. Louis County	5/24/1989	Thunderstorm Wind	58	0	0	unknown
St. Louis County	8/16/1988	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/7/1988	Thunderstorm Wind	60	0	0	unknown
St. Louis County	7/31/1988	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/31/1988	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/15/1988	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/15/1988	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/7/1988	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/21/1988	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/21/1988	Thunderstorm Wind	69	0	0	unknown
St. Louis County	8/29/1987	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/29/1987	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/29/1987	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/3/1987	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/21/1987	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/24/1986	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/24/1986	Thunderstorm Wind	57	0	0	unknown
St. Louis County	6/21/1986	Thunderstorm Wind	60	0	0	unknown
St. Louis County	6/16/1985	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/16/1985	Thunderstorm Wind	0	0	0	unknown
St. Louis County	10/16/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/8/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/2/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	4/27/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	4/27/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	4/27/1984	Thunderstorm Wind	55	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
St. Louis County	4/27/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	4/26/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	4/26/1984	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/9/1983	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/8/1983	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/29/1983	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/26/1983	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/26/1983	Thunderstorm Wind	54	0	0	unknown
St. Louis County	8/24/1983	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/12/1982	Thunderstorm Wind	52	0	0	unknown
St. Louis County	5/4/1982	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/5/1981	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/8/1981	Thunderstorm Wind	0	0	0	unknown
St. Louis County	5/29/1981	Thunderstorm Wind	62	0	0	unknown
St. Louis County	5/29/1981	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/8/1980	Thunderstorm Wind	50	0	0	unknown
St. Louis County	9/3/1980	Thunderstorm Wind	55	0	0	unknown
St. Louis County	8/19/1980	Thunderstorm Wind	52	0	0	unknown
St. Louis County	9/1/1979	Thunderstorm Wind	70	0	0	unknown
St. Louis County	8/31/1979	Thunderstorm Wind	52	0	0	unknown
St. Louis County	8/31/1979	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/19/1979	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/14/1978	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/8/1977	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/16/1977	Thunderstorm Wind	52	0	0	unknown
St. Louis County	6/29/1977	Thunderstorm Wind	53	0	0	unknown
St. Louis County	7/22/1976	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/22/1976	Thunderstorm Wind	70	0	0	unknown
St. Louis County	8/31/1975	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/31/1975	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/24/1975	Thunderstorm Wind	52	0	0	unknown
St. Louis County	8/24/1975	Thunderstorm Wind	50	0	0	unknown
St. Louis County	8/12/1975	Thunderstorm Wind	85	0	0	unknown
St. Louis County	8/9/1975	Thunderstorm Wind	60	0	0	unknown
St. Louis County	8/9/1975	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/3/1975	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/1/1975	Thunderstorm Wind	52	0	0	unknown
St. Louis County	7/1/1975	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/25/1974	Thunderstorm Wind	85	0	0	unknown

Location or County	Date	Type	Magnitude (in knots)	Deaths	Injuries	Property Damage
St. Louis County	8/25/1974	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/25/1974	Thunderstorm Wind	68	0	0	unknown
St. Louis County	7/12/1973	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/11/1973	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/11/1973	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/16/1972	Thunderstorm Wind	65	0	0	unknown
St. Louis County	8/9/1971	Thunderstorm Wind	50	0	0	unknown
St. Louis County	8/14/1970	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/7/1970	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/7/1970	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/7/1970	Thunderstorm Wind	70	0	0	unknown
St. Louis County	7/7/1970	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/12/1968	Thunderstorm Wind	0	0	0	unknown
St. Louis County	8/12/1968	Thunderstorm Wind	65	0	0	unknown
St. Louis County	7/14/1968	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/26/1967	Thunderstorm Wind	53	0	0	unknown
St. Louis County	7/22/1967	Thunderstorm Wind	53	0	0	unknown
St. Louis County	7/10/1967	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/17/1966	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/17/1966	Thunderstorm Wind	0	0	0	unknown
St. Louis County	7/9/1966	Thunderstorm Wind	53	0	0	unknown
St. Louis County	7/16/1965	Thunderstorm Wind	54	0	0	unknown
St. Louis County	6/19/1965	Thunderstorm Wind	54	0	0	unknown
St. Louis County	5/4/1964	Thunderstorm Wind	88	0	0	unknown
St. Louis County	5/22/1962	Thunderstorm Wind	50	0	0	unknown
St. Louis County	8/2/1961	Thunderstorm Wind	50	0	0	unknown
St. Louis County	9/1/1960	Thunderstorm Wind	0	0	0	unknown
St. Louis County	9/1/1960	Thunderstorm Wind	0	0	0	unknown
St. Louis County	6/28/1960	Thunderstorm Wind	65	0	0	unknown
St. Louis County	7/29/1955	Thunderstorm Wind	0	0	0	unknown
Highest Value Property Damage						\$80,000

Table C - 4. All extreme flood events recorded by NCEI, 1997-July 2019

Location or County	Date	Type	Deaths	Injuries	Property Damage
Side Lake	9/15/2018	Flash Flood	0	0	unknown
Cook	7/12/2018	Flash Flood	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Palmers	7/8/2018	Flash Flood	o	o	unknown
Cook	6/16/2018	Flash Flood	o	o	unknown
Cook	6/16/2018	Flash Flood	o	o	unknown
Missabe Jct	6/15/2018	Flash Flood	o	o	unknown
Missabe Jct	6/15/2018	Flash Flood	o	o	unknown
Markham	9/14/2017	Flash Flood	o	o	unknown
Markham	9/14/2017	Flash Flood	o	o	unknown
Polo	9/14/2017	Flash Flood	o	o	unknown
Polo	9/14/2017	Flash Flood	o	o	unknown
Makinen	9/14/2017	Flash Flood	o	o	unknown
Central Lakes	9/14/2017	Flash Flood	o	o	unknown
Bear River	6/13/2016	Flood	o	o	\$1,000
Crane Lake	7/1/2014	Flood	o	o	\$1,000
Kabetogama	6/14/2014	Flood	o	o	unknown
Kabetogama	6/14/2014	Flood	o	o	unknown
Mahoning	4/30/2013	Flood	o	o	unknown
Pequaywan Lake	6/21/2012	Flood	o	o	unknown
Pequaywan Lake	6/21/2012	Flood	o	o	unknown
Duluth Hgts	6/20/2012	Flash Flood	o	o	unknown
Duluth Intl Arpt	6/20/2012	Flash Flood	o	o	unknown
Saginaw	6/20/2012	Flash Flood	o	o	unknown
Hermantown	6/20/2012	Flash Flood	o	o	unknown
Missabe Jct	6/20/2012	Flash Flood	o	o	unknown
Duluth Hgts	6/20/2012	Flash Flood	o	o	unknown
Fond Du Lac	6/20/2012	Flash Flood	o	o	unknown
Floodwood	6/20/2012	Flash Flood	o	o	unknown
Duluth Hgts	6/19/2012	Flash Flood	o	o	unknown
Duluth Hgts	6/19/2012	Flash Flood	o	o	unknown
Hunters Park	6/19/2012	Flash Flood	o	o	unknown
Hermantown	6/19/2012	Flash Flood	o	o	unknown
Duluth Hgts	6/19/2012	Flash Flood	o	o	unknown
Duluth Hgts	6/19/2012	Flash Flood	o	o	unknown
Hermantown	6/19/2012	Flash Flood	o	o	unknown
Duluth Hgts	5/28/2012	Flash Flood	o	o	unknown
Fond Du Lac	8/8/2011	Flash Flood	o	o	unknown
Sturgeon	6/27/2011	Flash Flood	o	o	unknown
Smithville	8/7/2010	Flash Flood	o	o	unknown
North Hibbing	8/1/2010	Flash Flood	o	o	unknown
Kabetogama	7/1/2010	Flash Flood	o	o	unknown
Duluth	10/18/2007	Flood	o	o	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Gheen	5/21/2007	Flash Flood	0	0	unknown
Southern St. Louis / Carlton (Zone)	6/25/2002	Flood	0	0	unknown
Southern St. Louis / Carlton (Zone)	6/24/2002	Flood	0	0	unknown
Southern St. Louis / Carlton (Zone)	6/23/2002	Flood	0	0	unknown
Virginia	6/22/2002	Flash Flood	0	0	unknown
Central Portion	7/5/1999	Flash Flood	0	0	unknown
Southeast Portion	7/5/1999	Flash Flood	0	0	unknown
Duluth	6/24/1997	Flash Flood	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/6/1997	Flood	0	0	\$160,800
Duluth	7/6/1996	Flash Flood	0	0	\$300,000
Highest Value Property Damage					\$300,000

Table C - 5. All severe winter weather events recorded by NCEI, 1996-July 2019

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern Lake (Zone)	5/8/2019	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	5/8/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/29/2019	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	4/11/2019	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	4/11/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/11/2019	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/11/2019	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/20/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/20/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/10/2019	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/6/2019	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/6/2019	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/6/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/6/2019	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern St. Louis / Carlton (Zone)	2/5/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/5/2019	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/3/2019	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	1/21/2019	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/21/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	1/21/2019	Heavy Snow	0	0	unknown
Southern Lake (Zone)	1/6/2019	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/27/2018	Heavy Snow	0	0	unknown
Southern Lake (Zone)	12/27/2018	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	12/26/2018	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/26/2018	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/15/2018	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/15/2018	Winter Storm	0	0	\$9,000,000
Central St. Louis (Zone)	3/26/2018	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	3/26/2018	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/5/2018	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/24/2018	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/24/2018	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/24/2018	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/24/2018	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/22/2018	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/22/2018	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/19/2018	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/19/2018	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/18/2018	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/18/2018	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/18/2018	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/3/2018	Winter Weather	0	0	unknown
Central St. Louis (Zone)	1/10/2018	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	1/10/2018	Heavy Snow	0	0	unknown
Southern Lake (Zone)	11/1/2017	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	10/27/2017	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	10/26/2017	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Central St. Louis (Zone)	10/26/2017	Heavy Snow	0	0	unknown
Southern Lake (Zone)	10/26/2017	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/13/2017	Lake-Effect Snow	0	0	unknown
Southern Lake (Zone)	1/2/2017	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	1/2/2017	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/25/2016	Winter Storm	0	0	unknown
Southern Lake (Zone)	12/25/2016	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/11/2016	Heavy Snow	0	0	unknown
Southern Lake (Zone)	12/11/2016	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/18/2016	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	11/17/2016	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	11/17/2016	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	3/16/2016	Heavy Snow	0	0	unknown
Southern Lake (Zone)	3/16/2016	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	3/16/2016	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/26/2015	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/15/2015	Heavy Snow	0	0	unknown
Southern Lake (Zone)	12/15/2015	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	1/2/2015	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	11/10/2014	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/10/2014	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/24/2014	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/16/2014	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/16/2014	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/3/2014	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/3/2014	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/27/2014	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	3/21/2014	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/17/2014	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/20/2014	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/20/2014	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/20/2014	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Central St. Louis (Zone)	2/20/2014	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/20/2014	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/17/2014	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/17/2014	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/17/2014	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	12/4/2013	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/4/2013	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/2/2013	Heavy Snow	0	0	unknown
Southern Lake (Zone)	12/2/2013	Heavy Snow	0	0	unknown
Southern Lake (Zone)	11/27/2013	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/22/2013	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/22/2013	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/14/2013	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/11/2013	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/11/2013	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	4/5/2013	Heavy Snow	0	0	unknown
Southern Lake (Zone)	4/5/2013	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	3/18/2013	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/4/2013	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	3/4/2013	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/10/2013	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/10/2013	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/10/2013	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/10/2013	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	1/28/2013	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/9/2012	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/9/2012	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/9/2012	Heavy Snow	0	0	unknown
Southern Lake (Zone)	12/9/2012	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	4/15/2012	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	4/15/2012	Heavy Snow	0	0	unknown
Southern Lake (Zone)	3/3/2012	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/3/2012	Heavy Snow	0	0	unknown
Southern St. Louis /	3/3/2012	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Carlton (Zone)					
Southern St. Louis / Carlton (Zone)	2/29/2012	Blizzard	0	0	\$1,000,000
Northern St. Louis (Zone)	2/26/2012	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/26/2012	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/26/2012	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/20/2012	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/20/2012	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/20/2012	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	4/15/2011	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/22/2011	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/30/2011	Lake-Effect Snow	0	0	unknown
Southern Lake (Zone)	1/28/2011	Heavy Snow	0	0	unknown
Southern Lake (Zone)	1/16/2011	Lake-Effect Snow	0	0	unknown
Northern St. Louis (Zone)	12/30/2010	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/30/2010	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/20/2010	Heavy Snow	0	0	unknown
Southern Lake (Zone)	12/20/2010	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/20/2010	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	11/29/2010	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/29/2010	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	11/29/2010	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	11/24/2010	Heavy Snow	0	0	unknown
Southern Lake (Zone)	11/24/2010	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	11/24/2010	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	11/22/2010	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	11/13/2010	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/13/2010	Heavy Snow	0	0	unknown
Southern Lake (Zone)	11/13/2010	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	10/26/2010	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	5/7/2010	Winter Weather	0	0	unknown
Central St. Louis (Zone)	5/7/2010	Winter Weather	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/8/2010	Lake-Effect Snow	0	0	unknown
Southern Lake (Zone)	2/7/2010	Lake-Effect Snow	0	0	unknown
Southern Lake (Zone)	1/24/2010	Winter Storm	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Central St. Louis (Zone)	1/23/2010	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	1/23/2010	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/23/2010	Winter Storm	0	0	unknown
Central St. Louis (Zone)	12/24/2009	Winter Storm	0	0	unknown
Southern Lake (Zone)	12/24/2009	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	12/24/2009	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/23/2009	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/1/2009	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	4/1/2009	Winter Storm	0	0	unknown
Central St. Louis (Zone)	4/1/2009	Winter Storm	0	0	unknown
Southern Lake (Zone)	4/1/2009	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/31/2009	Winter Storm	0	0	unknown
Central St. Louis (Zone)	3/31/2009	Winter Storm	0	0	unknown
Southern Lake (Zone)	3/31/2009	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	3/31/2009	Winter Storm	0	0	unknown
Southern Lake (Zone)	3/23/2009	Ice Storm	0	0	\$815,000
Central St. Louis (Zone)	3/10/2009	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/10/2009	Winter Storm	0	0	unknown
Southern Lake (Zone)	3/10/2009	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	3/9/2009	Winter Storm	0	0	unknown
Southern Lake (Zone)	2/26/2009	Lake-Effect Snow	0	0	unknown
Southern Lake (Zone)	1/3/2009	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/3/2009	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	1/3/2009	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	1/3/2009	Heavy Snow	0	0	unknown
Southern Lake (Zone)	12/20/2008	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/20/2008	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/13/2008	Winter Storm	0	0	unknown
Southern Lake (Zone)	12/13/2008	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	12/13/2008	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/13/2008	Blizzard	0	0	\$5,000
Northern St. Louis (Zone)	4/25/2008	Winter Storm	0	0	unknown
Central St. Louis (Zone)	4/10/2008	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	4/10/2008	Winter Storm	0	0	unknown
Southern St. Louis /	4/10/2008	Blizzard	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Carlton (Zone)					
Southern Lake (Zone)	4/10/2008	Blizzard	0	0	unknown
Central St. Louis (Zone)	4/5/2008	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	4/5/2008	Winter Storm	0	0	unknown
Southern Lake (Zone)	1/11/2008	Lake-Effect Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/23/2007	Winter Storm	0	0	unknown
Central St. Louis (Zone)	12/23/2007	Winter Storm	0	0	unknown
Southern Lake (Zone)	12/22/2007	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	12/22/2007	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/4/2007	Lake-Effect Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/1/2007	Winter Storm	0	0	unknown
Central St. Louis (Zone)	12/1/2007	Winter Storm	0	0	unknown
Southern Lake (Zone)	12/1/2007	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	12/1/2007	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/3/2007	Winter Storm	0	0	unknown
Southern Lake (Zone)	4/3/2007	Winter Storm	0	0	unknown
Central St. Louis (Zone)	4/3/2007	Winter Storm	0	0	unknown
Central St. Louis (Zone)	3/1/2007	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/1/2007	Blizzard	0	0	unknown
Southern Lake (Zone)	3/1/2007	Blizzard	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/24/2007	Blizzard	0	0	unknown
Southern Lake (Zone)	2/24/2007	Blizzard	0	0	unknown
Central St. Louis (Zone)	12/30/2006	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/30/2006	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	12/30/2006	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/1/2006	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/24/2006	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/24/2006	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	12/16/2005	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/16/2005	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/16/2005	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/14/2005	Heavy Snow	0	0	unknown
Southern St. Louis /	12/14/2005	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Carlton (Zone)					
Southern Lake / North Shore (Zone)	12/14/2005	Heavy Snow	0	0	<i>unknown</i>
Northern St. Louis (Zone)	11/28/2005	Winter Storm	0	0	<i>unknown</i>
Southern Lake / North Shore (Zone)	1/21/2005	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	1/21/2005	Heavy Snow	0	0	<i>unknown</i>
Central St. Louis (Zone)	1/21/2005	Heavy Snow	0	0	<i>unknown</i>
Southern Lake / North Shore (Zone)	1/20/2005	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	1/20/2005	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	1/12/2005	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	1/1/2005	Winter Storm	0	0	<i>unknown</i>
Southern Lake / North Shore (Zone)	1/1/2005	Winter Storm	0	0	<i>unknown</i>
Central St. Louis (Zone)	1/1/2005	Winter Storm	0	0	<i>unknown</i>
Northern St. Louis (Zone)	1/1/2005	Winter Storm	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	12/30/2004	Ice Storm	0	0	<i>unknown</i>
Central St. Louis (Zone)	12/30/2004	Ice Storm	0	0	<i>unknown</i>
Northern St. Louis (Zone)	12/30/2004	Ice Storm	0	0	<i>unknown</i>
Southern Lake (Zone)	12/30/2004	Ice Storm	0	0	<i>unknown</i>
Central St. Louis (Zone)	1/25/2004	Heavy Snow	0	0	<i>unknown</i>
Southern Lake (Zone)	1/25/2004	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	1/25/2004	Heavy Snow	0	0	<i>unknown</i>
Northern St. Louis (Zone)	1/13/2004	Heavy Snow	0	0	<i>unknown</i>
Central St. Louis (Zone)	1/13/2004	Heavy Snow	0	0	<i>unknown</i>
Southern Lake / North Shore (Zone)	1/13/2004	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	1/13/2004	Heavy Snow	0	0	<i>unknown</i>
Southern Lake / North Shore (Zone)	12/15/2003	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	11/22/2003	Heavy Snow	0	0	<i>unknown</i>
Central St. Louis (Zone)	11/22/2003	Heavy Snow	0	0	<i>unknown</i>
Southern Lake / North Shore (Zone)	10/27/2003	Heavy Snow	0	0	<i>unknown</i>
Central St. Louis (Zone)	10/27/2003	Heavy Snow	0	0	<i>unknown</i>
Southern St. Louis / Carlton (Zone)	10/27/2003	Heavy Snow	0	0	<i>unknown</i>

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern St. Louis / Carlton (Zone)	4/16/2003	Ice Storm	0	0	unknown
Southern Lake / North Shore (Zone)	4/4/2003	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/4/2003	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	3/27/2003	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/27/2003	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	3/27/2003	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	12/18/2002	Ice Storm	0	0	unknown
Southern Lake (Zone)	12/18/2002	Ice Storm	0	0	unknown
Northern St. Louis (Zone)	12/18/2002	Ice Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/17/2002	Ice Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/9/2002	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	3/9/2002	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	3/9/2002	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/7/2002	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	3/7/2002	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	3/7/2002	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/26/2001	Winter Storm	0	0	\$500,000
Southern Lake (Zone)	11/26/2001	Winter Storm	0	0	unknown
Central St. Louis (Zone)	11/26/2001	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/22/2001	Ice Storm	0	0	\$4,200,000
Southern Lake / North Shore (Zone)	4/22/2001	Ice Storm	0	0	unknown
Northern St. Louis (Zone)	4/15/2001	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	4/15/2001	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	3/11/2001	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/11/2001	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/24/2001	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/24/2001	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/24/2001	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/24/2001	Heavy Snow	0	0	unknown
Southern St. Louis /	2/7/2001	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Carlton (Zone)					
Southern St. Louis / Carlton (Zone)	1/29/2001	Ice Storm	0	0	unknown
Southern Lake / North Shore (Zone)	1/29/2001	Ice Storm	0	0	unknown
Southern Lake (Zone)	12/20/2000	Heavy Snow	0	0	unknown
Southern Lake (Zone)	11/11/2000	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/11/2000	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/15/2000	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/15/2000	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	1/17/2000	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/5/1999	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	4/5/1999	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	4/5/1999	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	4/3/1999	Ice Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/3/1999	Ice Storm	0	0	unknown
Southern Lake (Zone)	4/3/1999	Ice Storm	0	0	unknown
Northern St. Louis (Zone)	4/1/1999	Ice Storm	0	0	unknown
Central St. Louis (Zone)	4/1/1999	Ice Storm	0	0	unknown
Southern Lake (Zone)	4/1/1999	Ice Storm	0	0	unknown
Northern St. Louis (Zone)	3/17/1999	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	3/8/1999	Heavy Snow	0	0	unknown
Southern Lake (Zone)	3/8/1999	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/8/1999	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	3/5/1999	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/5/1999	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/1/1999	Ice Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/1/1999	Ice Storm	0	0	unknown
Southern Lake / North Shore (Zone)	2/1/1999	Ice Storm	0	0	unknown
Northern St. Louis (Zone)	2/1/1999	Ice Storm	0	0	unknown
Central St. Louis (Zone)	12/17/1998	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/17/1998	Heavy Snow	0	0	unknown
Southern Lake / North	12/17/1998	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Shore (Zone)					
Northern St. Louis (Zone)	11/18/1998	Heavy Snow	0	0	unknown
Southern Lake (Zone)	11/18/1998	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	11/18/1998	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/9/1998	Winter Storm	0	0	unknown
Southern Lake (Zone)	11/9/1998	Winter Storm	0	0	unknown
Central St. Louis (Zone)	11/9/1998	Winter Storm	0	0	unknown
Southern Lake / North Shore (Zone)	3/31/1998	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/31/1998	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	3/31/1998	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	1/13/1998	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	1/8/1998	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	11/21/1997	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	11/21/1997	Heavy Snow	0	0	unknown
Southern Lake / North Shore (Zone)	11/21/1997	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/13/1997	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	2/28/1997	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/28/1997	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/28/1997	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/28/1997	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/23/1997	Heavy Snow	0	0	unknown
Southern Lake (Zone)	1/23/1997	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	1/23/1997	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	1/4/1997	Winter Storm	0	0	unknown
Southern Lake (Zone)	1/4/1997	Winter Storm	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/4/1997	Winter Storm	0	0	unknown
Central St. Louis (Zone)	1/4/1997	Winter Storm	0	0	unknown
Northern St. Louis (Zone)	1/1/1997	Ice Storm	0	0	unknown
Central St. Louis (Zone)	1/1/1997	Ice Storm	0	0	unknown
Southern Lake (Zone)	1/1/1997	Ice Storm	0	0	unknown
Southern Lake (Zone)	12/30/1996	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/30/1996	Heavy Snow	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern St. Louis / Carlton (Zone)	12/22/1996	Heavy Snow	0	0	unknown
Northern St. Louis (Zone)	4/25/1996	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	4/12/1996	Winter Weather	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/24/1996	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	2/26/1996	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/26/1996	Heavy Snow	0	0	unknown
Southern Lake (Zone)	2/26/1996	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	1/28/1996	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/28/1996	Heavy Snow	0	0	unknown
Southern Lake (Zone)	1/28/1996	Heavy Snow	0	0	unknown
Southern Lake (Zone)	1/17/1996	Heavy Snow	0	0	unknown
Central St. Louis (Zone)	1/17/1996	Heavy Snow	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/17/1996	Heavy Snow	0	0	unknown
Highest Value Property Damage					\$9,000,000

Table C - 6. All severe cold/wind chill events recorded by NCEI, 1996-July 2019

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern St. Louis / Carlton (Zone)	1/29/2019	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/29/2019	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/29/2019	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/29/2019	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/27/2019	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/27/2019	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/27/2019	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/27/2019	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/19/2019	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/19/2019	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/4/2018	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/4/2018	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/4/2018	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton	1/12/2018	Extreme Cold/Wind Chill	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
(Zone)					
Central St. Louis (Zone)	1/12/2018	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/5/2018	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/5/2018	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/4/2018	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/4/2018	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	12/25/2017	Extreme Cold/Wind Chill	0	1	unknown
Central St. Louis (Zone)	12/25/2017	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/25/2017	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/16/2017	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	12/10/2017	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	12/3/2017	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	10/28/2017	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/12/2017	Cold/Wind Chill	1	0	unknown
Northern St. Louis (Zone)	1/17/2016	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/17/2016	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/16/2016	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/16/2016	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/14/2016	Cold/Wind Chill	1	0	unknown
Northern St. Louis (Zone)	2/23/2015	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/23/2015	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/23/2015	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/22/2015	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/22/2015	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/22/2015	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/6/2015	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/6/2015	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/6/2015	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/6/2015	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/5/2015	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/5/2015	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/4/2015	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/4/2015	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/4/2015	Extreme Cold/Wind Chill	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Central St. Louis (Zone)	1/4/2015	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/3/2015	Cold/Wind Chill	1	0	unknown
Central St. Louis (Zone)	3/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	3/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	3/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	3/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	3/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	3/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	2/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/5/2014	Cold/Wind Chill	1	0	unknown
Central St. Louis (Zone)	1/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/27/2014	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/22/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/22/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/22/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/22/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/14/2014	Cold/Wind Chill	1	0	unknown
Northern St. Louis (Zone)	1/8/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/8/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/8/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/8/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/4/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/4/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/4/2014	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/4/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/2/2014	Cold/Wind Chill	1	0	unknown
Southern St. Louis / Carlton (Zone)	1/2/2014	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/2/2014	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/1/2014	Extreme Cold/Wind Chill	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern Lake (Zone)	1/1/2014	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	12/30/2013	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	12/30/2013	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/30/2013	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	12/30/2013	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	12/28/2013	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	12/28/2013	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	12/28/2013	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	12/11/2013	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/11/2013	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	12/11/2013	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	12/8/2013	Cold/Wind Chill	0	1	unknown
Southern St. Louis / Carlton (Zone)	1/21/2013	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/21/2013	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/21/2013	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/21/2013	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/27/2012	Cold/Wind Chill	1	0	unknown
Southern Lake (Zone)	1/19/2012	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/19/2012	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/19/2012	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/19/2012	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/17/2012	Cold/Wind Chill	1	0	unknown
Central St. Louis (Zone)	1/11/2010	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/1/2010	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/1/2010	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/26/2009	Extreme Cold/Wind Chill	1	0	unknown
Southern St. Louis / Carlton (Zone)	1/25/2009	Extreme Cold/Wind Chill	1	0	unknown
Southern St. Louis / Carlton (Zone)	1/13/2009	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/13/2009	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/13/2009	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/13/2009	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	12/15/2008	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	12/15/2008	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	12/15/2008	Extreme Cold/Wind Chill	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Southern St. Louis / Carlton (Zone)	12/15/2008	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/19/2008	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/19/2008	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/9/2008	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/9/2008	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	2/9/2008	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/9/2008	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/29/2008	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/29/2008	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/29/2008	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/29/2008	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/19/2008	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/19/2008	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/19/2008	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/3/2007	Extreme Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	2/3/2007	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/3/2007	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/3/2007	Extreme Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/2/2007	Extreme Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/2/2007	Extreme Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	2/17/2006	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	2/16/2006	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/16/2006	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	2/16/2006	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/14/2005	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/14/2005	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/14/2005	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/14/2005	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	1/21/2004	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/21/2004	Cold/Wind Chill	0	0	unknown
Southern Lake / North Shore (Zone)	1/21/2004	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/21/2004	Cold/Wind Chill	0	0	unknown
Southern Lake (Zone)	1/15/1997	Cold/Wind Chill	0	0	unknown
Southern St. Louis / Carlton (Zone)	1/15/1997	Cold/Wind Chill	0	0	unknown

Location or County	Date	Type	Deaths	Injuries	Property Damage
Central St. Louis (Zone)	1/15/1997	Cold/Wind Chill	0	0	unknown
Northern St. Louis (Zone)	1/15/1997	Cold/Wind Chill	0	0	unknown
Central St. Louis (Zone)	2/2/1996	Cold/Wind Chill	0	0	unknown
Highest Value Property Damage					unknown

Table C - 7. All heat events recorded by the NCEI, 1996-July 2019

Location or County	Date	Deaths	Injuries	Property Damage
Southern St. Louis / Carlton (Zone)	7/20/2016	0	0	unknown
Southern Lake (Zone)	7/16/2011	0	0	unknown
Southern St. Louis / Carlton (Zone)	7/16/2011	0	0	unknown
Southern St. Louis / Carlton (Zone)	8/7/2001	5	0	unknown
Highest Value Property Damage				unknown

Table C - 8. All lightning events recorded by the NCEI, 1996-July 2019

Location or County	Date	Deaths	Injuries	Property Damage
Duluth Hgts	7/12/2018	0	0	\$75,000
Winton	6/19/2016	0	0	unknown
Homecroft	9/2/2015	0	0	\$5,000
Duluth Hgts	6/28/2015	0	1	unknown
Kirk	6/28/2015	0	2	unknown
Duluth Sky Harbor Apt	8/18/2012	1	4	unknown
Nopeming	7/27/2010	0	1	unknown
Grand Lake	9/20/2007	0	0	unknown
Embarrass	7/1/2006	0	0	unknown
Orr	9/4/2004	0	0	unknown
Duluth	5/16/2004	0	0	\$30,000
Duluth	7/7/2003	0	0	\$250,000
Duluth	10/20/2001	0	2	unknown
Hibbing	8/16/1998	0	0	\$10,000
Ely	7/20/1998	0	1	unknown
Mountain Iron	7/14/1998	0	0	\$400,000

Location or County	Date	Deaths	Injuries	Property Damage
Duluth	6/25/1998	0	0	\$75,000
Greaney	8/3/1997	0	0	\$100,000
Hibbing	8/6/1996	0	0	\$400,000
Duluth	7/21/1996	0	1	<i>unknown</i>
Highest Value Property Damage				\$400,000

Appendix D

Adopting Resolutions

Resolutions to be added to Appendix D by St. Louis County following final approval of the plan by FEMA.

Appendix E

Steering Committee Meetings

7/3/2019

Minnesota 10-County Multi-Hazard Mitigation Update Project Kick-off Orientation Webinar

UNIVERSITY OF MINNESOTA GEOSPATIAL ANALYSIS CENTER

SWENSON COLLEGE
OF SCIENCE & ENGINEERING
University of Minnesota Duluth
Driven to Discover

Webinar Purpose & Goals

Purpose:

The purpose of this webinar is to provide an orientation kick-off meeting for the Emergency Managers participating in the Minnesota 10-County Multi-Hazard Mitigation Plan Update project.

Goals:

- Introduce the UMD Team and County contacts.
- Provide an overview of the project.
- Clarify roles and responsibilities.
- Outline the planning process, discuss key tasks and timelines.
- Discuss next steps and answer your questions.

Introductions

Who We Are (UMD Project Team)



Who You Are (County Emergency Managers):

- Name, Title, and County
- Past Experience with MHMP?

Minnesota HSEM:

Jennifer Nelson, MN HSEM
State Hazard Mitigation Officer

Project Overview

10 Counties

County	FEMA's Evaluation Date
St. Louis	8/1/2018
Brown	8/13/2018
Martin	8/13/2018
Blue Earth	9/3/2018
Lake of the Woods	9/3/2018
Benton	9/3/2018
Norman	9/3/2018
Shelburne	9/3/2018
Clearwater	10/13/2018
City	11/16/2018



Why UMD-GAC?

➢ Proven experience

GAC has extensive experience in the comprehensive review and update of county MHMPs, as well as update of the State MHMP.

➢ Advanced Capabilities

GAC has expertise in the application of GIS, HAZUS, and research to support MHMP development and meeting all FEMA requirements.

➢ Ability to Expedite

GAC has the ability to expedite the MHMP update process for multiple counties through a consistent approach and format, which also supports State and FEMA review of draft plans.

➢ Planning Team

GAC project team includes working with advanced GIS students and experienced consultants to effectively complete tasks.

Overview of MHMP

Update Process

Key Considerations for Discussion

7/3/2019

EM Roles & Responsibilities

- Act as main Point of Contact.
- Track required local match and submit to HSEM.
- Coordinate communication and outreach to engage local planning team, additional key stakeholders, and the public.
- Review past mitigation actions and provide status update.
- Provide information for Capabilities Assessment (Plans & Programs in Place / Program Gaps or Deficiencies) for each hazard.
- Assist in development of new mitigation action chart (must be county and jurisdictionally specific) that includes projects for HMA eligibility.
- Provide information for Critical Facilities forms.
- Provide coordination with GIS and assessor's data managers in order to obtain GIS and parcel information for GIS analyses.
- Assist in timely review of material throughout the plan update process via phone, email, and in-person meetings.

Planning Team Engagement

Each EM will play a critical role in identification and engagement of a planning team during the plan update process. The MHMP must document who was involved & how, and include representation from the county and each participating city jurisdiction. Neighboring communities, local and regional agencies should also be given the opportunity to participate.

Key Considerations:

- **Planning Team** – Should include key county departments/staff and representation from all participating cities, as well as other key agency or organizational personnel (i.e., MNDNR, Utility reps, Schools)
- **In Person Meetings** – Our planning process consists of 2 in-person planning team meetings (Kickoff Meeting and Mitigation Action Chart review meeting).
- **Other Communication** – At different parts of the planning process we will seek additional participation & feedback via email.

Public Engagement

As part of the planning process, the MHMP must document how the public was given the opportunity to be involved in the planning process and how their feedback was incorporated into the plan.

Key Considerations:

- Our public outreach process consists of 2 outreach periods (early in the process and for public review of draft plan).
- We provide you with a news release for posting/distribution.
- We work with you to document your public outreach in the plan.
- We provide a website for posting the plan and collection of public feedback.
- If you wish to do additional public outreach, you may do so (i.e., Facebook postings, providing an update at meetings, or distributing information at public events, such as a booth at the County Fair).

Hazard Identification and Risk Assessment

All plans will address the **natural hazards** identified to pose risk to the county and its jurisdictions. Non-natural hazards (technological and human-caused) will not be included in the risk and vulnerability assessment and development of mitigation strategies and actions.

Key Considerations:

- Identify specific impacts and vulnerabilities (at the county/jurisdiction level) due to natural hazards.
- Identify if and how any priorities changed since the last plan (i.e., financial, legal, political realities, and post-disaster conditions).
- Identify existing development or future development that may increase or decrease the community's vulnerability to natural hazard events.

Mitigation Action Plan

Key activities to support the update of the 5-year Mitigation Action Plan will include a capabilities assessment for mitigating against natural hazards, as well as a comprehensive review of the status of mitigation actions in the previously approved plan.

Key Considerations:

- Plans and Programs in Place that support mitigation.
- Program Gaps or Deficiencies that hinder mitigation.
- Past Mitigation Action Review (Completed, Deleted, or Ongoing)
- Identification of projects that may be eligible for HMA funding
- Local Mitigation Survey to assess local-level capabilities and mitigation actions.

Plan Adoption

After FEMA has provided "APA" status (Approval Pending Adoption), the county and all participating jurisdictions must formally adopt the plan.

Key Considerations:

- Engaging key County and City personnel throughout the planning process will help to ensure understanding of the purpose and process of the MHMP update, including expectation of follow-through to adopt the plan.

7/3/2019

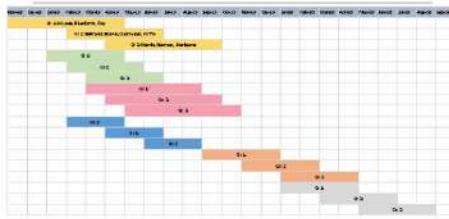
Project Timeline

- 30-Month total timeline - 24 months active
- Staggering of Counties will be required to complete UMD's update of risk assessments, research of hazard histories, etc. for each county.
- Many tasks occur concurrently, others must be done in succession.

Estimated Time-line

DATE	TIME	ACTIVITY	COMMITTEE MEET	OTHER MEET
1	10am	Initial County Meeting, with UMD Team, to begin the process of updating the MHP. This will include a review of the MHP, the county's hazard history, and the county's current mitigation measures.		
2	10am	County Hazard Risk Assessment - Phase 1. This will include a review of the county's hazard history, and the county's current mitigation measures.	Planning Committee Meeting and County Board Meeting	County Hazard Risk Assessment
3	10am	County Hazard Risk Assessment - Phase 2. This will include a review of the county's hazard history, and the county's current mitigation measures.		
4	10am	County Hazard Risk Assessment - Phase 3. This will include a review of the county's hazard history, and the county's current mitigation measures.		
5	10am	County Hazard Risk Assessment - Phase 4. This will include a review of the county's hazard history, and the county's current mitigation measures.		
6	10am	County Hazard Risk Assessment - Phase 5. This will include a review of the county's hazard history, and the county's current mitigation measures.		
7	10am	County Hazard Risk Assessment - Phase 6. This will include a review of the county's hazard history, and the county's current mitigation measures.		
8	10am	County Hazard Risk Assessment - Phase 7. This will include a review of the county's hazard history, and the county's current mitigation measures.		
9	10am	County Hazard Risk Assessment - Phase 8. This will include a review of the county's hazard history, and the county's current mitigation measures.		
10	10am	County Hazard Risk Assessment - Phase 9. This will include a review of the county's hazard history, and the county's current mitigation measures.		
11	10am	County Hazard Risk Assessment - Phase 10. This will include a review of the county's hazard history, and the county's current mitigation measures.		
12	10am	County Hazard Risk Assessment - Phase 11. This will include a review of the county's hazard history, and the county's current mitigation measures.		
13	10am	County Hazard Risk Assessment - Phase 12. This will include a review of the county's hazard history, and the county's current mitigation measures.		
14	10am	County Hazard Risk Assessment - Phase 13. This will include a review of the county's hazard history, and the county's current mitigation measures.		
15	10am	County Hazard Risk Assessment - Phase 14. This will include a review of the county's hazard history, and the county's current mitigation measures.		
16	10am	County Hazard Risk Assessment - Phase 15. This will include a review of the county's hazard history, and the county's current mitigation measures.		
17	10am	County Hazard Risk Assessment - Phase 16. This will include a review of the county's hazard history, and the county's current mitigation measures.		
18	10am	County Hazard Risk Assessment - Phase 17. This will include a review of the county's hazard history, and the county's current mitigation measures.		
19	10am	County Hazard Risk Assessment - Phase 18. This will include a review of the county's hazard history, and the county's current mitigation measures.		
20	10am	County Hazard Risk Assessment - Phase 19. This will include a review of the county's hazard history, and the county's current mitigation measures.		
21	10am	County Hazard Risk Assessment - Phase 20. This will include a review of the county's hazard history, and the county's current mitigation measures.		
22	10am	County Hazard Risk Assessment - Phase 21. This will include a review of the county's hazard history, and the county's current mitigation measures.		
23	10am	County Hazard Risk Assessment - Phase 22. This will include a review of the county's hazard history, and the county's current mitigation measures.		
24	10am	County Hazard Risk Assessment - Phase 23. This will include a review of the county's hazard history, and the county's current mitigation measures.		
25	10am	County Hazard Risk Assessment - Phase 24. This will include a review of the county's hazard history, and the county's current mitigation measures.		
26	10am	County Hazard Risk Assessment - Phase 25. This will include a review of the county's hazard history, and the county's current mitigation measures.		
27	10am	County Hazard Risk Assessment - Phase 26. This will include a review of the county's hazard history, and the county's current mitigation measures.		
28	10am	County Hazard Risk Assessment - Phase 27. This will include a review of the county's hazard history, and the county's current mitigation measures.		
29	10am	County Hazard Risk Assessment - Phase 28. This will include a review of the county's hazard history, and the county's current mitigation measures.		
30	10am	County Hazard Risk Assessment - Phase 29. This will include a review of the county's hazard history, and the county's current mitigation measures.		
31	10am	County Hazard Risk Assessment - Phase 30. This will include a review of the county's hazard history, and the county's current mitigation measures.		

Estimated Time-line (scenario)



Our Recent Experience

These things help speed up the update process.

The UMD Team provides you with prepared communications & formats.

- Using the existing formats we provide to you for particular to utilize data collection, meeting notices, news releases, etc. will expedite our process, effectively use your time, and maintain consistency among plans.

EM's complete task assignments in a thorough and timely fashion.

- The quicker you get them back to us with complete information, the faster we can work with them.

EM's help coordinate getting information that we need.

- Your assistance to coordinate with your CH dept. or County Assessor will help to ensure we get the information we need to update the plan.
- Your assistance to coordinate with county departments and city personnel to get information or feedback will also be extremely helpful.

EM's do a great job of convening planning team meetings & outreach.

- Well attended planning team meetings help to ensure easier communication on this project with all those involved, and helps to document required participation to HSEM and FEMA in the planning process. It also strengthens your local network.

EM Tasks

The UMD Team will work with each County EM or designated POCTo facilitate completion of the following tasks:

- ✓ Public News Releases (2)
- ✓ Plans & Programs in Place Checklist
- ✓ Capabilities Assessment
- ✓ Post Mitigation Action Review
- ✓ Coordination of Local Mitigation Survey
- ✓ Planning Team Meetings (2)
- ✓ Compilation of Critical & Essential Facilities in Each Jurisdiction
- ✓ Building Attribute Checklist for Flood Economic Loss Analysis

Match

- ✓ Make sure all stakeholders/participants know where/how to record their time for county's match

- ✓ Report match time quarterly to HSEM

7/3/2019

Next Steps

UMD Team members will follow up with each EM to provide & discuss the following task assignments you can begin to work on:

- Disseminate News Release #1 (Bonnie)
- Complete Plans in Place Checklist (Bonnie)
- Complete Capabilities Assessment (Bonnie)
- Conduct Past Mitigation Action Review (Bonnie)
- Disseminate Local Mitigation Survey (Bonnie)
- Schedule 1st Planning Team Meeting (Bonnie)
- Complete Listing of Critical Facilities (Zach)

Questions?

What questions do you have for UMD or HSEM about the MHMP Update process?

Contact Information

Stacey Stark, MS, GISP
Geospatial Analysis Center
skstark@d.umn.edu
218-726-7438

Example Plans:
<https://z.umn.edu/hazardmitigation>

**St. Louis County
Multi-Hazard Mitigation Plan Update**

Planning Team Meeting #1

May 28, 2019, Virginia, MN, 2:00 p.m. – 4:00 p.m.

May 29, 2019, Duluth, MN, 10:00 a.m. – 12:00 p.m.

Meeting Summary:

On Tuesday, May 28 and Wednesday, May 29, 2019, key county, city, and township representatives, as well as other stakeholders were convened to participate in a Planning Team Meeting for the update of St. Louis County Multi-Hazard Mitigation Plan (MHMP). The meeting was facilitated by the University of Minnesota – Duluth Geospatial Analysis Center (GAC) project team who are leading the update of the St. Louis County MHMP. A total of 25 people attended Virginia meeting and 25 people attended the Duluth meeting.

For each meeting, the opening presentation covered 6 key areas:

1. The purpose of hazard mitigation planning.
2. The role & responsibilities of the Planning Team.
3. An overview of content in the MHMP (County physical & social profile, Asset Inventory, Hazard Assessment and Vulnerability Analysis, Capability Assessment and Mitigation Actions).
4. Review and discussion of natural hazards that pose risk to the County, including consideration of the following:
 - How has the risk to severe natural hazard events *increased or decreased* since the last plan?
 - Are there *jurisdictional variations* in risk?
 - Are there *local vulnerabilities* to consider?
 - Have there been *changes in development*?

Planning Team Discussion Notes:

- *Wildfire risk has been reduced to some degree due to strong ongoing Firewise program efforts and wildland fuels reduction efforts. St. Louis County has an official Firewise Coordinator in place and a Community Wildfire Protection Plan is currently being updated. The northern parts of the county, particularly the Ely area are noted to have communities that face a higher wildfire risk than the southern parts of the county. However, wildland fires are a concern county-wide.*
- *Severe wind events continue to be a top concern that comes with spring and summer storms. Identification of facilities that would benefit from a storm shelter or community safe room was noted, such as campgrounds and mobile home parks.*
- *Coastal flooding and coastal erosion have increased significantly as risks for the City of Duluth lakeshore area (including Park Point) with the impact of several severe Lake*

Superior storms in the last 5 that caused extensive damage resulting in both State and Federal disaster declarations. Mitigation for flooding in the central Hillside area of Duluth was also noted as a priority to help hold water and reduce downstream impacts.

- *Potential for severe ice storms and impacts to critical infrastructure (such as powerlines) was felt to be more frequent; potential for ice storms seems to be higher county-wide.*
- *Severe cold temperatures are common county-wide, but were especially noted for the extended duration of cold during the winter of 2018-2019 which required the opening of warming centers in the City of Duluth for the homeless or others in need. Discussion was held on the need for local jurisdictions to be prepared to work with the Red Cross and County Public Health on local sheltering if needed.*

5. Review of mitigation strategies and examples of related mitigation actions.

6. An overview of the FEMA Hazard Mitigation Assistance (HMA) Grants program.

Following the presentation, a facilitated Mitigation Action Working Session was held. Participants discussed the natural hazards of concern to their communities and filled out Mitigation Ideas Worksheets to identify new, jurisdictionally-specific mitigation actions to be included in the MHMP plan update. Mitigation actions were required to fall within one of the 5 mitigation action strategies:

1. Local Planning and Regulations
2. Structure and Infrastructure Projects
3. Natural Systems Protection
4. Education and Awareness Programs
5. Mitigation Preparedness and Response Support

Following the Mitigation Action Working Session, the group then discussed the upcoming process and anticipated timeline for engaging the public and other key stakeholders in the plan update. Meeting attendees were told that they would be contacted for additional information and kept informed on the upcoming steps in the planning process, including development of local mitigation action charts and review of the final draft plan.

Attached to this meeting summary are the following documentation items:

- May 28 & 29 Planning Team Meeting Stakeholder Invite List
- May 28 & 29, 2019 St. Louis County Meeting Email Invite
- May 28 & 29, 2019 Meeting Agendas
- May 28 & 29, 2019 Meeting Sign-in Sheets (typed & scanned)
- May 28 & 29, 2019 Power Point Presentation Slides
- May 28 & 29, 2019 Meeting Handouts (Mitigation Strategies, HMA Grants, Mitigation Ideas Worksheet)
- May 28 & 29, 2019 Mitigation Ideas Working Session Notes

Meeting Summary Prepared By: Bonnie Hundrieser, UMD Project Team

St. Louis County 2019 MHMP Update
May 28 & 29, 2019 Planning Team Meetings Stakeholder Invite List

Following is the list of stakeholders that were invited via email to attend the St. Louis County MHMP Update Planning Team Meetings #1 held on May 28 & 29, 2019 in Virginia, MN and Duluth, MN.

Agency Type	Agency	Title	Name	Email
City Contacts	Aurora	City of		cityclerk@ci.aurora.mn.us
City Contacts	Aurora	City Clerk	Becky Lammie	becky@ci.aurora.mn.us
City Contacts	Babbitt	City of		cathy@babbltt-mn.com
City Contacts	Babbitt	Mayor	Andrea Zupanich	andrea@zupnorth.com
City Contacts	Biwabik	City of		srmackey@cityofbiwabik.com
City Contacts	Biwabik	City Administrator	Jeff Jacobson	administrator@cityofbiwabik.com
City Contacts	Breitung Twp	Police Chief	Dan Nylund	police@breitungtownship.org
City Contacts	Brookston	City of		nmfosness@gmail.com
City Contacts	Buhl	City of		buhladmin@accessmn.com
City Contacts	Buhl	Mayor	Shari Swanson	buhladmin@accessmn.com
City Contacts	Chisholm	City of		bmanney@ci.chisholm.mn.us
City Contacts	Chisholm	Fire Chief	Bob Brown	brownfd@mchsi.com
City Contacts	Chisholm	Mayor	Mary Jo Rahja	mrahja@ci.chisholm.mn.us
City Contacts	Chisholm	Police Chief	Vern Manner	vmanner@ci.chisholm.mn.us
City Contacts	Cook	City of		theresa@cookmn.us
City Contacts	Cook	Administrator-Clerk/Treasurer	Theresa Martinson	Theresa@cookmn.us
City Contacts	Duluth	City of		Chelmer@duluthmn.gov
City Contacts	Duluth		Jim Filby Williams	jfwilliams@DuluthMN.gov
City Contacts	Duluth		Mike LeBeau	mlebeau@DuluthMN.gov
City Contacts	Duluth	EM Director/Deputy Fire Chief	Shawn Krizaj	skrizaj@duluthmn.gov
City Contacts	Ely	City of		elyod@ely.mn.us
City Contacts	Ely	Police Officer/Emergency Management	George Burger	George.burger@ely.mn.us
City Contacts	Ely	Police Chief	John Lahtonen	elypd@ely.mn.us
City Contacts	Ely	Fire Chief	Tom Erchull	Tom.erchull@ely.mn.us
City Contacts	Eveleth	City Administrator/Clerk	Jackie Monahan-Junek	jackie@evelethmn.com
City Contacts	Eveleth	Chief of Police	Timothy H. Koivunen	koivunent@evelethmn.com
City Contacts	Eveleth	City of		jackie@evelethmn.com

City Contacts	Floodwood	Police Records supervisor	Corinne Suonvieri	csuonvieri@ci.floodwood.mn.us
City Contacts	Floodwood	Police Chief/Emergency Manager	Verne VanGuilder	vguilder@ci.floodwood.mn.us
City Contacts	Floodwood	City of		admin@ci.floodwood.mn.us
City Contacts	Gilbert	City of		jamespaulsen@gilbertmn.org
City Contacts	Gilbert	City of Gilbert - Mayor	Beth Milos	callenbeth@yahoo.com
City Contacts	Gilbert	Gilbert Fire Department Fire Chief	Marc Kwiatkowski	mk@pqsupplies.com
City Contacts	Gilbert	Chief of Police	Ty Techar	tytechar@gilbertmn.org
City Contacts	Hermantown	Police Chief	Jim Crace	crace@hermantownmn.com
City Contacts	Hermantown	Fire Chief	Mike Marshall	hermantownfire@hermantownmn.com
City Contacts	Hermantown	City of	Paul Senst	dlund@hermantownmn.com; psenst@hermantownmn.com
City Contacts	Hibbing	City of		makepler@ci.hibbing.mn.us
City Contacts	Hibbing	Fire Chief	Erik Jankila	ejankila@ci.hibbing.mn.us
City Contacts	Hibbing	Firefighter	Matt Ashmore	mashmore@ci.hibbing.mn.us
City Contacts	Hoyt Lakes	City Clerk-Treasurer	Becky Burich	rburich@hoytlakes.com
City Contacts	Hoyt Lakes	Deputy Clerk	Tammy Snetsinger	tsnetsinger@hoytlakes.com
City Contacts	Hoyt Lakes	City of		tsnetsinger@hoytlakes.com
City Contacts	Hoyt Lakes/Aurora - East Range PD	Police Chief	Tim Soular	chief@eastrangepd.com
City Contacts	Iron Junction	Mayor	Travis McDonald	vanhrioux@yahoo.com
City Contacts	Iron Junction	City of		cityofironjunction@mchsi.com
City Contacts	Kinney	Mayor	Michael H. Dahl Jr.	citykinney@mchsi.com
City Contacts	Kinney	City of		citykinney@mchsi.com
City Contacts	Leonidas	City of		mbeltezore@gmail.com
City Contacts	Leonidas	Mayor	Kyle Andrews	mbeltezore@gmail.com
City Contacts	McKinley	Mayor	Tony Nygaard	mltveit908@gmail.com
City Contacts	McKinley	City of		mltveit908@gmail.com
City Contacts	Meadowlands	City of		info@cimeadowlands.mn.us
City Contacts	Mt Iron	City of		cwainio@ci.mountain-iron.mn.us
City Contacts	Mt. Iron	City Administrator	Craig Wainio	cwainio@ci.mountain-iron.mn.us
City Contacts	Mt. Iron	Mayor	Gary W. Skalko	cwainio@ci.mountain-iron.mn.us
City Contacts	Mt. Iron	Fire Chief	Larry Simonson	Simonson35@gmail.com

City Contacts	Mt. Iron	Ambulance Director	Troy Malley	meadowlandsamb@frontier.com
City Contacts	Orr	City of		orrmn@centurytel.net
City Contacts	Orr	Mayor	Joel Astleford	orrmn@centurytel.net
City Contacts	Proctor	City of		cityhall@proctormn.gov
City Contacts	Proctor	Police Chief	Kent Gaidis	kgaidis@proctorpd.org
City Contacts	Rice	City of		TBlomdahl@RiceLakeCityMN.com
City Contacts	Rice Lake	Mayor	John Werner	Clerk1@ricelakecitymn.com
City Contacts	Tower	City of		linda@cityoftower.com
City Contacts	Tower	Mayor	Orlyn A. Kringstad	orlyn@cityoftower.com
City Contacts	Tower	Ambulance Director/Fire Chief	Steve Altenburg	fire@cityoftower.com
City Contacts	Virginia	City of		plabine@virginiamn.us
City Contacts	Virginia	Virginia Fire Chief	Allen G. Lewis	lewisa@virginiamn.us
City Contacts	Virginia	City Administrator	Britt See-Benes	britts@virginiamn.us
City Contacts	Winton	City of		wintoncityclerk@gmail.com
City Contacts	Winton	Mayor	Adam Masiroski	amasloski@boundarywatersc.com
County Commissioners	St. Louis County	SLC County Commissioners	Frank Jewell	jewellf@stlouiscountymn.gov
County Commissioners	St. Louis County	SLC County Commissioners	Keith Nelson	nelsonk@stlouiscountymn.gov
County Commissioners	St. Louis County	SLC County Commissioners	Mike Jugovich	jugovichm@stlouiscountymn.gov
County Commissioners	St. Louis County	SLC County Commissioners	Patrick Boyle	boylep@stlouiscountymn.gov
County Commissioners	St. Louis County	SLC County Commissioners	Paul McDonald	McDonaldP@StLouisCountyMN.gov
County Contacts	St. Louis County	PHHS Division Director	Amy Westbrook	westbrooka@stlouiscountymn.gov
County Contacts	St. Louis County	Planning Director	Barb Hayden	haydenb@stlouiscountymn.gov
County Contacts	St. Louis County	Deputy Planning Director	Darren Jablonsky	jablonskyd@stlouiscountymn.gov
County Contacts	St. Louis County	Environmental Program Administrator	Dave Fink	Finkd2@stlouiscountymn.gov
County Contacts	St. Louis County	County Assessor	Dave Sipla	siplad@stlouiscountymn.gov
County Contacts	St. Louis County	Planning Manager	Dave Yappel	yapeld@stlouiscountymn.gov
County Contacts	St. Louis County	Supervising Deputy	Jason Lukovsky	lukovskyj@stlouiscountymn.gov
County Contacts	St. Louis County	Deputy Land and Minerals Director	Jason Meyer	meyerj@stlouiscountymn.gov

County Contacts	St. Louis County	IT	Jeremy Craker	CrakerJ@stlouiscountymn.gov
County Contacts	St. Louis County	Public Works Director	Jim Foldesi	foldesij@stlouiscountymn.gov
County Contacts	St. Louis County	Administrator	Kevin Gray	grayk@stlouiscountymn.gov
County Contacts	St. Louis County	Land and Minerals Director	Mark Weber	weberm@stlouiscountymn.gov
County Contacts	St. Louis County	GIS Specialist	Matthew Goodman	goodmanm@stlouiscountymn.gov
County Contacts	St. Louis County	Lieutenant	Neil Porter	portern@stlouiscountymn.gov
County Contacts	St. Louis County	Sheriff-Director of Emergency Management	Ross Litman	litmanr@stlouiscountymn.gov
County Contacts	St. Louis County	Public Health Emergency Preparedness Coordinator	Scott Lesnau	lesnaus@stlouiscountymn.gov
County Contacts	St. Louis County	Public Health Supervisor/Emergency Preparedness	Steven Leslie	leslies@stlouiscountymn.gov
County Contacts	St. Louis County	Principal Engineer	Victor Lund	lundv@stlouiscountymn.gov
County Contacts	St. Louis County	SWCD District Manager - North		-
County Contacts	St. Louis County	Firewise Coordinator	Gloria Erickson	gloria@dovetailinc.org
County Contacts	WCD	SWCD District Manager - South	R. C. Boheim	r.c.boheim@southstlouiswcd.org
Other Stakeholders	Allete	Emergency Management Cordinator	Larry DiDomenico	ldidomenico@allete.com
Other Stakeholders	Allete	Director Security/EM	Warren LaPlante	wlaplante@allete.com
Other Stakeholders	Babbitt – Northeast Range Secondary	Principal	Kelly Engman	kengman@isd2142.k12.mn.us
Other Stakeholders	Chisholm Public School District		Dr. Janey Blanchard	jblanchard@chisholm.k12.mn.us
Other Stakeholders	Duluth Public School District	Superintendent	William Gronseth	William.gronseth@isd709.org
Other Stakeholders	Duluth Public Schools Academy	Director	Bonnie Jorgenson	Bonnie.jorgenson@duluthedison.com
Other Stakeholders	Ely Public School District	Superintendent	Kevin Abrahamson	kabrahamamson@ely.k12.mn.us
Other Stakeholders	Enbridge	Emergency Response Coordinator	Josh Saunders	Joshua.Sanders@enbridge.com

Other Stakeholders	Enbridge	Region Director	Trent Wetmore	trent.wetmore@enbridge.com
Other Stakeholders	Eveleth-Gilbert School District	Superintendent	Jeff Carey	jcarey@egschools.org
Other Stakeholders	Floodwood Public School District	Superintendent	Dr. Rae Villebrun	rvillebrun@isd698.org
Other Stakeholders	Fond du Lac Band of Lake Superior Chippewa	Emergency Management Director	Cassie Diver	cassiediver@fdlrez.com
Other Stakeholders	Hibbing Public School District	Superintendent	Brad Johnson	Brad.johnson@isd701.org
Other Stakeholders	Hibbing Technical College	Vice President of Finance and Administration	Karen Kedrowski Gina Godeen gina.godeen@hibbing.edu	kkedrowski@nhed.edu
Other Stakeholders	HSEM Region 2		Blain Johnson	blain.johnson@paramountplanning.net
Other Stakeholders	HSEM Region 2		Roy Holmes	roy.holmes@state.mn.us
Other Stakeholders	Lake Country Power	Operations Supervisor	Todd Johnson	tjohnson@lcp.coop
Other Stakeholders	Mesabi Range College	President	Bill Maki	wmaki@nhed.edu
Other Stakeholders	MN DNR Firewise Program	Northeast MN	Jeff Jackson	Jeffrey.Jackson@state.mn.us
Other Stakeholders	MN DNR Lake Superior Coastal Program	Coastal Program Specialist	Clinton Little	clinton.little@state.mn.us
Other Stakeholders	MN Power	Dam Safety Engineer	David Aspie	daspie@mnpower.com
Other Stakeholders	MN Sea Grant		Jesse Schomberg	jschombe@d.umn.edu
Other Stakeholders	Proctor Public Schools	Superintendent	John Engelking	jengelki@proctor.k12.mn.us
Other Stakeholders	St. Louis County School District	Superintendent	Dr. Reggie Engebritson	rengebritson@isd2142.k12.mn.us
Other Stakeholders	U.S. Forest Service – Kawishiwi Ranger District Ely	District Ranger	Douglas Smith	kawishiwi@fs.fed.us
Other Stakeholders	University of Minnesota Duluth	Police Chief	Sean Hulls	shuls@d.umn.edu
Other Stakeholders	USDA – Rural Development Community Programs	NE MN Specialist, Baxter	Tyler Ray	tyler.ray@usda.gov
Other Stakeholders	Virginia Public School District	Superintendent	Dr. Noel Schmidt	nschmidt@vmps.org
St. Louis County Commissioner	St. Louis County	Public Safety Board Rep	Beth Olson	Olsonb1@stlouiscountymn.gov

Township Contacts	Alango	Town of		jeribonnette@yahoo.com
Township Contacts	Alborn	Town of		alborn.clerk@gmail.com
Township Contacts	Alden	Town of		aldentwpclerk@gmail.com
Township Contacts	Angora	Town of		pattialt@yahoo.com
Township Contacts	Arrowhead	Town of		angie.irvine@yahoo.com
Township Contacts	Ault	Town of		aulttwp@frontiernet.net
Township Contacts	Balkan	Town of		balkantown@gmail.com
Township Contacts	Bassett	Town of		
Township Contacts	Beatty	Town of		beattytwp@gmail.com
Township Contacts	Biwabik	Town of		
Township Contacts	Breitung	Town of		breitung@breitungtownship.org
Township Contacts	Brevator	Town of		Bpallin22@gmail.com
Township Contacts	Camp	Town of		ccundy@hotmail.com
Township Contacts	Canosia	Town of		canosiatownship@yahoo.com
Township Contacts	Cedar Valley	Town of		cedarvalleyclerk@gmail.com
Township Contacts	Cherry	Town of		akoski@isd2142.k12.mn.us
Township Contacts	Clinton	Town of		clintontownshipmn@gmail.com
Township Contacts	Colvin	Town of		colvintownhall@frontier.com
Township Contacts	Cotton	Town of		towncotton@arrowheadtel.net
Township Contacts	Crane Lake	Town of		info@cranelaketwp.com
Township Contacts	Culver	Town of		clerk.culvertownship@outlook.com
Township Contacts	Duluth	Town of		townclerk@lakenet.com
Township Contacts	Eagles Nest	Town of		eaglesnesttwp@citlink.net
Township Contacts	Ellsburg	Town of		ellsburg2@arrowheadtel.net
Township Contacts	Elmer	Town of		elmertownship@outlook.com

Township Contacts	Embarrass	Town of		embarrasssttownship@frontier.net.net
Township Contacts	Fairbanks	Town of		Township1@outlook.com
Township Contacts	Fayal	Town of		fayaltownship@mchsi.com
Township Contacts	Field	Town of		clerk@fieldtownship.com
Township Contacts	Fine Lakes	Town of		wjdawson@frontier.com
Township Contacts	Floodwood	Town of		vickiej@frontiernet.net
Township Contacts	Fredenberg	Town of		Fredenbergtwp@gmail.com
Township Contacts	French	Town of		jws.vei@gmail.com
Township Contacts	Gnesen	Town of		Lottie@gnesen.org
Township Contacts	Grand Lake	Town of		grandlakeclerk@hotmail.com
Township Contacts	Great Scott	Town of		shauta@ci.hibbing.mn.us
Township Contacts	Greenwood	Town of		clerk@greenwoodtownshipmn.com
Township Contacts	Halden	Town of		jpavlek@hotmail.com
Township Contacts	Industrial	Town of		kristelkubis@gmail.com
Township Contacts	Kabetogama	Town of		Kabtown@frontier.com
Township Contacts	Kelsey	Town of		slygh55724@msn.com
Township Contacts	Kugler	Town of		jsuihk@hotmail.com
Township Contacts	Lakewood	Town of		ehanson5@d.umn.edu
Township Contacts	Lavell	Town of		deslongchamps78@gmail.com
Township Contacts	Leiding	Town of		marie57@centurytel.net
Township Contacts	Linden Grove	Town of		ronetteen@yahoo.com
Township Contacts	McDavitt	Town of		<u>rlmcdtwp@accessmn.com</u>
Township Contacts	Meadowlands	Town of		debraz@frontiernet.net
Township Contacts	Midway	Town of		midwaytwp@msn.com
Township Contacts	Morcom	Town of		morcomtownshipmn@gmail.com

Township Contacts	Morse	Town of		elyecho@aol.com
Township Contacts	Ness	Town of		nesstowship@gmail.com
Township Contacts	New Independence	Town of		newindependenceclerk@gmail.com
Township Contacts	Normanna	Town of		ehanson5@d.umn.edu
Township Contacts	North Star	Town of		brittonX277@yahoo.com
Township Contacts	Northland	Town of	Bobbi Pirkola, Clerk	pirkolad@frontiernet.net
Township Contacts	Owens	Town of		shirley1268@wildblue.net
Township Contacts	Pequaywan	Town of		peqclerk@gmail.com
Township Contacts	Pike	Town of		Jodi_backman@yahoo.com
Township Contacts	Portage	Town of	Shannon Bibeau	<u>bibeaustarr@yahoo.com</u>
Township Contacts	Portage	Town of		portagetwpmn@gmail.com
Township Contacts	Prairie Lake	Town of		plt1@hotmail.com
Township Contacts	Sandy	Town of		sandytownship@yahoo.com
Township Contacts	Solway	Town of		solwayclerk@hotmail.com
Township Contacts	Stoney Brook	Town of		moejacwil@frontier.com
Township Contacts	Sturgeon	Town of		tcswani@yahoo.com
Township Contacts	Toivola	Town of		sticksville5@frontiernet.net
Township Contacts	Van	Town of		sue.rae.hutchinson@gmail.com
Township Contacts	Vermilion	Town of		vermillionlaketownclerk@gmail.com
Township Contacts	Waasa	Town of		sgclerk@yahoo.com
Township Contacts	White	Town of		townofwhite@yahoo.com
Township Contacts	Willow	Town of		djparson@live.com
Township Contacts	Wuori	Town of	dnelson5164@gmail.com	Townofwuori@yahoo.com

From: Holly Olson
To: Holly Olson
Cc: Duane Johnson; hundriesconsulting@outlook.com
Subject: MEETING INVITATION: 2019 MULTI-HAZARD MITIGATION PLAN UPDATE
Date: Thursday, April 25, 2019 8:37:50 AM
Attachments: [image001.png](#)
[image003.png](#)
Importance: High

This message was sent securely using Zix®

Greetings,

Your presence is requested at a Planning Team Meeting for the update of the **2019 St. Louis County Multi-Hazard Mitigation Plan**. You are requested to participate in this vital meeting because you have a position of administrative or departmental responsibility within either the County, a municipal government, or are a key stakeholder related to the planning process. You are encouraged to bring a team of additional staff from your county department, municipality, or associated stakeholder organization.

Two meetings will be held to serve the northern and southern parts of the County. Please attend the meeting that is the most adjacent to your area:

MEETING #1 - VIRGINIA

Date: Tuesday, May 28
Time: 2:00 p.m. – 4:00 p.m.
Location: St. Louis County Public Works Building – Training Room
(7823 Hwy 135, Virginia MN 55792)

MEETING #2 - DULUTH

Date: Wednesday, May 29
Time: 10:00 a.m. – 12:00 p.m.
Location: St. Louis County Public Safety Office – EOC
(5735 Old Miller Trunk Highway, Duluth MN 55811)

About the Plan

The update of the St. Louis County Multi-Hazard Mitigation Plan (MHMP) is a requirement by the State of Minnesota Department of Homeland Security & Emergency Management (HSEM) as well as the Federal Emergency Management Agency (FEMA) every 5 years. Our 2013 plan is due for an update and our planning is currently underway. The plan addresses the natural hazards that face St. Louis County and will result in the identification of mitigation actions that will help to reduce or eliminate the impact of future hazard events, such as flooding and severe winter or summerstorms.

Your participation in this plan update is important for several reasons:

1. You will help to identify critical mitigation projects to implement at the county / local level, and how they can be integrated with existing plans, policies, or project efforts.

2. Participating jurisdictions will be eligible to apply for FEMA hazard mitigation grant funding.
3. Mitigation planning is necessary to keep our communities resilient against future disasters and reduce the costs of recovery.
4. FEMA requires documentation of how local government and key stakeholders participated in the planning process.

During this meeting we will review and rank the natural hazards that pose risk St. Louis County and individual communities and discuss a range of mitigation measures for local implementation. The meeting will be facilitated by personnel from the University of Minnesota Duluth - Geospatial Analysis Center team who are working closely with us on this project.

Please RSVP

RSVP to Holly Olson olsonh@stlouiscountymn.gov or 218-726-2921 to indicate your attendance at either the Virginia or Duluth meeting location, and how many will be attending. If you cannot attend, please plan to send someone in your stead to ensure representation.

Thank you,

Dewey Johnson
Emergency Management Coordinator
St. Louis County Sheriff's Office
218-726-2936

Holly Olson | Information Specialist II
St. Louis County Sheriff's Office
911/Communications
2030 North Arlington Avenue
Duluth, Minnesota 55811
218-726-2921
olsonh@StLouisCountyMN.gov

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St. Louis County

2019 Multi-Hazard Mitigation Plan Update

Planning Team Meetings

Tuesday, May 28, 2019 – Virginia, MN (2:00 p.m. – 4:00 p.m.) and
Wednesday, May 29, 2019 – Duluth, MN (10:00 a.m. – 12:00 p.m.)

Presenting:

- Stacey Stark, Director, University of Minnesota –Duluth, Geospatial Analysis Center
- Bonnie Hundrieser, Hundrieser Consulting LLC (UMD Project Team)

Agenda:

1. Welcome and Introductions
2. Overview of MHMP Update
 - Purpose of the Plan
 - Role of the Planning Team
 - Content of the Plan
 - Review of Natural Hazards
3. Review of Mitigation Strategies
4. Overview of FEMA Hazard Mitigation Assistance (HMA) Grants
5. Mitigation Action Working Session

Point of Contact:

Dewey Johnson
St. Louis County Emergency Management Coordinator
Phone: 218-726-2936
Email: johnsond@stlouiscountymn.gov

St. Louis County

5/28/19 MHMP Planning Team Meeting #1 – VIRGINIA, MN

List of Participants (25)

St. Louis County MHMP Update - Planning Team Meeting #1			
May 28, 2019 - 2:00 p.m. - 4:00 p.m. (VIRGINIA, MN)			
Participant Sign-in List			
Name	Agency/Organization	Title	Email
Josh Brinkman	St. Louis County SO / EM	EM Intern	brinkmanj@stlouiscountymn.gov
Duane Nelson	Wuori Township	Township Supervisor	dnelson5164@gmail.com
Jeri Bonnette	Alango Township	Clerk	jeribonnette@yahoo.com
Jim Hofsommer	Colvin Township	Supervisor	
Dave Marshall	Vermilion College	Director of Facilities	d_marshall@vcc.edu
Vernon VanGuilder	Floodwood PD	Chief	police@ci.floodwood.mn.us
John E. Stoessel	City of Meadowlands	City Clerk	johnstoessel@hotmail.com
Clark Niemi	Town of White	Foreman	white.township@yahoo.com
Phillip Anderson	Vermilion Lake Township	Supervisor	andersontw@aol.com
Megan Deslangchamps	Lavell Township	Clerk	deslangchamps78@gmail.com
Warren Topker	Lavell Township	Supervisor	
Natalie Beck	Town of Colvin	Clerk	covintownhall@frontier.com
Gina Godeen	NHED Colleges	Safety / Emergency Management	gina.godeen@hibbing.edu
Chris Clark	Virginia Fire	Fire Marshal	cclark@virginiamn.us
Bill Hennis	City of Virginia	Lead Engineer	hennisb@virginiamn.us
Jesse Anderson	City of Tower	Emergency Management Director	linda@cityoftower.com
Allen Lewis	City of Virginia	Fire Chief	lewsa@virginiamn.us
Jim Park	Biwabik Township	Supervisor	jim@biwabiktownship.com
Keith Perrhing	Mesabi Range	Supervisor	
Steven Lotz	Vermillion Lake FD	Chief	slotz@localnet.com
Richelle Cole	City of Virginia Library	Library Clerk	richelle.perreault@alslib.info
Bob Brown	Chisholm Fire	Fire Chief	brownfd@mchsi.com
Dave Olds	Hibbing Community College	Director of Facilities	davidolds@hibbing.edu
Bill Manney	City of Chisholm	Administrator	bmanney@ci.chisholm.mn.us
Dewey Johnson	St. Louis County - SO/EM	EM Coordinator	johnsond@stlouiscountymn.gov

St. Louis County – Multi Hazard Mitigation Plan Update
Planning Team Meeting #1 – May 28, 2019 (VIRGINIA) 2:00 p.m. – 4:00 p.m.

PARTICIPANT SIGN IN SHEET

Name	Agency/Organization	Title	Email
1. Josh Brinkmann	SLC Emergency Management	Intern	BrinkmannJ@StLouisScouting.org
2. Deanne Nelson	Hyperion, Twp. Supervisor	Twp Supervisor	Deanne.styler.smith@twp.com
3. Jeri Bonnette	Alango Township	Supervisor	Jeri.bonnette@yahoo.com
4. Jim Hotzmaier	Colvin Twp	Supervisor	
5. Dave Marshall	Vernon Collier	Director of Facilities	d_marshall@ucc.edu
6. Vernon VanBuulder	Fladdeed PD	Chief	
7. John C. Stoesel	Meadholand	City Clerk	John.stoesel@meadholand.org
8. Clark Nienow	Town of White	Foreman	white.township@yahoo.com
9. Phillip Anderson	Vernilion LK. Twp	Supervisor	andersontw@att.net
10. Megan Deslongchamps	Lavel L township	Clerk	deslongchamps78@gmail.com
11. Urgsreez Tipton		Supervisor	
12. Natalie Beck	Town of Colvin	Clerk	Colvin.townhall@frontier.com
13. Linda Gabay	NHED Colleges	Secretary	linda.gabay@hibbing.edu
14. Clark Clark	Virginia Fire	Fire Marshal	clark@virginia.us
15. Bill Dennis	City of Cheshire	Lead Engineer	bill.dennis@cheshire.us
16. Jesse Anderson	City of Tower	Emergency Management Director	linda@cityoftower.com
17. Allen Kaus	City of Virginia	Fire Chief	lenska@virginia.us
18. Jim Paus	Blawalk Township	Supervisor	jim@biwabik.township.com
19. Keith Gertzke	MESETA, Ridge Super		
20. Steven Lott	Vernilion Lake FD	Chief	610.722.1000@lambert.com
21. Michelle Cole	City of Virginia Library	Library Clerk	Michelle.perreault@lambert.info
22. Bob Brown	Calisham FIRE	Fire Chief	brownbob@lambert.info

St. Louis County – Multi Hazard Mitigation Plan Update
Planning Team Meeting #1 – May 28, 2019 (VIRGINIA) 2:00 p.m. – 4:00 p.m.

Name	Agency/Organization	Title	Email
23. <i>Dave Olds</i>	<i>Hobson Community College</i>	<i>Director of Facilities</i>	<i>David.Olds@hobson.org</i>
24. <i>Bill Manney</i>	<i>City of Chisholm</i>	<i>Administrator</i>	<i>bmanney@ci.chisholm.mn.us</i>
25. <i>Darby Johnson</i>	<i>SLC -SC/EM</i>	<i>EM Coordinator</i>	
26.			
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St. Louis County

5/29/19 MHMP Planning Team Meeting #1 – DULUTH, MN

List of Participants (25)

St. Louis County MHMP Update - Planning Team Meeting #1 May 29, 2019 - 10:00 a.m. - 12:00 p.m. (DULUTH) Participant Sign-in List			
Name	Agency/Organization	Title	Email
Warren LaPlante	Allete/MN Power - Sec & EM	Manager, Sec & EM	wlaplante@allete.com
Scott Lesnau	St. Louis Count P. II	PHN Emer Pre Coor.	lesnau@stlouiscountymn.gov
Steve Leslie	St. Louis County	Supervisor - P4	leslies@stlouiscountymn.gov
Lottie Haller	Town of Gnesen	Clerk	lottie@gnesen.org
Clyde Mortinsen	Canosia Township	Asst. Fire Chief	canosiafire@yahoo.com
Gary Oswell	Canosia Township	Road Foreman	garyoswell49@gmail.com
Todd Johnson	Lake County Power	Operations Manager	tjohnson@lcp.coop
Daniel Golen	Canosia Township	Supervisor	canosiadg@gmail.com
John Werner	Rice Lake	Mayor	clerk1@ricelakecitymn.com
Jim Foldesi	St. Louis County	Public Works Director	foldesi@stlouiscountymn.gov
Mark Weber	St. Louis County	Land Commissioner	weberm@stlouiscountymn.gov
Ron Gajewski	Solway Township	Supervisor	solwayclerk@hotmail.com
Paul Senet	Hermantown	Public Works Director	psenst@hermantownmn.com
Mark Pannuk	St. Louis County County Land	Area Land Manager	pannukm@stlouiscountymn.gov
Clayton Cich	Fredenberg Township	Supervisor	claytoncich@yahoo.com
Jason Meyer	St. Louis County Land & Min	Dep Land & Min Director	meyerj@stlouiscountymn.gov
Sandi Nelson	Cotton Township	Dep Clerk	towncotton@arrowheadtel.net
Toni Blomdahl	Rice Lake	Clerk-Treasurer	tblomdahl@ricelakecitymn.gov
Jim Ray	Fredenberg Township	Supervisor	jray.southbay@gmail.com
Vic Lund	St. Louis County	Traffic Engineer	lundy@stlouiscountymn.gov
Josh Sanders	Enbridge	ER Coordinator	joshua.sanders@enbridge.com
Jim F. Williams	City of Duluth	Director of Public Admin	jfwilliams@duluthmn.gov
Shawn Krizaj	Duluth Fire / EM	Interim Chief	skrizaj@duluthmn.gov
Dave Yapel	SLC Planning / GIS	GIS Mgr.	yapeld@stlouiscountymn.gov
Dewey Johnson	SLC SO / EM	EM Coordinator	johnsond@stlouiscountymn.gov
Josh Brinkman	SLC SO / EM	EM Intern	brinkmani@stlouiscountymn.gov

St. Louis County – Multi Hazard Mitigation Plan Update
 Planning Team Meeting #1 – May 29, 2019 (DULUTH) 10:00 a.m. – 12:00 p.m.

PARTICIPANT SIGN IN SHEET

Name	Agency/Organization	Title	Email
1. Warren LaPlante	Allegheny Power - Sec 4EM	Manager, Sec 4EM	wholante@allegh.com
2. Scott Lesnes	Lesnes Associates, Inc.	Energy Project Manager	scott.lesnes@lesnesassociates.com
3. Steve Lesniak - Sec	Lesniak Associates, Inc.	Project Manager - P.M.	steve.lesniak@lesniakassociates.com
4. Leslie Loeffler	Town of Oneida	Clerk	leslie.loeffler@oneida.org
5. Clyde Mortensen	Canastra Township	Asst Fire Chief	clyde.mortensen@yakota.com
6. Gary Osprell	Canadia Tree	Road Foreman	gary.osprell49@gmail.com
7. Todd Johnson	Lake Country Power	Operations Mgr.	tjohnson@lcp.coop
8. DANIEL GOLIN	Chaska Twp	Supervisor	chaska.dg@gmail.com
9. Jim Lujan	Ram Lake	Manager	jim.lujan@gmail.com
10. Jim Polkisi	St. Louis County	Police Works Director	policeworks@stlouiscountymn.gov
11. Mark Weber	"	Land Commissioner	mark.weber@stlouiscountymn.gov
12. Bob Gaffeyesky	Sokoly Twp.	SUPERVISOR	sokoly.scholar@hotmail.com
13. Paul Sevier	Hermantown	Works Dir	psenior@hermantownmn.org
14. Mark Pankuk	St. Louis Co Land	Area Manager	pankukm@slcmn.org
15. Charon Cich	Freelensing Twp	Sup	charon.cich@yale.org
16. Jason Meyer	St. Louis Co Head, Hwy	Dep Land & Min Dist. Mgr	jason.meyer@stlouiscountymn.gov
17. Sandi Nelson	Cotton Township	Dep Clerk	towncotton@arrowheadtel.net
18. Toni Blundahs	Rice Lake	Clerk-Treasurer	tblundahs@ricecitygarden.com
19. Jim Ray	Fredberg Twp	Supervisor	jray.southbay@gmail.com
20. Vic Lunda	St. Louis Co	Traffic Engineer	lunda.v@lisa.mn.gov
21. Josh Sanders	Enbridge	ER Coordinator	Joshua.Sanders@enbridge.com
22. Jim Ellingson	Co	Dir of Public Info	jellingson@lisa.mn.gov

Jim Ellingson
gov

St. Louis County – Multi Hazard Mitigation Plan Update
Planning Team Meeting #1 – May 29, 2019 (DULUTH) 10:00 a.m. – 12:00 p.m.

Name	Agency/Organization	Title	Email
23. Shawn Krizan	Duluth Fire / EM	Interim Chief	Shawn.Krizan@stlouiscounty.org
24. Dave Yager	SCC Planning / GIS	GIS Mgr.	YagerD@stlouiscounty.org
25. Dewey Johnson	SCC SO/EM	EM Coordinator	
26.			
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6/21/2019



October 2018 Lake Superior storm damage in Duluth

St. Louis County

2019 MULTI-HAZARD MITIGATION PLAN UPDATE
PLANNING TEAM MEETING #1
May 28 & 29, 2019

Agenda

1. Welcome and Introductions
2. Overview of MHMP Update
 - *About the Plan*
 - *Role of the Planning Team*
 - *Content of the Plan*
 - *Review of Natural Hazards*
3. Review of Mitigation Strategies
4. Overview of FEMA Hazard Mitigation Assistance (HMA) Grants & Eligible Activities
5. Mitigation Action Working Session



April 2019 Spring Storm



June 15, 2018 West Duluth Flooding



May 2016 Forest Lake Fire (left of Dyk)

About your UMD Project Team

UMD
Geospatial Analysis Center
University of Minnesota Duluth
Driven to Discover

- The **Geospatial Analysis Center (GAC)** at the **University of Minnesota Duluth (UMD)** was contracted by MN HSEM to facilitate the development of this plan and to conduct spatial analysis, mapping and research for the plan.
- The GAC has worked on 30 MHMP's (2011-2019), working with both Minnesota counties and tribes.
- Working with the GAC is **Bonnie Hundrieser**, who specializes in Emergency Management planning.

About the Plan

The Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). The development of a local government plan is required in order to maintain eligibility for FEMA hazard mitigation grant programs.

MHMP's must:

- Be updated every 5 years
- Identify hazards and conduct a risk assessment
- Include goals, strategies, and mitigation actions
- Address all jurisdictions
- Engage stakeholders and include public participation

What is Hazard Mitigation?

- HM is **sustained action** to reduce or eliminate long-term risk to people and their property from hazards.
- HM Planning is the process local government use to **identify risks and vulnerabilities** associated with natural disasters, and develop long-term strategies for protecting people and property from future hazard events.
- HM planning allows communities to strategically plan for and work **together** to implement activities that are cost effective, technically feasible and environmentally sound ... **BEFORE** a disaster strikes.
- \$1 spent on mitigation grants leads to an average of \$6 in avoided post-disaster relief costs and increased federal tax revenues.

Role of the Planning Team

An MHMP **must** be developed with the participation of jurisdictional representatives and other key stakeholders. This group is referred to generally as the "Planning Team".

The role of the Planning Team is to help:

1. Review the natural hazards that pose risk to the county and its jurisdictions since the last plan was adopted.
2. Identify mitigation activities for implementation, including eligible FEMA HMA grant activities.
3. Assist with public outreach and gathering feedback.
4. Review of the draft plan and provide input to mitigation action charts.
5. Facilitate final adoption of the MHMP by local government.

6/21/2019

Who the Plan Covers

This is a multi-jurisdictional plan that covers St. Louis County, including the cities of Aurora, Babbitt, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton.

The County and Cities are required to adopt the final plan. Townships are covered under the umbrella of the County.



Content of the Plan

- Documentation of the Planning Process
- Physical & Social Profile
- Critical Infrastructure Inventory
- Risk Assessment & Vulnerability Analysis
- Capability Assessment
- Mitigation Strategies and Actions



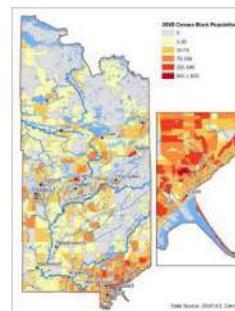
Lakewalk after October 2017 storm

Led by HC
Led by JMD

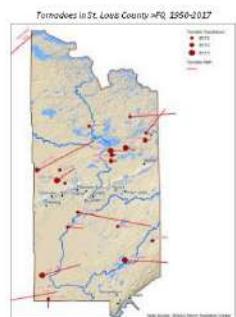
Role of GAC

- Project Management and communication with HSEM
- Technical writing, editing of plan
- Research to create/update the county profile
 - characteristics of county: physical, environmental, economic, demographic
 - work with county to identify Critical Infrastructures
- Research to create/update hazard profiles
 - hazard history; frequency of the hazard; who's most vulnerable to the hazard; influence climate change has on hazard
- GIS is used to inform our research

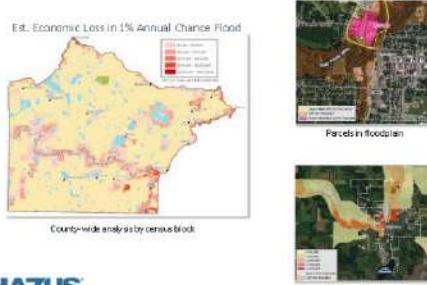
County Profile: Pop. by Census Block



Hazard Profile: Tornado History



Vulnerability Analysis: Flood Modeling



6/21/2019

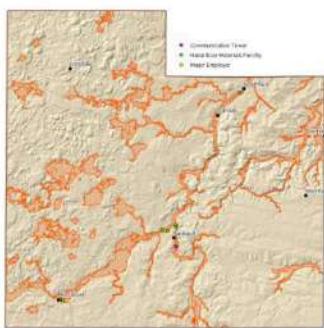
Critical Infrastructure (CI)

Group	Sub-Group	Examples
Emergency & Shelter Facilities	Healthcare Facilities	Hospitals, nursing homes, medical clinics, dentists, dental offices, medical clinics, assisted care homes, senior adult living facilities, blood banks, other housing for the elderly or occupants who may not be sufficiently mobile to avoid the loss of life or injury during natural disasters.
Emergency & Shelter Facilities	Emergency Services	Law Enforcement, Fire & Emergency Services, Emergency Medical Service (EMS), Emergency Operations Center (EOC)
Emergency & Shelter Facilities	Schools & Evacuation Centers/Shelters	Elementary, middle, high schools, and postsecondary schools, church, community centers, other facilities designated as emergency shelters
Infrastructure Systems	Transportation Systems	Airports, roads, bridges, railways, commercial shipping ports
Infrastructure Systems	Utility Systems	Energy Utilities (electricity), power generating stations (including wind farms, solar farms, etc.), main above-ground transmission lines, substations Pipeline Systems (oil & natural gas) underground assets, such as pipelines, pumping stations & compressor stations Water & Sewer Utilities: water treatment plants Communication: radio towers used for emergency communication (AMVER) sites

Critical Infrastructure (CI)

Group	Sub-Group	Examples
High-Potential Loss Structures	Demol. Levees	Hydroelectric power generation, manufacturing and industrial waste supplies, agricultural irrigation, sediment and flood control, oil or gas storage for refined bulk shipping, industrial waste management, and remediation
High-Potential Loss Structures	Hazardous Materials Facilities	Facilities required to submit an EPA Tier II report, facilities that use, produce or store highly volatile, flammable, explosive or toxic or waste-reactive materials
Significant County Assets	Employers	Large employers (e.g. factories, manufacturers, hospitals, universities, etc.); employers who represent the primary economic sector of a community
Significant County Assets	Government Buildings (Federal, State, Local, Tribal)	Main government service centers, court houses, jails & prisons
Significant County Assets	Cultural Resources	Cultural and historic assets that are unique or irreplaceable, or any asset that is deemed important to the community

CI Intersecting Floodplain

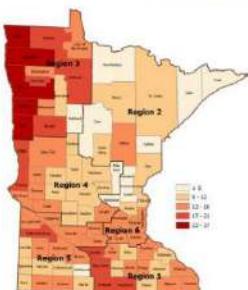


UMD – County Coordination

The UMD GAC Team works closely with personnel from the County to collect key information for the plan update, commonly including:

- County Emergency Management Director
- County GIS Specialist
- County Assessor
- County Departments (i.e. Highway, Planning & Zoning, SWCD, others).

FEMA-Declared Disasters & Emergencies in St. Louis County



St. Louis County has been part of 11 FEMA-declared disasters & emergencies.

Most Recent:

2018: DR-4390 (due to severe storms, tornadoes, straight-line winds, and flooding)

2019: DR-4414 (due to severe storms and flooding)

What Hazards are Addressed?

A Multi-Hazard Mitigation Plan looks primarily at natural disasters, including:

Flooding	Hail	Drought
Dam/Levee Failure	Lightning	Extreme Heat
Wildfire	Winter Storms	Extreme Cold
Windstorms	Landslides/Erosion	Earthquakes
Tornadoes	Land Subsidence (Sinkholes & Karst)	

Hazard Categories from the Minnesota State Plan

Manmade hazards are not required by the DMA 2000 to be addressed in the MHMP.

6/21/2019

Review of Natural Hazards that Pose Risk to St. Louis County

The MHMP update needs to include a review of the following:

- How has the risk to severe natural hazard events *increased or decreased* since the last plan?
- Are there *jurisdictional variations* in risk?
- Are there *local vulnerabilities* to consider?
- Have there been *changes in development*?

Main Risk Factors: Probability & Severity (Impacts)

Severe Winter Storms

• **Probability:** High

• **Possible Impacts:**

- Danger to Life Safety (road passage, roof collapse)
- Interruption to Transportation and Emergency Services
- Damage to Property
- Cascading Effects** such as downed power lines & extended power outages to homes and critical facilities.



Severe Summer Storms

• **Probability:** High

• **Possible Impacts:**

- Danger to Life Safety
- Damage to Natural Resources
- Damage to Roads & Property
- Cascading Effects** such as flooding to roads, area lakes & streams, downed power lines & extended power outages to homes and critical facilities.



Flooding

Flash Flood, Riverine Flood & Coastal Flood

• **Probability:** Moderate/High

• **Possible Impacts:**

- Danger to Life Safety (road passage, flooding of homes)
- Interruption to Transportation and Emergency Services
- Flooding of ag land and lost harvest / tilled land run-off
- Damage to Roads & Property
- Cascading Effects** such as pump station failure or dam failure; displacement of residents.



Extreme Temperatures

• **Probability:** Moderate

• **Possible Impacts:**

- Danger to Life Safety (prolonged exposure)
- Potential impact to critical infrastructure and other properties
- Cascading Effects** such as need provide temporary mass care sheltering for vulnerable populations.



Erosion, Coastal Erosion, Landslides & Land Subsidence

• **Probability:** Moderate/High

• **Possible Impacts:**

- Erosion of slopes, streambanks, riverbanks, coastal lake edges
- Sediment load to lakes
- Damage to Property or Imminent Risk of failure
- Cascading Effects** such as road closures and impacted storm water systems from sediment load



6/21/2019

Wildfire

- **Probability:** Moderate/High

- **Possible Impacts:**

- Danger to Life Safety (homes in wooded areas)
- Loss of Forests/Grasslands and Natural Resources
- Damage to Roads & Property
- **Cascading Effects** such as air quality pollution, need for extended evacuation.



Drought

- **Probability:** Low/Moderate

- **Possible Impacts:**

- Impacts to local water resources and lakes
- Impact to agricultural harvest
- **Cascading Effects** such as increased danger for wildfire.



Dam Failure

- **Probability:** Low

- **Possible Impacts:**

- Danger to Life Safety (downstream residents)
- Localized flooding



Review of Mitigation Capabilities

Multi-Hazard Mitigation Plans require that each jurisdiction **must** document the existing authorities, policies, programs, and resources in place for mitigation.

- What **plans and programs** are in place to support mitigation against that hazard?
- What **program gaps or deficiencies** exist to support mitigation against that hazard?

Mitigation Strategies



1. Local Planning & Regulations
2. Structure & Infrastructure Projects
3. Natural Systems Protection
4. Education and Awareness Programs
5. Mitigation Preparedness & Response Support

STRATEGY #1 Local Planning & Regulations

These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.

- Comprehensive plans
- Land use ordinances
- Planning and zoning
- Building codes and enforcement
- Floodplain ordinances
- NFIP Community Rating System
- Capital improvement programs
- Open space preservation
- Shoreline codes
- Stormwater management regulations and master plans
- Mobile home park compliance for storm shelters



6/21/2019

STRATEGY #2**Structure & Infrastructure Projects**

These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area.

This type of action also involves projects to construct manmade structures to reduce the impact of hazards.



- Property Acquisitions and elevations of structures in flood prone areas
- Utility undergrounding
- Structural retrofits (i.e., metal roofs)
- Floodwalls and retaining walls
- Detention and retention structures
- Culvert Installation/Modification
- Roads & Bridge risk reduction
- Safe Room (new construction or facility retrofit)
- Green Infrastructure Methods

August, 2012 – 1st school based tornado safe room (Wadena)

**Power Line retrofit/burial****Community Safe Rooms**

Wadena-Deer Creek School, June 17 2010

**Green Infrastructure Projects****STRATEGY #3****Natural Systems Protection**

These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.



- Soil stabilization for sediment and erosion control
- Floodplain and Stream corridor restoration
- Slope management
- Forest management (defensible space, fuels reduction, sprinkler systems)
- Conservation easements
- Wetland restoration and preservation
- Aquifer Storage & Recovery
- Flood Diversion and Storage

6/21/2019

Natural Systems Protection examples



STRATEGY #4 Education & Awareness Programs

These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

- Radio or television spots
- Websites with maps and information
- Social media outreach
- Promotion of sign-up for emergency warnings
- Real estate disclosure
- Promotion of NFIP insurance to property owners
- "Turn Around Don't Drown"
- Presentations to school groups or neighborhood organizations
- Mailings to residents in hazard-prone areas.
- NWS StormReady Program

Education & Awareness Program Examples



STRATEGY #5 Mitigation Preparedness & Response Support

This is a State of Minnesota mitigation strategy with the intent of covering emergency preparedness actions that protect life and property prior to, during, and immediately after a disaster or hazard event.

These activities are typically not considered mitigation, but support reduction of the effects of damaging events.

- Emergency Operations Plan
- Flood fight plans and preparedness measures
- Dam emergency action plans
- Emergency Warning Systems (i.e., CodeRED, Everbridge, warning sirens)
- Generator backup power
- NWS Storm Spotter Training
- Training and education for local elected officials and key partners.
- Exercises to test capabilities

Mitigation Preparedness & Response Support examples



5-Year Mitigation Action Chart (MAC)

Year	Activity	Lead Agency	Timeline	Comments	Implementation Status
1	1st Year: Mitigation & Response	Identify the current level of preparedness and identify areas for improvement.	12/31/2020	Minneapolis, St. Paul, Ramsey, Hennepin, Anoka, Washington, Dakota, Hennepin, and Ramsey counties.	MC Health Office (MCDO), Office of Emergency Management (OEM), and other county emergency management offices.
2	2nd Year: Education & Outreach Programs	Identify and develop education and outreach programs to raise awareness and promote preparedness.	12/31/2021	Minneapolis, St. Paul, Ramsey, Hennepin, Anoka, Washington, Dakota, Hennepin, and Ramsey counties.	MC Health Office (MCDO), OEM, and other county emergency management offices.
3	3rd Year: Mitigation & Response	Continue to prioritize and implement mitigation and response actions, including hazard assessments, risk assessments, and emergency preparedness measures.	12/31/2022	MC Health Office (MCDO), OEM, and other county emergency management offices.	MC Health Office (MCDO), OEM, and other county emergency management offices.

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MAC Development: 2019-2023

- Past Mitigation Action Review (2013-2019)
- County Capabilities Assessment
- Local Mitigation Survey (LMS)
- Additional Mitigation Action Ideas gathered during HMP Planning Team Meeting #1
- 2019 State Hazard Mitigation Plan
- MDH Climate Profiles & MPCA/paleBLUEdot Climate Adaptation Strategies

FEMA HMA Grant Program

A current and adopted MHMP is required for eligibility.

Eligible applicants: Local Government (county, cities), Tribal Government, and private non-profits.



Cost Share: **75%/25%**

HMGP
PDM
FMA

Eligible projects must be identified in the local MHMP.

HMA Eligible Project Types

- Property Acquisition / Demolition / Relocation
- Safe Room Retrofit or Construction
- Flood & Erosion Mitigation
- Green Infrastructure
- Infrastructure Retrofits (Utility Systems, Roads & Bridges)
- Minor Localized Flood Reduction Projects
- Wildfire Mitigation
- Soil Stabilization
- 5 Percent Initiative Projects



Historical projects in St. Louis County resulting from Hazard Mitigation funding

Year	Project Description	Funding Type	Sub-Contractor	Federal Share
1997	MDOT (St. Louis) - living shore fence	HMGP	MDOT - District 3	\$15,000
1997	Overhead to underground power line conversion	HMGP	Cooperative Light & Power Association	\$44,867
1997	St. Louis - 52nd	HMGP		\$50,000
1998	Back up generator	HMGP	Willing	\$11,849
1998	Missing storm water catch basin	HMGP	Willing	\$113,700
1998	Missing park addition sewer project	HMGP	Willing	\$10,000
1998	Missing drainage system	HMGP	Willing	\$10,000
1998	Missing fire main sanitary sewer - 14th/67	HMGP	Willing	\$10,076
1998	Virginia storm water runoff project	HMGP	Willing	\$43,315
1998	Virginia storm water runoff project	HMGP	Willing	\$84,298
1998	Willing-Sargent addition sewer project	HMGP	Willing	\$215,852
1998	Willing-drainage addition sewer project	HMGP	St. Louis county	\$20,800
1998	St. Louis county - 52nd	HMGP	St. Louis county	\$83,389
1999	City of Riverview, Sewer project	HMGP	Willing	\$109,675
2001	ARDC Mitigation Plan	HMGP	ARDC	\$77,367
2001	St. Louis County - 52nd Sprinkler Retrofit	HMGP	St. Louis (County)	\$417,812
2007	Project	HMGP	St. Louis (County)	\$417,812
2009	City of Osceola - 14th	HMGP	St. Louis (County)	\$109,675
2010	City of Duluth Acquisition	HMGP	St. Louis	\$108,395
2012	City of Duluth Acquisitions	HMGP	St. Louis county	\$106,767
Total HMGP/PDM Funding - St. Louis County				\$1,131,880

Mitigation Action Working Session

- Review feedback from St. Louis County 2019 LMS Report.
- Use the Mitigation Ideas Worksheet for new mitigation projects (county / local level).
- Consider projects that may be eligible for FEMA HMA grant funding.

Next Steps in MHMP Process

- Draft Mitigation Action Charts will be developed.
- Follow-up will be conducted as necessary.
- UMD will be working on the full draft plan with the County.
- 2nd HMP Planning Team meeting for MAC Review (estimated Fall, 2019).
- Completion of draft plan and public review period.

Mitigation Strategies & Action Types

Following are the five types of mitigation strategies that will be used in the update of the Multi-Hazard Mitigation Plan with examples of related mitigation actions. Minnesota HSEM recommends the use of these mitigation strategies to be in alignment with the State plan and those recommended by FEMA. The first four strategies listed are taken from the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). The fifth strategy type was determined by Minnesota HSEM for use within the state.

These strategies will provide the framework for identification of new jurisdictional-level mitigation actions for implementation over the next 5-year planning cycle.

Mitigation Strategy	Description	Example Mitigation Actions
Local Planning and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	<ul style="list-style-type: none"> • Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans • Mobile home park compliance for storm shelters
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.	<ul style="list-style-type: none"> • Property Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits (i.e., metal roofs) • Floodwalls and retaining walls • Detention and retention structures • Culvert Installation/Modification • Roads & Bridge risk reduction • Safe Room (New construction or facility retrofit) • Green Infrastructure Methods <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>

Mitigation Strategy	Description	Example Mitigation Actions
Natural Systems Protection	<p>These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.</p>	<ul style="list-style-type: none"> • Soil stabilization for sediment and erosion control • Floodplain and Stream corridor restoration • Slope management • Forest management (defensible space, fuels reduction, sprinkler systems) • Conservation easements • Wetland restoration and preservation • Aquifer Storage & Recovery • Flood Diversion and Storage <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>
Education and Awareness Programs	<p>These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions that support life safety and lessen property damage.</p>	<ul style="list-style-type: none"> • Radio or television spots • Websites with maps and information • Social media outreach • Promotion of sign-up for emergency warnings • Real estate disclosure • Promotion of NFIP insurance to property owners • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • NWS StormReady Program • Firewise Communities <p><i>Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".</i></p>
Mitigation Preparedness and Response Support	<p>This is a State of Minnesota mitigation strategy with the intent of covering emergency preparedness actions that protect life and property prior to, during, and immediately after a disaster or hazard event. These activities are typically not considered mitigation, but support reduction of the effects of damaging events.</p>	<ul style="list-style-type: none"> • Emergency Operations Plan • Flood fight plans and preparedness measures • Dam emergency action plans • Emergency Warning Systems (i.e., CodeRed, warning sirens) • Generator backup power • NWS Storm Spotter Training • Training and education for local elected officials and key partners.



State of Minnesota
Department of Public Safety
Division of Homeland Security and Emergency Management
445 Minnesota Street, Suite 223
St. Paul, MN 55101-6223

HAZARD MITIGATION ASSISTANCE

Hazard Mitigation Assistance (HMA) grant programs provide funding with the aim to reduce or eliminate risk to property and loss of life from future natural disasters. HMA programs are typically a 75%/25% cost share program. The federal share is 75% of total eligible project reimbursement costs. The local applicant is responsible for 25% of the project costs. The amount of HMGP funds availability is based on a percent of Public Assistance provided by Federal Emergency Management Agency (FEMA).

- Hazard Mitigation Grant Program (HMGP) funds assists in implementing long-term hazard mitigation measures following a Presidential major disaster declaration.
- Pre-Disaster Mitigation (PDM) provides funds for hazard mitigation planning and projects on an annual basis.
- Flood Mitigation Assistance (FMA) provides funds on an annual basis to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP).

Who is eligible for grant funding?

All applicants must have or be covered under an approved Hazard Mitigation Plan. Eligible applicants include: State and local governments; certain private non-profit organizations or institutions; and Tribal Communities

What types of projects can be funded?

All projects must be eligible, technically feasible, and cost-effective. All projects are subject to environmental and cultural resource review. Examples of projects include:

- **Advance Assistance** may be used to develop mitigation strategies and obtain data, including for environmental and historic preservation compliance considerations, and develop complete project applications in a timely manner.
- **Aquifer Storage and Recovery** (ASR) projects serve primarily as a drought management tool, but can also be used to reduce flood risk and restore aquifers that have been subject to overdraft. The concept is to capture water when there is an abundant supply, store the water in subsurface aquifers, and recover water from the storage aquifer when needed. Storing water underground can help protect it from pollutants, evaporation, and weather events.
- **Floodplain and stream restoration** (FSR) projects are used primarily to reduce flood risk and erosion by providing stable reaches, and may also mitigate drought impacts. FSR projects restore and enhance the floodplain, stream channel and riparian ecosystem's natural function. They provide base flow recharge, water supply augmentation, floodwater storage, terrestrial and aquatic wildlife habitat, and recreation opportunities by restoring the site's soil, hydrology and vegetation conditions that mimic pre-development channel flow and floodplain connectivity.
- **Flood Diversion and Storage** (FDS) projects often are used to reduce flood risk, but also can be used to mitigate drought and improve ecosystem services. These projects involve diverting floodwaters from a stream, river, or other body of water into a conduit such as a canal, pipe, or wetland and storing them in an above-ground storage facility. Water is then slowly released, reducing flood risk.

- **Green Infrastructure Methods** are a sustainable approach to natural landscape preservation and storm water management. Include in *eligible hazard mitigation activities* as well as provide additional ecosystem benefits. Ecosystem-based approach to replicate a site's pre-development, natural hydrologic function. Benefits include: Increase water supply, improved water quality, can be scaled to size and designed to fit site conditions.
- **Property Acquisition and Structure Demolition or Relocation** – The voluntary acquisition of an existing at-risk structure and the underlying land, and conversion of the land to open space through the demolition or relocation of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions.
- **Retrofit Flood-Prone Residential Structures** are changes made to an existing structure to reduce or eliminate the possibility of damage to that structure from flooding, erosion, or other hazards. Examples of this mitigation are primarily elevation of structures above flood levels and floodwalls.
- **Safe Room Construction** - Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events. Includes retrofits of existing facilities or new safe room construction projects, and applies to both single and dual-use facilities
- **Minor Localized Flood Reduction Projects** - Projects to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or up-sizing of culverts, and stormwater management activities, such as creating retention and detention basins. These projects must not duplicate the flood prevention activities of other Federal agencies and may not constitute a section of a larger flood control system.
- **Infrastructure Retrofit** - Measures to reduce risk to existing utility systems, roads, and bridges.
- **Soil Stabilization** - Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geotextiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring. These projects must not duplicate the activities of other Federal agencies. *New tools for Bioengineered Shoreline Stabilization, Bioengineered Streambank Stabilization.*
- **Wildfire Mitigation** - Projects to mitigate at-risk structures and associated loss of life from the threat of future wildfire through: Defensible Space for Wildfire, Application of Ignition-resistant Construction and Hazardous Fuels Reduction. *New tool for Bioengineered Wildfire Mitigation.*
- **HMGP only - 5 Percent Initiative Projects** – These projects, which are only available pursuant to an HMGP disaster, provide an opportunity to fund mitigation actions that are consistent with the goals and objectives of approved mitigation plans and meet all HMGP program requirements, but for which it may be difficult to conduct a standard Benefit-Cost Analysis (BCA) to prove cost-effectiveness.

How do I apply?

Start by submitting a Notice of Interest, available on HSEM's website at:
<https://dps.mn.gov/divisions/hsem>

Where can I obtain further information?

For additional information about the HMA grant program, you can refer to the FEMA website:
<http://www.fema.gov/hazard-mitigation-assistance>

DPS-HSEM December 2018

MITIGATION IDEAS WORKSHEET

Please use the following worksheet to identify mitigation actions that you feel will help to reduce or eliminate the impact of future natural hazard events to the county or to your individual jurisdiction.

JURISDICTION:

CONTACT

Name:

Phone:

Email:

Hazard	Description / Proposed Mitigation Action

ST. LOUIS COUNTY

May 28 & 29, 2019 MHMP Planning Meeting #1

Mitigation Ideas Worksheet Notes

Following are notes from the **St. Louis County 5-28-19 & 5-29-19 MHMP Planning Team Meeting #1** "Mitigation Action Working Session". Participants used worksheets to provide input on mitigation activities they felt would help to reduce or eliminate the impact of future natural hazard events to the county or local jurisdictions. The mitigation actions identified will be used to support development of new mitigation actions to include in the St. Louis County MHMP 2019 Update.

St. Louis County (Highway Dept.)

Submitted by: Victor Lund, Traffic Engineer

Hazard: Flooding
Action: Culvert Mapping – Develop a map of culverts under roadways to 1) support program to inspect/review culverts to ensure good condition and hydraulic capacity and 2) support active monitoring of culverts during flooding disaster.

Hazard: All-Hazards
Action: Traffic Control Preparedness – Ensure transportation agencies have the necessary resources to quickly deploy traffic control devices onto roadways. Also identify private traffic control contractors that could assist during a disaster event.

Hazard: All-Hazards
Action: Evacuation Routes – Identify evacuation routes to evacuate major population centers. Ensure redundancy of evacuation routes.

Hazard: All-Hazards
Action: Traffic Progression Along Signalized Corridors – Many traffic signals in the metro area are not connected to a management center. We need to get these signals connected to allow remote management of signal timing. Requires coordination between MnDOT, St. Louis County, City of Duluth and City of Hermantown.

St. Louis County (Land and Minerals Dept.)

Submitted by: Jason Meyer, Dept. Director

Hazard: Dam Failure
Action: Develop a more structured monitoring program for the Upper Stone Lake Dam (T5512) and an evacuation and response plan. Solidify responsibility for maintenance work.
(Background: Ownership of this structure is cloudy. Tax forf/railroad/State(?) structure is inspected by the MN DNR Dam Safety Dept. Periodic maintenance has been done by County Land Dept. Breach would risk property and life – there is a history of vandalism.)

St. Louis County (Public Health Dept.)

Submitted by: Scott Lesnau, Public Health Nurse/Emergency Preparedness Coordinator

Hazard: Severe Storms (shelters)

Action: St. Louis County has a lack of MOU's for shelters. SLC works with the American Red Cross for shelter locations. Red Cross determines shelters and county will open and run them when needed. Need more locations for evacuation and sheltering. We are currently working with the Red Cross to update. Also expand shelter training to non-public health staff.

Enbridge

Submitted by: Josh Sanders, Emergency Response Coordinator

Hazard: Power Loss due to Various Hazards

Action: Generator Backup Power – Ensure not only generators are identified in emergency plans but where fuel services will come from as well. Previous cases show the majority of generators rely on relatively few fuel companies. In some cases, these few fuel companies cannot provide sufficient capacity for refueling.

City of Duluth

Submitted by: Jim Filby Williams, Director of Public Administration

Hazard: Lake Superior & St. Louis River Estuary – Storms that cause damage to shoreline assets

Action: Reconstruct shoreline infrastructure to withstand more frequent severe storms. Stabilize and/or armor previously unimproved or minimally improved shoreline. Relocate vulnerable assets away from the shoreline. Acquire vulnerable shoreline to protect as undeveloped buffer. Beach nourishment (vegetation). Engineered wetlands from scratch. Analysis of long-term vulnerabilities in light of changing climate. Retrofit critical public infrastructure that cannot be relocated.

Hazard: High velocity flash flood water damaging urban infrastructure and private property on or below Duluth hillside.

Action: Acquisition, protection, and where applicable, enhancement/restoration of upland wetlands to protect and enhance. Upsizing of culverts and replacement of culverts with bridges. Reconnection of upland stream courses to their floodplain. Elimination of conditions where infrastructure inadvertently diverts floodwater.

Hazard: Floodwaters that immerse assets in or close to flood plains.

Action: Property Acquisition – Purchase and demolition of private property in flood plain areas.

City of Rice Lake

Submitted by: Toni Blomdahl, Clerk-Treasurer

Hazard: Severe Storms (Power Outage)

Action: Obtain generators for City Hall, Public Works, and Fire Hall.

Hazard: Tornado
Action: Safe room at Fire Hall. Warning Siren System.

City of Tower

Submitted by: Jesse Anderson, Emergency Management Director

Hazard: Flooding
Action: Lake Vermilion/West Two River. City airport and city campground are located on shores of Lake Vermilion. Also downstream from Pike River Dam. West Two River runs through town and drains into Lake Vermilion.

Hazard: Extreme Cold
Action: State record cold temperatures. Due to terrain, Tower is always experiencing sever cold temps during winter months.

Hazard: Wildfire
Action: City of Tower Forest, Parks & Property clearing/cleaning up of potential fuels for wildfires.

City of Floodwood

Submitted by: Vern VanGuilder, Chief of Police

Hazard: Severe Summer Weather
Action: Need a shelter for a campground in a wooded area with no current shelter.

Hazard: Flooding
Action: Four rivers in the city area. Fast moving flood water can split city and prevent emergency services due to road washouts. Damages can occur to buildings, houses, lift stations and sewer ponds.

Hazard: Severe Storms (Power Outages)
Action: Vulnerable infrastructure includes the school, senior center, clinic and FST. The city purchased a generator and has an emergency plan with every neighboring jurisdiction in case city is split. Currently helping community with setting up Northland Alert, specifically at Senior Building.

City of Meadowlands

Submitted by: John E. Stoessel, City Clerk

Hazard: Severe Storms (Extended Power Outage)
Action: Obtain generators (portable for permanent) for water tower and community center.

Hazard: Severe Wind Events/Tornado
Action: We have no "safe" wind/tornado proof structures. Explore berm building or berming existing building.

Hazard: Flooding (Stormwater Management)
Action: We currently have a project in progress this year (2019) to improve surface drainage for storm waters (our current one is 25 years old). Funding is from IRRRB & CDBG grants.

City of Virginia

Submitted by: Bill Hennis, Lead Engineer

Hazard: Flooding
Action: Update of East Two Rivers stormwater/floodplain study.

City of Virginia

Submitted by: Allen Lewis, Fire Chief

Hazard: Severe Wind Event
Action: Safe room for new Miners memorial building, new public safety building and schools.

Hazard: All-Hazards (Preparedness)
Action: Have all department heads and city councilors undergo ICS 100/200 training.

Hazard: Wildfire
Action: Rail line clean up – vegetation removal along Canadian National and mining lines.

Town of Genesen

Submitted by: Lottie Haller, Clerk

Hazard: Severe Wind Event
Action: We are trying to make our community center an emergency shelter. We were just informed that our gym roof is not up to code and will need to be replaced to be used as a shelter. The cost will probably be \$100,000 and we would like to apply for a FEMA grant to help defray the costs to replace the gym roof. We have installed a generator and we will be installing handicap accessible bathrooms. Also, we do not have any warning/alarm system.

Solway Township

Submitted by: Ron Gadewski, Supervisor

Hazard: Loss of Power
Action: We have already installed a generator at our Fire Hall that could provide a shelter for heat, water, cooking facilities, etc.

Cotton Township

Submitted by: Sandra Nelson, Deputy Clerk

Hazard: Dam Failure
Action: The Whiteface Dam runs to St. Louis River – runs to Lake Superior/flooding. Make sure dam operator has a dam emergency action plan in place. Transportation routes for evacuation.

Hazard: Emergency Safe Room/Shelter
Action: Old School Lives, Inc. supplies some emergency services. Could safe room be established? Red Cross open center?

Hazard: Trains (Wildfires & Hazardous Material)
Action: Evacuation ? HazMat availability?

Hazard: Emergency evacuation route Iron Range to Duluth
Action: Identify evacuation routes if Hwy. 53 is closed down.

Canosia Township

Submitted by: Daniel Golen, Supervisor

Hazard: Flooding
Action: Build resiliency into sewer systems. Eliminate cross-connections with storm sewers/sumps/etc. WLSSD currently working on Inflow & Infiltration (I&I) ordinance and corrective actions. Flooding can overwhelm storm system capacity with potential release to environment or backup into homes and businesses. I concede this is a pretty low risk to my township, but should be considered in the overall plan for resiliency.

Hazard: Severe Storms (sheltering)
Action: Our township is working to establish our Town Hall as an emergency shelter. The drinking water well is now having contamination issues, making it a problem for being a shelter. Can grant funding be available to assist with a new well?

Wuori Township

Submitted by: Duane Nelson, Supervisor

Hazard: Wildfire (Dead Trees)
Action: Possible action on the Federal/State lands would be to conduct controlled burns to reduce the fuel loads. Of concern is the balsam tree die-off.

Hazard: Mining Company Holding Ponds
Action: Within Wuori Township both the Minntac and Arcelor-Mittal Mines have holding ponds, that if breached would cause some damage within the Township.

Hazard: All-Hazards (Public Notification with Everbridge)
Action: This information has not really been addressed or gotten out to the area (the info on Everbridge and how it is used).

Town of White

Submitted by: Clark Niemi, Foreman

Hazard: Dams (Mines) (Private)
Action: Minntac, Hibtac, Former Polymet – tailings ponds potential to flood Britt, Side Lake and Waasa/Embarrass.

Hazard: Dams (MPL) (Private)
Action: Lakes – Whitewater (2 dams), Whiteface (2 dams), and Island Lake. (All man made lakes?)

Hazard: Severe Storms (Power Outage)
Action: Backup generator for Township Garage and Fire Hall. Building houses township & County EMS.

Hazard: Severe Wind Events/Tornado
Action: Old School Building (1950's) – possible safe room (new or retrofit).

Embarrass Township

Submitted by: Richelle Cole, Resident / City of Virginia Library Clerk

Hazard: Severe Storms (Falling Trees on Powerlines)
Action: A numerous amount of power outages occurred last year. Look into clearing or tip cutting of trees near powerlines.

Hazard: Severe Storms (public notification)
Action: Improve public awareness of the County's Everbridge notification system and get residents signed up for it. ("Is there a means of getting the word out by cell phone like an amber alert?")

Town of Colvin

Submitted by: James Hofsommer, Supervisor

Hazard: Severe Storms – Power outages that cause failure of septic systems to function
Action: Adjust county septic regulations to promote gravity systems (which are just as effective) as those requiring pumps, timers, lights, beepers and electronic controls. There is an imminent public health hazard caused by non-functioning septic systems due to storms, winds, floods, etc. that knock electrical power out for days or weeks.

Alango Township

Submitted by: Jeri Bonnette, Clerk

Hazard: Flooding on Roads
Action: Replacing and installing new culverts to avoid over the road flooding from high rain events.

Hazard: Severe Storms (falling trees)
Action: We are checking and removing trees that winds could cause them to fall over roadways.

Vermilion Lake Township

Submitted by: Phillip Anderson, Supervisor

Hazard: Township Road Damage from Storm Events
Action: Ditching, culverts, lift of roadbed

Hazard:	Pike River Dam
Action:	Dam is a State structure. Level of maintenance unknown.
Hazard:	Wildfire
Action:	Making sure the Township Fire Department is well-prepared with good equipment.

Lavell Township

Submitted by: Warren Topker, Supervisor

Hazard:	Flooding
Action:	Ditching 4 ½ miles.
Hazard:	Safety
Action:	Clean up right of way 4 ½ miles.

Biwabik Township

Submitted by: Jim Park, Supervisor

Hazard:	Ditches
Action:	Main county ditch running through township needs cleaning – it is overgrown with brush. Township will start cleaning of township road ditches, Existing township road beds stay saturated due to poor ditch drainage.
Hazard:	Beaver dams
Action:	Conduct annual monitoring and maintenance of beaver dams to avoid flooding to adjacent roads.

Jurisdictional MAC Participation Log

The following representatives provided review & input to mitigation actions to be included in their respective draft Mitigation Action Chart (MAC) as part of the St. Louis County 2020 MHMP Update.

(Activity Period: 3rd & 4th Quarter, 2019)

NAME OF JURISDICTION	NAME OF REPRESENTATIVE, TITLE & TIME
St. Louis County	<p>County Staff: Dewey Johnson – SLC EM Coordinator, 3 hours R.C. Boheim - South St. Louis SWCD District Manager, 30 minutes Gloria Erickson - SLC Firewise Coordinator, 2.5 hours Jason Meyer - SLC Deputy Land and Minerals Director, 1 hour David Yapel – SLC GIS Manager, 2 hours Jennifer Bourbonais – SLC Planning Dept., 2 hours Mark Weber – SLC Land Commissioner, 1 hour Carol Andrews – SLC Public Works Envr. Project Manager, 8 hours Jim Foldesi – SLC Public Works Director/Highway Engineer, 3 hours Matt Hemmila – SLC Public Works, Deputy Director - Engineering, 3 hours Brian Boder - SLC Public Works Deputy Director - Maintenance, 2 hours Vic Lund - SLC Public Works Traffic Engineer, 2 hours</p> <p>Other Stakeholders: Derek Howe, Chief Operating Officer, Lake Country Power, 30 minutes Ann Ellis, General Manager, North Star Electric Cooperative, 30 minutes</p>
City of Aurora	Becky Lammi, City Administrator, 30 minutes
City of Babbitt	Cathy Bissonette, Clerk-Treasurer, 30 minutes Tony Chamberlin, Fire Chief, 30 minutes
City of Biwabik	Jeff Jacobson, City Administrator, 2 hours Dan Mackey, Fire Chief, 1 hour David Levelwind, Water Operator, 1.5 hours
City of Brookston	Gene Nelson, City Councilor, 30 minutes
City of Buhl	Ryan Pervenante, City Clerk/Treasurer, 30 minutes Dianne Thronson, Finance Manager, 30 minutes
City of Chisholm	Bill Manney, City Administrator, 30 minutes Bob Brown, City Emergency Manager and City Fire Chief, 30 minutes Mandy Galli, City Building Official and Safety Director, 30 minutes Larry Folstad, City Public Works Supervisor, 60 minutes
City of Cook	Theresa Martinson, Administrator/Clerk-Treasurer, 30 minutes Dawn Kehoe, Office Assistant, 30 minutes
City of Duluth	Shawn Krizaj, Fire Chief/Emergency Management Director, 3 hours Jim Filby Williams, Director of Public Administration, 1.5 hours Adam Fulton, Deputy Director of Planning & Economic Development, 1 hour Carrie Pederson, Chief Engineer of Transportation, 30 minutes
City of Ely	Gloria Erickson, SLC Firewise Coordinator, 4 hours George Burger, Emergency Management Director, 1 hour Harold Langowski, Public Works Director, 30 minutes Tom Erchul, Fire Chief, 30 minutes
City of Eveleth	Jackie Monahan-Junek, City Administrator, 1 hour Jerry Rosati, Public Works Director, 1 hour Mark Karpen, Assistant Public Works Director, 1 hour Tim Koivunen, Police Chief / EM Director, 1 hour Jesse Linde, Deputy Police Chief, 1 hour Robert Vlaisavljevich, Mayor, 1 hour
City of Floodwood	Jess Rich, City Administrator, 30 minutes

NAME OF JURISDICTION	NAME OF REPRESENTATIVE, TITLE & TIME
City of Gilbert	Ty Techar, Chief of Police, 30 minutes James Paulsen, Interim City Clerk, 30 minutes
City of Hermantown	Jim Crace, Chief of Police, 1 hour David Bolf, City Engineer, 3 hours
City of Hibbing	
City of Hoyt Lakes	Rebecca Burich, City Clerk, 30 minutes Tim Soular, East Range Police Chief/Emergency Manager, 30 minutes
City of Iron Junction	Van Rioux, City Clerk/Treasurer, 30 minutes Travis McDonald, Mayor, 30 minutes
City of Kinney	Debra Bachel, City Clerk, 30 minutes
City of Leonidas	Mary Beltezore, City Clerk, 30 minutes Kyle Andrews, Mayor, 30 minutes
City of McKinley	Michelle Tveit, City Clerk, 30 minutes Tony Nygaard, Mayor, 30 minutes
City of Meadowlands	John Stoessel, City Clerk, 2 hours Betsy Crabb, Mayor, 30 minutes Mary Ann Durovec, Deputy Mayor/City Councilor, 30 minutes Mike Josephson, City Councilor, 30 minutes Donna Perkins, City Councilor, 30 minutes Jamie Durovec, City Councilor, 30 minutes Marge Dunder, City Treasurer, 30 minutes Jesse Otten, Public Works, 30 minutes Kathy Matvey, EMT/Ambulance, 30 minutes
City of Mountain Iron	Craig Wainio, City Administrator/City EM, 30 minutes
City of Orr	Cheri Carter, Clerk/Treasurer, 30 minutes
City of Proctor	Mark Casey, City Administrator, 1 hour
City of Rice Lake	Toni Blomdahl, Clerk-Treasurer, 30 minutes John Werner, Mayor, 30 minutes
City of Tower	Victoria Ranua, City Clerk Treasurer, 30 minutes Steve Altenburg, Fire Chief, 30 minutes Tom Gorsma, Public Works Director, 30 minutes
City of Virginia	Allen Lewis, Fire Chief, 1 hour Bill Hennis, City Engineer, 30 minutes
City of Winton	Anne Jackson, City Clerk, 1 hour Kathy Brandau, Mayor, 30 minutes Marlene Zorman, City Councilor, 30 minutes Lee Tessier, Council, 30 minutes Adam Masloski, Council, 30 minutes

St. Louis County Multi-Hazard Mitigation Plan Update

Planning Team Meeting #2

December 13, 2019 9:00 a.m.-11:00 a.m. (Duluth)

December 18, 2019, 9:00 a.m. – 11:00 a.m. (Webinar)

Meeting Summary:

On Friday, December 13, 2019 St. Louis County Emergency Management convened representatives from St. Louis County, cities, townships and other key stakeholders to participate in the 2nd Planning Team Meeting for the St. Louis County (SLC) Multi-Hazard Mitigation Plan (MHMP) Update for 2020-2025. Two meetings were held to serve the southern and northern portions of the county with a total of 42 people participating. The meetings were facilitated by members of the U-Spatial at the University of Minnesota Duluth

(U-Spatial@UMD) team that is leading the update of the St. Louis County MHMP.

- **12/13/19 Southern SLC Meeting:** The meeting for the southern portion of the County was held on Friday, December 13th, 2019 at the St. Louis County Public Safety Office (EOC) in Duluth, MN from 9:00 a.m. – 11:00 a.m. with a total of 30 people who attended.
- **12/18/19 Northern SLC Meeting:** The meeting for the northern portion of the County was offered as a webinar on Wednesday, December 18th from 9:00 a.m. – 11:00 a.m. with a total of 12 people who attended. *(Note: This meeting was originally scheduled for Friday, 12/13/19 from 2:00 p.m. – 4:00 p.m. in Virginia, MN but was cancelled due to winter weather and poor driving conditions. St. Louis County provided staff at the SLC Public Works Building conference room for any people wishing to participate in the webinar but without an internet connection to do so.)*

For both meetings, the opening Power Point presentation covered a re-cap of key points about the plan update, a review of the Risk Assessment & Vulnerability Analysis, an overview of FEMA Hazard Mitigation Assistance (HMA) grant funding; an overview of how mitigation actions are developed and an overview of the Mitigation Action Charts (MACs). Following the presentation, participants were provided with an opportunity to review and discuss the County and jurisdictional mitigation action charts (MACs). Prior to this meeting, County staff and personnel from each city reviewed and approved of their draft MACs. This discussion period offered a facilitated opportunity for participants to consider any changes or new additions to the MACs prior to completion of the draft plan for public review.

Throughout the presentation participants were invited to ask questions or provide other feedback about the plan update. Following is an overview of any key questions or discussion:

12/13/19 In-Person Meeting (Southern St. Louis County Area)

- A representative from the MN Sea Grant asked if rip currents in Lake Superior should be included as a hazard for life safety. It was noted that rip currents could be mentioned in the section of the plan that addresses coastal storms.
- The Mayor of the city of Rice Lake noted that Minnesota Power owns an earthen dam on Rice Lake that was stressed during the 2012 flood event that occurred in NE MN. MN Power is a private company that maintains the dam and they have an Emergency Action Plan (EAP) for response due to any breach.
- A participant inquired on roughly what percentage of projects were completed from the County's last 2013 plan. The SLC EM explained that many projects are on-going and are carried over into the 2020 plan, but estimated that about 70% of other projects were completed.
- The SLC Traffic Engineer inquired on a mitigation action to coordinate traffic signals to expedite vehicles during an evacuation. The SLC EM clarified that this sort of planning would fall under the Emergency Operations Plan, not the mitigation plan.
- A participant inquired on what Green Infrastructure was. Examples were provided as they relate to flood mitigation.
- The city of Rice Lake noted that they have a mobile home park that was not reflected in a map provided in the presentation. The data will be corrected for the final draft of the plan.
- The city of Rice Lake noted that their jurisdiction was listed as "Rice Lake Township" on a map and noted they now have city designation. It will be corrected on any maps within the plan.

12/18/19 Webinar Meeting (Northern St. Louis County Area)

- The Virginia Public Schools Building Director noted that they are in the design phase of a future elementary and high school and would like to look at incorporating safety for extreme storm & wind events into the design of those facilities. Bonnie Hundrieser followed up with the Building Director to develop a mitigation action to be added into the City of Virginia local mitigation action chart to address this effort, and its potential for future FEMA HMA grant funding if a tornado safe room is included in designs.
- Following the webinar, the St. Louis County Firewise Coordinator (FWC) contacted the U-Spatial@UMD presenters to provide feedback & questions on a few items:
 - FWC inquired if further modifications or additions to the wildfire mitigations could be made after conferring with agency partners. It was discussed that if anything is presented that is not well-covered already it can be considered for addition.
 - FWC noted a correction for the City of Tower. This will be corrected where it is noted in the local MAC.
 - FWC had a few specific questions regarding data in maps. These were clarified and discussed with Stacey Stark, Director of the U-Spatial@UMD office who is leading development of the plan.

Each meeting concluded with an overview and timeline of the upcoming next steps of posting the plan for public review and input and submitting the draft plan to HSEM and FEMA for final review and approval.

Attached to this meeting summary are the following documentation items:

- 12-13-19 Planning Team Meeting Stakeholder Invite List
- 12-13-19 St. Louis County HMP Mtg. #2 Email Invite
- 12-13-19 Meeting Invitation to County & Tribal Jurisdictional Neighbors
- 12-18-19 Northern St. Louis County Meeting Reschedule (Webinar Invitation)
- 12-13-19 Meeting Agenda
- 12-13-19 Meeting Sign-in Sheets
- 12-18-19 Webinar Meeting List of Participants
- 12-13-19 Power Point Presentation Slides
- 12-13-19 Meeting Handout (Mitigation Strategies & Action Types)

Note: The above meeting items for 12-13-19 the same for the meeting held via webinar on 12/18/19.

Meeting Summary Prepared By: Bonnie Hundrieser, U-Spatial@UMD Project Team

St. Louis County 2020 MHMP Update

December 13, 2019 Planning Team Meetings Stakeholder Invite List

Following is the list of stakeholders that were invited via email to attend the St. Louis County MHMP Update Planning Team Meeting #2 held on December 13, 2019 in the cities of Duluth and Virginia.

Agency Type	Agency	Title	Name	Email
City Contacts	Aurora	City of		cityclerk@ci.aurora.mn.us
City Contacts	Aurora	City Clerk	Becky Lammie	becky@ci.aurora.mn.us
City Contacts	Babbitt	City of		cathy@babbitt-mn.com
City Contacts	Babbitt	Mayor	Andrea Zupanich	andrea@zupnorth.com
City Contacts	Biwabik	City of		srmackey@cityofbiwabik.com
City Contacts	Biwabik	City Administrator	Jeff Jacobson	administrator@cityofbiwabik.com
City Contacts	Breitung Twp	Police Chief	Dan Nylund	police@breitungtownship.org
City Contacts	Brookston	City of		nmfosness@gmail.com
City Contacts	Buhl	City of		buhladmin@accessmn.com
City Contacts	Buhl	Mayor	Shari Swanson	buhladmin@accessmn.com
City Contacts	Chisholm	City of		bmanney@ci.chisholm.mn.us
City Contacts	Chisholm	Fire Chief	Bob Brown	brownfd@mchsi.com
City Contacts	Chisholm	Mayor	Mary Jo Rahja	mrahja@ci.chisholm.mn.us
City Contacts	Chisholm	Police Chief	Vern Manner	vmanner@ci.chisholm.mn.us
City Contacts	Cook	City of		theresa@cookmn.us

Agency Type	Agency	Title	Name	Email
City Contacts	Cook	Administrator-Clerk/Treasurer	Theresa Martinson	Theresa@cookmn.us
City Contacts	Duluth	City of		Chelmer@duluthmn.gov
City Contacts	Duluth		Jim Filby Williams	jfwilliams@DuluthMN.gov
City Contacts	Duluth		Mike LeBeau	mlebeau@DuluthMN.gov
City Contacts	Duluth	EM Director/Deputy Fire Chief	Shawn Krizaj	skrizaj@duluthmn.gov
City Contacts	Ely	City of		elyod@ely.mn.us
City Contacts	Ely	Police Officer/Emergency Management	George Burger	George.burger@ely.mn.us
City Contacts	Ely	Police Chief	John Lahtonen	elypd@ely.mn.us
City Contacts	Ely	Fire Chief	Tom Erchull	Tom.erchull@ely.mn.us
City Contacts	Eveleth	City Administrator/Clerk	Jackie Monahan-Junek	jackie@evelethmn.com
City Contacts	Eveleth	Chief of Police	Timothy H. Koivunen	koivunent@evelethmn.com
City Contacts	Eveleth	City of		jackie@evelethmn.com
City Contacts	Floodwood	Police Records supervisor	Corinne Suonvieu	csuonvieri@ci.floodwood.mn.us
City Contacts	Floodwood	Police Chief/Emergency Manager	Verne VanGuilder	vvanguilder@ci.floodwood.mn.us
City Contacts	Floodwood	City of		admin@ci.floodwood.mn.us
City Contacts	Gilbert	City of		jamespaulsen@gilbertmn.org
City Contacts	Gilbert	City of Gilbert - Mayor	Beth Milos	callenbeth@yahoo.com
City Contacts	Gilbert	Gilbert Fire Department Fire Chief	Marc Kwiatkowski	mk@pqsupplies.com
City Contacts	Gilbert	Chief of Police	Ty Techar	tytechar@gilbertmn.org
City Contacts	Hermantown	Police Chief	Jim Crace	crace@hermantownmn.com
City Contacts	Hermantown	Fire Chief	Mike Marshall	hermantownfire@hermantownmn.com
City Contacts	Hermantown	City of	Paul Senst	dlund@hermantownmn.com;psenst@hermantownmn.com
City Contacts	Hibbing	City of		makepler@ci.hibbing.mn.us
City Contacts	Hibbing	Fire Chief	Erik Jankila	ejankila@ci.hibbing.mn.us
City Contacts	Hibbing	Firefighter	Matt Ashmore	mashmore@ci.hibbing.mn.us
City Contacts	Hoyt Lakes	City Clerk-Treasurer	Becky Burich	rburich@hoytlakes.com
City Contacts	Hoyt Lakes	Deputy Clerk	Tammy Snetsinger	tsnetsinger@hoytlakes.com
City Contacts	Hoyt Lakes	City of		tsnetsinger@hoytlakes.com
City Contacts	Hoyt Lakes/Aurora - East Range	Police Chief	Tim Soular	chief@eastrangepd.com

Agency Type	Agency	Title	Name	Email
	PD			
City Contacts	Iron Junction	Mayor	Travis McDonald	vanhrioux@yahoo.com
City Contacts	Iron Junction	City of		cityofironjunction@mchsi.com
City Contacts	Kinney	Mayor	Michael H. Dahl Jr.	citykinney@mchsi.com
City Contacts	Kinney	City of		citykinney@mchsi.com
City Contacts	Leonidas	City of		mbeltezore@gmail.com
City Contacts	Leonidas	Mayor	Kyle Andrews	mbeltezore@gmail.com
City Contacts	McKinley	Mayor	Tony Nygaard	mltveit908@gmail.com
City Contacts	McKinley	City of		mltveit908@gmail.com
City Contacts	Meadowlands	City of		info@cimeadowlandsmn.us
City Contacts	Mt Iron	City of		cwainio@ci.mountain-iron.mn.us
City Contacts	Mt. Iron	City Administrator	Craig Wainio	cwainio@ci.mountain-iron.mn.us
City Contacts	Mt. Iron	Mayor	Gary W. Skalko	cwainio@ci.mountain-iron.mn.us
City Contacts	Mt. Iron	Fire Chief	Larry Simonson	Simonson35@gmail.com
City Contacts	Mt. Iron	Ambulance Director	Troy Malley	meadowlandsamb@frontier.com
City Contacts	Orr	City of		orrmn@centurytel.net
City Contacts	Orr	Mayor	Joel Astleford	orrmn@centurytel.net
City Contacts	Proctor	City of		cityhall@proctormn.gov
City Contacts	Proctor	Police Chief	Kent Gaidis	kgaidis@proctorpd.org
City Contacts	Rice	City of		TBlomdahl@RiceLakeCityMN.com
City Contacts	Rice Lake	Mayor	John Werner	Clerk1@ricelakecitymn.com
City Contacts	Tower	City of		linda@cityoftower.com
City Contacts	Tower	Mayor	Orlyn A. Kringstad	orlyn@cityoftower.com
City Contacts	Tower	Ambulance Director/Fire Chief	Steve Altenburg	fire@cityoftower.com
City Contacts	Virginia	City of		plabine@virginiamn.us
City Contacts	Virginia	Virginia Fire Chief	Allen G. Lewis	lewisa@virginiamn.us
City Contacts	Virginia	City Administrator	Britt See-Benes	britts@virginiamn.us
City Contacts	Winton	City of		wintoncityclerk@gmail.com
City Contacts	Winton	Mayor	Adam Masloski	amasloski@boundarywaterscc.com
County Commissioners	St. Louis County	SLC County Commissioners	Frank Jewell	jewellf@stlouiscountymn.gov
County Commissioners	St. Louis County	SLC County Commissioners	Keith Nelson	nelsonk@stlouiscountymn.gov
County Commissioners	St. Louis County	SLC County Commissioners	Mike Jugovich	jugovichm@stlouiscountymn.gov
County	St. Louis	SLC County	Patrick Boyle	boylep@stlouiscountymn.gov

Agency Type	Agency	Title	Name	Email
Commissioners	County	Commissioners		
County Commissioners	St. Louis County	SLC County Commissioners	Paul McDonald	McDonaldP@StLouisCountyMN.gov
County Contacts	St. Louis County	PHHS Division Director	Amy Westbrook	westbrooka@stlouiscountymn.gov
County Contacts	St. Louis County	Planning Director	Barb Hayden	haydenb@stlouiscountymn.gov
County Contacts	St. Louis County	Deputy Planning Director	Darren Jablonsky	jablonskyd@stlouiscountymn.gov
County Contacts	St. Louis County	Environmental Program Administrator	Dave Fink	Finkd2@stlouiscountymn.gov
County Contacts	St. Louis County	County Assessor	Dave Sipla	siplad@stlouiscountymn.gov
County Contacts	St. Louis County	Planning Manager	Dave Yappel	yapeld@stlouiscountymn.gov
County Contacts	St. Louis County	Supervising Deputy	Jason Lukovsky	lukovskyj@stlouiscountymn.gov
County Contacts	St. Louis County	Deputy Land and Minerals Director	Jason Meyer	meyerj@stlouiscountymn.gov
County Contacts	St. Louis County	IT	Jeremy Craker	CrakerJ@stlouiscountymn.gov
County Contacts	St. Louis County	Public Works Director	Jim Foldesi	foldesij@stlouiscountymn.gov
County Contacts	St. Louis County	Administrator	Kevin Gray	grayk@stlouiscountymn.gov
County Contacts	St. Louis County	Land and Minerals Director	Mark Weber	weberm@stlouiscountymn.gov
County Contacts	St. Louis County	GIS Specialist	Matthew Goodman	goodmanm@stlouiscountymn.gov
County Contacts	St. Louis County	Lieutenant	Neil Porter	portern@stlouiscountymn.gov
County Contacts	St. Louis County	Sheriff-Director of Emergency Management	Ross Litman	litmanr@stlouiscountymn.gov
County Contacts	St. Louis County	Public Health Emergency Preparedness Coordinator	Scott Lesnau	lesnaus@stlouiscountymn.gov
County Contacts	St. Louis County	Public Health Supervisor/Emergency Preparedness	Steven Leslie	leslies@stlouiscountymn.gov
County Contacts	St. Louis County	Principal Engineer	Victor Lund	lundv@stlouiscountymn.gov
County Contacts	St. Louis County	SWCD District Manager - North		-
County	St. Louis	Firewise	Gloria Erickson	gloria@dovetailinc.org

Agency Type	Agency	Title	Name	Email
Contacts	County	Coordinator		
County Contacts	WCD	SWCD District Manager - South	R. C. Boheim	r.c.boheim@southstlouisswcd.org
Neighboring Jurisdiction	Carlton County	EM Director	Steve Van Kekerix	Steve.vankekerix@co.carlton.mn.us
Neighboring Jurisdiction	Aitkin County	Sheriff/EM Director	Dan Guida	sheriff2@co.aitkin.mn.us
Neighboring Jurisdiction	Itasca County	EM Coordinator	Marlyn Halvorson	marlyn.halvorson@co.itasca.mn.us
Neighboring Jurisdiction	Koochiching County	EM Coordinator	Willi Kostiuk	Will.kostiuk@co.koochiching.mn.us
Neighboring Jurisdiction	Lake County	EM Director	BJ Kohlstedt	Bj.kohlstedt@co.lake.mn.us
Neighboring Tribal Reservation	Fond du Lac Band of Lake Superior Chippewa	EM Director	Cassie Diver	cassiediver@fdlrez.com
Neighboring Tribal Reservation	Bois Forte Band of Chippewa	EM Director (INTERIM)	Dan Milbridge	dan.milbridge@boisforte-nsn.gov
Other Stakeholders	Allete	Emergency Management Cordinator	Larry DiDomenico	ldidomenico@allete.com
Other Stakeholders	Allete	Director Security/EM	Warren LaPlante	wlaplante@allete.com
Other Stakeholders	Babbitt – Northeast Range Secondary	Principal	Kelly Engman	kengman@isd2142.k12.mn.us
Other Stakeholders	Chisholm Public School District		Dr. Janey Blanchard	jblanchard@chisholm.k12.mn.us
Other Stakeholders	Duluth Public School District	Superintendent	William Gronseth	William.gronseth@isd709.org
Other Stakeholders	Duluth Public Schools Academy	Director	Bonnie Jorgenson	Bonnie.jorgenson@duluthedison.com
Other Stakeholders	Ely Public School District	Superintendent	Kevin Abrahamson	kabrahamamson@ely.k12.mn.us
Other Stakeholders	Enbridge	Emergency Response Coordinator	Josh Saunders	Joshua.Sanders@enbridge.com
Other Stakeholders	Enbridge	Region Director	Trent Wetmore	trent.wetmore@enbridge.com
Other Stakeholders	Eveleth-Gilbert School District	Superintendent	Jeff Carey	jcarey@egschools.org

Agency Type	Agency	Title	Name	Email
Other Stakeholders	Floodwood Public School District	Superintendent	Dr. Rae Villebrun	rvillebrun@isd698.org
Other Stakeholders	Hibbing Public School District	Superintendent	Brad Johnson	Brad.johnson@isd701.org
Other Stakeholders	Hibbing Technical College	Vice President of Finance and Administration	Karen Kedrowski Gina Godeen gina.godeen@hibbing.edu	kkedrowski@nhed.edu
Other Stakeholders	HSEM Region 2		Blain Johnson	blain.johnson@paramountplanning.net
Other Stakeholders	HSEM Region 2		Roy Holmes	roy.holmes@state.mn.us
Other Stakeholders	Lake Country Power	Operations Supervisor	Todd Johnson	tjohnson@lcp.coop
Other Stakeholders	Mesabi Range College	President	Bill Maki	wmaki@nhed.edu
Other Stakeholders	MN DNR Firewise Program	Northeast MN	Jeff Jackson	Jeffrey.Jackson@state.mn.us
Other Stakeholders	MN DNR Lake Superior Coastal Program	Coastal Program Specialist	Clinton Little	clinton.little@state.mn.us
Other Stakeholders	MN Power	Dam Safety Engineer	David Aspie	daspie@mnpower.com
Other Stakeholders	MN Sea Grant		Jesse Schomberg	jschombe@d.umn.edu
Other Stakeholders	Proctor Public Schools	Superintendent	John Engelking	jengelki@proctor.k12.mn.us
Other Stakeholders	St. Louis County School District	Superintendent	Dr. Reggie Engebritson	rengebritson@isd2142.k12.mn.us
Other Stakeholders	U.S. Forest Service – Kawishiwi Ranger District Ely	District Ranger	Douglas Smith	kawishiwi@fs.fed.us
Other Stakeholders	University of Minnesota Duluth	Police Chief	Sean Hulls	shuls@d.umn.edu
Other Stakeholders	USDA – Rural Development Community Programs	NE MN Specialist, Baxter	Tyler Ray	tyler.ray@usda.gov

Agency Type	Agency	Title	Name	Email
Other Stakeholders	Virginia Public School District	Superintendent	Dr. Noel Schmidt	nschmidt@vmps.org
St. Louis County Commissioner	St. Louis County	Public Safety Board Rep	Beth Olson	Olsonb1@stlouiscountymn.gov
Township Contacts	Alango	Town of		jeribonnette@yahoo.com
Township Contacts	Alborn	Town of		alborn.clerk@gmail.com
Township Contacts	Alden	Town of		aldentwpclerk@gmail.com
Township Contacts	Angora	Town of		pattialt@yahoo.com
Township Contacts	Arrowhead	Town of		angie.irvine@yahoo.com
Township Contacts	Ault	Town of		aulttwp@frontiernet.net
Township Contacts	Balkan	Town of		balkantown@gmail.com
Township Contacts	Bassett	Town of		
Township Contacts	Beatty	Town of		beattytwp@gmail.com
Township Contacts	Biwabik	Town of		
Township Contacts	Breitung	Town of		breitung@breitungtownship.org
Township Contacts	Brevator	Town of		Bpallin22@gmail.com
Township Contacts	Camp	Town of		ccundy@hotmail.com
Township Contacts	Canosia	Town of		canosiatownship@yahoo.com
Township Contacts	Cedar Valley	Town of		cedarvalleyclerk@gmail.com
Township Contacts	Cherry	Town of		akoski@isd2142.k12.mn.us
Township Contacts	Clinton	Town of		clintontownshipmn@gmail.com
Township Contacts	Colvin	Town of		colvintownhall@frontier.com
Township Contacts	Cotton	Town of		towncotton@arrowheadtel.net
Township Contacts	Crane Lake	Town of		info@canelaketwp.com
Township Contacts	Culver	Town of		clerk.culvertownship@outlook.com
Township Contacts	Duluth	Town of		townclerk@lakenet.com

Agency Type	Agency	Title	Name	Email
Township Contacts	Eagles Nest	Town of		eaglesnesttwp@citlink.net
Township Contacts	Ellsburg	Town of		ellsburg2@arrowheadtel.net
Township Contacts	Elmer	Town of		elmertownship@outlook.com
Township Contacts	Embarrass	Town of		embarrassttownship@frontiernet.net
Township Contacts	Fairbanks	Town of		Township1@outlook.com
Township Contacts	Fayal	Town of		fayaltownship@mchsi.com
Township Contacts	Field	Town of		clerk@fieldtownship.com
Township Contacts	Fine Lakes	Town of		wjdawson@frontier.com
Township Contacts	Floodwood	Town of		vickiej@frontiernet.net
Township Contacts	Fredenberg	Town of		Fredenbergtwp@gmail.com
Township Contacts	French	Town of		jws.vei@gmail.com
Township Contacts	Gnesen	Town of		Lottie@gnesen.org
Township Contacts	Grand Lake	Town of		grandlakeclerk@hotmail.com
Township Contacts	Great Scott	Town of		shauta@ci.hibbing.mn.us
Township Contacts	Greenwood	Town of		clerk@greenwoodtownshipmn.com
Township Contacts	Halden	Town of		jpavlek@hotmail.com
Township Contacts	Industrial	Town of		kristelkubis@gmail.com
Township Contacts	Kabetogama	Town of		Kabtown@frontier.com
Township Contacts	Kelsey	Town of		slygh55724@msn.com
Township Contacts	Kugler	Town of		jsuihk@hotmail.com
Township Contacts	Lakewood	Town of		ehanson5@d.umn.edu
Township Contacts	Lavell	Town of		deslongchamps78@gmail.com
Township Contacts	Leiding	Town of		marie57@centurytel.net
Township Contacts	Linden Grove	Town of		ronetteen@yahoo.com
Township Contacts	McDavitt	Town of		<u>rlmcdtwp@accessmn.com</u>

Agency Type	Agency	Title	Name	Email
Township Contacts	Meadowlands	Town of		debraz@frontiernet.net
Township Contacts	Midway	Town of		midwaytwp@msn.com
Township Contacts	Morcom	Town of		morcomtownshipmn@gmail.com
Township Contacts	Morse	Town of		elyecho@aol.com
Township Contacts	Ness	Town of		nesstowship@gmail.com
Township Contacts	New Independence	Town of		newindependenceclerk@gmail.com
Township Contacts	Normanna	Town of		ehanson5@d.umn.edu
Township Contacts	North Star	Town of		brittonX277@yahoo.com
Township Contacts	Northland	Town of	Bobbi Pirkola, Clerk	pirkolad@frontiernet.net
Township Contacts	Owens	Town of		shirley1268@wildblue.net
Township Contacts	Pequaywan	Town of		peqclerk@gmail.com
Township Contacts	Pike	Town of		Jodi_backman@yahoo.com
Township Contacts	Portage	Town of	Shannon Bibeau	<u>bibeaustarr@yahoo.com</u>
Township Contacts	Portage	Town of		portagetwpmn@gmail.com
Township Contacts	Prairie Lake	Town of		plt1@hotmail.com
Township Contacts	Sandy	Town of		sandytownship@yahoo.com
Township Contacts	Solway	Town of		solwayclerk@hotmail.com
Township Contacts	Stoney Brook	Town of		moejacwil@frontier.com
Township Contacts	Sturgeon	Town of		tcswani@yahoo.com
Township Contacts	Toivola	Town of		sticksville5@frontiernet.net
Township Contacts	Van	Town of		sue.rae.hutchinson@gmail.com
Township Contacts	Vermilion	Town of		vermillionlaketownclerk@gmail.com
Township Contacts	Waasa	Town of		sgclerk@yahoo.com
Township Contacts	White	Town of		townofwhite@yahoo.com
Township	Willow	Town of		djparson@live.com

Agency Type	Agency	Title	Name	Email
Contacts				
Township Contacts	Wuori	Town of	dnelson5164@gmail.com	Townofwuori@yahoo.com

2020 MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at the **2nd Planning Team Meeting** for the update of the **St. Louis County Multi-Hazard Mitigation Plan (MHMP)**. You are requested to participate in this vital meeting because you have a position of administrative or departmental responsibility within either the County, a municipal government, or are a key stakeholder related to the planning process.

On Friday, December 13, 2019 we will be holding meetings at 2 locations to serve the southern and northern portions of the County.

Meeting Detail

Date: **Friday, December 13th**

Meeting #1: **(DULUTH) 9:00 a.m. – 11:00 a.m.**
St. Louis County Public Safety Office – EOC
5735 Old Miller Trunk Highway, Duluth MN, 55811

Meeting #2 **(VIRGINIA) 2:00 p.m. – 4:00 p.m.**
St. Louis County Public Works Building - Training Room
7823 Hwy 135, Virginia, MN 55792

The draft St. Louis County MHMP is underway and will be ready for review by planning team members in advance of this meeting. An email with a link will be sent out prior to the meeting.

The purpose of this meeting is to provide an overview of the plan, including a review of the updated risk assessment for natural hazards that affect the county (history, local vulnerabilities, and future trends). We will also discuss the Mitigation Action Charts that have been developed for St. Louis County and each city, as well as potential funding opportunities for future projects under the FEMA Hazard Mitigation Assistance grant program. Your participation in this meeting and feedback on the draft plan is important to us.

Meeting Attendance: Please RSVP your attendance to me via email. You are encouraged to bring associate staff with you. If you cannot attend, please seek to send someone else in your stead for your representation.

If you have any questions, please do not hesitate to contact me.

Thank you,

Dewey Johnson
St. Louis County Sheriff's Office
Emergency Management Coordinator
218-726-2936

Email Invitation to Neighboring County & Tribal Jurisdictions

Wednesday, 11/20/19

To: Cassie Diver, Fond du Lac Reservation, EM Director
Dan Milbridge, Bois Forte Reservation, Interim EM Director
Steve Van Kekerix, Carlton County, EM Director
Dan Guida, Aitkin County, Sheriff/EM Director
Marlyn Halvorson, Itasca County, EM Coordinator
Willi Kostiuk, Koochiching County, EM Coordinator
BJ Kohlstedt, Lake County, EM Director

Greetings,

St. Louis County Emergency Management is in the final stages of completing an update to the County's 2013 Multi-Hazard Mitigation Plan. As part of the stakeholder engagement process, FEMA requires that neighboring communities be included in an opportunity to be involved in the planning process. As Tribal and County jurisdictional neighbors to St. Louis County you are invited to the upcoming St. Louis County Multi-Hazard Mitigation Planning Team Meeting on December 13th (two locations, Duluth & Virginia). (See invite below)

This the 2nd and last group planning meeting prior to the plan being submitted to HSEM and FEMA for approval. If you would like to attend, please RSVP to Holly Olson (see invite below). For those that have plan updates coming up in 2020, it might interest you to have a preview of how things will be done similarly for your planning process. We hope you can join us.

Thank you,

Bonnie K. Hundrieser

Hazard Mitigation Planning Specialist
Part of the U-Spatial@UMD MHMP Planning Team

Hundrieser Consulting LLC

Phone: 218-343-3468

From: Holly Olson <OlsonH@StLouisCountyMN.gov>
Sent: Wednesday, November 6, 2019 9:58 AM
To: Holly Olson <OlsonH@StLouisCountyMN.gov>
Cc: Duane Johnson <JohnsonD@StLouisCountyMN.gov>; 'Bonnie K Hundrieser' <hundrieserconsulting@outlook.com>

Subject: MEETING INVITATION: 2019 St. Louis County Multi-Hazard Mitigation Plan Update

Importance: High

Good morning,

Your presence is requested at the **2nd Planning Team Meeting** for the update of the **St. Louis County Multi-Hazard Mitigation Plan (MHMP)**. You are requested to participate in this vital meeting because you have a position of administrative or departmental responsibility within either the County, a municipal government, or are a key stakeholder related to the planning process.

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St. Louis County Public Works Building - Training Room

7823 Hwy 135, Virginia, MN 55792

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The purpose of this meeting is to provide an overview of the plan, including a review of the updated risk assessment for natural hazards that affect the county (history, local vulnerabilities, and future trends). We will also discuss the Mitigation Action Charts that have been developed for St. Louis County and each city, as well as potential funding opportunities for future projects under the FEMA Hazard Mitigation Assistance grant program. Your participation in this meeting and feedback on the draft plan is important to us.

You are encouraged to bring associate staff with you. If you cannot attend, please seek to send someone else in your stead for your representation.

RSVP Meeting Attendance: Please RSVP your attendance via email to Holly Olson olsonh@stlouiscountymn.gov. Be sure to include the location where you will be attending and the name(s) of the attendee(s).

If you have any questions, please do not hesitate to contact me.

Thank you,

Dewey Johnson

St. Louis County Sheriff's Office

Emergency Management Coordinator

218-726-2936

Holly Olson | Information Specialist II

St. Louis County Sheriff's Office

911/Communications

2030 North Arlington Avenue

Duluth, Minnesota 55811

218-726-2921

olsonh@StLouisCountyMN.gov

12/16/19 Email Notice of Meeting Reschedule for 12/18/19 Webinar

Notice to ALL Multi-Hazard Planning Meeting Agencies:

Per Dewey Johnson, please see the information below regarding the rescheduled Virginia Multi Hazard Meeting that was postponed this past Friday.

Thank you.

Holly Olson | Information Specialist II

St. Louis County Sheriff's Office

911/Communications

2030 North Arlington Avenue

Duluth, Minnesota 55811

218-726-2921

olsonh@StLouisCountyMN.gov

From: Duane Johnson

Sent: Monday, December 16, 2019 8:34 AM

To: Holly Olson
Cc: Neil Porter
Subject: Cancelled Virginia HMP rescheduled meeting information

Good morning,

The Hazard Mitigation Meeting that was cancelled last Friday will be held on Wednesday December 18th, from 0900-1100. The meeting will be through webex with the new Virginia GSC as an available location for those who do not have internet access.

The meeting location is at Virginia GSC in the Taconite Room. This room is behind locked doors, Scott Lesnau will meet attendees in the lobby at 0845. Those coming after that will have to call him at 218-780-9651 and he will come and meet you in the lobby.

Webex meeting access information:

Meeting

link: <https://stlouiscountymn.webex.com/stlouiscountymn/j.php?MTID=mca46d8991f3101c2a68ae21b9bf9cf65>

Meeting number: 923 016 205

To join by phone: 1-415-655-0001

Access code: 923 016 205



Dewey Johnson
Emergency Management Coordinator
St. Louis County Sheriff's Office

218-726-2936

St. Louis County 2020 Multi-Hazard Mitigation Plan (MHMP) Update

Planning Team Meeting #2

Friday, December 13, 2019

SLC Public Safety Office (Duluth, MN), 9:00 a.m. – 11:00 a.m.

SLC Public Works Building (Virginia), 2:00 p.m. – 4:00 p.m.

Presenting:

- Stacey Stark, U-Spatial at University of MN Duluth
- Bonnie Hundrieser, Hundrieser Consulting LLC

Agenda:

1. Welcome & Introductions
2. Recap of MHMP Key Points
3. Review of Risk Assessment & Vulnerability Analysis
4. Overview of Mitigation Actions & HMA Grant Funding
5. Mitigation Action Chart Review & Feedback
6. Next Steps (Public Review & Plan Submission)

Point of Contact:

Dewey Johnson

St. Louis County Emergency Management Coordinator

Phone: 218-726-2936

Email: johnsond@stlouiscountymn.gov

St. Louis County

12/1319 MHMP Planning Team Meeting #2 – DULUTH, MN

List of Participants (30)

St. Louis County MHMP Update - Planning Team Meeting #2
Friday, December 13, 2019 - 9:00 a.m. - 11:00 p.m. (DULUTH)
Participant Sign-in List

Name	Agency/Organization	Title	Email
Melanie Perello	MN DNR Coastal Program	Coastal Management Fellow	melanie.perello@state.mn.us
Nate Skelton	St. Louis County Sheriff's Office	Lieutenant	skeltonn@stlouiscountymn.gov
Jon Skelton	St. Louis County Sheriff's Office	Supervising Deputy	skeltonj@stlouiscountymn.gov
Steve Lindberg	Duluth Edison Charter School	Facility Manager	steve.lindberg@duluthedison.com
Jason Barsness	Duluth Public Schools	Safety Coordinator	jason.barsness@isd709.org
Zac Morris	AMI Consulting Engineers	Coastal Engineer	zac.morris@amiengineers.com
Cary Korpela	Lake Country Power	Area Supervisor	ckorpela@lcp.coop
Scott Lesnau	St. Louis County Public Health	Emergency Prep. Coordinator	lesnaus@stlouiscountymn.gov
Jason Meyer	SLC Land & Minerals Dept.	Deputy Director	meyerj@stlouiscountymn.gov
Kevin L. Comnick	Canosia Township	Chairman Town Board	comnick@msn.com
Ron Gajewski	Solway Township	Supervisor	rgajewski@aol.com
Paul Senst	City of Hermantown	Public Works Director	psenst@hermantownmn.com
Clinton Little	MN DNR Coastal Program	Coastal Specialist	clinton.little@state.mn.us
Jim Crace	City of Hermantown	Police Chief	crace@hermantownmn.com
Grant Forsyth	Town of Midway	Zoning Administrator	forsythgrante@gmail.com
Jesse Schomberg	U of MN Sea Grant	Associate Dir. for Outreach	jschombe@d.umn.edu
Mark Pannkuk	SLC Land & Minerals Dept.	Area Land Manager	pannkukm@stlouiscountymn.gov
Patrice Erickson	Aitkin County Sheriff's Office	Dispatch Sup./Emerg. Mgmt.	patrice.erickson@co.aitkin.mn.us
Shawn Krizaj	Duluth Fire / EM	Fire Chief	skrizaj@duluthmn.gov
Dewey Johnson	SLC SO / EM	EM Coordinator	johnsond@stlouiscountymn.gov
Dave Yapel	SLC Planning/GIS	GIS Manager	yapeld@stlouiscountymn.gov
Victor Lund	SLC Public Works	Traffic Engineer	lundy@stlouiscountymn.gov
John Hegstrom	City of Rice Lake	City Councilor	johnh@cityofricelake.org
John Werder	City of Rice Lake	Mayor	wernerj@cityofricelake.com
Matt Goodman	St. Louis County	GIS Specialist	goodmanm@stlouiscountymn.gov
Lottie Haller	Gnesen Township	Clerk	lottie@gnesen.org
Tyler Ray	USDA Rural Development	Community Program Specialist	tyler.ray@usda.gov
Sherry Rovig	Clifton Fire & Duluth Township	EOC Co-Director & FD Secretary	cliftonfiredepartment@gmail.com
Julie McDonnell	MN DNR Coastal Program	Coastal Program Specialist	julie.mcdonnell@state.mn.us
Margaret D. Taylor	Midway Township	Supervisor	howmar5628@aol.com

12/13/19 Scanned Sign-in Sheets

St. Louis County – Multi Hazard Mitigation Plan Update
Planning Team Meeting #2 – Friday, December 13, 2019 (DULUTH) 9:00 a.m. – 11:00 p.m.

PARTICIPANT SIGN IN SHEET

Name	Agency/Organization	Title	Email
1. <u>Melanie Perello</u>	Coastal Program, MN DNR	Coastal Management Fellow	melanie.perello@state.mn.us
2. <u>Nate Sketton</u>	St. Louis County Sheriff	LIEUTENANT	Sketton@StLouisCountyMn.gov
3. <u>Ton Sketton</u>	St. Louis County Sheriff	Supervising Deputy Sheriff	Skettonj@StLouisCountyMn.gov
4. <u>Steve Lindberg</u>	Duluth Edison Charter School	Facility Manager	steve.lindberg@duluthedison.com
5. <u>JASON BARNES</u>	Duluth Public Schools	Safety Coordinator	jason.barnes@id799.org
6. <u>ZAC MORRIS</u>	AMJ CONSULTING ENGINEERS	COASTAL ENGINEER	ZAC.MORRIS@AMJ-ENGINEERS.COM
7. <u>Cary Korpela</u>	LAKE Country Power	Area Supervisor	C.Korpela@LCP.coop
8. <u>Scott Lesnau</u>	St. Louis County, MN EPC	Emergency Preparedness Coor	lesnau@stlouiscountymn.gov
9. <u>Jason Meyer</u>	St. Louis County – Land & Minerals Dept.	Deputy Director	MeyerJ@StLouisCountyMn.gov
10. <u>Kevin L. Connick</u>	CANOSIA TOWNSHIP	CHAIRMAN TOWN BOARD	connick@msn.com
11. <u>RON GATEJSKI</u>	SOLVAY TOWNSHIP	SUPERVISOR	rgatejski@sol.vt.edu
12. <u>PAUL SENST</u>	City of Hermantown	Public Works Dir.	psenst@hermantownmn.com
13. <u>Clinton Little</u>	MN DNR /Coastal Program	Coastal Specialist	clinton.little@state.mn.us
14. <u>Jim Crace</u>	City of Hermantown	Police Chief	crace@hermantownmn.com
15. <u>Grant Forsyth</u>	Town of Midway	Zoning Adm	forsythgrant@gmail.com
16. <u>Jesse Schomberg</u>	U of MN Sea Grant	Assoc. Dir. for Outreach	jschombe@umn.edu
17. <u>Mark Pannkuk</u>	St. Louis County Land & Minerals Area	LAND MANAGER	pannkukm@stlouiscountymn.gov
18. <u>Patrice Erickson</u>	Itasca Co. Sheriff office	Disp. Supr. /Em. mngt	patrice.erickson@co.itasca.mn.us
19. <u>Shawn Krieger</u>	City of Duluth	Fire Chief /EM Director	Skrieger@ duluthmn.gov
20. <u>Deputy Johnson</u>	St. Louis County	EM Coordinator	JohnsonJ@stlouiscountymn.gov
21. <u>David Yafel</u>	SLC Planning /GIS	GIS Manager	yafel@stlouiscountymn.gov
22. <u>Victor Lund</u>	SLC Public Works	Traffic Engineer	lundv@stlouiscountymn.gov

St. Louis County – Multi Hazard Mitigation Plan Update
Planning Team Meeting #2 – Friday, December 13, 2019 (DULUTH) 9:00 a.m. – 11:00 p.m.

Name	Agency/Organization	Title	Email
23. <u>John Hegstrom</u>	City of Rice Lake	City Council	johnh@cityofricelake.org
24. <u>John Wierzer</u>	" " "	Mayor	wierzer@stlouiscountymn.gov
25. <u>Matt Goodman</u>	St. Louis Co.	GIS Specialist	goodmanm@stlouiscountymn.gov
26. <u>Lottie Haller</u>	Gnesen Township	Clerk	lottie@gnesenior.org
27. <u>Tyler Ray</u>	USDA - Rural Development	COMMUNITY PROGRAM SPECIALIST	tyler.ray@usda.gov
28. <u>Sherry Rovis</u>	Clifton Fire & Mid-Township	EOC co-Director	cliftonfiredepartment@gmail.com
29. <u>Julie McDonnell</u>	MN DNR	EOC Director	julie.mcdonnell@state.mn.us
30. <u>Margaret D'Taylor</u>	Midway Twp	Coastal program spec	
31.		Supervisor	
32.			
33.			
34.			
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36.			
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45.			

St. Louis County

12/18/19 Webinar Meeting List of Participants

HMP Mtg. #2 for Northern St. Louis County

1. Dewey Johnson, St. Louis County Emergency Management Coordinator
2. Scott Lesnau, St. Louis County PHEP Coordinator
3. Gloria Erickson, St. Louis County Firewise Coordinator
4. Matt Goodman, St. Louis County Sheriff's Office, GIS Specialist
5. David Fink, St. Louis County Deputy Environmental Services Director
6. Nicole Young Mattson, City of Virginia, Police Chief
7. Keith Beal, Virginia Public Schools, Building Director
8. Cory Suonvieri, City of Floodwood Police Dept., Administrative Assistant
9. Nancy Reing, City of Cook, EMS (Cook Ambulance)
10. Dirk Davis, Beatty Township, Supervisor
11. Chad Emery, Cass County, Emergency Management Coordinator
12. David Baker, Alltec (MN Power), Emergency Management Coordinator

12/13/19 & 12/18/19 Power Point Presentation Slides

St. Louis County



2020 MULTI-HAZARD MITIGATION PLAN UPDATE
PLANNING TEAM MEETING #2
DECEMBER 13, 2019

1

Agenda

1. Welcome and Introductions
2. Recap of MHMP Key Points
3. Review of Risk Assessment & Vulnerability Analysis
4. Overview of FEMA HMA Funding and Mitigation Action Chart (MAC)
5. MAC Review & Feedback
6. Next Steps



Hazard Mitigation Planning Meeting #2

2

Overview of Plan Update & Purpose

- St. Louis County is updating its **Multi-Hazard Mitigation Plan (MHMP)** to fulfill a state & federal requirement. The plan must be updated every 5 years. The last plan was adopted in 2013. This plan update will cover **2020-2025**.
- The purpose of the plan is to identify & assess natural hazards that pose risk to the County and its jurisdictions and **develop long-term strategies and mitigation actions** that will help to reduce or eliminate the impact of future hazard or disaster events.

About your Project Team

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover

- **U-Spatial at the University of Minnesota Duluth** was contracted by MN HSEM to facilitate the development of this plan and to conduct spatial analysis, mapping and research for the plan.
- U-Spatial@UMD has worked on 30 MHMP's (2011-2019), working with both Minnesota counties and tribes.
- Working with U-Spatial@UMD is **Bonnie Hundrieser**, who specializes in Emergency Management planning.

3

4

Who the Plan Covers

This is a **multi-jurisdictional** plan that covers St. Louis County, including the cities of Aurora, Babbitt, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton.

The County and Cities are required to adopt the final plan. Townships are covered under the umbrella of the County.



Who Needs to Participate

Stakeholder Participation

It is required to provide an opportunity for local county & municipal government, related agency stakeholders and neighboring jurisdictions to participate in the plan update.

- 2 Planning Team Meetings
- Local Mitigation Survey
- Provision of key data
- MAC Review & Feedback
- Review of Draft Plan

Public Participation

It is required to provide an opportunity for the public to learn about the plan update, ask questions and provide input that may be incorporated into the plan update.

- 2 News Releases
- Outreach conducted via website, social media and local media
- Online public review & comment period for draft plan

5

6

Prioritization of Hazards for St. Louis County

Prioritization of hazards by the St. Louis County Planning Team included consideration of:

- Probability and Severity of natural hazard events
- Observed increase or decrease in risk since 2013
- Jurisdictional variations in risk (i.e., local vulnerabilities, changes in development)

Natural Hazards	Risk Severity (Probability)	Risk Severity (Probability)
Severe Thunderstorms, Lightning, Hailstorms, Windstorms, Tornadoes	High	High
Severe Winter Storms (Snow, Heavy Snow, Ice Storms)	High	High
Flood, Flood-Related Flood, Coastal Flood	Moderate	Moderate (Coastal Flood - High)
Earthquakes (Severe/Local)	Moderate	Moderate
Landslides/Debris/Debris Flow/Debris Avalanche	Moderate	Moderate (Debris Flow - High)
Waves	High	Moderate
Drought	Low	Low
Confidence Intervals	Low	Low

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Hazards Risk Assessment

- Validate prioritization
- Provide probability and severity of future events as possible
- Identify vulnerable populations and structures at risk as possible
- Consider variable jurisdictional vulnerability
- Inform Mitigation Actions in the HMP

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U-Spatial@UMD – County Coordination

U-Spatial@UMD Team has worked closely with personnel from the County to collect key information for the plan update.

- County Emergency Management Director
- County GIS Specialist
- County Assessor
- County Departments (i.e. Highway, Planning & Zoning, SWCD, others).

9

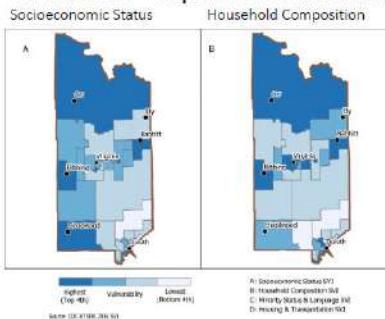
All Hazards – Critical Infrastructure

- Healthcare Facilities
- Hazardous Materials Facilities
- Emergency Services
- Major Employers
- Schools and Shelters
- Government Buildings
- Transportation
- Cultural Resources
- Utilities
- Dams and Levees



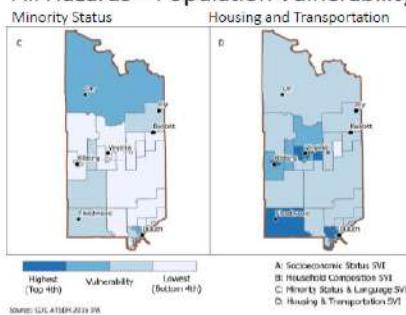
10

All Hazards – Population Vulnerability



11

All Hazards – Population Vulnerability



12



13

Winter Storms
(Blizzards, Heavy Snow, Ice Storms)

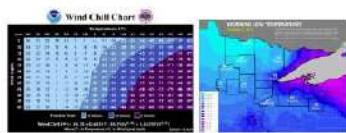


APRIL 2018
A severe spring snowstorm resulted in 15-foot waves on Lake Superior, causing high surf that led to coastal flooding in Duluth. The Duluth Lakewalk was heavily damaged, with an estimated \$9 million in property damage.

OCTOBER 2017
An early winter storm brought gusts over 50 mph, causing waves up to 16 feet. Portions of the Duluth Lakewalk, Brighton Beach, Canal Park and Park Point were damaged. The Minnesota Governor authorized a disaster declaration, with \$1.12 million from the state and \$1.38 million from local governments for repairs and cleanup.

14

Extreme Cold

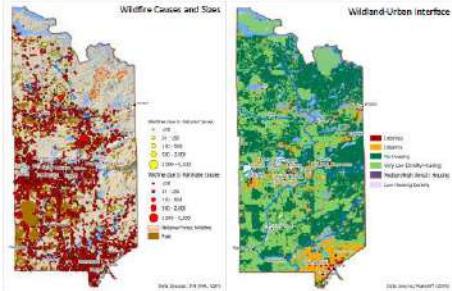


Program Gaps and Deficiencies:
Generators for Backup Power to Healthcare Facilities

Plans and Programs in Place:
Emergency Operations Plan (i.e. public information and warning, evacuation, mass care sheltering, etc.)
School Closings – policy and communication plan
Mass Care Shelter Facilities – expanded capacity

15

Wildfire



16

Flash Flooding & Riverine Flood

- Obtained building and parcel values from County
- Used statewide building footprint data
- Obtained FEMA Flood Insurance Rate Maps
- Ran flood model to estimate economic loss
- Identified Critical Infrastructure in flood zone

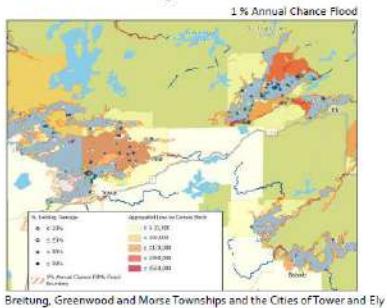
Flash Flooding & Riverine Flood

Jurisdiction	Parcels	Buildings	Estimated Loss
Morse township	110	118	\$8,672,514
Rice Lake township	27	27	\$3,010,653
Grand Lake township	65	104	\$2,898,185
Breitung township	67	98	\$2,020,230
Greenwood township	63	69	\$1,686,416
Gnesen township	12	12	\$1,445,134
Crane Lake township	15	20	\$1,317,881
Cook city	52	69	\$1,268,553
Fredenberg township	19	20	\$1,262,005

17

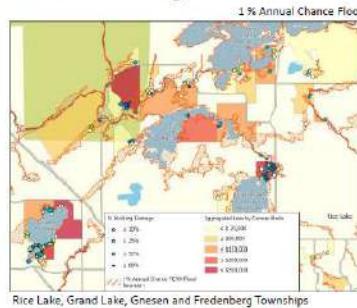
18

Flash Flooding & Riverine Flood



19

Flash Flooding & Riverine Flood



20

Coastal Flooding



21

Development of Mitigation Actions

- Mitigation Actions (MA's) are informed by the Risk Assessment and Vulnerability Analysis.
- MA's are also developed based on an assessment of local capability strengths or deficiencies.
- MA's should reflect efforts to reduce or eliminate risk to life safety, critical infrastructure and systems, property and the environment.
- Any hazard prioritized as high or moderate must have MA's to address them.
- Each jurisdiction must have MA's specific to their own identified local risks & vulnerabilities.
- Any future FEMA grant projects must be identified.

22

FEMA HMA Grant Funding

FEMA Hazard Mitigation Assistance (HMA) grant programs provide funding with the aim to reduce or eliminate risk to property and loss of life from future natural disasters.

HMA programs are typically a 75%/25% cost share program.

Projects must be identified in the local mitigation action chart to support future application.

Example Eligible Activities:

- Property Acquisition (repetitive flooding / erosion imminent risk of failure)
- Tornado Safe Room Construction/Retrofit
- Infrastructure Retrofit (utility systems, roads & bridges)
- Wildfire Mitigation
- Soil Stabilization
- Flood Reduction Projects
- Green Infrastructure
- Additional Projects difficult to conduct a standard BCA

23

Overview of Mitigation Action Charts & Discussion

- The MHMP results in **Mitigation Action Charts** for the County and each city jurisdiction with targeted activities to implement over the next 5 years.
- All MACs have been reviewed and initially approved prior to this meeting.
- Please consider any final additions or changes to include based on information provided today and overview of the MAC.

24

Next Steps (January-February, 2020)

- The full draft plan will be posted online for public review & comment. Public outreach will be conducted for the open review period.
 - Local jurisdictions and partner agencies are encouraged to help promote review & feedback.
 - Public input received will be reviewed for incorporation into the plan.
- Any resulting revisions will be made, and the plan will be submitted to HSEM and FEMA for review and approval.

Mitigation Strategies & Action Types

Following are the five types of mitigation strategies that will be used in the update of the Multi-Hazard Mitigation Plan with examples of related mitigation actions. Minnesota HSEM recommends the use of these mitigation strategies to be in alignment with the State plan and those recommended by FEMA. The first four strategies listed are taken from the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). The fifth strategy type was determined by Minnesota HSEM for use within the state.

These strategies will provide the framework for identification of new jurisdictional-level mitigation actions for implementation over the next 5-year planning cycle.

Mitigation Strategy	Description	Example Mitigation Actions
Local Planning and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	<ul style="list-style-type: none"> • Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans • Mobile home park compliance for storm shelters
Structure and Infrastructure Projects	<p>These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.</p> <p>This type of action also involves projects to construct manmade structures to reduce the impact of hazards.</p>	<ul style="list-style-type: none"> • Property Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits (i.e., metal roofs) • Floodwalls and retaining walls • Detention and retention structures • Culvert Installation/Modification • Roads & Bridge risk reduction • Safe Room (New construction or facility retrofit) • Green Infrastructure Methods <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>

Mitigation Strategy	Description	Example Mitigation Actions
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	<ul style="list-style-type: none"> • Soil stabilization for sediment and erosion control • Floodplain and Stream corridor restoration • Slope management • Forest management (defensible space, fuels reduction, sprinkler systems) • Conservation easements • Wetland restoration and preservation • Aquifer Storage & Recovery • Flood Diversion and Storage <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions that support life safety and lessen property damage.	<ul style="list-style-type: none"> • Radio or television spots • Websites with maps and information • Social media outreach • Promotion of sign-up for emergency warnings • Real estate disclosure • Promotion of NFIP insurance to property owners • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • NWS StormReady Program • Firewise Communities <p><i>Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".</i></p>

Mitigation Preparedness and Response Support	<p>This is a State of Minnesota mitigation strategy with the intent of covering emergency preparedness actions that protect life and property prior to, during, and immediately after a disaster or hazard event. These activities are typically not considered mitigation, but support reduction of the effects of damaging events.</p>	<ul style="list-style-type: none">• Emergency Operations Plan• Flood fight plans and preparedness measures• Dam emergency action plans• Emergency Warning Systems (i.e., CodeRed, warning sirens)• Generator backup power• NWS Storm Spotter Training• Training and education for local elected officials and key partners.
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Appendix F

Public Outreach &

Engagement Documentation

Record of Public Input & Incorporation

News Release #1 – January 15, 2019, “Public Input Wanted as County Updates Multi-Hazard Mitigation Plan”

On January 15, 2019, St. Louis County Emergency Management put out a news release announcing the start of the County’s Multi-Hazard Mitigation Plan. The news release was shared via numerous channels to reach the public, including the St. Louis County website, local newspapers, a live TV interview on KBJR TV 6 as well as local community Facebook and bulletin board postings. The news release provided information on the purpose and content of the plan, who the plan covers, stakeholders involved in the plan update and examples of hazard mitigation activities.

St. Louis County used the news release to gather feedback from residents and businesses from across the County to incorporate into the plan, inviting feedback to the following:

- What are the natural hazards you feel pose the greatest risk to your community?
- Have you experienced a previous disaster event?
- What concerns do you have, and what sorts of mitigation actions or projects do you feel would help to reduce the damages of potential future events for your personal property, your community, or the County as a whole?

The public was strongly encouraged to contact St. Louis County Emergency Management to submit comments, concerns, or questions regarding natural disasters and potential mitigation actions to be included into the plan update process.

Appendix F contains documentation of the means of public outreach for News Release #1.

Record of Public Input & Incorporation:

Following News Release #1, the St. Louis County Emergency Management Coordinator received one return response for public feedback, which was received via email on July 12, 2019. Feedback was provided by a resident of Gnesen Township. The resident’s concern was in relationship to wildfire and neighbors that do not clean up downed trees after severe blow-down events. Her question was “*Could there be some sort of incentive or offer of help for people to clean up their trees?*”

Incorporation of Feedback: This concern was incorporated into the St. Louis County Mitigation Action Chart through the following mitigation actions:

Mitigation Action #12

WOODY DEBRIS PILES

Work with local governments, MN DNR, Tribal & County partners to increase the number of disposal sites for woody debris removed by land owners, and assist in maintaining and elimination of these piles.

Mitigation Action #13

HAZARDOUS TREE/WOODY DEBRIS REMOVAL

Provide assistance to land owners and local governments with removal of downed trees after a blow-down event, as well as removal of trees killed by insects in order to protect the defensible space zone around structures.

Feedback Not Incorporated: The resident providing feedback had additional suggestions for mitigation related to non-natural hazards or emergency response planning and were deemed not relevant by the St. Louis County Emergency Management Coordinator to address in the MHMP update. They included 1) County planning for distribution of potable water if there are extended power outages; 2) Obtaining information on chemicals being stored or transported at industrial facilities and how to deal with chemical emergencies (i.e., Husky Refinery Explosion, April 2018); and 3) Stopping development of the Twin Metals and Polymet Mines.

News Release #2 – January 15, 2020, “Public Comment Sought for County’s Multi-Hazard Mitigation Plan”

On January 15, 2020 St. Louis County Emergency Management put out a news release announcing the completion of the draft St. Louis County Multi-Hazard Mitigation Plan and invitation for public review and comment. The news release was shared via numerous channels to reach the public, including the St. Louis County website, local newspapers, posting on local city websites and township bulletin boards and additional outreach by related stakeholders. In addition, an email was sent to all city and township representatives encouraging them to review the plan and provide feedback. The news release informed the public that a copy of the draft MHMP and a survey for public feedback was available online at <https://sites.google.com/d.umn.edu/stlouiscounty/home>. The public feedback period for the draft plan was open from January 15, 2020 to January 31, 2020, for a total of 17 days.

Appendix F contains documentation of the means of public outreach for News Release #2.

Record of Public Input & Incorporation:

Public input was received via use of the online comment form and via direct response to the St. Louis County Emergency Management Director. Following is a record of public input received and description of how the feedback was incorporated into the plan, and if not, why.

Online Comments – There were 9 reviewers who indicated they reviewed the plan by filling out the online comment form. Only 2 out of 9 reviewers provided specific comments in response to survey questions. Following are the survey questions that generated response, the person’s comment, and how it either was or was not addressed in the plan update:

1. Question: Are there any issues in your community related to natural hazards that we did not address in the plan? Please explain in as much detail as possible.

Comment: I might be missing this in what I read, but I don't see a plan in addressing the possible contamination to the water in the Lake Superior Watershed and St Louis River which could make Duluth's water undrinkable. This could be an industrial dam upstream. What is the obligation of parties to communicate this failure and what would be the channels of response? This might be caused by climate changes that would put additional strain on containment structures. That is why I see this as natural disaster. – Duluth for Clean Water League of Women Voters

Action: No action necessary for plan update. Water contamination is not a part of this plan because it addresses natural hazards only. Contamination of the Lake Superior Watershed and St. Louis River and potential impacts on the City of Duluth's drinking water falls under other response planning by state agencies such as the Minnesota Department of Natural Resources, MN Department of Public Health and local government departments such as St. Louis County Public Health and the City of Duluth.

2. Question: Are there any issues in your community related to natural hazards that we did not address in the plan? Please explain in as much detail as possible.

Comment: Implementing a county wide 911 address signage update for the areas that still have the old, non-reflective, one-sided signs. This would be a key step in response to any emergency incident. – Fire Chief

Action: No action necessary for plan update. This comment was shared with St. Louis County Emergency Management. Updating the County's 911 signage falls under the realm of emergency response planning rather than hazard mitigation planning.

Comments Submitted Directly to County EM – One comment was received directly by St. Louis County Emergency Management:

Comment: "After discussion in our township meeting it was brought up the main issue we have in our area is lack of cell service, which could be used to notify everyone of a warning of severe weather, or other disasters. Our other issue is a problem with beavers building dams along our roadways and flooding our roads." - Clerk, Portage Township

Action:

- 1) Issue #1 - The lack of cell service was noted by St. Louis County Emergency Management. Addressing improvement of cell service is not included in the County's mitigation action chart as it lies outside of the County's jurisdiction to take action to install new cell towers. St. Louis County does work to conduct outreach for severe weather events through additional communication channels such as local television, radio and social media postings for those that are signed up for it.

- 2) Issue #2 – The issue with management of beaver dams was addressed by updating mitigation action #25 in the St. Louis County Mitigation Action Chart:

ICE DAMS & BEAVER DAM MANAGEMENT

Address ice dams that may impact the road system in a timely manner in order to prevent damage to infrastructure and over-the-road flooding, in particular during the spring thaw. Also monitor and address beaver dams adjacent to roads that may cause localized flooding.

(Column J Comment: This is an annual part of the SLC Highway Dept. work plan for roads maintenance and safety of County-owned roads. Public Works needs additional equipment to de-ice culverts and implement new technology. Activities may also include replacing culverts that are frequent problem locations. Beaver dams are addressed on an as-needed basis by the County Hwy. Dept.)

- **Other Feedback Received** – The St. Louis County Firewise Coordinator submitted a correction to U-Spatial@UMD team member Bonnie Hundrieser that two cities (Hibbing and Chisholm) had identified in their local mitigation action charts that they were Firewise Communities (per MN DNR). This was noted as incorrect and requested to be changed. The corrections were made in the two local mitigation action charts.



Saint Louis County

Office of the Sheriff • 2030 Arlington Avenue North Duluth, Minnesota 55811
Patrol, Investigation and Records: (218)336-4360
FAX: (218)336-4370

Ross Litman
Sheriff

FOR IMMEDIATE RELEASE

Date: January 15, 2019

Media Contact: Duane Johnson, Emergency Management Coordinator
(218) 726-2936

Public input wanted as County updates multi-hazard mitigation plan

Tornadoes, flooding, wildfires, blizzards, straight-line winds, ice storms, and droughts are the kinds of natural disasters most likely to cause widespread economic loss and personal hardship in St. Louis County. Taking steps to minimize the damage from a natural disaster is key to the County's multi-hazard mitigation plan (MHMP); and as the County works to update the plan, it wants to hear from the public.

The St. Louis County Sheriff's Office - Emergency Management Division is working with the University of Minnesota Duluth – Geospatial Analysis Center (GAC) to update the County's plan. Also working on the update is a planning team of representatives from County departments, local municipalities, school districts, and other key stakeholders such as utility providers.

The St. Louis County multi-hazard mitigation plan covers St. Louis County, including the cities of Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton. The St. Louis County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan.

"Hazard mitigation planning is a central part of our emergency management program," said Dewey Johnson, St. Louis County Emergency Management Coordinator. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include improvements to roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, parks, mobile home parks or schools to protect lives in the event of tornadoes or severe wind events; burying power lines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the

public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

Reply to:

Communication Dept.
2030 Arlington Avenue North
Duluth, MN 55811
Phone: (218) 726-2920
Fax: (218) 726-2923

County Jail
4334 Haines Road
Duluth, MN 55811
Phone: (218) 726-2345
Fax: (218) 725-6134

Emergency Management
5735 Old Miller Trunk Hwy
Duluth, MN 55811
Phone: (218)625-3969
Fax: (218)625-3965

Sheriff's Office
300 South 5th Avenue
Virginia, MN 55792
Phone: (218) 749-7134
Fax: (218) 749-7192

Sheriff's Office
1810 12th Ave E
Hibbing, MN 55746
Phone: (218) 262-0132
Fax: (218) 262-6334

An Equal Opportunity Employer

As part of the planning process, St. Louis County is seeking feedback from residents and businesses from across the County to incorporate into the plan:

- What are the natural hazards you feel pose the greatest risk to your community?
- Have you experienced a previous disaster event?
- What concerns do you have, and what sorts of mitigation actions or projects do you feel would help to reduce the damages of potential future events for your personal property, your community, or the County as a whole?

Comments, concerns, or questions regarding natural disasters and potential mitigation actions to be included into the plan update process should be submitted to St. Louis County Emergency Management Coordinator Dewey Johnson at 218-726-2936 or johnsond@stlouiscountymn.gov.

There will be additional opportunities for public feedback throughout the update process. A draft of the plan will be posted on the County website for public review prior to submission of the plan to the State of Minnesota. Future news releases will be shared with the media to notify the public of these opportunities.

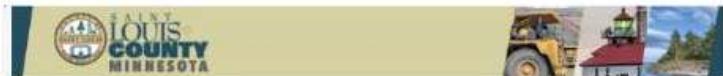
The Federal Disaster Mitigation Act of 2000 (DMA 2000) requires counties to update their plan every five years in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.

St. Louis County MHMP News Release #1 - Public Outreach

St. Louis County Website Bulletin

January 16, 2019

Screen shot of posted news release



Public Input wanted on multi-hazard mitigation plan

St. Louis County MN sent this bulletin at 9/16/2019 02:22 PM CST

Having trouble viewing this email? [View it as a Web page](#)



ST. LOUIS COUNTY
SHERIFF'S OFFICE NEWS
RELEASE

Sheriff's Office • 100 North Fifth Avenue West • Duluth, MN 55802
Phone: (218) 726-2340 • www.saintlouiscountymn.gov

Ross Litman
Sheriff

FOR IMMEDIATE RELEASE

Date: January 16, 2019

**Media Contact: Duane Johnson, Emergency Management Coordinator
(218) 726-2936**

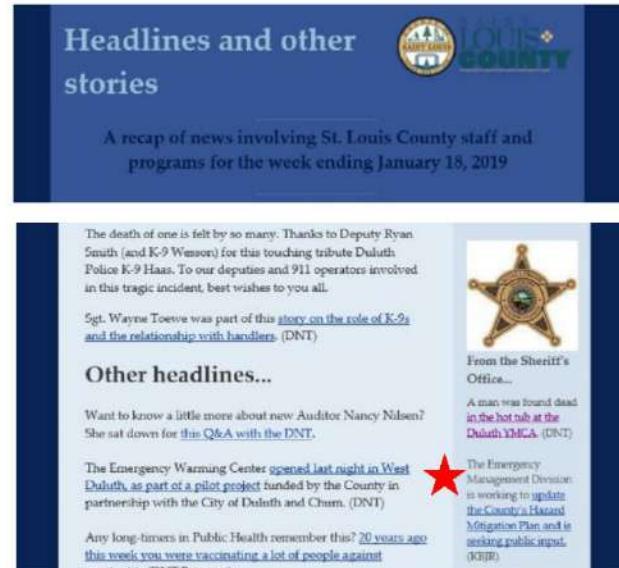
Public input wanted as County updates multi-hazard mitigation plan

Tornadoes, flooding, wildfires, blizzards, straight-line winds, ice storms, and droughts are the kinds of natural disasters most likely to cause widespread economic loss and personal hardship in St. Louis County. Taking steps to minimize the damage from a natural disaster is key to the County's multi-hazard mitigation plan (MHMP); and as the County works to update the plan, it wants to hear from the public.

The St. Louis County Sheriff's Office - Emergency Management Division is working with the University of Minnesota Duluth - Geospatial Analysis Center (GAC) to update the County's plan. Also working on the update is a planning team of representatives from County departments, local municipalities, school districts, and other key stakeholders such as utility providers.

The St. Louis County multi-hazard mitigation plan covers St. Louis County, including the cities of Aurora, Babbitt, Blongibb, Brookston, Bush, Chanhassen, Cook, Duluth, Elv, Evelyn, Elverson, Gilbert,

St. Louis County MHMP News Release #1 - Public Outreach
St. Louis County "In the News This Week" Email and KJBR 6 Online News
January 16, 2019



The death of one is felt by so many. Thanks to Deputy Ryan Smith (and K-9 Wenson) for this touching tribute Duluth Police K-9 Haas. To our deputies and 911 operators involved in this tragic incident, best wishes to you all.

Sgt. Wayne Toeve was part of this [story on the role of K-9s and the relationship with handlers](#). (DNT)

Other headlines...

Want to know a little more about new Auditor Nancy Nielsen? She sat down for this [Q&A with the DNT](#).

The Emergency Warming Center [opened last night in West Duluth](#), as part of a pilot project funded by the County in partnership with the City of Duluth and Churn. (DNT)

Any long-timers in Public Health remember this [20 years ago this week you were vaccinating a lot of people against meningitis](#)? (DNT Response)

A man was found dead in the hot tub at the Duluth YMCA. (DNT)

The Emergency Management Division is working to update the County's Hazard Mitigation Plan and is seeking public input. (KJBR)

Link to KJBR 6 Online News Story & Article, January 16, 2019

<https://kjbr6.com/news/top-stories/2019/01/16/st-louis-county-seeks-feedback-on-preventing-weather-related-damage/>



Start Now
Play Anywhere. Watch Anytime. 100% Free. No
Contract. Use Stream.

St. Louis County seeks feedback on preventing weather-related damage

1:30 pm January 16, 2019 TOP STORIES

County Seeks Feedback on Hazard Mitigation Plan
St. Louis County, MN

St. Louis County is updating its plan for how to prevent damage from weather-related emergencies like ice storms, flooding, and blizzards, and now they are asking the community to help them answer some big questions.

KJBR 6 Weather Authority

FRIIDAY

SATURDAY

BONE CHILLING SATURDAY AND SNOW CHANCE MONDAY AFTERNOON

SATURDAY: We've got sunny skies and cold temperatures for Saturday. There's a high pressure system moving to the north of Minnesota this weekend, so it will cold & northward.

CONNECT WITH KJBR 6

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KBJR Online Article:

St. Louis County is updating its plan for how to prevent damage from weather-related emergencies like ice storms, flooding, and blizzards, and now they're asking the community to help them answer some big questions.

Along with seeking public feedback on the county's "multi-hazard mitigation plan," the St. Louis County Sheriff's Office-Emergency Management Division is also working with the University of Minnesota-Duluth and several other agencies to help the county become more resilient in the wake of an emergency.

"Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county," Dewey Johnson, St. Louis County Emergency Management Coordinator, said.

The county is asking the community to respond to these specific questions:

- What are the natural hazards you feel pose the greatest risk to your community?
- Have you experienced a previous disaster event?
- What concerns do you have, and what sorts of mitigation actions or projects do you feel would help to reduce the damages of potential future events for your personal property, your community, or the County as a whole?

Responses from St. Louis County should be submitted to St. Louis County Emergency Management Coordinator Dewey Johnson at 218-726-2936 or johnsond@stlouiscountymn.gov.

There will be more opportunities for public feedback before a draft plan is posted on the County website for public review. A final plan will eventually be submitted to the state.

Examples of hazard mitigation include:

- improvements to roads and culverts that experience repetitive flooding
- construction of safe rooms at campgrounds, parks, mobile home parks or schools to protect lives in the event of tornadoes or severe wind events
- burying power lines that may fail due to heavy snow, ice or wind storms
- ensuring timely emergency communication to the public through warning sirens and mass notification systems
- conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event.

St. Louis County MHMP News Release #1 - Public Outreach

Hometown Focus Newspaper

January 25, 2019

The Hometown Focus is a free weekly newspaper distributed across the Iron Range.



St. Louis County updates multi-hazard mitigation plan

January 25, 2019



ST. LOUIS COUNTY – Tornadoes, flooding, wildfires, blizzards, straight-line winds, ice storms, and droughts are the kinds of natural disasters most likely to cause widespread economic loss and personal hardship in St. Louis County. Taking steps to minimize the damage from a natural disaster is key to the county's multi-hazard mitigation plan (MHMP). As the County works to update the plan, it wants to hear from the public.

The St. Louis County Sheriff's Office—Emergency Management Division is working with the University of Minnesota Duluth—Geospatial Analysis Center (GAC) to update the county's plan. Also working on the update is a planning team of representatives from county departments, local municipalities, school districts, and other key stakeholders such as utility providers.

The St. Louis County multi-hazard mitigation plan covers St. Louis County, including the cities of Aurora, Babbitt, Baudette, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gibbet, Hampton, Hibbing, Hoy Lakes, Iron Junction, Kinney, Lester, McKinley, Meadowlands, Mt. Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton. The St. Louis County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan.

"Hazard mitigation planning is a central part of our emergency management program," said Dewey Johnson, St. Louis County emergency management coordinator. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include improvements to roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, parks, mobile home parks or schools to protect lives in the event of tornadoes or severe wind events; buying power lines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems; and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

As part of the planning process, St. Louis County is seeking feedback from residents and businesses from across the county to incorporate into the plan:

• What are the natural hazards you feel

pose the greatest risk to your community? • Have you experienced a previous

disaster event?

• What concerns do you have, and

what sorts of mitigation actions or projects do you feel would help to reduce

the damages of potential future events

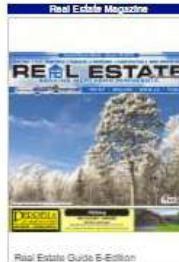
for your personal property, your community or the county as a whole?

Comments, concerns, or questions regarding natural disasters and potential mitigation actions to be included into the plan update process should be submitted to St. Louis County Emergency Management Coordinator Dewey Johnson at 218-726-2936 or ljohnson@stlouiscountymn.gov

There will be additional opportunities for public feedback throughout the update process. A draft of the plan will be posted on the county website for public review prior to submittal of the plan to the State of Minnesota. Future news releases will be shared with the media to notify the public.



2019-01-25 E-Edition



Real Estate Guide E-Edition



January 2019

Month

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St. Louis County MHMP News Release #1 - Public Outreach

KBJR TV 6 – “Beyond the Headlines” Live Interview

February 22, 2019

On Friday, February 22, 2019 St. Louis County Emergency Management Coordinator **Dewey Johnson** and City of Duluth Fire Department **Chief Dennis Edwards** provided a live interview on KBJR6 News “Beyond the Headlines” news segment about the update of the 2019 St. Louis County Multi-Hazard Mitigation Plan.

The interview aired on Sunday, February 24th and was posted on the KBJR6 website on Monday, February 25th. Following is a link to the 3-part video interview and article online:

<https://kbjr6.com/news/2019/02/25/beyond-the-headlines-updating-st-louis-countys-hazard-mitigation-plan/>

Beyond the Headlines: Updating St. Louis County's "Hazard Mitigation Plan"

◎ 12:00 pm · February 25, 2019 · NEWS



SUNNY AND COLD TODAY

February 25, 2019

TODAY/TONIGHT: Today we will have clear skies and calm winds. We will start out mostly sunny, but there will be partly cloudy skies at times.

Read More ↗

CONNECT WITH KBJR 6



ARTICLE:

DULUTH, MN — Extreme weather. It comes in several forms—from flooding, to fire, and tornadoes.

It can be unpredictable, extremely costly, and at times deadly. And in recent months, we've had no shortage of storms that have wreaked havoc on our region.

One storm in October 2018 caused \$11.5 million dollars in damage in Duluth alone, leading to a federal disaster declaration by President Donald Trump.

A few months before that, federal and state officials verified more than \$21 million of damage across 29 Minnesota counties in the wake of storms between June 15th and July 12th.

It's scenarios like these—coupled with the need for federal funding—that are leading St. Louis County officials to adopt an updated county-wide plan that aims to better prepare us for when disaster strikes.

It's called a Multi Hazard Mitigation Plan, or MHMP, and it covers all of St. Louis County, including the cities of Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton.

Officials say it also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan. That's why as many people as possible from across the county are being asked to take part in the process.

"Hazard mitigation planning is a central part of our emergency management program," says Dewey Johnson, St. Louis County Emergency Management Coordinator. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

On this episode of Beyond the Headlines, Dan Wolfe sits down with Johnson, and Chief Dennis Edwards with the Duluth Fire Department.

In the meantime, St. Louis County is seeking feedback from residents and businesses from across the County to incorporate into the plan:

(from an official St. Louis County press release)

- *What are the natural hazards you feel pose the greatest risk to your community?*
- *Have you experienced a previous disaster event?*
- *What concerns do you have, and what sorts of mitigation actions or projects do you feel would help to reduce the damages of potential future events for your personal property, your community, or the County as a whole?*

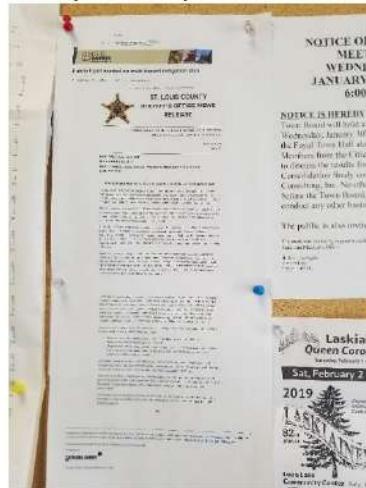
Comments, concerns, or questions regarding natural disasters and potential mitigation actions to be included into the plan update process should be submitted to St. Louis County Emergency Management Coordinator Dewey Johnson:

218-726-2936 or johnsond@stlouiscountymn.gov.

There will be additional opportunities for public feedback throughout the update process. A draft of the plan will be posted on the County website for public review prior to submission of the plan to the State of Minnesota. Future news releases will be shared with the media to notify the public of these opportunities.

**St. Louis County MHMP News Release #1 - Public Outreach
Community Postings of News Release (Bulletin Boards & Facebook)
January-February, 2019**

Fayal Township Bulletin Board



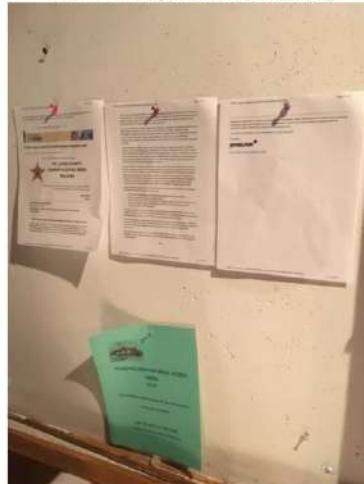
Town of Grand Lake Bulletin Board



Greenwood Township Bulletin Board



Town of Kugler Bulletin Board



Town of Solway Bulletin Board



Northland Township Facebook Page

Posts

 **Northland Township, Canyon Minnesota**
Published by Bobbi Pirkola (7) · 4 mins · [...](#)

St. Louis County Hazard Mitigation Plan
<https://content.govdelivery.com/.../MNSTLOU.../bulletins/228285b>
CONTENT.GOVDELIVERY.COM

Public input wanted on multi-hazard mitigation plan
Tornadoes, flooding, wildfires, blizzards, straight-line winds, ice storms, and droughts are the kinds of natural disasters most likely to cause widespread economic loss and personal hardship in St. Louis County. Taking steps to minimize the damage from a natural disaster is key to

City of Proctor Facebook Page

 **City of Proctor**
@CityOfProctor

[Like](#) [Share](#) [...](#)
<https://content.govdelivery.com/.../MNSTLOU.../bulletins/228285b>
CONTENT.GOVDELIVERY.COM

Public input wanted on multi-hazard mitigation plan
Tornadoes, flooding, wildfires, blizzards, straight-line winds, ice storms, and droughts are the kinds of natural disasters most likely to cause widespread economic loss and personal hardship in St. Louis County. Taking steps to...

[Like](#) [Comment](#) [Share](#)



St. Louis County MN sent this bulletin at 01/15/2020 12:24 PM CST



ST. LOUIS COUNTY SHERIFF'S OFFICE NEWS RELEASE

Sheriff's Office • 100 North Fifth Avenue West • Duluth, MN 55802
Phone: (218) 726-2340 • www.stlouiscountymn.gov

Ross Litman
Sheriff

FOR IMMEDIATE RELEASE

Date: January 15, 2020

Media Contact: Dewey Johnson, (218) 726-2936

St Louis County Emergency Management Coordinator

Public comment sought for county's Multi-Hazard Mitigation Plan

St. Louis County has completed an updated draft of its Multi-Hazard Mitigation Plan (MHMP) and is now seeking public feedback on it. Citizens can find a link to review the plan and offer feedback by visiting z.umn.edu/stlouis mhmp. The review and comment period is open through Friday, January 31, 2020. After that, the county will submit the draft plan to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review.

The St. Louis County MHMP is a multi-jurisdictional plan that covers St. Louis County, including the cities of Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia, and Winton. The plan incorporates the concerns and needs of townships, school districts, and other participating stakeholders.

St. Louis County is vulnerable to a variety of potential natural disasters, which threaten the loss of life and property in the county. The plan addresses how to mitigate against hazards such as tornadoes, flooding, coastal storms and erosion, wildfires, blizzards, straight-line winds, ice storms, and droughts which have the potential for inflicting vast economic loss and personal hardship.

Update of the plan has been under direction of St. Louis County Emergency Management in cooperation with U-Spatial at the University of Minnesota Duluth and representatives from County departments, city and township governments, school districts, and other key stakeholders. Together, the planning team worked to identify cost-effective and sustainable actions to reduce or eliminate the long-term risk to human life or property from natural hazards. Some examples include improvement of roads and culverts that experience repetitive flooding, construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornadoes or severe wind events; burying power lines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people be prepared to take safe action before, during, or following a hazard event.

Hazard mitigation planning helps St. Louis County and other jurisdictions protect their residents. Working with local communities through the process helps identify vulnerabilities and develop strategies to reduce or eliminate the effects of a potential hazard. In addition, increasing public awareness of local hazards and disaster preparedness helps to create a community that is resilient to disaster, and breaks the cycle of response and recovery. Updating the plan further allows the County and its jurisdictions to apply for eligible projects under future Hazard Mitigation Assistance (HMA) grant funding from FEMA for projects that are cost-effective and will help to reduce or eliminate impacts of future natural disaster events.

####

From: [Holly Olson](#)
To: [Holly Olson](#)
Cc: [Bonnie K Hundrieser](#); [Duane Johnson](#)
Subject: St. Louis County MHMP News Release #2 & Website Public Review Period
Date: Thursday, January 16, 2020 2:09:43 PM
Attachments: News Release Public comment sought for county's Multi-Hazard Mitigation Plan.pdf
Importance: High

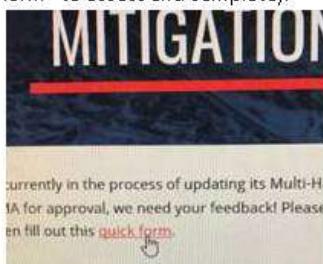
This message was sent securely using Zix®

Good afternoon all St. Louis County City and Township Representatives,

The St. Louis County Multi-Hazard Mitigation Plan draft document is ready for public review and comment until Friday, January 31st. City and Township personnel are encouraged to look at the plan and submit any questions, comments, or changes for the plan so we can submit everything to the State of MN and FEMA.

Action Items for City/Township Representatives:

1. **REVIEW and COMMENT** on the Multi-Hazard Mitigation plan at this website: <https://sites.google.com/d.umn.edu/stlouiscounty/home> - in particular the mitigation actions for your jurisdiction, and then fill out the online form (click on the words "quick form" to access and complete).



2. **POST THE NEWS RELEASE** (attached) and **SEND PROOF OF POSTING** to help announce the public review period.
This could be a bulletin board photograph, website link, Facebook page – whatever method you used to get the word out.
Once you post the News Release, please send proof of posting to Holly Olson at olsonh@stlouiscountymn.gov.
This is an essential part in proving to FEMA that we have provided opportunity for public review of the plan.

Many thanks for all of the input and assistance you have given during this process.
Please contact me with any questions.

Dewey Johnson
St. Louis County Sheriff's Office
Emergency Management Coordinator

218-726-2936

Holly Olson | Information Specialist II
St. Louis County Sheriff's Office
911/Communications
2030 North Arlington Avenue
Duluth, Minnesota 55811
218-726-2921
olsonh@StLouisCountyMN.gov

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**St. Louis County MHMP News Release #2 - Public Review & Comment Period
Documentation of News Release Postings (January, 2020)**

St. Louis County Postings

St. Louis County Website (Bulletin Posting)



Public comment sought for St. Louis County's Multi-Hazard Mitigation Plan

St. Louis County MN sent this bulletin at 01/15/2020 12:24 PM CST

Having trouble viewing this email? View it on a Web page.

**ST. LOUIS COUNTY
SHERIFF'S OFFICE
NEWS RELEASE**

Sheriff's Office • 100 North Fifth Avenue West • Duluth, MN 55802
Phone: (218) 726-2340 • www.stlouiscountymn.gov
Ross Litman
Sheriff

FOR IMMEDIATE RELEASE
Date: January 15, 2020
Media Contact: Dewey Johnson, (218) 726-2936
St Louis County Emergency Management Coordinator

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St. Louis County has completed an updated draft of its Multi-Hazard Mitigation Plan (MHMP) and is now seeking public feedback on it. Citizens can find a link to review the plan and offer feedback by visiting z.umn.edu/stlouis mhmp. The review and comment period is open through Friday, January 31, 2020. After that, the county will submit the draft plan to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review.

The St. Louis County MHMP is a multi-jurisdictional plan that covers St. Louis County, including the

Local Newspapers

Duluth News Tribune Article online (1-27-20)



The screenshot shows a news article from the Duluth News Tribune. The article is titled "St. Louis County plans ahead for natural disasters" and is dated January 27th, 2020, at 7am. The article discusses the Multi-Hazard Mitigation Plan, which is updated every five years to address changing climate conditions. It mentions specific challenges in Chisholm and Duluth, such as new development and impermeable surfaces, and the need for flood mitigation projects. The article quotes Dewey Johnson, emergency management coordinator for the St. Louis County Sheriff's Office, saying, "This is a living, breathing document and we learn things every time we update it." The website layout includes a navigation bar with links to News, Sports, Opinion, Videos, Weather, Business, Obituaries, and Sections. There are also social media sharing buttons and a sidebar with various news categories and links.

Full Article:

St. Louis County plans ahead for natural disasters

The Multi-Hazard Mitigation Plan is updated every five years and changes to meet a changing climate. Written By: Brady Slater | Jan 27th 2020 - 7am.

In Chisholm, two new senior assisted living facilities mean new considerations for how to help the large communities of people living in those places if there were a natural disaster.

In Duluth, an ongoing surge in new development has added significantly to the city's impermeable surfaces in the last five years — meaning more stormwater runoff and the need for smart, aggressive flood mitigation projects.

These are just two conclusions in a more than 500-page plan to save lives and property in the face of natural disasters in St. Louis County.

"This is a living, breathing document and we learn things every time we update it," said Dewey Johnson, emergency management coordinator for the St. Louis County Sheriff's Office.

Johnson spoke to the News Tribune about the county's Multi-Hazard Mitigation Plan, which is currently [open for public review and comment](#) through Friday.

The Mitigation Plan is updated every five years and has been a federal requirement since 2000. It encompasses the overall county with additional focus on its two dozen cities: Aurora, Babbitt, Biwabik, Brookston, Buhl, Chisholm, Cook, Duluth, Ely, Eveleth, Floodwood, Gilbert, Hermantown, Hibbing, Hoyt Lakes, Iron Junction, Kinney, Leonidas, McKinley, Meadowlands, Mountain Iron, Orr, Proctor, Rice Lake, Tower, Virginia and Winton.

The Mitigation Plan also incorporates the concerns and needs of townships and school districts, a St. Louis County news release said this month.

Before being sent to the Federal Emergency Management Agency, the Mitigation Plan will need to be approved by the St. Louis County Board and local city councils.

The year-long process to update the Mitigation Plan has been no small task, Johnson said. As communities and environments evolve and change, the plan has to adapt, too.

"Because of the damage we've seen, coastal flooding has become an increased concern," Johnson said. "With Lake Superior levels as high as they are, if we get wind in the right direction now, we've got issues."

According to the National Oceanic and Atmospheric Administration, 2017 was a record year in the United States with \$306 billion in damages due to natural disasters. And while the Northland is valued for the way it's insulated from the costliest disasters, such as hurricanes, it remains subject to the volatile whims of the weather.

"The plan addresses how to mitigate against hazards such as tornadoes, flooding, coastal storms and erosion, wildfires, blizzards, straight-line winds, ice storms and droughts, which have the potential for inflicting vast economic loss and personal hardship," the county news release said.

The Mitigation Plan cites a prime example within Duluth, where there were four declared storm-related disasters from 2016 to 2018.

"Duluth is already seeing the more frequent and severe storms that are projected for the area in association with climate change," the Mitigation Plan says. "More powerful storms are producing larger precipitation amounts, higher wind speeds, larger waves and more coastal flooding and, at times,

coming in such quick succession that the city is unable to complete repair work from one disaster before another disaster occurs."

Mitigation planning helps change how communities address risks, Johnson said, noting how the Lakewalk in Duluth is being re-engineered to be more durable. Between October 2017 and October 2018, successive storms compounded damage on the Lakewalk before repairs could be completed.

The Mitigation Plan is a trove of information about the county itself, including social and economic data, historic tornado data, an inventory of dams and levees in the county, and even a count of the total number of buildings in St. Louis County: 155,662.

St. Louis County, using a grant from Minnesota Division of Homeland Security and Emergency Management, teamed with U-Spatial at the University of Minnesota Duluth to update the mitigation plan. U-Spatial is a program that offers expertise in geographic information systems.

While the Mitigation Plan encompasses natural hazards, it does not address terrorism or other man-made risks.

"That's found in our Emergency Operations Plan — not in this," Johnson said.

City Postings

City of Mountain Iron - Facebook

City of Mountain Iron - Twitter

City of Ely – Twitter Posting



Sgt. George Burger
@sgtburger

Sergeant at @ElyPolice and Emergency Management Director for the City of Ely Minnesota. #ElyMN

④ Ely, MN ⑤ ely.mn.us
Joined November 2019

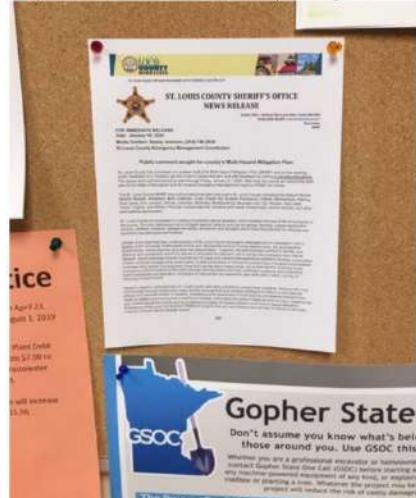
30 Following 64 Followers

[Tweets](#) [Tweets & replies](#) [Media](#) [Likes](#)

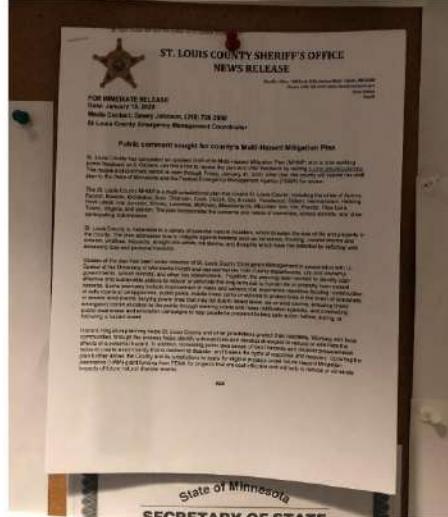
Sgt. George Burger @sgtburger 7s
St. Louis County needs your input on the County Multi-Hazard Mitigation Plan.
#HSEM

[Public Comment Sought for County's ... scribd.com](#)

City of Gilbert bulletin board posting

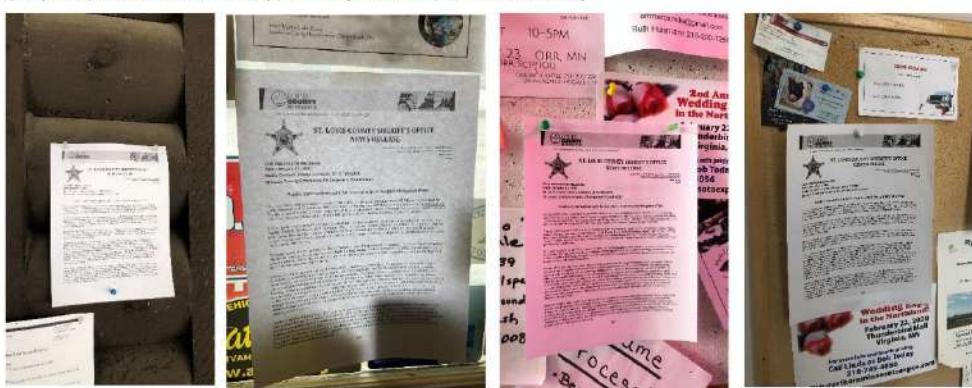


City of Hoyt Lakes bulletin board posting



City of Orr community flyer postings

(City Hall, Norman's One Stop, Orr Liquor Store, Orr Post Office)



The screenshot shows the Facebook page for the City of Rice Lake. It displays three posts:

- Post 1:** A post from the City of Rice Lake page on January 17 at 12:23 PM. It links to the St. Louis County Multi-Hazard Mitigation Plan draft document for public review and comment until Friday, January 31st. The link is <https://sites.google.com/d.umn.edu/stlouiscounty/home>.
- Post 2:** A post from the St. Louis County page on January 10 at 11:03 AM. It discusses the process of updating the Multi-Hazard Mitigation Plan and encourages feedback. The link is <https://sites.google.com/d.umn.edu/stlouiscounty/home>.
- Post 3:** A post from the City of Rice Lake page on January 10 at 11:03 AM. It states that according to City of Rice Lake Ordinance No. 51, licenses are required for all dogs over 6 months of age.

Below the posts, a large orange button labeled "2020 Dog Licenses" is visible.

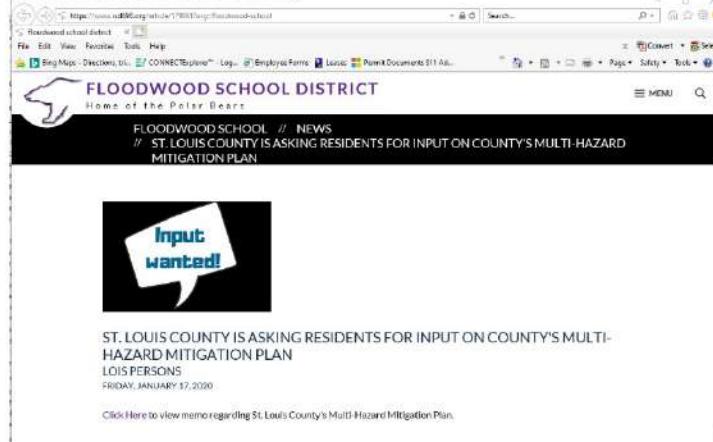
Township Bulletin Board Postings

Multiple townships within St. Louis County sent in photo documentation or written notice to St. Louis County Emergency Management of the news release flyer posted to community bulletin boards. They included:

- Breitung Township
- Town of Colvin
- Ellsborg Township
- Fayal Township
- Field Township
- Town of Gnesen
- Grand Lake Township
- Halden Township
- Town of Kugler
- McDavitt Township
- Midway Township
- Town of Pequaywan
- Town of Pike

Other Postings:

Floodwood ISD Website Posting



Regional Stormwater Protection Team (RSPT)

An announcement on the public review period was included in an Email to the RSPT email list.

tournaments, fireworks, and more! <http://lakesuperiorfestival.com/>

3. The St. Louis River Summit is celebrating their 10th year, and this year will be held at the DECC on March 3-4, 2020. [Registration and more info!](#)
4. NASECA/City of Superior Construction Site EC and SW Permit Compliance Training at UWS, April 1-2! (flier and draft agenda are attached to this email) This two day course is designed for those who perform site management duties, supervise or direct construction activities, install best management practices, and/or inspect sites for compliance relating to erosion/sediment control and storm water management. The course and its exam are approved by the Wisconsin Department of Safety and Professional Services (DSPS) as a Soil Erosion Inspector Training Course, which is one of the only approved courses available for certification as an Erosion Control Inspector of 1- and 2-family dwellings in Wisconsin. A registration link and more information can be found here: <https://nasecawi.org/events-training/erosion-control-compliance-training/>
5. The St. Louis County Multi-Hazard Mitigation Plan draft document is ready for public review and comment until Friday, January 31st. City and Township personnel are encouraged to look at the plan and submit any questions, comments, or changes for the plan before submission to the State of MN and FEMA. **REVIEW and COMMENT** on the Multi-Hazard Mitigation plan at this website: <https://sites.google.com/d.umn.edu/stlouiscounty/home>
6. GLRI Grants available to keep trash out of the Great Lakes! State agencies, federally recognized tribes and tribal consortia, any agency or instrumentality of local governments, nonprofit organizations, interstate agencies, and colleges and universities are eligible to apply for the grants.

St. Louis County 2020 MHMP Update Public Review Website & Comment Form
URL: <https://sites.google.com/d.umn.edu/stlouiscounty/home>

The St. Louis County 2020 MHMP Update was made available for public review online with a website hosted by U-Spatial at the University of Minnesota Duluth (U-Spatial@UMD). The website provided a full draft of the 2020 MHMP update and individual excerpts of the Mitigation Action Charts for the County and each city jurisdiction. A “quick form” comment form was also provided for the submission of online comments or questions.

Public Review Website



St. Louis County is currently in the process of updating its Multi-Hazard Mitigation Plan. Before the plan is submitted to the State of Minnesota and FEMA for approval, we need your feedback! Please review the draft plan, in particular the mitigation actions for your jurisdiction, and then fill out this quick form.

- [St. Louis County MHMP 2020 draft](#)
- [St. Louis County Mitigation Actions](#)
- [Aurora Mitigation Actions](#)
- [Babbitt Mitigation Actions](#)
- [Baudette Mitigation Actions](#)
- [Brooten Mitigation Actions](#)
- [Brookston Mitigation Actions](#)
- [Buhl Mitigation Actions](#)
- [Cass Lake Mitigation Actions](#)
- [Cook Mitigation Actions](#)
- [Duluth Mitigation Actions](#)
- [Ely Mitigation Actions](#)
- [Eveleth Mitigation Actions](#)
- [Flourland Mitigation Actions](#)
- [Gilbert Mitigation Actions](#)
- [Hermantown Mitigation Actions](#)
- [Hibbing Mitigation Actions](#)
- [Hoyt Lakes Mitigation Actions](#)
- [Iron Junction Mitigation Actions](#)
- [Keweenaw Mitigation Actions](#)
- [Lemire Mitigation Actions](#)
- [McKinley Mitigation Actions](#)
- [Mendota Mitigation Actions](#)
- [Mountain Iron Mitigation Actions](#)
- [Ore Mountain Actions](#)
- [Proctor Mitigation Actions](#)
- [Rice Lake Mitigation Actions](#)
- [Tower Mitigation Actions](#)
- [Virginia Mitigation Actions](#)
- [Winton Mitigation Actions](#)

For more information, please contact Stacey Stark at stark@umn.edu or visit <http://research.umn.edu/units/umn-research/mhmp2020-climate>

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover

St. Louis County MHMP Feedback & Comment Form

The "quick form" provided an opportunity for reviewers to submit feedback on the plan. Feedback submitted was collected by U-Spatial@UMD and reviewed for incorporation into the plan. The form included the following:

Instructions

Upon reviewing the draft Multi-Hazard Mitigation Plan update for St. Louis County, please answer the following questions to provide feedback and suggestions. Thank you!

Reviewer Information

- Name
- Email
- Job Title and Organization
- Jurisdiction (drop down menu)

Questions

- After reviewing the mitigation actions for your jurisdiction, do you have any ideas for new ones to add? Please explain in as much detail as possible.
- Are there any issues in your community related to natural hazards that we did not address in the plan? Please explain in as much detail as possible.
- Does this plan reflect the needs of Blue Earth County to mitigate against future natural hazards? If not, please explain.
- Do you have any other comments or suggestions on the plan before it is submitted to the State of Minnesota and FEMA for approval?
- How did you find out about this planning effort? (Selection menu)

St. Louis County MHMP Feedback & Comments

Upon reviewing the draft Multi-Hazard Mitigation Plan update for St. Louis County, please answer the following questions to provide feedback and suggestions. Thank you!

Name
Your answer

Email address
Your answer

Job Title and Organization
Your answer

Jurisdiction
Choose

After reviewing the mitigation actions for your jurisdiction, do you have any ideas for new ones to add? Please explain in as much detail as possible.
Your answer

Are there any issues in your community related to natural hazards that we did not address in the plan? Please explain in as much detail as possible.
Your answer

Does this plan reflect the needs of St. Louis County to mitigate against future natural hazards? If not, please explain.
Your answer

Do you have any other comments or suggestions on the plan before it is submitted to the State of Minnesota and FEMA for approval?
Your answer

How did you find out about this planning effort?
 Colleague
 Friend
 Facebook Page
 County Announcement/E-mail
 County Email
 Newspaper
 Other: _____

Submit

Appendix G

Mitigation Actions by Jurisdiction

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Table G - 1. City of Aurora Mitigation Action Chart (2020-2025)

City of Aurora Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC EM	The city of Aurora has a website where information on the County's emergency notification system with a link can be posted. This can go on the "Emergency Information" page under the "Residents" tab. The city can also encourage residents to sign up via reminders at city council meetings or at community events.	City funding
2	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	Ongoing	High	2020-2025	City Admin. in cord. with SLC EM	On the City of Aurora's website, there is an "Emergency Information" page under the "Residents" tab. The city provides information here for residents on who to contact and things to be aware of regarding preparedness for emergencies and severe weather.	City funding
3	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Upgrade the city's outdoor warning siren.	n/a	New	High	2020-2025	City Admin. in cord. with SLC EM	The City of Aurora and city Emergency Manager will coordinate with SLC Emergency Management for assistance on this project, including obtaining funding for a new siren and installation of it. The USDA Rural Development Grant program may be a possible source of grant funding.	City funding, USDA Rural Dev. grant funding

The mitigation activities listed in the **City of Aurora Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 2. City of Babbitt Mitigation Action Chart (2020-2025)

City of Babbitt Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Babbitt has a website and city Facebook page where information on the County's emergency notification system with a link could be posted.	City funding	
2	Severe Winter / Summer Storms	Mitigation Preparedness & Response Recovery	Regularly remove risk trees that may fall during severe storm events (i.e., ice storms, blizzards, high winds).	Yes (Existing Buildings)	Ongoing	Mod.	2020-2025	City Public Works	The City Public Works Dept. has removed risk trees to avoid trees falling on power lines, roads or other structures. The PW Dept. will continue to monitor and address trees that may be at risk of falling.	City funding	

The mitigation activities listed in the **City of Babbitt Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 3. City of Biwabik Mitigation Action Chart (2020-2025)

City of Biwabik Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Biwabik has a website and a city Facebook page where information on the County's emergency notification system with a link can be posted.	City funding	
2	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	Ongoing	High	2020-2025	City Admin. in cord. with SLC EM	The City of Biwabik posts severe weather awareness information in the East Range Shopper. Information can also be posted to our city Facebook page.	City funding	
3	Flood	Structure & Infrastructure Systems	Improve the City's stormwater system to help with surface drainage from high-rain events.	Yes (<i>Stormwater System Infrastructure</i>)	New	High	2020-2025	City Public Works Dept.	Within the last 5 years the city has upgrade our pipe network in our storm water system. We now have significant amounts of ditching to do to help with surface drainage. We have worked closely with the USDA Rural Development Program to address our infrastructure needs for flood mitigation and will seek additional grant funds to support this project.	City funding, USDA Rural Dev. grant funding	

The mitigation activities listed in the **City of Biwabik Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 4. City of Brookston Mitigation Action Chart (2020-2025)

City of Brookston Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Brookston is a small community with a population of 141. We do not have a website or social media, but will encourage residents to sign up for the County's emergency notification system through reminder announcements at City Council meetings.	City funding	
2	Flood	Local Planning & Regulations	Work with St. Louis County to work with homeowners who experience repetitive flooding along the St. Louis River to participate in a voluntary buyout program.	Yes (Existing Homes)	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	There are 7 homes built along the St. Louis River on the north side of the city that have experienced major flooding that caused major damages and the need to evacuate. Many homeowners have expressed they would be interested in a buyout of their property. The city of Brookston with work with St. Louis County to investigate / apply for FEMA HMA grant funding to conduct property buyouts and then convert those properties to open space.	City funding, County funding, FEMA HMA grant funding	

The mitigation activities listed in the **City of Brookston Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 5. City of Buhl Mitigation Action Chart (2020-2025)

City of Buhl Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Buhl has a website where information on the County's emergency notification system with a link could be posted. We can also provide reminders at City Council meetings or by posting flyers at community facilities.	City funding
2	Flood	Structure & Infrastructure Projects	Update the city sewer and storm sewers to better manage high rain events.	Yes (<i>Sewer & Stormwater Infrastructure</i>)	Ongoing	High	2020-2025	City Public Works Dept.	The City of Buhl continues to make updates to our sewer & stormwater system as funds are available. Funding is limited for our city and outside grant funding is necessary to assist with implementation. The USDA Rural Development Program may be a source of funding to investigate and pursue as applicable.	City funding, USDA Rural Dev. grant funding
3	Flood	Education & Awareness Programs	Encourage residents to maintain or update their sump pumps to avoid basement flooding during high rain events.	Yes (<i>Existing Buildings – Residences</i>)	Ongoing	Mod.	2020-2025	City Admin, City Public Works	In the past 5 years the city has experienced minor flooding events which caused backup into resident's basements. The City has a website where information can be posted to encourage residents to maintain or update their sump pumps in advance of high rain events or the spring melt.	City funding

The mitigation activities listed in the **City of Buhl Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing

mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 6. City of Chisholm Mitigation Action Chart (2020-2025)

City of Chisholm Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Chisholm has a website and city Facebook page where information on the County's emergency notification system with a link could be posted.	City funding
2	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City Admin. in cord. with SLC EM	The City of Chisholm participates in the National Weather Service's Severe Winter/Severe Spring Awareness Weeks. The city is in the process of updating our website and will work to improve information on emergency preparedness to residents. We can also utilize our city Facebook page when we have important severe weather information to share.	City funding

City of Chisholm Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
3	Severe Winter / Summer Storms	Local Planning & Regulations	Obtain emergency generators and agreement with contractors for support during extended power outages resulting from severe storms (i.e., blizzards, ice storms, thunderstorms, windstorms)	Yes <i>(Existing Businesses & Residences and System Infrastructure)</i>	New	High	2020-2021	City Public Works Depart.	The City of Chisholm is working to develop an Emergency Potable Water and Sewage Pumping plan. The plan includes purchase of emergency generators for the pumps which supply the city with potable water and pump sewage to the Central Iron Range Sanitary Sewer District Waste Water Treatment Plant. The City is a participant with the MN Rural Water's Statewide MnWARN (Water/Wastewater Agency Response Network) a 24/7/365 Public Works On-Call Network for backup too.	City Funding
4	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Upgrade the City's outdoor warning siren.	n/a	New	High	2020-2025	City Admin. in cord. with SLC EM	The City of Chisholm will coordinate with SLC Emergency Management for assistance on this project, including obtaining funding for a new siren and installation of it. The USDA Rural Development Grant program may be a possible source of grant funding.	City funding, USDA Rural Dev. grant funding

City of Chisholm Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
5	Flood	Structure & Infrastructure Projects	Improve the City's stormwater system to better handle the runoff from large storm events through measures such as creation of detention & retention ponds and street reconstruction projects that include new storm sewer and catch basins.	Yes <i>(Storm Sewer System Infrastructure)</i>	New	High	2020-2025	City Public Works Dept.	The City of Chisholm has a goal of doing at least one street reconstruction project per year, which includes changing out storm sewers and catch basins. We will work with our City Engineer/Public Works Administrator to evaluate opportunities for additional projects to slow the impact of high rain events on our system, including implementation of detention & retention basins in key areas. The City may need to seek additional outside grant funding to support those projects from USDA or FEMA as eligible.	City funding, USDA Rural Dev. grant funding, FEMA HMA grant funding
6	Wildland Fire	Natural Systems Protection	Strategically conduct logging operations north of the city to reduce the potential for wildfire.	Yes <i>(Existing Buildings –Residences)</i>	New	High	2020-2025	City Admin & Public Works Dept. in cord with MN DNR	The City of Chisholm is planning to log a 40-acre parcel north of town which will mitigate potential wildfire activity for the city. The project will be conducted by a contractor but under the oversight of City Admin / City Public Works. The city may seek supportive funding for this project through a MN DNR Firewise grant.	City funding, MN DNR Firewise grant funding

The mitigation activities listed in the **City of Chisholm Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon

existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 7. City of Cook Mitigation Action Chart (2020-2025)

City of Cook Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Cook has a website and a local Facebook page where information on the County's emergency notification system with a link could be posted.	City funding	
2	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City Admin. in cord. with SLC EM	The City is in the process of updating our website and will work to improve information on emergency preparedness to residents. We can also utilize our local Facebook page when we have important severe weather information to share. The City participates in Tornado Awareness week and has done alerts and shared information with our residents on what the use of sirens means and what to do when they go off.	City funding	
3	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Upgrade the City's outdoor warning siren.	n/a	New	High	2020-2025	City Admin. in cord. with SLC EM	The City of Cook will coordinate with SLC Emergency Management for assistance on this project, including obtaining funding for a new siren and installation of it. The USDA Rural Development Grant program may be a possible source of grant funding.	City funding, USDA Rural Dev. grant funding	

City of Cook Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Flood	Local Planning & Regulations	Enforce the City's floodplain ordinance and maintain participation in the National Flood Insurance Program (NFIP).	Yes <i>(New Building Construction)</i>	Ongoing	High	2020-2025	City Planning & Zoning Committee	The City participates in the NFIP. We have a Planning and Zoning Committee that has established and that enforces the city's Floodplain Ordinance.	City funding

The mitigation activities listed in the **City of Cook Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 8. City of Duluth Mitigation Action Chart (2020-2025)

City of Duluth Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for St. Louis County's "Northland Alert" emergency notification system.	n/a	Ongoing	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The City of Duluth Fire Department website has a link for residents to sign up for the Northland Alert system. The system allows users to subscribe to receive alerts about emergencies and other important community news.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the ability to deliver timely notification and information to all segments of the community in advance of, during and following disaster events.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt. & Communications Team	The City has a designated Emergency Management Director (Fire Chief) and a three-person communications team that leads the way on disaster related media relations and community relations. Outreach communication tools include Northland Alert, IPAWS, Social Media, and Local TV/Radio media.	City funding	
3	All-Hazards	Education & Awareness Programs	Provide outreach to residents and visitors on personal and family emergency preparedness for severe storms, extended power outages, flooding and other hazard events, such as chemical releases.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt. (FD)	The City of Duluth FD website includes an Emergency Preparedness page with information and links for the public. The FD also has a Facebook page that is used for posting of information on storms and safety alerts. Information is also shared through various public presentations by the Fire Dept. such as at schools or special events, such as National Night Out.	City funding	

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	All-Hazards	Mitigation Preparedness & Response Support	Ensure shelters are available to the public as needed in the event of severe storms, flooding or extreme heat / extreme cold events that pose risk to life-safety.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt. (FD)	The City maintains an Emergency Operations Plan which includes plans and procedures for mass care sheltering. The City works with the American Red Cross, CHUM and St. Louis County Public Health & Human Services as needed in the event activation of designated warming or cooling centers. The City will continue to work to increase the number of designated facilities that can be activated during dangerous temperature events that pose risk to public safety, particularly the homeless.	City funding, County funding
5	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Ensure that warning sirens throughout the City are maintained and are functioning to alert residents during dangerous high wind or tornado events.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt. (FD)	The City, in collaboration with St. Louis County Dispatch, tests all warning sirens on the first Wednesday of every month at 1:00 p.m. to ensure they are in proper working order. Sirens are used for dangerous high wind or tornado events but may be used for other dangers if necessary. Continued collaboration with local partners is required to ensure electrical system resilience. We would like to upgrade siren activation to 800 mhz from current UHF format.	City funding

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
6	Flood	Structure & Infrastructure Projects	Install green infrastructure and traditional Best Management Practices (BMP) infrastructure to reduce peak discharge and volume of stormwater runoff.	Yes <i>(Transportation & Stormwater System Infrastructure)</i>	Ongoing	High	2020-2025	City Public Works & Utilities Dept. and City Public Admin Dept.	Utility Operations has increased BMP maintenance and cleaning of the storm sewer system and will continue to do so. Green infrastructure options are applied where effective and will continue to be evaluated and applied in stormwater improvement projects. City Public Admin Dept. has implemented complimentary projects on public green space.	City funding, MN DNR, MPCA, FEMA HMA grant funding, MN Clean Water Fund
7	Flood	Structure & Infrastructure Projects	Increase cross culvert size to reduce damage to road and utility infrastructure due to overtopping of drainage ways during weather events by increasing the size of culverts.	Yes <i>(Transportation & Stormwater System Infrastructure)</i>	Ongoing	High	2020-2025	City Public Works & Utilities Dept.	During street improvement projects the City works to replace cross culverts with increased sizes to provide flood protection and decrease the potential for debris blockages that may cause localized flooding.	City funding, MN DNR, FEMA HMA grant funding

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
8	Flood	Local Planning & Regulations	Increase the storm water utility maintenance budget to increase cleaning of pipes to ensure maximum capacity of the system, also expand the road ditching program to allow for mowing of ditches to reduce debris blockages and increase the amount of maintenance ditching done each year.	Yes (Transportation & Stormwater System Infrastructure)	Ongoing	High	2020-2025	City Public Works & Utilities Dept.	The City Public Works & Utilities Dept. maintains an annual budget for prioritized projects for road improvements and stormwater management. Budget increases will occur as deemed feasible over the next 5 years. The City will also consider road relocation or raising in problematic areas prone to flooding.	City funding
9	Flood	Natural Systems Protection	Restore flood plains along our creeks and streams in an effort to provide additional storage of flood waters.	Yes (New/Existing Buildings downstream)	New	High	2020-2025	City Public Works & Utilities Dept. and City Public Admin Dept. in cord. with SWCDs and other key partners	The City participates in an inter-agency Duluth Urban Watersheds Advisory Committee that identifies and prioritizes problems and cost-effective remedies. This is one focus of that group. Restoration efforts are also an effort of both the North and South St. Louis SWCD as funding allows. Future FEMA HMA funding may be considered for water retention and floodplain restoration measures.	City funding, MN Clean Water Fund, Federal GLRI funds, SWCD, FEMA HMA Grant funding

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
10	Flood	Education & Awareness Programs	Increase public education about flooding events and being safe during a flood.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt. (FD)	The City uses numerous outreach methods to educate the public during dangerous storm and flood events and provide safety information. Outreach methods include media releases, City websites and social media (i.e., City of Duluth FB, Fire Dept. FB, and Police Dept. FB & Twitter). IPAWS notification will be conducted in coordination with St. Louis County Emergency Management with evacuation/sheltering becomes necessary.	City funding
11	Flood	Education & Awareness Programs	Increase public education about the FEMA flood plain insurance program.	Yes (New & Existing Buildings)	Ongoing	High	2020-2025	City Planning & Economic Dev. Dept.	The City provides information to the public through the city website with links directing to FEMA's floodplain insurance program.	City funding
12	Flood	Local Planning & Regulations / Structure & Infrastructure Projects	Take action to restore many of the natural creeks and river banks in order to increase water retention efforts through means such as designating & enforcing shoreland setbacks, and updating and reinforcing infrastructure in terms of culverts and permeable surfaces.	Yes (New Buildings)	Ongoing	High	2020-2025	City Planning & Economic Dev. Dept. in cord with City Public Works & Utilities Dept. and North/South SWCDs	Implementing and enforcing shoreland setbacks falls under the Planning & Economic Development Department. Specific infrastructure projects are identified and implemented by the Public Works & Utilities Dept.	City funding, MN DNR, MPCA

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
13	Flood	Natural Systems Protection	Acquire and protect wetlands that are important to floodwater retention and flood hazard mitigation emphasizing wetlands in the upper reaches of stream sheds that are unusually prone to damaging flooding – e.g. Mission, Keene, Miller, Brewery, Coffee, Tischer, and Amity Creeks.	Yes <i>(Downstream Buildings & Infrastructure)</i>	New	High	2020-2025	City Public Admin Dept. in cord. with City Planning and Public Works Depts and agency partners	This is an initiative that would involve the coordination of the City and others, including the Duluth Urban Watersheds Advisory Committee, North and South SLC SWCDs, St. Louis County, MN DNR and other groups or agencies in relation to identified wetland projects.	City funding, MN DNR, MPCA, MN Outdoor Heritage Fund, Federal GLRI funds, FEMA HMA Grant funding
14	Flood	Natural Systems Protection	Identify wetlands (or former wetlands) whose flood retention capacity can be cost-effectively enhanced.	Yes <i>(Downstream Buildings & Infrastructure)</i>	New	High	2020-2025	City Public Admin Dept. in cord. with City Planning and agency partners	Same as above.	City funding, MN DNR, MPCA, MN Outdoor Heritage Fund, Federal GLRI funds, FEMA HMA Grant funding

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
15	Flood	Local Planning & Regulations	Identify opportunities to build constructed wetlands in areas where flood mitigation benefits will be particularly great.	Yes <i>(Downstream Buildings & Infrastructure)</i>	New	High	2020-2025	City Public Works Dept with support from Planning and Public Admin Depts and agency partners	Same as above.	City funding, MN DNR, MPCA, FEMA HMA Grant funding
16	Flood	Natural Systems Protection	Implement wetland enhancement and wetland construction projects.	Yes <i>(Downstream Buildings & Infrastructure)</i>	New	High	2020-2025	City Public Works Dept with support from Planning and Public Admin Depts and agency partners	Same as above.	City funding, MN DNR, MPCA, FEMA HMA Grant funding
17	Flood	Structure & Infrastructure Projects	Accelerate enhancements to stormwater infrastructure.	Yes <i>(Stormwater System Infrastructure)</i>	New	High	2020-2025	City Public Works & Utilities Dept.	The city has an Engineering Division and a stormwater utility that have the technical capacity to plan and implement stormwater management and flood mitigation project. Enhancements to these systems will be implemented on an annual basis as funding allows.	City funding

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
18	Flood	Natural Systems Protection	Complete additional stream restoration projects identified as priorities by the interagency Duluth Urban Watersheds Advisory Committee and the Regional Storm Water Protection to reconnect streams to their flood plains, reduce erosion, improve ecological health, and mitigate flood hazard.	n/a	New	High	2020-2025	City Public Admin and Public Works Depts and agency partners	This is an initiative that would involve the coordination of the City and others, including the Duluth Urban Watersheds Advisory Committee, North and South SLC SWCDs, St. Louis County, MN DNR and other groups or agencies in relation to identified wetland projects. Such projects may be up for evaluation for application to FEMA for supportive HMA grant funding.	City funding, MN Clean Water Fund, MN Outdoor Heritage Fund, Federal GLRI grants, FEMA HMA Grant Funding
19	Flood	Local Planning and Regulations	Examine new FEMA flood maps to identify flood-prone private properties for property acquisition purchase and demolition.	Yes (Existing Buildings)	In-Prog. / Ongoing	High	2020-2025	City Planning & Economic Dev and City Public Admin Depts.	The City Planning & Economic Development Dept. and City Public Admin are working with the MN DNR and homeowners within the floodplain to buy out properties in an effort to remove structures in the floodplain.	City funding, FEMA HMA Grant Funding

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
20	Coastal Storms (Erosion/ Flooding)	Local Planning and Regulations	Improve the City's understanding of how climate change is likely to impact coastal storm hazards and vulnerable coastal infrastructure and how such infrastructure can be cost-effectively protected from harm in its current location, eliminated altogether, or relocated to a less vulnerable location.	Yes (Coastal Infrastructure)	In-Prog. / Ongoing	High	2020-2025	City Public Admin and Public Works Depts in cord. with agency partners	<p>The City participates in the "Great Lakes One Water Duluth" regional initiative that explores how to improve resiliency in the face of climate change. The City of Duluth also works with the MN DNR's Minnesota Lake Superior Coastal Program (MLSCP).</p> <p><i>Upon FEMA approval of the St. Louis County 2020 MHMP update, the City of Duluth plans to apply for a FEMA Hazard Mitigation Assistance grant (Advance Assistance) to support implementation of this effort. Project objectives include to identify and demonstrate economically feasible methods of reducing bank collapse, to access the capabilities of partner institutions to cooperatively implement an erosion control program and to provide data and recommendations that could be used in similar situations and locations.</i></p>	<p>City funding, GLRI, MN OHF, MN DNR other partner agency funding, *FEMA HMA Advance Assistance Grant</p>

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
21	Coastal Storms (Erosion/ Flooding)	Structure & Infrastructure Projects	Improve the ability of coastal infrastructure to withstand coastal storm damage by constructing shoreline armoring to contemporary coastal engineering standards. When possible, demolish vulnerable infrastructure close to the shoreline, relocating inland where necessary.	Yes <i>(Coastal Infrastructure)</i>	New	High	2020-2025	City Public Admin and Public Works Depts in cord. with agency partners	<p>The City is developing plans for reconstruction of developed coastal areas including the Lakewalk, Canal Park, the Western Waterfront Trail and Brighton Beach that will make public infrastructure there much more resilient via a mix of demolition, relocation, armoring and green infrastructure. The City of Duluth also works with the MN DNR's Minnesota Lake Superior Coastal Program (MLSCP).</p> <p><i>Upon FEMA approval of the St. Louis County 2020 MHMP update, the City of Duluth plans to apply for a FEMA Hazard Mitigation Assistance Grant to support implementation of this effort. The grant application (in summary) will be to armor the lakeshore from Canal Park to 21st Ave. in between the FEMA and State declared damage areas.</i></p>	<p>City Funding, MN DNR, MN Legacy Parks and Trails, *FEMA HMA Grant Funding</p>

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
22	Coastal Storms (Erosion/ Flooding)	Structure & Infrastructure Projects	Protect the potable water plant located on the Lake Superior shoreline by armoring the adjoining shoreline and establishing a backup on-site power supply that can operate indefinitely.	Yes (Water Plant Infrastructure)	New	High	2020-2025	City Public Works & Utilities Dept.	<p>Priority measures identified for action include 1) Shoreline armoring to protect the Lakewood Water Treatment Facility (Duluth) following HSEM/FEMA declared disasters to provide increased protection for future storms and 2) Acquire backup generators to maintain pump capabilities during electrical outages.</p> <p><i>Upon FEMA approval of the St. Louis County 2020 MHMP update, the City of Duluth plans to apply for a FEMA Hazard Mitigation Assistance grant (Advance Assistance) to support planning for Shoreline armoring to protect the Lakewood Water Treatment Facility.</i></p>	<p>City funding, *FEMA HMA Advance Assistance Grant</p>

City of Duluth Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
23	Coastal Storms (Erosion/ Flooding)	Local Planning & Regulations	Improve the City's understanding of how and where the Park Point sand spit is likely to lose mass over the next decade, how ongoing beneficial reuse of harbor dredge spoils may be used in beach nourishment projects to slow or reverse that loss, and how to most cost-effectively mitigate hazards to public and private assets through a flexible mix of asset purchase, demolition, relocation, and/or armoring and enhancement of gray and green infrastructure.	n/a	New	High	2020-2025	Planning, Public Admin and Public Works Depts with U.S. Army Corps of Engineers, MN DNR and other agency partners	Future study should focus on the areas of Park Point closest to the Duluth canal entry and the Superior entry where the loss of land mass is most pronounced. The City will work in coordination with other key agency partners such as the South SLC SWCD, MN DNR, MPCA and others in related study and research efforts and identification of long-term solutions that are cost effective.	City Funding, MN DNR Coastal Program, FEMA HMA grant funding, Other funding TBD

The mitigation activities listed in the **City of Duluth Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 9. City of Ely Mitigation Action Chart (2020-2025)

City of Ely Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system and city Facebook page to receive emergency notifications and information.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Ely has a website and a city Facebook page where information on the County's emergency notification system with a link can be posted. The City also uses its Facebook page to communicate information to residents on hazardous storm or wildfire conditions.	City funding
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The City has an EOP in place that addresses the plans and procedures in place for key response functions including public information and warning, evacuation, mass care sheltering, and more. The City will work to keep the EOP updated and in coordination with the St. Louis County EOP.	City funding
3	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City EM in cord. with SLC Emergency Mgmt.	The city of Ely has a website with an "Emergency Preparedness" page that provides links to the American Red Cross on thunderstorm, tornado, wildfire and winter weather safety.	City funding

City of Ely Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Severe Winter / Summer Storms	Mitigation Preparedness & Response Support	Regularly remove risk trees that may fall during severe storm events (i.e., ice storms, blizzards, high winds).	Yes <i>(Existing Buildings)</i>	Ongoing	Mod.	2020-2025	City Tree Board / City Public Works	The City of Ely Tree Board have conducted an inventory and survey of trees on city property and worked with Public Works to remove trees deemed to be at risk to cause damage to property or life safety during a storm. The City Tree Committee and PW Dept. will continue to monitor and address trees that may be at risk of falling.	City funding
5	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Work with the National Weather Service to provide Skywarn Spotter training to area residents and First Responders.	n/a	Ongoing	Mod.	2020-2025	City EM in cord. with NWS	The City of Ely works with the NWS to offer SKYWARN training every two years and will continue to do so. The training is sponsored by the NWS at no cost to the city.	NWS

City of Ely Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
6	Wildland Fire	Mitigation Preparedness & Response Support	Work in coordination with St. Louis County, key agency partners and neighboring communities to plan for risk reduction to property, life safety and the environment from wildfire.	Yes (New & Existing Buildings)	Ongoing	High	2020-2025	City EM in cord with SLC, MN DNR, USFS and others	The City of Ely Emergency Management Director works in coordination with the SLC Firewise Coordinator, MN DNR, USFS and neighboring city and township communities to plan for, train for, and respond to wildfire events. The City of Ely is a High-Risk Wildland Urban Interface (WUI) Area in the St. Louis County Community Wildfire Protection Plan (CWPP). The City participates actively in coordinated planning for wildfire mitigation measures and response functions.	City funding, MN DNR, USFS, County Funding
7	Wildland Fire	Education & Awareness Programs	Provide active outreach and education to local residents and visitors on the level of wildfire danger and how to minimize risk of starting wildfires.	Yes (New & Existing Buildings)	Ongoing	High	2020-2025	City EM in cord with SLC, MN DNR, USFS and others	This is an ongoing effort that is addressed by the City of Ely Emergency Management, local Volunteer Fire Departments as well as the MN DNR and USFS offices in the area. Information on wildfire risk is posted in key community facility locations as well as posted on the City's Facebook page. Volunteer Fire Departments hold open houses during the year and help to promote fire safety.	City funding, MN DNR, USFS, SLC Firewise Program funding

City of Ely Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
8	Wildland Fire	Education & Awareness Programs	Promote the creation of defensible space around structures owned by property owners, business or other critical facilities and provide assistance in conducting Firewise assessments.	Yes (New & Existing Buildings)	Ongoing	High	2020-2025	City EM in cord. with SLC FW Coordinator	The St. Louis County Firewise Coordinator is located in the City of Ely and works closely with the city of Ely Emergency Manager on promotion of defensible space by homeowners, businesses, key facilities such as schools. Technical assistance is provided to property owners to conduct Level-I or II Firewise Assessments to properties when requested.	City funding, SLC Firewise Program funding
9	Wildland Fire	Local Planning & Regulations	Enforce the City Code Section 4.04 Building Code which requires that sprinkler systems be incorporated into all new commercial construction.	Yes (New Buildings)	Ongoing	High	2020-2025	City EM	The following optional provisions identified in the most current edition of the State of MN Building Code are adopted and incorporated as part of the building code for the City of Ely: 1. Chapter 1306 Special Fire Protection Systems.	City funding

City of Ely Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
10	Wildland Fire	Local Planning & Regulations	Continue to work with key partners to provide and manage a disposal site for hazardous woody debris removed by land owners within the city of Ely.	Yes (New & Existing Buildings)	Ongoing	High	2020-2025	City EM, City Public Works Dept. in cord. with Fire Dept. and key agency partners	The City of Ely Public Works Dept and Fire Dept. will continue to work with St. Louis County and other agency partners (i.e. MN DNR, USFS) to provide and manage a hazardous woody debris disposal options for city land owners. Maintenance and elimination of the debris requires a shared responsibility both financially and physically among partners.	City funding, County funding, MN DNR, other funding TBD
11	Wildland Fire	Natural Systems Protection	Work with key agency partners to plan for and promote annual spring and fall "Chipper Day" events.	Yes (New & Existing Buildings)	New (2019)	High	2020-2025	City EM, City Public Works Dept. in cord. with Fire Dept. and key agency partners	The City of Ely will explore how Chipper Day events can be funded, organized and implemented to assist land owners in the reduction woody debris. Alternatively, a possible approach may be to arrange for a rebate program on Chipper rental for property owners.	City funding, County funding, MN DNR, other funding TBD
12	Wildland Fire	Natural Systems Protection	Thin and remove hazardous woody debris on City-owned property.	Yes (New & Existing Buildings)	New	High	2020-2025	City Public Works Dept. in cord with Fire Dept	Implementation of this effort will need to be a coordinated effort of our local government and Fire Department to plan for a thinning project on city-owned property. Where appropriate the city may seek input from the public or utilize a citizen task force to help with strategic planning.	City funding, Other funding TBD

City of Ely Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
13	Wildland Fire	Local Planning & Regulations	Create a Task Force to plan for creation of a fuel break around the city of Ely. Implement the plan as deemed feasible based on funding and coordination with key partners.	Yes <i>(New & Existing Buildings)</i>	New	High	2020-2025	City EM, City Public Works Dept. in cord. with Fire Dept. and key agency partners	This is an effort that has not been started but can be explored under leadership of the City EM in coordination with other city departments, St. Louis County Firewise Coordinator, St. Louis County Emergency Management and partners agencies such as the USFS, MN DNR and resident land owners. Implementation of creating a fuel break around the city would require extensive outside grant funding in order to be possible.	City funding, County funding, MN DNR, USFS, NRCS, Timber Sale, FEMA HMA grant funding, and land owners
14	Wildland Fire	Mitigation Preparedness & Response Support	Provide active outreach and education to the public, owners of critical facilities (i.e., hospitals, nursing homes), businesses and other vulnerable populations (i.e., elderly / disabled) on preparedness for wildfire events that require evacuation of the City of Ely.	n/a	New	High	2020-2025	City EM in cord with Fire Dept. and key agency partners	The City maintains an EOP that addresses procedures for evacuation. However, promoting education on steps to take for individual, family, business, or critical facility preparedness for evacuation before it occurs is critical in order to support evacuation and save lives in the event of wildfire. Implementation of this planning and outreach effort would require outside grant funding such as from MN DNR Firewise Program or other funders. (TBD)	City funding, County funding, MN DNR, FEMA HMA grant funding, Other funding TBD

The mitigation activities listed in the **City of Ely Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 10. City of Eveleth Mitigation Action Chart (2020-2025)

City of Eveleth Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Eveleth has a website where information on the County's emergency notification system with a link could be posted. The city also has a Twitter feed that can be used to promote sign up for the system by residents.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	In 2018 the City of Eveleth updated it's EOP in coordination with Fayal Township. Our city EM will work to keep the EOP updated as needed.	City funding	
3	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City EM in cord. with City Admin.	The city of Eveleth participates in the NWS Severe Weather Awareness Week in the spring and will continue to do so. Information about emergency preparedness for severe weather can be promoted on our website and Twitter feed, as well as at special community events.	City funding	
4	Flood	Structure & Infrastructure Projects	Update the city's sewer and catch basins with new street reconstruction projects.	Yes (<i>Stormwater / Sewer System Infrastructure</i>)	Ongoing	High	2020-2025	City Public Works Dept.	The City of Eveleth will continue to update its stormwater and sewer system infrastructure as we do future road reconstruction projects.	City funding	

The mitigation activities listed in the **City of Eveleth Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 11. City of Floodwood Mitigation Action Chart (2020-2025)

City of Floodwood Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Floodwood promotes the County's Northland Alert system to the public for emergency notifications and other community news and will continue to do so. We have conducted a workshop to help residents to sign up for the system. The city also has a website where a link to sign up for the system could be posted.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The city of Floodwood has an EOP in place that we review and update on an annual basis. The EOP addresses the plans and procedures in place for key response functions.	City funding	
3	All-Hazards	Mitigation Preparedness & Response Support	Purchase a community electronic bulletin board sign to communicate emergency information to the public and other travelers passing through.	n/a	New	Mod.	2020-2025	City Emergency Mgmt.	The city of Floodwood Emergency Manager will work with the City to acquire outside funding to purchase this sign. Potential funding sources are yet to be identified.	City funding, other funding TBD	

City of Floodwood Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City EM in cord. with SLC Emergency Mgmt.	The city of Floodwood participates in Severe Weather Awareness Week and we also work with the local school and other agencies on tornado drills.	City funding
5	Severe Winter / Summer Storms	Mitigation Preparedness & Response Support	Inventory and address trees that are at risk of falling and causing damage during severe winter or summer storms.	Yes (Existing Buildings & Roads)	Ongoing	Mod.	2020-2025	City Public Works Dept.	The City of Floodwood has conducted an inspection of trees on city property and noted decaying trees that should be eliminated. We are also working with homeowners if we have noted trees on private property.	City funding
6	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Construct a storm shelter or tornado safe room for the Floodwood Municipal Campground.	n/a	New	High	2020-2025	City Emergency Mgmt.	The City's municipal campground is located in a wooded area along the St. Louis River. During severe storm events (i.e. thunderstorms, high wind events) campers are vulnerable to falling trees as there is no place to take safe shelter. The City will work to evaluate construction options, including a sturdy storm shelter or technical tornado safe room. Outside grant funding would likely be needed to implement this project.	City funding, USDA Rural Dev. grant funding, FEMA HMA grant funding

City of Floodwood Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
7	Flood	Structure & Infrastructure Projects	Install wastewater manhole upgrades to prevent storm and flood water from entering the wastewater system and backing up into homes or causing wastewater pond overflow.	Yes <i>(Wastewater System Infrastructure & Existing Buildings)</i>	New	High	2020-2025	City Public Works Dept.	The City has a water and wastewater emergency plan in place, but necessary infrastructure improvements have been identified to mitigate against future localized flooding and emergency discharges into the Floodwood River. The City Engineer and Maintenance Superintendent work on and address stormwater issues on an ongoing basis.	City funding, Other funding TBD
8	Flood	Local Planning & Regulations	Identify and acquire repetitive flood residential properties through a buyout process and convert them to open space.	Yes <i>(Existing Buildings)</i>	New	High	2020-2025	City Admin.	The City will seek to work with property owners of 2 repetitive loss properties in town to see if they are interested in conducting a buy-out. FEMA HMA grant funding would be pursued to help implement this project if we move forward with it.	City funding, FEMA HMA grant funding

The mitigation activities listed in the **City of Floodwood Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 12. City of Gilbert Mitigation Action Chart (2020-2025)

City of Gilbert Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Gilbert has a website where information on the County's emergency notification system with a link could be posted. We will also promote sign up for the system during special community events or by posting flyers in community facilities such as City Hall.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The city of Gilbert updated it's EOP in 2018 in coordination with several other neighboring communities. The City Emergency Manager will be lead to maintain an update of the EOP as necessary.	City funding	
3	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City EM in cord. with City Admin.	The city of Gilbert has several community events every year to educate on safety and fire awareness.	City funding	
4	Flood	Structure & Infrastructure Projects	Ensure the City's wastewater treatment system is capable of handling future high rain events.	Yes (Wastewater System Infrastructure)	In-Progress	High	2020-2025	City Admin & Public Works Dept.	The City of Gilbert is currently building a \$12 million-dollar waste water treatment plant.	City funding	

The mitigation activities listed in the **City of Gilbert Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 13. City of Hermantown Mitigation Action Chart (2020-2025)

City of Hermantown Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin & City EM	The city of Hermantown website has information and a link to the County's Northland Alert system. We promote that residents sign up for the system.	City funding
2	All-Hazards	Local Planning & Regulations	Update the city's Comprehensive Plan to include considerations for mitigation against future natural disaster events.	n/a	New	High	2020-2025	City Admin.	The city last updated its Comprehensive Plan in 2001, with two additional amendments in 2014. When the City plans to update the Comp Plan again we will consider mitigation measures that help to protect our resources as we develop, grow and change.	City funding
3	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City Admin & City EM	The City of Hermantown participates in the Severe Winter/Spring Awareness Weeks by posting severe weather awareness information on our City of Hermantown Facebook page. Our local school also practices tornado drills on an annual basis.	City funding

City of Hermantown Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Flood	Structure & Infrastructure Projects	Identify and implement road improvement projects reduce areas where over-the-road repetitive flooding occurs.	Yes (Transportation Infrastructure)	Ongoing	High	2020-2025	City Public Works Dept.	The City has recently reviewed the condition of all City roads and bridges. This includes review of the drainage characteristics. The City has replaced (1) bridge and (2) major centerline culverts in the past couple of years. Currently, the City is in the process of replacing culverts along Okerstrom Road to improve flow conditions in Keene Creek. The City is also in the process of eliminating (1) bridge. Public Works keeps an ongoing list of areas in need of drainage improvements and cleans ditches as necessary to allow proper road way drainage. Current efforts include: a) Kingsbury Creek Bridge Replacement b) Midway River Box Culvert c) Okerstrom Road Culvert Replacement d) Lindahl Road Bridge Removal	City funding

City of Hermantown Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
5	Flood	Education & Awareness Programs	Ensure all new development and re-development projects adhere to the City's Stormwater Ordinance.	Yes (<i>Stormwater System Infrastructure & Local Roads</i>)	Ongoing	High	2020-2025	City Admin & Public Works Dept.	The City of Hermantown has updated the Stormwater Ordinance to be in compliance with the NPDES Municipal Separate Storm Sewer System Permit. All new development and redevelopment are subject to providing stormwater improvements to clean stormwater runoff and reduce runoff flow rates into the City's storm sewer, rivers and streams.	City funding

The mitigation activities listed in the **City of Hermantown Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 14. City of Hibbing Mitigation Action Chart (2020-2025)

City of Hibbing Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	Ongoing	High	2020-2025	City Admin / City Emergency Mgmt.	The city of Hibbing participates in the County's Northland Alert (Everbridge) emergency alert system and encourages residents to sign up for it. A link for registration for the system is provided on the Hibbing Fire Department web page. The city will work to continue to promote residents to sign up through means such as outreach on our city Facebook page.	City funding	
2	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	Ongoing	High	2020-2025	City Admin / City Emergency Mgmt.	The city of Hibbing participates in the National Weather Service's Severe Winter/Spring Weather Awareness weeks by posting information on our city Facebook page. The Fire Dept. also has open houses on fire safety and presents in the schools. Our local schools practice tornado drills on a regular basis.	City funding	

City of Hibbing Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
3	Severe Summer Storms / Tornado	Local Planning & Regulations	Work with mobile home park operators within the city to meet MN Dept. of Health (MDH) requirements for evacuation and sheltering of park residents in the event of severe weather such as tornadoes, high winds or floods.	n/a	Ongoing	High	2020-2025	City Admin / City Emergency Mgmt.	This is an ongoing effort of the City in working with MHP operators to make sure they are in compliance with MDH requirements. If the city and any MHP operator determine construction of a tornado safe room is needed, the city will seek outside grant funding to support the project (i.e. FEMA Hazard Mitigation Assistance grant funding for a safe room project).	City funding, FEMA HMA grant funding
4	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Upgrade the city's outdoor warning sirens.	n/a	New	High	2020-2025	City Admin / City Emergency Mgmt., City Public Works Dept.	The city wishes to upgrade its system of outdoor warning sirens to function properly and ensure our ability to warn the public. Not all residents are signed up for Northland Alert and warning sirens are an important notification tool during dangerous high wind events or tornados. The city requires outside grant funding to upgrade sirens and will consider application to the USDA Rural Development grant program which funds community emergency services equipment, including sirens.	City funding, USDA Rural Dev. grant funding

City of Hibbing Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
5	Flood	Local Planning & Regulations	Upgrade the city's Sump Pump Ordinance to eliminate drain tile connections to our sanitary sewer system.	Yes (Sanitary Sewer System Infrastructure)	New	High	2020-2025	City Admin.	The city has a storm sewer ordinance in place to help prevent illicit discharges to our city storm sewer, but it is in need of an update. The ordinance will be updated and enforced by City Administration. Enforcing the ordinance will help reduce strain on the city's sanitary sewer system during high rain or flood events.	City funding
6	Flood	Education & Awareness Programs	Encourage residents to install check valves on their sanitary sewer service lines to prevent backflows in the event of a flood.	Yes (Residential Homes)	New	High	2020-2025	City Admin.	The city will use its Facebook page and other means out outreach (i.e., local media, information flyers) to encourage homeowners to take action on this important measure. In the last 5 years the City has experienced heavy rainfall events that caused damage to City sanitary sewers & storm sewers and resulted in collapsed sanitary lines that caused sewage to back up in to many homes or basement flooding.	City funding

City of Hibbing Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
7	Flood	Structure & Infrastructure Projects	Maintain and upgrade the City's stormwater, lift station and roads infrastructure to ensure they can handle future high rain and flood events.	Yes (<i>Storm/Sewer infrastructure and Roads</i>)	Ongoing	High	2020-2025	City Public Works Dept.	The City Engineer/Public Works Director addresses road maintenance issues for necessary repairs and improvements. Our Public Works Dept. also addresses any issues with the sanitary sewer, storm sewers and lift stations. The City has a 5-year road paving and maintenance plan, which includes a schedule of storm sewer culverts that need repair or replacing. The city has done extensive work in the last 5 years to improve our Inflow & Infiltration System and upgraded our lift stations to avoid sanitary sewer backups.	City funding
8	Wildfire	Natural Systems Protection	Implement fuel reduction measures as needed to reduce wildfire risk to the City.	Yes (<i>Existing Buildings</i>)	Ongoing	Mod.	2020-2025	City Fire Dept. in cord. with MN DNR	The city of Hibbing will seek to apply for MN DNR Firewise grants for eligible projects.	City funding, MN DNR Firewise grant funding

The mitigation activities listed in the **City of Hibbing Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 15. City of Hoyt Lakes Mitigation Action Chart (2020-2025)

City of Hoyt Lakes Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Hoyt Lakes has a website where information on the County's emergency notification system with a link could be posted. We can also promote sign up for the system during special community events or through the posting of flyers in community facilities.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The city of Hoyt Lakes updated it's EOP in 2018 in coordination with several other neighboring communities. The City's Emergency Manager (East Range Police Dept. Chief) will be lead to work with the city to update the EOP as necessary.	City funding	
3	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City Admin. in cord. with SLC EM	The City's website includes a page for the East Range Police Department, which provides a "Pre-Evacuation Packet" to residents on their personal steps to be ready and procedures in place should we need to evacuate the city for dangerous events such as wildfire.	City funding	

The mitigation activities listed in the **City of Hoyt Lakes Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon

existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 16. City of Iron Junction Mitigation Action Chart (2020-2025)

City of Iron Junction Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Iron Junction is a small city with a population of 87. We do not have a website to promote locals to sign up for the County's emergency notification system, but we can do so by direct conversations with our residents and announcements at City Council meetings.	City funding	
2	Flood	Structure & Infrastructure Projects	Update culverts to larger sizes in order to more effectively handle high rain events and avoid over-the-road flooding.	Yes (Transportation Infrastructure)	In-Progress	High	2020-2025	City Public Works Dept.	The city of Iron Junction Public Works Dept. is currently working to replace 3 culverts to larger ones. The City continues to address road and drainage improvements as necessary and as funding allows.	City funding	

The mitigation activities listed in the **City of Iron Junction Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 17. City of Kinney Mitigation Action Chart (2020-2025)

City of Kinney Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	Ongoing	High	2020-2025	City Admin. / Emergency Mgmt.	The city of Kinney is a small city with a population of 169. We do not have a website but we promote residents to sign up through direct contact and announcements at City meetings.	City funding
2	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Purchase and install a 2 nd outdoor warning siren to provide better coverage for the city of Kinney residents.	n/a	New	High	2020-2025	City Admin. / Emergency Mgmt. in cord. with SLC EM	We will work with SLC Emergency Management to seek funding for this project. USDA Rural Development grant program may be a source of funding.	City funding, USDA Rural Dev grant
3	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Construct a centralized tornado safe room storm shelter within the city to protect residents from high wind and tornado events.	n/a	New	High	2020-2025	City Admin. / Emergency Mgmt. in cord. with SLC EM	The city was previously using the Township of Great Scott's town hall basement as a designated storm shelter, but they will be tearing it down. We have a lot of mobile homes in our city and need an emergency shelter for severe storms with high winds and tornado events. Outside grant funding will be necessary to construct a tornado safe room. We will work with SLC Emergency Management to seek funding for this project. The FEMA HMA grant program may be a source of funding.	City funding, FEMA HMA grant funding

The mitigation activities listed in the **City of Kinney Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 18. City of Leonidas Mitigation Action Chart (2020-2025)

City of Leonidas Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin.	The city of Leonidas is a small city with a population of 52. We do not have a website to promote locals to sign up for the County's emergency notification system, but we can do so by direct conversations with our residents and announcements at City Council meetings.	City funding	

The mitigation activities listed in the **City of Leonidas Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 19. City of McKinley Mitigation Action Chart (2020-2025)

City of McKinley Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of McKinley is a small city with a population of 128. We do not have a website to promote locals to sign up for the County's emergency notification system, but we can do so by direct conversations with our residents and announcements at City Council meetings.	City funding	

The mitigation activities listed in the **City of McKinley Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 20. City of Meadowlands Mitigation Action Chart (2020-2025)

City of Meadowlands Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Meadowlands has a website and a city Facebook page where information on the County's emergency notification system with a link could be posted. We are a small city with a population of 134.	City funding
2	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Obtain a portable generator to support backup power for the City's critical facilities (i.e., City Hall, Fire Hall) during an extended power outage.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city does not have a portable generator but desires to have one. We will seek to work with St. Louis County Emergency Management to identify where funding could come from to purchase a generator.	City funding, other funding TBD
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Identify and address damaged and vulnerable trees that may fall during severe storm events.	Yes (Existing Buildings & Roads)	Ongoing	Mod.	2020-2025	City Public Works Dept.	This is an ongoing effort of the city. We regularly trim trees that may be prone to losing branches that can cause damage if they fall due to heavy snow, ice or high winds.	City funding
4	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Purchase and install an outdoor warning siren for the City of Meadowlands.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The City will confer with SLC Emergency Management on this project and seek supportive funding to purchase and install a siren if we proceed with it. The USDA Rural Development Program is one possible funding program to support implementation.	USDA Rural Dev grant program

City of Meadowlands Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
5	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Explore the need/feasibility to construct a tornado safe room within the community to protect vulnerable people against high wind events.	n/a	New	Mod.	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The City has some storm shelters but does not have a tornado safe room. We will evaluate the need for / opportunity to construct a tornado safe room. If we decide to pursue a project, FEMA HMA grant funding will be needed to implement it.	City funding, FEMA HMA grant funding
6	Flood	Structure & Infrastructure Projects	Improve the city's surface stormwater drainage system to better handle high rain events and reduce localized flooding.	Yes (Transportation Infrastructure)	In-Progress	High	2020-2025	City Public Works Dept.	The City of Meadowlands has taken action to reduce flooding by applying for and receiving a grant to update our surface drainage, which has been untouched for over 20 years. There are provisions to perform some street repairs as well. New culverts are included in our current projects. In 2019 the first year of a possible two year plan was successful. We plan to continue applying for grants from the CDBG and IRRRB sources to continue funding the project.	City funding, CDBG, IRRRB

The mitigation activities listed in the **City of Meadowlands Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 21. City of Mountain Iron Mitigation Action Chart (2020-2025)

City of Mountain Iron Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the City's Nixle emergency notification system.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The city of Mountain Iron website has information and a link for residents to sign up for the city's internal Nixle emergency notification system. Residents may also sign up for the County's Northland Alert system to receive county-issued notifications.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The city of Mountain Iron updated its EOP in 2018 in coordination with several other neighboring communities. The City Emergency Manager will be lead to maintain an update of the EOP as necessary.	City funding	
3	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The city of Mountain Iron has use of its city website, Facebook & Twitter page, as well as special events to share information with the public on readiness for severe weather events or other emergencies.	City funding	

City of Mountain Iron Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Flood	Local Planning & Regulations	Enforce the city's Floodplain Management Ordinance and maintain participation in the National Flood Insurance Program (NFIP).	Yes (<i>New Buildings</i>)	Ongoing	High	2020-2025	City Admin.	City Code, Chapter 151 Floodplain Management establishes city regulations for development within floodplain areas. The ordinance is enforced by the City Administrator. The City participates in the NFIP and will continue to do so.	City funding
5	Flood	Structure & Infrastructure Projects	Identify and implement improvement projects for the City's streets and stormwater/sewer systems to lessen the impacts of high rain events and localized flooding.	Yes (<i>Stormwater / Sewer System & Transportation Infrastructure</i>)	Ongoing	High	2020-2025	City Public Works Dept.	The City's Public Works Dept oversees all street maintenance and stormwater management and addresses improvement projects on a regular basis as needed.	City funding

The mitigation activities listed in the **City of Mountain Iron Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 22. City of Orr Mitigation Action Chart (2020-2025)

City of Orr Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Orr has a website and city Facebook page where information on the County's emergency notification system with a link could be posted.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Admin / Emergency Mgmt.	The city of Orr EOP is reviewed and updated annually as needed by the city Emergency Manager and City Admin. The City wishes to work with the CN Railway to better identify how emergency operations will be coordinated in the event of a train derailment (non-natural hazard event).	City funding	
3	All-Hazards	Structure & Infrastructure Projects	Work to get high speed internet in our area for better and quicker communication with residents during an emergency.	n/a	In-Progress	High	2020-2025	City Admin	The City of Orr has obtained a grant from the Blandin Foundation to help make this project possible.	Blandin Fnd.	
4	All-Hazards	Mitigation Preparedness & Response Support	Purchase and install a generator to provide backup power to the city's wastewater plant.	Yes (Wastewater Plant)	New	Mod.	2020-2025	City Admin / Public Works	The City will work to obtain a generator. Outside funding may be necessary to identify and apply for, such as from the Blandin Foundation.	Funding TBD	

City of Orr Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
5	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	Ongoing	High	2020-2025	City Admin / Emergency Mgmt.	The city of Orr has use of its city website and city Facebook page, as well as special events to share information with the public on readiness for severe weather events or other emergencies.	City funding
6	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Work with the MN DNR to increase dock space on Pelican Lake so that boaters can safely get off the water during storm events.	n/a	In-Progress	High	2020-2025	City Admin / Emergency Mgmt.	The City has reached out to the MN DNR to help address this issue. Due to inadequate docking space on Pelican Lake in the downtown MN DNR boat ramp, boaters on Pelican Lake are unable to get off the lake quickly enough when a storm develops.	MN DNR
7	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Retrofit the Orr Center to include construction of a new storm shelter or tornado safe room.	n/a	New	High	2020-2025	City Admin / Emergency Mgmt.	The City is pursuing establishing a storm shelter or safe room in the Orr Center to provide safe refuge to the public during dangerous high wind or tornado events. The City will evaluate feasibility for this project and if necessary will seek to apply for FEMA or other grant funding to support project implementation.	City funding, FEMA HMA grant funding, other funding TBD
8	Flood	Structure & Infrastructure Projects	Work with the Mn Dept. of Transportation (MnDOT) to address flooding on Hwy. 53 in the downtown area near the storm drain.	Yes (Transportation Infrastructure & Existing Buildings)	In-Progress	High	2020-2025	City Admin / City Public Works Dept.	The City has been in contact with MnDOT to address the flooding on Hwy. 53. When the storm drain does not drain water it poses a risk to motorists as well as causes flooding to local businesses.	MnDOT funding

The mitigation activities listed in the **City of Orr Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 23. City of Proctor Mitigation Action Chart (2020-2025)

City of Proctor Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Emergency Mgmt. in cord. with SLC EM	The city of Proctor has a website and a city Facebook page where information on the County's emergency notification system with a link could be posted. We can also promote sign up at special community events or by posting flyers in key community locations.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The City of Proctor Police Dept is currently updating our Emergency Operations Plan. The EOP will be kept updated on a regular basis.	City funding	
3	All-Hazards	Mitigation Preparedness & Response Support	Upgrade the City's Fire Department's fire engines.	n/a	Ongoing	High	2020-2025	City Fire Dept.	The City's Fire Department Engines 1 & 2 have had many repairs and need to be upgraded. These pumbers assist during all hazard events that require FD response, including flooding.	City funding (FD)	
4	Severe Winter / Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events or emergencies.	n/a	New	High	2020-2025	City EM in cord. with SLC EM	The city of Proctor will work to promote emergency preparedness to our residents through means such as participating in Severe Winter/Spring Awareness weeks where we can post information to our city Facebook page.	City funding	

City of Proctor Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
5	Severe Winter / Summer Storms	Mitigation Preparedness & Response Support	Identify and address trees that may be at risk of falling and causing damage due to severe storm events (i.e., blizzards, ice storms, wind storms).	Yes <i>(Existing Buildings & Roads)</i>	Ongoing	Mod.	2020-2025	City Public Works Dept.	The Public Works Dept. regularly removes hazardous and/or dying trees and branches to minimize the effects of future storm damages and will continue to do so.	City funding
6	Severe Summer Storms / Tornado	Mitigation Preparedness & Response Support	Repair or replace the city's outdoor warning siren for severe wind and tornado events.	n/a	New	High	2020-2025	City Emergency Mgmt. in cord. with SLC EM	Our outdoor warning siren stopped working and currently Police Officers on duty must manually turn on the siren during a severe wind or tornado event. This is neither safe nor practical and an upgrade is needed. The City of Proctor will work with St. Louis County Emergency Management to acquire funding for a new outdoor warning siren, have it installed, and set up remote activation. The USDA Rural Dev. Grant Program may be a possible source of funding.	City funding, USDA Rural Dev. grant funding

City of Proctor Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
7	Flood	Structure & Infrastructure Projects	Identify and address stormwater and drainage improvement projects to city streets to avoid over-the-road flooding resulting from high rain events.	Yes (<i>Stormwater System & Transportation Infrastructure</i>)	Ongoing	High	2020-2025	City Public Works Dept.	The Public Works Dept. regularly monitors and addresses ditch and culvert maintenance to reduce the impacts of high rain events and will continue to do so. The City still has a need for additional storm sewer upgrades, purchase of additional pumps and sand bags in the event of flooding. The City has applied for Community Development Block Grants (CDBG) for reconstruction projects but to date has not received any funds.	City funding, CDBG funding
8	Flood	Structure & Infrastructure Projects	Work with the Minnesota Dept. of Transportation (MnDOT) to increase the size of stormwater pipes that run under Hwy. 2 to better handle high flow from Kingsbury Creek following high-rain events.	Yes (<i>Transportation Infrastructure</i>)	New	High	2020-2025	City Public Works Dept. in cord. with MnDOT	The City of Proctor has Kingsbury Creek running through the middle of town and large stormwater pipes run under Hwy. 2. During the June, 2012 flood these pipes could not handle the flow of water and over the road flooding occurred. We will encounter the same problem in a similar extreme rain event. The City Engineer and Public Works Director will seek to work with MnDOT to address this important flood mitigation project.	City funding, MnDOT funding

City of Proctor Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
9	Flood	Local Planning & Regulations	Identify and acquire repetitive flood residential properties through a buyout process and convert them to open space.	Yes (<i>Existing Buildings</i>)	New	High	2020-2025	City Admin & Public Works Dept.	The City will seek to work with property owner of 1 repetitive loss properties in town to see if they are interested in conducting a buy-out. FEMA HMA grant funding would be pursued to help implement this project if we move forward with it.	City funding, FEMA HMA grant funding

The mitigation activities listed in the **City of Proctor Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 24. City of Rice Lake Mitigation Action Chart (2020-2025)

City of Rice Lake Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Rice Lake has a website and a city Facebook page where information on the county's emergency notification system with a link could be posted. We can also promote sign-ups at special community events or by posting flyers at key community locations.	City funding	
2	All-Hazards	Local Planning & Regulations	Update the City's Comprehensive Plan to address considerations for future hazard events.	n/a	New	Mod.	2020-2025	City Admin.	The city has a Comprehensive Plan in place. When we update it, the city will seek to include mitigation considerations for natural hazards such as flooding as part of our planning for future development.	City funding	
3	Severe Winter / Summer Storms	Mitigation Preparedness & Response Support	Obtain generator for Public Works and the Fire Hall Complex for emergency backup power.	n/a	New	High	2020-2025	City EM / Public Works	The city will seek to budget for the purchase of generator or seek outside grant funding. The generator is needed to power our critical facilities & infrastructure during extended power outages. We have purchased power cords that can be used to convert the lift stations to operate off of a generator should we lose power to them. During the windstorm of 2016 city lift stations required pumping to remove sewage due to the loss of power to the lift stations.	City funding, Other funding TBD	

City of Rice Lake Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Work with St. Louis County Emergency Management to purchase and install an outdoor warning siren.	n/a	New	High	2020-2025	City Admin / Emergency Mgmt.in cord. with SLC County EM	The city does not currently have an outdoor warning siren. We will work with the St. Louis County EM to obtain funding to purchase and install a siren. The USDA Rural Development Community Facilities Loan & Grant Program is a potential source of funding that we would seek grant funding from.	USDA Rural Dev grant funding
5	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Assess & address the need to construct a tornado safe room at the Rice Lake Fire Hall.	n/a	New	High	2020-2025	City EM / City Fire Dept.	The city's Fire Hall will be assessed for a retrofit project to include a tornado safe room to protect FD staff and surrounding community members during dangerous high wind events. If deemed necessary and feasible, outside grant funding would be necessary to implement the project (i.e., FEMA grant funding or other source).	City funding, FEMA HMA grant funding

The mitigation activities listed in the **City of Rice Lake Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 25. City of Tower Mitigation Action Chart (2020-2025)

City of Tower Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Tower has a website and a city Facebook page where information on the County's emergency notification system with a link could be posted.	City funding
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The City of Tower has an Emergency Operations Plan. The EOP will be kept updated by our Emergency Management Director on a regular basis.	City funding
3	Severe Winter / Summer Storms & Extreme Temps	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events, extreme cold temperatures or other emergencies.	n/a	New	High	2020-2025	City EM in cord. with SLC EM	The city of Tower will work to promote emergency preparedness to our residents through means such as participating in Severe Winter/Spring Awareness weeks where we can post information to our city Facebook page. Tower regularly experiences State-record cold temperatures in winter. We work to put out safety reminders on the dangers of extreme temps to residents and visitors to our area.	City funding

City of Tower Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Severe Winter / Summer Storms	Mitigation Preparedness & Response Support	Identify and address trees and other structures that may be at risk of falling and causing damage due to severe storm events (i.e. blizzards, ice storms, wind storms).	Yes <i>(Existing Buildings & Roads)</i>	Ongoing	Mod.	2020-2025	City Public Works Dept.	The City has started the process of replacing street lights that have not been secure and are susceptible to high wind damage. The power companies that serve the City of Tower have removed or limbed dangerous trees to mitigate against future risk of falling on power lines or structures during severe storms.	City funding, Power Company funding
5	Wildfire	Natural Systems Protection	Work with MN DNR to implement wildland fuel reduction measures for the Tower Forest, parks & other properties.	n/a	Ongoing	High	2020-2025	City EM in cord with MN DNR Forestry	The City of Tower is a high-risk wildfire area. We have MN DNR Firewise funding and technical assistance available to use as a resource.	City funding, MN DNR Firewise grant funding

The mitigation activities listed in the **City of Tower Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 26. City of Virginia Mitigation Action Chart (2020-2025)

City of Virginia Mitigation Action Chart											
A	B	C	D	E	F	G	H	I	J	K	
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding	
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin, City Fire Dept. & City Police Dept.	The city of Virginia participates in the county's emergency notification system and encourages residents to sign up for it. One means of outreach has been through articles in the city's Police Department. The city also has a website and city Facebook page where information on the County's Northland Alert system with a link could be posted.	City funding	
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the City maintains an updated Emergency Operations Plan (EOP) that adequately details the necessary functions to respond to all potential hazards.	n/a	Ongoing	High	2020-2025	City Emergency Mgmt.	The city of Virginia updated its EOP in 2018 in coordination with several other neighboring communities. The City Emergency Manager will be lead to maintain an update of the EOP as necessary.	City funding	
3	All-Hazards	Education & Awareness Programs	Provide ICS 100/200 training to all city department heads and City Councilors.	n/a	New	High	2020-2025	City Emergency Mgmt.	The City EM (Fire Chief) will work to strengthen the city's preparedness for emergency response by making sure all key department heads and city councilors have undergone ICS 100/200 training.	City funding	

City of Virginia Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
4	Severe Summer Storms / Tornado	Structure & Infrastructure Projects	Construct a tornado safe room at the Miners Arena and Event Center to protect lives during severe wind or tornado events.	n/a	New	High	2020-2025	City Emergency Mgmt.	The city of Virginia is planning to apply to FEMA for a hazard mitigation assistance grant for construction of a tornado safe room within the Miners Arena and Event Center. Planning has been underway in 2019 and a grant application is expected to be made by the city in 2020 after FEMA approves the updated St. Louis County MHMP.	City funding, FEMA HMA grant funding
5	Severe Summer Storms / Tornado	Local Planning & Regulations / Structure & Infrastructure Projects	Evaluate and address the need for safety in design against severe storm & wind events (i.e. thunderstorms, straight line winds, tornadoes) for the future construction of the K-6 Elementary School and 7-12 Middle/ High School.	Yes <i>(Elementary & High Schools – future construction)</i>	New	High	2020-2025	Virginia Public Schools District Building Director + Contractor	Virginia Public Schools is currently in a design phase for future construction of both the K-6 Elementary School and 7-12 Middle/High School. High wind and tornado events are a high concern for both staff and students and considerations for how to enhance safety through design will be explored. This may include considerations such as less glass in areas that may be used as storm shelter areas or construction of dual-use areas (i.e., gymnasium) to meet specifications for FEMA safe rooms. If deemed appropriate a FEMA HMA grant application may be pursued for a safe room component in construction.	Virginia Public Schools, FEMA HMA grant funding, other funding TBD

City of Virginia Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
6	Wildland Fire	Natural Systems Protection	Reduce risk of grassfires along the Canadian National rail line and mining lines by removing overgrown vegetation.	Yes <i>(Rail lines, Existing Buildings & Roads)</i>	New	High	2020-2025	City Emergency Mgmt. in cord with city Public Works, CN & Mining Company	The City's Emergency Manager will work in coordination with the City Public Works Dept., as well as the CN Railway and mining companies to mitigate against grassfires resulting from rail sparks. Reducing overgrown vegetation will help to reduce the chance of grassfires that can spread and threaten homes or other structures.	City funding, CN & Mining Co.
7	Flood	Local Planning & Regulations	Update the East Two Rivers stormwater/floodplain study to help the city of Virginia plan for future stormwater and floodplain management.	n/a	New	High	2020-2025	City Public Works Dept.	The City's Engineering Dept. will continue to work with MN DNR to update the East Two Rivers water shed study. Virginia Public Works Dept. will continue to maintain the East Two Rivers water way through Virginia.	City funding

The mitigation activities listed in the **City of Virginia Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Table G - 27. City of Winton Mitigation Action Chart (2020-2025)

City of Winton Mitigation Action Chart										
A	B	C	D	E	F	G	H	I	J	K
#	Hazard	Mitigation Strategy	Mitigation Action	Reduces Risk to New / Existing Buildings or Infrastructure	Status	Priority	Expected Time-frame	Responsible Party	Comments on Implementation, Administration & Integration into Local Planning Mechanisms	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage city residents to sign-up for the County's "Northland Alert" emergency notification system.	n/a	New	High	2020-2025	City Admin. in cord. with SLC Emergency Mgmt.	The city of Winton is a small city with a population of 172. We do not have a website. The city will encourage residents to sign up for the County's emergency notification system through means such as announcements at City Council meetings, posting of flyers at key community locations and regular interactions with residents.	City funding
2	Wildfire	Natural Systems Protection	Conduct strategic fuel-reduction projects to reduce the risk of wildfire to the City of Winton.	Yes (Existing Buildings)	In-Progress	High	2020-2025	City Admin. & Fire Dept.	In Fall, 2019 the City contracted with a local logger to log off the area west of the City. The project will begin in Winter, 2019 and extend over a 3-year period. The City also contracts with Morse/Fall Lake Fire Association to burn brush. The city conducted a blight campaign in the summer of 2019 to remove junk and unlicensed vehicles from property, which further reduced risk for flammable materials. The City regularly works with the County, key agencies (USFS, MN DNR) and neighboring jurisdictions to mitigate the risk of wildfire to our city.	City funding

The mitigation activities listed in the **City of Winton Mitigation Action Chart** were identified for inclusion in the St. Louis County 2020 Multi-Hazard Mitigation Plan Update through city staff participation in the planning process and mitigation action chart development. Mitigation activities are based upon existing

mitigation efforts that are incorporated into local planning mechanisms and determination of new, cost-effective and sustainable activities that will support long-term risk reduction to the people, property and environment of our city.

Appendix H

Past Mitigation Action Review

Status Report (2013-2019)

Following is a report on the status of mitigation actions listed in **Section 5: Goals, Objectives, and Strategies from the St. Louis County 2013 Mitigation Plan**. This report describes those actions that have been completed, are being deleted, or are ongoing and carried over into the 2019 plan update.

Taken from Section 5.6 Chart

Hazard	Mitigation Action	Status	Comments
Violent Storms and Extreme Temperatures	Use State Severe Weather Awareness Week to educate St. Louis County residents and visitors on safety during strong summer storms.	Ongoing	Revise as needed for plan update. St. Louis County participates annually in the MN HSEM severe weather weeks to bring awareness to county residents.
Violent Storms and Extreme Temperatures	Use local publications to educate St. Louis County residents and visitors on safety during strong summer storms.	Ongoing	Revise as needed for plan update. This will fall under efforts for public education and awareness.
Violent Storms and Extreme Temperatures	Work with campground operators to post information regarding storm shelters and safety during severe storms on bulletin boards.	Delete	This is covered under broader emergency outreach /weather awareness to the public.
Violent Storms and Extreme Temperatures	Continue County Health Department licensing requirement shelters for mobile home parks.	Ongoing	Revise as needed for plan update. MDH sets regulations for mobile home parks (MHP's) in local communities and the County.
Violent Storms and Extreme Temperatures	Regularly update information about storm shelters and assure it is communicated to the affected residents, visitors and community leaders.	Delete	Not a county-level mitigation action. Communities that have storm shelters will have this included in their local mitigation action charts.
Violent Storms and Extreme Temperatures	Ensure storm spotters in St. Louis County receive training on a regular basis in order to maintain their storm spotting skill level.	Ongoing	St. Louis County Emergency Management continues to work with the NWS to provide SkyWarn training to have a system of trained storm spotters.
Violent Storms and Extreme Temperatures	Ensure procedures are in place so that area emergency management personnel, county sheriffs, and other emergency response teams are notified as soon as possible in the event of an approaching storm.	Completed	9-1-1 dispatch has procedures for impending severe weather to alert local agencies via sending weather to on duty squads and paging FD's.
Violent Storms and Extreme Temperatures	Install strategically located signage along roadways informing people about emergency information radio frequency.	Delete	St. Louis County uses Everbridge as well as IPAWS to get out emergency public information. Most of the public also uses specialized weather apps as well for emergency notices.

Hazard	Mitigation Action	Status	Comments
Violent Storms and Extreme Temperatures	Promote the use of NOAA weather radios for weather related emergency information during storm awareness weeks.	Ongoing	St. Louis County is a Weather Ambassador recognized by the NWS.
Violent Storms and Extreme Temperatures	Assure the functionality of warning systems for the areas with warning systems in place.	Ongoing	St. Louis County will encourage cities where there are warning sirens to keep them maintained, however, the County does not have any county-owned warning sirens and is not responsible for the maintenance of jurisdictional warning sirens. St. Louis County 9-1-1 center sets off sirens for cities who have them so we do need to encourage cities to keep them functional. It will be a city-level mitigation action to ensure the functionality of warning sirens.
Violent Storms and Extreme Temperatures	Participate in the winter storm awareness program.	Ongoing	Revise as needed for plan update. This will already be covered in the updated mitigation action chart. St. Louis County participates annually in the spring and winter NWS awareness weeks.
Violent Storms and Extreme Temperatures	Expand information on risks of heat related illnesses available to residents, especially the elderly and people who participate in physically strenuous activities.	Ongoing	St. Louis County helps to convey dangerous cold and heat weather advisories when they are put out by the NWS.
Violent Storms and Extreme Temperatures	Assure there are current information and delivery systems in place related to extreme temperatures.	Completed	
Violent Storms and Extreme Temperatures	Update and maintain a database of shelters including capacity and features such as air conditioning and back-up power.	Ongoing	Revise as needed for plan update. The American Red Cross works with individual jurisdictions to evaluate and establish MOU's with facilities that can serve as temporary mass care shelters. It is important for St. Louis County Emergency Management and Public Health to be aware of where such facilities are located.
Violent Storms and Extreme Temperatures	Assure shelter is available to residents and visitors based on geographic distribution and will meet needs including features such as pre-wiring for generator power and provision of air conditioning.	Delete	See above. Establishing functional mass care shelters is under the directive of the American Red Cross and individual jurisdictions.

Hazard	Mitigation Action	Status	Comments
Violent Storms and Extreme Temperatures	Build and/or maintain storm shelters for residents and visitors who are vulnerable because such shelter is not available such as in their homes, cabins or camping facilities.	Ongoing	Revise as needed for plan update. This effort will apply to county-owned parks or campgrounds where applicable.
Flood	Maintain bridge, road, and culvert infrastructure at a level that is capable of sustaining a major storm event and will not be vulnerable to washouts.	Ongoing	Revise as needed for plan update.
Flood	Incorporate vulnerability of infrastructure and population put at risk when setting funding priorities for infrastructure projects.	Delete	Repetitive. This will be covered under the item above.
Flood	Address ice dams that may impact the road system in a timely manner in order to prevent damage to infrastructure, in particular during the spring thaw.	Ongoing	Revise as needed for plan update.
Flood	Steer development away from areas that may be difficult to serve with reliable road access.	Ongoing	This is included in the Ord 65 Comp Land Use Plan and Zoning Ordinance 62 and Subdivision Ordinance 60.
Flood	Assure access for residents and emergency vehicles during and after flood events.	Delete	This is an emergency response activity. Decisions on transportation access during and after flood events are not under the realm of the MHMP.
Flood	Ensure floodplain maps are accurate and current.	Completed	We do floodplain checks on all permits and administer the County's Floodplain Ordinance 43.
Flood	Maintain effective communication with MN DNR Waters and FEMA.	Delete	Not a strong mitigation action. St. Louis County communicates with the MN DNR and FEMA as necessary.
Flood	Make use of GIS capability to estimate potential damage and estimate cost.	Completed	Damage Assessment mobile survey forms and dashboards have been built and are in process of being rolled out to public safety agencies.
Flood	Maintain and facilitate an effective zoning process for shoreland management.	Ongoing	Shoreland Management is part of Zoning Ordinance 62.
Flood	Enforce all shoreland management standards.	Ongoing	Combine with mitigation action above to reduce redundancy in the plan. This is addressed in County Ordinance 62.
Flood	Identify flood mitigation solutions for high risk communities.	Ongoing	Revise as needed for plan update. The County works with individual jurisdictions as needed on addressing flood issues.

Hazard	Mitigation Action	Status	Comments
Flood	Property acquisition of homes with repeated flood risk.	Ongoing	Revise as needed for plan update. St. Louis County will continue to evaluate the opportunity for property acquisition and conversion to open space.
Flood	Repair, restore and stabilize shorelines of streams, rivers and lakes.	Ongoing	Revise as needed for plan update. This is an effort of the North and South SLC SWCD's to accomplish this.
Flood	Identify areas in watersheds that may be vulnerable for increased flooding as a result of development that changes peak run-off regimes.	Completed	This is in our Water Management Plan for St. Louis County.
Flood	Ensure that current storm water management guidelines are adequate to limit post development run-off and will not result in storm water run-off created flood damages.	Ongoing	The County will continue to apply stormwater management guidelines Part of Comp Plan Ord 65 and Zoning Ordinance 62.
Flood	Identify and address beaver problem areas.	Ongoing	Addressed in Water Management Plan.
Flood	Maintain effective communication with MN DNR.	Delete	Not a strong mitigation action. St. Louis County communicates with the MN DNR as part of our permitting process through Planning.
Flood	Work with right of way owners to address ditch and drainage maintenance concerns.	Ongoing	Revise as needed for plan update.
Infectious Diseases	Secure adequate resources to ensure an effective public health system is in place to identify and respond to outbreaks of infectious diseases.	Delete	Not relevant for MHMP plan update. This is an effort of SLC Public Health Dept.
Infectious Diseases	Ensure that the St. Louis County Emergency Operations Plan (EOP) is reviewed as needed in order to effectively respond to a disease outbreak.	Delete	Not relevant for MHMP plan update. The SLC EOP is updated on an annual basis. Response planning for disease outbreaks is an effort of SLC Public Health.
Infectious Diseases	Educate residents about available resources and who to contact in case of an emergency.	Delete	This is a continuous process.
Infectious Diseases	Develop and promote a beach testing program for recreational beaches on inland lakes.	Delete	Not relevant for MHMP plan update.
Infectious Diseases	Promote public information programs regarding beach closures.	Delete	Not relevant for MHMP plan update.

Hazard	Mitigation Action	Status	Comments
Wildland Fire	Educate area residents through the FireWise Program.	Ongoing	Revise as needed for plan update. Addressed in Comp Plan Ord 65. St. Louis County hired its first Firewise Coordinator in 2018. This person is responsible for coordinating Firewise, assisting with Federal Grant programs and updating the CWPP.
Wildland Fire	Identify and work with communities to achieve official Firewise Community Status.	Ongoing	Revise as needed for plan update. Responsibility of Firewise Coordinator.
Wildland Fire	Educate and inform landowners about fire prevention related to tree and shrub species, replanting and defensible space.	Ongoing	Revise as needed for plan update. Addressed in Comp Plan Ord 65.
Wildland Fire	Identify and map high risk and high hazard areas on non-federal lands using GIS technology.	Ongoing	Revise as needed for plan update. St. Louis County maintains a Community Wildfire Protection Plan (CWPP). Not an EGIS project as of now but would be in the future.
Wildland Fire	Update and maintain communications plans and public information systems.	Ongoing	Revise as needed for plan update. Meet with USFS and MN DNR annually before each fire season to discuss updates from previous year and build on lessons learned.
Wildland Fire	Update and develop evacuation plans for high risk communities and rural areas.	Ongoing	Revise as needed for plan update. Our shining star here is Eagles Nest Township. They conducted an evacuation exercise in 2018.
Wildland Fire	Identify areas where firefighting capacity is lower because of limited availability of water.	Ongoing	This is done at the local level in cooperation with 9-1-1 communications, MN DNR, local Fire Departments and USFS.
Wildland Fire	Installation dry fire hydrants or water holding tanks at strategic locations.	Delete	This is done at the local level by local Fire Departments. The CWPP addresses areas of need for increased water capacity for wildfire suppression.
Wildland Fire	Coordinate and ensure that new development will have adequate access and egress for emergency response vehicles.	Ongoing	Revise as needed for plan update. Part of our subdivision process under Ord 60 and Comp Plan Ord 65.
Wildland Fire	Install sprinkler systems at high risk homes and businesses.	Ongoing	Revise as needed for plan update. St. Louis County has implemented a FEMA sprinkler project in the past and may do so again in the future. Include as a potential mitigation measure in the plan update.

Hazard	Mitigation Action	Status	Comments
Wildland Fire	Identify areas on public and private property where fuel reduction is needed and develop effective fuel reduction programs.	Ongoing	Revise as needed for plan update. This is coordinated by Firewise Coordinator.
Wildland Fire	Identify, develop and maintain strategically located Safety Zones in high risk areas to assure resident and visitor safety.	Delete	Nothing has been done at the county level on this. This is a jurisdictional-level planning effort in conjunction with local evacuation planning.
Wildland Fire	Install metal roofing on high risk homes and businesses.	Ongoing	Nothing has been done at the county level on this. Include as a potential mitigation measure in the plan update.
Wildland Fire	Continue inter-agency training efforts.	Delete	Not a strong mitigation action. St. Louis County works with the MN DNR, USFS and local fire departments collaborate on training where feasible.
Wildland Fire	Continue to involve residents of at-risk communities in planning efforts.	Delete	Not a strong mitigation action. The FW Coordinator regularly works with residents in high-risk wildfire areas in planning and project efforts.
Wildland Fire	Develop and implement protocol to warn fire departments of high- risk fire days to ensure adequate staff is on hand.	Completed /Ongoing	Red flag day procedures are in place a 9-1-1 communications in place for FD notification.
Wildland Fire	Assure effective forest management and wildland fuels management practices.	Ongoing	Revise as needed for plan update as related to County-level forestry activity.
Wildland Fire	Recruit and train firefighters to assure adequate fire response capacity.	Delete	Not relevant for MHMP update.
Wildland Fire	Update and implement the Community Wildfire Protection Program	Ongoing	Currently being updated in 2019.
Wildland Fire	Collaborate on landscape level fuels reduction and forest management.	Delete	Redundant. These efforts fall under implementation of the CWPP update and Firewise projects.
Wildland Fire	Explore and develop biomass options to lower costs when implementing fuels reduction.	Delete	Not relevant for MHMP update.
Dam Failure	Work with state and federal agencies, local jurisdictions, and private parties to ensure dams are structurally sound, maintained and functioning properly.	Delete	Not a county-level mitigation activity. All Dams in St. Louis County are owned and operated by Minnesota Power. Annual updates are received and frequently participated in exercises involving the dams.

Hazard	Mitigation Action	Status	Comments
Dam Failure	Work with the Department of Natural Resources (DNR) dam inspection program using their technical expertise to identify risks and develop solutions for at-risk dams.	Delete	All Dams in St. Louis County are owned and operated by Minnesota Power.
Dam Failure	Identify populations and property at risk in case of a dam failure.	Completed /Ongoing	This has been done by MN Power and communicated to local agencies.
Dam Failure	Inform property owners in these areas of potential risks, what warning systems are in place and the proper response in case of dam failure.	Completed	St. Louis County now has a group built in Everbridge to notify residents in high risk areas. This process is testing during exercises.
Dam Failure	Assure adequate warning systems are in place.	Completed /Ongoing	Completed with ongoing updates.
Hazardous Materials	Maintain current information on hazardous materials that typically travel through St. Louis County.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Hazardous Materials	Maintain communication with MN-DOT, MN State Patrol and U.S. Customs regarding hazardous material transportation.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Hazardous Materials	Continue to work with MPCA, MN Division of Homeland Security and Emergency Management (EPCRA) to identify and map all fixed hazardous materials sites within St. Louis County.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Hazardous Materials	Disseminate information to all affected local units of government.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Hazardous Materials	Improve safety where railroads intersect with roads and trails.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Hazardous Materials	Participate in regional exercises that test local plans and interaction between agencies, including the Minnesota Incident Command Center.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Hazardous Materials	Provide drop off locations or pick up times for resident hazardous waste.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Fire – Urban and Structure	Support educational programs that stress fire prevention.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Fire – Urban and Structure	Educate residents about the need to have a personal fire emergency plan.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.

Hazard	Mitigation Action	Status	Comments
Fire – Urban and Structure	Develop regional partnerships to assist volunteer fire departments to recruit, train, and retain volunteer firefighters to ensure adequate staffing for response to fires, to conduct inspections and to provide education programs.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Fire – Urban and Structure	Recruit and train firefighters to assure adequate fire response capacity.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Fire – Urban and Structure	Coordinate between local Fire Chiefs and St. Louis County Land Use Planners to ensure properties have good access and egress.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Fire – Urban and Structure	Identify areas that have limited water availability for firefighting and continue to strategically place dry fire hydrants or water holding tanks.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Water Supply Contamination	Work with the MN Department of Health to develop wellhead and source water protection plans.	Delete	St. Louis County currently has no wellhead protection plan.
Water Supply Contamination	Provide individual well water testing to St. Louis County residents.	Delete	Done by MN Department of Health.
Water Supply Contamination	Assure water and wellhead protection is addressed with railroad.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Water Supply Contamination	Monitor water and wastewater lines, including televising options.	Delete	Responsibility of local sewer system operators.
Water Supply Contamination	Assure safe water source for all residents and visitors.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Wastewater System Failure	Working with the MPCA to ensure installations work properly.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Wastewater System Failure	Continue to implement programs that ensure municipal infrastructure works properly.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Wastewater System Failure	Continue to implement programs that ensure proper septic treatment systems are in place in areas not served by a central wastewater treatment system.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Wastewater System Failure	Assure secure access, sufficient lighting and security equipment.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Wastewater System Failure	Continue education efforts to public about septic system maintenance and use.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.

Hazard	Mitigation Action	Status	Comments
Terrorism	Work with operators of critical infrastructure to assess needs and implement safety measures such as restricted access and monitoring capabilities.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Terrorism	Participate and assist in regional preparedness exercises using the Homeland Security Exercise Evaluation Program.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Terrorism	Ensure exercises are coordinated to effectively use available time and resources such resources available through the Coast Guard Area Maritime Security Plan.	Delete	Not relevant for MHMP update focus on natural hazards mitigation.
Regional Cooperation & Communication	Assure compatibility of communications systems and develop communications protocols.	Delete	Delete – This is an ongoing process that falls under emergency response communications planning.
Regional Cooperation & Communication	Assure an effective command and control radio system.	Delete	Not relevant for MHMP update focus on natural hazards mitigation. St. Louis County has adapted the National Incident Management System (NIMS) and continues to train, exercise and utilize the NIMS system.
Regional Cooperation & Communication	Implement local emergency management plans as part of regional emergency management exercise efforts.	Delete	Not relevant for MHMP update focus on natural hazards mitigation. St. Louis County is a member of AREMA and has worked to coordinate regional plans to align with local plans as much as possible.
Regional Cooperation & Communication	Assure an efficient system for delivery of supplies and availability at local sites in the case of a disaster.	Delete	Not relevant for MHMP update. This falls under emergency response planning.
Regional Cooperation & Communication	Assure adequate, trained staff is available in the case of a disaster.	Delete	Not relevant for MHMP update. This falls under emergency response planning.
Regional Cooperation & Communication	Assure security of shelter sites during disaster events.	Delete	Not relevant for MHMP update. This falls under emergency response planning. Ensuring locations for mass care sheltering will already be covered under an All-Hazards action regarding shelter planning.
Regional Cooperation & Communication	Assure residents and visitors have routes and transportation to shelter sites in the case of a disaster.	Delete	Not relevant for MHMP update. This falls under emergency response planning.

Appendix I

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Appendix J

St. Louis County Plans & Programs in Place

Planning & Regulatory

Plans/Programs	Yes/No
Comprehensive/Master Plan	Yes
Capital Improvements Plan	Yes
Economic Development Plan	Yes
Emergency Operations Plan	Yes
Climate Adaptation Plan	
Continuity of Operations Plan	Yes
Transportation Plan	Yes (included in comp plan)
Stormwater Management Plan	Yes (included in Comp plan and ordinance 62)
Community Wildfire Protection Plan	Yes
FireWise Program	Yes
Water Conservation/Emergency Preparedness Plan	
Wellhead Protection Plan	No (Some of our cities do but the county does not)
Database of dry hydrants/well access	Yes
Burning permits/restrictions	Yes Through DNR
Water Management Plan	Yes
Zoning ordinance	Yes
Subdivision ordinance	Yes
Floodplain ordinance	Yes
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes
Flood insurance rate maps	Yes
Acquisition of land for open space and public recreation uses	Yes
School closing policy/communications plan in event of inclement weather/temperatures	Yes
Storm shelters (list all locations)	St. Louis County does not, however; many of our communities may have them. We do not have a current list of them.
Warning sirens (list all locations)	Yes (Duluth, Gilbert, Floodwood, Proctor)
SKYWARN Program	Yes
Everbridge Mass Notification System	Yes
Severe Weather Awareness Week	Yes
Winter Weather Awareness Week	Yes
NOAA Weather Radios	Yes
THIRA	Yes

Administrative & Technical

Administration	Yes/No
Planning Commission	Yes
Mitigation Planning Committee	Unsure
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes (shoreland only)
Mutual aid agreements	Yes
Staff	Yes/No
Chief Building Official	Yes
Floodplain Administrator	Yes
Emergency Manager	Yes
Community Planner	Yes
Civil Engineer	Yes
GIS Coordinator	Yes
Technical	Yes/No
Warning systems/services (Reverse 911, outdoor warning signals)	Everbridge with IPAWS, outdoor sirens in Duluth, Gilbert, Proctor and Floodwood
Hazard data and information	Yes
Hazus analysis	

Education & Outreach

Program/Organization	Yes/No
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes (SWCD contracts)
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes (SWCD contracts)
Natural disaster or safety related school programs	No
StormReady certification	Yes
Firewise Communities certification	Yes
Public-private partnership initiatives addressing disaster-related issues	Yes

Appendix K

Local Mitigation Survey Report

As part of St. Louis County's 2020 Multi-Hazard Mitigation Plan update, participating jurisdictions and County personnel were asked to participate in filling out a two-part "Local Mitigation Survey" form. The purpose of the survey was to gather information needed to support update of the plan and development of local-level mitigation actions the next five-year planning cycle. Following are the responses from the County departments and jurisdictions that participated in the survey.

NORTH & SOUTH ST. LOUIS SOIL & WATER CONSERVATION DISTRICTS

Part A: Past Events & Vulnerability Assessment

- 1. In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?**
(North SWCD) Flooding as a result of large storm events have occurred within the communities within the district. Data on climate trends indicates we are likely to experience more frequent and higher intensity precipitation events as time progresses.

(South SWCD) Yes. Several high rain events that impacted coastal areas of Duluth in particular.

- 2. In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** (North SWCD) The Soil and Water Conservation District (SWCD) offers technical assistance and programs that primarily focus on soil health and water quality as a goal. Generally, conservation practices are being designed to withstand certain flood frequency events—i.e. 50 year, 100 year, 500 year floods. Depending upon the practice, many times installing measures to be able to withstand certain flood events can be mitigating for what was previously existing. A good example would be replacing an undersized culvert may not only benefit water quality by reducing erosion, or improving wildlife passage, but also may reduce the risk of a road washing out during a significant rainfall event.

(South SWCD) Yes. The Soil and Water Conservation District (SWCD) offers technical assistance and programs that primarily focus on soil health and water quality as a goal.

- 3. In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** (North SWCD) The SWCD does not oversee zoning within St. Louis County.

(South SWCD) The SWCD does not oversee zoning within St. Louis County.

- 4. What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**
(North SWCD) The capacity of some of these smaller municipalities to actively be working on risk management for natural disasters is a concern. These municipalities often may be limited on the number of staff that they can employ; while these staff are qualified to be doing the jobs

they are hired for, they may not all be versed in water resource management, hydrology and other related fields that may be able to help proactively plan for future storm events.

(South SWCD) In our limited role we would be involved in building storm resiliency into stream restoration, conservation, and stormwater management systems.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** (North SWCD) Cost share policy for erosion control and water management funds.

(South SWCD) Cost share policy for erosion control and water management funds.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** (North SWCD) Staff have training and background experience with natural resource management—various specialties: forestry, wetlands, water resources, etc. Staff may be able to help residents and communities plan projects that could limit certain risk of future natural disasters.

(South SWCD) Technical/Engineering staff available for design assistance – six staff.
3. **What programs are in place to help accomplish mitigation in your community?** (North SWCD) Cost share for erosion control and water management.

(South SWCD) Technical and financial assistance available. Financial assistance limited, and often competitive.
4. **What funding or other resources are available to help accomplish mitigation in your community?** (North SWCD) Competitive grants such as the Clean Water Fund could be applied for. Projects would have to primarily be focused on improving/protecting water quality, however often a side benefit could potentially be mitigating a potential natural disaster in the future. An example of this could be stabilizing a stream bank through a natural restoration; this would help protect and improve water quality by reducing the amount of sediment entering a stream and potentially protect property and/or infrastructure from risk.

(South SWCD) State Clean Water fund.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** (North SWCD) Often communication or more importantly how to best communicate to your audience is a large hurdle. Specifically conveying the importance of why land use regulations exist to residents can be a critical component. An example would be setbacks along rivers are in place not only to limit the impact on water quality but also to help protect a property owner from floods that will frequently occur within the floodplain of a river.

(South SWCD) Funding is limited. Funding in the past has been available after a storm event, but not for mitigation.

Part C: Contributors & Time

Phil Norvitch, Resource Conservationist, North St. Louis SWCD, 1 hour

R.C. Boheim, District Manager, South St. Louis SWCD, 30 minutes.

CITY OF AURORA

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery? No.**
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events? The City, in conjunction with the other East Range Communities and the East Range Police Department, has developed an updated emergency operations plan.**
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events? No.**
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events? The City would like to upgrade the severe weather and emergency siren.**

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community? The City has budgeted to replace the severe weather and emergency siren in 2019.**
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community? The Police Chief is our Emergency Management Coordinator. There is a chain of command and information flow in place.**
3. **What programs are in place to help accomplish mitigation in your community? The Police and Fire Departments do community outreach.**
4. **What funding or other resources are available to help accomplish mitigation in your community? Not known.**

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** The City would like to upgrade the severe weather and emergency siren to increase our ability to reach the public with emergency notification.

Part C: Contributors & Time

Becky Lammi, City Clerk, 30 minutes

Karin Krueger, Deputy Clerk, 30 minutes

CITY OF BABBITT

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** Yes. We have experienced substantial wind damage to trees and power outages to City properties as well as private properties in the last couple of years.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** Yes. We removed some risk trees.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** None.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The City has a complete Comprehensive Plan and drainage policies.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** Public Safety Committee, Fire Chief, Street Supervisor and the City Council all work together to prevent issues.
3. **What programs are in place to help accomplish mitigation in your community?** City-wide tornado practice, including the school.

4. **What funding or other resources are available to help accomplish mitigation in your community?** We participate in the Firewise program. The Fire Chief and other members attend trainings on mitigation.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** None.

Part C: Contributors & Time

Tony Chamberlin, Street Supervisor and Fire Chief, 30 minutes

CITY OF BIWABIK

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** Yes, we had major damage to trees and power lines during a thunderstorm/straight-line winds storm during Labor Day Weekend of 2015. We also had major damage to water and sewer lines in a washout caused by heavy rains in April, 2017.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** Biwabik is currently wrapping up a 4 year, 12.5 million dollar reconstruction of streets and utilities. This involved extensive replacement of storm sewer lines, curbing and gutter. We have upgraded the SCADA monitoring of our lift stations to provide advance warning during high-flow events. We replaced our weather siren in 2015. The new model can be activated via radio by the police or fire department.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** Now that we have upgraded the pipe network in our storm water system, we have significant amounts of ditching to do to help with surface drainage.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** We recently updated our comprehensive plan.

We annually update a 5-year Capital Improvements Plan.

We enforce the MN State Building Code using a certified Building Official.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** We have an Infrastructure Improvement Task Force made up of City Councilors, Public Utility Commissioners, City Administrator, Public Works Foreman, and City Engineer to review and plan for all infrastructure needs including hazard mitigation.
3. **What programs are in place to help accomplish mitigation in your community?** The City promotes posting severe weather awareness information in the East Range Shopper.
Our Fire Department has a fire prevention open house each fall.
Our local school practices for a tornado drill on an annual basis.
4. **What funding or other resources are available to help accomplish mitigation in your community?** We have worked closely with the USDA Rural Development Program to address the infrastructure needs associated with mitigation.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** We lack funding to do ditch work.

Part C: Contributors & Time

Jeff Jacobson, City Administrator, 3.5 hours

CITY OF BROOKSTON

No LMS Form.

CITY OF BUHL

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** The City has experienced minor flooding events which caused backups into residents' basements.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** City continues to update sewer and storm sewers when funds are available.

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events? No.**

4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**
The elderly residents are always a concern in the community. Many of them have limited mobility. We do our best to check in on residents without law enforcement. Budgets are always a concern, GLA is low and there just are not enough grant dollars available to invest in infrastructure or full time law enforcement to help out community members.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The city continues to invest in infrastructure when funding is available.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** Buhl has limited resources. The positions in place include a Volunteer Fire Chief and City Administrator.

3. **What programs are in place to help accomplish mitigation in your community?** County alert system.

4. **What funding or other resources are available to help accomplish mitigation in your community?** Buhl funding is limited. Outside grants sources are needed to assist with projects.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** Funding is the main issue, and City staff and volunteers are limited.

Part C: Contributors & Time

Ryan Pervenante, City Administrator, 1 hour

Trent Pink, Foreman, 30 minutes

Josh McDowell, Fire Chief, 30 minutes

CITY OF CHISHOLM

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?**
None.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** Chisholm has committed to doing at least one street reconstruction project per year which includes changing out storm sewers and catch basins. We are in the process of contracting with St. Louis County for the Everbridge notification system for our community. The City will be updating our website in the near future and will work to improve emergency preparedness and communications to residents. The City has a Facebook page which could also be used for emergency notifications.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** A couple of senior assisted living housing developments have been built therefore creating a challenge with a large number of senior citizens needing assistance during a disaster event.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** We plan to log a 40-acre parcel just to the north of town which will mitigate potential wildfire activity for the City. An upgrade is needed to the city's warning siren system. The implementation of detention and retention ponds would be beneficial to handle the runoff from large storms. We plan to continue our annual goal of at least one street reconstruction per year which includes new storm sewer and catch basins. A concern is what happens to the Everbridge notification system if the cell tower is taken out during a severe storm?

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** We have natural gas backup generators at our fire hall/police station, water plant and city garage. The automation of our water plant was just completed to a "state of the art" system with multiple alarms in case of any failures. Our Comprehensive Plan is scheduled to be updated in the next year and we will assess and include emergency notification along with other potential hazard mitigation items. In the event of an emergency we have worked with the local school district with busing to evacuate people to safe areas.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** The City has a Safety Committee and Planning and Zoning Committee which meet on a monthly basis to address pertinent issues to the City. The Fire Chief is our designated Emergency Manager. We have a City Engineer and are hiring a new Public Works Supervisory to address road maintenance issues for flooding and overall public safety.

3. **What programs are in place to help accomplish mitigation in your community?** We are in the process of signing up for St. Louis County's emergency notification system, Everbridge. We have a City Chaplain to assist as needed in all aspects of life events. The City participates in the annual Severe Winter/Spring Weather Awareness Week. The Fire Department has open houses on fire safety and presents in the schools. Our schools practice fire and tornado drills on a regular basis. Our Fire and Police Chiefs attend city council meetings, which are broadcast live on Public Assess TV, and inform the city council and the public as necessary regarding health/safety events.
4. **What funding or other resources are available to help accomplish mitigation in your community?** Our city applies for grant funding for our street reconstruction program from multiple state and federal agencies. We are recognized as a Firewise Community and apply for the MN DNR Firewise grant funding. Our city works closely with St. Louis County and the State of Minnesota on mitigation efforts for our community with various projects and emergency notifications.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** Funding is a challenge for all aspects of hazard mitigation. Also, at times, the timing of grant awards does not tie out with our short construction season and the time it takes to get projects to the "shovel ready" state. Knowledge of gaps and deficiencies is a barrier to accomplishing mitigation in our community.

Part C: Contributors & Time

Bill Manney, City Administrator, 2 hours

Bob Brown, Fire Chief, 30 minutes

Vern Manner, Police Chief, 30 minutes

Jim Johnson, City Engineer, 30 minutes

Mandy Galli, City Building and Safety Official, 15 minutes

Leon Wegener, Public Works Foreman, 15 minutes

CITY OF COOK

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** Yes. We have experienced heavy rains in June 2018, causing street flooding & damage to City roads.

2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** The City has re-dug & cleaned out drainage ditches to help reduce localized flooding.

The City did a complete revamping of the utility system – water, sewer, and storm lines and a reconstruction of the streets.

The City is developing a new web page and will consider communicating with residents on community preparedness.

Residents contact the local power company regarding any down trees, power lines, etc.

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** N/A

4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** We would like an upgrade to the city's warning siren and identify some safe locations, in the community.

An education piece is needed to share with resident regarding the types of preparedness materials they should have on hand: list of medications, water, flash light, food, etc.

The city should research what organizations and entities have in place for emergency preparedness within their facilities.

The city has updated its pumps but should consider purchasing some sand bags.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** We have a Planning and Zoning Committee that has established a Floodplain Ordinance. The City participates in the NFIP.

The City has a comprehensive plan that is designated to plan for future growth of the city and is working to update the zoning map.

The city has an emergency plan and is in the process of updating and will coordinate with St. Louis County.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** We have a Maintenance Supervisor that address road maintenance issues for flooding (culvert clear out, ditch clearing)

Our city has an Emergency Preparedness/Bio-Terrorism/Safety Committee that meets regularly.

3. **What programs are in place to help accomplish mitigation in your community?** The city participates in Tornado Awareness Week and has done alerts and shared information.

Our Fire Department has conducted open houses and National Night Out.

Our Ambulance Department has delivered water to homes, when a water issue arose.

We have done mock drills, in the past.

4. **What funding or other resources are available to help accomplish mitigation in your community?** The City has worked with federal and state agencies regarding floodplain management and assistance.

The City has attended local railroad training in regards to hazards.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** We need more education on preparation for all.

The City needs to identify an alert system.

Part C: Contributors & Time

Dawn Kehoe, Office Assistant, 1 hour

Don Flack, Maintenance Supervisor, 30 minutes

Elizabeth Storm, City Councilor, 30 minutes

Theresa Martinson, Administrator, 1 hour

CITY OF DULUTH

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?**

Kaleb Montgomery

Yes. Duluth has experienced heavy rain, wind damage to trees, heavy snow storms, and power outages. In July of 2016, the City of Duluth experienced severe weather causing power outages including many signalized intersections, a lightning strike that damaged the Board of Trade

Building and caused an electrical outage at the main water pumping station. Gusts of wind up to 100 mph swept the Duluth area causing many trees and power lines to fall. Additionally, the City experienced wind gusts of 50 mph in October of 2018, resulting in flooding along Lake Superior's shore including Canal Park and extensive damage to the Lakewalk trail and several trees. According to the City of Duluth, this storm caused \$18.4 million in damage and causing power outages across the city.

Jim Filby Williams

The City of Duluth has experienced four declared disasters in the last five years:

1. A state-declared derecho straight line wind event in July of 2016 with sustained winds in excess of 75 mph across a wide area and gusts along Lake Superior in excess of 100 mph. The storm blew down many trees resulting in \$1,547,120 in City of Duluth recovery and restoration costs. The storm also cut off all power to the City of Duluth's potable water plant for 12 hours. The plant is the sole source of drinking water for more than 120,000 residents.
2. A state-declared coastal storm surge event in October of 2017 in which 60 mph winds and up to twenty-foot waves on Lake Superior caused \$9,020,000 of damage to City infrastructure located along the lakeshore including the Lakewalk park and trail system that is the engine of Duluth's six-million-visitors-per-year tourism economy and the City's potable water plant which provides the .
3. A state-declared coastal storm surge event in April of 2018 in which wind and waves caused \$1,500,000 of additional damage to the City of Duluth's coastal infrastructure.
4. A state and federally declared coastal storm surge event in October of 2018 with sustained winds in excess of 60 mph, gusts in excess of 80 mph, and waves in excess of twenty feet caused \$20,080,000 of additional damage to the City of Duluth's coastal infrastructure much of it in the Lakewalk/Canal Park area that is the primary engine of Duluth's six-million-visitors-per-year tourism economy. Other City assets impacted include a railroad, a potable water plant, stormwater infrastructure, parks and trails, and shoreline armoring that is the last line of defense against wave damage for hundreds of millions of dollars of privately-owned residences, hotels, restaurants, and retailers.

In addition to formally declared disasters, the City regularly incurs significant damage from wind, waves, and minor floods in storms that are severe but do not rise to the level of state or federal declaration. A 2019 assessment of a four-mile stretch of Congdon Boulevard along Lake

Superior revealed \$14 million of wave-related damage that was not attributable to any of the three storm surge events.

2. In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?

Todd Carlson, Tom Johnson & Jim Benning

- Utility Operations has increased BMP maintenance and cleaning of the storm sewer system
- Engineering is identifying vulnerable inlets that cause flooding of property and working to retrofit them with overflow structures
- Duluth is providing data on cross culverts to assist FEMA in producing newly updated flood plain maps.
- Planning is working with DNR and homeowners within flood plains to buy out the property in an effort to remove structures in the flood plain.

Kaleb Montgomery

The City has been working toward the complete street reconstruction of Superior Street in the central business district, implementing more storm sewer and catch basins as well as storm water retention efforts. Street reconstruction efforts now anticipate higher quantities of surface water flow to the storm sewer system. After a major flood event in 2012, the City of Duluth began identifying and demolishing houses that were affected by this event, subsequently removing many homes located in vulnerable flood zones across the city.

Jim Filby Williams

Since the devastating 2012 flood, the City of Duluth has elevated resiliency and hazard mitigation to permanent top priority status. The elevated priority of hazard mitigation is front and center in the City of Duluth's new (2018) comprehensive plan, *Imagine Duluth 2035*, one of whose major policies is to, "Improve Duluth's resiliency to flooding and natural disasters." The plan identifies six proactive strategies the City will pursue to improve resiliency including protection, restoration, and construction of green infrastructure to mitigate damage from extreme wind, flood, and wave events and adaptation of City infrastructure to changing climate.

Capital investments in resiliency have focused primarily on mitigating flood damage via projects that preserve or enhance the floodwater retention capacity of natural and constructed wetlands, reconnect incised streams to their flood plains, right-size stormwater infrastructure, and/or stabilize eroding slopes. In partnership with the South St. Louis County Soil and Water Conservation District and the Minnesota Department of Natural Resources, the City has

contributed to more than 10 major stream restoration projects on Miller Creek, Chester Creek, Amity Creek, Sargent Creek, Kingsbury Creek, Knowlton Creek, and Mission Creek at a total cost in excess of \$10 million. These projects jointly emphasize natural resource protection and hazard mitigation.

In partnership with St. Louis County and the Minnesota Department of Transportation, the City of Duluth Public Works Department has undertaken numerous projects to mitigate flood damage by repairing and replacing stormwater infrastructure, often with culverts that can handle more volume and are less prone to blockage.

To further mitigate flood damage, the City of Duluth Parks and Recreation Division has begun incorporating resiliency in all planning and construction projects including a nearly \$600,000 investment in improving stormwater infiltration at Piedmont Park and Lincoln Park to mitigate flood damage and environmental harm along Miller Creek, a designated cold-water trout stream.

To guide future investments in flood mitigation that will provide a positive return on investment, the City of Duluth is partnering with the University of Minnesota-Duluth Natural Resources Research Institute to identify restorable wetlands in the upper reaches of flood-prone Duluth stream sheds whose floodwater storage capacity can be increased most cost-effectively.

Following three declared coastal storm surge disasters in 2017 and 2018, the City of Duluth expanded its hazard mitigation efforts to include mitigation of hazards from coastal storm damage along Duluth's extensive exposed coastline. The City is in the midst of what will ultimately be more than \$30 million of storm damage repair work whose major purpose is to restore our coastline infrastructure to be more resilient in the face of increasingly frequent and severe coastal wave events. The projects in preparation will include relocation of roads and trails away from the coastline, obliteration of other roads and trails, and engineered shoreline armoring and asset reconstruction where relocation and obliteration are not possible. To guide future investments in coastal hazard mitigation, the City is seeking to partner with the University of Minnesota – Duluth and the University of Michigan to identify vulnerable coastal infrastructure, develop and assess cost-effective strategies to increase the resiliency of that infrastructure, and conduct the benefit-cost analyses necessary to submit those projects for hazard mitigation project implementation funding.

To slow or reverse the loss of land mass on Park Point, the City of Duluth engaged the Army Corps of Engineers beginning in 2019 to beneficially reuse harbor dredge materials for beach restoration. The City would like to see a long-term commitment to an ongoing program of beach nourishment.

To improve the City's overall hazard mitigation knowledge and expertise, the City is participating intensively in a number of regional resilience and hazard mitigation initiatives including Great Lakes One Water Duluth for which the City of Duluth is on the advisory board.

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?**

Todd Carlson, Tom Johnson & Jim Benning

-New development does create additional impervious surface and may create additional stormwater runoff.

Kaleb Montgomery

No zoning changes have been made that increase vulnerability to future severe weather events. Additional development pressure in areas susceptible to severe weather or disaster events has continued, including along Park Point and near certain rivers and streams; zoning rules have sought to minimize risk.

Jim Filby Williams

After four declared storm-related disasters in a little over two years from 2016 to 2018, Duluth is already seeing the more frequent and severe storms that are projected for the area in association with climate change. More powerful storms are producing larger precipitation amounts, higher wind speeds, larger waves, and more coastal flooding and, at times, coming in such quick succession that the City is unable to complete repair work from one disaster before another disaster occurs. In the 12 months from October 2017 to October 2018, Duluth saw three declared coastal storm surge disasters each of which hit the same public assets in the same way, each compounding the damage from prior storms before repairs could be completed.

A sustained surge in new development has added significant impermeable surface in the last five years. That development has been offset to an unknown degree by green and gray stormwater infrastructure projects that have mitigated flood hazards. With significant ongoing development anticipated, the City of Duluth will need to continue to aggressively pursue smart flood mitigation projects to ensure that we at least do not lose ground.

The arrival of Emerald Ash Borer to Duluth's extensive ash forests makes Duluth more vulnerable to wind events that will more easily take down dead, dying, and brittle ash trees and to flood events which may be worse if black ash wetlands convert to grassy wetlands with diminished floodwater retention capacity.

4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**

Todd Carlson, Tom Johnson & Jim Benning

- Installing Green infrastructure and traditional gray BMP infrastructure to reduce peak discharge and volume of stormwater runoff.
- Increase cross culvert size to reduce damage to road and utility infrastructure due to overtopping of drainage ways during weather events by increasing the size of culverts.
- Increasing the storm water utility maintenance budget to increase cleaning of pipes to insure maximum capacity of the system, also expand the road ditching program to allow for mowing of ditches to reduce debris blockages and increase the amount of maintenance ditching done each year
- Restore flood plains along our creeks and streams in an effort to provide additional storage of flood waters.
- Increase the public education about flooding events and being safe during a flood.
- Increase public education about the FEMA flood plain insurance program.

Kaleb Montgomery

The City of Duluth has extensive waterways that funnel through all parts of the city. To mitigate flood vulnerability, the city would like to take action to restore many of the natural creeks and river banks in order to increase water retention efforts by designating and enforcing shoreland setbacks, and updating and reinforcing infrastructure in terms of culverts and permeable surfaces.

Public education for homeowners would benefit the community to be more prepared for extended power outages and big storms.

Jim Filby Williams

To mitigate flood hazard, the City needs to:

1. Acquire and protect wetlands that are important to floodwater retention and flood hazard mitigation emphasizing wetlands in the upper reaches of stream sheds that are unusually prone to damaging flooding – e.g. Mission, Keene, Miller, Brewery, Coffee, Tischer, and Amity Creeks.
2. Identify wetlands (or former wetlands) whose flood retention capacity can be cost-effectively enhanced.
3. Identify opportunities to build constructed wetlands in areas where flood mitigation benefits will be particularly great.
4. Implement wetland enhancement and wetland construction projects.

5. Accelerate enhancements to stormwater infrastructure.
6. Complete additional stream restoration projects identified as priorities by the interagency Duluth Urban Watersheds Advisory Committee and the Regional Storm Water Protection to reconnect streams to their flood plains, reduce erosion, improve ecological health, and mitigate flood hazard.
7. Examine new FEMA flood maps to identify flood-prone private properties for purchase and demolition and prioritize stormwater system improvements.

To mitigate coastal storm hazard, the City needs to:

1. Improve its understanding of how climate change is likely to impact coastal storm hazards and vulnerable coastal infrastructure and how such infrastructure can be cost-effectively protected from harm in its current location, eliminated altogether, or relocated to a less vulnerable location.
2. When possible, demolish vulnerable infrastructure close to the shoreline, relocating inland where necessary.
3. When demolition is not possible, improve the ability of coastal infrastructure to withstand coastal storm damage by constructing shoreline armoring to contemporary coastal engineering standards.
4. Protect the potable water plant located right on the shoreline by armoring the adjoining shoreline and establishing a backup on-site power supply that can operate indefinitely.
5. Improve its understanding of how and where the Park Point sand spit is likely to lose mass over the next decade, how ongoing beneficial reuse of harbor dredge spoils may be used in beach nourishment projects to slow or reverse that loss, and how to most cost-effectively mitigate hazards to public and private assets through a flexible mix of asset purchase, demolition, relocation, and/or armoring and enhancement of gray and green infrastructure. Future study should focus on the areas of Park Point closest to the Duluth canal entry and the Superior entry where the loss of land mass is most pronounced.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?**

Todd Carlson, Tom Johnson & Jim Benning

-The city enforces the FEMA flood plain insurance program.

-During street improvement projects the city works to replace cross culverts with increased sizes to provide flood protection and decreases the potential for debris blockages that may cause localize flooding.

-the City of Duluth Unified Development Code

-Administration of the Wetland Conservation Act

Kaleb Montgomery

We have adopted a comprehensive plan that outlines several climate resiliency policy goals and intentions.

The City has also updated the Floodplain map and initiated more intensive development standards that strive to reduce or eliminate the vulnerability of storm events.

In 2017, the City adopted a Street Improvement Plan that has become successful in identifying and scheduling road improvement projects that include drainage improvements and reduce over-the-road repetitive flooding.

Jim Filby Williams

1. The City has a new comprehensive plan that elevates resilience and hazard mitigation as major priorities.
2. The City has a new Natural Resources Commission whose charge includes resiliency.
3. The City participates in an inter-agency Duluth Urban Watersheds Advisory Committee that identifies and prioritizes problems and cost-effective remedies.
4. The City has new Council-approved plans for reconstruction of developed coastal areas including the Lakewalk, Canal Park, the Western Waterfront Trail, and Brighton Beach that will make public infrastructure there much more resilient via a mix of demolition, relocation, armoring, and green infrastructure.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?**

Todd Carlson, Tom Johnson & Jim Benning

- The City of Duluth PWU (Street department, Engineering and Utility Operations) have staff (work crews and supervisors) available during the workday and after hours to respond to utility related emergencies.

- Mapping of the City of Duluth to include city owned utilities, roads, aerial photos, contours, development areas, wetlands, streams, etc. are in a GIS system that is updated daily to insure accurate information is being distributed to City of Duluth personal.

Kaleb Montgomery

The City's engineering department works closely and comprehensively with stormwater management and mitigation. Additionally, Engineering and the Planning Division work to identify and enforce floodplain management. Facilities works on resiliency efforts to update public infrastructure such as the Lakewalk trail to reduce the chances of repetitive damage. The City and St. Louis County also work well together when emergency response is required.

Jim Filby Williams

1. The City Council includes a Public Safety Committee.
2. The City has a Natural Resources Commission whose duties include acquisition, improvement, and use of public green space for the purpose of hazard mitigation.
3. Our Fire Chief is the City's designated Emergency Manager.
4. The City has an Engineering Division and a stormwater utility that have the technical capacity to plan and implement flood hazard mitigation projects.
5. The City has a full-time Natural Resources Coordinator who is especially adept at engaging natural resource agency partners to help design, finance, and implement projects that enhance the environment and mitigate hazards.
6. The City has unusually strong collaborators in the area of hazard mitigation including Minnesota HSEM, St. Louis County, Minnesota Sea Grant, Ecolibrium3, the University of Minnesota-Duluth, the South St. Louis County Soil and Water Conservation District, Minnesota DNR, and Minnesota Pollution Control Agency.
7. The City has a three-person communications team that leads the way on disaster-related media relations and community relations.

8. The City has a strong construction project management division that manages project implementations.
3. **What programs are in place to help accomplish mitigation in your community?**

Todd Carlson, Tom Johnson & Jim Benning

The UDC – engineering permit process to review and prevent new development and redevelopment from being vulnerable and impacted by extreme weather events.

Duluth participates in the FEMA flood plain insurance program.

Kaleb Montgomery

The Comprehensive Plan focuses on many mitigation efforts that include several policy goals and priority actions. Moreover, after the major flood event in June 2012, the City utilized the Buy Out Program to eliminate properties in the floodway and have expressed interest in utilizing this funding source in the future.

Jim Filby Williams

Great Lakes One Water Duluth – a regional initiative to improve resiliency in the face of climate change.

4. **What funding or other resources are available to help accomplish mitigation in your community?**

Todd Carlson, Tom Johnson & Jim Benning

-City of Duluth works with outside partners on stream restoration projects that reduce stream bank erosion improving flood storage, debris passage and water quality.

-City of Duluth stormwater partners with the University of Minnesota Duluth (UMD) Natural Resources Research Institute (NRRI) on the duluthstreams.org/ LakeSuperiorStreams.org website. This is a public resource for stormwater/ stream related information

- Grant or funding programs i.e. - Minnesota's Lake Superior Coastal Program, Department of Natural Resources (DNR), Minnesota Pollution Control Agency (MPCA).

Kaleb Montgomery

The City has worked with state and federal partners to address mitigation efforts following past disaster events such as the October, 2018 severe wind and flooding event.

The City has sought funding through the State HSEM program and works closely with the DNR to fund river and stream resiliency for storm water retention.

Jim Filby Williams

The State of Minnesota Outdoor Heritage Fund and Clean Water Fund support projects that advance a mix of environmental restoration goals and hazard mitigation goals.

The EPA Great Lakes National Program Office Focus Area Four, funded by the federal Great Lakes Restoration Initiative, funds projects that advance a mix of environmental restoration and hazard mitigation goals.

The SWCD, DNR, and MPCA have often been willing to administer and manage grants and construction projects.

The City has a strong collaboration with St. Louis County and the State of Minnesota HSEM that helps use navigate the hazard mitigation system and prioritize and implement specific projects.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?**

Todd Carlson, Tom Johnson & Jim Benning

- Funding

Kaleb Montgomery

We need to identify mitigation efforts listed in the Comprehensive Plan and begin to enforce/implement such policy goals intentionally and in a steadfast manner.

Another barrier includes the lack of staff time for plan implementation efforts. The City needs to provide more accessible information to residents and business owners on storm shelter locations and disaster response.

Funding is also an ongoing barrier to mitigation efforts.

Immediate barriers to risk mitigation include a lack of emergency shelter options, particularly in severe cold weather emergencies, and the city's topography which creates flood risk for street washout which can result in few routes for public safety access.

Jim Filby Williams

We need to better understand coastal flood hazards, identify specific vulnerable sites, and develop cost-effective mitigation remedies for those sites. The need is especially acute at Park

Point but also the entirety of Duluth's Lake Superior shoreline and those portions of the St. Louis River Estuary shoreline that are exposed to unusually long fetch from the NE.

We need to better identify specific cost-effective projects that will protect, restore, and enhance wetlands for floodwater mitigation purposes.

The City needs funding assistance to implement specific coastal hazard mitigation, flood hazard mitigation projects.

Part C: Contributors & Time

Todd Carlson, Program Coordinator, 4 hours

Tom Johnson, Stormwater Engineer, 2 hours

Jim Benning Public Works Director, 1 hour

Jim Filby Williams, Director of Public Administration, 5 hours

Kaleb Montgomery, Planning Technician, 90 minutes

CITY OF ELY

Part A: Past Events & Vulnerability Assessment

- 1. In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?**
Severe weather caused property damage and posed risk to life safety in 2016 and 2018.
- 2. In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?**
 - Dedicated Emergency Management Director appointed to identify problem areas and improve preparedness and response.
 - Ely Tree Study/Public Works Project removes trees on public property that could cause property damage and/or risk to life safety.
 - Police Department: Response to severe weather events protocol. Outdoor Emergency Siren is prioritized, then a survey of outdoor populated areas with announcements over PA Speaker if safe to do so.
 - Skywarn Spotter Training offered every two years in the City of Ely.
 - Improved communications with public and private community partners.
 - Social Media development.

3. In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events? No.
4. What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events? None.

Part B: Local Mitigation Capabilities Assessment

1. What plans, authorities, or policies are in place to help accomplish mitigation in your community?
 - Emergency Operations Plan
 - Dedicated Emergency Management Director
 - Improved communication with partners in both the public and private sector
 - Social Media
 - Property Development
2. What staff (organizational capacity) are in place to help accomplish mitigation in your community?
 - Emergency Management Director
 - Police and Fire Department
 - Public Works / Utilities
 - Clerical Staff
3. What programs are in place to help accomplish mitigation in your community? Skywarn: National Weather Service-sponsored training to educate public on severe weather spotting.

West End Development: The land development, which includes a new road, will provide better access to the Ely Hospital. This eliminates the need to travel through residential areas to access the Ely Hospital.

City of Ely Tree Board: Members came together and conducted an inventory, survey, and obtained a study of trees on City of Ely Public Property. The Tree Board's work has and is accomplishing mitigation, in partnership with the City of Ely Public Works, by removing hazardous trees that may cause property damage and/or reduce risk to life safety.

Wildland-Urban Interface/Fire Adapted Community: The City of Ely, neighboring communities, Minnesota DNR, US Forest Service, and others work together through education, training, risk

management, and communication to achieve success in reduction and response to wildland fire events that occur in the area.

4. **What funding or other resources are available to help accomplish mitigation in your community?** The City of Ely has converted their Cellular Phone network to FirstNet, which was geared to emergency response. City of Ely phones are issued to key staff that would be utilized in the event of an emergency.

They Vermilion Range Amateur Radio Club is a partner of the City of Ely. This Amateur Radio club meets weekly, trains, administers required licensing exams, and practices the skills necessary to provide communication assistance to the City of Ely in the event of an emergency. The club maintains a repeater and an Automated Packet Reporting System. The club is dedicated and committed to providing auxiliary communications in the event of an emergency.

Team Rubicon has a presence in the City of Ely. Team Rubicon is a group of disaster response volunteers. They have multi-discipline training which allows Team Rubicon to be used in various roles during an emergency.

The Ely Police Department provides 24/7 coverage and is being informed of best practices when it comes to mitigating hazards. Prioritization of response to risk to life and property from hazard events is discussed with staff. Availability of resources is also discussed.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** None.

Part C: Contributors & Time

George Burger, Emergency Management Director- 2 Hours

Harold Langowski, City Clerk/Treasurer/Operations Director- 1 Hour

CITY OF EVELETH

Part A: Past Events & Vulnerability Assessment

- 1. In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** In July of 2016, our jurisdiction and Fayal Township experience straight line winds which resulted in hundreds of trees falling and damage to houses, cabins, and other property. Damaged property consisted of out buildings, airport hangers, cars, trucks, boats, etc.
- 2. In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?**

The City of Eveleth has completed several street reconstruction projects resulting in replacing old sewer and catch basins including Jackson Street, Pierce Street, Douglas Court. The City will continue to update on present and future projects.

The City of Eveleth has also replaced old Emergency Sirens and collaborated with Mt. Iron, Virginia, Fayal Township, and Gilbert.

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events? No.**
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**
(blank)

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The City of Eveleth has upgraded our Emergency Operation Plan along with other communities of Mt. Iron, Virginia, Gilbert, Fayal, and St. Louis County.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** The Chief of Police is the designated Emergency Operations Manager. The City also has a Public Works Director and Assistant Public Works Director to deal with street, sewer, and water maintenance issues.
3. **What programs are in place to help accomplish mitigation in your community?** The City of Eveleth has participated in the Spring Weather Awareness Week. The Police/Fire/EMS will be sponsoring an open house at the fire hall on Wednesday, May 22, 2019 from 3-7 PM. Our local schools also practice yearly tornado drills and the emergency sirens sound the first Wednesday of each month at 1:00 PM.
4. **What funding or other resources are available to help accomplish mitigation in your community?** The City continues to work and cooperate with St. Louis County with ongoing trainings and discussions.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** I feel continued training and tabletop exercise discussions will help educate and assist our community to work with other agencies in emergency situations.

Part C: Contributors & Time

Chief Timothy H Koivunen, Chief of Police, 30 minutes

Jerry Rosati, Public Works Director, 15 minutes

CITY OF FLOODWOOD

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery? No.**
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events? The City of Floodwood recently acquired two large generators – one to operate city hall (emergency management command center) during extended power outages and the other operate the city water pumps during power outages. We also belong to and promote the Northland Alert to alert the public about emergencies and other important community news. Improvements to 7th Avenue West included curb, gutters and storm water system to avoid residential storm water flooding. The City of Floodwood has conducted an inspection of trees and noted decaying trees that should be eliminated. We are working with homeowners if the trees are on private property. We have large pump on a trailer to assist with water/flooding emergencies.**
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events? No.**
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events? The City of Floodwood needs wastewater manhole upgrade to prevent storm and flood water from entering the wastewater system. Storm and flood water entering the wastewater system causes system backups into homes, wastewater pond overflow which calls for emergency discharges into the Floodwood River.**

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community? We have a Floodplain Management ordinance.**

The City participates in the NFIP.

We have a Wellhead Protection Plan which is updated and reviewed annually.

We review and updates our Emergency Management Plan on an annual basis.

We have a water and wastewater emergency plan in place.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community? The Chief of Police is our Emergency Management Director.**

The City Administrator is the Floodwood Plain Manager.

The City Engineer and Maintenance Supt. work on and address storm water issues.

We monitor river levels daily during flooding prone seasons.

The City has the county hazard mitigation plan posted on its website.

3. **What programs are in place to help accomplish mitigation in your community?** The City participate and promotes the county alert system.

The city participates in severe weather week.

The city works with the local school and other agencies on tornado drills.

The City conducts a monthly test of the civil defense siren.

We conducted a workshop to help residents sign up for the alert system.

We do not allow open burning.

4. **What funding or other resources are available to help accomplish mitigation in your community?** The city is a Firewise Community.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** The City of Floodwood does not have a Comprehensive Plan.

The City of Floodwood needs assistance is improving our waste water manholes to prevent backups into homes.

Not all residents are signed up for the alert system.

We need assistance updating our pa system on our main street. The PA system can be used for announcements and emergency management information dissemination.

We need financial assistance purchasing a community electronic bulletin board sign which can be used to disseminate emergency management.

Part C: Contributors & Time

Jess Rich, City Administrator, 1 Hour

Dave DeNoyer, Mayor, 30 minutes

Vern VanGuilder, Chief of Police, 30 minutes

Rick Vittetoe, Maintenance Superintendent, 30 Minutes

Josh Lassila, Fire Chief, 30 minutes

Cory Suonvieri – Administrative Assistant, 30 minutes

CITY OF GILBERT

Part A: Past Events & Vulnerability Assessment

1. In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery? None.
2. In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events? We are currently building a 12 million dollar waste water treatment plant.
3. In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events? None.
4. What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events? None.

Part B: Local Mitigation Capabilities Assessment

1. What plans, authorities, or policies are in place to help accomplish mitigation in your community? We updated our city's Emergency Operations Plan in 2018.
2. What staff (organizational capacity) are in place to help accomplish mitigation in your community? Chief of Police is also the city's assigned Emergency Management Director.
3. What programs are in place to help accomplish mitigation in your community? We have several community events every year to educate on safety and fire awareness.
4. What funding or other resources are available to help accomplish mitigation in your community? None.
5. What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community? None.

Part C: Contributors & Time

Ty Techar, Chief of Police/Emergency Management Director, 30 minutes

CITY OF HERMANTOWN

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** Yes, we had two culvert failures that required immediate replacements in 2016. Upon a road condition review, we needed to close the roads immediately for the safety of the public. We were able to get the culverts replaced in a timely manner and reopen the roads to the public. We did utilize a press release to notify the public, 911, school bus drivers, and others of the closure.

Also, in July of 2016 we had straight line winds which knocked trees over on power lines. Power was out for a few days in sections of town.

In September of 2017, we had another culvert fail on a road that we needed to post with reduced weight limits. Being a trout stream, we had difficulty getting a DNR permit at this time of the season. We ultimately got the construction completed by Nov. 1, 2017.

2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** The City of Hermantown has partnered with St. Louis County on multiple projects in recent years, including road improvement and safety projects. The City also created a stormwater utility, which has allowed for initial cleaning of ditches and the replacing of more culverts. Studies were also conducted on our culverts and bridges. Hermantown also rebuilt two fire halls.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** New development certainly increases the costs of damages associated with tornado, wind, hail, flood, etc. We have many assisted living facilities within the City that support more vulnerable populations.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** We could better utilize our communication resources to alert our population to issues.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** Public Works has identified, and is continuing to identify, areas that need improvement – including centerline culvert replacement and maintenance. Our new stormwater utility allows us to clean sections of ditches more frequently in order to get stormwater moving more freely.

In addition:

We have a 20-year Comprehensive Plan that is designed to plan for the future physical growth of the city and appropriate land uses.

We have a Planning and Zoning Commission that has established a Floodplain Ordinance. The City participates in the National Flood Insurance Program (NFIP).

We have an annual transportation plan to that identifies and schedules road improvement projects that include culvert and drainage improvements to reduce over-the-road repetitive flooding.

The City works with our 5 mobile home parks to be in compliance with the Minnesota Department of Health requirements to plan for the evacuation and sheltering of the residents of the park in times of severe weather such as tornadoes, high winds, or floods.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** Our Chief of Police, Jim Crace, serves as the designated Emergency Manager. Joe Wicklund is Hermantown's new Communications and Community Relations Manager. The City Engineer and Public Works Director have, and continue to, address roadways and ditches.
3. **What programs are in place to help accomplish mitigation in your community?** We do several things related to public outreach and working with local schools. With our new Communications and Community Relations Manager we feel as though our communication processes will be more efficient and effective.
 - The City participates in the County's emergency alert system, Northland Alert. We have a link on our website for residents to sign up for the system.
 - The City participates in the annual Severe Winter/Spring Weather Awareness Week by posting severe weather awareness information out on our City of Hermantown Facebook page.
 - Our Fire Department has open houses on fire safety and presents in the schools.
 - Our local school practices tornado drills on an annual basis.
 - Each fall & spring we do active outreach to homeowners to clear leafy and woody debris from roadside gutters to prevent clogging and over the road flooding in these areas.

4. **What funding or other resources are available to help accomplish mitigation in your community?** Hermantown has instituted a stormwater utility to assist in covering costs associated with stormwater maintenance and improvement.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** Yes, we do need to update our Comprehensive Plan in order to address future events. We also need to improve how many of our residents are signed up for the County's emergency alert system.

Part C: Contributors & Time

Paul Senst, Director of Public Works, 1 hour

Joe Wicklund, Communications and Community Relations Manager, 1 hour

David Bolf, City Engineer, 1 hour

Jim Crace, Chief of Police, 1 hour

CITY OF HIBBING

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?**

Yes, we have experienced heavy rainfall events that have caused damage to the City Sanitary Sewers and Storm sewers. We experienced collapsed sanitary lines and manhole structures, this has caused homes to back up with sewage. The City experienced flooding in July of 2018 that caused damage to city roads and storm sewers, we also had a collapsed sanitary sewer manhole that caused flooding in many residential basements. We also experienced an untreated sanitary sewer bypass at our treatment plant due to the amount of stormwater that was entering our sanitary sewer system. The fire dept. had over 100 calls in 2 hours.

2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?**

The City has completed roughly 55,000 feet of sanitary sewer pipe lining to help reduce Inflow/Infiltration. Our public works crews have also installed many storm sewer culverts that were failing during rain events. We have upgraded four lift stations over the past 5 years to help with sanitary sewer backups.

The city has also moved to use of St. Louis County's emergency notification system (Everbridge).

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?**

No.

4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**

We would like to upgrade our city sump pump ordinance to eliminate drain tile connections to our sanitary sewer system.

We need to encourage residents to install check valves on their sanitary sewer service lines to prevent any back flows in the event of a flood.

We need to upgrade warning sirens to function properly and need to do better public outreach to grow our alert system participation.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?**

We have a storm sewer ordinance to help prevent illicit discharges to our city storm sewer.

We have a 5-year road paving and maintenance plan. This also includes a schedule of storm sewer culverts that need repair or replacing.

The city works with mobile home parks to be in compliance with the MDH requirements to plan for the evacuation and sheltering of the residents of the park in times of severe weather such as tornadoes, high winds, or floods.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?**

We have a City Engineer/Public Works Director that addresses road maintenance issues for maintenance or rehabilitation.

We have a Public Works Department that addresses any issues with the sanitary sewers, storm sewers and lift stations.

We contract with a GIS Specialist/I.T. Director.

3. What programs are in place to help accomplish mitigation in your community?

Each year the city offers a Fall Yard Waste Cleanup to the residents. This is a curb side pickup of leaves, lawn clippings and brush.

The City participates in the County's Everbridge emergency alert system. Residents can sign up on our website.

The City participates in the annual Severe Winter/Spring Weather Awareness Week by posting severe weather awareness information out on our city Facebook page.

Our fire department has open houses on fire safety and presents in the schools.

Our local school practices tornado drills on an annual basis.

4. What funding or other resources are available to help accomplish mitigation in your community?

We have worked with St. Louis County and the Community Development Block Program on our sanitary sewer lining projects.

Our community is a recognized Firewise Community and can apply for MN DNR Firewise grant funding.

5. What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?

The City needs to update the sump pump ordinance to try to eliminate drain tile connections to our sanitary sewers.

Not all residents are signed up for the County's emergency alert system.

Need funds to upgrade sirens.

Part C: Contributors & Time

Jesse Story, City Engineer/Director of Public Works, 1 hour

Erik Jankila, Fire Chief, 1 hour

Mary Ann Kepler, City Clerk-Treasurer, 1 hour

CITY OF HOYT LAKES

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** 2015 we had a large wildfire that threatened our community, the fire was started via railcar traveling on the railroad tracks outside of town. Evacuation was conducted of our senior living facility. Multiple agency from local fire services responded along with the US forest service, the fire and continued control and clean up lasted approximately 7 days total.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** The City participates in the severe weather warnings activating sirens twice a year.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** The Polymet mining project is within our City limits and is essentially in our back yard, we have been working with Polymet on what their needs maybe now and in the future, the construction phase up to completion and into operation will present many challenges for emergency response to the site.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** Possible protesting control regarding the Polymet Mining site, increase construction workers working on the site, and EMS needs that may arise as a result of the project. A new \$2.5 million public safety building was completed in 2015 housing the fire/ambulance & police department, also a new severe weather warning siren was installed outside the building.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** Our Emergency Operations plan was just redone and updated along with our neighbor communities the City of Aurora & Township of White. We also have a trailer park and large family campground occupied during the summer.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** Our Police Chief serves as our Emergency Manager, we have a Public works director in place along with a City clerk.
3. **What programs are in place to help accomplish mitigation in your community?** The Hoyt Lakes Ambulance due to increased call volume went to a paid on call for all EMT's - 24/7. They also went to a part-time ALS service with Paramedics available to respond.
4. **What funding or other resources are available to help accomplish mitigation in your community?** Other than local funding via property tax revenue our option appear limited.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** The City has many services in place already, but is always willing to improve upon the current plane, funding is limited and would be useful in implementing anything new.

Part C: Contributors & Time

Tim Soular, Emergency Manager, City of Hoyt Lakes, 2 hours

CITY OF IRON JUNCTION

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** No.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** No.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** We would like to replace culverts and clean out ditches.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** None.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** The City Council includes a Public Safety Committee.
3. **What programs are in place to help accomplish mitigation in your community?** None.
4. **What funding or other resources are available to help accomplish mitigation in your community?** None.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** We have tried to get funds from the county and other organizations to help us with funding, but no help for small cities as we fall below the population limits they have set in place.

Part C: Contributors & Time

Van Rioux, Clerk/Treasurer, 30 Minutes

CITY OF KINNEY

No LMS Form.

CITY OF LEONIDAS

No LMS Form.

CITY OF MCKINLEY

No LMS Form.

CITY OF MEADOWLANDS

Part A: Past Events & Vulnerability Assessment

- 1. In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** In the last 5 years we have had a severe summer storm that caused a power outage for several days, and because of our flat topography, local flooding is common after heavy rains. The most dramatic flooding was experienced in 2012 when that record rainfall caused severe damage in Duluth. In other storms we have had trees come down, damaging homes or cars on the streets.
- 2. In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** The city has taken action to reduce flooding by applying for and receiving a grant to update the surface drainage, which has been untouched for over 20 years. There are provisions to perform some street repairs as well, and a project to improve a local street by the Community Center was done last summer. New culverts are included in our current project, which has already been surveyed. Earthwork should begin in June, 2019.

Damaged and vulnerable trees are checked and trimmed as needed.

We have some emergency shelters, but none are tornado resistant, including the assisted living facility.

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** Our local population is stable. No new housing developments have been planned.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** Preparing for future disasters would mean purchasing a siren or outdoor public address system. The City's size is small enough to not need an extensive (and more expensive) siren. Some public buildings could be reinforced against high winds but there is no current plan for this option.

The sewer drainage ponds are about a mile south of the city, and are maintained. Other equipment like portable generators and emergency water depots don't exist. We are serviced by both Minnesota Power and Lakes Cooperative.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The city formed a development plan to its east side which is currently undeveloped. Nothing has been done, because there is not demand for property development now. The cost to bring in sewer and water is beyond our budget, but if the economy demands new properties in our area, it is ready, and has been evaluated by a professional engineer. The city council often receives small requests for businesses, but we have no tax incentives that would help the industries here already. Our business profile is small and rural.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** There is a city clerk, treasurer, maintenance, and EMT/Ambulance representative. The city council reviews all organization and mitigation policies.
3. **What programs are in place to help accomplish mitigation in your community?** Because of our size, there are no special standing committees, but we have outside resources when necessary. Contract work on our streets is shared with the County, as common sense and availability dictates. We have a volunteer Fire Department, but not Police Department. There is a neighborhood watch program with some private electronic monitoring. We bring in a dumpster for spring cleaning, and encourage good, orderly yard maintenance by the homeowners. Advisory letters are sent to homeowners as necessary to keep order. In the winter we have a contract snow plowing service for businesses, and the city keeps the streets and sidewalks cleared. Our ambulance service was begun after World War II and is active locally with training sessions as needed.

4. **What funding or other resources are available to help accomplish mitigation in your community?** Funds are limited, but they are available. We are currently solvent. A development fund and regular expense budget is reviewed with our treasurer monthly at regular meetings. Applications for other grants are used when available. The CDBG and IRRRB funds have helped us with the current surface drainage project in progress this year. However, a city with only 52 taxpaying properties has limited revenue. The gaps are based on a real population face that we can only do so much with what we have.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** Funding. (See above)

Part C: Contributors & Time

John E. Stoessel, City Clerk, 2 hours

CITY OF MOUNTAIN IRON

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** No.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** Yes. We installed the Nixle Everbridge System to use within the city to send out emergency notifications and other community information.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** Drainage improvements, citizen notification and emergency generator at Garage/Fire Hall.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The City Code includes ordinances for Floodplain Management (Ord. #04-01)

The city also updated its Emergency Operations Plan in 2018.

The City has the Nixle Everbridge emergency notification system in place for residents to sign up to receive emergency alerts and other community information. A link is provided on the city website for residents to sign up.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** City Administrator (City Emergency Manager), Dept. of Public Works and Dept. of Public Utilities.
3. **What programs are in place to help accomplish mitigation in your community?** None.
4. **What funding or other resources are available to help accomplish mitigation in your community?** Capital Improvement Fund.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** Funding for projects is a challenge. We also need assistance in identifying what efforts we need to undertake.

Part C: Contributors & Time

Craig J. Wainio, City Administrator, 30 minutes

CITY OF ORR

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** We experienced numerous high wind/rain storms in the summer of 2018. Local resorts reported numerous downed trees and power lines. Damage was caused to a driveway/alley in the city due to heavy rain. Flooding occurs on Highway 53 in the downtown area by the MnDOT storm drain creating a hazard to motorists. Local businesses have experienced flooding when the MnDOT storm drain doesn't drain the water. Due to inadequate docking space on Pelican Lake in the downtown DNR boat ramp, boaters on Pelican Lake are unable to get off the lake quickly enough when a storm develops.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** The city has been in contact with MnDOT to address the flooding on Highway 53. We have also reached out to the Minnesota DNR to try obtain more docking space on Pelican Lake. We have obtained a grant from the Blandin Foundation to try get high speed internet in our area for better and quicker communication with residents during an emergency.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No.

4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**
See No. 2 above - flooding on Highway 53, more docking space needed on Pelican Lake, and high speed internet needed. The city is also pursuing establishing a storm shelter or safe room in the Orr Center. The city is looking into purchasing another generator for the wastewater plant. Need to establish safety meetings and trainings with the CN railroad in the event of a derailment.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The City of Orr Emergency Action Plan is reviewed and updated annually. Our comprehensive plan was reviewed and updated in March, 2018.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** City Staff, Ambulance and Fire Departments.
3. **What programs are in place to help accomplish mitigation in your community?** City of Orr Emergency Action Plan.
4. **What funding or other resources are available to help accomplish mitigation in your community?** Funding is a huge issue for smaller cities like ours with a low tax base.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** Funding.

Need for coordinated emergency action plan with railroad in case of derailment.

We are considered an unserved high-speed internet area, and not all residents are able to receive hazardous weather warnings timely.

Part C: Contributors & Time

Cheri Carter, Clerk-Treasurer, 30 minutes

Paul Koch, Maintenance Supervisor, 30 minutes

CITY OF PROCTOR

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** Yes.

During April 2019, we had several trees knocked down due to high winds and some power outages.

In August 2018 we had a tree that was struck by lightning, which then fell on house, and caused a water break. In turn, the water break damaged the sewer line leading to a road collapse.

In Winter 2018/19, heavy snow accumulated on the City Hall roof, causing thousands of dollars of water damage to police department offices, TV studio, Council Chambers and Conference room.

Our city warning siren stopped working automatically. Police Officers on duty must manually turn on siren. Example would be during a tornado warning issued for the Proctor area.

During the 2014 flood our Fire Hall was completely under 3 feet of water, damaging the stairs and turnout gear.

2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** Yes. The city has completed two street reconstruction projects on Almac and 6th Street. Upgrades and replacements have been made to sanitary sewer, storm sewer, and water lines that were collapsing and/or breaking. The City is working with Western Lakes Sanitary Sewer District in developing ordinances that will require homes to replace dilapidated or failing sewer lines. Social Media has been a large part of the city communication with its residents.

The Street Department removes hazardous and/or dying trees and branches as they can to be as proactive as possible to minimize storm damage. Also the same for culverts and ditches, as the Street Department tries to stay on top of maintenance in these areas.

We now have a 2nd entrance/exit to our Street Garage. During the flood of 2012 the Street Dept. building was nearly impossible to access for about 48 hours due to road flooding to the north. In the future we have the option of another access to the building from the south.

The police department is currently updating our Emergency Management plan to involve city departments and resources.

Enrolled the police department in Everbridge alert system with help of St. Louis County; this program is available to city staff, departments and citizens of Proctor.

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** The school has constructed a new multi-use hockey facility which at times could have a large concentration of individuals in the building during a disaster event. Drainage may be undersized for the facility.

4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**
The City still has a need for additional storm sewer upgrades, purchase of additional pumps, and sand bags in the event of flooding.

Proctor has Kingsbury Creek running through the middle of town and large stormwater pipes under Highway 2. Both of these could not handle the water during the June 2012 flood. We would encounter the same problems in another similar event.

Obtain assistance to repair or replace our severe weather (tornado siren.)

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The city has updated its Comprehensive Plan in 2015 addressing some of the needs and concerns of growth. The city is also a part of the Metropolitan Interstate Council that addresses traffic needs and concerns within the area.

Updated Emergency Operations Plan.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** We have a City Engineer and a Public Works Director that address road maintenance issues for flooding.

The city contracts with an I.T. company that will handle all the city's needs. The city also has a Public Safety Committee and has an Emergency Management Team designated. The Police Chief serves as the city's Emergency Management Director, who works closely with St. Louis County and their emergency management.

3. **What programs are in place to help accomplish mitigation in your community?** Fire Department puts on several educational sessions with Early Childhood Family Education (ECFE), Boy Scouts and National Night Out.

4. **What funding or other resources are available to help accomplish mitigation in your community?** Fire Department has applied for and received DNR matching grants every other year.

The city is on the state Public Facility Authority IUP list for sewer upgrades

The City has applied for CDBG funds for reconstruction projects but to date has not received any funds.

FEMA has provided assistance during the flooding of 2012.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** We have worked with the property owner of the only trailer park in the city to address and or number trailer houses per city code.

The Fire Department which is part of the EMT is in dire need to upgrade their fire engines. These pumper assist during flooding events as well as fire. Many repairs have been made to Engines 1 and 2.

Part C: Contributors & Time

Mark Casey, City Administrator, 40 minutes

Kent Gaidis, Police Chief, 30 minutes

Rick Lalonde, Public Works Foreman, 45 minutes

Kerry Helquist, Fire Chief, 25 minutes

CITY OF RICE LAKE

Part A: Past Events & Vulnerability Assessmen

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** The city experienced wind damage to trees and structures, street flooding, and power outages in the windstorm of 2016. City lift stations required pumping to remove the sewage due to the loss of power to the lift stations.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** We have purchased power cords that can be used to convert the lift stations to operate off of a generator should we lose power to them again.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** N/A
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?**
(No answer)

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The City has recently become a member of MNWARN which is an organization

that communities can use to find other communities that may have resources needed in a storm or weather event, i.e. one community may have an emergency generator we could use if we need one or we may be able to volunteer our fire trucks or other equipment to assist another community in need during an event.

2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** The City has a Safety Committee and a Road Supervisor that addresses road maintenance issues to minimize potential flooding.
3. **What programs are in place to help accomplish mitigation in your community?** Our Fire Department has open houses on fire safety and coordinates events with the local school for fire safety week. The city participates in the County's emergency alert system.
4. **What funding or other resources are available to help accomplish mitigation in your community?** The city is working with State partners to address road flooding by upgrading a road with curb and installing a storm water system.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** We need to update our Comprehensive Plan to address considerations for future hazard events. We need to encourage my residents to sign up for the County's emergency alert system and post more alerts specific to the city.

Part C: Contributors & Time

Toni Blomdahl, Clerk-Treasurer, 1 hour

John Werner, Mayor and Road Supervisor, 1 hour

John Goman, Utility Supervisor, 1 hour

CITY OF TOWER

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** Yes, the last several years we have had fast moving storms with straight line winds that have blown trees onto power lines resulting in loss of power for days to some of the rural parts of our service area. We have had wind damage that has affected not only city-owned structures/infrastructure but privately owned structures also.

2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** The power companies have removed or limbed appropriately to mitigate future damage.
The City has started the process of replacing street lights that have are not secure and susceptible to high wind damage.
3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** We need an evacuation center/command center for large fire and weather-related disasters.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** A City emergency management plan which includes Fire, Ambulance, Police, and City staff.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** All City Emergency Services staff, City Staff, City Engineer, and outside assisting agencies.
The city Emergency Manager is former Police Chief, now a state trooper.
3. **What programs are in place to help accomplish mitigation in your community?** Safety presentations with Fire/EMS and the schools.
Face to face information dissemination with residents on safety issues.
We occasionally have open houses for Emergency Services departments.
4. **What funding or other resources are available to help accomplish mitigation in your community?** MN DNR Firewise funding/staff assistance is available as a resource.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** We need to have information on safety and hazards available to the public linked to the city web site.
We need to develop a more comprehensive citywide disaster alert system.
We need to resolve the lack of space available for evacuations/command centers, and general Emergency Services operations.

Part C: Contributors & Time

Steve Altenburg, Fire Chief/Ambulance Director, 25 minutes

Linda Keith City Clerk Treasurer, 30 Minutes

CITY OF VIRGINIA

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** None that we are aware of.
2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** Working toward early notification, upgrades to the alarm system and better streamlined coordination of notification procedures. Revised the entire EOP.

The Warning siren has been moved to a more appropriate location

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No.
4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** Empowering local Emergency Managers to fully activate systems such as Everbridge. Time is lost when this information is forced to flow through dispatch. From the time a funnel cloud is sighted to when the notification is actually sent under the current system the tornado threat could be over.

It is also the intent of the City of Virginia to apply for a FEMA hazard mitigation grant for a safe room at the Miners Arena and Event Center.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** Revised EOP shared with Mountain Iron and multiple surrounding communities.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** The Fire Chief is designated the Emergency Manager for the City.

3. **What programs are in place to help accomplish mitigation in your community?** The Fire Department has an open house of Fire Safety during October.

Implementing Firewise.

Outreach to homeowners on the use of smoke alarms and carbon monoxide detectors.

4. **What funding or other resources are available to help accomplish mitigation in your community?** Limited federal funding and some state grants.

5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** Lack of adequate operational facility, lack of training for administrative and elected positions.

Part C: Contributors & Time

Allen Lewis, Fire Chief, 30 minutes

CITY OF WINTON

Part A: Past Events & Vulnerability Assessment

1. **In the last 5 years, has your community experienced any severe weather or disaster events that posed risk to life safety, caused property damage, or incurred costs for recovery?** Yes. In 2018 high straight-line winds caused damage to 2 trees in the City park and 1 tree in a residential yard, falling onto a garage that damaged a roof.

2. **In the last 5 years, has your community taken any particular actions to reduce the vulnerability of your community against future severe weather or disaster events?** The City of Winton has better enforcement of a blight ordinance to help eliminate safety and fire hazard. Three abandoned houses were removed.

3. **In the past 5 years, has anything, especially related to zoning or development, changed that you feel has increased your community's vulnerability to future severe weather or disaster events?** No zoning or development has increased disaster events. There is very little construction or change in the City.

4. **What concerns do you have / what mitigation actions do you think would help your community to reduce or eliminate risk against future severe weather or disaster events?** Public information should be improved to establish better warning systems or planned fire routes. There has never been a flood event.

Part B: Local Mitigation Capabilities Assessment

1. **What plans, authorities, or policies are in place to help accomplish mitigation in your community?** The City has a 5-year Comprehensive Plan for future development.
There will be logging west of the City to eliminate fire hazard.
2. **What staff (organizational capacity) are in place to help accomplish mitigation in your community?** The City has a full-time maintenance and public works director who works on road and building safety and infrastructure issues. There is an active City Council that addresses safety issues.
3. **What programs are in place to help accomplish mitigation in your community?** The City holds an annual Clean-Up week to help with waste. The City contracts with Morse/Fall Lake Fire Association to burn brush and provide First Responder services as well as fire protection.
4. **What funding or other resources are available to help accomplish mitigation in your community?** The City has County, Township and Forest Service in close proximity. The City belongs to an Ely Area Joint Powers Association that works on local issues as well as economic issues.
5. **What program gaps or deficiencies do you feel exist that are a barrier to accomplishing mitigation in your community?** There is a need for better information on the emergency alert system for the residents.

Part C: Contributors & Time

Anne Jackson, City Clerk, 30 minutes

Appendix L

Minnesota Department of Health Climate & Health Report

Planning for Climate & Health Impacts in Northeast Minnesota

Emergency Management Considerations for HSEM Region 2

Published by the Minnesota Climate & Health Program in August 2018



ABOUT THE REGIONAL PROFILE

EXTREME WEATHER IS A FAMILIAR CONCERN FOR MINNESOTANS

While experience has helped Minnesotans adapt to historical weather patterns, climate change trends are pushing us to adapt even further to weather patterns and extreme events that pose major threats to our health, homes, environment, and livelihood. Over 50 years of storm data on record document that Minnesota has experienced an increase in the number and strength of weather-related natural disasters, particularly those related to rising temperatures and heavy downpours. These events cost our state millions in property loss, damaged infrastructure, disrupted business, medical care and support services, and put residents and responders at risk. Understanding how our weather is changing now and into the future will help planners and decision-makers in emergency management and supporting fields extend our progress in climate adaptation and lead to more resilient communities.

CLIMATE PROJECTION DATA AS A TOOL

Climate projections can help us prepare for the future. These data result from highly sophisticated global climate models and provide a general idea of trends in temperature and precipitation many decades into the future at ever-increasing time and spatial scales. Like every dataset, there are limitations to our understanding and application of the information to real-life decision-making. Yet despite limitations, climate projection data offer a crucial glimpse into our potential futures, and allow us to start considering the best way to allocate our preparedness dollars and management resources to reduce the severe impacts of extreme weather.



Pagami Creek Fire (Greg Sietz, 2011)

REGION 2 /2

PUTTING CLIMATE CHANGE INTO CONTEXT

Sometimes, climate change and extreme weather events and the impact on our communities appear distant and abstract. That is why the Minnesota Department of Health's Minnesota Climate & Health Program teamed up with state and local emergency management and preparedness professionals as well as state climatologists to develop a custom climate profile for each of the six Homeland Security and Emergency Management (HSEM) regions across the state. Each regional profile includes a description of climate change trends along with a summary of climate projection data to illustrate these trends. Regional climate data are presented alongside population projection data, as it's important to consider both our climate future and population future as we plan to minimize risk and build resilience against climate impacts.

Additionally, each regional profile provides a local case study, a "focusing event," to illustrate the links between extreme weather and natural disasters and what climate projection data can (and cannot) signify for similar events in the future. Each case study features a recent natural disaster that impacted the HSEM region and provides a comparison between temperature and precipitation measures related to that event alongside historical baseline trends and future projection estimates. Taken together, the six HSEM regional profiles provide an extensive overview of climate change trends for Minnesota and describe the potential impact of these trends for emergency management and preparedness professionals and their partners.

FOR MORE INFORMATION

A long form report, including all six profiles, individual county data, and a more comprehensive description of climate change trends and supporting research will be available at:

[Minnesota Climate & Health Planning Tools & Data
\(www.health.state.mn.us/divs/climatechange/data.html\)](http://www.health.state.mn.us/divs/climatechange/data.html)

REGION 2 OVERVIEW

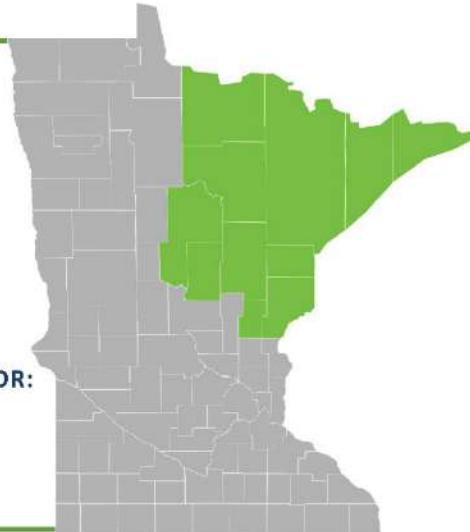
REGION 2: Northeast Minnesota

COUNTIES

- Atkin
- Carlton
- Cass
- Cook
- Crow Wing
- Itasca
- Kanabec
- Koochiching
- Lake
- Pine
- St. Louis

HSEM REGIONAL PROGRAM COORDINATOR:

Roy Holmes
218-327-4496
roy.holmes@state.mn.us



MINNESOTA CLIMATE & POPULATION TRENDS

OUR KNOWLEDGE OF CLIMATE CHANGE IS EXPANDING RAPIDLY

Climate records show that across the Midwest and here in Minnesota we are experiencing an increase in warmer, wetter conditions as well as an increase in extreme weather events and related natural disasters. Experts expect these conditions to continue well into the future. By mid-century, Minnesotans can expect much warmer winters, more severe summer heat waves, a higher frequency of very heavy rain events and a higher frequency of late growing season drought conditions.

Many communities in Minnesota rely on economies rooted in agriculture and outdoor recreation, such as wintertime tourism, including snowmobiling, ice fishing, and skiing. Future climate conditions may stress agricultural economies by delaying planting and fieldwork, increasing disease and pest pressure, and reducing crop yields due to cycles of flooding and dry spells. Rapidly warming winter temperatures will turn snowfall into rain and reduce the depth and timing of lake ice cover, affecting winter recreation.

Extreme rainfall events will increase flood risk, particularly in floodplain areas, disrupting transportation and utility service, and damaging property and infrastructure. In addition, surface runoff may lead to soil erosion, lake pollution, and reduced drinking water quality. Nutrient runoff in particular, along with warmer temperatures, are likely to contribute to a larger occurrence of harmful algal blooms on waters, many valued for recreation. Changing climate conditions are likely to strain the viability of native species, including popular recreational fish, invite encroachment by invasive species, and increase the geographic range and types of ticks and mosquitoes.

Some of these trends are evident in the current climate projection data that are available. However, because these data are often averaged or summarized for large areas over large time periods, they can mask the local peaks in temperature and precipitation that can trigger disasters. Until more finely-scaled climate projection data become available to Minnesota planners and decision-makers, the current data still remain useful for exploring the future ahead and establishing a baseline understanding of what our weather challenges may be moving forward.

REGION 2 CLIMATE PROFILE

Use the following information on temperature, precipitation, and vulnerable populations to help plan for future weather-related incidents.

TEMPERATURE

There has been an increase in winter and summer temperatures. Our average winter lows are rising rapidly, and our coldest days of winter are now warmer than we have ever recorded. In fact, Minnesota winters are warming nearly 13 times faster than our summers. The continued rise in winter temperatures will result in less snow pack, which will increase chances for grassland/wildfires as well as drought. The warmer winter temperatures will also have major consequences for our ecosystems, including native and invasive species, whose growth, migration, and reproduction are tied to climate cues. The increase in Lyme disease across Minnesota is also likely influenced in part by the loss of our historical winters, due to a longer life-cycle period for ticks. Freeze-thaw cycles are likely to increase as well, damaging roads, power lines and infrastructure, and causing hazardous travel conditions. By mid-century our average summer highs will also see a substantial rise, coupled with an increase in more severe, prolonged heat waves that can contribute to drought and wildfires and pose a serious health threat, particularly to children and seniors. Here are temperature trends for HSEM Region 2:



Average Summer Maximum Temperature for HSEM Region 2		
1981-2010	2050-2075	Change
77.2 °F	84.6 °F	+7.4 °F



Average Winter Minimum Temperature for HSEM Region 2		
1981-2010	2050-2075	Change
1.2 °F	11.3 °F	+10.1 °F

PRECIPITATION

There has been an increase in total average as well as heavy precipitation events, with longer periods of intervening dry spells. Our historical rainfall patterns have changed substantially, giving rise to larger, more frequent heavy downpours. Minnesota's high-density rain gauge network has captured a nearly four-fold increase in "mega-rain" events just since the year 2000, compared to the previous three decades. Extreme rainfall events increase the probability of disaster-level flooding. However, there is also an increased probability that by mid-century heavy downpours will be separated in time by longer dry spells, particularly during the late growing season. Over the past century, the Midwest hasn't experienced a significant change in drought duration. However, the average number of days without precipitation is projected to increase in the future, leading Minnesota climate experts to state with moderate-to-high confidence that drought severity, coverage, and duration are likely to increase in the state. Modeling future precipitation amounts and patterns is less straight-forward compared to temperature. Some climate models do a better job than others representing rainfall for the Midwest, and available data sources only provide average estimates on a monthly scale, masking the spikes in extremes that trigger flood and drought disasters. Trend data provided here for HSEM Region 2 are summarized for early summer, when historically Minnesota receives most of its rainfall, and for early fall when rainfall scarcity may threaten crop harvests and local agricultural economies:



Average Early Summer Precipitation for HSEM Region 2		
1981-2010	2050-2075	Change
4.1"	4.7"	+0.6"



Average Early Fall Precipitation for HSEM Region 2		
1981-2010	2050-2075	Change
2.9"	2.9"	0.0"

VULNERABLE POPULATIONS

There has been an increase in the older adult population. Extreme weather events cause a range of health impacts and disruptions that vary across population groups. The vulnerability of a group is a function of its sensitivity to a hazard, exposure to risks, and capacity for responding or coping with the impacts. Children and older adults are often identified as groups vulnerable to climate change threats, including extreme weather and natural disasters. For example, physiologically these groups have a lower capacity to tolerate extreme heat and are often dependent on others for transportation to cooling centers. These groups are also often critically dependent on others during a disaster, such as needing help to evacuate during a flood or wildfire, or to find alternative housing if displaced. Planning for the specific needs of vulnerable populations strengthens local efforts to reduce the impact of extreme weather-related events. Population trend data provided here for HSEM Region 2 are intended to highlight the changes in two key demographic groups for the region, but planners and managers should also consider future changes in other populations of concern, such as those with low incomes, immigrant groups, indigenous peoples, persons with disabilities, or vulnerable occupational groups (such as outdoor workers):



Childhood Population (0-14) Projection Estimates for HSEM Region 2		
2015	2050	Change
76,714	66,044	-14%



Elder Population (65+) Projection Estimates for HSEM Region 2		
2015	2050	Change
93,639	121,876	+30%

REGION 2 CASE STUDY

The following case study is intended to illustrate the links between climate and weather and natural disasters. Acting as a “focusing event,” the case study demonstrates how a previous weather-related event (i.e., wildfire) impacted important economic drivers, environmental resources, and population health. Then, the Climate Projection Data section compares weather data from the case study with baseline and projected weather data to show the possibilities of future disaster events. This case study highlights the relevancy of climate projection data for understanding future climate and weather risks in Minnesota.

EVENT: WILDFIRE

DATE: 2011

The Pagami Creek Wildfire was first detected on August 18th, 2011 in Lake County, approximately 13 miles east of the town of Ely, inside the Boundary Waters Canoe Area Wilderness (BWCA). Likely caused by a lightning strike in a bog area, it grew to become the largest wildfire in Minnesota since 1918.

At first the fire kept to a small quarter acre within the bog, but on August 26th, a drop in relative humidity coupled with strong wind pushed flames up into tree tops spreading the fire to approximately 130 acres. Dry conditions and a lack of rain made fire suppression difficult. Then, on September 12th, extreme shifting winds caused the fire to expand dramatically in multiple directions to approximately 93,000 acres. Smoke from the Pagami Creek Wildfire drifted east and south to the Upper Peninsula of Michigan, Ontario, Chicago, even as far as Poland, Ukraine, and Russia. The extent of smoke drift demonstrates that while wildfires may occur locally, the air quality impacts are far-reaching.

REGION 2 CASE STUDY: KEY IMPACTS

It is nearly impossible to capture all the various impacts from a natural disaster. These impacts broadly include costly infrastructure damage, disrupted utility service, prolonged work and school absences, acute physical injury, and persistent strains on mental health, on scales ranging from the community to the household to the individual.

The extensive costs associated with the 2011 Pagami wildfire are difficult to capture in a single estimate. Besides evacuations and structural damage, there were substantial costs associated with mobilizing more than 960 firefighters and support personnel to suppress the fire and support affected communities. The Minnesota National Guard was called up to assist with response efforts. Some sources cite that the fire-fighting effort alone cost nearly 23 million dollars. Despite major investments in fighting the fire, essential resources were limited due to aircraft and personnel being dedicated to competing wildfires in the south and west regions of the U.S. In addition, months of battling the flames required a massive cleanup of more than 150 miles of fire hose, water pumps, watercraft, and other gear.

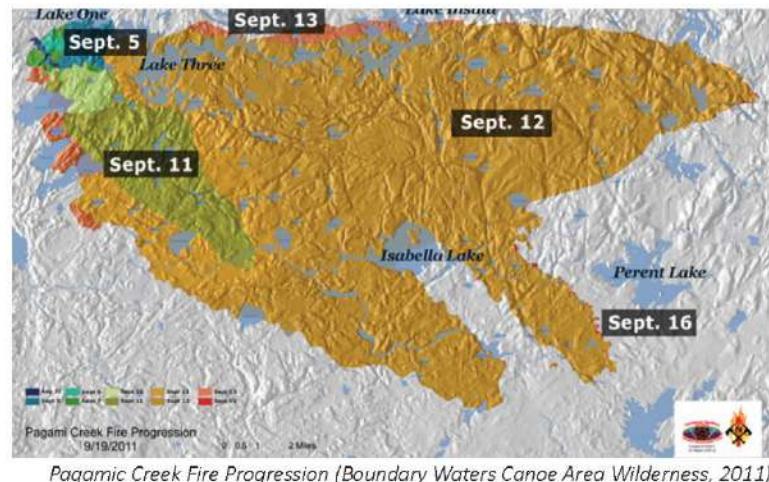
The following are just a few examples of the adverse impacts on HSEM Region 2 communities from the Pagami Creek Wildfire:

PUBLIC SAFETY: No fatalities occurred but there were major threats to firefighters and other emergency personnel during fire suppression response. In addition, the fires burned large portions of the BWCA wilderness, a very popular recreation destination, endangering visitors spread throughout a large area and beyond the reach of easy communication. Particulate matter from the fires posed a serious threat to respiratory health, particularly for individuals with asthma, lung disease, heart ailments, and other conditions. Air quality alerts were released across numerous Minnesota, Wisconsin, and Illinois counties.

DISPLACEMENT & DISRUPTED COMMUNITY

NETWORKS: Fires threatened numerous homes, cabins, and businesses and required mandatory evacuation of at least 36 addresses and numerous campsites within the BWCA. Most of the eastern BWCA was closed during peak fire suppression response.

INFRASTRUCTURE FAILURES: Many county and Forest Service roads closed. Smoke and ash from the fire made land and air travel extremely dangerous. In some areas, visibility was reduced to one-and-a-half miles.



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Smoke from the Pagami Creek Wildfire drifted east and south to the Upper Peninsula of Michigan, Ontario, Chicago, even as far as Poland, Ukraine, and Russia.



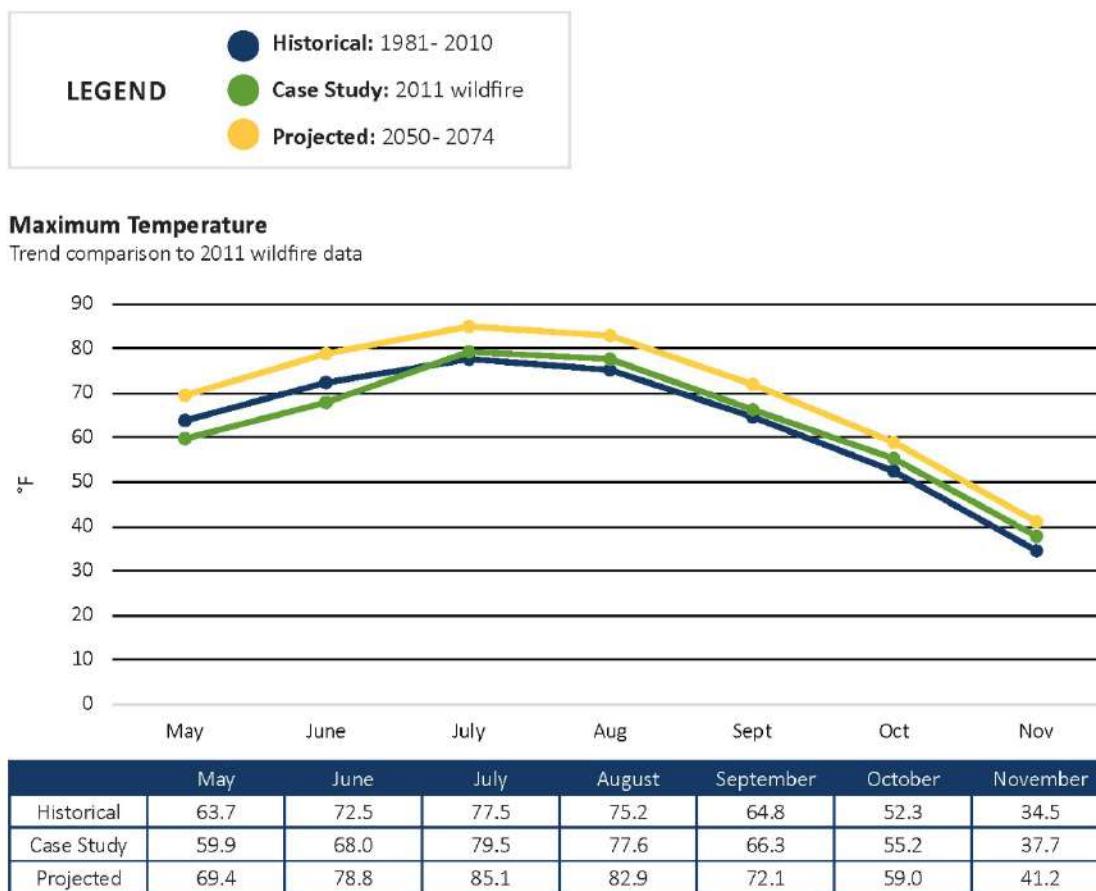
Top: Firefighters in the BWCA (Steve Foss, 2011)

Bottom left: Aerial visual of smoke (NASA, 2011)

Bottom right: Smoke plume over water (Greg Seitz, 2011)

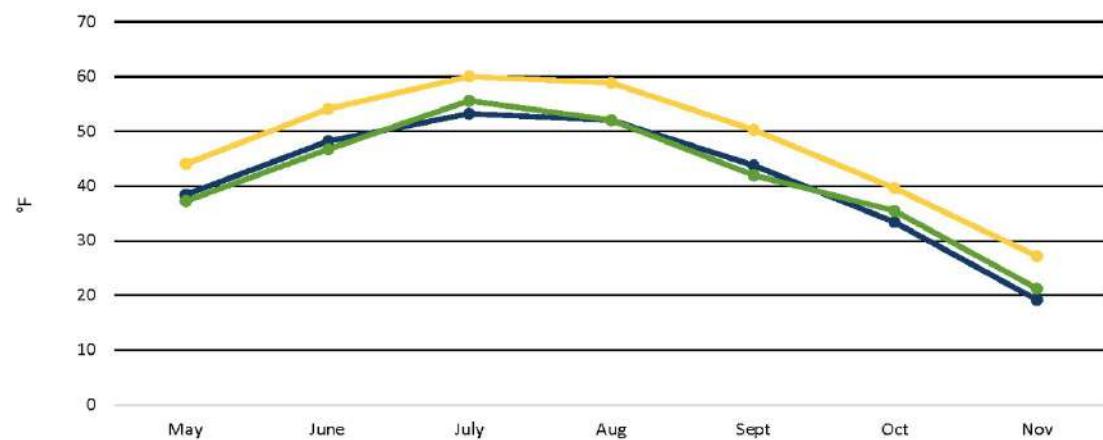
CLIMATE PROJECTION DATA

Following are visual representations of climate projection data for Region 2 Lake County, given that the Pagami Creek Wildfire burned mainly within this county. (Data for individual counties are available in the long-form report.) The graphs below compare future temperature and precipitation projection data (in yellow) with a historical climate baseline (in blue) and weather data associated with the Pagami wildfire (in green). Although wildfires seem to have an abrupt onset, they are often enabled by persistent weather conditions, like high temperatures and lack of rainfall. Thus, data are provided starting from the early part of summer to the end of fall to highlight conditions leading up to the event and those that persisted which exacerbated the spread of the fires and complicated management and risk reduction activities.

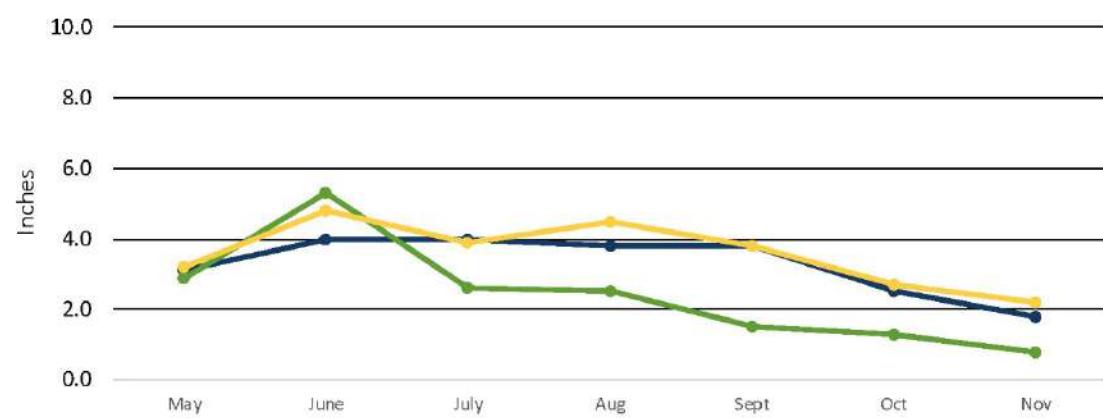


Minimum Temperature

Trend comparison to 2011 wildfire data

**Total Precipitation**

Trend comparison to 2011 wildfire data



SUMMARY

CLIMATE DATA EXPERTS expect that future climate conditions across the Midwest will continue to change and affect our environment, economy, and public health. Such conditions are projected to lead to a higher frequency of late growing season drought conditions, elevated winter temperatures with reduced snowpack, prolonged high heat days, and extended periods of low rainfall. Similar conditions in the past likely contributed to the 2011 Pagami wildfire disaster. Summer maximum and minimum temperatures were slightly above average leading up to the start of the wildfire. Midcentury climate estimates indicate that average summer maximum and minimum temperatures for Lake County will be approximately 6-8°F warmer than historical trends. These significantly warmer temperatures will likely increase the risk of wildfires, particularly in areas with existing vulnerabilities, such as dead or dying vegetation or expansion of residential development in wilderness areas.

Precipitation was well below average for the spring and summer season leading up to the start of the wildfire. This dry period continued into the fall season, making suppression efforts difficult. Midcentury climate estimates indicate minimal changes in average monthly precipitation for Lake County, with the exception of March, June, and August, which may receive well over a half inch additional rain compared to historical trends. The additional rain may help alleviate some of the fire pressures brought about by rising temperatures. However, climate experts predict that rainfall patterns will change across the Midwest, with rainfall occurring more often as heavy precipitation events separated in time by longer, more severe dry spells. Prolonged periods without rain can harden the ground so when rainfall does occur, it is less likely to be absorbed by the dry soil, and it will remain susceptible to fire.

CLIMATE DATA IS A CRITICAL TOOL in planning for resilient communities into the future. Assessing threats from climate change and planning effective mitigation and response strategies is a key element for emergency managers and other planners to reduce future risk. It is crucial to understand the potential impacts of climate change and the associated priorities and vulnerabilities of communities, including population, the environment, critical infrastructure, and more. However, vulnerability is a nuanced concept and most effective as an indicator of risk when planners seek to understand and address vulnerability as close to the individual level as possible and in association with a specific hazard.

Climate data is a critical tool in planning for resilient communities into the future.

For example, in HSEM Region 2, population projections show a decrease in children but a substantial increase in seniors. Older people may be more at-risk for respiratory complications during dry, dusty periods, or have limited access to transportation if wildfires necessitate evacuation. Considering the impacts of climate change to vulnerable populations is just one example of how to prioritize mitigation and response planning.

CLIMATE PROJECTION DATA continues to improve and should be considered as a priority to advance for Minnesota. Currently, global climate models that produce climate projection data for the Midwest are more accurate at simulating future temperature changes than they are for precipitation. However, the accuracy and resolution of these models are advancing rapidly as are their ability to model the future prevalence in short-duration, high-intensity localized heavy rainfall events.

Minnesota would benefit from a statewide high-quality climate projection dataset that is derived using the climate and environment features unique to our state, similar to datasets developed for other states. Meanwhile, data from national resources, like the U.S. Geological Survey (USGS) and National Oceanic and Atmospheric Administration (NOAA), can still provide a powerful input to regional scenario-planning efforts by allowing planners, managers, and analysts a means of “unpacking” general climate change predictions for the Midwest by looking at potential monthly fluctuations in coarse precipitation and temperature measures for Minnesota and its counties.

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NEXT STEPS: MINIMIZE RISK & BUILD RESILIENCE

Prepare today for tomorrow's climate hazards. Emergency managers, planners, elected officials, and the public play a critical role in creating safe and healthy communities, especially in the face of extreme weather events. There are steps you can take to minimize local risk and build more resilient communities:



BRING EVERYONE TO THE TABLE: Build an inclusive yet nimble team to collectively identify climate hazards and potential impacts. Be sure to include members of the community; local department professionals responsible for built, natural, and health resources; planning commissioners; faith-based and cultural organizations; research centers; and commercial organizations. Including diverse perspectives throughout your process will help support more equitable planning efforts that best leverage cross-functional resources.



INCORPORATE CLIMATE INTO PLANNING: Incorporate climate projection data into planning efforts, such as exercise scenarios and long-range planning, to comprehensively identify future climate hazards and potential cascading effects. Explore how these interact with non-climate hazards in the community, such as aging infrastructure, to understand potential exposure to multiple threats and prioritize actions that build the community's capacity to respond.



CHAMPION CLIMATE & HEALTH: Be a champion for climate and health data. Seek opportunities to learn about these data and incorporate it in your work on an iterative basis. Support its application in professional networks and articulate the need to fund dynamically downscaled climate projection datasets for Minnesota. Climate data is a critical multi-discipline tool in proactively planning for resilient communities.

RESOURCES & REFERENCES

TOOLS & DATA

- [Climate at a Glance: National Climatic Data Center](http://www.ncdc.noaa.gov/cag/), National Oceanic and Atmospheric Administration
Source for all historical and much of the case study data presented in this profile.
www.ncdc.noaa.gov/cag/
- [Incident Information System](http://inciweb.nwcc.gov/), InciWeb
National data source for incident related information, including wildfire.
[https://inciweb.nwcc.gov/](http://inciweb.nwcc.gov/)
- [Minnesota Climate and Health Profile Report \(PDF\)](http://www.health.state.mn.us/divs/climatechange/docs/mnprofile2015.pdf), Minnesota Department of Health
Profiles historic climate trends, future projections, and likely climate change impacts on the health of Minnesotans.
<http://www.health.state.mn.us/divs/climatechange/docs/mnprofile2015.pdf>
- [Minnesota Climate Change Vulnerability Assessment \(PDF\)](http://www.health.state.mn.us/divs/climatechange/docs/mnclimvulnreport.pdf), Minnesota Department of Health
Assesses five climate hazards and the populations that are most vulnerable to the hazards in Minnesota.
<http://www.health.state.mn.us/divs/climatechange/docs/mnclimvulnreport.pdf>
- [Minnesota Population Projection Data](http://mn.gov/admin/demography/data-by-topic/population-data/our-projections/), Minnesota State Demographic Center
Source for all population projection data presented in this profile.
[https://mn.gov/admin/demography/data-by-topic/population-data/our-projections/](http://mn.gov/admin/demography/data-by-topic/population-data/our-projections/)
- [National Climate Change Viewer](http://www2.usgs.gov/climate_landuse/clu_rd/nccv/viewer.asp), United States Geological Survey
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KNOWLEDGE & CAPACITY

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Practical action steps to help emergency managers build a path to enhance their climate resilience.
<https://www.domesticpreparedness.com/resilience/five-steps-toward-enhancing-climate-resilience/>
- [U.S. Climate Resilience Toolkit](https://toolkit.climate.gov/), United States Global Change Research Program
Information and tools to help communities adapt to climate change, featuring real-world case studies.
<https://toolkit.climate.gov/>
- [Wildfire Information Center](https://www.dnr.state.mn.us/forestry/fire/wildfirereports_tools.html), Minnesota Department of Natural Resources
Information source for fire danger and updates, including fire weather forecasts for Minnesota.
https://www.dnr.state.mn.us/forestry/fire/wildfirereports_tools.html

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Front cover photo: Pagami Creek Fire (Derek Montgomery, 2011)

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