

Roseau County
All Hazard Mitigation Plan

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Introduction

Every day, unforeseen circumstances threaten Roseau County. Possibilities ranging from loss of life to loss of property or jobs can be seen from natural, technological, and human-made hazards.

"Hazard mitigation refers to any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazardous conditions. Making the best long-term decisions requires analytical steps that are best summarized as planning" (FEMA, 2002).

Hazard mitigation in Roseau County is taking an increased role due to a law that was recently passed. The Disaster Mitigation Act of 2000 requires that units of local government (cities, townships, and counties) need to have a mitigation plan approved in order to receive mitigation grant money from disasters occurring after November 1, 2004. The purposes behind the Disaster Mitigation Act were fourfold:

1. Revise sections of the Robert T. Stafford Disaster Relief and Emergency Assistance Act
2. Govern costs of federal disaster assistance
3. Organize a national program for pre-disaster mitigation
4. Streamline dispensation of disaster relief

Hazard mitigation takes place because of mitigation dollars from FEMA through Homeland Security and Emergency Management and the Department of Public Safety. FEMA requires that this planning process occur in all counties in Minnesota. Failure to comply means that said county or other local government unit will not be eligible for mitigation funding from FEMA and has the possibility of reduced recovery funding during the next disaster.

Hazard mitigation got its start because of the simple fact that the constructed environment that humans live in today is not as resilient as the natural environment when it comes to dealing with hazards. In fact, the two environments deal with a hazardous situation in completely different ways. Regeneration, dependence and recuperation are just a few examples. Also, more people are choosing to live and work in areas that have an increased chance of seeing a hazardous situation develop, such as in a floodplain. Mitigation done now reduce recovery dollars required after a hazard occurs and will break the recurring damage/loss cycle. Mitigation is currently done in three ways: construction, planning and education. It is through these methods that the differences between the constructed and natural environments lessen and a balance is achieved.

Hazard mitigation is currently being done in this county because often, the price of mitigating a hazard beforehand is more cost effective than paying for the recovery and response after one occurs and losing priceless lives. This definition outlined above is executed through hazard mitigation strategies found in this report. Much time and effort on many individuals' parts were done to make sure that the strategies found in this document are practical, cost-effective, and acceptable to Roseau County. Major precedence for hazard mitigation is given to anything that the public uses regularly or needs. Examples are homes, utilities, transportation routes and employment facilities. Preference is also given to places that would harm the public if damaged, such as chemical plants, pipelines, or certain warehouses.

The goal of the hazard mitigation plan for Roseau County is to get people, property, jobs, natural resources, and crops out of harms way. This is done through a four-step process: county and community profiling, hazard documentation, risk analysis, and response.

Step one is the county and community profile. This gives a better description of what in the region needs protection from potential hazards. People, property, jobs, natural resources, and crops are all identified as the benefactors of a good hazard mitigation plan.

Step two is identification of hazards that will affect the county and community detailed in step one. This includes both factors that are manmade and those that occur naturally. Possible risks are pointed out, and the hazards in the county that caused the mitigation plan to be written are also recognized. This is broken down into which hazards have happened repeatedly in the past and those which are potential hazards in the future.

Step three is the risk analysis. In this step, the risks pinpointed in step two will be prioritized. Top priority will be given to the risk that is a constant threat to the county. This list will then be discussed as to what measures of correction should be taken first. Practicality and cost effectiveness will be the major issues that are taken into account.

Step four is the response step. In this section, we will restate our original goal outlined above and provide the proper responses that we believe will complete it. The response will include who would be responsible for carrying the given response out, a time frame, and a potential cost. This step will also include responses that if implemented would cause the county great harm. The responses listed in this step fall into three different categories: Those which inhibit a hazard from county members and property, those which keep county members and property away from hazards, and those that reduce the influence a particular hazard may have on a county. The final thing to be discussed is what currently stands in the way of a hazard happening in the area. This can be anything from emergency plans currently in place to previously existing mitigation efforts.

The finished plan depicts a unified and continuous effort and commitment by many dedicated people in Roseau County, as well as Homeland Security and Emergency Management, FEMA, the Department of Public Safety and county/government officials to keep damages and losses at a minimum. The plan written is meant to be a guide for dealing with present and future hazards. More specific steps are outlined in documents such as county emergency response plans, watershed plans, county water plans and zoning ordinances. The written plan does not replace existing operational mitigation plans currently in use but rather supplements them, helping to reinforce and/or improve present and future mitigation. This document can be and is encouraged to be updated when new information and hazards become available. Benefits of this plan go beyond a printed document. Appreciation of partners is heightened and higher levels of trust are earned. In addition, a proactive response is fostered within the county instead of a reactive one.

Step I: County and Community Profile Outline

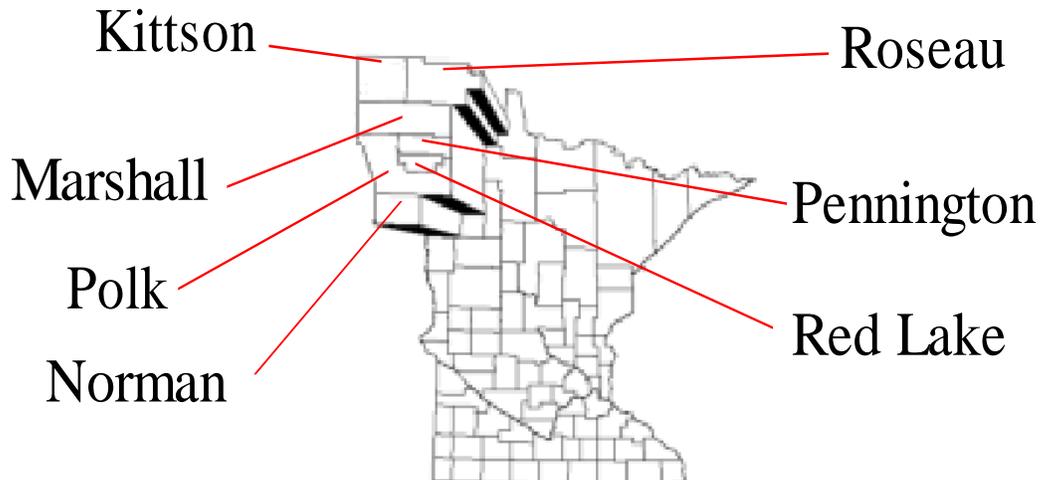
The county and community profile is an important aspect of the hazard mitigation process. This profile serves to recognize and familiarize the reader with the targets of a dangerous hazard, specifically: people, property, jobs, natural resources, and crops. Through this informational process, a general picture of the make-up of Roseau County can be identified.

Several documents were essential in the writing of this plan. The excerpts written below recaps these resources for the purpose of providing an idea of the general environment of Roseau County.

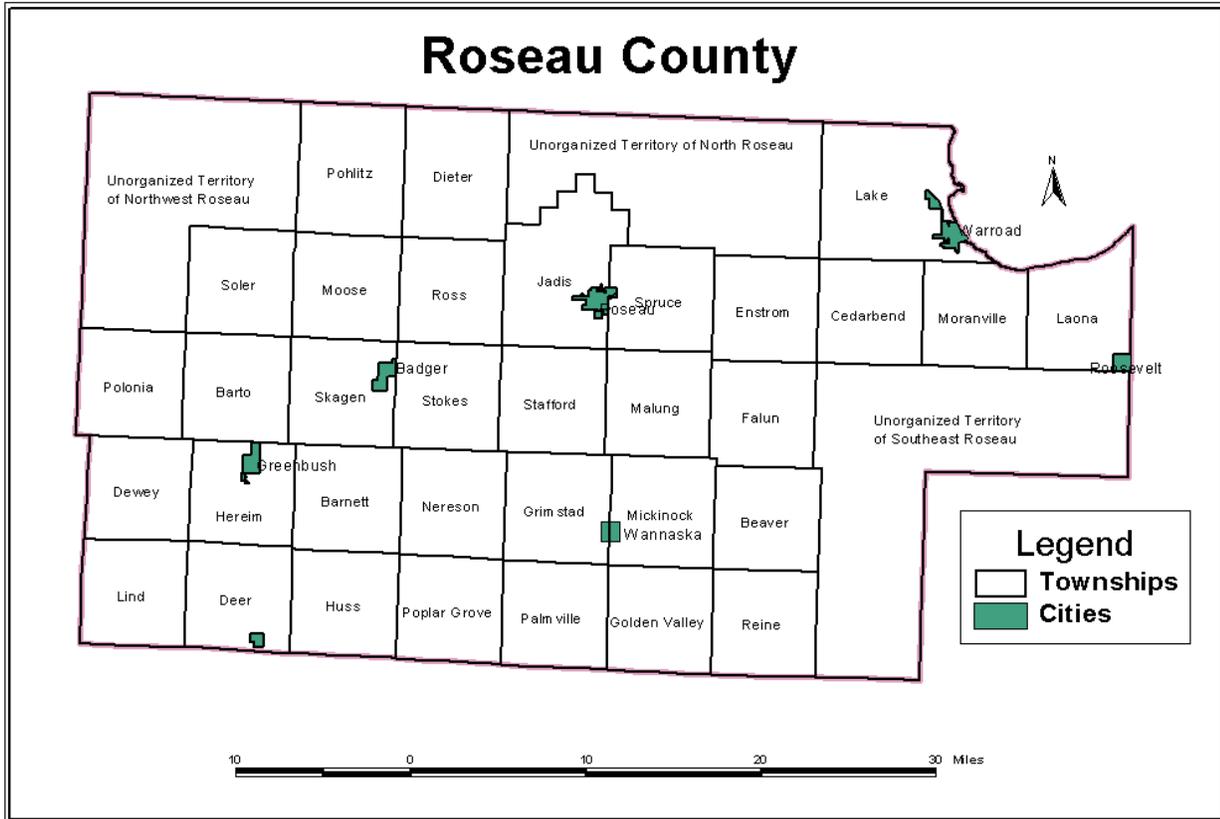
A correctly written hazard mitigation plan will secure the life, wellness, and security of its residents, avert repetitive damages due to various hazards, and furnish a faster recovery process when a disaster does occur. In addition, there is an increased sense of cooperation and communication among the public as well as an increased possibility for funding recovery and reconstruction projects.

Roseau County

Roseau County is located in the northwest corner of the state of Minnesota. It has an area of approximately 1,676 square miles, or about 1,072,640 acres. Its dimensions are approximately thirty-two miles long, sixty-two miles wide in the northern section of the county, and forty-nine miles wide in the southern section. It is bordered to the north by Manitoba (Canada), to the south by Beltrami County, and to the east by Lake of the Woods County.



There are six cities residing in Roseau County (Wannaska is unincorporated). Warroad, Roosevelt, Roseau, Badger, Greenbush, Wannaska and Strathcona are all participating in the hazard mitigation process and will be represented in the plan. The county seat for Roseau County is in Roseau. The largest city in the county, it is located at the intersection of state highways 11 and 310. The county is classified as completely rural (less than 2,500 urban population) or non-metro by the Economic Research Service (ERS).



Physical Characteristics

The physical aspects of Roseau County are very important to the hazard mitigation process. It can dictate how great of an effect a particular disaster will have upon the land and its people. Physical characteristics such as climate, precipitation and geology can enhance the effects of one disaster, while acting like a barrier toward another. Rivers and lakes are just a few of the many examples of landforms that show scars of past disasters. Economic factors are just one-representative of those constituents that are influenced by the physical characteristics listed below. It is through greater understanding of the land and it's aspects that a higher comprehension of hazard risk and a superior grasp of mitigation is achieved.

Climate & Precipitation

The climate of Roseau County is classified as continental. This means that the area gets low amounts of precipitation and cooler weather. During cool weather, polar air masses exert the most influence, while warmer air from the Gulf of Mexico tends to affect the spring and summer months. High and low pressure systems move continuously through the region, usually traveling from west to east.

Seasonal Temperature for 1971 - 2000

Season	Avg. Temp (F)
Spring	36 to 40
Summer	62 to 66
Fall	38 to 42
Winter	4 to 8

Source: State Climatology Office - DNR Waters

The precipitation of Roseau County varies both by month and by year. The average precipitation per year from 1971 to 2000 varies between twenty and twenty-four inches. The average snowfall in this same period lies between thirty-five and forty-five inches. The Roseau County area goes through various wet and dry cycles that can last anywhere from one year to ten. One decade can be remembered as a wet and rainy while another can be known for it's crippling droughts. Flooding trouble has surfaced in recent years due to a downpour of precipitation in a short period of time. This coupled with ground saturation values, ice jams, land use and the topography of the land can create major problems.

Temperature and Precipitation for Roseau County for 1971 - 2000

Roseau	Max. Temp (F)	Min. Temp (F)	Precipitation (in)
January	8 to 14	-12 to -8	0.50 to 1.00
February	16 to 22	-6 to 0	0.25 to 0.75
March	30 to 36	10 to 14	0.50 to 1.00
April	48 to 52	26 to 30	1.00 to 1.50
May	64 to 68	38 to 42	2.25 to 2.75
June	72 to 76	48 to 52	3.25 to 4.00
July	76 to 80	52 to 56	3.00 to 3.75
August	76 to 80	50 to 54	2.50 to 3.25
September	64 to 68	40 to 44	2.25 to 3.00
October	50 to 54	30 to 34	1.50 to 2.00
November	30 to 34	14 to 18	1.00 to 1.50
December	14 to 18	-4 to 0	0.50 to 1.00

Source: State Climatology Office - DNR Waters

Record Temperatures

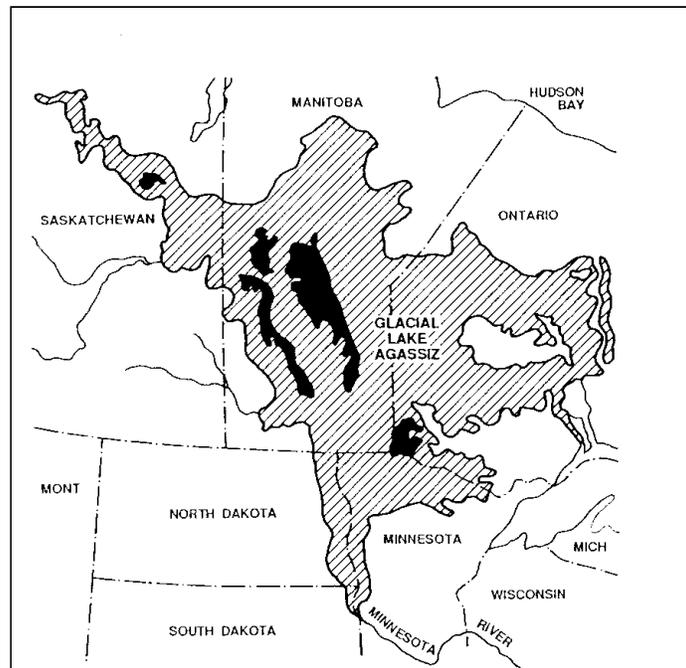
City	Record High Temp. (F)	Record Low Temp. (F)
Warroad	101 degrees (1989)	-48 degrees (1966)
Roosevelt	101 degrees (1989)	-48 degrees (1966)
Roseau	98 degrees (1970)	-52 degrees (1996)

Badger	98 degrees (1970)	-52 degrees (1996)
Greenbush	99 degrees (1988)	-46 degrees (1996)
Strathcona	99 degrees (1988)	-46 degrees (1996)

Source: weather.com

Geology

The geology of Roseau County was influenced by a glacier that occurred many years ago. This glacier blocked all North flowing rivers in the late Wisconsin period. Glacial Lake Agassiz was formed because of this large glacier. In turn, Glacial Lake Agassiz caused lake beds, lowlands, and beach ridges to form in Roseau County. The landscape we see today was almost solely caused when Glacial Lake Agassiz receded approximately 8,500 years ago.



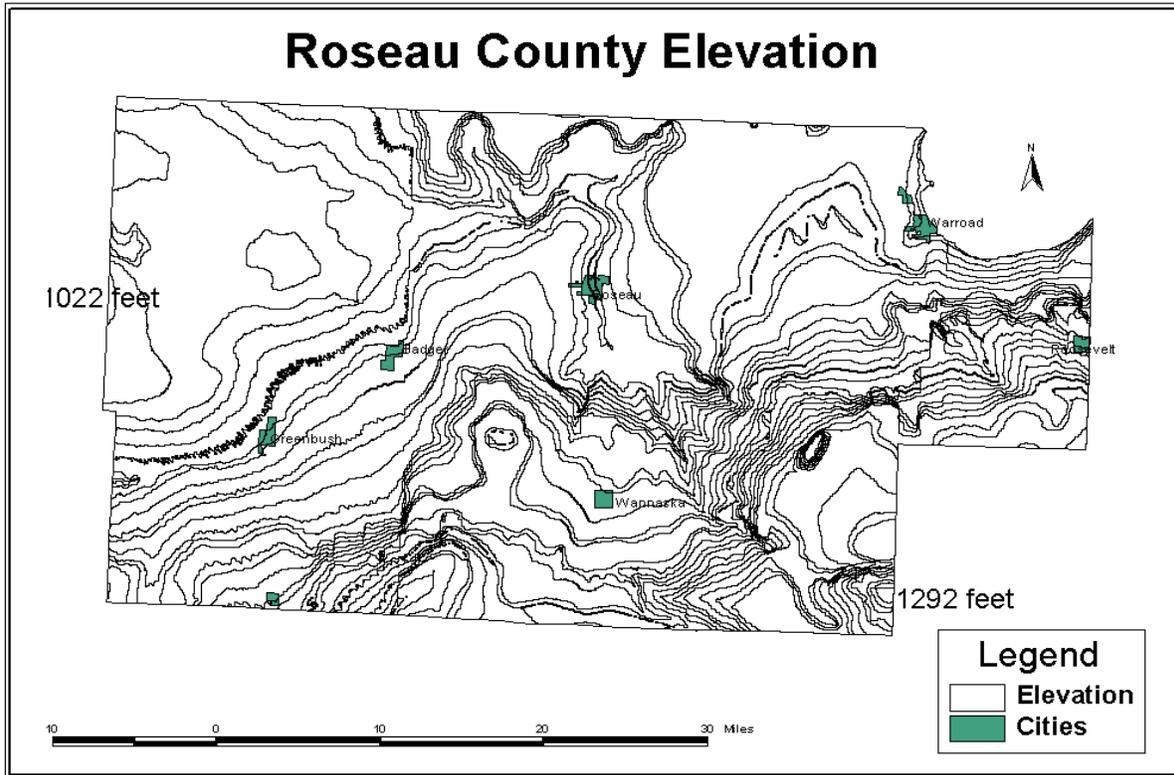
Source: Joe River Watershed District Overall Plan, 2002

A beach ridge occurs at the edge of a lake. Because Lake Agassiz fluctuated greatly in terms of water content, many beach ridges were left instead of just one. The fluctuation of Lake Agassiz was due to the recession/procession of the ice sheet. The beach ridge area seen in Roseau County includes these ancient beaches as well as the marshy, poorly drained areas that occur between the beaches.

Topography

The topography of Roseau County varies. A great majority of the county was once Glacial Lake Agassiz. This land is almost level and made up mostly of either organic deposits or lacustrine materials. The other part of the

county is made up of glacial till. A rolling, undulating topography can be viewed from this region. The highest and lowest elevations are marked on the map below:



The topography of Roseau County currently looks like this:

Roseau County Land Use



The high percentage of cultivated land indicates that the dominant use of land is for agriculture. Cropland is a valuable resource for Roseau County and should be protected from future hazards, as it is a way of life for many people. The minimal amounts of forest and water resources also are indicative of the prairie environment that covers the area.

Soil

Roseau County is primarily made up of three general types of soil: fluvial sediments, remnants of Glacial Lake Agassiz, and glacial drift. Since different geomorphic regions exist in the state, the soil is also different. For most of the region, the presence of impermeable clays makes water infiltration slow. Precambrian bedrock underlies the soil types at depths of 100 feet or greater. Roseau County has four distinct regions:

Glacial Lake Plain: This area is nearly level, having a gradual slope both to the west and north. It was formed in the time of the glacier, under about 300 feet of water. The dominant sediments are the lake-laid type made up of clays (some silty), ranging anywhere from five feet to 100 feet thick. The sediment formed under shallower water is not as thick. Many of the soils in this area are poorly to very poorly

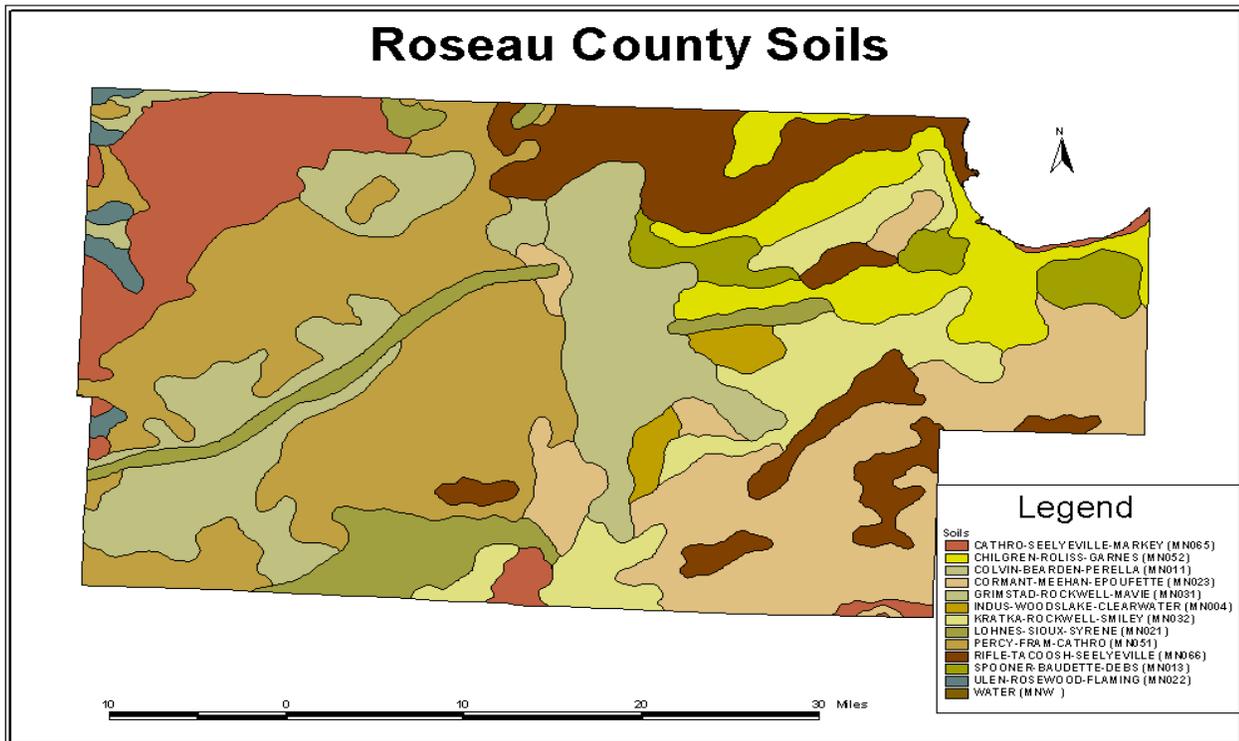
drained. Erosion due to waves can be seen in places.

Inter-Beach Area: this area is composed of mainly beach ridges connected with marshy areas. These marshy areas are often lower than the ridges and poorly drained. Beaches are often described as rather narrow and long, often discontinuous. Gravel and sand are common.

Beltrami Island Area: This area is often described as a slightly depressional lake plain. A long beach ridge from the inter-beach region bisects the area.

Agassiz Peatlands: This area is described as a low, very poorly drained lake plain. Most of the soil found here is organic and sandy. Peat bogs are commonly found in depressions and can be as much as 20 feet deep.

Glacial deposits can be found to almost entirely cover Roseau County. The drift was deposited by the glaciers that went through this area, also referred to as till. Till consists of various sizes of material from the very fine clay or silt up to the very coarse pebble or boulder. The till is unsorted and has a very nonstratified bedding. Some of the soil that covers Minnesota originates from the drift that the glacier left behind.



The bedrock of Roseau County greatly varies. It is made up of a variety of rocks and minerals instead of one homologous type. Faults can also be seen crossing the bedrock.

Roseau County shows different size bands of bedrock having the same orientation. This trend is a southwest-northeast direction. Five bedrock types display this banding trend. They are all formed in the late Archean.

- The first type is made up of granitic and granodioritic rocks. They can vary from syntectonic to pre-tectonic and are closely associated with the Vermillion granitic complex, the Giants Range and the Bemidji batholiths. It is found in the western part of the county, as well as the northeast corner.
- The second type is a metavolcanic type. Variable quantities of felsic volcanogenic and volcanoclastic rocks can be found composing this type, as well as iron. This type is often described in a number of volcanic sequences varying from mafic to felsic. It is found in the southern and eastern part of the county.
- The third type of bedrock is a mafic metavolcanic type. Concentrations of iron formations are almost always found scattered throughout the basalt, as well as thin sedimentary units. This bedrock is found in the southern part of the county.
- The fourth type of bedrock is composed of paragneiss and schist rich migmatite. This bedrock can be viewed in the central part of the county.
- The fifth type is part of the Vermilion Granitic Complex. It is made up of granitic gneiss, paragneiss, schist and migmatite. This bedrock is found on the western side of the county.

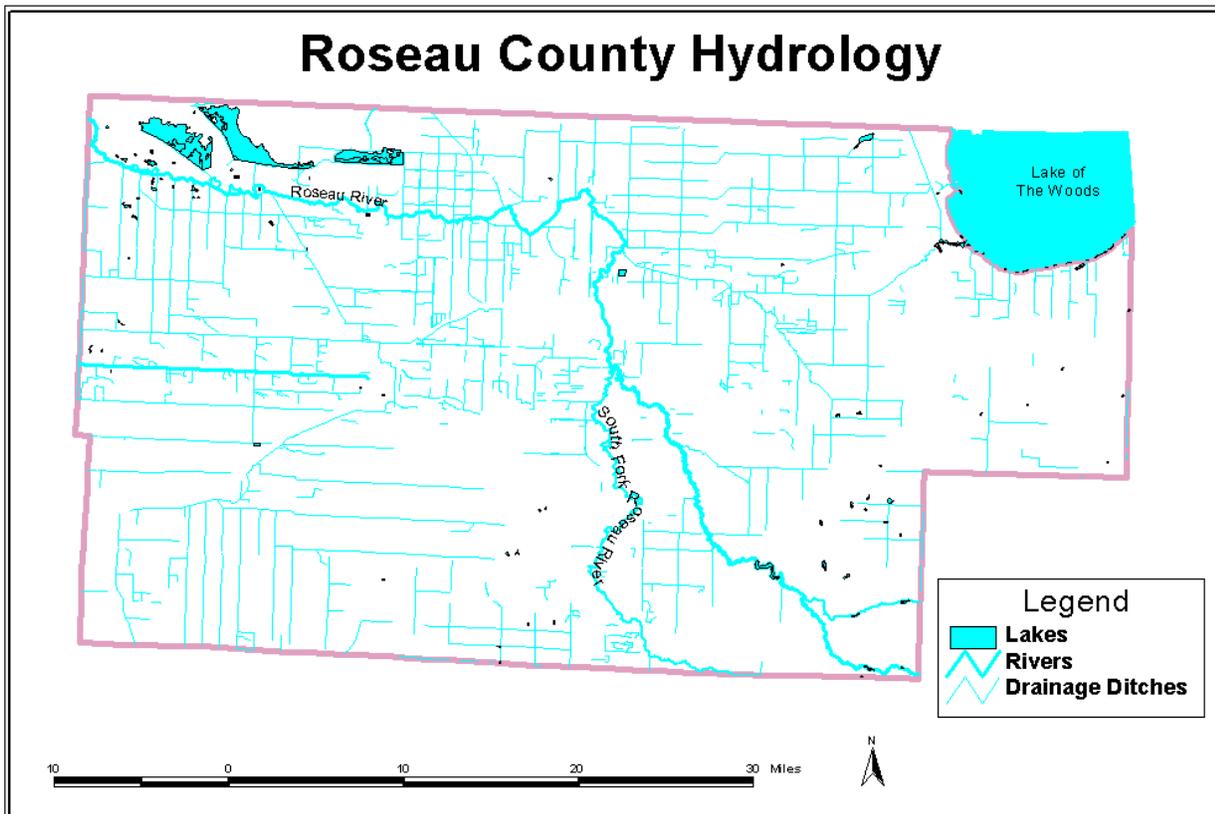
Concentrations of bedrock are found in spots across Roseau County, and do not band.

- The first is made up of gabbro, peridotite and pyroxenite type rocks. This type of bedrock often carries a distinct magnetic signature.
- The second type is made up of granodiorite, syenite, diorite, and a monzonite that can be rich in hornblende, pyroxene or biotite. Both the first and second types of bedrock were formed in the late Archean.
- The third type was formed in the Mesozoic. This is made up of rocks from the Dakota, Graneros, Greenhorn, Carlile, Niobrara and Pierre formations.

Hydrology

The hydrology of Roseau County is a very important section of this report because of the flooding problems northwest Minnesota has had recently. Northwest Minnesota is one of the most drained areas in the United States, if not the world. Water issues and flooding present a challenge to someone every year. It is important to document what the hydrology of the county is as a first step to try and mitigate flooding.

Roseau County Hydrology



Groundwater

Groundwater is gotten through aquifers. An aquifer is any rock formation that can be used to store or transmit water. It is usually a porous material such as sandstone or gravel that is confined by a less porous material. It is not depicted as a void beneath the ground. The aquifers of Roseau County are found in two places, glacial drift and the underlying bedrock. Roseau County is characterized by clay rich glacial drift overlying Cretaceous bedrock. Both the bedrock and the glacial drift contain limited sand and sandstone aquifers. There are also aquifers that are found between interbedded layers of sandstone and thick shale.

Surficial aquifers are described as both the most widespread aquifers and also as the uppermost. It consists mainly of glacial deposits. Depending on where the glacier and its lobes were coming from determined what properties the deposits had. In Roseau County, the depth to bedrock is 100 feet at minimum. Buried sand and gravel aquifers are very apt to exist, and do in some areas. These can occur from ice deposits (moraines) or water deposits (outwash, lake sand, kames and eskers). In some cases, water will move down to recharge bedrock aquifers, or move from bedrock aquifers up to the surficial aquifers for discharge into a nearby stream or river. Wells often take water from this type of aquifer.

Crystalline rock aquifers are one of the most common in Roseau County.

Precambrian rocks are the main constituents of the crystalline rock aquifers. Granite, gabbro, gneiss, schist and slate are all common lithologies. Water collects by following faults, joints and fractures within the rock. The quality of the water collected is broad, ranging from salty to fresh.

The Cretaceous aquifer can be seen in small regions of Roseau County. This aquifer is not one of the most common in the area. It is defined by sandstone beds, ranging from thick to thin, overlain by beds of limestone or shale. The limestone and shale have a confining property upon the aquifer. The Cretaceous aquifer is also overlain by glacial deposits. Overall, the total thickness drifts from ninety feet to about 170, depending on the area. Water from this aquifer tends to contain concentrations of dissolved solids.

Aquifer Withdrawal Rates

County	Glacial/Surficial Aquifer	Other Aquifers
Becker	6.52	0.71
Kittson	0.6	0.56
Marshall	0.31	0.28
Norman	0.22	0.18
Pennington	0.06	0.02
Polk	0.67	0.48
Red Lake	0.87	0.15
Roseau	0.66	0.25

Figures are MG/D (million gallons per day)
Source: United States Geological Survey

The cities within the county, as well as rural residents get their water from wells. The depth ranges from 80 to 120 feet; the groundwater level of Roseau County is close to the surface. The Roseau River Watershed has flowing wells in four townships. Municipal wells in the city of Roseau provide about 41.2 million gallons per year for commercial and industrial purposes and approximately 27.5 for domestic purposes. The yield is about 200 to 300 gallons per minute. Agriculture use around the Roseau area utilizes about 45.5 million gallons per year, and livestock average about 103.1 million gallons per year.

Lakes

The only man-made lake in Roseau County is Hayes Lake. This 200-acre lake is located almost halfway and a little to the right of the locations of Skime and Pencer, once towns. It was created when Minnesota DNR built a dam on the Roseau River on the north fork. It was built for recreational use (stocked with fish), and was not intended for flood control.

Marvin Lake is located in the northeastern corner of Roseau County. This lake is almost on the Canadian-U.S. border. It is 240 acres and is rectangular in shape.

Roseau Lake is approximately 3.5 miles in diameter. In the past, this shallow body of water covered 2,198 acres. Due to drainage ditches and channel enlargement, the lake is now dry except in times of flooding. This

basin regulates runoff and could serve as a natural retarding basin.

Rivers

The dominant river in Roseau County is the Roseau River. It enters near the south, southeast corner of the county and exiting near the northwest corner of the county near the town of Caribou. Its channel varies from well-defined upstream of Roseau to a meandering one downstream. Upstream of Roseau, common stream gradients are about seventeen feet per mile, while downstream the stream gradient goes down to 0.2 feet per mile while traveling through a swampy area. The Roseau River has four major tributaries: Hay Creek, Pine Creek, Sprague Creek (Mud Creek), and the South Fork of the Roseau River. A minor tributary is Hansen Creek. The east and west branches of the Warroad River also occur in Roseau County, near the town of Warroad.

The rivers above need to be watched for possible floods because of the difference in water flows that occurs seasonally. Depending on the winter precipitation, a high flow period could occur in late winter / early spring when the snow melts. High flow is also seen when the late spring or summer rains start to fall. A flood could occur if a particularly heavy spring rain occurs too soon after a moisture-laden snow melt or an ice jam. A low flow period is seen in the late summer or early fall months and again in the winter when the rivers and lakes are frozen over. Humans have affected rivers since their settlement in the area in various ways such as sedimentation, dikes, levees, drainage, etc... Our activity sometimes will also lead to flooding. Flooding information will be covered in greater detail later in this report in the hazard identification section.

Roseau County is partially in the Roseau River Watershed. This watershed occupies 2,057 square miles in the U.S. and Canada. Eighty-eight percent of the watershed or 645,990 acres is located in Roseau County. There are six sub-watersheds to the Roseau River Watershed. They are:

- #1. The lower reach
- #2. Sprague Creek and Pine Creek
- #3. South Fork of the Roseau River
- #4. Hay Creek
- #5. Roseau River
- #6. Local drainage between Malung and Roseau

Wetlands

Wetlands serve an important function in the region. They are integral in their usage as wildlife habitats. Many wetlands serve both as nesting grounds and as stops for migrating birds. Wetlands are also valued because they slow down surface water runoff. The dense plant growth can store vast quantities of water, which helps in flood control or in times of immense precipitation or snow melt. The sediments that are found in wetlands can also be used as a natural filter for pollutants. There are eight types of wetlands found in Minnesota.

Type 1 (seasonally flooded basin) wetlands are often found in upland depressions or forests that are found in the flood plain. Looks can be deceiving as this swamp only floods during certain seasonal periods, leaving it well-drained other times of the year. Vegetation varies

greatly depending on the continuity and time of the flood. Varieties from herbaceous plants to hardwood trees can be seen.

Type 2 (wet meadow) wetlands are often found in shallow basins or sloughs. The soil is waterlogged a few inches below the surface. Grasses, rushes, sedges, and various broad leaf plants inhabit this type of wetland.

Type 3 (shallow marsh) wetlands are found in shallow lake basins or sloughs. The soil is waterlogged and is covered by six inches of water or more. Grass, rushes, cattails, arrowheads, smartweed, and pickerelweed are often found populating this wetland.

Type 4 (deep marsh) wetlands are found in depressions like shallow lake basins, potholes, and sloughs. Six inches to three feet of water often covers the soil. Cattails, rushes, reeds, and wild rice are found here, as well as pondweeds, nalads, coontail, watermilfoils, waterweeds, duckweeds, and water lilies.

Type 5 (shallow open water) wetlands are found in shallow lake basins. Water less than ten feet deep covers the surface of the soil. Vegetation here is similar to the vegetation in Type 4 wetlands.

Type 6 (shrub swamp) wetlands are located along slow streams, drainage depressions, and flood plains. Water up to six inches covers the ground. This is because the water table is located at or near the surface. Vegetation residing here includes alders, willows, dogwoods, buttonbrush, and swamp-privet.

Type 7 (wooded swamp) wetlands are found in ancient shallow lake basins, oxbows, slow streams, and on flat uplands. Up to one foot of water covers the ground. This is because the water table is located at or near the surface. Hardwood and coniferous vegetation such as black spruce, tamarack, balsam, red maple, and black ash is found residing in these swamps, as well as deciduous duckweed and smartweed.

Type 8 (bog) wetlands are found in shallow glacial lake basins and depressions, flat uplands, and slow streams. The soil is usually waterlogged because the water table is at or near the surface. Woody and herbaceous varieties of vegetation grow here, as well as moss.

The following graph lists the acreage of each type (info. from MN DNR):

County	T1	T2	T3	T4	T5	T6	T7	T8
Becker	2,207	10,564	60,004	3,642	13,701	26,904	8,304	23,026
Kittson	2,938	42,356	5,112	827	193	17,505	2,290	211
Marshall	5,319	52,328	41,201	5,244	2,596	56,192	22,985	8,446
Norman	2,275	4,032	6,857	217	0	1,921	2,932	216
Pennington	1,726	15,299	3,778	76	0	6,059	1,861	276
Polk	3,763	27,237	26,617	440	2,462	14,800	7,228	1,437
Red Lake	1,187	5,106	2,156	65	0	2,202	1,903	259
Roseau	8,235	119,160	4,149	2,815	1,682	110,511	69,323	49,251

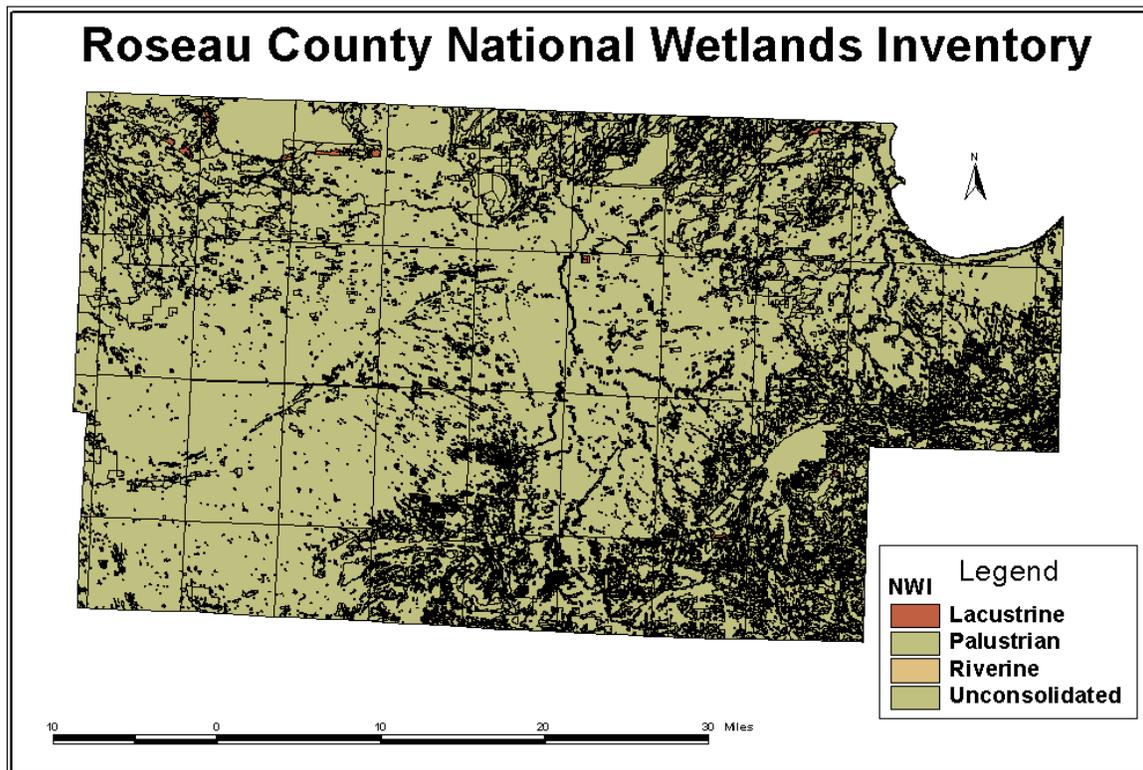
There is a large wetland area in Roseau County called "Big Swamp." Big Swamp occupies the northern region of the county, sloping to the southwest. This sloping factor means that the marshy area to the north of the Roseau River drains into it, and the area south of the river drains the opposite way. Drainage ditches have been put in place to correct the opposite flow. However, during times of high water output, water will overflow the banks of the Roseau River and cause damage to property, structures, and crops overland.

The National Wetlands Inventory maps wetland vegetation types and boundaries using high altitude aerial photography.

A lacustrine environment is a wetland with lakes and deep ponds.

A riverine environment is a wetland with a river, creek, or stream.

A palustrine environment is a wetland with a shallow pond, marsh, swamp or slough. Woody vegetation can sometimes be seen.



Community Infrastructure

Community Infrastructure can be defined as the framework of a community. Without it, a community will not function, grow or prosper. Facilities, resources, institutions, services and equipment can all be described as infrastructure. Ewoud Verhoef lists the four basic features of an infrastructure:

- It is a large-scale system
- It has a strong technological dimension
- It consists of unmovable physical components
- It delivers an essential service (a.k.a. necessary and not replaceable)

The information listed in the following sections may also be considered critical infrastructure. Buildings that are considered critical infrastructure are often near the top of the list for protection and prevention efforts, because the destruction of these resources poses a significant risk for communities. There are eight types of critical infrastructure categories: telecommunications, electrical power, gas/oil, banking/finance, transportation, water supply, government and emergency services.

Schools

There are four school districts that provide knowledge to the residents of Roseau County: Badger Public School District #676, Greenbush-Middle River School District, Roseau School District #682, and Warroad School district # 690. These schools provide superior education to community members that are enrolled in kindergarten through twelfth grade.

Name of School	District #	Grades	Type
Badger School	676	K - 12	Public
Greenbush High School	Greenbush	9 - 12	Public
Middle River Jr. High School	Greenbush	4 - 8	Public
Greenbush Elementary School	Greenbush	K - 6	Public
Roseau Jr.-Sr. High School	682	7 - 12	Public
Malung Elementary School	682	K - 6	Public
Roseau Elementary School	682	K - 6	Public
Wannaska Elementary School	682	Pre - 3	Public
Warroad High School	690	9 - 12	Public
Warroad Middle School	690	4 - 8	Public
Angle Inlet School	690	K - 6	Public
Warroad Elementary School	690	K - 6	Public

SCHOOL ENROLLMENT	Number	Percent
Population 3 years and over enrolled in school	4,373	100
Nursery school, preschool	341	7.8
Kindergarten	309	7.1
Elementary school (grades 1-8)	2,219	50.7
High school (grades 9-12)	1,201	27.5
College or graduate school	303	6.9

EDUCATIONAL ATTAINMENT	Number	Percent
Population 25 years and over	10,366	100

Less than 9th grade	985	9.5
9th to 12th grade, no diploma	834	8
High school graduate (includes equivalency)	3,911	37.7
Some college, no degree	2,254	21.7
Associate degree	841	8.1
Bachelor's degree	1,301	12.6
Graduate or professional degree	240	2.3

Source: 2000 Census of the Population

According to the Economic Development Authority, Minnesota ranks second in the nation with a high school graduation rate of 89.1% (the national average is 71.1%). This might be partially due to the fact that Minnesota believes in open enrollment, a policy that lets children go to school in a district that they do not live in.

Important Public Facilities

The facilities listed below encompass the categories the public visits on a day to day basis. These provide an important service to the community as well as the region. Many of these facilities are specifically named in parts of this section. Some of these buildings can serve as a shelter, while others are a public place that should be mitigated for various hazards.

Retail facilities	Emergency service localities
Industrial facilities	Community organizations
County buildings	City buildings

Libraries:

- Badger has a school library
- Wannaska has a school library
- Greenbush has a school and a public library
- Warroad has a school and a public library
- Roseau has a school, public and a special library

Churches (and adjoining cemeteries for those applicable):

- Bethel Mission Covenant Church (Roseau)
- Blessed Sacrament Rectory (Greenbush)
- Woodland Bible Church (Warroad)
- New Life Assembly of God (Warroad)
- Roseau Community Church (Roseau)
- First Baptist Church (Roseau)
- Warroad Baptist Church (Warroad)
- Sacred Heart Catholic Church (Roseau)
- St. Joseph's Catholic Church (Strathcona)
- St. Mary's Catholic Church (Warroad)
- St Mary's Church (Badger)
- Give Glory to God Church (Warroad)
- Church of Jesus Christ of Latter-day Saints (Warroad)
- Union Congregational Church (Warroad)
- Grace Evangelical Church (Strathcona)

- Evangelical convent Church (Roseau)
- Kingdom Hall (Roseau)
- Bethlehem Evangelical Lutheran Church ELS (Warroad)
- Norland Lutheran Church (Salol)
- Pine Grove Lutheran Church (Roseau)
- Ross Lutheran Church (Roseau)
- Badger Creek Free Lutheran Church (Badger)
- Free Lutheran Church of Roseau AFLC
- Oiland Free Lutheran Church (Greenbush)
- Rose Lutheran Church AFLC (Roseau)
- Bethel Lutheran Church (Greenbush)
- Bethel Lutheran Church of Stafford ELCA (Roseau)
- First Lutheran Church ELCA (Salol)
- First Lutheran Church ELCA (Roseau)
- Messiah Lutheran Church (Roseau)
- Moe Lutheran Church (Roseau)
- Our Redeemers Lutheran Church (Badger)
- Zion Lutheran Church ELCA (Warroad)
- Spruce Free Lutheran Church (Roseau)
- United Free Lutheran Church (Greenbush)
- Our Saviour's Lutheran LCMS (Roseau)
- United Methodist Church (Roseau)

Daycare

Roseau County has 84 daycare facilities registered with the Department of Human Services under family child care. There is a total capacity of 946. For more information on daycare facilities in Minnesota for adults and children, please visit the following website:

http://www.dhs.state.mn.us/main/groups/business_partners/documents/pub/dhs_id_017167.hcsp

City/County Buildings:

The Roseau County Courthouse is located in Roseau and holds a variety of county personnel. Each city has a city hall or other specific meeting place, such as a community center, set aside for usage. The majority of townships have a town hall or other specified location to utilize for meetings and other purposes.

Special Event Area

The Roseau County fair is held every year at the fairgrounds in Roseau. It is managed by a fair board. There is a grandstand upon the property, as well as bathrooms, electricity, and many buildings/barns.

County and State Parks and Natural Areas

Roseau County is home to Hayes Lake State Park, a 3,000 acre area with camping and fishing opportunities. This park is centered around Hayes Lake, a 200-acre impoundment. The park averages between 30,000 and 35,000 people per year. There are thirteen miles of trails for people to hike, divided into snowmobile and cross-country skiing type trails in the wintertime. There is also swimming and picnic areas for additional recreation.

Near the southeastern corner of the county lies the Beltrami Island State Forest and Red Lake Wildlife Management Area. This region occupies 1,050 acres of land, but not all of this is in Roseau County. Only 156 square miles lie in the Roseau River watershed. There are logging, snowmobiling and hiking trails that run through the area, as well as opportunities to go horseback riding, hunting and mountain biking. The upland and wetland forests together with the bogs and fens make it an ideal place to observe nature. Picnic and campground areas are available, however the region has few roads that travel through it.

The Lost River State Forest lies in the northeastern corner of the county. The 63,000 acre forest lies across 25 miles of land adjacent to the Canadian border. This area has both lowland and upland areas with a multitude of flora and fauna perfect for the nature enthusiast. There are trails running through the region, including groomed trails kept up by the local snowmobile clubs. Hunting cabins are also available, but there are no developed recreational areas in the area yet.

State wildlife management areas in Roseau County include:

- Border - 513 acres
- Roseau Lake - 6,495 acres
- R C 3 - 80 acres
- Grimstad - 8 acres
- Enstrom - 78 acres
- Polonia - 400 acres
- Nereson - 3,871 acres
- Bear Creek - 280 acres
- Skime - 1,170 acres
- Wannaska - 80 acres
- Palmville - 3,454 acres
- Cedarbend - 1,454 acres
- South Shore - 1,661 acres
- Haves - 74 acres
- East Branch - 80 acres
- Clear River - 80 acres
- Rosver - 38 acres
- Marbel - 88 acres
- Roseau River - 74,637 acres

A natural area of scientific importance in Roseau County is the Two Rivers Aspen Prairie Parkland. This area is home to the rare northern gentian. Sandhill Cranes also choose this region to nest at. Rare spring fens can be found in Sprague Creek Peatland and Pine Creek Peatland. There are only five found in the state of Minnesota. Sandhill Cranes also nest at Pine Creek Peatland, which can also be seen extending into Canada and the Luxemburg Peatland. This peatland was disturbed by nearby ditches, and lacks any type of bog pattern. Nevertheless, English sundew, yellow rails, and short eared owls may still be located here.

There are fens scattered throughout the county. A fen is described as a peat producing wetland with groundwater inflows. Grassy vegetation such as aquatic plants or coarse/sedge type grasses is found growing at the fen. Water partially or totally covers the fen, a kind of transition between land

and water. As of December 2003, Roseau County has thirteen seepage, transition and boreal fens varying between shrub, calcareous, and sedge subtypes.

In addition, many municipal areas have city parks. The Pinecreek port of entry has a picnic area, as well as the port of entry straight north of Roseau.

Historic Resources

There are three places registered with the Minnesota Historic Society:

1. Canadian National Depot - 1914 in the city of Warroad
2. Lodge Boleslav Jablonsky No. 219 - 1916 in Poplar Grove Township
3. Roseau County Courthouse - 1913-1914 in the city of Roseau

Transportation

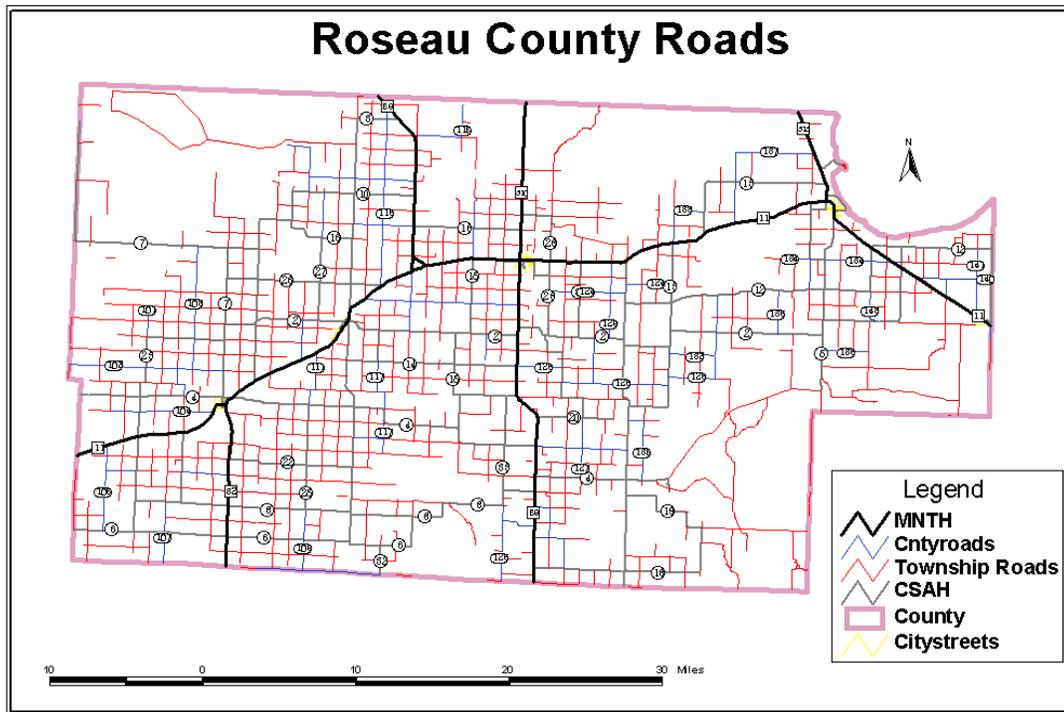
Roseau County's transportation system is made up of township, county, and state roads, railway, airport, trails, and public transportation. Through these pathways come materials and services needed to sustain the area. Agriculture, various businesses, tourism, government, and residents are all dependent on the transportation system.

Roads

The state of Minnesota has 132,250 miles of roads within the state. 116,232 miles are classified as rural roads and 16,018 are classified as urban. Roads can be into state, county, township or municipal types.

COUNTY	ROADWAY	MILES
ROSEAU	MNTH	132
ROSEAU	CSAH	483
ROSEAU	COUNTY	236
ROSEAU	TOWNSHIP	1158
ROSEAU	UNORG. TOWNSHIP	84
ROSEAU	CITY STREETS	41
ROSEAU	STATE FOREST	83
COUNTY TOTAL		2217

The Minnesota Department of Transportation is responsible for the Minnesota Trunk Highway Systems (MNTH) and the State Forest Roads. The county state aid highway (CSAH) and the county roads are the responsibility of Roseau County. All remaining roadways are the responsibility of the township or city that they are located in. Small roadways can cause problems for emergency vehicles. A small country lane that is aesthetically pleasing may cause trouble because a fire truck or ambulance might not be able to fit down the road. Damage might be done to the road and the homeowner (if applicable) might have to end up either fixing the road, abandoning it or widening it.



Waters of the Dancing Sky is a scenic byway found intercepting Roseau County. This road is named for the brilliant northern lights display that can be seen in the area on some nights. This byway stretches from Karlstad to Voyageurs National Park. It holds many attractive stops in towns along the way for a truly interesting drive.

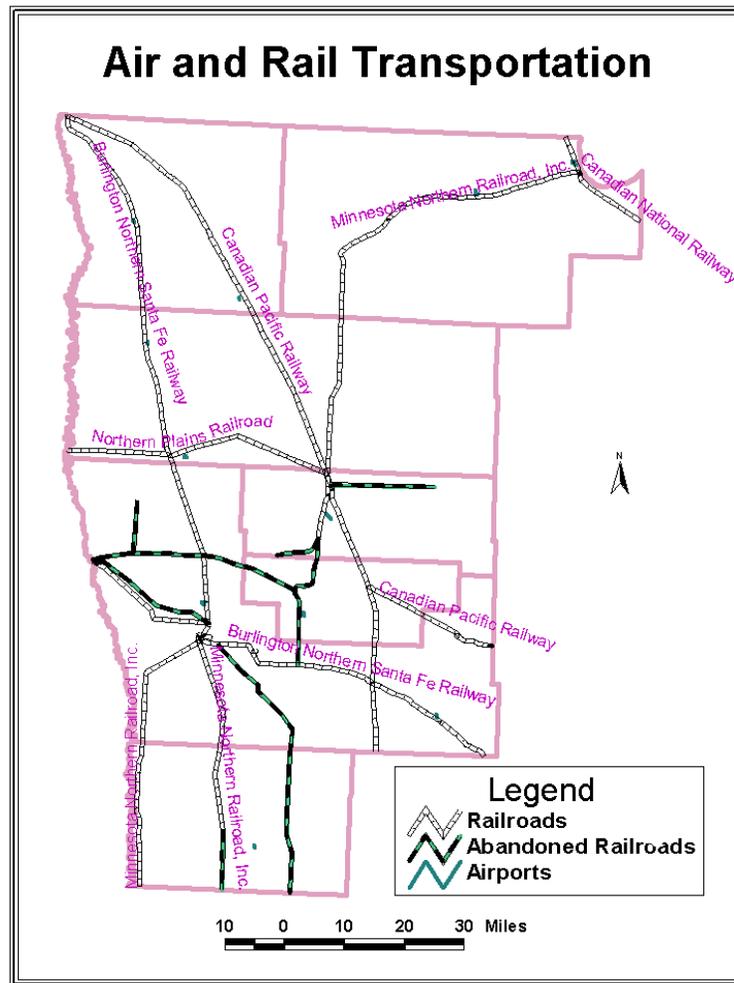
The number of bridges in Minnesota can be broken down into two categories, national highway system bridges (NHS) and non national highway system bridges (Non-NHS). There were 11,191 bridges in the Non-NHS category in the year 2000. 1,206 of them were structurally deficient (10.78%), and 515 were functionally obsolete (4.6%). There was a total of 1,620 bridges in the NHS category in the year 2000. Seventy-two of these bridges were structurally deficient (4.44%) and another eighty-nine were functionally obsolete (5.49%).

Railroads

The Minnesota Northern Railroad (MNRR) is the one of two railroads that crosses into Roseau County. This Company has 241 miles of track running through Minnesota. In Roseau County, the Minnesota Northern Railroad connects the towns of Strathcona, Greenbush, Badger, Roseau, Salol, and Warroad, where the line ends. Started in 1996, the MNRR carries about 10,000 carloads annually. The line hauls mainly agriculture related commodities (90%), but other items are carried such as various chemicals, clay, glass, and stone. The average haul length for this railroad is 85 miles. Railways cross the state of Minnesota and provide an important means of transportation

to and from the farmers in this area.

The Canadian National (CN) is the other railroad that crosses into Roseau County. The track connects the towns of Warroad and Roosevelt. It follows the curving pattern of state highways 313 and 11. The CN has 17,821 miles of track in eight Canadian provinces and the 14 U.S. states and has the distinction of being the only transcontinental railway network in North America. It connects the Atlantic and Pacific Oceans to the Gulf of Mexico. A great variety of revenues are moved including agricultural products, metals, forest products, chemicals, and automotive products.



Air Transportation

Airport	Location	Runway	Area (feet)	Aircraft	Average
Roseau Municipal Airport	Roseau	asphalt	4,400 X 75	21	55 / day
		turf	2,504 X 250		

Piney Pinecreek Border Airport	Pinecreek	asphalt	3,298 X 75	N/A	57 / week
Warroad International Airport	Warroad	asphalt	5,400 X 100	20	25 / day
		turf	3,000 X 150		
Greenbush Municipal Airport (P)	Greenbush	turf	2,553 X 82	7	61 / week
		turf	2,500 X 192		
		turf	1,897 X 192		
Norris Landing Strip Airport (P)	Roosevelt	turf	2,640 X 108	N/A	N/A

(P)= private airport
Source: Airnav.com

Transit

School busses are used in educational facilities in the towns of Roseau County. This aids both rural and municipal children in getting to their homes. There is also a bus service called Roseau County Area Transit Community Bus (RCAT), soon changing its name to FAR (for all residents) North Public Transit. This system's administration is the Roseau County Committee on aging. The bus service connects the towns of Roosevelt, Warroad, Salol, Roseau, Badger, Greenbush, and Strathcona. Everyone can ride the community bus because there are no restrictions on either age or income. The bus is able to seat 16 people, or 12 people and two wheelchairs. The Roseau County Committee on aging also provides medical travel services for seniors. These two services provide transportation for senior citizens and the disabled in the Roseau County area, those two groups who sometimes need transit the most.

For more information on transit, please refer to the Northwest Minnesota Region One Public Transit Plan.

Trails

Groomed snowmobile trails cross the entire region of Roseau County, as well as the whole northwest corner of Minnesota. This provides many people with wintertime enjoyment. ATV trails also run through the county. For the nature enthusiast, there is a new birding trail that runs through the county called the Pine to Prairie birding trail. This trail covers more than 200 miles of Minnesota and features forty-three stops. More than 275 species of birds can be viewed while on this trail. According to the Minnesota Ornithologists' Union, bog areas of Roseau County are listed as one of the total of sixteen quality bird watching areas in the state of Minnesota. At least five species of owl can be seen regularly, as well as the spruce grouse.

Response

The following facilities, the equipment contained within and the people employed are all part of the response: an ability to respond to a hazard or disaster. This is important because a well-prepared facility is able to respond to an incident faster, saving valuable lives and property in both this county and surrounding ones. The facilities listed below are important to communities, both local and regional. Without these facilities in the area, population would wither and needs would not be addressed properly.

Medical Facilities

There are three Altru clinics in the county. The Altru Clinic in Greenbush has family medicine as its specialty, as does the Altru Clinic in Warroad. The Altru Clinic in Roseau has several specialties including cardiology, orthopedics, urology, a diabetes center, family medicine, rheumatology, internal medicine, oncology, OB/GYN, and an ear nose and throat (otolaryngology) department. Altru Clinic was started in 1997 when the Grand Forks Clinic and United Health Service joined together. The Altru system has spread since then, currently serves North Dakota and Minnesota in sixteen cities, assisting a population base of more than 225,000 (in 2001). More than 190 physicians in thirty-six specialties help people with a range of problems.

There is also a hospital in Roseau. This hospital has 149 beds available for use. It has general medicine, surgery, pediatrics and obstetrics.

Supervised living:

- Greenbush Community Nursing Home has sixty beds available.
- Roseau Area Hospital and Homes Inc. has twenty-five hospital beds, seven infant bassinets and sixty-four nursing home beds.
- Warroad Care Center has forty-five nursing home beds available.
- Greenbush Housing Redevelopment Authority has housing with services.
- Lakeview Retirement Residence has assisted living/housing with services.
- North Star Apartments has housing with services.
- Northern Communities Hospice has a state classification of a class D hospice.
- Sunburst Acres Inc. provides housing with services.
- Ageless Care Options Inc. has a state classification of a Class A professional home care agency.
- Ardis Thompson has a state classification of a Class C individual para-professional.
- Roseau County Home Health Care has a state Classification of a Class A professional home care agency.

Fire Services

Fire departments are located in the towns of Badger, Greenbush, Roseau and Warroad. They are volunteer based. Fire departments in the area have aid agreements to help each other and neighboring towns in different counties/states in case of a large fire.

Emergency Services

The National Guard is also ready to assist stranded people, including snowbound travelers. The Civil Air Patrol (Minnesota Wing), Minnesota Highway Patrol and the Minnesota Search and Rescue Dog Association Inc. could also help in case of a large search and rescue operation.

Badger has a rescue squad that consists of sixteen first responders and EMTs. The squad communicates by radios and pagers. Immediate medical attention can be paid by these rescue groups for victims with major or minor injuries. Equipment for use by the squad includes long backboards, portable oxygen and

defibrillators.

Wannaska also has a first response squad. Eight first responders communicate with each other using pagers. Equipment for use includes long backboards, KEDs, portable suction and oxygen, and defibrillators.

The Northern Lights first responders consist of eighteen first responders and EMTs. They communicate with each other by the use of pagers. Equipment for use includes long backboards, portable suction and oxygen and KEDs.

Ambulance

Roseau EMS is located in the town of Roseau. Equipment for use includes long and short backboards, KEDs, cots, portable suction and oxygen and defibrillators. Warroad Rescue is located in the town of Warroad. Equipment for use includes long and short backboards, KEDs, cots, portable suction and oxygen and defibrillators. Tri-County Ambulance in Greenbush also has much of the same equipment.

County Public Health

Roseau Public Health provides the public healthcare for the county.

Police Stations

Police departments are located in the towns of Greenbush, Roseau and Warroad. The Roseau County sheriff also resides in Roseau.

Emergency Operations Center

The warning point for Roseau County is located at the Roseau County Sheriff's Department in Roseau. This locale was chosen because of the twenty-four hour warning capability it possesses. The Roseau County warning point officer is the Roseau County sheriff. The warning point officer is responsible that all statements and warnings are appropriately received and broadcasted. People notified by telephone, radio, and television include those living in affected cities, people in private/public facilities, and rural residents. NOAA weather alert broadcasts can also be heard on frequencies in Thief River Falls, Lake Bronson and Roosevelt. The issue now becomes getting the public to buy a NOAA weather alert radio. The warning point also is responsible for notifying the Emergency Alert System and activating the outdoor sirens in affected cities. Currently all urban areas are covered except for the Wannaska area and some trailer courts in the county.

The Emergency Operating Center (EOC) is located in the Roseau County sheriff's department in Roseau, Minnesota. The Roseau County Courthouse serves as an alternate EOC in case of need of a larger event. General duties of the EOC include coordination of response to hazard, including volunteer help, communication to local/state/federal governments and agencies, communication with the National Weather Service during serious weather, and producing suitable information for public viewing. Supplies at the disposal of the EOC for an emergency include but are not limited to:

Communication equipment - telephone, two-way radio

Extra supplies provided by county - paper, chairs, tables, maps, etc...

Food - from local grocery stores

Telecommunication

This media is one of the examples of the sources that broadcast severe weather alerts for the county. By using multiple media sources, Roseau County ensures that the maximum amount of people are warned about upcoming severe weather.

Radio stations:

- KRWB - Roseau
- KQ92 - Warroad
- KJ102 - Roseau

TV stations:

- No county-based television station. Viewers turn into television stations from Grand Forks, Fargo and Winnipeg.

Newspapers:

- Roseau Times
- Warroad Pioneer
- Greenbush Tribune

Power Facilities

Minnesota has two nuclear power plants. These power plants are not located in Roseau County, or any of the surrounding counties. Although a nuclear problem with these plants would affect Roseau County, it is not a hazard that is directly dealt with. The Roseau County EOP has a detailed section about what to do in the event of a nuclear or radiologic exposure.

Electricity needs for the county are met by three electric companies. Otter Tail Power resides in Greenbush, The Roseau Electric Cooperative, and North Star Electric in the eastern end of the county. Aquila provides the natural gas. Fuel is provided by several local/co-op stations in towns across Roseau County. There are also fuel pipelines that run underground through the entire area.

Due to homeland security, individual plants and substations will not be mapped out. Please see the emergency management staff for more information about this topic.

Socioeconomics

The socioeconomics section of this report defines Roseau County. Population, housing, employment and economic trends are discussed, both in past and future tenses. Key discussion is on how these four trends interact with each other. This section is important because it outlines the county's inhabitants, one of the most important reasons for hazard mitigation.

Population

The population of Roseau County is an important factor in the services it can give and receive from the people living within it. The greater number of

people living within a community demands a greater number of services than a smaller community. Consequently, a hazard will have a greater effect on an area with a greater population. More mitigation efforts might need to be concentrated on larger areas of population.

Roseau County Population - Census

	1950 Pop. Census	1960 Pop. Census	1970 Pop. Census	1980 Pop. Census	1990 Pop. Census	2000 Pop. Census	Change 90-2000
Barnett township	312	217	214	202	165	169	4
Barto township	278	181	181	164	128	142	14
Beaver township	169	111	92	103	91	103	12
Cedarbend township	178	157	118	134	251	230	(21)
Deer township	211	185	153	153	129	92	(37)
Dewey township	171	110	137	144	130	114	(16)
Dieter township	331	263	209	216	177	162	(15)
Enstrom township	337	239	196	263	478	580	102
Falun township	352	302	207	250	257	226	(31)
Golden Valley township	183	141	165	184	200	190	(10)
Greenbush city	713	706	787	817	800	784	(16)
Grimstad township	276	196	198	211	169	190	21
Hereim township	284	276	245	257	222	248	26
Huss township	215	218	185	165	125	145	20
Jadis township	546	517	425	544	545	564	19
Lake township	0	0	415	738	1,836	2,087	251
Laona township	351	249	223	286	527	578	51
Lind township	143	79	83	92	63	58	(5)
Malung township	388	336	310	349	390	427	37
Mickinock township	435	400	345	301	262	302	40
Moose township	171	142	131	150	122	134	12
Moranville township	535	392	334	402	789	940	151
Nereson township	153	104	123	115	105	69	(36)
Palmville township	120	63	38	58	53	55	2
Pohlitz township	157	102	66	52	42	36	(6)
Polonia township	165	131	96	71	56	38	(18)
Poplar Grove township	179	142	125	127	103	80	(23)
Reine township	191	112	90	89	92	115	23
Roosevelt city (part)	228	145	104	124	170	163	(7)
Roseau city	2,231	2,146	2,552	2,272	2,396	2,756	360
Ross township	328	217	214	320	342	454	112
Skagen township	271	194	192	212	220	235	15
Soler township	192	138	116	110	100	104	4
Spruce township	307	283	297	537	573	614	41
Stafford township	257	244	201	193	219	297	78

Stokes township	316	249	208	207	224	229	5
Strathcona city	143	64	31	47	40	29	(11)
Warroad city	1,276	1,309	1,086	1,216	1,679	1,722	43
Roseau Co. Unorganized	964	756	336	379	375	407	32
Total	14,505	12,154	11,555	12,574	15,026	16,338	1,312

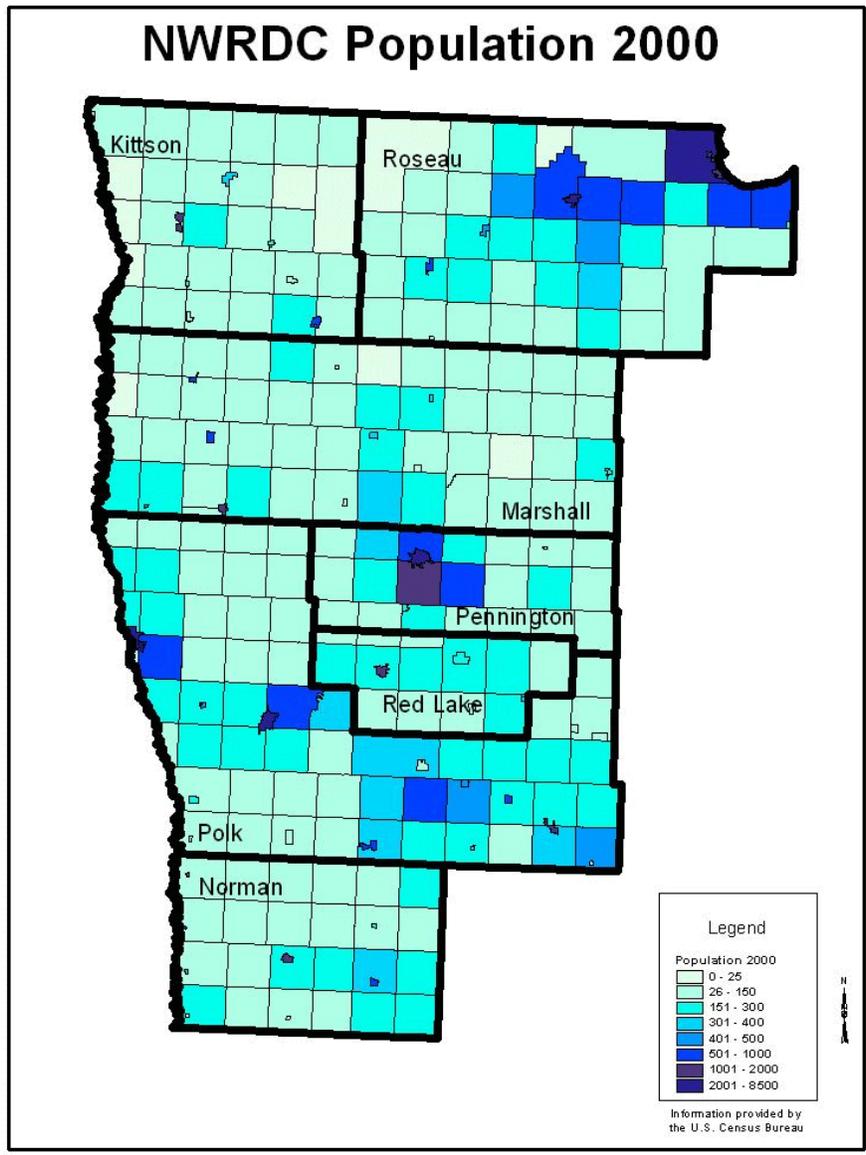
Source: U.S. Census of the Population

Roseau County is in a state of population increase. Companies like Polaris Industries and Marvin Windows and Doors are attracting people to the county. This increase is in contrast to the population decline that most surrounding counties are facing due to farming hardships. The city of Roseau saw the most growth, followed by a few townships: Lake, Moranville, and Ross.

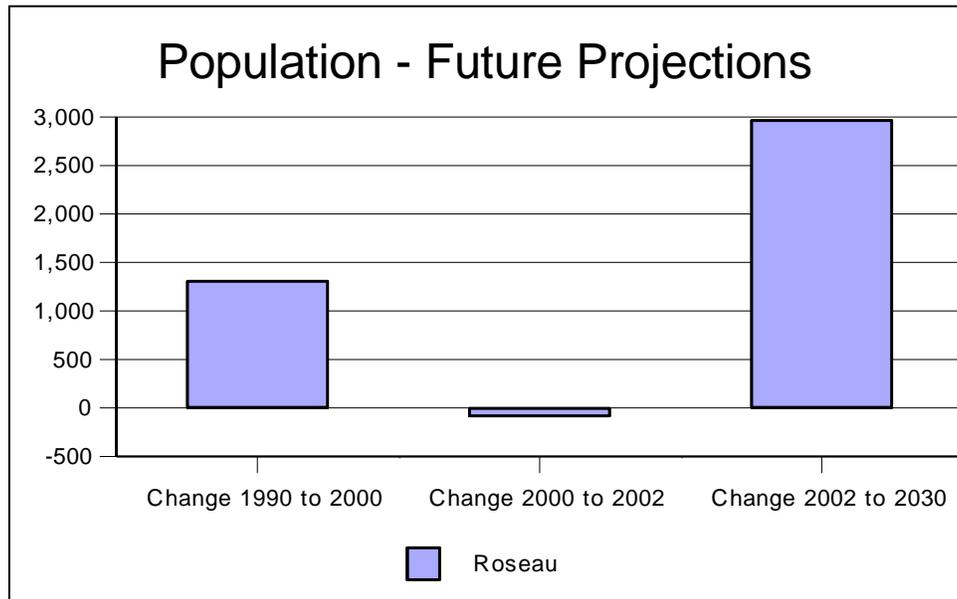
County	% Urban	% Rural
Kittson	0	100
Marshall	0	100
Norman	0	100
Pennington	68	32
Polk	49	51
Red Lake	0	100
Roseau	17	83

Source: U.S. Census Bureau, 2000

This is a population map of the northwest Minnesota area. Natural hazards have depopulated some of the areas around the Red River, with the exception of the city of East Grand Forks. Some areas are completely depopulated.



A population projection is highly important in trying to assess whether a given region will decline/increase in population. By using a population projection, a community can foresee whether it needs to acquire more services for its inhabitants and prepare for the future. This method does have its drawbacks though. Because the population projection is dependent on so many factors, the county cannot be in control of them all. This leads to the realization that although the population projection is accurate, there is a margin for error.

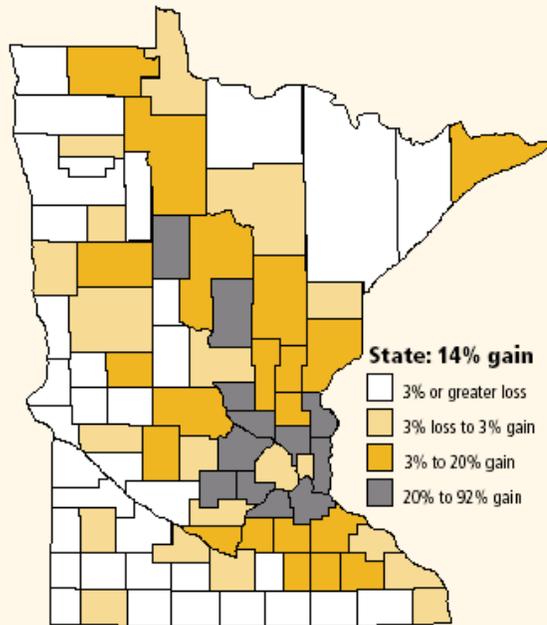


Source: U.S. Census of the Population and MN State Demographer's Office

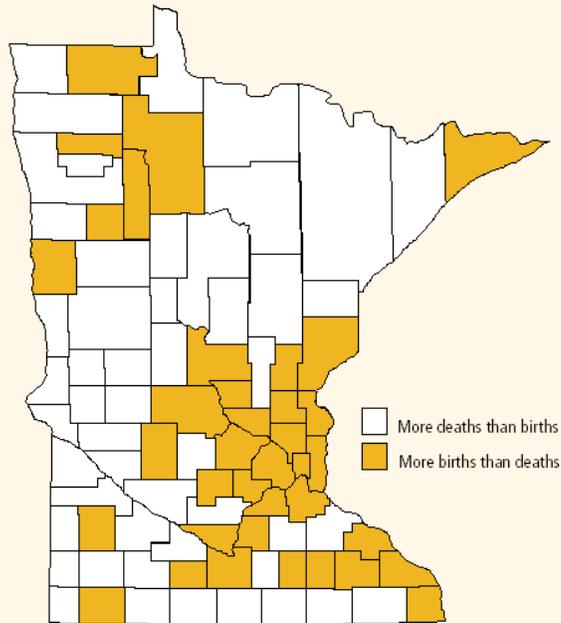
As of the year 2000, Roseau County had a population of 16,338. This is almost ten people per square mile. The population projection shows that the population will continue to grow for Roseau County. Some people theorize that this future growth is partially due to the rivers flowing through the county. People like to live near water, no matter what hazards are associated with it. As soon as there is no more housing space available near lakes, people will start moving near rivers. This combined with the quiet atmosphere and recreational opportunities makes Roseau County an ideal place to live. This idea could be marketed in future years to draw population to the area, but hazards such as subsidence and flooding would have to be taken into account. The rise in population along the river's edge could cause many hazards.

Minnesota Planning has also done some population projections about Minnesota. Below are various examples of how Roseau County compares to other Minnesota counties.

Suburban counties projected to grow fastest between 1995 and 2025



More deaths than births projected in majority of counties between 2020 and 2025



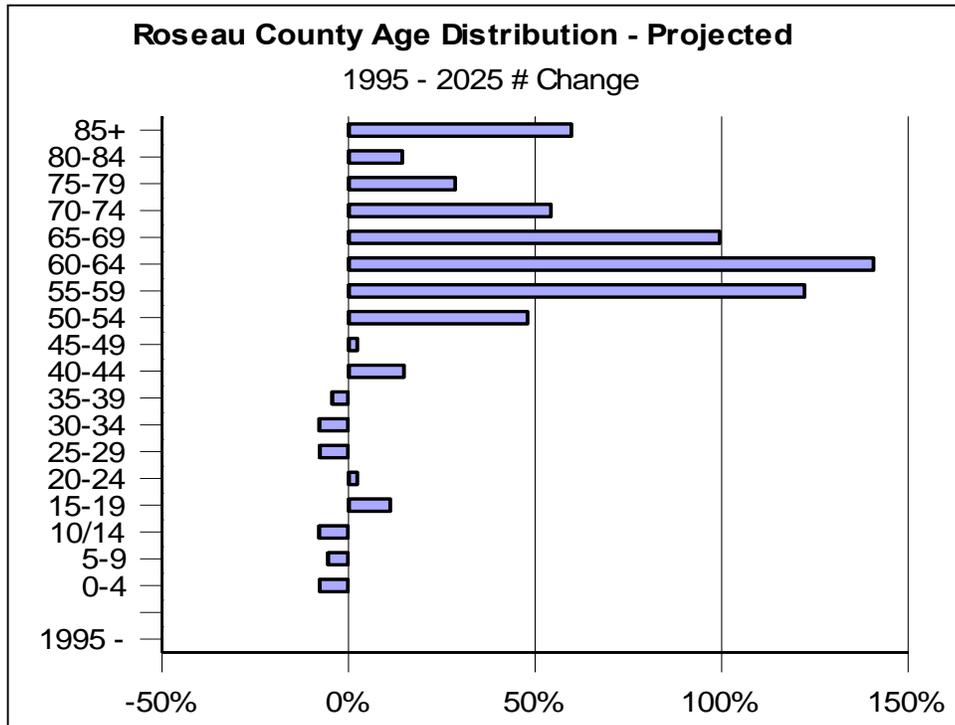
Age Characteristics

Roseau County Age Distribution - Historical

	1970	1980	1990	2000	Change 80-90	Change 90-2000
Total Population	11,569	12,574	15,026	16,338	2,452	1,312
Under 5 Years	979	1,074	1,443	1,185	369	(258)
5 to 17 Years	3,455	2,871	3,240	3,682	369	442
18 to 20 Years	336	601	450	524	(151)	74
21 to 24 Years	469	769	835	595	66	(240)
25 to 44 Years	2,226	3,029	4,590	4,893	1,561	303
45 to 54 Years	1,285	1,108	1,382	2,018	274	636
55 to 59 Years	688	640	519	785	(121)	266
60 to 64 Years	627	600	537	601	(63)	64
65 to 74 Years	857	1,105	1,043	915	(62)	(128)
75 to 84 Years	503	587	753	785	166	32
85 Years & Over	144	190	234	355	44	121
Under 18 Years	4,434	3,945	4,683	4,867	738	184
Percent of Pop.	38.3%	31.4%	31.2%	29.8%		
65 Years and Over	1,504	1,882	2,030	2,055	148	25
Percent of Pop.	13.0%	15.0%	13.5%	12.6%		
85 Years and Over	144	190	234	355	44	121
Percent of Pop.	1.2%	1.5%	1.6%	2.2%		

Source: U.S. Census of the Population

The population distribution chart confirms the fact that the population in Roseau County is increasing. Nearly every age category except three saw an increase in the last ten years. A good portion of the population in Roseau County is young. The twenty-five to forty-four age group has the most people followed by the forty-five to fifty-four age group. These are the years that people typically start a family. The fact that people aged eighteen and younger makes up almost thirty percent of the population testifies to the fact that many people are settling in Roseau County. It is a bonus to the economic status of Roseau County if it can draw and keep young families in the area.

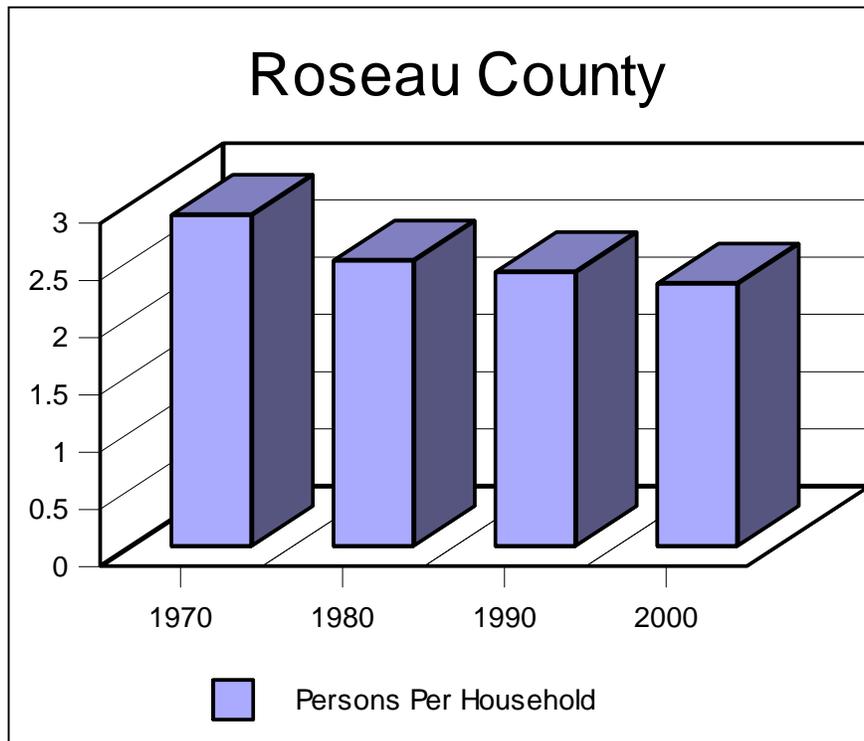


Source: MN State Demographer's Office

The population distribution does not show Roseau County as staying a young county. Growth is seen in every age group above 40, some exceeding 100%. Roseau County will be getting older in coming years. Certain changes must be incorporated to ensure the safety of citizens including transportation and housing alterations.

Household Characteristics

The average household size has much effect on the population and the community. It can affect land usage in the town, what kind of housing is built, and what kind of needs the community will have and the services it will receive. Looking at the charts below, it is documented that the total people living in one household in Roseau County is decreasing. This could be due to many factors including couples not having as many children, people staying single for a longer duration, and couples getting separated/divorced. This change in the household size will affect both the need for housing, and the types of housing built. The general statement is that when the household size decreases, the number of housing units must increase. This is true even in an area of population loss, and is documented in the table below.



Source: U.S. Census of the Population

The types of households are listed below. Family households constitute the major portion of households in Roseau County. Other types of households do exist, but are not a composition of the majority of the population.

Types of Households	Number	Percent
Family households (families)	4,439	71.7
Married-couple family	3,717	60
Female householder	424	6.8
Nonfamily households	1,751	28.3
Total households	6,190	100
Householder living alone	1,522	24.6
Householder 65 years and over	613	9.9

Source: 2000 Census of the Population

Apartment rentals provide a place to live for a specific part of the population. Many students, single people, and the elderly choose to live in an apartment instead of owning a house. The demand for apartments fluctuates depending on the economy. Once demand for apartments increases, demands for other sectors will have to increase as well, such as transportation, education, etc... As you can see in the graph below, only 16.2 percent of total housing available is renter occupied. The majority of housing is owner-occupied, making individuals' duration in Roseau County longer. There

is an 11.1 percent renter vacancy rate, so apartments are available. This compares to a 2.8 percent homeowner vacancy rate.

RENT PAYED	Number	Percent
Less than \$200	103	11.6
\$200 to \$299	81	9.1
\$300 to \$499	393	44.4
\$500 to \$749	236	26.6
\$750 to \$999	4	0.5
\$1,000 to \$1,499	0	0
\$1,500 or more	0	0
No cash rent	69	7.8
Median (dollars)	442	N/A

Source: 2000 Census of the Population

The amount of apartments available for rent can be a double-edged sword. Having too many empty apartments can hurt a struggling county just like not having enough apartments. Landlords will agree that it is better to rent an apartment at a low price than to leave it empty and collect nothing at all. To entice people to rent their apartment, they discount it. If a landlord is not making profit on an apartment, they will be less inclined to fix it. This is the case with old buildings serving as apartments in parts of Roseau County. In addition, if a landlord is not making any money, there will be less new housing built in a particular town. This could be a devastating fact for a town whose elderly/single population is growing, or whose persons per household ratio is decreasing.

Occupancy of Housing	Number	Percent
Occupied housing units	6,190	87.2
Vacant housing units	911	12.8
Seasonal, recreational, or occasional use (vacant)	357	5
Total housing units	7,101	100

Source: 2000 Census of the Population

Housing Types	Number	Percent
Occupied housing units	6,190	100
Owner-occupied housing units	5,188	83.8
Renter-occupied housing units	1,002	16.2

Source: 2000 Census of the Population

The age of housing in Roseau County is an important factor to consider. Older units need structural improvement to protect against becoming obsolete. If not kept up, older rundown homes can give the town and county a poor aesthetic appearance as well as be a potential danger for many residents. Some older homes also contain lead paint and asbestos, materials that were

harmless in the past, but are presently considered dangerous. Maintain and preservation of existing housing is just as significant as bringing new housing to the community. Older housing is a reflection of the rich historical heritage of Roseau County; a variety of accommodations are required to attract people to the region.

Housing Age	Minnesota	Roseau
Total	2,065,946	7,101
Built 1999 to March 2000	48,172	87
Built 1995 to 1998	136,340	597
Built 1990 to 1994	148,759	619
Built 1980 to 1989	299,068	1,257
Built 1970 to 1979	375,503	1,729
Built 1960 to 1969	247,952	624
Built 1950 to 1959	249,830	569
Built 1940 to 1949	133,047	508
Built 1939 or earlier	427,275	1,111

VALUE OF HOUSING	Number	Percent
Less than \$50,000	476	20.3
\$50,000 to \$99,999	1,324	56.4
\$100,000 to \$149,999	440	18.8
\$150,000 to \$199,999	91	3.9
\$200,000 to \$299,999	13	0.6
\$300,000 to \$499,999	2	0.1
\$500,000 to \$999,999	0	0
\$1,000,000 or more	0	0
Median (dollars)	76,300	N/A

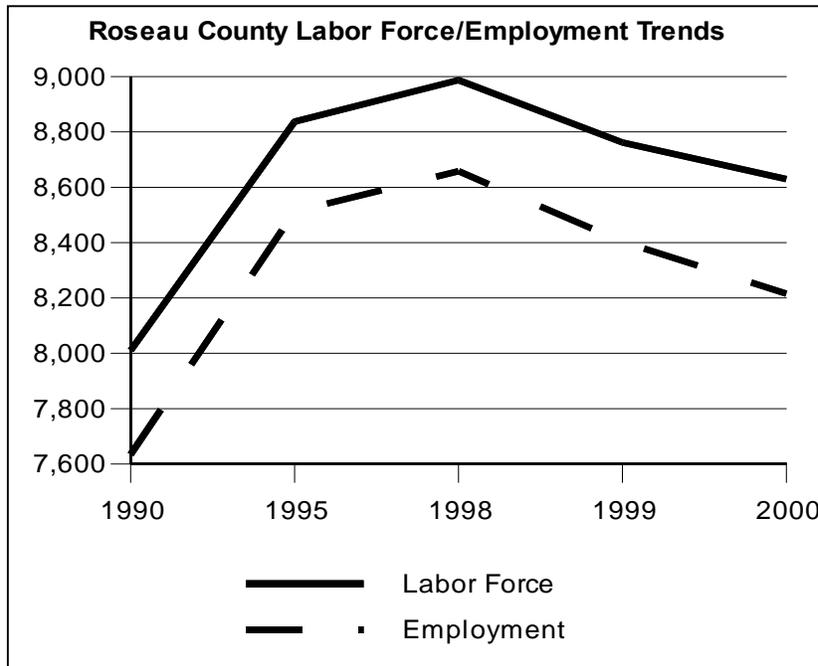
Source: 2000 Census of the Population (both)

From the graph above, it is easy to see that fewer houses are being built presently than in the past. The expected depopulation from the 2002 flood did not occur; people stayed in the area because they had employment (Todd Peterson, city planner). The flood took out around fifty homes and around twelve rental units in Roseau, leaving many people homeless. With Polaris Industries expanding and hiring about 200 more people in the next year, the city and county of Roseau is facing a housing shortage. As of September 2003, twenty-four families were living in FEMA housing waiting for home repairs or a new home entirely. Another fifty-two families are waiting for small home repairs. More than 2,000 Polaris employees have to commute to work, some over seventy-five miles a day. Contractors are working around the clock trying to keep up with Roseau's growth. Local companies such as Polaris and Marvin's Windows contribute to the Roseau County Affordable Housing Loan Pool. This program provides local home buyers assistance with down payments.

Economic Synopsis

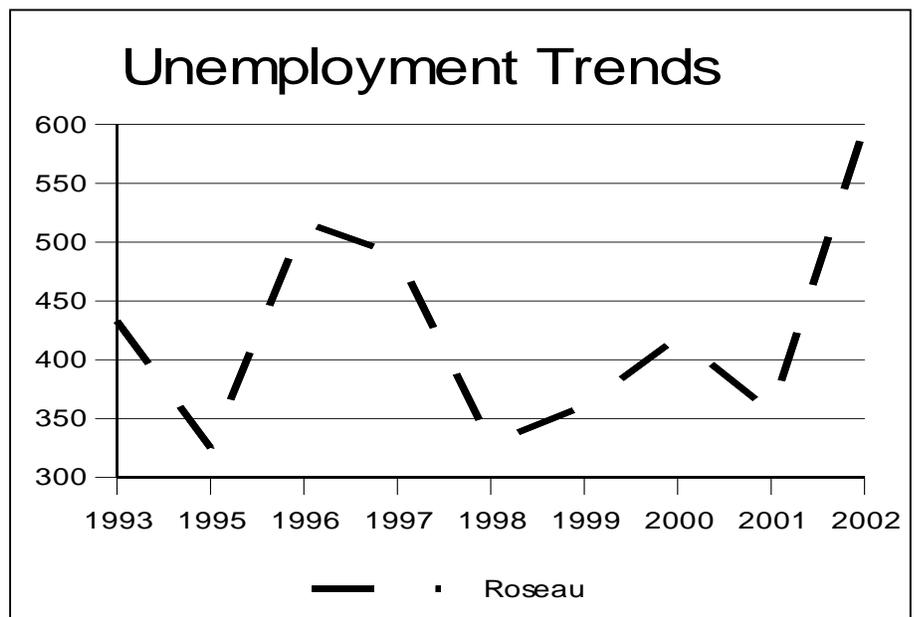
Employment plays a critical role in the economic future of Roseau County. Job growth is one of the main reasons why a community grows and develops. Having a business that is expanding can in turn promote settlement to a specific region and cause a shift in the population.

The labor force and employment followed similar trends in Roseau County. The labor force rose as more jobs were available, and fell when employment was low.



Source: Minnesota Department of Economic Security (both)

Unemployment in Roseau County is very diverse. During an eight year increase in labor force and employment from 1993 to 2002, unemployment varied from a ten year high to a ten year low. The only trend that makes sense is during 1998 to 2000. A decrease in employment and labor force saw an increase in unemployment.



Employment for Roseau County is on the rise. The service sector saw the most gain, followed by manufacturing. These two are also the sectors that employ the most people. This could be due to prosperous companies such as Polaris in Roseau and Marvin Windows and Doors in Warroad. Approximately 1,800 people work at Polaris Industries, less than half live in the city of Roseau. Marvin Windows employs about 2,900. Many businesses in the County benefit from Polaris Industries such as Intercept Industries (contract assembly from Polaris) and Woodland Container Corporation (crates for Polaris). Other employers of Roseau County citizens include Roseau area hospitals, Roseau School District #684, Roseau County, Central Boiler, the state of Minnesota, and other U.S. government offices in the region. The growth illustrated in the chart below could contribute to the further development of Roseau County and the region around it.

	Roseau	
	1990	2000
Farming	1370	1352
Ag Service	70	123
Mining	(L)	0
Cont.	197	295
Man.	4309	4869
Trans.	149	261
Whole.	205	166
Retail	1110	1316
Fin.	199	373
Service	1390	2381
Gov.	999	1012
Total	10006	12148

(L)= Less than 10 jobs.

Source: U.S. Bureau of Economic Analysis

Current economic trends for the region (Kittson, Marshall, Norman, Polk, Pennington, Red Lake and Roseau Counties) are as follows:

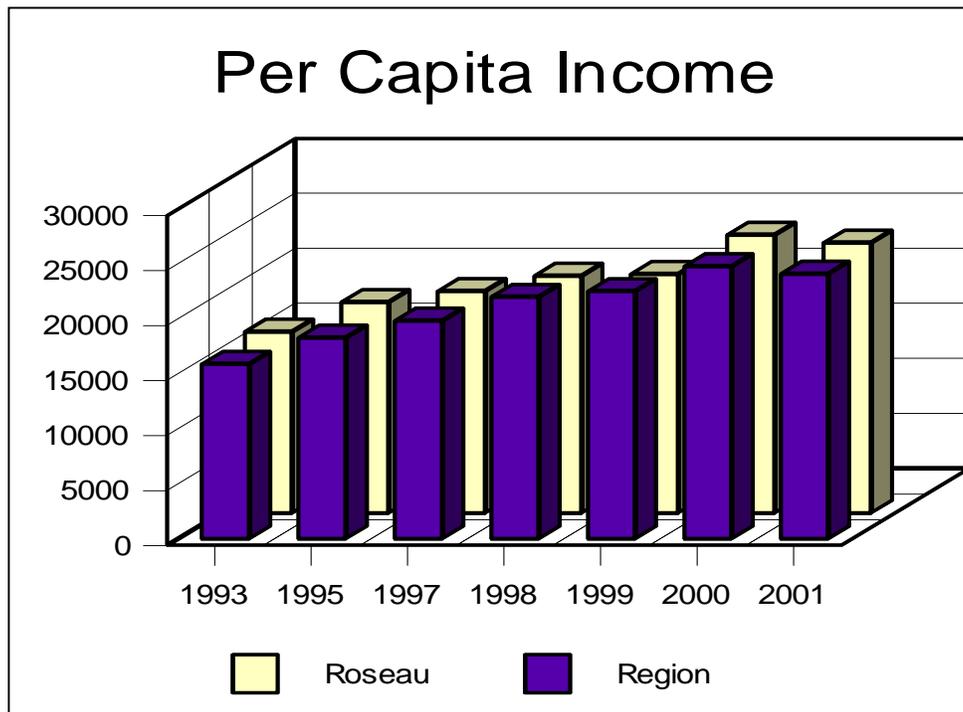
1. Aspects of agriculture have plummeted in recent years. Counties in the region with the most population loss often are agriculturally dependent. Population loss is an important issue in many counties.
2. Employment in the region has increased since 1990, but it is not an even growth. The gain is not enough to prevent population loss. Large losses are seen in agriculture and self employment.
3. Some recent growth in the service and retail portions of the workforce is related to outside visitors coming to the region and surrounding areas for recreational purposes.
4. Agricultural lands and natural areas are a majority of the landscape in the region. The ensuing environment befits the

preferences of a rural population.

Development trends for Roseau County are discussed at the following website: (<http://www.mnpro.com/>). A community profile link lists the following area specific information about northwest Minnesota cities: major employers, workforce, utilities, telecommunications, commercial transportation/shipping, housing/commercial activity, business/community service, education, government, property taxes, commercial buildings/land sites, economic development services and disaster/emergency contacts. This website provides a great insight into the development trends of Roseau County in the past, present and future.

Income

The income for Roseau County has been on the rise. A region with higher income has the power to draw more people and businesses in the future. Since 1993, Roseau County has almost equaled or exceeded the region in terms of per capita income. A business can be encouraged to come into an area to relocate, start or expand when a good chance of profit stands to be made.



Source: Bureau of Economic Analysis

Farming is an important part of the economy of Roseau County. Roseau County is located in the Red River Valley, a region known predominately for wheat. With proper drainage, the rich soil deposits left by Lake Agassiz make the county prime for agricultural use. Percentages and acreage of popular crops are listed below. Not all crops or livestock are mentioned on this list, this has nothing to do with importance of a certain crop to this county. Many local people have been farming for generations. Farming started in

Roseau County in 1886. In past years, farming was the principal occupation for many people. As the employment chart illustrates, there has been much turnover in recent years in what was once a very profitable trade.

Cropland	Acres	Percent
Total County Area	1,074,065	100
Cropland	439,145	41
CRP Land (% of cropland)	65,089	15
Corn (% of cropland)	6,500	1
Wheat (% of cropland)	162,300	37
Oats (% of cropland)	10,300	2
Hay (% of cropland)	76,500	17
Number of Cattle	29,500	N/A
Number of Hogs	5,300	N/A

Source: University of Minnesota, Dept. of Soil, Water, and Climate

Minnesota's Top Ten Crop Producing Counties of 2002

Crop	1	2	3	4	5
Corn for Grain	Renville	Martin	Redwood	Faribault	Mower
Wheat	Polk	Marshall	Clay	Wilkin	Kittson
Oats	Stearns	Otter Tail	Fillmore	Wabasha	Winona
Barley	Marshall	Polk	Pennington	Roseau	Kittson
Sunflowers	Marshall	Norman	Clay	Polk	Roseau
Sugar Beets	Polk	Wilkin	Clay	Renville	Marshall
Canola	Roseau	Marshall	Kittson	Lake of the Woods	Pennington
Flaxseed	Marshall	Roseau	-	-	-
Dry Edible Beans	Polk	Otter Tail	Hubbard	Renville	Marshall
Potatoes	Sherburne	Morrison	Polk	Todd	Benton

Crop	6	7	8	9	10
Corn for Grain	Freeborn	Blue Earth	Jackson	Lyon	Yellow Medicine
Wheat	Norman	Otter Tail	Traverse	Becker	Grant
Oats	Todd	Olmsted	Roseau	Houston	Goodhue
Barley	Norman	Wilkin	Stearns	Clay	Otter Tail
Sunflowers	Kittson	Wilkin	Otter Tail	Pennington	Red Lake
Sugar Beets	Kittson	Chippewa	Norman	Kandiyohi	Grant
Canola	Clay	Red Lake	-	-	-
Dry Edible Beans	Kandiyohi	Swift	Norman	Morrison	Clay
Potatoes	Freeborn	Clay	Marshall	Kittson	Red Lake

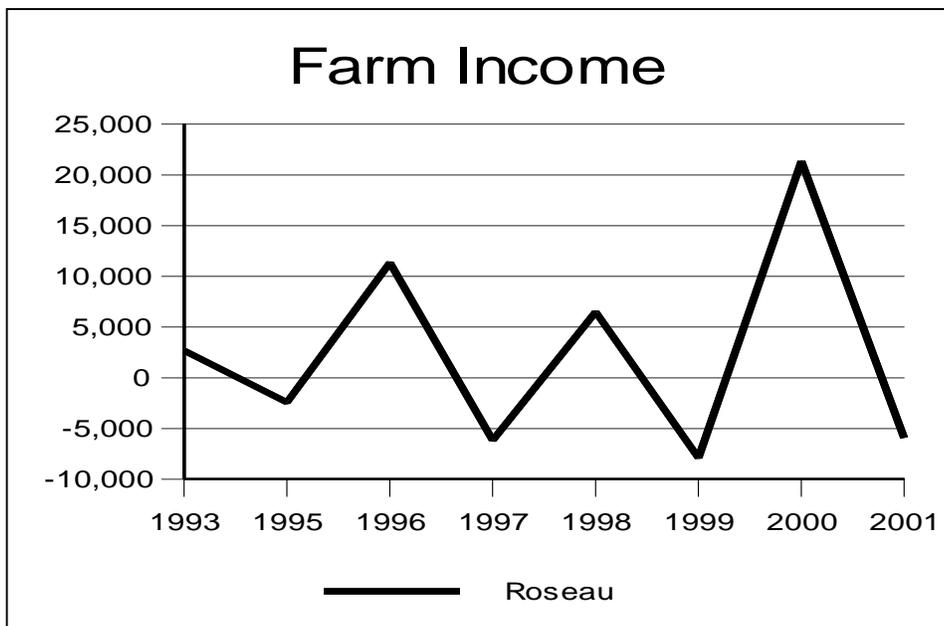
Source: Minnesota Agriculture Statistics Service

Roseau County Agriculture Profile

	1987	1992	1997	Change 87 to 97
Farms	1,124	891	1,051	(73)
500 to 999 acres	232	186	180	(52)
1,000 + acres	162	143	152	(10)

Source: U.S. Census of Agriculture

We see that the income in the farming industry changes from year to year, sometimes to the extreme. This is a contrast to the general income of Roseau County, which is on the rise. The income in this county is no where close to the region's agriculture income. This is partially the reason why fewer people are farming in Roseau County every year. The up and down income is more than some people can afford. If not for programs like crop insurance and disaster payments, the people that are involved in the farming occupation might be even less. Many farmers have already found it too difficult to continue and are employed elsewhere. The regional farm income trends are similar. The agriculture industry in general has seen much fluxuation in the last decade.

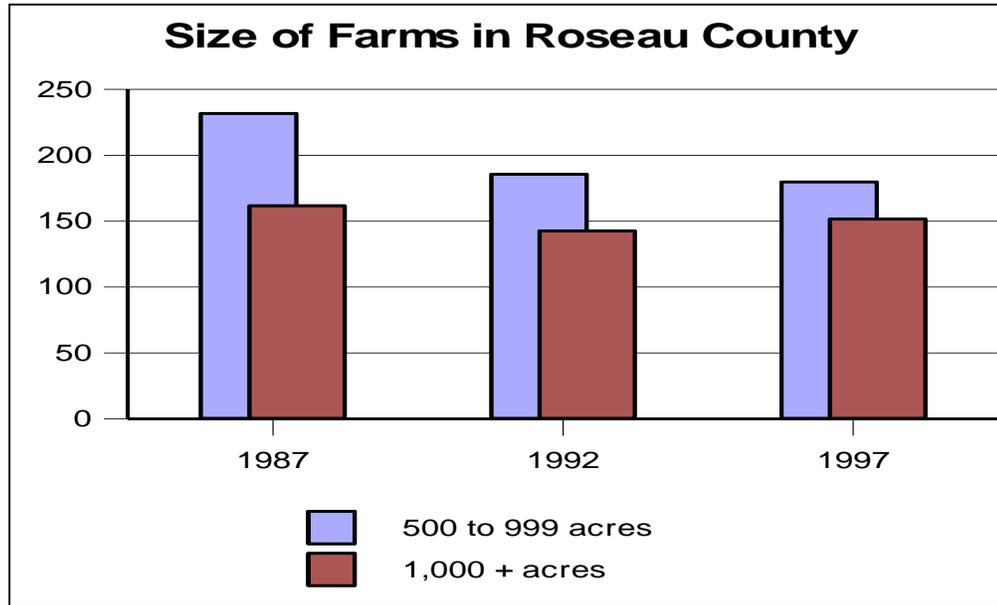


Source: Bureau of Economic Analysis

A number of strains placed on the farmer in recent years have made farming extremely unprofitable. These strains include poor crop price, low yields, and deficient growing conditions. The number of total farms has seen a decline in recent years. The smaller farms seem to be hit hardest, while larger farmers can survive the negligible circumstances. It seems that having larger acreage farms helps resist the hardships and rising expenses that often plague farmers.

One of these expenses is federal crop insurance. It has been rising in

recent years. Farmers are almost required to have this to plant to show any sort of gain, and it is necessary to have some sort of insurance with the recent past in mind. The higher this insurance rises (due to past hazards such as storms and flooding), the less profit farmers see at the end of the year.



Source: U.S. Census of Agriculture

Farmers are also important in hazard control and prevention, not only to Roseau County, but also to Northwest Minnesota. Farmers have been a great assistance in the past, as the equipment they possess has been essential in the construction of certain structures necessary to fight floods and other hazards. The creation of dikes in limited amounts of time to protect against flooding is just one example. The manpower and machinery that the farmers of Roseau County possess is a great strength to the mitigation efforts currently going on and much appreciation and gratitude should go out to these individuals during emergency situations.

Step II: Hazard Identification

Natural Hazards

A natural hazard is defined as any physical event that harms man, but is not caused by man. This section deals with hazards that are atmospheric, hydrologic, geologic, or viral in nature.

Winter Storms

Roseau County experiences three basic types of winter storms: blizzards, heavy snow events and ice storms. Ice storms include freezing rain, freezing drizzle and sleet.

Blizzards

Blizzards, the most violent of the winter storms, are characterized by low temperatures, usually below twenty degrees Fahrenheit, accompanied by strong winds. Winds in excess of thirty-five miles per hour carry falling or blowing snow to create visibilities of one-quarter mile or less for an extended period of time, usually above three hours. To see the dangers of a snowstorm or heavy snow, please refer to the blizzard section above.

Blizzards are very dangerous storms. In a short period of time, they can cripple large areas and kill humans and animals from overexposure. Blizzards can occur anytime from the beginning of October through the end of April. A heavy snow can enhance an already weak structure flaw on a building. Power outages, transportation slow down, lack of communications, and inability to obtain certain goods or services are all problems of a large blizzard. Alternate ways of heating when the power goes out can cause fires. Agriculture is also affected by blizzards. Too early of a storm can affect harvest, and too late of one can affect spring planting. This can affect the economy. The economy can also be affected during a heavy snowfall season when snow removal costs are higher than usual or when people are continuously prevented from working at a facility.

Ice Storms

Freezing rain occurs during a precipitation event. Warm air above the surface exceeds thirty-two degrees while the surface remains below the freezing point. When precipitation (rain or drizzle) contacts physical structures on the surface, a coating of ice forms. This creates many problems for traffic, utility lines and tree limbs. Photo examples below are courtesy of Sterling public submitted weather photos.



Ice coatings can range to one inch in thickness and cause many hazards. Motorists and pedestrians are at risk due to slippery conditions. Thick ice coatings can get quite heavy and cause trees and power lines to topple, as well as communications towers. The potential lapse in power and communications can interrupt many essential services. The effects can be felt community wide, especially on populations such as the elderly and certain hospitalized people. Economic loss can be seen during outages that last for days. Businesses also suffer as some workers are not able to be present.



Sleet Storms

Sleet forms when precipitation (rain or partially melted snowflakes) falls through a rather large layer of the atmosphere that has below freezing temperatures. This cold section allows the rain drops or snowflakes to freeze before coming into contact with the ground. Sleet storms are often accompanied by either snow or rain, depositing ice on exposed physical structures. This type of storm only develops during the winter months, and is difficult to forecast.

Sleet is also referred to as ice pellets, but is not the same as an ice storm due to the specialized atmospheric conditions that sleet forms under. Sleet is also similar to freezing rain, but is differentiable due to its visibility. Sleet does not deposit on trees or wires, but can cause hazardous driving conditions if there is a considerable amount. A half of inch or more of sleet is termed "heavy" and is a rarity. Economic hardships on the county are also seen in a sleet storm; many are the same as the ones outlined in the ice storm section.

Heavy Snow or Snowstorm

In Minnesota a heavy snow event is defined by six or more inches of snow in a twelve-hour period and eight or more inches of snow in a twenty-four hour period. Snow is considered heavy when visibilities drop below one-quarter mile regardless of wind speed.

A MNDOT estimate states that there are at least four thousand problem sites on Minnesota roads that need snowdrift protection. The living snow fence program is a great way to combat conditions caused by heavy precipitating snowstorms or blizzards. A living snow fence is a designed planting of trees, shrubs and/or native grasses located near roads, ditches, cities and residences to trap or control snow. A typically low cost solution, these fences have many benefits including: better road visibility, more open drainage systems resulting in the reduction of flooding potential, a decrease in the cost of snow removal (twenty percent reduction in energy costs according to the Univ. of MN Extension Office) and a reduction in soil erosion. Private landowners are most important to this process and because their land is being used to protect the public, some sort of compensation is necessary for the location of the snow fence as well as any inconveniences.

Extreme Cold

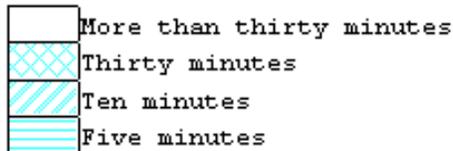
Severe wind chills are also a problem in Roseau County. The flat, treeless plain makes the area more inclined to be affected by the high winds. It is also a symptom of a typical Minnesota winter. During the winter months, temperatures can dip dangerously low. It is common for a period of days to go by when the temperature does not reach zero. During these cold spells, fatalities can occur if people or animals are outside too long. Skin can freeze in seconds, and hypothermia can also be a problem.

Power outages can be deadly if the time lapse is long enough. If there is no generator at a particular structure, only alternative heating methods are available to warm a building. In addition, the alternative heating methods cause an increase in the amount of structural fires, especially wood heating

stoves. Roseau County has a heating assistance program through Northwest Community Action for people who have a hard time paying the high utility bills that collect during winter months. The city also cannot disconnect the power or gas during the winter.

The graph below shows the time it takes to develop frostbite. The wind is an important factor because it carries heat away from the body faster, causing frostbite to develop at a more rapid pace. It is important to consider that frostbite can also occur at temperatures higher than those shown on the graph.

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



Source: U.S. National Weather Service

This freezing cold can have a statewide effect, like on January 15, 1994. Wind chills reached temperatures of eighty degrees below zero, and affected every county in Minnesota. Roads were slippery when automobile exhaust immediately froze to the cold roads, causing accidents. Water lines also froze, even affecting an entire city. On February 1, 1996, the cold weather that affected a nineteen-county area caused a power cable to go out, leaving seventy-five residents seventy-one hours without power. Those people said that it got to fifty-six degrees below zero.

-On January 4, 2004, wind chills more than sixty degrees below zero were felt in eleven counties for two days. A steady wind was felt through this spell.

-On January 21, 2004, wind chills over forty degrees below zero were felt in nine counties.

-An almost six-day cold snap affected eighteen counties in Minnesota. Starting January 26, 2004 after the two-day winter storm, wind chills dropped to sixty-five degrees below zero. Power outages occurred, albeit brief. Many people reported car trouble.

-A low pressure near the Hudson Bay helped to create an extreme cold condition on June 23, 2004. Eighteen counties had temperatures cold enough to create frost, killing sensitive crops. Temperatures reached thirty-two degrees, and some record lows were set in the area.

The cold weather does not only affect humans. Countless other structures and

properties are damaged by the cold temperatures. Roads are just one example of a structure impaired by the cold, specifically frost related. A frost heave is caused by the expansion of materials in the road as freezing occurs. When thawing transpires, the materials weaken and the load capacity decreases, creating a frost boil. Multiple road repairs have to be done because of frost heaves and boils; this is seen as a very symptomatic problem in northern Minnesota and engineers have problems under control as they develop.

History

Date	Type	Counties affected	Snow (in.)	Winter Storm Details
01/12/1993	Snow	12	up to 14	Many events were cancelled. Numerous traffic accidents occurred during this two day storm.
04/26/1994	Snow	12	up to 9	N/A
03/04/1995	Snow	61	more than 10	Low pressure brought heavy snowfall. Up to forty-five mph. wind gusts created whiteout conditions and drifts that were up to five feet high in places.
02/22/1996	Ice	13	N/A	No travel advised due to freezing rain. Many traffic accidents occurred and hospitals were busy with broken bones.
04/25/1996	Snow	2	Up to 10	A snowstorm combined with twenty-five mph winds caused whiteout conditions in Roseau County.
01/30/1997	Ice	13	N/A	Many accidents because of 0.05 inches of freezing rain. Police could not reach some accident scenes to help travelers.
04/04/1997	Ice	8	N/A	Freezing rain coated exposed surfaces with up to an inch of ice. Power lines and poles were damaged. Thunder and lightning accompanied the beginning of the storm in some areas.
11/18/1998	Winter Storm	12	up to 17	A low pressure system brought heavy snow preceded by thunder and lightning. The storm did not have strong winds, but visibility was still poor. Many events were closed.
01/17/1999	Snow	5	up to 6	A low pressure system produced heavy snow.
04/01/1999	Winter Storm	4	up to 7	A low pressure system brought a mixture of freezing rain and snow. Lines were downed and power was lost.
04/03/1999	Winter Storm	5	up to 6	A low pressure system brought another mixture of freezing rain and snow two days after a previous winter storm. Hundreds of people lost their power.
12/20/2000	Winter Storm	8	up to 6	N/A

10/24/2001	Winter Storm	4	up to 7	A storm occurred early in the winter season with gusty winds that reduced visibility
12/05/2001	Winter Storm	8	up to 2	A low pressure system brought a combo of freezing rain, strong wind, and snow. Exposed surfaces were covered with a quarter inch of ice. Slick roads made driving hazardous and accidents likely
03/08/2002	Winter Storm	18	up to 6	Strong wind gusts up to forty-seven mph created visibilities as low as a quarter mile to a half mile.
03/26/2003	Snow	5	up to 12	Light rain turned to heavy snow in this storm. A heavy snow warning was issued, as tree branches began to damage power lines and cause power outages.
04/04/2003	Snow	5	up to 8	Heavy snow warning issued
12/15/2003	Winter Storm	15	up to 6.5	A low pressure system created this storm. Because wind speeds increased after the heaviest snow fell, visibility neared zero.
01/02/2004	Winter Storm	7	up to 8	Twenty to forty-five mph winds caused near zero visibility, cancelling many events.
01/24/2004	Winter Storm	18	up to 24	This two day storm was characterized by heavy snow and wind chills nearing thirty below. Some areas had no mail service and many activities were cancelled. It was the heaviest snowfall since the 1996/1997 winter.
12/11/2004	Winter Storm	12	up to 6	Low pressure system that began as a rain/freezing rain mixture. Gusts were reported over fifty-eight mph, causing whiteout conditions.
12/29/2004	Winter Storm	13	up to 10	Freezing rain (up to a quarter inch of ice) changing to snow characterized this storm. Wind speeds picked up, causing visibility restrictions.
12/31/2004	Winter Storm	16	up to 8	Freezing drizzle and snow caused concern, but blowing snow was not a factor. No travel was advised.
11/27/2005	Winter Storm	8	up to 14	Rain and freezing rain coated structures with up to an inch of ice. Wind speeds increased, breaking power lines in vast numbers and causing visibility issues. Thousands of people in MN/ND lost power as several thousand power poles were snapped. Roads were blocked by trees, branches and power lines.
03/01/2006	Heavy Snow	5	up to 12	Heavy snow fell along the Canadian border from Cando, ND to Baudette, MN. Road quality deteriorated.

Source: National Climactic Data Center

Summer Storms

Summer storms affecting Roseau County include thunderstorms, tornadoes, hailstorms and windstorms.

Thunderstorms

Thunderstorms are the most common summer storm in Roseau County. A process of convection forms thunderstorms: a cyclic process of warm air rising and cool air falling. Thunderstorms are usually produced by cumulonimbus clouds, always accompanied by lightning, and usually contain strong wind gusts, heavy rain and sometimes hail or tornadoes. Thunderstorms can occur singly, in a cluster, or in a line. It is conceivable that several thunderstorms can impact an area in a few hours time.

Lightning

Lightning is probably the most frequent hazard associated with thunderstorms and the hazard that causes the most loss of life. Lightning occurs to balance the difference between positive and negative discharges within a cloud, between two clouds, and between the cloud and the ground. For example, a negative charge at the base of the cloud is attracted to a positive charge on the ground. When the difference between the two charges becomes great enough, a lightning bolt strikes with a temperature around 50,000 degrees Fahrenheit. The charge is usually strongest on tall buildings, trees and other objects protruding from the surface and consequently such objects are more likely to be struck than lower objects. The awesome power of lightning can start fires, electrocute people and animals on contact, split trees, and cause electrical failures affecting the activities of many people.

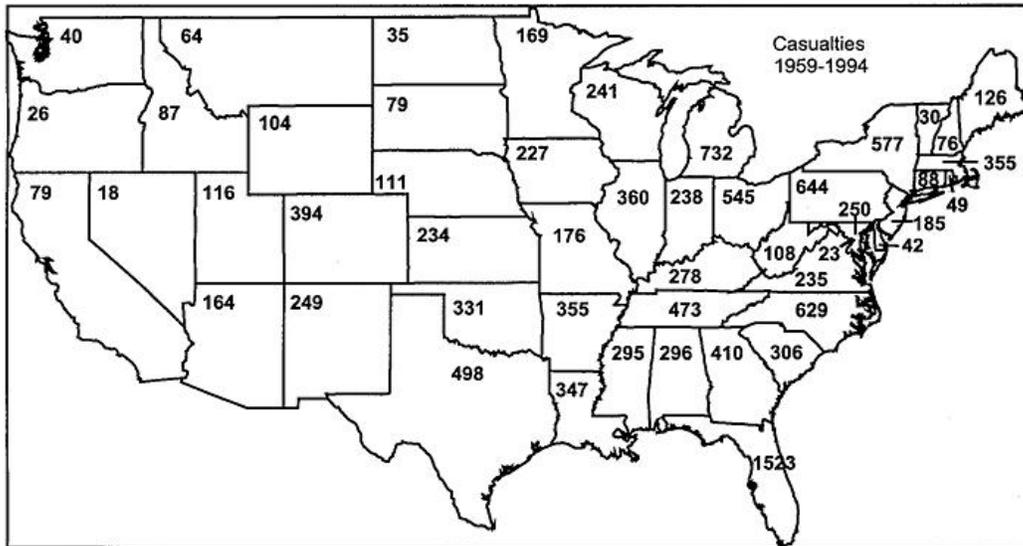


Source: NOAA, National Weather Service, 45th Weather Squadron

While cloud-to-ground lightning poses the greatest threat to people and objects on the ground it actually accounts for only 20 percent of all lightning strikes. The remaining lightning occurs within the cloud, from cloud to cloud or from the ground to the cloud with in-cloud lightning being

the most common. According to the Natural Weather Service, lightning strikes kill more people than winter storms, tornadoes, and hurricanes combined (in a normal year).

Lightning Strike Casualties in the United States



Source: Local Planning Assistance

Tornado

Tornadoes are one of the most violent types of storm. The tornado is essentially a comparatively short-lived rapidly rotating column of air that is spawned by a cumulonimbus cloud. Warm air ascends quickly because of the layer of cool air directly over it. When it drops to the ground, it can create significant damage and loss of life. Tornadoes always occur in association with thunderstorms, and almost every thunderstorm carries the potential to spawn one. A thunderstorm in a dark, greenish tinted sky with hail could signal a possible tornado. A loud roar described as sounding like a freight train can also be heard.

Tornadoes are most likely to occur during warm humid spells but have occurred as early as March and as late as November in Minnesota. Cold air funnels occur after the passage of a cold front. The air is much less humid but the air aloft is very cold creating enough instability to make funnel clouds. Most tornadoes occur during the warm part of the day - late afternoon or early evening. More than eighty percent of tornadoes occur between noon and midnight.

The tornado's path typically ranges from 250 feet to a quarter of a mile in width. The speed of a tornado varies but commonly is between twenty and thirty mph. Tornadoes will travel up to sixty mph and have wind speeds up to 400 mph in the center of the storm. Most tornadoes stay on the ground for less than five minutes and frequently move from the southwest to the northeast but this is variable and cannot be counted on in all instances.

Dr. T. Theodore Fujita developed the Fujita tornado scale in 1971. This scale has six categories that define a spawned tornado. This scale can assess wind speed based on the building and structure damage. The six categories are described below:

F0: This is also known as a gale tornado, in which the maximum wind speed reaches between 40 and 72 mph. It causes light damage (damage to trees, chimneys, and windows).

F1: This is also known as a moderate tornado, in which the maximum wind speed reaches between 73 and 112 mph. It causes moderate damage (damage to roofs, mobile homes and cars).

F2: This is known as a significant tornado, in which the maximum wind speed is between 113 and 157 mph. It causes considerable damage (damage to weak foundations, totaled mobile homes, boxcars, and missiles from light weighted objects).

F3: This is known as a severe tornado, in which the maximum wind speed is between 158 and 206 mph. It causes severe damage (damage to weak pavement, trains, and heavy automobiles).

F4: This is known as a devastating tornado, in which the maximum wind speed is between 207 and 260 mph. It causes devastating damage (homes leveled and missiles from heavier objects).

F5: This is known as an incredible tornado, in which the maximum wind speed is between 261 and 318 mph. It causes incredible damage (homes picked and/or moved and automobile sized missiles).

F6 and above: This is when the maximum wind speed is greater than 319 mph. The maximum wind speed of a tornado is not expected to exceed F5 levels.

The picture to the right was taken from Sterling public submitted weather photos and illustrates a tornado's path from a NASA satellite.



Tornado Type	Weak	Strong	Violent
Percent Occurrences	88%	11%	< 1%
Death Accountability	< 5%	Almost 30%	70%
Touchdown Time	1-10 minutes	> 20 minutes	> 1 hour
Wind Speed	< 110 MPH	110-205 MPH	> 205 MPH

Source: NOAA, National Weather Service & U.S. Dept. of Commerce

Trailer parks are extremely vulnerable to a tornado because the structure is easily damaged and/or moved by high winds. Law states that trailer parks in Minnesota are required to have a shelter, but it does not necessarily have to be on the site. Many have a designated site near the court and information letting trailer court residents know where to go during a tornado watch or warning. People traveling to a shelter are at risk while on the road. Many fatalities could occur if a tornado spawns early or unexpectedly or if a family is late getting to a shelter. The uninformed also pose a huge risk in terms of vulnerability.

Hailstorms

Hail is ice and a product of a multicell, super cell or cold front induced thunderstorm. It is formed when strong updrafts within the cumulonimbus cloud carry water droplets above the freezing level or when ice pellets in the cloud collide with water droplets. The water droplets freeze or attach themselves to the ice pellets as strong updraft winds toss the pellets and droplets back up into colder regions of the cloud. Both gravity and downdrafts in the cloud pull the pellets down, where they encounter more droplets that attach and freeze then once again when the ice is tossed to higher levels in the cloud. This continuous cycle determines how big the hailstones will be. This process continues until the hailstones become too heavy to be supported by the updrafts and fall to the ground.

Most hail in Minnesota ranges in size from pea-size to golf-ball size. Larger hailstones have been reported but occur much less frequently. The largest hailstone ever measured occurred in Coffeyville, Kansas. The hailstone was 17.5 inches in circumference and weighed approximately 1.67 pounds. Strong updrafts, usually associated with severe thunderstorms, are necessary or hail would not form. Area coverage of individual hailstorms is highly variable and spotty because of the changing nature of the cumulonimbus cloud. While almost all areas of Minnesota can expect some hail during the summer months, most hail is not large enough to cause significant crop or property damage.

Hail Size	Diameter
Pea	0.25 in.
Marble or Mothball	0.50 in.
Dime or Penny	0.75 in.
Nickel	0.875 in.
Quarter	1.0 in.
Ping-Pong Ball	1.50 in.

Golf Ball	1.75 in
Tennis Ball	2.50 in.
Baseball	2.75 in.
Tea Cup	3.00 in.
Grapefruit	4.00 in.
Softball	4.50 in.

Source: Minnesota State All-Hazard Mitigation Plan

Windstorm

Windstorms can occur in all months of the year; however, the most severe windstorms usually occur during severe thunderstorms from April through September. These include windstorm types such as downburst and straight-line winds. Winds greater than sixty mph are also associated with intense winter, spring, and fall low pressure systems. These windstorms can produce a hazardous driving environment, impose damage to buildings, and in some cases overturn high profile vehicles.

Wind Speed	Effects
25-31 mph	Movement of large branches and telephone wires
32-38 mph	Movement of whole trees
39-54 mph	Twigs break off trees, wind impedes walking
55-72 mph	Damage to chimneys, TV antennas, and shallowly rooted trees
73-112 mph	Overturnd trailer houses, damage to windows and roof surfaces
113 + mph	Roofs torn off houses, damage to trailer houses, weak buildings, and large trees

Source: Minnesota State All-Hazard Mitigation Plan

A downburst is a severe localized downdraft from a thunderstorm or a rain shower near the Earth's surface. Winds up to 130 mph have been reported. Downburst winds can cause as much damage as a small to medium sized tornado and are frequently confused with them because of the extensive damage caused. As these downburst winds spread out, they are often referred to as straight-line winds. These winds often precede a thunderstorm, occurring in the leading edge of the storm called the gust front. These cool winds can cause major structural and tree damage over a relatively large area.

History

From July of 1973 to January 1 of 2006, thunderstorms with high winds caused problems for Roseau County seventy-three times. Wind gusts measured up to seventy-five knots. Much damage was done including damage to power lines, windows, roofs, trees, and crops. Power outages are common as falling trees break power lines, disrupting power for sometimes hours at a time. Damage to property and crops can reach into the tens or even hundreds of thousands of dollars.

During the time period from July 11, 1973 to January 1, 2005, 115 hailstorms

have been reported in Roseau County. The magnitude of the hail ranges from 0.75 of an inch to 3.00 inches. Smaller hail such as pea size was not recorded. These storms have affected every region in the county and are usually associated with severe thunderstorms.

Date	Magnitude	Length (mi.)	Width (yd.)	Tornado Details
08/05/1966	F1	N/A	N/A	This tornado caused \$250,000 in property damage.
07/25/1967	F1	0	33	This tornado caused \$25,000 in property damage.
06/12/1976	F1	1	200	This tornado caused \$25,000 in property damage.
07/05/1982	F1	7	30	This tornado caused \$25,000 in property damage.
07/13/1983	F2	4	867	This tornado caused \$3,000 in property damage.
06/26/1991	F0	0	10	N/A
06/26/1991	F0	0	10	N/A
08/08/1993	F0	0	10	This tornado touched down near the town of Roseau, causing damage to a warehouse. Total property damage to the town is estimated to be \$500,000.
06/30/1994	F0	0	10	A tornado touched down near Greenbush.
08/27/1994	F0	0	10	A tornado ripped many gutters off buildings and blew down trees. A small plane flipped over right after it landed, but no one was hurt. A U.S. Customs communication tower fell onto some power lines, resulting in partial communication loss for U.S. Customs, and power loss for area residents.
08/27/1994	F0	0	10	A tornado was seen on the south shore of Lake of the Woods, west of Long Point.
07/09/1995	F0	0	10	A tornado touched down in some farmland near Warroad.
06/27/1997	F2	11	150	A tornado did damage to homes, farm buildings, and grain bins as it hit near Greenbush. One man that was plowing a nearby field had the glass tractor cab he was in explode, causing retinal damage. \$250,000 in damage was done by this tornado.
06/27/1997	F1	1	25	N/A
06/06/1999	F0	1	25	A tornado touched down near Badger.
06/06/1999	F0	0	25	A tornado touched down near Greenbush
06/06/1999	F0	1	25	A tornado touched down near Badger.
05/29/2002	F0	0	25	A tornado touched down twice near Badger.
05/29/2002	F0	0	25	A tornado touched down near Roseau.
07/01/2002	F0	0	25	A tornado touched down near Swift.

08/25/2003	F1	1	50	A tornado touched down near Wannaska. A barn was destroyed and the debris spread. \$20,000 in damage was caused.
07/02/2005	F1	1	100	A tornado tore up several trees northwest of Pinecreek.
07/03/2005	F1	2	100	A wildlife area northwest of Haug had large trees that were snapped off and uprooted.
08/05/2006	F1	5	50	Tornado was spotted northwest of Warroad. Peak wind speeds were 100 mph, and \$100,000 in crop damage was done.
08/05/2006	F3	4	500	Tornado caused \$20 million in property damage around Warroad, with wind speeds up to 180 mph. The Marvin Windows plant had a damaged roof and several overturned trailers. At the campground, almost forty campers were destroyed as well as ten boats. The Trading Post Gift Shop was completely destroyed, and the newly remodeled swimming pool was damaged. The Pepsi Plant sign was blown down, and about ten homes sustained damage.
08/05/2006	F0	8	25	This tornado near Swift & Roosevelt was the third in a series of tornadoes spawning. Wind speeds were estimated at 70 mph, causing \$200,000 in crop damage. Debris and fallout from the Warroad tornado above was noted.
08/05/2006	F1	10	100	This tornado caused \$200,000 in crop damage and caused damage near Skime and in the Beltrami Island State Forest. Wind speed was estimated at 85 mph.
08/16/2006	F0	3	25	A tornado damaged a vehicle shelter, trees & yard furnishings, causing \$10,000 in property damage to two farmsteads.

Source: National Climactic Data Center

Plans and Programs

Hailstorms	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
	Dept. of Natural Resources				X	X					
Dept. of Public Safety, Division of Emergency Management					X			X			
Minnesota National Guard	X	X	X	X	X			X	X		
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

Windstorms	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
	Dept. of Agriculture				X	X			X		
Dept. of Commerce					X			X			
Dept. of Human Services			X					X			
Dept. of Natural Resources	X			X	X	X		X		X	
Dept. of Public Safety, Division of Emergency Management		X		X		X					

Dept. of Public Safety, Office of Pipeline Safety					X						X
Dept. of Transportation	X			X	X						X
Minnesota National Guard	X	X	X	X	X			X	X		
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

Lightning	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Public Safety, Division of Emergency Management					X			X			
Dept. of Public Safety, Office of Pipeline Safety					X						X
Minnesota National Guard			X	X	X			X	X		
Metropolitan Airports Commission	X					X		X			
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

Tornado	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
	Dept. of Agriculture				X	X			X		
Dept. of Commerce					X			X			
Dept. of Health		X		X	X			X			X
Dept. of Human Services		X	X					X			
Dept. of Natural Resources	X	X		X	X					X	
Dept. of Public Safety, Division of Emergency Management		X		X		X					
Dept. of Public Safety, Office of Pipeline Safety					X						X
Dept. of Transportation	X			X	X					X	
Housing Finance Agency			X							X	
Minnesota National Guard	X	X	X	X	X			X	X		
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

Ice Storm	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Commerce					X			X			
Dept. of Natural Resources	X	X		X	X					X	
Dept. of Public Safety, Division of Emergency Management				X		X					
Dept. of Public Safety, Office of Pipeline Safety					X						X
Dept. of Transportation	X	X	X	X	X	X		X		X	X
Minnesota National Guard	X	X	X	X	X			X	X	X	
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

Blizzard	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Commerce					X			X			
Dept. of Human Services								X			
Dept. of Natural Resources	X			X	X	X				X	

Dept. of Public Safety, Division of Emergency Management	X	X		X		X		X	X		
Dept. of Public Safety, Office of Pipeline Safety					X						X
Dept. of Transportation	X	X		X	X	X		X	X	X	
Minnesota National Guard	X	X	X	X	X			X	X	X	
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

-One of the best ways Minnesota prepares for hazards is by updating and enforcing their building codes. These codes make sure that newly constructed structures are protected from hazards. These preventive steps ward off loss, both for the owner and for the community. Almost all hazards that occur in Minnesota have some associated building codes that combat potential damage from these threats. A properly manufactured house can stand up to the majority of Minnesota hazards if the building codes are followed. To see Minnesota's current building codes, please go to the following address:

<http://www.buildingcodes.admin.state.mn.us/rules/rules.html>

Flood

A flood is defined as an overflowing of water onto an area of land that is normally dry. It is naturally a recurring problem for Minnesota, a state with the nickname "land of 10,000 lakes" and more than 91,000 miles of streams and rivers existing in it. This seasonal process varies with time, it can be slow rising or have a sudden onset (flash flood). Flooding needs to be mitigated for Minnesota, whose annual direct flood loss falls between sixty and seventy million dollars. Indirect flood loss also impacts many people, including forfeited profit for businesses shut down by floods and unemployment.

Floods generally occur from natural weather-related causes, such as a sudden snow melt or ice jam. Often a flood is coupled with a wet, rainy spring or sudden and very heavy rainfalls. A frozen ground can prevent water infiltration during an abrupt warm spell or rain storm. Floods can, however, result from human causes as a dam impoundment bursting or storm sewers overflowing. Some development on the flood plain can also cause flooding.

Roseau County is susceptible to flooding due to the close proximity of the Red River. This river is known for going through some kind of flooding episode every two or three years. One reason for this phenomenon is because the river flows north. The area to which the Red River flows often thaws last, causing water back-up upstream. Another reason is the topography. The land around the Red River is very flat. Flood effects from the Red River can be felt for many miles simply for this reason. The flooding of the Red River and its tributaries have been affecting people for many years. Sir Sandford Fleming stated in 1880:

"It is futile to assume that Red River shall never again overflow its banks. Man is utterly powerless to prevent its occurring periodically,

and whenever it occurs the disastrous consequences will be intensified in proportion to the increased number of inhabitants within the submerged district."

This statement is partially true. Although it is not possible to entirely stop the flooding of the Red River, it is possible to mitigate the effects of flooding so that people can escape from harm. If proper mitigation is put into effect, people can safely live beside the river without fear. The following structures are at an increased risk for flooding because of the important business that goes on at the location, the amount of people present at any given time or because of the function that it provides to the area. (Terrorism could also be an increased risk for these facilities for the same reason):

- City Hall
- County Courthouse
- Schools
- General residential areas
- Bridges, including railroad varieties
- Railroad tracks
- Highways
- Water System
- Hospitals and clinics

The 100-year flood or base flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. The following cities/counties are participating in the NFIP. The townships are covered under the county.

Entity	CID #	Date Entry	Current Map
Badger	270412	06/08/1984	No Special Hazard Area
Greenbush	270413	09/30/1982	09/30/1982
Roseau Co.	270633	01/02/1980	12/04/1981
Roseau	270414	09/29/1978	10/30/1981
Warroad	270415	12/04/1979	12/04/1979

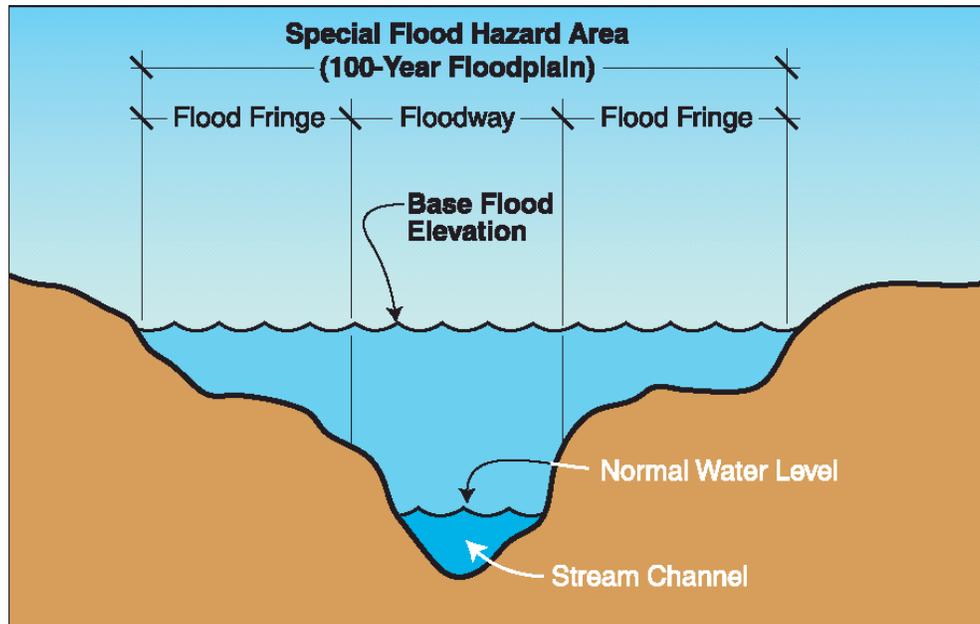
Source: FEMA

One hundred year floodplains have been identified, mapped and used for further analysis using the Geographic Information System (GIS). For floodplain management purposes, the Federal Emergency Management Agency (FEMA) uses the following definition:

The term "100-year flood" is misleading. It is not a flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1 percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time.

Flood	Probability/Year
10 - Year	10%
50 - Year	2%

100 - Year	1%
500 - Year	0.2%



Source: Understanding Your Risks CD, FEMA

Substantially damaged buildings are also an aftereffect of the flood that needs to be watched. A building is substantially damaged if it is determined that the damage equals or exceeds fifty percent of the building's market value (before the flood). Communities must make sure that substantially damaged buildings are in compliance with the local floodplain ordinance. Failure to abide by this can lead to either probation or suspension from the NFIP. Under probation, a surcharge is attached to every flood insurance policy. If the community does not bring violators into compliance, probation turns into suspension. No disaster aid (federal) is given to people under probation during a presidential disaster declaration, and federal loans would not be available. Some buyout programs on the state and federal level would also not be available. New policies will not be given to anyone living in a community under probation, and renewals to existing policies will not be available.

One example of substantially damaged buildings is a repetitive loss structure. NFIP's definition of this term is a building that has gotten flood damage two or more times in a ten-year span (while covered by flood insurance). During each flooding event, the cost to repair the damage is at least twenty-five percent of the market value at the time the damage is made. Currently there is one property that is classified as a repetitive loss structure. It is located at or near the city of Roseau.



Source: Minnesota Department of Natural Resources

During some periods of time, it seems like there is little progress advancing to mitigate against a massive flood event like a 500-year or greater flood. Unless counties obtain state or federal dollars, the cost to protect is usually too great for a smaller budget to handle. This limits the type of response a county can take against a flood. County members believe that there should be no price on human safety and simply want to feel secure. A community will not grow larger in a city that is endangered by flooding on a consistent basis.

The International Joint Commission (IJC) is an organization composed of members from both the United States and Canada. The purpose of its creation is primarily to advise both nations on water/flood related questions and to prevent/resolve situations relating to the use/quality of boundary waters. The IJC prepared a report in 2003 about flood mitigation and preparedness in the Red River Basin. The following conclusions were reached:

- A flood with the magnitude of the 1997 flood or greater will occur again in the Red River Basin. It is proven that wet and dry cycles document themselves throughout history. There are still mitigation needs for people and structures.

- It would be next to impossible to reduce large scale flooding damages using only large storage reservoirs. Other means are also needed as using storage solely is not good both economically or environmentally. Storage for local flooding is an option however.

- Microstorage should not solely be used to mitigate against large-scale flooding, even though it has the potential to reduce flood peaks. This can be a great mitigation solution for local flooding, although proficient implementation is not an easy task. The waffle plan is a good illustration of this idea.

-Wetland storage is an advantageous way to reduce local flooding in the area. Large scale flooding cannot depend on this method alone however.
-Flooding in the Red River Basin has been affected by dikes and roads (acting like dikes). Setback levees are becoming a good way to deal with flooding and increasing culvert capacity also is beneficial.

-There is a risk for several areas until a large scale flooding solution can be found. Many methods will have to be utilized, and environmental concerns will need to be taken into account.

Sedimentation, the deposit of eroded matter into ditches, rivers and streams, is a potential problem in Roseau County. Over time, this process will cause the volume flowing through a particular channel to increase. The channel also may narrow or become shallower as sediment is deposited. This causes flooding if left unchecked for too long. This process also renders dikes and levees endangered if they are not heightened and expanded on a regular basis. Removing sediment from a channel or ditch will help combat this, but care must be taken. If grass is not lining the sides of the waterway, erosion will increase. This is just sediment that will settle somewhere else. Because grasses grow slowly, people line the ditches with bales of straw. This is a good idea to slow down both the water flow and the erosion process, but if the bales are still there when winter comes, it becomes a hazard for snowmobiles. There are permits required before removing sediment out of certain places. The process can get extremely difficult at times.

After flood waters recede, people involved in cleanup and restoration activities may be exposed to many hazards. The danger of flooding does not end when the water leaves the landscape. Safety precautions need to be taken and although homeowners may be anxious to save residence remains, professionals sometimes need to be dispatched to a scene first. The following list is composed of hazards that homeowners, volunteers and professionals may face as compiled from the National Institute for Occupational Safety and Health, the US Department of Health & Human Services and the Centers for Disease Control and Prevention:

- Electrical hazards.
- Carbon Monoxide poisoning from gasoline powered devices in a confined locality or other collected gasses.
- Muscular injury from continuous or heavy lifting
- Heat related conditions from continuous work or weather
- Cold related conditions from working in standing water
- Damage done to structures and roads by water, rendering them unstable
- Hazardous materials in floodwater
- Fire
- Drowning
- Infectious disease spread, mold or other respiratory ailments due to lack of ventilation.
- Emotional exhaustion or extreme stress

Flood control structures such as dikes, dams and levees are talked about later in this section, these are structures that Roseau County uses to protect itself against a flood. Practices such as filter strips and grassed waterways are also discussed later as a possible way to mitigate floods. These two programs also have additional benefits such as shoreline

stabilization, preventing pollution and sedimentation, and decreasing soil displacement. Water diversion devices, contouring, and terracing can also be used as methods to slow down fast moving water. Promotion of certain programs to turn farm land or other land into grassland is a great way to control runoff and help the flooding issue. Drainage is an important issue because in the past prior to drainage, no one lived in the northwest Minnesota area permanently. People only either fought or hunted.

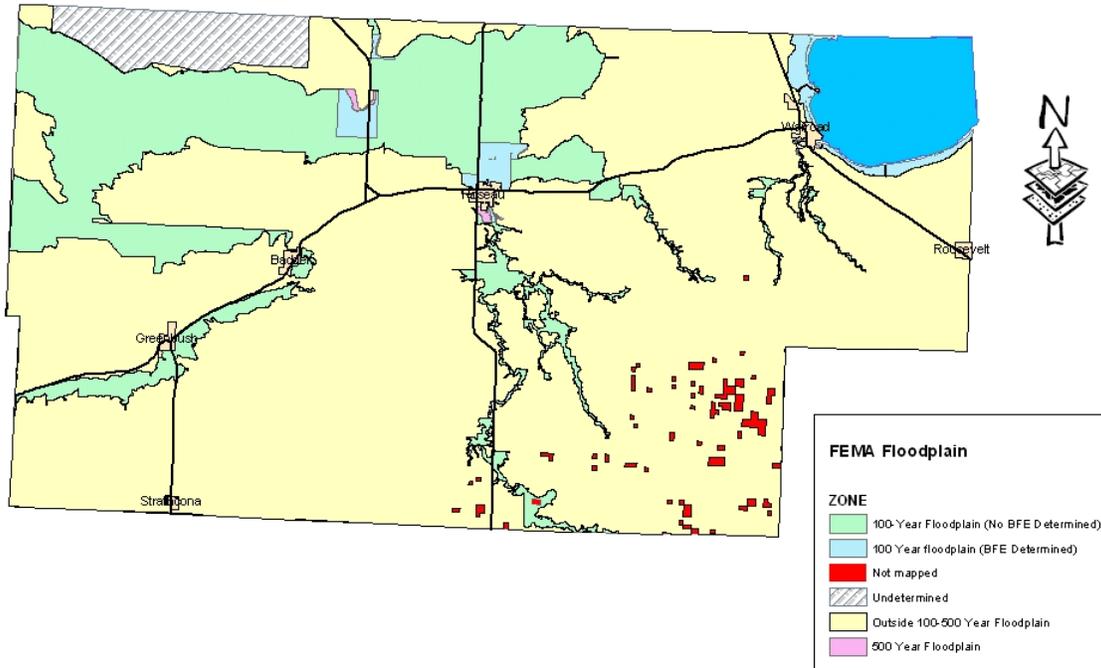
Flooding has hit Roseau County hard in recent years, but tremendous advances in mitigation are being made. The following mitigation results are from the city of Roseau. While the fight against flooding is not over, the following statements prove that solutions put forth are working.

- Protecting Polaris Industries was a major priority during the 2002 flood. Currently, the company has expanded and jobs were added.
- Although some homes have been lost to the 2002 flood, the city's population has not seen a dramatic decline.
- A strong housing market can be seen in the area.
- Businesses are coming back.
- Recovery work is ongoing throughout the county
- The flooding episode in 2004 tested the new equipment and proved the new plan.
- The West Intercept Project is soon to start, rerouting current water flows northward.

History

Below is a map of the floodplain in Roseau County. Those structures nearest to the floodplain have a greater amount of flooding risk than those further away. For more information on the analysis of flooding problems faced by the area, please visit <http://store.msc.fema.gov/> and look for city specific flood insurance studies under the catalog link.

Roseau County FEMA Floodplain



Map created by the NWRDC
Contact Troy Schroeder 218-745-6733

Date	Type	Details
04/10/1996	Flood	A flood lasting twenty days affected seven counties in Minnesota. Above average precipitation rates marked the winter and early spring, along with lingering snow cover. These factors combined with a sudden snowmelt and ice jams caused a major flooding event that cost many dollars in damage. The National Guard was called in to help.
05/17/1996	Flash Flood	Flooding caused ten thousand dollars in property damage.
07/18/1996	Flash Flood	Up to eight inches of rain fell on Roseau County, causing ten thousand dollars worth of property damage.
06/25/1999	Flash Flood	Heavy rains caused ten thousand dollars in damage. Buildings were flooded including the Polaris snowmobile factory.
07/18/2001	Flash Flood	A recent storm caused water to flow over local roads and ditches to be nearly full near Pencer.
07/31/2001	Flash Flood	A storm caused roads to be flooded near the town of Greenbush. Two hundred thousand dollars in property damage was caused.

07/31/2001	Flash Flood	A storm caused streets to flood in Roseau. Two hundred thousand dollars in property damage was caused.
06/10/2002	Flood	Heavy rainfall of up to eighteen inches was reported for Roseau County. The Roseau River rose seventeen feet, setting a new record. Dikes could not hold the massive river and water flooded the town, which was evacuated to Badger. An estimation states that ninety percent of cropland was flooded. Two hundred million dollars in damage was caused by the flood. A presidential disaster declaration was given to Roseau County.
06/10/2002	Flash Flood	A storm caused roads to be flooded near the Warroad area. The Warroad River flooded part of Warroad, evacuating about sixty people. Local businesses in town were damaged by the incoming water.
06/10/2002	Flood	Immense rainfalls totaling up to eighteen inches were observed in areas of Roseau County. A new record stage of 23.3 feet was reached for the Roseau River, which rose seventeen feet, and water overtopped the dike. People were evacuated to Badger and about ninety percent of all cropland was flooded. \$200 million dollars in property damage was done by this fifteen day flood.
03/28/2004	Flood	Warm rain fell upon snow cover and a still frozen ground, creating flood events. Local rivers were iced over, increasing ice jam probability. Clogged culverts and ditches were a common problem. Warroad had to sandbag and the Roseau River crested around nineteen feet.
04/01/2004	Flood	This episode started from the previous entry. Flooding threats diminished significantly, so the flood warning was cancelled in the afternoon.
05/11/2004	Flood	Varying temperatures across Minnesota combined with strong winds created severe weather including tornadoes and hail. Up to six inches of rain dropped in the multi-county area. As temperatures fell, water turned to a maximum inch coating of ice on structures, bringing power loss. This lasted for ten days in Roseau County and many roads were flooded. Sandbagging was done, as well as dike reinforcement.
06/27/2005	Flash Flood	Fields and farm access roads were flooded along Lateral Ditch #2 near the Roseau/Kittson County border.

Source: National Climactic Data Center

Plans and Programs

River Flood	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Building Codes & Standards											X
Dept. of Agriculture				X	X			X			
Dept. of Commerce					X			X			
Dept. of Health		X		X	X			X			X
Dept. of Natural Resources	X	X	X	X	X	X	X	X		X	X
Dept. of Public Safety, Division of Emergency Management		X	X			X			X		
Dept. of Public Safety, Office of Pipeline Safety					X						X
Dept. of Transportation	X			X	X	X				X	
Housing Finance Agency			X							X	
Minnesota National Guard	X	X	X	X	X			X	X		
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

Storm Flood	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Building Codes & Standards											X
Dept. of Agriculture				X	X			X			
Dept. of Health		X		X	X			X			X
Dept. of Human Services								X			
Dept. of Natural Resources	X	X	X	X	X	X	X	X		X	X
Dept. of Public Safety, Division of Emergency Management		X	X	X		X		X	X		
Dept. of Public Safety, Office of Pipeline Safety					X				X		
Dept. of Transportation	X			X	X	X				X	
Housing Finance Agency			X							X	
Minnesota National Guard	X	X	X	X	X			X	X		
Metropolitan Airports Commission			X		X				X		
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

-Currently, Roseau County uses methods such as storm water management and maintenance to drainage systems to mitigate against a flood. Floodplain regulations are enforced. Flood-proofing homes is done, sometimes to the extreme of relocating the house to another property or acquiring the property from the homeowner.

-A popular solution to flood mitigation is often to buy buildings and land from the owner to move them out of the flood plain. This land is often prime farmland or a nice spot to live. This valuable land, depending on what source of funding bought it out, is sometimes not available to be developed or used even after the property is out of the flood plain. Also, people often have attachments to property that cannot be mitigated with any dollar amount.

-Tiling the land is also a flood control practice used mostly on flat cropland or any area with no slope that is threatened by flooding. A porous pipe is placed underneath the ground. The pores in the pipe may vary from wide to narrow depending on factors such as soil structure and clay content. Water percolates through the ground and into the tube. The water can then be moved to a ditch or river. Once water logged cropland can now become tillable. Land with low permeability may not benefit from tiling, as this factor is one of the main components.

-The Energy and Environmental Research Center (EERC) in Grand Forks, ND has come up with a flood control idea called the Waffle Plan. This plan uses low spots in topography that are surrounded by raised roads or other structures to form a sort of storage basin during a flood. This plan is an alternative to dams and dikes and is named because of how the land would look during a flood if this idea were used. The plan is being field tested during the winter/spring of 2003-2004.

-The Northwest Minnesota Foundation often gives grants to aid in flood mitigation. Agencies, families, individuals and businesses all can benefit.

-Minnesota Department of Natural Resources helped the flood mitigation process by starting the Flood Damage Reduction Grant Assistance Program in 1987. The MN DNR will grant up to fifty percent of an accepted project, helping local entities who might not have had the finances to entirely fund the project. Projects that have been done using this program include: buyouts, construction of levees, ring dikes and flood walls, studies and workshops, plans, flood plain and river restorations, and cost-share on federal projects as well as a multitude of others not listed above.

-Canada is looking at ways to divert water so less will come into Roseau County. One of the ways is to modify Sprague Creek. With Roseau and Canada both holding back water, all parties involved will benefit by this show of teamwork.

-CREP (conservation reserve enhancement program) was started to reduce flooding in 51,000 acres in the Red River Valley. This program will let farmers and ranchers take land that is near a body of water, frequently flooded and generally unproductive and set it aside. Farmers receive an easement for a period of years for partaking in this program. By doing this, neighboring land not in the CREP program may also see a reduction in flooding damage and reap additional benefits, including water quality betterment, increased erosion control, reduced pollution levels and improved wildlife habitat. Wetland restorations will be a big part of this program, 24,000 acres are targeted to be restored in the Red River Valley. Since farmland rehabilitation after a flooding event can be high-priced, CREP is a good way to help the farmer with the additional expense.

-Older FIRM maps are a concern for areas of Minnesota. This is a statewide problem, as a whopping sixty-six percent of areas have a FIRM

map that is greater than fifteen years old. Another twenty percent have a map that is between ten and fifteen years old. Older maps limit usage and have many inaccuracies, due to county/state upgrades in the base map, transportation routes or techniques. Many improvements have been made since the FIRM was created which would take certain locations out of the flood plain/flood fringe. Individual homeowners also have voiced the need for these maps to qualify for home betterment projects, loans, etc... Minnesota currently is enacting the Minnesota Map Modernization Plan, starting in 2004 and ending in 2009. This plan will produce an updated digital floodplain map for every county in Minnesota. Roseau County is scheduled to start this process in 2006. When this plan ends, Minnesota will be a CTP state. The funding scenario for this project is estimated to be eighty million dollars.

-During the 2002 Roseau Flood, these agencies provided assistance:

- Wynne Consulting - funding for housing rehabilitation
- Social Services - funding for mental health and other programs
- North Border Interfaith Coalition - family outreach
- NW Community Action - construction incentive program, mortgage foreclosure program, and furniture funding
- Salvation Army - short-term item needs
- Red Cross
- NW Regional Development Commission - loan funds for businesses, low interest loans, Flood Wrap Program.
- Area businesses, agencies, groups and residents in Roseau County and beyond, whose help was immensely appreciated for the many contributions.

-The US Army Corps. of Engineers is working on the Hay Creek Aquatic Ecosystem Restoration. In the past, the area was modified so that the land could be farmed by draining wetlands and deepening/realigning the creek. The finished project will reduce flood damages and improve wildlife habitats by the addition of a wetland area, setback levees, buffer zones, floodwater storage and replacement to a sinuous channel. The Ecosystem Restoration Report and Environmental Assessment was submitted and approved in 2003. The construction is set to begin in late 2005, dependent on funding, and a total project estimation is set at eight million dollars.

-The US Army Corps. of Engineers is also working on a Flood Control Study for Roseau. After flooding episodes in 2002, a study was started to determine the feasibility of a flood control project for Roseau. The Federal Interest Report in 2003 showed a federal interest, but a cost that exceeded section 205 funding limits. An analysis was done in late 2003 that transitioned the project into a section 905 and was approved. A feasibility study is expected to be completed in June of 2005 and dependent upon the results and funding, construction could begin in 2007. Estimates show that the flood control project could cost twenty million dollars. Two options that have come out of this project are a large east diversion plan and a permanent in-town levees plan. A Screening of Alternatives Report that is scheduled to be done in early 2005 will identify the most cost-effective flood reduction plan.

-The Red River Basin Commission (RRBC) has developed the Red River Basin Natural Resource Framework Plan (NRFP). The plan provides a framework on the path of action the RRBC plans to take on issues relating to flood damage reduction, drainage, water supply, water quality, fish/wildlife and conservation. The plan invites many different people and agencies to find common ground and work together toward a beneficial solution to the problems seen in the Red River Basin. A copy is available through the office or the website for interested individuals.

Drought and Extreme Heat

Drought is defined as a prolonged period of dry weather, a lack of rainfall. The time it takes for a drought to occur varies throughout the country due to the climate and the different levels of precipitation areas of the world receive. This condition is often illustrated through other factors such as a water supply deficiency or crop damage. Because of different water needs, there are four ways to define a drought:

1. Meteorological: An amount of precipitation from a specified time frame departs from normal.
2. Agricultural: Soil moisture is deficient for a certain crop.
3. Hydrological: Surface or subsurface water is beneath normal
4. Socioeconomic: When a shortage of water begins to affect people.

Extreme heat and drought conditions often coexist with each other. The presence of one may cause the other to appear. The only difference is the longevity. There are three dangers that people face when coming into contact with extreme heat conditions:

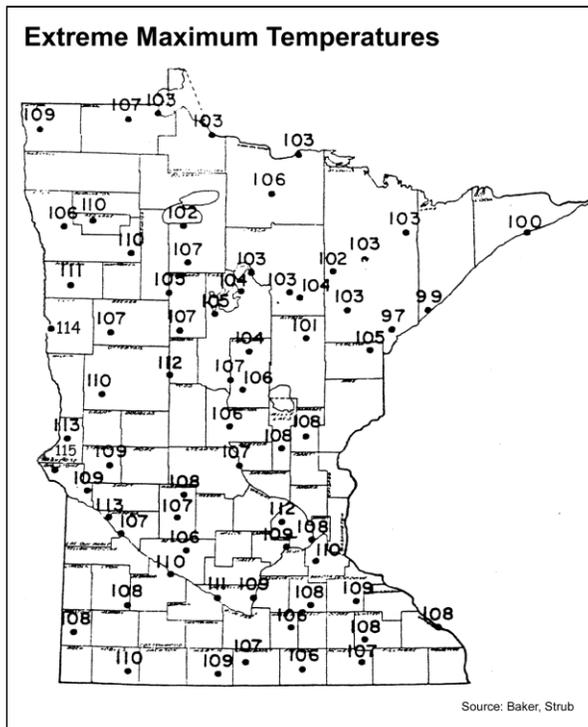
Heat Strain occurs when various conditions threaten to increase a body's core temperature above ninety-nine degrees Fahrenheit.

Heat Impairment occurs when the body's core temperature reaches one hundred and two degrees Fahrenheit. At this temperature, the body's physical and mental functions are somewhat disrupted. Watch for signs such as fatigue, headache, nausea, lightheaded feelings, changes in facial appearance, and pulse abnormalities.

Heat Emergencies is a collective term used to describe impairments from continuous overexposure to heat. If exposure gets too severe, the affected person can suffer from heatstroke, collapse due to water depletion, and heart attacks.

Electrical shortages are often common on high temperature days due to the increased usage of electricity. Many people, especially the young and elderly, are in danger when a house has no air conditioning. The increased power load also generates heat, affecting a local area near the power plant. Crops can have stunted growth from lack of moisture and increased heat. Animals can also die of the heat; the decreased amount of oxygen in the water kills fish. Highway damage is often higher during extreme temperature periods, and fires occur more frequently. Drought conditions are often made more severe with the presence of high temperature.

History



Making sure that residences and cities have water during drought conditions is an important part of drought mitigation. Historically, this problem causes areas concern, especially for those that use rivers as a major source of water. Even large rivers can be reduced to no-flow conditions. The Red River, one of the larger rivers in the area, was reduced to zero flow conditions for five consecutive months during a drought in 1934. Ten low flow days occurred after this period and then an additional two more months of no flow conditions occurred (measured in Fargo, ND. Facts documented by the ND Bureau of Reclamation).

Plans and Programs

Drought	Response & Mitigation Equipment
	Plans
	Training
	Public Information
	Trained Personnel
	Projects to Reduce Impact
	Legislation to Reduce Impact
	Response Procedures
	Exercise Capabilities
	Data Collection
Codes and Policies to Reduce Impact	

Dept. of Natural Resources				X	X	X				X
Dept. of Public Safety, Division of Emergency Management				X						
Minnesota Planning						X				X
Pollution Control Agency				X				X	X	X

Source: Minnesota State All-Hazard Mitigation Plan

-Seeding clouds is sometimes used in the area to bring rain. This must be watched however because if an area is over seeded or the weather conditions are just right, torrential rains can occur, causing more damage to the dry landscape than the drought.

Wildfire

A wildfire is an uncontrolled fire spreading through vegetative fuels. A suppression reaction is often necessary, depending on environmental conditions such as wind speed and moisture content. The predominate danger from wildfires is the destruction of timber, property, wildlife and injury or loss of life to people either living in the affected area or using the area for recreational facilities. Wildfires cause problems because they can occur in undeveloped areas and spread with great speed to urban areas where structures and other human development are more concentrated. While some wildfires start by natural causes like lightning, humans cause four out of every five wildfires. Debris burns, arson or carelessness are the leading causes.

As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. Any area with a buildup of dead trees and thick brush can be a potential hazard, because this is fuel waiting for a spark. A fire will burn longer and faster with abundant moisture-lacking vegetation in its path. For example, five feet high CRP is a major fire risk. A fire that size would not be held by roads, and could encompass housing. Roseau County has CRP areas that are a huge fire risk during high temperature and high wind days.

Minnesota Active CRP

Ranking	County	CRP Acreage	% of MN CRP
1	Marshall	202,342	12.92
2	Polk	150,403	9.6
3	Roseau	137,187	8.76
4	Kittson	99,272	6.34
5	Pennington	76,577	4.89
6	Otter Tail	72,900	4.65
7	Red Lake	49,717	3.17
8	Norman	46,743	2.98
9	Clay	42,292	2.7
10	Kandiyohi	33,363	2.13

11	Becker	31,675	2.02
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Source: FSA, 2000

An uncontrolled wildfire can have many long-lasting effects that scar the land. The burned and smoldered land may take years to gain back the habitat and vegetation that once was a representation of it. This bare land is very prone to erosion. The addition of water to this naked landscape can cause landslides, flash floods, and mud flows to occur.

But not all fires scar the land, in fact, some help the natural environment. Prescribed burning is one way to manage overabundant vegetation in a somewhat natural way. This method can upgrade current wildlife habitats in the area, create a more productive pasture, and enhance current native plant communities. Prescribed burning rouses new growth from plants and cuts down on fire hazards such as dead trees and brush. Prairie grasses were immune to these fires, growing back partly because of the deep roots some of the plants possess. A prairie area needs some sort of burning event to survive. In many areas, using fire is a cheaper way to control overgrowth areas than by cutting, bulldozing or the use of chemicals.

History

Below is the fire history for 2002 based on information from local fire departments:

County	Fire Runs	Other Runs	\$ Loss Total	Fire Rate	\$ Loss Per Fire	Fire Deaths
Becker	224	323	\$1,153,500	172	\$6,629	1
Kittson	61	57	\$169,000	120	\$3,841	0
Marshall	47	61	\$37,400	254	\$935	0
Norman	35	54	\$552,200	266	\$19,721	0
Pennington	84	129	\$409,180	168	\$5,052	1
Polk	183	1303	\$692,591	179	\$3,958	0
Red Lake	7	56	\$25,000	614	\$3,571	0
Roseau	82	118	\$175,000	207	\$2,215	1

Source: 2002 Fire in Minnesota, Fire Reporting System

Fire Dept.	Fire Runs	Other Runs	Dollar Loss
Badger	16	5	\$89,000
Greenbush	12	0	\$86,000
Roseau	29	55	\$0
Warroad	25	23	\$0

Source: 2002 Fire in Minnesota, Fire Reporting System

The Minnesota Department of Natural Resources (DNR) reports that lightning caused a fire seven times between January 1, 1993 to December 31, 2002. The fires burned 82.2 acres of land, producing \$222.29 worth of damage.

Plans and Programs

Wildfires	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Health		X						X			X
Dept. of Natural Resources	X		X	X	X	X	X	X	X	X	X
Dept. of Public Safety, Division of Emergency Management	X				X	X		X	X	X	X
Dept. of Public Safety, Office of Pipeline Safety					X						X
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

-Processes such as discing, mowing, plowing, bulldozing, backfiring, or creating a wetline are used to control fire.

-The Minnesota Department of Natural Resources (DNR) has adopted the Firewise Program. As more people build homes in the forests and fields of Minnesota, firefighters are less able to protect people's assets while combating a wildfire. The main dogma of this program is to protect homes from fire by having the communities resolve potential problems before these problems become fire hazards. Such mitigation activities include thinning of trees, road improvement, and the introduction of additional fire hydrants to deficient areas.

Subsidence and Karst

Subsidence is simply described as when portions of the crust of the Earth collapse. It is caused by dry weather. The clay in the soil shrinks from lack of moisture, leaving cracks and pockets of air. A small storm will cause precipitation to run into these voids. Slippage occurs when nothing is left to hold back the soil. A low river is a common factor in subsidence. The ground becomes unstable and collapses without the river's support. A similar process can be seen during intervals of increased precipitation, but this is not considered subsidence. Riverbank slumping seen on land near a river curve is also not considered subsidence, but several of the solutions

below may work for both problems.

What type of soil the ground holds plays a huge factor in whether an area is at risk for subsidence, as well as moisture in the soil and how the soil is layered. There is a lot of clay in the soil of northwest Minnesota because the Red River Valley was once the floor of glacial Lake Agassiz. Subsidence is extremely prone in these areas, as well as areas where the Sherack soil formation lies above either the Huot or the Brenna soil formation. The Huot or Brenna soil formations are more easily deformed than the above Brenna soil formation, and tend to flow under stress, causing the slumps that characterize subsidence.

Animals can also cause some additional subsidence and erosion. An increase in earthworms to an area can change the way the soil is broken down. This can affect existing plant species and change the vegetation in time, causing an environment that may be prone to subsidence. The deep rooted vegetation often prevents vegetation, as well as the reduction of heavy materials upon a prone landscape (clay).

Subsidence plays a huge roll in economics. A house that suffers from this hazard has a hard time getting a loan. It is seen as a big risk by banks because it might be in a river or down a bluff in the near future. The owner might see a loss in the value of his home because of subsidence. In addition, people can cause subsidence by removing trees or native vegetation with deep roots, building too near the shoreline, mowing right to the water level or by property development. It is a common problem in many areas, but is not always discussed. Many subsidence problems have been plaguing citizens for generations. Lesser cases are seen as nature taking its course.

Stabilizing a shoreline is one way to fight subsidence. An immediate stabilization process involves planting fast-growing grasses on the shore. These grasses establish a root structure in the soil, preventing erosion. Bales of straw or fencing are used for mitigation purposes on steep, erosion prone slopes with runoff contours. Mulch and netting are also used on some shorelines. These have multiple purposes including the preservation of moisture, averting surface compaction, runoff diminishment and helping to substantiate plant cover. Over time, the natural underbrush can be transplanted to the area, as well as trees and shrubs. The trees and shrubs provide protection from raindrop impact and the deeper roots will further stabilize the shoreline. The most surefire way to avoid subsidence is to avoid living or building in vulnerable areas (accomplished through zoning or buyouts), but this is not always an option.

Dutch elm disease may have had a part to play in the current subsidence problem. The first tree with Dutch elm disease was found in 1961, but it has since been found in every county in Minnesota. By 1985, it was estimated that 90% of wild elms over four inches in diameter had died of the disease. When elms along the water's edge died, their roots deteriorated. This caused previously secure soil to become more apt to the subsidence hazard. This could have been a major factor in increased subsidence in certain areas. This problem could be repeated by the exotic beetle, the emerald ash borer. Although not yet found in Minnesota, vast populations of ash trees could be at risk to this pest and subsidence in areas might be increased if more trees die off suddenly. This beetle has been detected in Canada, Michigan and

Ohio.

The disruption of wires and pipes in the ground is a huge concern when an area is affected by subsidence. Many structures can become structurally less stable. A sudden population increase, while good for the county, could cause subsidence to develop at an increased rate along certain areas. The removal of long rooted vegetation in exchange for lawns or crops can also cause subsidence to occur.

The erosional process above can also be seen in features of Karst topography. Karst structures develop when rain or ground water trickles down through the ground, dissolving carbonate rock such as limestone or dolostone. The physical movement of the carbonate rock can also be defined as karst. Structures such as caves, springs, underground streams and sinkholes can be classified as karst topography. Sinkholes are the most common structure, made when overlying sediment layers fall into a hole or cavity in a carbonate rock. Karst is usually seen in the southeastern part of Minnesota. It could be seen in other regions, except that the thick layer of glacial sediments that blankets much of Minnesota limits viewing. Water contamination can be an increased risk because of the path-like nature of Karst, moving water from the surface to aquifers below the surface.

Plans and Programs

-A problem slope near Malung suffering from subsidence and slumping was just redone.

Infectious Diseases

An infectious disease is defined as an organism or matter that has the potential to spread through and affect a population. Infectious diseases have the potential to affect any form of life at any time based on local conditions, living standards, basic hygiene, pasteurization and water treatment. Despite medical breakthroughs and technology, infectious diseases continue to pose an important public health problem. The overuse of antibiotics is assisting diseases to become more immune to various drugs. Today, the issue of emerging and reemerging infectious diseases is at the forefront of public health concern. The very young, older adults, and hospitalized and institutionalized patients are at increased risk for many infectious diseases. Changes in demographics, lifestyle, technology, land use practices, food production and distribution methods, and child care practices, as well as increasing poverty, have a role in emerging infections.

Many infectious diseases are preventable and are controllable. Prevention and control of infectious diseases involve collection of accurate assessment data (such as surveillance data for specific conditions), outbreak detection and investigation, and development of appropriate control strategies (both short and long term) based on specific epidemiologic data. These activities require close collaboration between clinical providers (especially infection-control practitioners within hospitals), clinical laboratories, state and local health departments, and federal agencies. Furthermore, a need exists for continued education of industry (particularly food producers and food-service industries), healthcare students and providers, along with research to improve immunizations, diagnostic methods, and therapeutic modalities.

Thus, the prevention of infectious diseases requires multidisciplinary interventions involving public health professionals, medical practitioners, researchers, community-based organizations, volunteer and private groups, industrial representatives, and educational systems.

The primary infectious diseases identified include:

Anthrax

Anthrax is mainly an animal disease. Herbivores, most commonly livestock, obtain this disease from eating feed or soil contaminated with spore forming bacteria called *Bacillus Anthracis*. These spores are very resistant. Some can retain their properties for decades when buried in some soil. Animal symptoms include quick death referred to as "lightning death," fever, convulsions, difficulty breathing, swelling of throat tissue, and hemorrhaging. Humans acquire this disease by coming into contact with infected animals' tissue, consuming undercooked, tainted meat, or by coming into contact with contaminated hides or products made from the hides. There are three types of Anthrax:

*Inhalational Anthrax: spores are inhaled into the body from the diseased specimen. Death is the usual outcome in this form of anthrax, even with treatment.

*Cutaneous Anthrax: spores are introduced through an existing lesion or abrasion in the skin. The lesion will develop a reddish look within a couple days. Blisters form that will eventually turn black and depressed. Deaths are rare with an antibiotic regimen, but twenty percent of people die when a doctor is not seen.

*Gastrointestinal Anthrax: spores are ingested from infected food. This form has rarely been seen in the United States. However, it is more common in third world countries. Death is the usual outcome.

Anthrax befalls all areas of the world, varying in severity from occasionally occurring to endemic proportions. More than 200 outbreaks of anthrax have been reported on farms in Minnesota since 1909, most recently in 1993, 1996, 1997, and 2000. In the early 1900's, about 130 cases of Anthrax developed. Since 1960, an average ten cases per year strike people. Ninety-five percent of all naturally occurring cases in the U.S. are cutaneous in origin. The remaining five percent is inhalational, since gastrointestinal anthrax has not been recognized to infect anyone in the United States. There is a vaccine to prevent anthrax, but only people that might come directly into contact with the *Bacillus Anthracis* bacteria are currently vaccinated.

Anthrax has recently been thrust into public spotlight for use as a possible bioterrorism weapon. Mail was intentionally contaminated with Anthrax spores and mailed to various places from Trenton, New Jersey. Twenty-two people were infected from this attack, evenly split between the inhalational and cutaneous varieties. Five people with inhalational anthrax died. Everyone infected had some connection to mail and mail sorting. Minnesota has not recently had anyone stricken with any form of Anthrax.

Smallpox

Smallpox has not been an issue in the United States for more than 50 years, but with the threat of terrorism this disease has been thrust to the forefront of public concern and fear. Smallpox is a serious, contagious, and

sometimes fatal infectious disease. The name *smallpox* is derived from the Latin word for "spotted" and refers to the raised bumps that appear on the face and body of an infected person. There is no specific treatment for smallpox, and the only prevention is vaccination. The vaccination is not without risks, however. There is a danger of both death and serious illness just from receiving a smallpox shot. For this reason, until an outbreak occurs, only those playing direct roles in responding to a terrorist attack are being vaccinated.

There are two clinical forms of smallpox. *Variola major* is the severe and most common form of smallpox, with a more extensive rash and higher fever. There are four types of *variola major* smallpox: ordinary (the most frequent type, accounting for 90 percent or more of cases); modified (mild and occurring in previously vaccinated persons); flat; and hemorrhagic (both rare and very severe). Historically, *variola major* has an overall fatality rate of about 30 percent; however, flat and hemorrhagic smallpox usually are fatal. *Variola minor* is a less common presentation of smallpox and a much less severe disease with death rates historically of one percent or less. Currently in Minnesota, there has not been a smallpox outbreak for many years.

Tuberculosis

Tuberculosis is a disease that is spread from person to person through the air. TB usually affects the lungs, but it can also affect other parts of the body, such as the brain, the kidneys or the spine. TB germs are put into the air when a person with TB of the lungs or throat coughs or sneezes. When a person inhales air that contains TB germs, he or she may become infected. People with TB infection do not feel sick and do not have any symptoms. However, they may develop TB at some time in the future. The general symptoms of TB include feeling sick or weak, weight loss, fever and night sweats. The symptoms of TB of the lungs include coughing, chest pain and coughing up blood. Other symptoms depend on the part of the body that is affected.

Tuberculosis in Roseau County is not a large problem, the majority of cases are found in the Twin Cities area. In the year 2002, there was only one case, and it was not a newly acquired case. Since 1993, Tuberculosis cases have been rising, a direct opposite of the decreasing trend seen nationally. In 2001, 239 new cases of Tuberculosis were reported, the largest number since the 1970's. The most considerable factor in the increasing tuberculosis trend is the high percentage of foreign-born people that contract the disease. In fact, according to the Minnesota Department of Health, 81% of people that developed tuberculosis in 2001 were not born in the United States.

Hepatitis

Hepatitis A is a viral disease that causes fever, malaise, anorexia, nausea, and abdominal discomfort, followed within a few days by jaundice. The disease ranges in clinical severity from no symptoms to a mild illness lasting one and two weeks to a severely disabling disease lasting several months. Transmission can occur by direct person-to-person contact; through exposure to contaminated water, ice or shellfish harvested from sewage-contaminated water; or from fruits, vegetables, or other foods that are eaten uncooked,

and which can become contaminated during harvesting or subsequent handling. A vaccine is available for anyone above two years of age to prevent infection. Good personal hygiene and proper sanitation are also ways to combat this disease.

Hepatitis B is caused by a virus called the Hepatitis B virus. This virus targets the liver. Common symptoms include jaundice, pain centered in the abdomen, nausea, joint pain, and loss of appetite. Major damage can be done by this virus including infection that lasts up to a lifetime, cirrhosis, cancer, liver failure, and fatality. Hepatitis B is transmitted when an uninfected person comes into contact with some blood or body fluid from an infected person. There is a vaccine that works for all age groups to prevent outbreaks from occurring.

Hepatitis C is caused by a virus called the Hepatitis C virus. Symptoms of this disease include fatigue, jaundice, nausea, loss of appetite, and pain located in the abdomen. Long term effects include chronic liver disease, infection, and fatality. It is transmitted when an uninfected person comes into contact with some blood or body fluids from an infected person. There is no vaccination to prevent Hepatitis C. Ways to prevent this disease include cessation of drugs, avoiding products that share blood/fluid such as toothbrushes or razors, and taking precautions with needles.

Hepatitis D is caused by the Hepatitis D virus. It is transmitted either through blood or body fluids exposure from an infected person. Most common ways that this occurs are either sexual or drug related. Hepatitis D needs the Hepatitis B virus to exist. Chronic liver disease and cirrhosis can occur with Hepatitis D because common hepatitis symptoms exist. The primary way to reduce Hepatitis D is by educating the public on preventing risk behaviors.

Hepatitis E is caused by a virus called the Hepatitis E virus. Symptoms of this disease include pain in the abdomen, fever, jaundice, nausea, and vomiting. Most outbreaks occur from drinking water contaminated with fecal matter. Person to person transmission is a minimal risk, but can occur. Almost all cases of Hepatitis E occurring in the United States include travelers visiting areas that have deficient sanitary conditions. There are no products obtainable to deter the effects of Hepatitis E. Avoid drinking water and ice that have questionable purity, shellfish, and raw fruit and vegetables.

West Nile Virus (WNV)

West Nile virus is a mosquito-transmitted virus that can cause encephalitis in some people. This virus circulated between mosquitoes and birds in Africa, the Middle East, and Europe since 1937. However, in 1999, an outbreak of West Nile encephalitis was reported in New York City. The virus is spread when an infected mosquito bites a human after biting a bird with high levels of West Nile Virus in its bloodstream. Animals can also be infected in this same manner. Common symptoms include fevers, head and body aches, rashes, and enlarged lymph glands. A severe case of West Nile Virus can also include symptoms such as neck stiffness, coma, tremors, muscle frailty, paralysis, and disorientation often associated with meningitis and encephalitis.

Since 1999, the virus has spread throughout much of the eastern United States. In 2002, Roseau County was reported by the Center for Disease Control to have two cases of West Nile Virus infecting a human and ten cases of the virus infecting pets, livestock, and wildlife. There is no treatment for WNV and no preventive measures such as vaccination that currently work to stop the spread of the disease. Methods for avoiding mosquitos include wearing long sleeved shirts and pants and insect repellent, installing screens on doors and windows, and avoiding prime feeding times for mosquitos such as dusk and dawn.

Influenza (Flu)

Influenza is a contagious disease that is caused by the influenza virus. It attacks the respiratory tract in humans (nose, throat and lungs). The flu is different from a cold. The flu usually comes on suddenly and may include these symptoms: fever, headache, tiredness (can be extreme), dry cough, sore throat, nasal congestion and body aches.

Influenza types A or B viruses cause epidemics of disease almost every winter. In the United States, these winter influenza epidemics can cause illness in 10 to 20 percent of people and are associated with an average of 20,000 deaths and 114,000 hospitalizations per year. Getting a flu shot can prevent illness from types A and B influenza. Influenza type C infections cause a mild respiratory illness and are not thought to cause epidemics. The flu shot does not protect against type C influenza. Influenza type A viruses are divided into subtypes based on two proteins on the surface of the virus. These proteins are called hemagglutinin (H) and neuraminidase (N). The current subtypes of influenza A viruses found in people are A(H1N1) and A(H3N2). Influenza B virus is not divided into subtypes. Influenza A(H1N1), A(H3N2), and influenza B strains are included in each year's influenza vaccine.

Hoof and Mouth Disease

Hoof and mouth disease (or foot and mouth disease in parts of the world) is a highly contagious disease caused by a virus discovered in 1897. It affects cloven-hoofed animals such as cattle, sheep, swine, and goats. Animals suffering from this disease display properties such as fever, loss of weight and appetite, and blisters. These blisters are commonly seen on the mouth, feet, udder, and mucous membranes. The discharge from these blisters is concentrated with the virus. This discharge, along with any urine, milk, or saliva contaminates food, water, soil, or other materials, spreading the disease rapidly throughout herds. Humans rarely contract this disease, but can act as a carrier, along with wild animals, rats, dogs, birds, cats, and frozen meat. Animals found infected with hoof and mouth disease are quarantined, slaughtered and disinfected, because there is no treatment. Vaccines are available to prevent the spread of this contagious disease. The spread of this disease can have a huge economic impact if a country is dependent on the export of beef. Although there has not been an outbreak in the United States lately, outbreaks have recently occurred in parts of Europe.

Prion Diseases

Prion diseases, or transmissible spongiform encephalopathies are a group of infectious diseases caused by an unidentified agent called a prion. Well-known afflictions in this group include human ailments such as kuru and Creutzfeldt-Jakob disease, chronic wasting disease in deer and elk, bovine spongiform encephalopathy (mad cow disease) in cattle, and scrapie in sheep. Prion diseases center on brain tissue, leaving holes that resemble a sponge. The prion protein that causes these diseases arouses no immune response while it transforms normal brain cells, rendering the body helpless. There is no treatment for any prion disease. While prion diseases are known to be hereditary, it can also be passed from eating infected meat or contaminated feed.

The increase in global transportation allows infectious diseases to spread into areas that were not indigenous. If an outbreak of any severe type were to occur, the distressed public could resort to rioting and other forms of disorder. Depending on the severity of the outbreak, specific public services could be impeded because of workforce absenteeism. Economic damage could also be done if businesses were forced to close for a length of time.

Avian Influenza (Bird Flu)

Bird Flu is an infection caused by avian influenza viruses. These viruses occur naturally among birds, and are considered extremely contagious. It has come under an increased amount of concern as of late due to the fact that there have been over one hundred confirmed cases of humans catching Bird Flu since 1997. Some are linking a possible Bird Flu outbreak to some of the pandemic flu's seen in the early 1900's that killed millions of people.

Infected birds emit the virus through their feces, saliva and nasal secretions. Other birds become infected when they come into contact with the body fluids. The virus lives in the intestinal tracts of birds, and usually does not affect the animal. Humans most often catch the disease through a contaminated surface or by coming into contact with infected birds. Transmission has not yet been observed where a human catches Avian Influenza from another human.

Symptoms can range from typical flu symptoms (fever, cough, sore throat, muscle aches) to eye infections, pneumonia and other severe respiratory diseases. Current prescription medications approved for human flu viruses currently work to prevent bird flu for people, however this may not always work since virus strains can become drug resistant. The CDC and other agencies are working hard to study bird flu to prevent a possible pandemic.

History

The following table represents communicable diseases that have been reported to the Minnesota Department of Health in 2004. The area where occurrences developed is classified as the following counties: Beltrami, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, and Roseau.

Communicable Disease	Occurrences
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Anaplasmosis	12
Campylobacteriosis	6
Cryptosporidiosis	1
West Nile	1
Escherichai Coli	2
Giardiasis	10
Haemophilus Influenzae invasive disease	4
AIDS	1
Lyme disease	43
Neisseria Meningitidis invasive disease	1
Pertussis	41
Salmonellosis	9
Chiamydia Trachomatis (STD)	248
Gonorrhea (STD)	28
Streptococcus Pneumoniae invasive disease	14
Streptococcal invasive disease - Group A	6
Streptococcal invasive disease - Group B	14
Tuberculosis	2
Viral Hepatitis, Type A	2
Viral Hepatitis, Type C	3

Source: Minnesota Department of Health

Plans and Programs

Infectious Diseases	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Board of Animal Health	X			X						X	
Dept. of Agriculture		X	X	X	X	X		X	X		X
Dept. of Health		X		X	X	X		X		X	X
Dept. of Natural Resources	X										
Dept. of Public Safety, Division of Emergency Management	X	X						X	X		
Minnesota National Guard	X	X	X	X	X			X	X		

Pollution Control Agency				X			X	X	X	
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Source: Minnesota State All-Hazard Mitigation Plan

The Minnesota State Health Department has many plans and programs to combat infectious diseases including:

1. The Acute Disease Investigation and Control Section has many functions including examination of outbreaks and eradication of sources, surveillance and monitoring of communicable diseases and outbreaks, and furnishing education to others about controlling communicable diseases.
2. The Cancer Control Section has a mission to reduce cancer in Minnesota by early detection. Programs include free breast and cervical screening to low/moderate income women whose insurance is deficient, free/discounted colposcopies to women, and information to educate public.
3. The Center for Health Promotion proposes new community-based grants that prevent diabetes, asthma and obesity.
4. Chronic Disease and Environmental Epidemiology protects the health of all Minnesotans. Projects include operating the Minnesota Cancer Surveillance System, the Asthma Program, and responding to chronic disease issues from various people and groups.
5. The Clinical Laboratory supports disease outbreak investigations, performs tests for infectious and heredity diseases, and works with rabies.
6. Immunization, Tuberculosis, and International Health works to support immunization providers, as well as local public health agencies in Minnesota. It also works with the Refugee Health Program as well as trying to prevent the spread of tuberculosis in Minnesota.
7. The National Electronic Disease Surveillance System contains an infectious disease database. This information can be used for a variety of sources and helps protect the health of Minnesota citizens.
8. The Refuge Health Program offers a screening to new refugees, treating existing health problems.
9. The STD and HIV section works to stop death and disability from sexually transmitted diseases, including HIV.

-The United States postal service launched a program in July of 2003 called the Biohazard Detection System. Anthrax detection systems are placed at certain mail-processing centers throughout the country.

-One of the main ways for Roseau County to target both infectious diseases and terrorism is by participation in the Strategic National Stockpile. This federal program collects and amasses pharmaceuticals and medical supplies for delivery anywhere in the United States within twelve hours of an emergency situation. Push packs include such items as medicines, antidotes of various types, medical supplies/equipment and vaccines. Polk County is the designated site for Northwest Minnesota to receive and distribute the push packs to nine counties and one tribal government. Public Health departments of both Roseau and Polk County have plans written to ensure that various operations go smoothly if the program ever needs to be utilized.

Technological Hazards

Technological hazards are primarily seen as human induced hazards, because technology is made by humans. Technological hazards occur chiefly from malfunctions in three areas: construction, manufacturing, and transportation. The technological advances seen in today's world have redefined hazards. Grasshoppers eating whole crops is a hazard of the past thanks to technology, but forms of terrorism and hazardous waste incidents are becoming major threats to many people in the present and future. In the future, we as a society must watch for these evolving hazards.

Fire

As stated above, humans cause four out of every five fires. These fires include any instance of uncontrolled burning which results in structural damage to residential, public or mercantile, and industrial or manufacturing properties in developed and undeveloped areas. Vehicle fires are also covered. Urban fires are blazes spreading through structures, posing danger and destruction to property. Fires can occur in any community, and pose a threat year round. Common ways people accidentally cause a fire includes setting off fireworks, campfires, smoking, electric fences, or letting a controlled burn of a ditch or other grassy area get out of control. Fires have also been known to start from the use of ATV, farm equipment, trains, or other vehicles.

Arson can be a major cause of a technological fire. Arson is the deliberate setting of a fire for various reasons including profit, revenge against another person or business, personal beliefs and masking additional crimes and the evidence contained within. People that do not have a criminal background may resort to this crime when faced with financial hardship.

The cost of heating is also a cause of fire. Because of the increased prices of natural gas and oil, people find cheaper alternate ways to heat a structure. Some portable gas and kerosene heaters have an open flame that is a fire hazard. The fuel stored in these heaters also could either cause an explosion or make someone sick if not used in a ventilated area. A wood burning stove or its chimney is a fire danger if not positioned correctly.

History

There were 441 fires that occurred from January 1, 1993 to December 31, 2002. The majority of fires are caused by two things: arson (147 counts, 37,093.8 acres) and debris (231 counts, 8,778.5 acres). There were eleven additional fires started by campfires, thirteen by smoking, thirteen by equipment use, two by the railroad, two by kids, and twenty-two other miscellaneous fires (power lines, electric fences, fireworks, prescribed burning, etc...).

Plans and Programs

Urban Fires	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Agriculture			X	X	X			X			
Dept. of Public Safety, Division of Emergency Management	X	X	X		X	X		X	X	X	X
Dept. of Public Safety, State Fire Marshal Division	X	X	X	X	X	X	X	X	X	X	X
Dept. of Public Safety, Office of Pipeline Safety	X	X	X	X	X	X	X	X	X	X	X
Dept. of Transportation	X			X	X			X			
Housing Finance Agency	X	X									
Metropolitan Airports Commission	X	X	X	X	X			X	X	X	
Minnesota State Colleges and Universities			X								
Pollution Control Agency	X	X	X	X	X	X	X	X	X	X	X

Source: Minnesota State All-Hazard Mitigation Plan

Hazardous Material

Hazardous materials are chemical materials which if emitted or abused can unleash a menace unto the environment or health of a community. These chemicals are used in industry, agriculture, medicine, research and consumer goods throughout Roseau County. Hazardous materials come in varied forms including explosives, flammable and combustible substances, corrosives, poisons and radioactive materials. Hazardous materials are used every day, many in households across the county. Used correctly, the standard of living for many people is improved. It is when hazardous materials are used incorrectly, not given respect for being a dangerous substance, or being transported in an unsafe manner that accidents occur and innocent people suffer. Types and effects of various hazardous materials are listed below:

1. Corrosives: Substances that attack tissue, mucous membranes, lungs, or

- the stomach (depending on mode of exposure).
2. Irritants: Substances that cause inflammation to the site of exposure. Lung function and respiration can also be affected.
 3. Asphyxiants: Substances that either prevent tissue from getting oxygen or cause the body to keep an inadequate supply of oxygen.
 4. Anesthetics: Substances that affect the central nervous system, having a depressant-type effect. The brain is particularly influenced.
 5. Hepatotoxics: Substances that cause the liver to be damaged.
 6. Nephrotoxics: Substances that cause the kidneys to be damaged.
 7. Neurotoxics: Substances that cause the nervous system to be damaged.
 8. Hemototoxics: Substances that cause the blood cells to be damaged. Bone marrow can also be affected.
 9. Carcinogens: Substances that can either start or hasten the development of a tumor.
 10. Mutagen: A substance that will affect the chains of chromosomes in cells that are subjected to the substance. The effect becomes hereditary, passed to future generations.
 11. Teratogen: A substance that will affect the fetus' development, but will not harm the mother. The effects are not hereditary.
 12. Sensitizer: A substance that will cause the exposed population to produce a reaction after repeated exposures.

A hazardous material spill or release can pose a risk to life, health and property. An incident can force the evacuation of a few people, a section of a facility or an entire neighborhood or community, resulting in significant economic impact and possible property damage. Spilled material can be costly to cleanse and may render the area of the spill useless for an extended period of time. Hazardous material incidences are generally associated with transportation accidents or accidents at fixed facilities. All highways and railroads associated with transport and anywhere that hazardous material is used or stored is susceptible to a spill, as well as the soil that a pipeline runs through. Most transported hazardous materials have a placard that identifies what is being carried. To read more about hazardous materials please visit <http://environmentalchemistry.com/yogi/hazmat/erg/>. Information is given on the chemical and the UN number. A guide is also given that includes information such as the potential hazards involved from a particular chemical, public safety data and emergency response steps. Placard examples are shown as well as which chemicals produce lethal gas when mixed with water and isolation/action distances for a large or small spill specific to which chemical was released.

Almost every town stores some kind of hazardous material. Examples include a season's supply of mosquito spray or road salt. A lot of companies generate hazardous material and some are quite common in today's society. These businesses include:

- Dry cleaners
- Auto repair shops
- Printing or painting shops
- Medical or dental clinics
- Photo or x-ray processors
- Metal finishing shops
- Certain county, state or federal agencies

Almost every business that produces hazardous material or uses it is required to have a response plan in case there is a release.

Another hazardous material is radiation. Serious health problems can occur from exposure to ionizing radiation. These effects vary, depending on the time exposed, strength and frequency of exposure, sensitivity of the exposed cells, and the penetrating power of the radiation. Some types of ionizing radiation include alpha particles, beta particles, gamma rays, X-rays, and neutron particles. The ionization damages molecules and certain structures within the cell.

People most at risk to radiation are living near a nuclear power plant, and all living matter is affected by ionizing radiation. People, property, and wildlife may suffer greatly if radioactive material contaminates an area such as a body of water.

History

Year	Events	Injuries	Evacuation	Industry	Materials
1995	1	0	0	Window MFG	Ethylene Glycol
1996	2	0	0	Window MFG, Seed retailer	Ethylene Glycol, Pesticide
1997	2	0	0	Seed Supplier, Farm Co-op	Pesticide, Ammonia
1998	1	0	0	Transport Vehicles	Chlorodifluoromethane
1999	1	0	0	Window MFG	Sulfuric Acid
2000	1	0	0	Window MFG	Ethylene Glycol
2001	0	N/A	N/A	N/A	N/A
2002	2	0	0	Farm Co-op	Pesticide, Ammonia
2003	4	0	0	Farm Co-op, Ag.	Pesticide, Ammonia

Source: HSEES events, MN Dept. of Health

Trains can pose a large threat to Roseau County. Since trains criss-cross area, a crash or derailment could affect many individuals, especially if the train was hauling hazardous material. The threat is amplified because many individuals do not know exactly what a train near their property is hauling. The chemical manufacturers association estimates that one out of every three trains is carrying some sort of hazardous material during the span of an average year. Below is a list of all the train accidents that have happened within the county during the last twenty nine years.

Date	RR	Accident	Cause	Equip Damage	Track Damage	Injured	MPH	Locos Der	Cars Der
11/05/1976	CNO	Derail	Human	\$0	\$162	0	4	0	1
11/15/1988	CNIC	Derail	Equip.	\$4,243	\$18,261	0	40	1	0
12/05/1991	BNSF	Other	Misc.	\$341,500	\$2,000	3	23	0	0
01/02/1993	BNSF	Derail	Track	\$17,500	\$2,000	2	12	0	5

Source: Federal Railroad Association Office of Safety Analysis

There have not been very many accidents in Roseau County in recent years.

According to the FRA, there has never been an accident involving hazardous material or the evacuation because of the release of a hazardous substance. The FRA also says that there has not been a death in Roseau County due to a train crash or derailment.

Toxic releases into the county are still a concern. The Environmental Protection Agency instituted the Toxics Release Inventory (TRI) to help with this concern that many areas have. This database contains information about different chemical releases and can be searched by state, county, or zip code. People have the right to know about toxic chemicals that are released into your area. It could do a community a great deal of harm if someone's home, school, drinking water supply, etc... was located near a toxic release site. To access the database please visit:

<http://www.epa.gov/triexplorer/>

For more internet databases concerning hazardous materials in your area please visit these additional sites:

<http://www.epa.gov/enviro/>

<http://www.scorecard.org/>

<http://www.rtknet.org/>

Plans and Programs

Transportation of Hazardous Waste Incidents	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Agriculture			X	X	X			X	X		
Dept. of Public Safety, Division of Emergency Management	X		X		X			X	X	X	X
Dept. of Public Safety, State Fire Marshal Division	X		X		X			X	X	X	
Dept. of Transportation	X	X	X		X			X			
Metropolitan Airports Commission	X	X	X	X	X		X	X	X		X
Minnesota State Colleges and Universities			X								

Pollution Control Agency		X		X				X	X	X	X
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Source: Minnesota State All-Hazard Mitigation Plan

Pipeline Incidents	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept of Natural Resources											
Dept. of Public Safety, Division of Emergency Management		X			X			X		X	
Dept. of Public Safety, State Fire Marshal Division	X	X	X	X	X	X	X	X	X	X	X
Dept. of Public Safety, Office of Pipeline Safety	X	X	X	X	X	X	X	X	X	X	X
Metropolitan Airports Commission	X	X	X	X	X			X	X	X	X
Minnesota State Colleges and Universities			X								
Pollution Control Agency		X		X				X	X	X	X

Source: Minnesota State All-Hazard Mitigation Plan

Fixed Facility Hazmat. Release	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Agriculture	X	X	X	X	X	X	X	X	X	X	X
Dept. of Natural Resources		X	X		X			X	X	X	
Dept. of Public Safety, Division of Emergency Management	X		X		X			X	X	X	X
Dept. of Public Safety, State Fire Marshal Division	X				X			X		X	
Dept. of Public Safety, Office of Pipeline Safety					X						
Housing Finance Agency		X									
Metropolitan Airports Commission	X	X	X	X	X			X	X	X	X
Minnesota National Guard	X				X			X			
Minnesota State Colleges and Universities			X								
Pollution Control Agency		X		X				X	X	X	X

Source: Minnesota State All-Hazard Mitigation Plan

Unknown/Research Developed Hazmat Incident	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Agriculture			X	X	X			X	X		
Dept. of Health	X				X						
Dept. of Natural Resources					X			X	X	X	
Dept. of Public Safety, Division of Emergency Management	X		X		X			X	X		
Dept. of Public Safety, State Fire Marshal Division	X		X					X		X	
Metropolitan Airports Commission	X	X	X	X	X			X	X	X	
Minnesota National Guard	X	X	X	X	X			X	X	X	
Minnesota State Colleges and Universities			X								
Pollution Control Agency		X		X				X	X	X	X

Source: Minnesota State All-Hazard Mitigation Plan

Radiological	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
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Dept. of Agriculture	X	X	X	X	X	X		X	X	X	X
Dept. of Commerce	X	X	X	X	X	X	X	X	X	X	X
Dept. of Health	X	X	X	X	X			X	X		X
Dept. of Human Services	X	X	X	X	X			X	X		
Dept. of Natural Resources	X	X	X	X	X			X	X	X	
Dept. of Public Safety, Division of Emergency Management	X	X	X	X	X	X		X	X	X	
Dept. of Transportation	X	X		X	X			X	X		
Housing Finance Agency		X									
Metropolitan Airports Commission	X	X		X				X		X	
Minnesota National Guard	X	X	X	X	X			X	X	X	
Minnesota State Colleges and Universities	X		X		X						

Source: Minnesota State All-Hazard Mitigation Plan

Anhydrous ammonia theft has been an increasing problem in Roseau County. This is used by many farmers as fertilizer for crops. Anhydrous ammonia is also an ingredient in the drug meth, and more farmers have been seeing their tanks vandalized by people who are interested in making the drug. Anhydrous is a dangerous chemical. If spilled, it makes a vapor cloud. It will burn body tissue on contact if the concentration is high enough. To combat this hazard, North Dakota has passed a law saying that all anhydrous tanks should have an approved lock when unattended. Although tank locks will not completely solve anhydrous theft, it may deter some of the miscreants and some form of this program in Minnesota may help combat the rising drug problem.

-Meth is a large problem for the county because each pound of Meth made produces about five/six pounds of toxic materials that are expensive to clean up. Materials to make the drug can be purchased out of a local store. Illegal labs can explode or leak, harming innocent people. An increase in criminal activity can also be seen. Users can be addicted quickly, as Meth is an "upper." Jails in Minnesota are becoming increasingly overcrowded because of this drug and the majority of counties in Northwest Minnesota are searching for funding the process of creating a new jail. Law enforcement agencies in Roseau County are currently working on this problem with the help of county and community members.

Flood Control Structure Failure

Dam failure could be defined as the collapse or failure of an impoundment resulting in upstream or downstream flooding. A dam can protect many lives and structures from harm but with improper production or maintenance, dam failures can result in loss of life and extensive property damages. Dam failure can result from an array of situations, including flood events, poor

operation, lack of maintenance and repair and terrorism. Some of the most common failures include piping or seepage problems, foundation deficits and overtopping of the dam in cases of extreme water. When a dam or levee fails, it costs money not only to replace it, but also to repair the damage resulting from the dam/levee failure and the loss of income by employees and businesses. The economic impact from this event can have a devastating impact upon a small or large community.

Reaction time is a large factor for failure in most communities. How fast a city or residence can enact flood protection measures may lessen the total amount of damage done by a flood. It is important for flood response plans to have mitigation actions done within hours instead of days because flash flooding does not give much preparation time, as evidenced in Grafton, North Dakota. Grafton has gaps in the dike that protect the west side of town. In the event of a flood, officials planned to fill the gaps but the flood in April 2004 occurred too quickly for a total reaction to occur and water poured through the gaps. Officials did not have enough time to move enough fill to plug the gaps that measured more than two thousand total feet.

One of the main benefits of dams is to hold back water. This is important during high water or floods, especially during spring runoff and immediately after heavy rains. Other advantages include irrigation, hydropower, and increased navigation for watercraft. Although dams act to prevent harm from flooding, they do pose potential threats if they fail. Dam failure can push a wall of water down the valley below the dam, destroying many things in its path. Sediment can also collect behind a dam, and this can lower the amount of water being held. Maintenance is important so that dam failure or overtopping does not occur. The intensity of damage done depends upon how much water is stored behind the dam and the weather. A large rainstorm can increase an already critical situation. Locations most often influenced by dam failure are often low lying elevation areas that are below a dam. Often these localities are near a creek, river or stream or in a valley of one of the three.

Boats and other recreational vehicles have been known to hit dams, causing injury and fatality. Passage by aquatic life is also prevented by dams, but this is both a pro and a con. Circulating currents just below the dam are also a danger, capsizing boats and drowning people by trapping them in the circular current. The cold water, vertical concrete abutment, and debris already trapped in the current also cause an additional danger for people. Air bubbles that are often mixed into the water at the bottom of a dam cause buoyancy to decrease by a third. Even a life preserver will not save some people from certain death. The Drayton Dam, located on the Minnesota/North Dakota border has the most fatalities in the area (twelve).

A dike is described as a structure made of rock or earth built to preserve the location and depth of an existing channel. A levee is made from earthen materials and built to protect low-lying lands from flooding. These are often placed between the structures that need protecting and the flood path. If the space between the flood path and a structure is small, a floodwall is usually erected out of concrete. A dike and a levee are often used synonymously.

Like dams, dikes, levees, and flood walls can only protect from floods that

they were designed for and the structures do need periodic maintenance. If built too closely to a water body, the flood levels, flows and storage may be compromised. Severe damage can occur when these flood control structures are breached. The floodplain may also not be able to function naturally with the structures, and wetlands may die. Despite this risk, having these structures often calms people, encouraging development in previously flood prone areas. The development of ring dikes and levees is sometimes thought of as fixing a symptom, not the problem (flooding). Communities do not want to depend on these structures alone to protect them against flooding, but have a network of flood responses ready.

History

Dam Name	River	Height (ft)	Storage (ac-ft)	Year Complete	Hazard Level	Owner
HAYES LAKE	ROSEAU	39	2,400	1973	Medium	STATE OF MN-PARKS
NERESON WMA	TRIB. of S. BRANCH TWO RIVERS	16	5,000	1981	Low	DNR
ROSEAU RIVER WILDLIFE MGMT. AREA POOL3	TRIB. of ROSEAU RIVER	7	13,000	1950	Low	STATE OF MN
ROSEAU RIVER WILDLIFE MGMT. AREA POOL 2	TRIB. of ROSEAU RIVER	10	15,000	1950	Low	STATE OF MN
ROSEAU RIVER WILDLIFE MGMT. AREA POOL 1	PINE CREEK DIVERSION	11	9,000	1950	Low	STATE OF MN

Source: National Inventory of Dams, U.S. Army Corps. of Engineers

Risk Definitions:

High: Loss of human life will most likely occur.

Medium: Economic loss can be seen, as well as damage to the surrounding environment. Critical facilities could be at risk.

Low: Virtually no risk of lost human life. Losses seen are primarily at/near the dam failure location.

Plans and Programs

Dam Safety	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Agriculture				X	X			X			
Dept. of Natural Resources	X		X	X	X	X	X	X	X	X	X
Dept. of Public Safety, Division of Emergency Management								X	X		
Pollution Control Agency				X			X	X	X	X	X

Source: Minnesota State All-Hazard Mitigation Plan

Water Supply Contamination

Water supply contamination is the introduction of pollutants into public ground water and/or surface water supplies. As water travels over various surfaces or through the ground, it can dissolve various materials, either naturally occurring or otherwise. As contaminated water enters a lake, aquifer or river, the contamination can spread. Although minimal, water supply contamination does pose a threat in the county. As the population continues to increase, the problem will increase in severity. Any water source can be susceptible to contamination. The following types of contamination can occur in Roseau County:

- Radioactive contamination
- Virus/bacterial contamination
- Pesticide/herbicide contamination
- Organic chemical contamination
- Inorganic contamination

Microbiological and chemical contaminants can enter water supplies through many varied routes. Chemicals can leach through soils from leaking underground storage tanks or sewage treatment facilities, feedlots and waste disposal sites. Human or animal wastes, fertilizer and pesticides can also be carried to lakes and streams during heavy rain or snowmelts. Manufacturing facilities can release toxic chemicals. In the right conditions, algae can create a byproduct that can have toxic effects on humans, wild life, and aquatic life.

Soil that has been contaminated often limits how it can be used, and animals that drink contaminated water might not be fit for human consumption. Crops that have been irrigated with impure water may have adverse effects upon the consumer, either human or animal.

One conservation method to remove sediment and pollutants from water sources is by utilizing filter strips. These are strips or areas of vegetation planted near any water body. Besides limiting the effects of wind/water erosion and surface water runoff, wildlife may also benefit. Grassed waterways work much the same way and are often used in association with filter strips. These two types of vegetation methods are talked about earlier in the report under flooding.

Other conservation methods to help prevent water contamination include maintaining a proper sewage system, correcting erosion and sedimentation problems, using biodegradable household chemicals instead of toxins and employing proper practices to decrease the eutrophication process on lakes. Use safe amounts of fertilizers, pesticides and herbicides on lawns or crops. Decreasing the amount of hard surfaces also helps decrease runoff. Buildings or roads are more impermeable to water, causing more runoff in other areas. Also by encouraging diversity in plants and animals, an environment becomes more adaptable and is able to cope with change with greater ease.

Wastewater treatment and disposal is an important part of our need to protect and preserve Minnesota's water resources. Although minimal, failure of wastewater treatment systems poses a potential risk in Roseau County. A water treatment plant uses varied means to rid the water of known contaminants; such processes include filtration, flocculation/sedimentation and disinfection. A continuous water quality monitoring program is also required. Contamination of a water supply requires public knowledge, or irreversible damage might be done to many people.

When not managed properly, feedlots can be a major cause of contamination. A feedlot is an area that is designated for the feeding of livestock. The manure from animals can get into the water supply and cause eutrophication and increased sedimentation. Manure can be introduced by a variety of ways including runoff, abandoned wells, a stream or lake that bisects the lot, shallow topsoil, shallow groundwater levels or fractures in the ground. A manure storage area can harbor these dangers also if not properly constructed. An area of increased slope can also encourage movement of pollutants. A feedlot should never be placed in a floodplain; permitting by the state helps to make sure that this does not occur. Areas with karst, drainage ditches, wetlands or subsidence are also localities that feedlots should never be placed near.

Underground storage tanks can be a major contributor to water contamination. If not properly sealed, liquids like fuel or oil can get into the water supply and poison people and animals. Corrosion is one such process that can cause leakage as well as spills and overfilling. Minnesota currently has about 18,500 underground storage tanks presently in use. To combat the hazard caused by these storage tanks, the Underground Storage Tank (UST) program was born. Its mission is to deter contamination that is caused by leaking storage tanks through both technical assistance and inspections. There is also an Aboveground Storage Tank program (AST). Methods used by

these programs to rid soil of contaminants include thermal treatments (soil is heated to remove contaminants) and land treatment (contaminated soil is mixed with native soil where the natural microbes break down the petroleum). To see a database of all the storage tanks in your county (both underground and above ground) go to this website listed below. What was originally stored in the tank is listed, as well as the capacity and the current status.

<http://www.pca.state.mn.us/cleanup/index.html>

This website also has a database that you can access to see all the Leaking Underground Storage Tanks (LUST) in your area. It will discuss where the leak occurred as well as what the leak was, when it was released and if any contamination occurred. The above website has a multitude of information concerning regulations of different types of tanks as well as exemptions and new rules set by the government. For additional information on releases that could be potentially dangerous to water in your area, please visit these three additional websites (Please note that the following websites could also be used in the hazardous materials section of this report):

- <http://www.rtknet.org> The Right-To-Know Network
- <http://www.scorecard.org/> Scorecard
- <http://www.epa.gov/enviro/> Envirofacts Data Warehouse

The Minnesota Department of Health has a Source Water Assessment done for every public water supply in Minnesota. A source water assessment provides information to people about where the water comes from, well construction assessment, well and aquifer sensitivity, source water susceptibility and contaminants of concern. The following chart illustrates the public water supplies localities for Roseau County. Complete information can be found at <http://156.98.150.16/swa/pdwmain.cfm> (The Minnesota Department of Health website under drinking water protection, source water protection.)

Source Water Assessment Location	Identification	City
89 Cafe	Non-Community	Wannaska
AMG, Inc.	Municipal	Warroad
Badger City Hall	Municipal	Badger
Badger Motel	Non-Community	Badger
Bemis Hill State Forest Campground	Non-Community	Skime
Bethel Lutheran Church of Stafford	Non-Community	Roseau
Bethel Mission Covenant Church	Non-Community	Roseau
Bethesda Lutheran Church	Non-Community	Skime
Bethlehem Lutheran Church	Non-Community	Warroad
Central Boiler/Central Fireplace	Non-Community	Greenbush
Church of Jesus Christ Latterday Saints	Non-Community	Swift
Coast and Border Protection	Non-Community	Warroad
Concordia Lutheran Church	Non-Community	Ross
DJ's Salol Store	Non-Community	Salol
Evangelical Covenant Church	Non-Community	Roseau
Faith Lutheran Church	Non-Community	Badger
First Lutheran Church	Non-Community	Salol
Greenbush City Hall	Municipal	Greenbush
Gustav Adolph Lutheran Church	Non-Community	Strathcona
Hayes Lake State Park	Non-Community	Roseau

Lakewood Park and Sales	Municipal	Warroad
Malung-Pencer School, ISD No. 682	Non-Community	Malung
New Life Assembly of God Church	Non-Community	Warroad
Norland Lutheran Free Church	Non-Community	Salol
Northern Lights Mobile Home Park	Municipal	Warroad
Oak Manor Mobile Home Park	Municipal	Roseau
Oiland Free Lutheran Church	Non-Community	Badger
Paradise Mall	Non-Community	Strathcona
Pine Grove Lutheran Church	Non-Community	Pencer
Pine Ridge Estates	Municipal	Warroad
Pioneer Farms and Village	Non-Community	Roseau
Rivers Edge Bait and Convenience	Non-Community	Greenbush
Riverside Lutheran Church	Non-Community	Wannaska
Roosevelt American Legion/Community Ctr.	Non-Community	Roosevelt
Roosevelt Cafe	Non-Community	Roosevelt
Rose Free Lutheran Church	Non-Community	Roseau
Roseau City Hall	Municipal	Roseau
Roseau Free Lutheran Church	Non-Community	Roseau
Roseau Municipal Airport	Non-Community	Roseau
Springsteel Island Supply	Municipal	Warroad
Springsteel Resort	Non-Community	Warroad
Spruce Free Lutheran Church	Non-Community	Roseau
St. Phillip's Catholic Church of Falun	Non-Community	Roseau
Strathcona City Well	Non-Community	Strathcona
Timberline Mobile Home Park	Municipal	Salol
U.S. Customs and Immigration	Non-Community	Pinecreek
United States Customs and Immigration	Non-Community	Roseau
Wannaska Public School, ISD No. 682	Non-Community	Roseau
Warroad	Municipal	Warroad
Warroad Baptist Church	Non-Community	Warroad
Warroad Eagles 4195	Non-Community	Warroad
Woodland Trailer Park	Municipal	Salol

A wellhead protection plan is also written for areas in Minnesota, however differences do exist between the two plans. Although the Minnesota Department of Health is involved, a wellhead protection plan is primarily written by either the water system or another appointed local party. The focus of the plan is to prevent drinking water from becoming contaminated by managing contamination sources. Specific requirements for the report vary, depending on the type of system, use and community. The Minnesota Department of Health has a goal that by 2006, all groundwater based community and nontransient noncommunity public water systems will have, at a minimum, begun the wellhead protection planning process. In Roseau County, there currently are no wellhead protection plans either completed or in the composition process. For more information, please contact the Minnesota Department of Health or search the following website:

<http://www.health.state.mn.us/divs/eh/water/swp/whp/index.htm>

History

Look at the history section of the hazardous materials section above for more information. The chance of water contamination is always greater when a hazardous chemical is accidentally or intentionally dumped in an area that is not prepared to combat the spill. Agents like wind or water can also take a material that is not hazardous to one environment and transport it to an environment that is more fragile and susceptible to contamination. For these reasons, hazardous materials and water contamination sometimes travel hand in hand.

Old landfills may pose a threat to Roseau County. Years back, landfills were not closed according to today's standards. Many chemicals that are illegal today were legal in years past. Some of these landfills have a danger of leaking and contaminating groundwater. The Minnesota Pollution Control Agency (MPCA) has a closed landfill program (CLP) that monitors and mitigates old landfills. Roseau County has two landfills in the program:

- The Salol landfill contains ninety-five permitted acres, forty-five and a half were filled. The site stopped accepting waste in April 1994. It is a class D landfill, which means that there is no threat to public health or the environment, lowest of the four classifications. The MPCA states that the landfill lacks an approved cover and gas venting system. The ground water monitoring system was recently upgraded and the site redesigned.

- The Greenbush landfill consists of eight permitted acres, 2.6 were filled with an estimated 31,581 cubic yards of waste. The landfill stopped operations in August 1980. It is a class D landfill, which means that there is no threat to public health or the environment, lowest of the four classifications. The MPCA states that the landfill lacks an approved cover system. The small size makes it a candidate for relocation to the Salol landfill.

Certain lakes and rivers have mercury warnings posted. Fish that come from these waters may be toxic to eat because they contain high levels of mercury. There are questions on whether animals that eat amounts of these fish become contaminated too. Mercury poisoning might occur from ingestion of the contaminated meat. Other items monitored in rivers, ditches and lakes include ammonia, biota types, chloride, fecal coliform, low oxygen, pH, turbidity, temperature and PCBs. Below is a list of the impaired waters in Roseau County from the Minnesota Pollution Control Agency:

- Aquatic life is affected in the Roseau River because of low oxygen. It is also impaired by mercury.

- Aquatic life is affected in the South Branch of the Two Rivers because of Biota.

Plans and Programs

Water Contamination	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Dept. of Agriculture		X	X	X	X	X	X	X		X	X
Dept. of Health		X		X	X			X			X
Dept. of Public Safety, Division of Emergency Management				X							
Pollution Control Agency				X				X	X	X	

Source: Minnesota State All-Hazard Mitigation Plan

-The Minnesota Department of Health also administers programs that protect drinking water purity. These programs execute the safe water drinking act, monitor and test water at different facilities, and establish/verify construction plans that deal with drinking water. Protecting water sources from contamination (source water protection) is also an important task. This is accomplished through water and wellhead protection plans.

-The Environmental Health Services Division of the Minnesota Department of Health analyzes onsite sewage treatment plans, making them secure and contamination free.

-The Water Operator Certification Office (sector of the Minnesota Department of Health) deals with the certification of operators working for the public water supply system.

-Well Management (in Minnesota Department of Health) guards Minnesota drinking water and groundwater by sealing old wells/borings and building new ones. Information is also given on where to test water for various elements and bacteria content.

-A group of organizations (almost 60) is composing a legislative proposal to clean Minnesota's lakes and rivers. Everyone would pay a flat tax to fix the pollution, considered mostly runoff (86%).

-The CREP program pays farmers to take land near rivers out of crop

production and back into wetlands or grasslands. This program will reduce erosion, control water flows, and work to lessen pollution.

-A law became effective on January 1, 2004 that prohibits the amount of phosphorus fertilizer that is applied to lawns. The main reason for this law is to reduce the amount of phosphorus runoff into lakes, rivers and streams, cutting water contamination. This is not a ban, but just a reminder to fertilize only when necessary, and exemptions do exist.

-The Red River Basin Riparian Project is a project that allows landowners in the Red River Basin in Minnesota and North Dakota to restore riparian corridors. Best Management Practices (BMPs) are used to accomplish this goal including native timber management, riparian forest buffer, grazing management and floodplain function restoration. Benefits to the project include:

- Flood damage reduction
- Sediment removal
- Erosion control
- Increase in biologic diversity
- Water quality improvement

-The Environmental Quality Incentives Program (EQIP) is a conservation program sponsored by the Natural Resources Conservation Service (NRCS). The program helps landowners protect soil/water resources through methods such as terracing, conservation tillage, nutrient management plans, animal waste management structures, wetland restoration, stream bank protection, grassed waterways, buffer/filter strips and pest management as well as many others.

Terrorism

Human-caused hazards are intentional, criminal, malicious uses of force and violence to perpetrate disasters against people or property. They can be the result of terrorism (actions intended to intimidate or coerce a government or the civilian population to further political or social objectives) which can be either domestic or international depending on the origin, base and objectives of the terrorist organization. Terrorism can also be performed by individuals perpetrated for personal reasons.

Hazards can result from the use of weapons of mass destruction, including biological, chemical, nuclear and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; and cyber terrorism. Other human hazards include meth labs, civil unrest, school violence, economic and agricultural attacks, hostage situations, threats, riots, food and water contamination and workplace violence.

School groups have also come under national attention for an increase in terrorist activities. Children coming into school with weapons such as knives and guns pose a threat not only to other children but to faculty and staff as well. Schools have evacuation plans in case an event like the above ever occurs.

Roseau County should be on watch for terrorism because of its proximity to the United States/Canadian border. The long, undefended border can be a prime target for terrorists, wishing to gain access into the United States. The varied ethnicity of Canada offers recruitment opportunities as well as a way to conceal themselves from public view. Canada allows certain groups to raise funds as long as it is not toward a violent purpose, these groups are not permitted to do this in the United States. There is also an air base in Grand Forks County, North Dakota. An attack on this base would possibly affect Roseau County. The threat is generally minimal, but the severity would depend on the mode of attack.

There are other buildings within the county that are vulnerable to attack from a terrorist. Reasons why a structure would appeal to a terroristic act include:

- Unrestricted public admission.
- No or lax security and security procedures.
- Heavy public traffic to and from the facility.
- Large building.
- Other potential targets adjacent to structure. Could also be used to house the terrorism act.
- Aftermath of the attack could be viewed by broad audiences.
- Materials that would cause serious harm to many members of the public stored at or near the facility.
- Meeting place for a specific group of people.
- Many escape routes, both out of the building and the area.
- The facility is anything that the public considers political, controversial, sensitive or otherwise offensive.
- The building has been threatened with terrorism before.
- Certain predictabilities with either people, procedures or events.

Roseau County is more at risk for domestic terrorism (disgruntled employee) than national terrorism. The area would be a target if the point was to prove that no one in the United States is safe from a threat. The lessened population (when compared to larger metro areas) could make a terroristic attack easier to plan and execute due to lack of continuous security and observance.

Just because an act of terrorism has not occurred in the county yet does not mean that Roseau County should not be prepared in case one does occur. A growing population in Minnesota simply means that any act will simply affect more people. The growing field of technology is a double-edged sword. While it can help mitigate against many hazards, it can also lead certain populations toward immense danger. Many individuals have become too dependent on certain systems. The failure of these systems could mean the beginning of a crisis for entire areas. By acting now, threats from a county level up to a national level will have less of an effect upon citizens.

Plans and Programs

Domestic Preparedness	Response & Mitigation Equipment	Plans	Training	Public Information	Trained Personnel	Projects to Reduce Impact	Legislation to Reduce Impact	Response Procedures	Exercise Capabilities	Data Collection	Codes and Policies to Reduce Impact
Minnesota National Guard	X	X	X	X	X	X		X	X	X	X
Dept. of Public Safety, Division of Emergency Management	X	X	X		X		X	X	X	X	
Dept. of Transportation	X	X	X		X					X	X
Dept. of Health	X	X		X	X			X		X	X
Dept. of Public Safety, Office of Pipeline Safety					X						X
Pollution Control Agency								X			
Dept. of Agriculture	X	X	X	X	X	X	X	X	X	X	X
Dept. of Human Services		X	X		X			X			X
Dept. of Public Safety, Bureau of Criminal Apprehension	X	X	X		X			X			
Dept. of Natural Resources	X	X	X	X	X	X	X	X	X	X	X
Minnesota Planning						X				X	
Metropolitan Airports Commission	X	X	X	X	X	X		X	X	X	X
Minnesota Housing Finance Agency		X									
Dept. of Commerce		X	X		X			X	X		

Source: Minnesota State All-Hazard Mitigation Plan

-The United States and Canada do several different training sessions in which the border is compromised. Many different groups and agencies on both sides of the border are involved. Training between Minnesota, Canada and North Dakota is done also concerning terrorism and other areas of hazard mitigation.

-The Office of Homeland Security was formed from grant money from the federal government. Its main purpose is to combat bioterrorism, which it does by administering grant money, overseeing regulations and programs, and assessing several responses to a bioterrorist attack.

Other Hazards

Earthquakes are the sudden release of stress/strain on the plates that make up the Earth's crust. This slipping motion results in the trembling or shaking feeling that is experienced in an earthquake. Many people are killed when an earthquake occurs because it is difficult to predict them and give a population advance warning. Buildings and other structures collapse, bridges fall, and general chaos ensues during an earthquake. Because there is not a meeting of two major plates in the Minnesota region, earthquakes are not considered a hazard for this area and will not be discussed in great detail. Nineteen weak to moderate earthquakes have occurred in Minnesota from 1860 to the present from minor fault lines running through Minnesota. The Minnesota Geological Survey gives the following recurrence rates for Minnesota earthquakes:

- Magnitude 4.0 = 10 years
- Magnitude 4.5 = 30 years
- Magnitude 5.0 = 89 years
- Magnitude 5.5 = 266 years

The following chart from the University of Minnesota displays a history of earthquakes in Minnesota. Although devastating on assets and property, the hazard has a rare occurrence in northwest Minnesota, and most magnitudes are quite small. Money for relief has never been paid out in Minnesota because of an earthquake. Since Roseau County has not had any earthquakes dating back to the 1860's, they have had no effect on any assets within the county and are not considered a priority hazard.

City Nearest Epicenter	County	Date	Magnitude
Long Prairie	Todd	1860-'61	5
New Prague	Scott	Dec. 16, 1860	4.7
St. Vincent	Kittson	Dec. 28, 1880	3.6
New Ulm	Brown	Feb. 5-Feb. 12, 1881	3.0-4.0
Red Lake	Beltrami	Feb. 6, 1917	3.8
Staples	Todd	Sept. 3, 1917	4.3
Bowstring	Itasca	Dec. 23, 1928	3.8
Detroit Lakes	Becker	Jan. 28, 1939	3.9
Alexandria	Douglas	Feb. 15, 1950	3.6
Pipestone	Pipestone	Sept. 28, 1964	3.4
Morris	Stevens	July 9, 1975	4.6 - 4.8
Milaca	Mille Lacs	Mar. 5, 1979	1
Evergreen	Becker	Apr. 16, 1979	3.1
Rush City	Chisago	May 14, 1979	0.1
Nisswa	Crow Wing	July 26, 1979	1
Cottage Grove	Washington	Apr. 24, 1981	3.6
Walker	Cass	Sept. 27, 1982	2
NW of Morris	Stevens	June 4, 1993	4.1
Granite Falls	Yellow Medicine	Feb. 9, 1994	3.1

Solar Storms develop when the sun ejects energetic and radiation particles called coronal mass ejections (CME) at speeds of more than 600,000 mph. These storms can disturb communications, harm satellites and cause climactic change. Even a couple degrees difference in the atmosphere can cause a satellite to change its orbit because of drag. Human life is indirectly influenced, as is property. The magnetic field, pipelines, power, radio waves, and navigation systems are also affected. Due to the many interruptions that are linked with solar storms, an early warning system is being looked into. Solar storms can affect the whole Earth, but are not discussed in great detail. The third largest recorded solar flare in history occurred on October 28, 2003. The greatest recorded solar storm occurred in 1859, shorting telegraph wires and starting fires throughout parts of the United States and Europe. The Minnesota State All Hazard Mitigation Plan states that "...no specific protective mitigation strategies on the part of state and local governments seem necessary or appropriate."

A hurricane is a type of tropical storm that forms over ocean waters. They are created when warm and cool air meet, causing unstableness in the atmosphere. High winds blow in a circular pattern around an eye, which is usually described as calm. This storm can be up to thirty miles wide and brings heavy precipitation, high winds, and flooding when the hurricane approaches land. This immense storm can affect a region of up to 400 miles. Because Minnesota and the states around it do not border an ocean, hurricanes are not believed to be a serious hazard and will not be discussed in great length.

Landslides occur when materials move downward on a sloping surface. Although landslides can start by either human activity or natural factors, gravity is the main force that influences movement down the slope. These are commonly seen in mountain regions. Types of flows include rock slides, mud slides, slumps, earth flows, and slurry. These flows vary in moisture, content, speed, and severity. Landslides are not a severe hazard in this county because of the lack of any substantial slope in the region, such as a mountain.

Power outages are also a hazard that can affect Roseau County. They can occur with nearly any type of natural or technological hazard and can have devastating effects due to the fact that many if not all individuals are largely dependent on some sort of device that runs on electricity. Other incidents that can cause power outages include prearranged upkeep, transportation accidents, animals or trees, and human error. Some of the many examples of hazards that power outages cause include no heat in the winter, cordless phones that will not work in the absence of electricity, and the possible shortage of vaccines due to storage temperature. In the winter months, some families have had to alternate their generator between heating the house and operating the sump pump. Livestock fatalities can also occur, for water is pumped with electricity. One of the largest blackouts in history occurred in August of 2003, affecting areas around New Jersey, New York, Pennsylvania, Connecticut, Vermont and Canada.

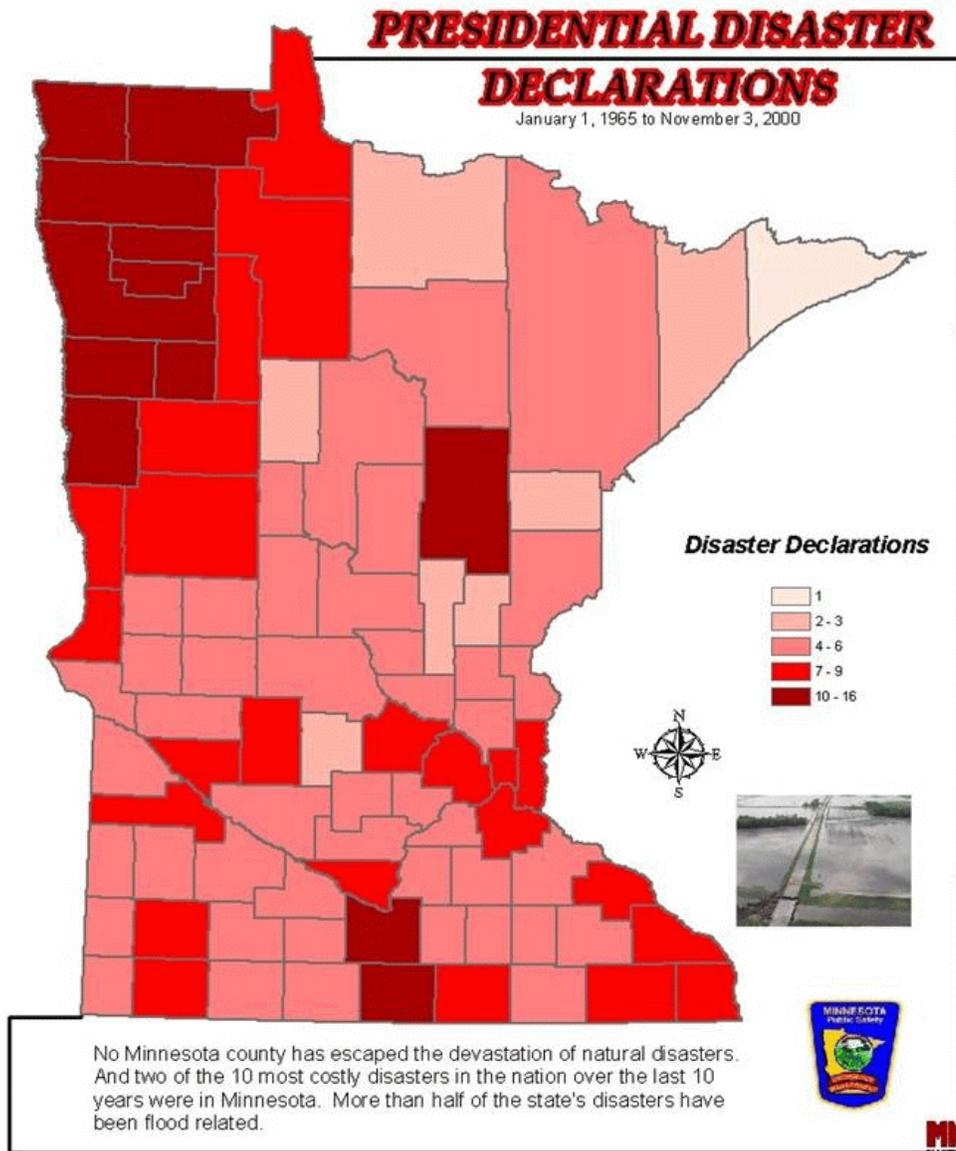
Objects falling from the sky can also pose a threat. Many satellites orbit the Earth every day for various purposes such as defense, weather, communications, etc... These have been known to plummet to the ground, however most hit the ocean where they pose no harm to people. Meteors and

asteroids also have orbits whose paths sometimes cross the Earth. Various aircraft have also known to cause a hazard to people when a malfunction occurs. Severity ranges from local (aircraft drops, killing people without warning in a few homes) to global (large meteor strikes the Earth, causing a global ice age and killing all life). The United States has detection equipment scanning the skies for possible meteoric threats. This hazard is not discussed in great detail due to the fact that any serious threat to an area would be dealt with on a national level, if not global. There are also some instances that happen so suddenly that there is no time to mitigate other than to get out of the way.

Communication problems can also cause a potential hazard. There are citizens of Roseau County that do not speak English well, if at all. These people could be unaware that a hazard is coming or occurring because of the language barrier. Members of the public fluent in multiple languages need to be located or trained in case a translator is ever needed.

	Roseau
Total:	6,204
English	5,712
Spanish:	111
Linguistically isolated	15
Not linguistically isolated	96
Other Indo-European languages:	283
Linguistically isolated	30
Not linguistically isolated	253
Asian and Pacific Island languages:	82
Linguistically isolated	34
Not linguistically isolated	48
Other languages:	16
Linguistically isolated	0
Not linguistically isolated	16

Source: U.S. Census of the Population, 2000



Regional Presidential Disaster Declarations

-In Minnesota, five million dollars uninsured damage to public infrastructure can declare an event a presidentially declared disaster. The affected area is then eligible for certain types of aid.

Date	Disaster	Counties Affected	Total Affected	Disaster #
04/11/1965	Flood	K, M, N, P, R	65 Counties	188
03/22/1966	Flood	K, M, N, Pe, P, RL, R	25 Counties	215
09/09/1968	Heavy Rains, Flood	Roseau	1 County	250
04/18/1969	Flood	K, M, N, Pe, P, RL, R	70 Counties	255
07/22/1970	Heavy Rains, Flood	K, M, N, Pe, P, RL, R	11 Counties	291
06/10/1974	Heavy Rains, Flood	K, M, Pe, N, RL, R	12 Counties	440
07/17/1975	Severe Storms, Tornadoes, Flood	K, M, N, Pe, P, RL, R	17 Counties	476
04/30/1979	Severe Storms, Flood	K, M, N, P, RL, R	11 Counties	582
06/11/1993	Severe Storms, Tornadoes, Flood	K, M, N, P, R	57 Counties	993
06/01/1996	Flood	K, M, N, Pe, P, RL, R	26 Counties	1116
01/16/1997	Severe Winter Storms, Blizzards, Snow Emergency Declaration	K, M, N, Pe, P, RL, R	40 Counties	1158
04/08/1997	Severe Flood, High Winds, Severe Storms	K, M, N, Pe, P, RL, R	58 Counties	1175
08/26/1999	Severe Ice Storms, Flooding, Heavy Rain	K, M, Pe, P, RL, R	6 Counties	1288
06/27/2000	Severe Storms, Flooding, Tornadoes	Norman, Roseau	15 Counties and 1 Tribal Government	1333
05/16/2001	Severe Winter Storms, Flood, Tornadoes	K, M, N, P, RL, R	66 Counties and 4 Tribal Governments	1370
07/14/2002	Severe Storms, Flooding, Tornadoes	K, M, R	21	1419

K = Kittson M = Marshall
N = Norman P = Polk
Pe = Pennington RL = Red Lake
R = Roseau

Source: Minnesota State Hazard Mitigation Plan

A Ten Year History of Minnesota Disasters

FEMA Disaster #	FEMA Programs & Approximate Expenditures	NW MN Affected?
993	\$43,503,413.00	Yes
1064	\$6,185,682.00	Yes
1078	\$5,241,439.00	No
1116	\$9,501,089.00	Yes
1151	\$15,170,659.00	No
1158	\$24,772,564.00	Yes
1175	\$217,869,022.00	Yes
1187	\$10,842,202.00	No
1212	\$35,531,082.00	No

1225	\$30,172,492.00	No
1283	\$15,299,593.00	No
1288	\$6,833,772.00	Yes
1333	\$17,886,199.00	Yes
1370	\$40,143,550.00	Yes
1419	\$30,033,373.00	Yes

Source: FEMA and MN HSEM

Regional Agricultural Declared Disasters

Disaster Number	Counties Affected	Type	Total Counties	Hazard	Date
S372	B, K, M, N, P, Pe, R, RL	Primary Contiguous	All of MN	Drought	Jan. 1 through July 26, 1988 (continuing)
M824	B, K, RL, R	Contiguous		Flooding	Started March 29, 1989
S587	Roseau	Primary	1	Hailstorms, Inadequate Sub-Soil Moisture, Rainfall & High Temperatures	Dec. 1, 1990 to Nov. 30, 1991
M993	B, K, M, N, Pe, P, RL, R	Primary Contiguous	Most of MN	Severe Storms, Flooding & Tornadoes	April 12 to May 6, 1993
S747	M, Pe, R	Primary	1	Excessive Moisture, Crop Disease & Frost	July 1 to Dec. 31, 1993
S816	M, R	Contiguous	2	Severe Storms, Hail, High Wind, Rain, Flooding & Crop Disease	June 1 to Sept. 30, 1994
S825	Roseau	Contiguous	3	Storms, Rain & Cool Temp.	June 9 to Oct. 31, 1994
N470	B, K, M, N, P, Pe, R, RL	Primary Contiguous	All MN Counties except 2	Excessive Heat	July 10 to 15, 1995
M1064	M, N, Pe, P, RL, R	Contiguous	18	Severe Storms, Tornadoes & Straight Line Winds	July 9 to 14, 1995
M1116	B, K, M, N, Pe, P, RL, R	Primary Contiguous	Many MN Counties	Flooding & Severe Storms	May 14 to June 17, 1996
M1158	B, K, M, N, P, Pe, RL, R	Primary Contiguous	Many MN Counties	Winter Storms	Jan 3, 1997 (continuing)
M1175	K, M, N, Pe, P, RL, R	Primary	21	Flooding, Winter Storms, Snow Melt, High winds, Rain & Ice	March 21, 1997 (continuing)
M1175 Amend. 6	K, M, N, Pe, P, RL, R	Primary	21		
S1212	B, M, P, RL, R	Contiguous	11	Flooding, Rain, Hail, High Winds & Crop Disease	April 1 to Oct. 31, 1997 (continuing)

S1213	M, R	Contiguous	2	Blizzards, Flooding, Rain, Crop Disease & Insect Infestation	Jan. 1 to Dec. 31, 1997
S1222	K, Pe, P, R	Contiguous	5	Rain, Flooding & Crop Disease	Jan. 1 to Dec. 31, 1997 (continuing)
M1288	K, M, Pe, P, RL, R	Primary	6	Ice Storms, Flooding & Rain	March 1 to May 30, 1999
S1351	K, M, P, Pe, RL, R	Primary	9	Snow, Rain, Flooding & Hail	April 1, 1999 (continuing)
M1333 Amend. 4	Roseau	Primary	2		
M1370 Amend. 1	Roseau	Contiguous	6		
M1370 Amend. 3	Roseau	Primary	9		
M1419	Roseau	Primary	1	Flooding	N/A
M1419 Amend. 1	B, K, M, N, Pe, P, RL, R	Primary	13	Severe Storms, Flooding & Tornadoes	N/A
M1419 Amend. 2	B, M, Pe, P, R	Contiguous	8		
M1419 Amend. 5	B, M, N, RL, R	Contiguous	23		
S1664	B, K, M, N, P, Pe, RL, R	Primary	12	Rain, Flash Flooding & Hail	N/A
S1815	M, N, Pe, P, R	Contiguous	21	Drought	N/A
S1960	K, M, P, Pe, R	Primary	8	Excessive rain, flooding and below normal temps.	5/11/2004 to present
S1968	B, K, M, N, P, Pe, R, RL	Primary	47	Frost Conditions	08/20/2004 and continuing
S2122	B, K, M, P, Pe, R, RL	Contiguous	55	Excessive Rainfall, Hail, High Winds	05/07/2005 to present

B = Becker K = Kittson
M = Marshall N = Norman
P = Polk Pe = Pennington
RL = Red Lake R = Roseau

(Tribal governments are tallied as counties)

Source: State Farm Service Agency, Minnesota

2001-2002 Crop Disaster Assistance Payments

Kittson	5 million
Marshall	6.7 million
Norman	4.2 million
Polk (west)	2.8 million
Polk (east)	1.7 million
Pennington	2.5 million

Red Lake	916,000
Roseau	6.4 million

(Totals are rounded)

Source: Farm Service Agency, Roseau

Minnesota Hazard Rankings for Northwest Minnesota

Ranking	Economic Impact	Death	Injury
First	Floods	Severe Wind	Severe Wind
Second	Blizzards	Tornadoes	Tornadoes
Third	Ice Storms	Blizzards	Blizzards
Fourth	Tornadoes	Lightning	Lightning
Fifth	Severe Wind	Floods	Floods
Sixth	Hail	Hail	Hail
Seventh	Lightning	Ice Storms	Ice Storms
Eighth	Extreme Cold	Extreme Cold	Extreme Cold
Ninth	Extreme Heat	Extreme Heat	Extreme Heat
Tenth	Drought	Drought	Drought

Source: Minnesota State Hazard Mitigation Plan

-Injury column could change when the mental anguish is tabulated into a hazard. Some older people die when they are forced to leave their home.

Step III: Risk Assessment For Roseau County

Hazard	Could Hazard Occur?	Significant Threat Posed?	Frequency	Area Possibly Affected	Impact Upon County
Winter Weather	Yes	Yes	Occurs Every Year	County	Limited
Summer Weather	Yes	Yes	Occurs Every Year	Large Area	Limited Substantial
Flood	Yes	Yes	Occurs Once in 3 Years	Large Area	Major
Flash Flood	Yes	Yes	Occurs Once A Year or More	Multiple Sites	Limited
Drought	Yes	No	Occurs Once in 10 Years	County	Limited Substantial
Fire	Yes	No	Occurs Once A Year or More	Single or Multiple Sites	Limited
Subsidence	Yes	No	Environment Dependent	Single Sites	Limited
Infectious Disease	Yes	No	Type Dependent	Large Area	Substantial Major
Hazardous Material	Yes	Yes	Occurs Once in 5 Years	Single Sites	Substantial Major
Flood Control Structure Failure	Yes	Yes	Has Not Occurred	Multiple Sites	Limited Substantial Major
Water Supply Contamination	Yes	No	Occurs Once in 5 Years	Multiple Sites	Substantial
Terrorism	Yes	No	Has Not Occurred	Large Area	Major

Impact:

- No impact upon people or property in county
- Limited impact upon people or property in county
- Substantial impact upon people or property in county
- Major impact upon people or property in county

This graph below shows risks associated for some of the more prominent hazards in the risk assessment table above. Associated perils are matched to the hazards that cause them. The more perils a particular hazard can cause, the more dangerous it is to an area.

HAZARD:	Flood	Haz. Mat.	Summer Storms	Winter Storms	Fire	Subsidence	Infect. Disease	Water Supply Cont.	Flood Control Structure Failure	Drought & Extreme Heat	Terrorism
Blocked Roads	X	X	X	X	X	X			X		X
Building Collapse	X		X	X	X	X			X		X
Business Interruptions	X	X	X	X	X	X	X	X	X	X	X
Delayed Emergency Response	X	X	X	X	X	X	X		X		X
Downed Power Lines	X		X	X	X	X			X		
Downed Trees	X		X	X	X	X			X		
Evacuation (Full)	X	X					X	X	X		X
Evacuation (Localized)	X	X	X	X	X	X	X	X	X		X
Explosion		X			X						X
Flooding (Street)	X		X						X		
Flooding (Structure)	X		X						X		
Hazardous Materials Release	X	X	X	X	X	X	X	X	X		X
Increased Fire Potential	X	X	X	X	X				X	X	X
Increased Public Safety Runs	X	X	X	X	X	X	X	X	X	X	X
Loss of Drinking Water	X	X	X	X			X	X	X	X	X
Loss of Medical Facilities	X		X	X					X		X
Loss of Power	X		X	X	X	X			X	X	X
Mass Casualties		X	X				X	X	X		X
Property Damage	X	X	X	X	X	X			X	X	X
School Closure	X	X	X	X			X		X		X
Sewer Backup	X								X		
Wind Chill				X							
Livestock Injury & Death	X	X	X	X	X		X	X	X	X	
Loss of Economy	X	X	X	X	X	X	X	X	X	X	X

Hazard relationships are an important factor to consider during mitigation. The presence of one known hazard, such as a flood, may cause other hazards to occur such as water contamination and infectious disease outbreaks. The following graph illustrates hazard relationships. The horizontal rows illustrate other hazards that a specific noted hazard can cause, while the vertical columns illustrate what contributes to a specific hazard occurring. This is an important fact to consider. Terrorism can cause many hazards to occur, but is not caused by the presence of another hazard, just the actions of man.

Hazard Relationships	Winter Storms	Summer Storms	Flood	Drought	Fire	Subsidence	Infectious Disease	Hazardous Material	Flood Control Structure Failure	Water Contamination	Terrorism
Winter Storms	X		X								
Summer Storms		X	X		X			X	X	X	
Flood			X		X	X	X	X	X	X	
Drought				X	X	X					
Fire					X						
Subsidence			X		X	X		X	X	X	
Infectious Disease							X			X	
Hazardous Material					X			X		X	
Flood Control Structure Failure			X			X			X	X	
Water Contamination							X	X		X	
Terrorism			X		X		X	X	X	X	X

Vulnerable Populations of Known Hazards

Flooding:

- Any structure in the floodplain
- Anyone living near a waterway
- Cities with storm sewer or drainage problems
- Property with improperly maintained flood control structures
- Property located in low elevations
- Improperly restrained property

Flash Flooding:

- Everything in the county is vulnerable because heavy rainstorms do not have a boundary
- See flooding section above

Hazardous Material:

- Property near transportation routes (roads and rail).
- Areas with pipelines

- Municipal areas
- Agriculturally utilized property
- Depending on the material and the spread, everyone in the county can be vulnerable.

Blizzard/Snowstorm:

- Everyone in the county is vulnerable because of the annual occurrence and because the storm does not have a boundary.
- Outdoor people and animals
- Weak structured roofs
- Anyone depending on one road to leave an area

Icestorm/Sleetstorm:

- Everything in the county is vulnerable because of the annual occurrence and because the storm does not have a boundary.
- Vehicles engaging in transportation
- Power dependent facilities
- Outdoor structures and trees

Extreme Cold:

- Everything in the county is vulnerable because of the annual occurrence and because the occurrence is without boundaries
- People, animals and structures located outside for long periods of time
- Stranded travelers
- Improperly insulated structures

Thunderstorm:

- Everyone and all land/structures in the county are vulnerable because of the annual occurrence, the storm does not have a boundary, and the unpredictable nature of lightning strikes, hail, tornadoes, rainfall and wind.

Lightning:

- Everything in the county is vulnerable because of the annual occurrence and because the storm does not have a boundary
- Structures, trees and people located at high elevations in relation to the ground or near/in water
- Improperly grounded buildings

Tornado/Windstorm:

- Everything in the county is vulnerable because of the potential annual occurrence and because the storm does not have a boundary
- Populations without access to a shelter
- Property not properly anchored to the ground
- Trailer houses

Hailstorm:

- Everything in the county is vulnerable because of the potential annual occurrence and because the storm does not have a boundary
- Crops and other outside property

Fire:

- Everything in the county is vulnerable because of the unpredictability

of the source

- Anything located near a fuel source
- Homes encompassed or near a forest or CRP
- Locations with mechanical concerns such as faulty/old wiring
- Residences far away from a fire department

Subsidence:

- Unpredictability makes many people vulnerable
- Anything located near a water body or waterway
- Anything located on the top of a considerable slope

Infectious Disease:

- Due to the unpredictability and variety of diseases, all people and animals are vulnerable
- Areas that do not have proper drainage are at risk for mosquito related diseases
- Recent flooding or other hazards may encourage the spread of certain diseases
- Public gathering locations or events
- A person or animal that ingests portions of a diseased animal.

Water Supply Contamination:

- Anything that utilizes water
- Any body of water, aquifer or waterway in the county.
- Locations where ground water meets surface water.
- Locations that have hazardous material upon them (see hazardous material section above)

Flood Control Structure Failure:

- Any people or property depending on a flood control structure for protection as well as the area around it
- People and property depending on an improperly maintained structure
- People and property depending on a structure that is forced to protect more than what it was constructed for
- People and property depending on a structure that needs time to be put up

Drought/Extreme Heat:

- Everything in the county is vulnerable because of the unpredictability of the source
- People or animals not near a water source
- People/animals depending on a water source that may dry up
- Crops or livestock
- People or animals outside for long periods of time

Terrorism:

- Everything in the county is vulnerable because of the unpredictability of the source
- Public buildings
- Controversial structures

The following hazard analysis graph illustrates a point system with a numeric value of four illustrating the most severe condition, while a numeric value of one indicating the least severe condition. An important factor to note is

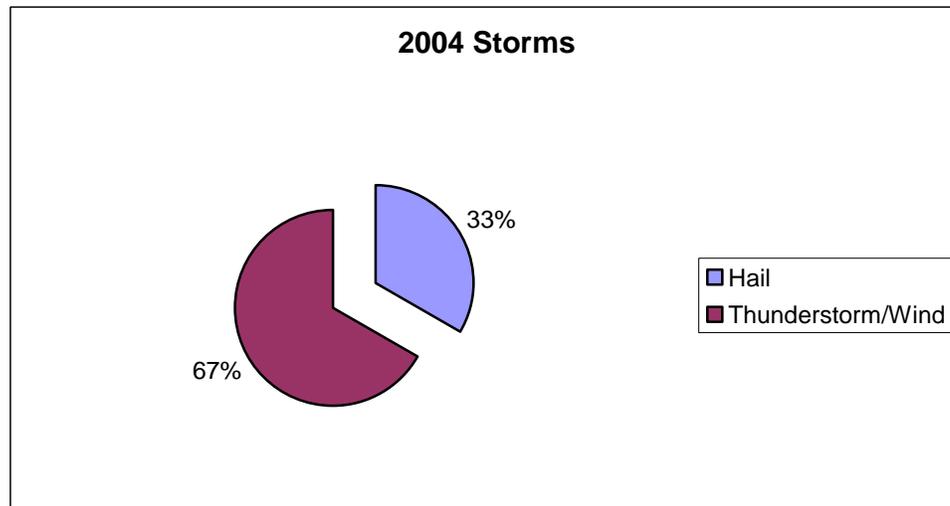
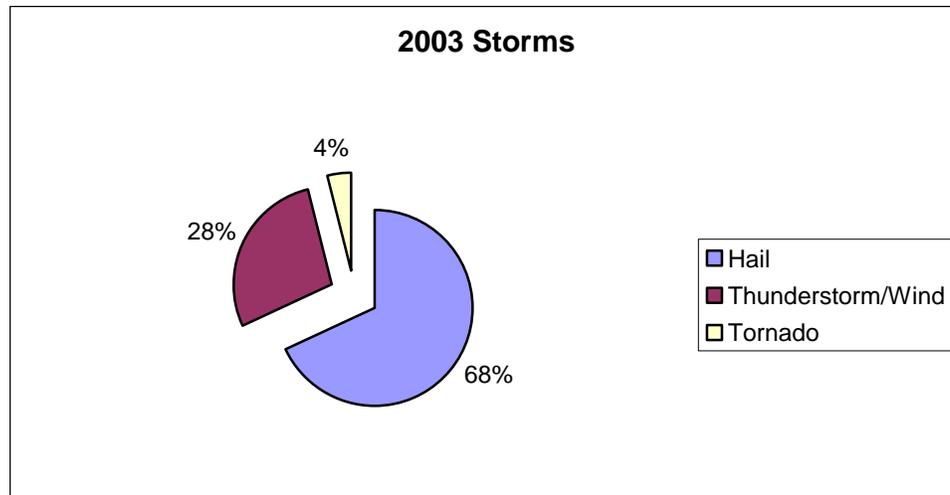
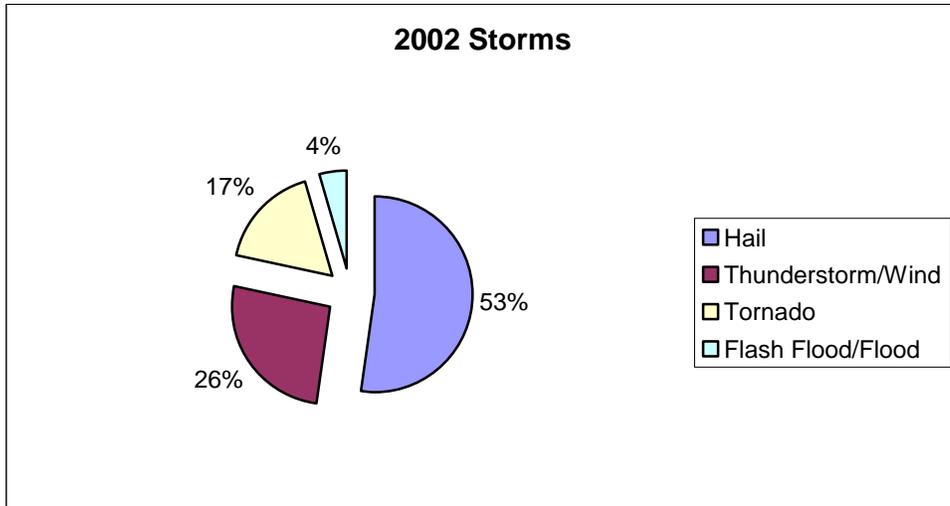
that this graph is not entirely dependent on frequency of an event. Terrorism has a high risk total number, yet is a relatively low frequency event for Roseau County. This illustrates the mitigation layout of Roseau County, to protect against both the most frequent hazards as well as the hazards that are the most destructive. The following analysis is for the whole county. Individual jurisdictional risks are noted in the response section below. The information in the graph (frequency, magnitude, local opinion etc...) was determined on team meeting discussions as well as input from emergency management.

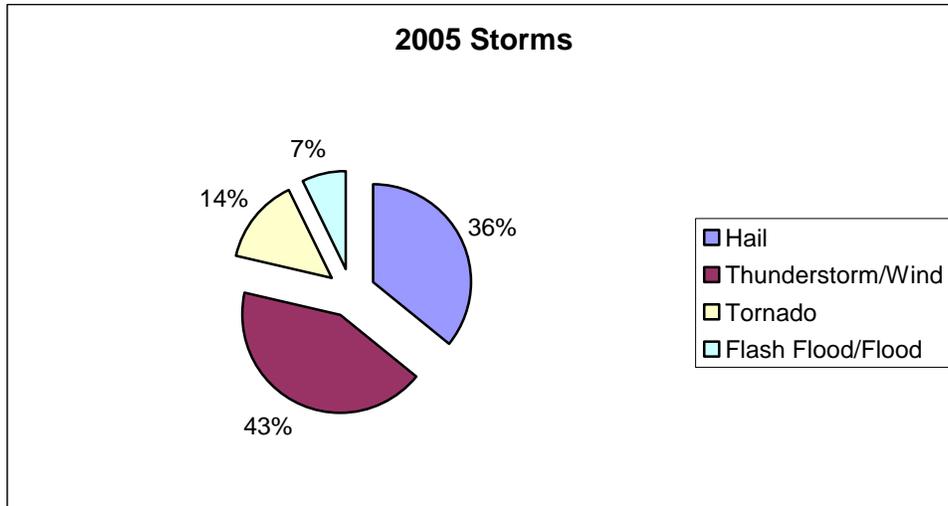
Hazard	Frequency	Magnitude	Warning Time	Local Opinion Severity	Risk Total
Blizzard	4 (Highly Likely)	2 (Limited)	2 (12-24 Hours)	2 (Limited)	10
Extreme Precipitation Blizzard	2 (Possible)	3 (Critical)	2 (12-24 Hours)	3 (Critical)	10
Ice Storm	3 (Likely)	3 (Critical)	2 (12-24 Hours)	2 (Limited)	10
Snowstorm	4 (Highly Likely)	2 (Limited)	2 (12-24 Hours)	1 (Negligible)	9
Hail	3 (Likely)	3 (Critical)	3 (6-12 Hours)	2 (Limited)	11
Thunderstorm	4 (Highly Likely)	3 (Critical)	3 (6-12 Hours)	2 (Limited)	12
Tornado	3 (Likely)	3 (Critical)	4 (Minimal)	3 (Critical)	13
Flood	3 (Likely)	3 (Critical)	1 (1 Day +)	4 (Catastrophic)	11
Flash Flooding	3 (Likely)	3 (Critical)	4 (Minimal)	3 (Critical)	13
Drought	2 (Possible)	2 (Limited)	1 (1 Day +)	2 (Limited)	7
Wildfire	2 (Possible)	2 (Limited)	4 (Minimal)	2 (Limited)	10
Subsidence	2 (Possible)	3 (Critical)	4 (Minimal)	2 (Limited)	11
Infectious Disease	2 (Possible)	2 (Limited)	4 (Minimal)	3 (Critical)	11
Hazardous Material	2 (Possible)	3 (Critical)	4 (Minimal)	3 (Critical)	12
Flood Control Structure Failure	2 (Possible)	3 (Critical)	4 (Minimal)	2 (Limited)	11
Water Contamination	2 (Possible)	3 (Critical)	4 (Minimal)	2 (Limited)	11
Terrorism	1 (Unlikely)	4 (Catastrophic)	4 (Minimal)	4 (Catastrophic)	13

Natural storms are prevalent both for Roseau County and for Northwest Minnesota. Uncontrollable factors cause frequency and magnitude to vary from

year to year. The following graphs (taken from NCDC information) illustrate the variety of storms that affect Roseau County and why mitigation is important.

(Please note that information retrieval for the source did not recover any winter storm information. Winter storms are a common yearly occurrence. Information from other sources was not put in the graphs below to keep the percentages as accurate as possible by trying to use the same source and the same reporting methods. These graphs can be fixed as soon as the online database's search rules are corrected.)





Analysis of Current Strategies

The following problems cite some of the hazards present in Roseau County, as well as strategies that are used for mitigation. The following list has been taken from issues raised at team meetings as well as individual meetings between cities and agencies. Strategies recommended later in this plan depend on what is currently being accomplished. Estimated costs are provided for projects when known. Prior to the implementation of mitigation projects, a cost-benefit review will be completed to ensure the projects are cost-effective.

Problem 1, Culverts: Culverts are a problem for Roseau County.

- Many people feel that certain culverts are too small for the amount of water that passes through them. A culvert survey and sizing should be done for all culverts in the county to see which need maintenance and which need replacement.
- The Two Rivers Watershed cites the following problems in Roseau County relating to culverts:
 - Culvert washouts are an annual problem for the State Ditch #95 subwatershed.
 - The State Ditch #91 subwatershed also has an annual culvert washout problem.
 - The Badger & Skunk Creek subwatershed would like to review culvert sizes.
- The Roseau River Watershed cites the following problems that could be solved by culvert sizing:
 - Flashy stream flow in Hay Creek/Norland Subwatershed
 - Road damage in North Branch Subwatershed

Current Strategies:

- The Two Rivers Watershed has many strategies to deal with culvert flooding including:
 - Problem areas are identified in the watershed.
 - A strategy listed in the overall plan is to implement a complete culvert sizing project in one or more subwatersheds (which is occurring).
 - Mitigation could be done through specific culvert

- sizes being placed at precise locations.
- Factors that need to be looked at include sizing, alignment and current condition.
- Promotion of land practices to reduce runoff
- Promotion of natural landscape storage activities
- Encourage stream and river rehabilitations to slow down stream flows.
- Appropriately located ag. levies
- Gated storage
- Fostered increased partnerships with nearby watersheds as well as Canada.
- Watershed wide culvert sizing system

Time Line:

- Problems listed in the Roseau River Watershed District's overall plan that are noted above have a set timeline of four to eight years.

Problem 2, Transportation Access: Emergency access to an area is compromised when a train enters an area, possibly blocking the only entry onto a house or farm. Precious seconds are lost.

- Other departments may have a higher response time when aiding a neighboring county disaster due to unfamiliar county settings and transportational patterns.
- Warroad is bisected by railroad tracks. If a train is utilizing the tracks, emergency service personnel may not be able to go to a certain section of the city, and citizens may not be able to access rescue facilities.

Current Strategies:

- Divert the road so traffic can go over/under the crossing. Continually used tracks and traffic patterns are monitored by MNDOT and construction of any structure that affects the tracks would be partnered by the railroad. Dangerous intersection complaints should be investigated by the railroad, MNDOT and the county to decrease accident potential.
- MNDOT's Real-Time Rail Crossing Information system. A warning message is sent to public safety agencies when the railroad crossing gates are down. Dispatchers can then inform emergency drivers of closed access roads and divert them to the nearest open entrance.
- Trains can only block a road for so long. Railroad companies know the regulations on road blockage. The majority of situations, excluding switching stations, are due to circumstances beyond the operator's control. Any known problems need to be brought up with the railroad company and MNDOT.
- Problem can be found in the MNDOT district 2 ITS scoping study.

Potential Solution:

- Emergency response personnel recognize the need for updated maps for the utilization of multiple roads for one location. Local ambulances are partnering with the Northwest Regional Development Commission for the construction of a book containing maps of

individual coverage areas for twelve counties specific to the department with all roads, E911 information and residences listed. Locales endangered by only one access route should be noted. This will enable neighboring ambulances a greater understanding of an area when aiding in a nearby county hazardous situation and create a lower response time. Other departments such as fire or law enforcement should consider such department specific information as a mitigation tool.

Time Frame:

-MNDOT has placed this in the over five years category (long term solutions).

Cost Estimation:

-\$10 to \$250 implementation cost. \$1 to \$25 annual operating costs (values are per rail crossing).

Problem 3, Weather Unpredictability: Weather conditions vary greatly in northwest Minnesota. Conditions can go from bad to worse in a matter of minutes, and not all areas are homogenous in reference to storm conditions. In addition, people can place themselves in danger by not knowing the weather ahead of time.

Current Strategies:

-MNDOT currently wishes to upgrade the road weather information systems (RWIS) by installing cameras at each station. These cameras could be accessed by the internet, providing a visual of current weather.

-MNDOT wishes to send interested agencies traffic or weather alerts from their MN/CARS system (condition acquisition reporting system). Real time information linkage can be received through various means such as cell phone messages, faxes, email, pager, etc... The CARS system is currently available to be viewed at its website or by dialing 511.

-Enact a South Dakota law that fines a motorist caught on a closed road \$500. Law enforcement currently deals with motorists caught on major closed roads, such as interstates. Minnesota governmental officials would have to be in charge of pushing a law through that would affect the whole state.

-Educate the public. This can sometimes be a lot cheaper than fixing the problem after it occurs and may prevent future hazards. It is a very cost effective way to prevent future hazards. There also needs to be a measure of responsibility placed on individual persons for checking the weather and not placing themselves in a foolish and dangerous position.

-Above MNDOT strategies are listed in the MNDOT district 2 ITS scoping study.

-The USDA collects global weather data as well as agricultural information for the Joint Agricultural Weather Facility. The potential impact of growing-season weather and conditions are discussed as well as crop and livestock production prospects. The USDA also collects information relating to snow, water and climate for the National Water and Climate Center.

Potential Solution:

-Weather is one factor everywhere that cannot be mitigated to prevent an occurrence. Storms have and will always occur with varying speeds and severity. Mitigation activities must focus on minimizing damage done by storms. Much must be done by the local population to see the elimination of this problem.

Time Frame:

-MNDOT has classified these two strategies a high priority solution (zero to three years).

Cost Estimation:

-The RWIS enhancements cost \$323,150 to implement and have an annual operating cost of \$20,200. Implementing agency and the primary operating agency would be MNDOT.

-The real time information linkage would cost \$121,210 to implement and has an operating cost of \$6,760 annually. MNDOT would be the implementing agency and the primary operating agency. The secondary operating agency would be local and county officials.

Problem 4, Public Infrastructure Location Data: There is a general lack of information available about the specific locations of certain critical infrastructure within the county.

-During a tornado, methods of location and landmarks may be gone. A GPS may be the only method of guiding unfamiliar emergency response personnel to a specific location.

Current Strategies:

-Construct a list of critical infrastructure points that need location data. Obtain a G.P.S. unit and acquire the necessary information. A map can then be made for distribution to emergency response personnel and other county officials with specific information related to the purpose.

-A G.P.S. unit has been located to be loaned to the county. A designated official will collect the required points and the Northwest Regional Development Commission and interested emergency management personnel will retain the points for utilization for future hazard mitigation.

-GeoComm was hired to provide E911 addresses for Roseau County. Roads were renamed and county addresses were redone for easier locations of localities.

-Addresses in the county have been changed to E911 addresses. Signs will be put up throughout the county in the near future.

-Appendix 1 has an example of an E911 address map. The NWRDC is working with the Northwest Emergency Medical Services to map ambulance districts for the entire district.

-Some emergency management response vehicles have locators and other GPS technology aboard the vehicle.

Potential Solution:

-Northwest Minnesota is behind the rest of Minnesota in terms of GPS/GIS usage. Utilization of this technology needs to increase, as it has many interesting implementations.

Problem 5, Communication Upgrades: Communication is deficient in certain areas of Roseau County.

-There are cell phone blind spots. The communications van that can be brought in to boost communications does not always work because of the lack of towers in the area. Satellite phones also did not work.

-The emergency personnel communications system (base station from the 1960's) in Roseau County also presents a problem. If this system were to go down, there would be no paging and no radio for emergency personnel. Sirens would have to be manually sounded also. Currently, the border patrol needs to change frequency just to be able to talk to Greenbush. Compatibility with other emergency personnel needs to be achieved and maintained. A solution to this problem NEEDS to be found, as currently there is no plan to deal with this problem.

Current Strategies:

-There is a movement to unite amateur radio communication within the region. The District Emergency Coordinator for the Minnesota District Three Amateur Radio Emergency Service came and spoke at the quarterly Department of Emergency Management meeting. Amateur radio operators are a valued volunteer during a hazard situation and can be major players in the absence of other communication methods.

-There is a great resource in the ham radio club located in Roseau County.

-Ham radio operators are part of the sheriff's communication team and help dispatch during an emergency.

-Construct additional cellular phone towers in Roseau County to add lines. Deficient locales are known by the individual cell phone companies and any additional towers would have to include their participation. Most cell phone companies are in charge of the construction of towers.

-Cell phone companies can also give emergency management priority in cases of extreme disaster.

-Roseau County has a specialized van that boosts communications during times of emergency. Money has been located to update the communications equipment inside.

-Money was received by the counties bordering Canada through a grant. Roseau County is spending their share in three phases for communication needs in Roseau, Warroad and Greenbush. This includes purchasing radios, antennas etc... as well as helping construct the new public safety building in Warroad. The following problems will be addressed through this grant:

-An upgraded digital system is desperately needed for Roseau County and all local emergency personnel that lie within the county borders.

-More towers and repeaters need to be constructed.

-Border patrol and the state patrol both need to have a local channel available to be able to talk to Roseau County emergency personnel.

-The DEM region has set a goal to bring all fourteen counties to APCO 25 compliant status by updating repeaters and base stations. A survey is to be handed out to all counties detailing where the county is at concerning communications, what it takes to get to the desired level and how much it will cost.

-Exercises dealing with various emergency personnel, hazardous situations and various departments/agencies/facilities are done on an annual basis.

-A recent exercise in Roseau County brought out some communication problems that are currently being addressed.

Potential Solution:

-This is a concern that needs to be mitigated because of it's potential to affect the response to a hazard by emergency response personnel. It is very cost-effective to mitigate this problem to help save lives, however the cost-effectiveness factor was aided by grant money being received.

-Increasing communication in Roseau County to the highest level seen in the state near the Twin Cities would not be a cost effective solution due to the high construction cost (towers need to be constructed every so many miles) and equipment prices.

-Purchase satellite phones. Satellite phones are a major expense. Cost effectiveness would be based on price, rates and overall usage. Emergency management is knowledgeable about the communication situation and a satellite phone purchase would be left up to her discretion. A suitable plan would need to be found that would not charge as much for periods when the phone was not used.

-It is important to have many methods of communication available because structures are vulnerable to specific hazards. Cell phones cannot be counted on because towers are vulnerable and because use soars during a disaster. Land lines are also vulnerable.

Problem 6, Equipment Requirements: Emergency management personnel in every city in the county need some additional equipment or funding to purchase items. Due to some of the low populations in areas, the needed cash or equipment is not as easy to access when compared to a larger population metro area. Also, some of the equipment/squads are based in Minneapolis. The people and equipment take a certain period of time to get up here for an extreme hazard when preparation and travel time are taken into account.

-Greenbush would like funding to construct facilities for storage. Emergency vehicles as well as other equipment would benefit from the additional space. New updated equipment is also needed for emergency personnel including communications equipment. Currently, Greenbush police squad cars have communication equipment from the 1960's.

-Warroad's ambulance needs to have the newest equipment because of the distance to the nearest hospital (if surgery is needed).

Every emergency service squad in Warroad would benefit from new equipment.

-Fire departments would like to be able to pay the volunteers more than they are currently making.

Current Strategies:

-Warroad is going to construct a new public safety building that will house multiple organizations. Much emergency management will be able to be done under one roof. The ground has recently been broken in for this project.

-A grant was given to the border counties in Minnesota. Some of these concerns will be addressed in Roseau County, see problem five for more information.

-Roseau has been replacing affected equipment since the flood. Many departments have been seeing new equipment when the funding allows.

Potential Solution:

-Search for funding. Fire and ambulance departments are an important part of mitigation in Roseau County and are responsible for the rather low risk of fire and medical peril in the area. Although very resourceful, cost efficiency prohibits small volunteer stations from purchasing all needed equipment within their own budget. Emergency management is aware of emergency response needs for all departments and aids them financially whenever possible.

Problem 7, Whiteout Peril: Whiteout conditions cause emergency service personnel not to be able to do their jobs efficiently. The rescue of stranded travelers often puts others at risk, as well as those in charge of road maintenance.

Current Strategies:

-Install in-pavement lights. In addition to making traffic lanes, crosswalks and railroad crossings clearer, these lights would help automobiles navigate in poor weather.

-Install emergency service vehicle head up displays. These mechanisms provide the driver with lane lines as well as other vehicles.

-Emergency service vehicle head up display units and in-pavement lights are listed in the MNDOT district 2 ITS scoping study.

-Roseau County is involved in the living snow fence program. A task force has been formed (statewide). The program includes planting windbreaks along flat areas, reducing the possibility for whiteout conditions and also causing decreased snowplow maintenance for the county.

-Moose Township has added more roads to be plowed for the safety of both drivers and homes with small children, etc... Other cities and townships do similar acts.

Potential Solutions:

-The National Weather Service and the Weather Channel are working

on the Northeast Snowfall Impact Scale. This is a scale similar to the ranking system seen in tornadoes and takes into consideration the size of the affected area, the population and the economic impact. A similar scale could be developed for the Minnesota area to gauge varying severity of blizzard levels.

Time Frame:

- MNDOT has placed the displays in the over five years category (long term solutions). The in-pavement lights are in the three to five year category (short term solutions).
- The living snow fence program has been going since May of 1998.

Cost Estimation:

- \$25 to \$500 per display for implementation. \$3 to \$50 per year in annual operating costs.
- \$20,000 to \$100,000 for implementation of in-pavement lights, \$2,000 to \$10,000 annual operating cost.
- Through matches and funding, 150 sites in twenty counties (including Roseau) have been approved for living snow fence projects.

Problem 8, Storm Shelters: Although every trailer court is legally bound to have some sort of shelter to house it's occupants, the shelter does not necessarily have to be on site, but nearby. Roseau County would like to see that every trailer court have some sort of shelter for people to go to in case of an emergency.

- Because of the high water table, buildings in Roosevelt are unable to have a basement. Residents looking for a basement to serve as a tornado shelter currently have to go to a neighboring town.
- If a tornado occurs suddenly, people driving to the shelter could be injured. This is a problem for rural trailer courts with no shelter on the property.
- This also goes for camp grounds. Travelers passing through the area may not know where the nearest shelter is and their tent or camper is not a good enough shelter from a tornado.
- There are trailer courts in townships near Lake of the Woods that are very populated. Past flooding events have damaged previous shelters; this is a potential problem across the county.
- Because Strathcona has such a small population and few businesses, there are no severe storm shelters in the area, except personal homes that have basements. Any severe storm threat requiring shelter would involve city residents to drive approximately ten miles away to nearby Greenbush or Middle River.
- Wannaska does not have a shelter large enough to house the entire city in the event of a tornado, but there are smaller businesses and residents that have opened up their home in case of inclement weather.

Current Strategies:

- City emergency management staff have shelters set up for municipal residents for both tornadoes, winter storms and power outage hazards. County emergency management knows all trailer

courts in the area and would work with city emergency management to secure shelter for affected problem populations. Identified problems can be solved through this cooperation.

- Cities have buildings that can be quickly turned into shelters if there is a need.

- Personal responsibility needs to be taken at a local level to ensure that serious weather is taken note of and that vulnerable populations are not affected while traveling to a shelter. Often times, a residence with a basement will shelter neighboring people without a shelter. Citizens should make a mental note to know where shelters are and travel there if they are threatened.

- Minnesota statute requires newly constructed trailer courts to have a shelter on site.

Potential Solution:

- Lists from programs such as meals on wheels could be obtained to be used as vulnerable population identity. People on these lists would need assistance leaving their home or be among the first locales to be checked after a hazard occurs. Cooperation between emergency management and these social programs would be required.

- The protection of residents in cities or campgrounds needs to occur, as the safety of county denizen's lives is the ultimate cost efficiency.

- Many of these projects would be cost-prohibitive in nature without some form of monetary help. Special construction would have to be done, as well as studies to make sure that shelters would survive damage potentially done by other storms such as floods and blizzards.

Problem 9, Abandoned Wells: Abandoned wells pose a contamination problem to Roseau County.

- Moose Township cites a need for more information regarding how to properly cap old wells.

- Bad odors in well water is an issue for the State Ditch #90 subwatershed in the Two Rivers Watershed.

Current Strategies:

- The Minnesota Department of Health has requirements to properly seal an abandoned well.

- The Minnesota Department of Health also administers programs that protect drinking water purity. These programs execute the safe water drinking act, monitor and test water at different facilities, and establish/verify construction plans that deal with drinking water. Protecting water sources from contamination (source water protection) is also an important task. This is accomplished through water and wellhead protection plans.

- State law requires that well sealing be done by a licensed well contractor.

- Many agencies and departments, such as homeowners, cities, townships and the DNR have inventoried old wells that need sealing.

- The DNR has collected funds to seal abandoned wells. They

also have a system available to locate buried wells that are not sealed or visible and a phone number for citizens to report an abandoned well.

-Coordinate with the Two Rivers, Roseau River and Warroad Watersheds. The overall plan of the Two Rivers Watershed lists a goal to enhance and protect ground water supplies by the following methods:

- Delineating critical recharge areas
- Protect recharge areas using BMPs and land use controls.
- Protecting surface waters from sedimentation, nutrients and agricultural chemicals.
- Delineate surface and groundwater relationships, especially in areas where groundwater serves as a public water supply.
- Coordinate source water protection and wellhead protection efforts with the rural water systems.
- Regulate water appropriations by watershed district rule and permit program.
- Utilize wetland restorations to filter and protect groundwater systems.
- Support well water testing programs

-The Two Rivers Watershed Districts monitors wells in Roseau County to measure water quality trends, both long and short term, to compile in a database. New sites will be established in years to come. The well water odor is noted in the Two Rivers Watershed's overall plan.

-Roseau County has a Comprehensive Local Water Plan. This plan helps to protect county water sources.

-Well Management (in Minnesota Department of Health) guards Minnesota drinking water and groundwater by sealing old wells/borings and building new ones. Information is also given on where to test water for various elements and bacteria content.

Potential Solution:

-Open wells are a pathway to ground water and aquifers and represent a huge contamination risk. Wells can be easily forgotten if the property has been sold, buildings relocated from original locations or if they are extremely old. For more information, please visit the Minnesota Department of Health website or contact them.

Problem 10, Endangerment By Anhydrous Facility: There is about 60,000 gallons of anhydrous ammonia and 800,000 pounds of urea stored in Greenbush. A tornado that ran through town could cause extreme damage if these facilities were damaged. (Other hazards such as fire or flooding could also cause damage.) A close call already occurred when a train struck a fuel tanker near this locality.

-Roseau also has some anhydrous located within the city limits that could cause chaos if leakage occurs.

Current Strategies:

-A tornado or other natural storm cannot be prevented from occurring, so the bulk of the mitigation falls on preventing damage done by the storm.

-Accidents also occur during transport by truck or train. Any area that has either a road or a railroad track running near could be at risk for a hazardous material spill.

Questions about what is being locally hauled often arise.

-Exercises are done annually to work on a response to a specific hazard. Greenbush should be involved in an exercise concerning their hazardous facilities so that response personnel are prepared.

-Hazardous material facilities have their own plans written documenting what to do in case of a spill and who to call. Make sure that these plans are kept up to date!

-It becomes increasingly hard to completely eradicate hazardous materials from the floodplain due to the presence of agriculture in the region. Agriculture makes use of many hazardous materials. A gasoline tank may occur on the property as fuel for the machines. A propane tank may be used for heating a structure such as a home or workshop. Any pesticides, fertilizer, or herbicides may also be stored somewhere on the property for future use.

-These materials are usually properly stored, but they are a presence and should be remembered.

-Vulnerable locales have been identified or are known by the Roseau County Emergency Operations Plan.

-Keep up maintenance on hazardous material bearing structures. Fix any problems immediately.

-The presence of anhydrous in a region also means that there is a possibility of tampering due to the production of meth. Anhydrous is one of the chief ingredients, and there have been spills due to tank tampering. Meth is a large problem for Minnesota and the labs that produce the drug are dangerous and costly to clean up. Often, those that try meth are hooked from the first use. There has been a need to increase jail space in the region, partially due to the arrests from meth.

-Legislation passed to ban over-the-counter sales of tablets containing pseudoephedrine, which is used to manufacture meth. Medications such as Sudafed and Claritin-D are affected.

Potential Solution:

-Measures have been taken to remove hazardous material from the floodplain, however the complete removal would only occur if agricultural use of the land was not happening in the county. This is not an option, as agriculture is a driving force of the economy for Roseau County, so a medium must be reached.

-Meth is a problem that Roseau County Law Enforcement is dealing with, along with state and national agencies. Citizen surveillance would be beneficial, so that any potential labs are reported. A greater amount of control on anhydrous ammonia facilities would also help curb the rising meth production problem.

Problem 11, Natural Storm Mitigation: Storms like blizzards and thunderstorms are a way of life for Roseau County. They always have occurred and always will. Mitigating their existence is impossible.

Storms are a way of life and require less mitigation than a more serious event such as flooding. How do you mitigate a spontaneous event that can occur anywhere throughout the county?

Current Strategies:

- Educating the public is one of the only ways to mitigate this hazard, for safety begins at home. Multiple mitigation responses on a local basis will cause the city, township and county to become more hazard resistant. This is also a hugely cost effective response.
- Seasonal information is given on that time period's hazards. Emergency management also has a table for health fairs and other informational activities
- Many emergency personnel will speak about various topics at public meetings or events.
- Roseau County has the community emergency response team (CERT). This group teaches people how to respond to emergencies in their own homes. It involves teaching people the basics of CPR and touring their house, locating the gas shut off valves, etc. It is an eight week training course.
- Roseau County pays for a UHF television system for storm warning.
- The USDA helps keep people prepared for disaster with safety alerts, preparedness lists and disaster prevention information.
- Roseau County celebrates National Severe Weather Awareness Week. Roseau tests sirens at publicly notified times. The hope is that citizens, families and businesses will practice tornado emergency plans and drills to be better prepared for the real occurrence.

Potential Solutions:

- NOAA weather alert radios will give continuous weather forecasts, as well as warn residents of an oncoming storm with a loud alarm tone. These are also available to any resident wishing to purchase one at major electronic stores (Radio Shack).
- Public education is an ongoing process. This problem will reoccur to varying levels with every new person that settles in Roseau County. It is very cost-efficient to teach people to protect themselves from harm, and it fosters responsibility.

Problem 12, NOAA: There is no NOAA tower in Roseau County. Frequencies can be heard from surrounding counties, but there is no frequency specific to Roseau. Having a NOAA tower would be an excellent education and awareness tool.

Current Strategies:

- A 300 foot tower is talked about being built. It would serve multiple purposes besides NOAA including addressing the communication concerns listed earlier in this report.
- Funding and location are currently being researched.

Potential Solution:

- A NOAA tower would provide Roseau County with a stronger frequency NOAA station to help warn residents of oncoming

weather. It is a very cost-effective solution to increase notification of potentially dangerous situations, and can reduce damage and lost or injured lives.

Problem 13, Icestorms: Damage from icestorms remain a concern for Greenbush. Power outages during severe winter weather periods in Minnesota have lasted for over two weeks. Many residents' lives were affected by the loss of electricity.

Current Strategies:

- Greenbush would like to convert some/all of their overhead lines to underground. Funding remains an issue however. Sources would need to be found to aid the cost-effectiveness.
- See problem 27 below regarding generators
- Burial of power lines is a good way to prevent icestorm damage, provided that the ground does not move suddenly. Cities are aware of this mitigation method and some have taken advantage of this for aesthetic reasons. Maintenance in the winter months can be difficult, as the ground is often frozen and covered with varying inches of snow. Rodents also have a tendency to chew either through the cable or chew the coating off the cable, causing stray voltage to be in the ground. Because of moisture and other factors, the cable does have to be replaced periodically.
- Some residents have purchased generators to continue the electricity flow to their home. Each city also can set up a shelter for affected citizens with various necessities in times of emergency.

Potential Solution:

- Most of Warroad's lines are buried.
- Partly because of the ice storm to hit the region in 1996 and 1997, power companies in Roseau as well as surrounding areas started to bury the most affected lines.
- Cities often have portions of power lines underground; the burial often coincides with maintenance or other construction that causes the road to be dug up. This method is more cost effective, as the road is being altered once but for multiple reasons.
- Cost effectiveness can vary, depending on the city and the upcoming maintenance schedule for a particular area. Power loss is a danger for county citizens, especially when many are dependent on the heat that electricity provides. Depending on the history of a line and it's maintenance, the electric providers of an area would be able to identify at risk areas as well as mitigation strategies that the electric company has to keep power up and running to the region.

Problem 14, Railroad Communication: Open communication with the railroads is strived for in Roseau County. Warroad would like to know the procedure for splitting the train (in case of an emergency situation) as well as what is being hauled through their town.

-Some residents are also concerned about what is being transported via truck through Roseau County.

Current Strategies:

- The county emergency response personnel participate in annual exercises on a county-wide and beyond scale that deal with potential spill situations.
- Plans are written by the railroad as well as the county to deal with a potential spill. Interested parties should talk to the Roseau County Emergency Manager for access to such documents or for information on hazardous materials passing through county or municipal borders.
- Vulnerable locales have been identified or are known by the Roseau County Emergency Operations Plan.

Potential Solution:

- Talk with the railroad to educate the affected public on any existing danger concerning hazardous materials and the response plan for a potential spill. This is a very cost-effective strategy.

Problem 15, West Nile Virus: Due to a small budget, some cities in Roseau County have only enough money to pay for so many applications of mosquito spray. Some residents worry about West Nile disease when mosquito populations get out of hand and the town is unable to spray (not always monetary reasons.)

- This is a concern for Warroad. However, every concession is made during moisture heavy seasons to produce maximum efficiency spraying.
- Large mosquito populations are a concern for the State Ditch #90 subwatershed in the Two Rivers Watershed.

Current Strategies:

- People can increase vaccinations to livestock to help stop the spread of the disease.
- Most cities either charge each resident a small surcharge (usually on the electric bill) for the protection against mosquitos.
- Mosquito issue in the Two Rivers Watershed District's Overall Plan.
- The USDA has a Pest Detection Program that protects resources by the early detection of harmful or economically significant plant pests and weeds.
- www.disasterhelp.gov has many mitigation strategies and ideas available about many hazards including disease resources involving the effects of diseases as well as prevention tips, risk behaviors and illness symptoms.

Potential Solution:

- A vaccine is being worked on at a federal level for humans.
- This is more of a concern when a wet season occurs.
- Although wetlands are a great method of controlling runoff and storing water, they also can be a breeding ground for mosquitos.

- The removal of standing water near an area (from tires, standing water in a ditch) can be quite cost effective to mitigate, depending on the amount of water needing removal.
- There are certain liabilities for spraying, including if a hive of bees are killed or if someone develops a rash. The public needs to know what kind of spray is being used and when the spraying schedule is. There also needs to be a certified sprayer.

Problem 16, Fire Fuel Reduction: There are some fire concerns in some areas of Roseau County with heavy tree growth or dry/dead conifers. There needs to be an increased rural water supply or a large fire would be difficult to combat.

- Lake Wood Trailer Park is located just west of Warroad. The trailers are mostly of an older style surrounded by dry trees. There is an abundance of dead trees that could make fuel for a large fire.
- There are some beautiful homes in the Beltrami Island Forest area that are at risk for fire because of the small roads. Fire equipment may not be able to respond to an incident as quickly because of these aesthetically pleasing roadways.
- The CRP in the county could become a fire risk if conditions were dry enough. A high wind could turn a small CRP fire into a large one.

Current Strategies:

- Concerned landowners can place a fire break around CRP as an additional fire deterrent. If a firebreak is wanted, the conservation plan for the CRP needs to be revised to include the firebreak and then passed by the NRCS. No reduction in benefits will be seen.
- Fire departments in the area have aid agreements with each other and do an excellent job of protecting Roseau County.
- During extremely dry conditions, fire restrictions are placed and enforced to reduce the chance of a fire starting.
- Processes such as discing, mowing, plowing, bulldozing, backfiring, or creating a wetline are used to control fire.
- A dry hydrant was just installed in Wannaska. Construct more dry hydrants through the county in water deficient areas when funding is available.

Potential Solution:

- The most cost-effective way to mitigate fire in Roseau County is to provide funding and equipment for local volunteer fire departments, so that response time is decreased.
- There are also many mitigation strategies that can be done by a concerned homeowner to lessen the chances of a fire affecting a home. This can include the trimming or removal of trees and making sure that a road leading up to a residence can accommodate a large emergency vehicle.
- The County Engineer's Office states that restrictive roadways are not a large problem for Roseau County.

Problem 17, Oxygen Station Proximity: If a mass casualty situation occurred, many people could die if there was not enough oxygen. The closest place to fill tanks is in either Grand Forks or Bemidji, and by that time countless people could die.

Current Strategies:

-Build an oxygen filling station nearer to Roseau County. This would also benefit adjacent counties. Warroad ambulance and first responders are tackling this problem, which was brought to light during an emergency disaster drill.

Potential Solution:

-This is a great example of the cost-effectiveness of annual emergency disaster exercises.

Problem 18, Response Group Communication: The Northern Lights and Wannaska first response groups are in need of radios. Currently the groups have pagers. There is no way to tell if the groups are currently at the scene, or if they have even received the page.

Current Strategies:

-Funding options are currently being researched to purchase communications equipment for both groups.

Potential Solution:

-It is not cost effective to have a huge communication gap between members of the emergency response team.

Problem 19, Hospital Access: The Roseau Area Hospital has only one entrance to the facility, Delmore Drive. During the flood in 2002, this entry was unable to be used by many vehicles. A secondary makeshift entrance had to be constructed.

Current Strategies:

-A second entrance is in the process of being constructed.
-Listed in the MNDOT district 2 ITS scoping study.

Potential Solution:

-It is not cost effective to have a major hospital suffering from isolation during a hazard.

Time Frame:

-MNDOT has placed this in the over five years category (long term solutions).

Cost Estimation:

-\$825 to \$1,500. \$40 to \$80 in annual operation costs.

Problem 20, Flood Mitigation: Flooding is a huge problem for Roseau County, who still feels the sting from the 2002 flood. The following comprehensive water plan addresses a response for the Roseau River

area. Funding could be an issue to seeing the implementation of some of these projects.

- Jadis Township sees a need for Roseau River flood projects upstream.
- Roseau School wants continued progress toward addressing the flooding on the Roseau River.
- Moose Township has flooding in the north two miles of the township when the Roseau River overflows.

Current Strategies: The following goals pertain to flooding are listed in the Overall Plan of the Two Rivers Watershed:

- Coordinate with other boards the delivery of flow to the Red River
- Maintain, modify, construct or improve properly functioning watercourses to provide protection to agricultural land for a ten year event, while ensuring that there are no resulting downstream adverse impacts.
- Reduce the duration, peak, and frequency of overland flooding.
- Reduce damages to and loss of residential areas from flooding for a 100 year event (minimum)
- Enhance and protect ground water supplies.
- Improve and sustain surface water quality.
- Reduce erosion and sedimentation.
- Participate in efforts to enhance, establish and protect stream corridors and riparian areas.
- Participate in efforts to enhance, provide and protect habitats.
- Provide educational and outreach opportunities.
- In addition, projects that concern drainage, water use/quality, or flood control need to alert the Two Rivers Watershed District. A permit is mandatory for projects that might possibly have an effect on the district's water and the resources related to it. Many watersheds have similar permitting policies.

Current Strategies: The following goals pertain to flooding are listed in the Overall Plan of the Roseau River Watershed:

- Provide 100-yr flood protection for the city of Roseau and rural homesteads in the district.
- Provide 10-year flood protection for agricultural lands
- Reduce flood damage to roads and crossings
- Reduce drought damages.
- Preserve ground water supply and recharge areas.
- Improve water quality in the Roseau River Watershed District.
- Cooperate with SWCD, U of MN and other agencies in the education of local residents and students.
- Coordinate and support workshops, public informational meetings and local media to educate the public on water stewardship issues.
- Continue to encourage land use practices that enhance water recharge and improve water quality.
- Educate the public for proper abandonment of wells, solid waste disposal, underground storage tanks and continue to inventory and record.
- Develop programs to identify and monitor potential sources of point and non-point pollution.

-Protect sensitive groundwater recharge areas and improve groundwater recharge monitoring programs.

Current Strategies:

-The following strategies are listed in the comprehensive water management plan for the Roseau River. Although the total proposal costs near 100 million, if implemented before June 2002, the plan would have saved more damages in this one flood than the cost of the plan. Many separate features form the solution:

- 1. Build impoundments upstream from Roseau in the headwaters. This would reduce the flood peaks at Roseau. The impoundments should be designed with gated storage to hold a minimum of four to five inches.
- 2. Construct a diversion for Roseau so that 100 year floodwaters would not cause damage. It would have specific specs. depending on whether the floodway was in the city or north of it. It is also noted that the bridges can carry 100-year flows but become restrictive during 2002 type flooding.
- 3. Install a storm drain on the west part of Roseau. This outlet will also prevent overland flow from land west of the city.
- 4. Create a meandering stream and restore wetlands to protect both farmland and natural resources (Hay Creek/Norland Project).
- 5. Construct additional impoundments to accomplish the goal of 15,000 additional acre feet of storage. Impoundments are also needed in the Lost River as well as Sprague Creek and Pine Creek in Canada. The gated structures could hold the water until the Roseau Lake can handle the inflow.
- 6. Install ring dikes around rural homes so farm areas can be protected from a 100 year event.
- 7. Improve storage at the drained Roseau Lake while enhancing wildlife benefits. During the 2002 flood, there was almost 150,000 acre feet of storage. There are many components of this feature including:
 - Wildlife management pools
 - Low dikes
 - Purchasing of farmlands that cannot be protected
 - Main dike to keep lake off farmland and homesteads during high water events. Water outflow would be controlled by three outlets.
 - Three outlets
- 8. Create two diversions to provide the needed additional flow capacity between the Lake and the Big Swamp. This will also provide protection to cropland in this area.
- 9. Roseau River WMA modification to use flood storage more efficiently by installing gated outlets.
- 10. Modify the Roseau River by restoring previously cut-off oxbows and other natural features. Several low head dams would also be constructed to increase low flow river levels.
- 11. Install outlets and a dike to make sure the Big Swamp

area of Roseau County does no damage to Canada or the Two Rivers watershed area when flooding occurs.

- Moose Township states that upstream holding areas combined with better farming practices/federal farm program would help the flooding problem.
- Aspects of flood mitigation have been discussed for a long time. Parts of this plan have already been enacted and other sections are in the planning process.
- Roseau County is working with the Army Corps. of Engineers to get itself out of the 100 year floodplain. A plan is currently being composed that is due July, 2005.
- Portions of the Roseau River Comprehensive Water Management Plan are listed in the Roseau River Watershed District's Overall Plan. The Stafford Subwatershed would be affected, and mitigation solutions would additionally benefit Big Swamp, Hay Creek/Norland and Lake Bottom Subwatersheds.
- A supplement to the Roseau River Comprehensive Water Management Plan is some potential impoundment sites upstream from Roseau. This report contains information on fifteen possible water storage sites with a total of 50,000 acre feet of storage. Please talk to emergency management to request a copy of this document.
- Money for Roseau flood protection is on the 2005 bonding bill.
- A preliminary report done by the USACE lists a diversion ditch east of Roseau as the best flood protection for the city. A diversion with a base width of 150 feet would cost twenty-one million dollars and has an average annual benefit of 1.9 million dollars. The levees would have cost twenty-nine million dollars and had an average annual benefit of 1.8 million dollars. Less social and environmental impact was seen with the diversion, which would only require the acquisition of a farmstead and 110 acres. The channel would run for four and a half miles and could be up to twenty feet deep.

Potential Solutions:

- Roseau County has adopted the attitude to help the landowners help themselves. Farmers can help protect their own land (dikes, filling in basements, road repairs, etc...) through the proper channels and with the proper permits. This way, some of the people that want immediate action taken on their property can help speed the process while helping in the mitigation effort.
- The city of Roseau is looking at many options for flood protection including various diversion locations, cutoff channels, levee changes and bridge modifications. Two main flood control plans that are undergoing further evaluation provide high levels of protection to both the city and the surrounding area. The plans include a large diversion east of Roseau and permanent levees in city limits. A screening of alternatives report is due in January, 2005 that lists the most cost-effective flood reduction solution. A flooding study with the Army Corps of Engineers is also being done to evaluate potential projects for Roseau that would involve the two entities as partners.
- In 2002, the Roseau River International Watershed was formed. The goal of this group is to work towards the solution of water

issues between the Roseau River Basin in Minnesota and Manitoba, Canada. It is important for Roseau County and Manitoba, Canada to work together because of the ditches, drainageways and waterways that the border shares.

-A survey given by the Roseau River Watershed had the following results about flooding

- 81% of people indicated that there was a need for flood management in the Roseau River Basin.

- Public support for a project should be two thirds or greater.

- The following flood control measures would be supported:

 - Drainage ditches and levees - 81%

 - Sandbagging and gated culvert openings - 77%

 - Improved channelization and restoration of the Roseau River - 65%

 - Conservation tillage - 64%

 - Floodways 62%

 - Wet dam impoundments, temporary dikes and culvert sizing - 60%

Time Frame:

- Construction on parts of this plan have already started, however the plan in its entirety may not be completed.

Cost Estimation: 105 million dollars

- Impoundments project has a cost of about twenty million dollars for 30,000 to 40,000 acres of flood water storage in Roseau. Additional impoundments named would cost about eight million dollars for fifteen thousand acres of flood water storage.

- The diversion for Roseau costs about thirty million dollars including the relocation of structures and utilities.

- The storm drain will cost about three million dollars.

- The Hay Creek/Norland project would cost about 8.3 million dollars. Funding assistance would be provided.

- Depending on the number of farms that need protection, the cost for ring dikes would be about 500,000 dollars.

- The cost for the Roseau Lake project is about fifteen million dollars.

- The two diversions will cost about ten million dollars.

- The two outlets for the Roseau River WMA will cost about \$500,000

- Roseau River restoration should cost about one million dollars.

- The Big Swamp projects costs about eight million dollars.

Problem 21, Dike Maintenance/Replacement: Many of the flood retention areas around the city of Roseau are in need of repair. Most were built in the 1960's as a temporary structure, but were never taken down. The levees need to be wider, and made with more clay. The current structure is partially composed of sand and old sandbags. Although the levees work well in the winter when frozen, during the summer the levees take on water and start to seep.

- Some cities and farmers have dikes and ring dikes built around their land, but not Army Corps of Engineers certified. The city

and/or farm is restricted by what it puts on certain lands until the land is out of the floodplain. The residence inside these ring dikes is still considered to be in the floodplain and any new construction inside the ring dike must meet the prerequisites of the local floodplain ordinance. Flood insurance is also usually required, even though flooding danger is lessened due to the dike.

Current Strategies:

- Funding is a major problem. Some source of funding needs to be available as Roseau County does not have enough money to fund this project by itself.
- Ring dikes are listed as a solution for the flood damage to homesteads problem in Big Swamp Subwatershed in the Roseau River Watershed.
- USACE is working on a plan that will be ready for Roseau County around the middle of summer.

Potential Solution:

- The dike is a very important piece in the current flood protection of Roseau.

Time Line: The Roseau River Watershed District lists 1-3 years.

Cost Estimation: The Roseau River Watershed District lists \$250,000.

Problem 22, Flood Mitigation Equipment: Roseau County needs its own sandbag machine and a conveyer. During the flooding situation in May, 2004, Roseau borrowed these pieces of equipment and flood mitigation went very smoothly.

Current Strategies:

- Polaris is purchasing two sandbag machines: one for the city of Roseau and one for Roseau County.

Potential Solution:

- It is very cost efficient for the county to have this equipment because it provides a higher degree of flood protection as well as a faster mitigation response.

Problem 23, Overland Flooding: Overland flooding is an issue for Roseau County.

- The city of Greenbush only has one portable water pump. This pump is used to pump the sewer lift stations (if needed) as well as resident's basements. For back up purposes as well as necessity, another water pump would be extremely beneficial.
- Large rains cause flooding near the campground in Warroad. The pumps have a hard time keeping up with the large flows of water.
- It is hard to mitigate the effects of a large rain (six inches or higher) when it comes all at a short time. Storm sewers cannot handle the amount of water, and flooding quickly occurs, both rural and urban. This will also cause overland flooding,

something the entire county needs protection from.

-The Two Rivers Watershed has problems with overland flooding in Roseau County.

-Overland flooding is the number one problem for Badger & Skunk Creek subwatershed. It occurs during the spring and summer seasons and impacts cropland, roads and infrastructure near the area where County Ditch #13 meets Lateral 1 of South Ditch #95.

-Skunk Creek is plugged, partially causing the overland flooding.

-The North Branch at Lancaster subwatershed has overland flooding issues because of the Roseau River. The Roseau River overflows and enters the subwatershed from the north. This occurs mainly during the spring and from high runoff events.

-Overland flooding occurs in the State Ditch #91 subwatershed, especially in the southeast.

Overland flooding occurs in the State Ditch #95 subwatershed in the southeast. Lateral 1 is subject to outflow to the south during runoff events.

-The State Ditch #95 subwatershed has overland flooding concerns dealing with the crossover of drainage systems from the north into the State Ditch #95 system. Water overflows from the Roseau River and enters the Two Rivers by State Ditch #72 and its laterals.

-Seepage after a heavy rain is a problem for the State Ditch #90 subwatershed, particularly during the summer.

-The Roseau River Watershed also has problems with overland flooding in Roseau County:

-Hay Creek/Norland Subwatershed has overland flooding problems in County Ditch #9 and #18, as well as Judicial Ditch #61.

-The North Branch Subwatershed has overland flooding problems.

-Crossover flooding from Norland affects the North Branch Subwatershed.

-Crossover from Sprague Creek and Hay Creek affects Lake Bottom Subwatershed.

-Multiple converging systems affect Big Swamp Subwatershed.

-The Pinecreek Diversion causes problems for Big Swamp and Lake Bottom Subwatersheds.

Current Strategies:

-More efficient maintenance of drainage is needed, since overland flooding is a county-wide problem.

-Many times, one mitigation problem may solve multiple aspects of flooding in Roseau County. For example, a beaver dam removal may mitigate an overland flooding issue as well as a drainage concern. A cost effective flood project solves many flooding problems of an area instead of a singular concern.

-The Watershed Districts are aware of overland flooding within their boundaries. Their overall plans list mitigation strategies available to cease this hazard.

- Storage of water would help eliminate some overland flooding concerns, but some plan needs to be developed that is specific to the affected area. Plans are in various stages of development within the county.
- Warroad is in the process of upgrading the lift station near the campground.
- The west intercept project will help protect Roseau from overland flooding. Lift station upgrades and additions are currently being done. Roseau is also replacing water, sewer and storm sewer pipes with a larger capacity to help prevent back-up as well as lessen damage done by overland flooding, flash flooding and heavy precipitation.
- The Roseau River Subwatershed lists the following solutions for overland flooding problems listed above:
 - North Branch Subwatershed - store water in Beltrami State Forest (overland flooding) and the Norland Project (solves crossover flooding).
 - Hay Creek/Norland Subwatershed - temporary water storage, Lost River State Forest (CD #9) and Norland Project (CD #18 and JD #61)
 - Lake Bottom Subwatershed - impoundments in Canada (crossover from Sprague Creek) and Norland Project (crossover from Hay Creek).
 - Big Swamp Subwatershed - upstream impoundments (multiple converging systems).
 - Establishing controls would solve the Pinecreek Diversion problem.

Potential Solutions:

- A personal responsibility for water needs to be seen in Roseau County.

Time Line:

- Overland flooding in Hay Creek/Norland Subwatershed
 - 10-20 years for CD #9
 - 4-8 years for CD #18 and JD #61
- 10-20 years for overland flooding in the North Branch Subwatershed.
 - 4-8 years for the Norland Project.
- Lake Bottom Subwatershed:
 - 8-12 years for the crossover from Sprague Creek problem to be resolved.
 - 4-8 years for the crossover from Hay Creek problem to be resolved.
- 10-20 years for the multiple converging systems problem in Big Swamp Subwatershed to be resolved.
- 4-8 years would solve the Pinecreek Diversion problem in Lake Bottom Subwatershed.

Cost Estimation:

- 8 million for the Norland Project.
- Upstream impoundments in Big Swamp Subwatershed will cost about thirty million dollars.

Problem 24, Standing Water Reduction: There is a ditch running through Roosevelt that produces sitting water. Large rains cause overland flooding to affect parts of town. The ponds also attract mosquitos. The railroad owns this land and the city has been unable to talk to someone about this problem despite multiple attempts.

-Jadis Township sites a need for drainage when water has been standing for over three weeks.

Current Strategies:

-Roosevelt has found a contact for the railroad and can currently communicate about the problem within the city.

Potential Solutions:

-There needs to be a reintroduction of drainage to the problem ditch, with construction or reworking the grade if necessary. Cooperation between the city and the railroad is essential to see this problem solved.

-Standing water is an issue for the county. There needs to be water stored so that drainage ditches and waterways do not get overloaded and flood. But the water cannot sit too long on cropland or farmers will be economically hurt. The solution is proper timing, where the system is controlled, causing flooding not to occur, but released in a timely manner so that the land can be utilized.

Problem 25, Siren Requests: Need sirens for some cities and townships in Roseau County including Wannaska and certain trailer courts. There is presently no funding available for these structures. There is also no money available for siren maintenance. Without periodic maintenance, areas could be put at risk with a deficient siren, and more money could be spent on replacement that would be spent on maintenance costs.

-There is a great amount of community interest for a siren in Wannaska.

-The siren in Greenbush is older and part of a base radio system for Roseau County that is becoming obsolete. For more information on this problem, see the communication response listed below in this report.

-The siren in Warroad is battery operated with a charger. There is no electric back-up and the campground is unable to hear the sound.

-The city of Roosevelt currently has no siren.

-Part of Badger cannot hear the siren when the wind is strong.

-Some of the smaller sirens in Roseau need maintenance. Parts are getting harder to find because of the age.

Current Strategies:

-Funding strategies for these structures are being researched.

-Funding for a siren in Wannaska is currently being worked out. The Lions Club is doing a majority of the fund raising.

-Testing at a specific time occurs to make sure that the siren is

in working order and to see if maintenance needs to occur.

Potential Solution:

- Sirens are important; many individuals are warned because of the presence of these structures. It is not cost-efficient to have the main method of warning multiple groups at half or a non-operational capacity.
- Complaints of not being able to hear the siren can be attributed to an indoor/outdoor variety. A city might have complete coverage from an outdoor siren, but citizens inside a structure may not be able to hear the alarm.

Problem 26, E911 Address Usage: Roosevelt needs the E911 addresses for the town by December, 2004. The city is going to change their fire department to Williams and they have requested the addresses to more quickly locate a fire and give directions to multiple emergency personnel.

Current Strategies:

- The addresses have been made. The wait is on the verification through GeoComm.
- Roosevelt has a contact in Roseau County and the problem has been discussed.
- Problem is taken care of.

Potential Solution:

- The addresses will ensure that the new fire department will have appropriate response times to anyone in the new district.

Problem 27, Generator Requests: Generators are in demand for Roseau County.

- The Roseau County Courthouse is in need of a generator. A power outage could cripple the facility.
- The city of Warroad only has one portable generator.

Current Strategies:

- Most important public facilities within the county have a back-up generator so that services to residents are not cut abruptly.
 - Marvin's has 100% back-up power. If an extreme emergency ever occurred, portions of Warroad would have electricity.
- Because of Y2K, Badger has enough generators available for use.
- Roseau County cities own generators that can be moved and hooked up to multiple businesses and structures to prevent various damage done by a power outage. County-owned generators could also be loaned to affected communities.
- Many people have individual generators to provide power for their own residences.
 - New technology makes it possible for people to own a stationary generator powered by either propane or natural gas that will power the whole home. A switch reduces feedback and the generator performs self tests to make sure that the unit is always in working condition. This

technology is becoming more affordable.

Potential Solution:

- It is not cost effective for county residents to have to suffer through the abrupt loss of services that some depend on. Generators provide multiple power sources that help mitigate against forms of flooding, icestorms, blizzards and extreme cold or hot.
- If not hooked up correctly, a generator can cause a power line to be partially energized (feedback). A lineman working on the "dead" line can be hurt or killed.

Problem 28, Lagoon Maintenance: The Greenbush lagoon system has water seeping into it. Conversely, there is also material seeping out. Repairs need to be made before this becomes a large problem.

- The lagoon system is currently in the process of being expanded in Warroad.
- The lagoon in Badger was just expanded.
- A city sewer system was just installed in Wannaska.

Current Strategies:

- Search for funding, including any available grants or aids.
- Greenbush is aware of the problem and has done some research about which avenues to take.
- The Project Priority List (PPL) is prepared by the MPCA to identify wastewater treatment projects that could potentially receive a loan or grant. All projects are ranked according to priority, but any project on the list meet the project's credo to protect human health and aquatic life. The following projects in Roseau County are on the MPCA's PPL:
 - Rehabilitating and expanding existing system in Warroad. Ranked fourteenth on the list.
 - Connect unsewered/collection in Lake Township to Warroad. Ranked sixteenth on the list.
 - Sewer improvement and I/I correction in Greenbush. Ranked #196 on the list.

Potential Solution:

- The cessation of water contamination is an important hazard to either minimize or eliminate in Roseau County. It is very cost-efficient to contain this, as the spread could potentially affect many people.

Problem 29, Water System Equipment: Badger needs a new iron removal filter. The one that is currently in use is twenty-five years old. A larger filter size than the current one would also help.

Current Strategies:

- Search for funding. Badger officials are aware of the situation and are currently exploring options.

Potential Solution:

-Providing quality water is important to Badger.

Problem 30, Railroad Crossing Deterioration: Train crossings in Warroad are starting to need maintenance. Further deterioration could lead to a derailment in the future if action is not taken presently.

-Railroads run through or very near every city in Roseau County.

Current Strategies:

- Talk with railroad officials about Warroad concerns.
- The county emergency response personnel participate in annual exercises on a county-wide and beyond scale that deal with potential spill situations.
- Plans are written by the railroad as well as the county to deal with a potential spill. Interested parties should talk to the Roseau County Emergency Manager for access to such documents or for information on hazardous materials passing through county or municipal borders.
- Vulnerable locales have been identified or are known by the Roseau County Emergency Operations Plan.

Potential Solution:

- Talk with the railroad to educate the affected public on any existing danger concerning hazardous materials and the response plan for a potential spill. This is a very cost-effective strategy.

Problem 31, Water System Replacement: Badger currently needs a larger water system. The current one pumps very slowly. A fire that needs a lot of water to put it out might put the city in jeopardy. Currently, businesses in Badger pay more because the insurance premiums are higher.

Current Strategies:

- Search for funding.
- Badger is aware of the problem and is currently researching options.
- Wannaska is currently finishing up a city-wide sewer system project. Individual sewer systems were replaced, and the whole city is now connected. The system is currently operational, with only a small amount of work remaining.

Potential Solution:

- Install a larger water tower. This combined with a new, larger iron removal filter might increase the capacity and provide faster pumping.

Problem 32, Campground Shelters: The campgrounds in Warroad are at risk for a tornado. There is no shelter available and the siren is not adequate.

Current Strategies:

- Cities have buildings that can be quickly turned into shelters if there is a need.
- See Problem 25 for siren related strategies.

Potential Solution:

- Many of these projects would be cost-prohibitive in nature without some form of monetary help. Special construction would have to be done, as well as studies to make sure that shelters would survive damage potentially done by other storms such as floods and blizzards.

Problem 33, Drought Mitigation: Mitigate against drought during this current wet cycle to minimize future effects. The wet/dry periods have a cyclic effect in Roseau County.

- Golf courses often have to cease operations during extremely dry periods, causing individual economic distress.
- Farmers can have irrigation problems during a drought, and ranchers can have water supply problems with their cattle.
- Shallow wells may run out of water.
- The hunting, fishing and tourism populations will all decline
- The Two Rivers Watershed cites the following drought concerns:
 - Pasture and crop loss is seen in the State Ditch #95 subwatershed during drought conditions. Shallow well capacity is also a concern. The same problems are seen in the State Ditch #91 subwatershed.
 - The State Ditch #90 subwatershed cites that the water Twin Lakes (in Kittson County, same subwatershed) was not here prior to the 80's. This is a problem that would affect both counties.
 - The North Branch at Lancaster subwatershed has drought concerns, although they are low in severity.

Current Strategies:

- The Two Rivers Watershed lists this as a concern in their overall plan. It is a strong belief by many that drought mitigation should not be forgotten just because the area is going through a wet cycle and is more prone to flooding.
- There are programs available to help farmers and livestock owners in case a drought causes animal or crop death.
- Local rural water systems have plans available in case of a water shortage.
- www.disasterhelp.gov has many mitigation strategies and ideas available about many hazards including drought involving current droughts, drought prone areas, and ways to survive a drought (physically and economically).
- The USDA has many programs available to help combat the effects of a drought including:
 - Non-Fat Dry Milk Livestock Feed Assistance
 - Providing resource management ideas for people while creating a drought plan to protect farms and ranches.
 - The National Drought Mitigation Center helps people and agencies implement measures to minimize risk through preparation and risk management.

Potential Solution:

- Mitigation of a drought is somewhat of an impossibility, but the mitigation of the effects caused by the drought is entirely possible. A long lasting, severe drought can cause harm to many people and it is essential that protection is given to those in need.

Problem 34, Road Flooding: Roads are one of the most repetitive damaged structures in Roseau County. Repair dollars need to be minimized.

- Spruce Township says that the creek banks in the Hay Creek project continue to erode after repairs. The road is threatened. The road south of the Roy Hovorka residence is also eroding.
- The Two Rivers Watershed cites the following problems regarding road flooding:
 - The North Branch at Lancaster subwatershed have a high problem with township and county road washouts. Occurrence is near the north and south banks of State Ditch #84.
 - The State Ditch #90 and #95 subwatersheds have problems with road flooding.
 - Road washouts are a high problem with an annual occurrence in the State Ditch #90 subwatershed.
- The Roseau River Watershed has the following problems regarding road flooding:
 - The Hay Creek/Norland Subwatershed has roadway flooding damage.
 - The Big Swamp Subwatershed has flooded roads.
 - Stafford Subwatershed has water flowing over the road.
 - The North Branch Subwatershed has roadway flooding problems.
 - The Lake Bottom Subwatershed has flooding roads.
- Roseau County is waiting for funding to repair the road south of the Roy Hovorka Residence.

Current Strategies:

- MNDOT is aware of problem localities.
- A recent survey done by the Government Performance Project lists maintenance of infrastructure as the only weakness for Minnesota out of twenty categories. The survey lists a lack of funding as a source of the deterioration. Many of Minnesota's roads were designed many years ago, and the population projections are no longer valid. Heavier vehicles are also being driven, causing a faster rate of decline of road quality.
- The issue is discussed in the Two Rivers Watershed District. Solutions are being planned.
- The Roseau River Watershed cites the following solutions to help solve roadway flooding in their overall plan:
 - Hay Creek/Norland Subwatershed - Temporary Water Storage in Beltrami
 - Upstream impoundments in Big Swamp, Lake Bottom and Stafford Subwatersheds.
 - Culvert sizing in North Branch Subwatershed.

Potential Solution:

- MNDOT, local watersheds, and state/county/city/township officials may use the following methods to mitigate against repetitive damage.
 - Build roads up higher (roads further act as dikes, possibly flooding nearby farmland. Wave action may erode parts during high water).
 - Have a low spot in a road that lets the water flow across (may cause drainage problems and the road is no longer useful for transportation).
 - Some roads are only used seasonally as an access to a field. These type of roads may only require seasonal protection.
 - Tar sections of gravel road that constantly come into contact with water.
 - Add culverts, etc... to reduce the possibility that the road acts as a dike.
 - Enlarge the ditches near the road.
 - Fix drainage problems that cause excessive amounts of water to overflow roads.
- This is a problem for all of Minnesota. It is not cost-effective for Roseau County to repair and upgrade every road within the boundaries. The roads currently in place are necessary for residences, employment, tourism, transportation and the agriculture industry. Not providing protection to these roads may cause isolation, economic decline and public disapproval.

Time Line:

- Upstream impoundments in the Big Swamp, Lake Bottom and Stafford Subwatersheds will take between ten and twenty years.
- Culvert sizing in North Branch Subwatershed will take between four and eight years.
- Temporary water storage in Beltrami will take between ten and twenty years.

Cost Estimation:

- Upstream impoundments in the Big Swamp, Lake Bottom and Stafford Subwatersheds will cost about thirty million dollars per subwatershed.

Problem 35, Contamination Surveillance: Increased security measures need to be taken at water system openings and sources. Contamination, whether accidental or deliberate, could affect many different water bodies and cause much sickness.

- Warroad and Roseau release treated water into the tributaries of the Roseau River.

Current Strategies:

- Get funding sources to lessen the expense.
- See Problem 9 on wells.
- Many different groups contribute to water quality and management mitigation in the Red River Basin. This creates a strong network to promote, pursue, construct and enforce solutions.

- IJC/International Red River Board - Pollution Control and Supply.
 - Red River Basin Commission - Coordinates implementation of a basin-wide approach to key water quality issues.
 - Red River Basin Watershed Management Board - Funds water management projects in organized MN watershed and levies taxes.
 - Red River Watershed Management Consortium - Identifies and addresses water quality issues facing member municipalities and industries.
 - Red River Basin Institute - Coordinates development of research agenda.
 - MPCA Basin Planning - Achieve Minnesota water quality standards.
 - NW Regional Office of MPCA - Management/enforcement of wastewater discharge permits, Inventory/Assistance/Enforcement of feedlots and through development of storm water management in developing areas.
 - Watershed Districts - Controls water by developing projects, levying taxes and developing plans for water management.
 - County Local Water Plans
 - DNR does water quality checks for contamination and checks fish for high levels of mercury.
- Wannaska has a site where the soil has tested positive for fuel. It was from a previous structure. The area is known, and mitigation is currently going on, including annual/semi-annual testing.

Potential Solutions:

- Contamination is an important factor to mitigate because, whether accidental or intentional, it has the potential to affect many people.
- The Impaired Waters Stakeholder Process is being proposed as a solution by sixty partners in response to the problem that Minnesota is not meeting federal water quality standards. Some key principals of this plan include cleaning up pollution instead of bureaucracy, providing resources to existing organizations and programs instead of creating new ones, encouraging local leadership, protecting clean waters and creating the Clean Water Council to guarantee a diversity of perspectives. Eighty million dollars would be raised per year because of a monthly three dollar fee on municipal wastewater connections and septic systems.

Problem 36, Flood Gauges: More rivers in Roseau County need flood warning gauges. There is no way to gauge the rise of some flood waters, and how long melting water takes to get to a certain point.

- The Two Rivers Watershed has the following problems dealing with water flows:
 - The Badger & Skunk Creek subwatershed cites an "unnatural" flow problem in which high flows are too high and low flows are too low. A more sustained, even flow would be better.

- Flashy stream flows are a concern for the North Branch at Lancaster subwatershed.
- Reduced flows in the State Ditch #91 subwatershed allow vegetative growth to occur in drainage channels. A high water table in the western portion of the subwatershed causes crop and housing problems. This is also a problem in the State ditch #95 subwatershed, but both concerns occur across the whole subwatershed.
- The Roseau River Watershed has problems dealing with varying flows in the following subwatersheds:
 - Loss of water storage in Lake Bottom, North Branch, Big Swamp and Hay Creek/Norland Subwatersheds.
 - Low flows in Big Swamp Subwatershed.
 - Uncontrolled water from Roseau River and Hay Creek in Lake Bottom Subwatershed.
 - Flashy stream flows in Stafford Subwatershed.
 - Drained lake bed in Big Swamp Subwatershed.

Current Strategies:

- The Roseau River has flood gauges.
- The Two Rivers Watershed has gauges on some of the rivers in the district.
- Find funding sources to purchase the gauges, as well as partners to maintain them, take readings and process information.
 - Many watersheds already have gauges in place on certain rivers to help with flood mitigation.
- The Warroad watershed district is working to become more active with the help of neighboring watersheds.
- Find new partnerships to find out what is occurring east of Roseau County to increase accuracy.
- The Roseau River Watershed has the following solutions listed for the problems above:
 - Water loss from storage in the North Branch and Hay Creek/Norland Subwatersheds could be solved by storing water in the Beltrami State Forest.
 - Loss of water storage in Lake Bottom Subwatershed could be resolved by restoring Roseau Lake. This would also solve the drained lake bed problem in Big Swamp Subwatershed.
 - Low flows in Big Swamp Subwatershed could be solved by adding upstream impoundments. This could also be used to solve the uncontrolled water from the Roseau River, the Hay Creek Problem in Lake Bottom Subwatershed and the flashy stream flow in Stafford Subwatershed.
 - Restoring Whitney Lake would solve the loss of water storage problem in Big Swamp Subwatershed.

Potential Solution:

- It is important to try and monitor varying flows within Roseau County to get a better idea of the hydrology of the county to increase flood prediction accuracy.

Time Line: (from the Roseau River Watershed)

- Water loss from storage in North Branch Subwatershed will take between ten and twenty years. This is also the time line for the

uncontrolled water problem in Lake Bottom Subwatershed and the flashy stream flow problem in Stafford Subwatershed.

-The loss of water storage in Lake Bottom Subwatershed will take between fifteen and thirty years. This is also the time line for the drained lake bed in Big Swamp Subwatershed.

-Low flows in Big Swamp Subwatershed will take between ten and thirty years to fix.

-Loss of water storage in Hay Creek/Norland Subwatershed will take between four and eight years.

-Loss of water storage in Big Swamp Subwatershed will take between thirty and fifty years.

Cost Estimation: (from the Roseau River Watershed)

-Restoring Roseau Lake will cost about fifteen million dollars in Big Swamp Subwatershed.

-Upstream impoundments will cost about thirty million dollars in Big Swamp Subwatershed and Lake Bottom Subwatershed.

-Upstream impoundments will cost about fifteen million dollars in Stafford Subwatershed.

Problem 37, Border Terrorism: Terrorism, although not a large threat, is a concern for Roseau County because it is along the United States/Canadian Border.

Current Strategies:

-Get funding sources when available to prevent a terrorism event.
-Raise awareness locally.

-Exercises are done annually in Roseau County. These can include acts of terrorism as well as those facilities most vulnerable to an attack.

-Public gathering localities are noted by Roseau County Emergency Management. Most have plans in place in case of emergency.

-The medical facilities have plans in place for various events. Aid agreements with neighboring facilities to treat large amounts of people. Aid agreements are done with many response agencies in Roseau County, as well as Northwest Minnesota.

-Neighboring cities have also taken in residents during flooding and other hazards.

-Border Patrol does a good job of monitoring passage into Minnesota. Other at risk facilities, agencies, departments and emergency management staff deserve much credit for researching and fixing potential hazards.

-The United States and Canada do several different training sessions in which the border is compromised. Many different groups and agencies on both sides of the border are involved. Training between Minnesota, Canada and North Dakota is done also concerning terrorism and other areas of hazard mitigation.

-The Office of Emergency Preparedness was formed from grant money from the federal government. It's main purpose is to combat bioterrorism, which it does by administering grant money, overseeing regulations and programs, and assessing several responses to a bioterrorist attack.

Potential Solution:

- Roseau County is in talks with the Coast Guard to get an older whaling ship to patrol waters and act as a deterrent.
- Roseau County is also part of a multi-county terrorism grant given to counties that border Canada.
- While terrorism is an unpredictable hazard, it's history of past occurrences leads Roseau County to rank this hazard less severely than other frequent, reoccurring hazards. It still has a great potential for occurrence because of the lessened population and the close border. Much mitigation has been done by departments and agencies with excellent results, but a cost-effective solution for a large-scale terrorism event cannot be recommended without participation from the state.

Problem 38, Subsidence Threats: Although not a main concern for Roseau, subsidence threatens a couple of properties in/near the city.

- The Two Rivers Watershed has some problems with subsidence:
 - The State Ditch #95 has some ditch bank erosion/subsidence problems, as well as noted erosion problems where fields enter main ditches. This causes an extended number of suspended solids to be left in water during runoff events. Field erosion is a huge concern.
 - Subsidence and sedimentation are a problem for the State Ditch #91 subwatershed. Field erosion/subsidence is the most severe in the northwest. Related factors include affects on the food chain and the increased levels of suspended solids affecting water quality.
 - Subsidence is a problem for the Badger and Skunk Creek subwatershed. Ditch and stream banks erode and slough into the channel, causing water quality issues and increased vegetation to grow. A maintenance plan needs to be implemented and side slopes should be leveled.
- The Roseau River Watershed has problems in the Lake Bottom and Big Swamp Subwatersheds dealing with subsidence, erosion and sedimentation.

Current Strategies:

- Get funding sources to lessen the expense of combating slope failure.
- Subsidence problems are noted in the Two Rivers Watershed's Overall Plan. Many watersheds have plans in place to deal with erosion and subsidence.
- Subsidence solutions listed in the Roseau River Watershed's Overall Plan include riparian corridors and buffer strips.

Potential Solution:

- The following methods can be used to fix subsidence problems:
 - Move structure to an area not near the river or demolish it, reducing the weight upon the bank and relieving pressure.
 - Stabilize the bank so that the land will not subside further.
 - Some areas were fixed by resloping the affected area,

adding rocks and extra drains.
-Because the Red River Valley is one of the most drained areas in the world, subsidence is bound to be a large problem, for the two often walk hand in hand.
-High flow areas will see an increase in erosion and subsidence. This will cause sediment to be deposited elsewhere, causing blockages and vegetation growth.

Time Line:

-The Roseau River Watershed has set the following time lines:
-One to three years for Lake Bottom Subwatershed (buffer strips).
-Eight to twelve years for Big Swamp and Lake Bottom Subwatersheds (Riparian Corridors).

Cost Estimation:

-The Roseau River Watershed has estimated that one million dollars each could fix Big Swamp and Lake Bottom Subwatersheds by establishing riparian corridors.

Problem 39, Disease Distribution Potential: Dead animals are a concern for infectious diseases. Many diseases including the avian flu, Anthrax or West Nile could be passed on through the bodies of deceased wild and domesticated animals. An increase in certain infectious diseases could be seen if bodies are not either picked up or buried according to the regulations (so many feet above the water table).
-Also a dead animal that contains some sort of infectious disease from one farm is transported to another area when the company picks up additional dead animals. A potential disease could be spread this way.
-Family farms are concerned about large companies establishing dairies and feeder lots in the county. An influx of animals carrying diseases might be seen if regulations are not followed.
-It is up to the owner to dispose of dead animals. It is a concern that improper disposal could lead to either increased sickness or contamination.
-Some individuals use ditches to dispose of dead animals. This could contaminate waters in addition to spreading disease.
-A deer shot in the Skime area tested positive for Bovine Tuberculosis.
-The first deer was infected with the same strain of Bovine TB as the cattle, which means that the disease did not originate within the deer population.
-Efforts by the DNR to test additional deer for bovine tuberculosis found another deer with lung lesions, and is suspected to also have contracted the disease.

-Minnesota has quarantined forty-three herds of cattle for bovine TB investigation. As of the end of December, 2005, thirty-six herds were being released after showing no infection.
-If the TB becomes widespread in the deer population, Roseau County and Minnesota will have to work hard for long

periods of time to become TB-free.

-In July, 2005, testing found that a cattle herd in Skime was infected with TB. Subsequent testing found three additional herds with the same disease in Roseau County.

Current Strategies:

-Currently there are programs to pick up deceased animals, but with the state of Minnesota trying to cut costs together with the livestock rendering industries seeing less of a profit every year, these programs are in jeopardy.

-The most recent pick-up occurred from March 15 to April 15 in 2005. The base fee is ninety dollars for the first four thousand pounds and \$2.50 for each hundred pounds after that. Roseau County will pay half of the base fee for 2005 with a cap of \$2,191.

-Some agencies do monitor wild animals and collect them if an otherwise healthy population dies (dead birds are monitored for West Nile).

-Livestock owners are in charge of vaccinations for their herds.

-The USDA has many programs to protect against animal contamination including:

-Seven dispersed state laboratories that provide surveillance of bovine spongiform encephalopathy.

-The Wildlife Disease Protection Program helps reduce the risk of disease transmission from wild animals to domesticated animals.

-Information on food safety and how it can be affected by unfavorable conditions and hazards. This helps minimize the risk of illness from tainted food.

-The DNR tested the lymph nodes from 479 deer during the opening weekend of Minnesota's firearms deer season, November 5-6.

-Additional testing will take place in the Skime area this winter, as well as during next fall's deer season.

-Venison can still be enjoyed as long as harvested meat is cooked to an internal temperature of 165 degrees.

-The State Board of Animal Health is working with other state and federal agencies to develop a coordinated response. It would include enhancing surveillance and testing, re-certifying veterinarians to test for bovine TB, public information and expediting the establishment of a National Animal Identification System in Minnesota.

-When a herd of cattle tests positive for TB, it is depopulated. All operations that share fence line and/or sold/purchased cattle from the infected herd are quarantined and tested.

Potential Solution:

-County and state employees/agencies do a good job of monitoring populations for outbreaks. Plans are in place to deal with the isolation and elimination of affected animals.

-The USDA and state agencies partnered to create the National Animal Identification System (NAIS). This program identifies specific animals in the United States and records their movement during their life. The NAIS will enable forty-eight hour traceback of the movement of any diseased or exposed animal,

ensuring rapid containment and maximum protection of both animals and people.

Problem 40, Floodplain Management: It becomes increasingly hard to completely eradicate hazardous materials from the floodplain due to the presence of agriculture in the region. Agriculture makes use of many hazardous materials. A gasoline tank may occur on the property as fuel for the machines. A propane tank may be used for heating a structure such as a home or workshop. Any pesticides, fertilizer, or herbicides may also be stored somewhere on the property for future use.

-These materials are usually properly stored, but they are a presence and should be remembered.

Current Strategies:

-Such methods such as anchoring and tie-downs can be used for applicable structures. Some residents have already done this, as everyone wants to minimize property lost during a flood.

-Floodproof structures in the floodplain. The buyout process has removed many homes that were repetitively flooded. Other residences have utilized the ring dike program to help protect their home and possessions from flooding damage. There are also construction techniques available to build a floodproofed structure.

-USDA participates in the Emergency Watershed Protection Program, which safeguards people and land from floods, droughts and erosion on any watershed when a natural occurrence causes a sudden impairment of the watershed.

-www.disasterhelp.gov has many mitigation strategies and ideas available about many hazards including flooding involving causes, repair and recovery steps.

Potential Solution:

-Floodplain management has been done continuously in Roseau County due to the increased history of flooding. Cost effectiveness is something that many of the projects take into account. Funding is the main concern for upcoming projects. Much mitigation has been done since 1997, and many endangered structures have been removed from the floodplain.

-Measures have been taken to remove hazardous material from the floodplain, however the complete removal would only occur if agricultural use of the land was not happening in the county. This is not an option, as agriculture is a main force of the economy for Roseau County, so a medium must be reached.

-Potential measures to remove material from the floodplain include returnable chemical containers. This would eliminate some of the on-site storage.

Problem 41, Runoff Prevention: An excess of impermeable surfaces in a small area (paved roads, buildings) can increase runoff in Roseau County. A saturated soil will also increase runoff, as no water is able to be absorbed. Flooding (overland) can occur, as well as water contamination.

-Excess runoff from Beltrami is a problem for the Hay Creek/Norland subwatershed in the Roseau River Watershed District.

Current Strategies:

- Some of the main ways to reduce runoff that are used in Roseau County include:
 - Keep vegetation on the ground, as more water will be absorbed.
 - Increase buffer strip usage to prevent soil/contaminants from entering water sources.
 - The increase in hard surfaces in an affected area cause an increase in the amount of runoff seen in an area.
- Problems and the mitigation solutions are listed in the watersheds' overall plans.
- The Two Rivers Watershed District does a snow survey in late winter and early spring with specific information collected on the depth and water capacity. This helps to predict spring flooding and the annual snowmelt runoff event that occurs.
- A law became effective on January 1, 2004 that prohibits the amount of phosphorus fertilizer that is applied to lawns. The main reason for this law is to reduce the amount of phosphorus runoff into lakes, rivers and streams, cutting water contamination. This is not a ban, but just a reminder to fertilize only when necessary, and exemptions do exist.
- A solution proposed by the Roseau River Watershed for runoff from Beltrami is to store water in the Beltrami State Forest.

Potential Solution:

- Runoff is often a main contributor to overland flow problems. A mitigation project for one specific flooding hazard may see other desired results in overland flooding, runoff, blocked drainage, sedimentation, contamination and subsidence.
- It is extremely cost effective to mitigate against runoff, since it is one of the most common ways to contaminate a water source.

Time Line:

- Runoff from Beltrami problem in the Hay Creek/Norland Subwatershed has a time line of ten to twenty years.

Problem 42, Needs of an Increasing Population: Heavy usage of roads because of morning and evening commutes cause an increase of accident risk. Marvin Windows and Doors and Polaris employ a large amount of people, and some think the road is not adequate in it's current condition to handle all of the traffic.

- All main highways leading into Roseau cause concern. Some specific roads include State Highway Eleven from Roseau to Warroad and from Roseau to Badger. Highway Eighty-Nine south of Roseau is also a traffic concern.
- Spruce Township, along with many other residents, cite the need for these highways to be larger.

Current Strategies:

-MNDOT is aware of the problem and solutions are listed in their long range plan. MNTH 11 from Roseau to Warroad is in the district's top fifty intersections for safety fixes. Fixes include centerline left turn lanes for a two-mile stretch that has the worst safety rating. Project depends on funding, specifically a favorable funding package with the transportation bill, passed at the end of May, 2005.

Potential Solution:

-It is very cost-effective to look for a solution to this problem because of the economic importance of Marvin Windows and Polaris to the area. Many people commute to these locations.

Problem 43, Airport Employment: The Roseau Airport is currently without personnel during the daytime. The present manager/mechanic is no longer able to make a suitable living due to various changes after the 9/11 crisis, including high insurance costs. Private planes were forced to be sold.

Current Strategies:

-Find funding
-The county is aware of the situation and is investigating possible solutions.

Potential Solution:

-An airport is an important part of an area, especially when spray planes are utilized for agriculture. Cost-effectiveness of any proposed project would depend upon the number of people utilizing the airport.

Problem 44, Response Times: There is a concern that the response time for fire, ambulance and other emergency response vehicles will be jeopardized by Roseau constructing a city government building on the current direct route.

Current Strategies:

-City knows about problem, and the concerns are being discussed.
-A citizen's committee and the City Council deemed that the facility should be built in the same location downtown.
The site creates traffic for downtown businesses.
-Groundbreaking occurred in October for the City Center, which will house City Hall, the Police Department, the Community Center, a Library and the Museum. Two classrooms for Northland Community and Technical College will also be included.
-Roseau voted four to one to forgo an environmental impact study and \$500,000 which would have come from FEMA. It would have studied the old City Hall's historic value and the subsequent effect on residents if it was demolished. Reasoning behind forgoing the \$500,000 includes:
-Roseau was required to pay the estimated \$100,000 cost of the EIS.
-There is no guarantee that FEMA would contribute \$500,000

when the EIS was completed. In fact, some individuals have strong doubts.

-Construction would be delayed by the year it would take to complete the EIS. The legislature was told that the project would be complete within the biennium and Mayor Pelowski wants to work hard to finish before that deadline.

-Although the governmental building will not shrink, plans will need to be scaled back. City residents will not pay the extra \$500,000. The project is scheduled for completion in July, 2006.

Potential Solution:

-Any action taken depends on Roseau.

Problem 45, Blocked Drainage: Drainage in Roseau County can be blocked by logjams and beaver dams. Overland flooding is more likely to occur with these structures blocking the natural flow.

-Sometimes a problem dam lies in a protected land area such as land belonging to the nature conservatory, so the dam cannot be removed easily.

-If bridges are improperly constructed or located, river debris can be caught by these structures and cause water to backup.

-The Two Rivers Watershed has the following problems with beaver dams:

-Beavers are a problem for the State Ditch #95 subwatershed, relating to their high population and their dispersement.

-The State Ditch #91 subwatershed has beaver control issues. -Beaver dams on ditch systems is a large problem for the State Ditch #90 subwatershed. Cropland is affected and water levels are heightened.

-Beaver dams are a problem for the North Branch at Lancaster subwatershed and cause overland flooding. It is noted that many groups should sit down and identify mutually beneficial solutions.

-Beaver dams blocking waterways is a problem for the Badger & Skunk Creek subwatershed.

-The Two Rivers Watershed has the following problems related to ditches and capacity:

-The main stem and laterals of the State Ditch #95 system have insufficient capacity. The State Ditch #95 subwatershed cites increased overland flooding and out of bank flows. Damage to cropland and area infrastructure is done.

-The State Ditch #91 subwatershed states that the channel capacity of the State Ditch #91 system has inefficient channel capacity, which causes backup at the outlet and damages Dewey and Hereim Townships. Problems generally occur during spring snowmelt or summer rainfall runoff.

-Agricultural ditching by private landowners upstream has added to the flooding problem in the North Branch at Lancaster subwatershed.

-The outlet to the systems (area where County Ditch #13 meets Lateral 1 of State Ditch #95) in the Badger and Skunk

Creek subwatershed is in disrepair. If maintained, the drainage system would function adequately.

-The State Ditch #95 subwatershed has inefficient drainage southwest of Badger. Lateral 3 needs to be extended.

-The Two Rivers Watershed has the following problems related to sediment and vegetation blockages:

-The State Ditch #95 subwatershed has cattail and sediment blockages in the drainage systems that need to be removed. The problem is frequent in nature.

-Blockages in local drainage systems occur in the State Ditch #91 subwatershed. Log jams also affect canoeing and boating.

-Debris in the main river channel is affecting the North Branch at Lancaster subwatershed. It is described as a moderate severity problem.

-Blockages are seen in the Badger & Skunk Creek subwatershed where snowmobiles cross ditches. Sometimes the ditch does not open up in the spring.

-The Roseau River Watershed has the following problems concerning blocked drainage:

-Bridge damage from flooding in Lake Bottom Subwatershed.

-Undersized outlet in Big Swamp Subwatershed and Lake Bottom Subwatershed.

Current Strategies:

-Watersheds use some of the following techniques to mitigate drainage blockages.

-Remove/relocate problem beavers and remove logjams.

-Discourage beaver populations from certain areas, and remove dead trees from the water's edge.

-Clean ditches to lessen the occurrence of overland flooding.

-A high flowing river will cause an increase in sedimentation. This extra sediment can cause blockages, generate more shallow drainage routes and foster cattail growth. A river with a sustained flow will stabilize bank slopes as well as limit vegetation growth.

-The Two Rivers Watershed has money and programs available to remove logjams and sediment/beaver blockages. These problems are listed in their overall plan.

-The Two Rivers Watershed provides an extra bounty to encourage beaver trapping.

-The Two Rivers Watershed does an annual inspection of all the ditches in the district, noting the condition as well as any sloughing, erosion, sedimentation, subsidence, culvert problems, vegetation, and beaver dams. A survey of the grade and cross-sections are done every five years to see if cleaning is necessary.

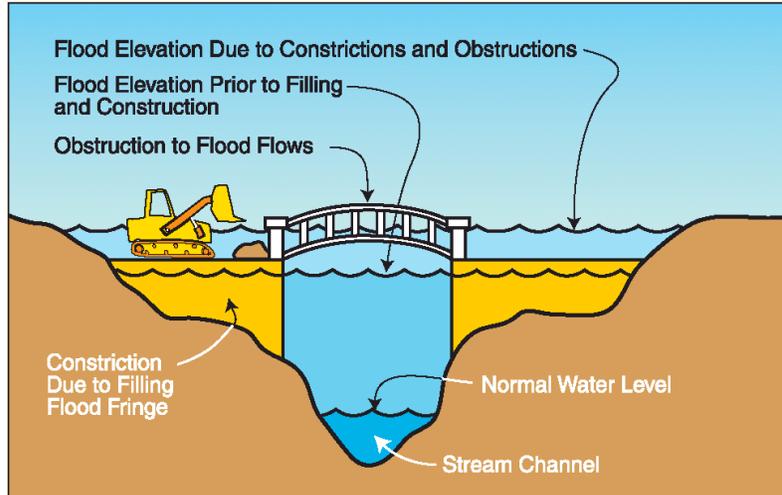
-The Roseau River Watershed will utilize upstream impoundments to fix problems listed above.

Potential Solution:

-Dead trees near the river are sometimes hard to get rid of.

Because of the moisture level, burning is not always an option.

Jams may occur if various material is left near the river.
 -Since the drainage channels remain one of the main ways to remove flood water from the county, blockage of these channels is a critical concern. The back-up can cause overland flooding to occur, as well as increased flooding damage to the area. It is very cost-effective to remove these blockages to reduce the risk of flooding to an already flood prone area.



Source: Understanding Your Risks CD, FEMA

Time Line:

-The Roseau River Watershed has a time line of ten to twenty years to fix above problems listed in their overall plan.

Cost Estimation:

-Big Swamp and Lake Bottom Subwatersheds each need thirty million dollars to fix above problems.

Problem 46, Agricultural Protection: Agriculture is an important employer in Roseau County. Currently, some hazards have been preventing seeding or harvesting of local crops, hurting the economy.

-Flooding has made agriculture very hard for all farmers in Roseau County.

-The Two Rivers Watershed has these concerns as listed from affected subwatersheds:

-There are wide agricultural problems in the Badger & Skunk Creek subwatershed, including the delay in spring planting, summer flooding and the accessibility issues of pastures from flooding. This problem has been annual for the last five years. It is widespread along the western side of the subwatershed and is limited to land near tributaries in the east.

-Crop losses in the North Branch at Lancaster subwatershed are a problem, including damage to hay and pasture land.

-Pasture and crop land damage is a problem for the State Ditch #90 subwatershed, particularly northwest of the

- ridge. -The state Ditch #91 subwatershed has agricultural flooding problems, most severely in the northwest quadrant.
- Crop loss is a problem for the State Ditch #95 subwatershed, mostly during the summer growing season.
- The following subwatersheds in the Roseau River Watershed have crop loss concerns: Big Swamp, Lake Bottom, Hay Creek/Norland, North Branch and Stafford. Damage to homes and property can be seen in North Branch and Hay Creek/Norland Subwatersheds.

Current Strategies:

- Agriculture is important to Roseau County. Many flood projects currently going on have additional benefits for nearby farm land. The following are methods that have been utilized to reduce flooding to farmland.
 - Water needs to be held back. Dry impoundments are a popular solution, however some members of the public would like to see them drained in the fall to better prepare the region for the spring melt.
 - Land in CRP holds back water for a limited amount of time.
 - Drainage problems need to be corrected. The initial melt needs to be drained quickly. Water coming a short time later can be held until the rivers are able to handle the oncoming water load.
 - There are programs for affected farmers to deal with agricultural flooding damage.
 - Tiling the land is also a flood control practice used mostly on flat cropland or any area with no slope that is threatened by flooding. A porous pipe is placed underneath the ground. The pores in the pipe may vary from wide to narrow depending on factors such as soil structure and clay content. Water percolates through the ground and into the tube. The water can then be moved to a ditch or river. Once water logged cropland can now become tillable. Land with low permeability may not benefit from tiling, as this factor is one of the main components. This method must make sure that the cessation of flooding problems on one land is not causing an increase of flooding problems upon another.
 - Land owners have improved private drainage systems and participated in efforts to implement larger scale flood protection systems.
 - Townships have used roadway ditches and other means to increase the effectiveness of drainage systems.
 - The county manages road and drainage systems to lessen the impacts of flood events.
- Overall watershed plans list agricultural flood protection.
- There are programs for affected farmers to deal with agricultural flooding damage.
- Many flood projects that are proposed have multiple benefits including seeing a decrease in runoff, overland flooding, contamination and protection to surrounding land, including agriculture. A project is more cost efficient if it addresses several concerns at once.
- The Roseau River Watershed lists upstream impoundments, storage

of water in Beltrami State Forest (North Branch) and temporary water storage in Beltrami (Hay Creek/Norland Subwatershed) as solutions for crop loss from flooding. Home and property damage can be fixed with upstream impoundments.

-The USDA has many programs in place to help areas combat the effects of hazards upon agriculture including:

- Rural Development Disaster Assistance through loans and grants.

- Information on applying through disaster assistance.

- Agriculture Assistance Act of 2003 - Provides assistance to producers who have losses due to weather related disasters or emergency conditions. The USDA administers disaster assistance programs in compliance with this act.

- Livestock Indemnity Program (LIP) - Provides partial reimbursements to eligible livestock owners for losses suffered due to a natural disaster or emergency.

- Emergency loan assistance for producers from losses due to natural disasters or quarantine.

- Noninsured Crop Disaster Assistance Program to producers with non-insurable crops with low yield, loss of inventory and prevented planting from a natural disaster.

- Crop insurance policies

- Information and facts on crop disasters

- Emergency Food Assistance Program to areas in crisis.

- Food Aid Programs for international needy people.

-The Red River Watershed Management Board and the Red River Basin Commission have taken basin wide leadership roles in both understanding and controlling all types of flooding, including agricultural land. The Red River Basin Commission is based in parts of Canada, North Dakota, Minnesota, and South Dakota.

Potential Solution:

- Mitigating losses to agriculture is difficult due to the fact that a crop is not able to be moved out of harm's way.

- Heavy rains often devastate crops and cause much flooding damage. This factor is multiplied when area drainage channels are blocked. A storm event such as a heavy rain or hail cannot be eliminated, the risk must be minimized.

Time Line:

- Crop damage and the damage done to homes and property in the Stafford, Big Swamp, Lake Bottom, Hay Creek/Norland and North Branch Subwatersheds will take between ten and twenty years to fix.

Cost Estimation:

- Crop damage in the Stafford, Lake Bottom and Big Swamp Subwatersheds will cost about thirty million dollars each.

- Home and property damage in North Branch Subwatershed will take about thirty million dollars to mitigate. The Hay Creek/Norland Subwatershed has a cost estimation of about ten million.

Step IV: Response Section

This section lists the most pressing problems related to the potential hazards threatening Roseau County, a range of approaches to mitigating those hazards and strategic recommendations. It is wise to recall that not all hazards can be prevented, for no one can control an act of nature. Although it is easier to get money after, rather than before a hazard occurs, this county realizes it cannot stand by and wait for a large substantial event to occur and then get funding to fix all the damaged land and structures. By being proactive and by starting to take initiative, Roseau County hopes to lessen the effects of any hazardous event or situation. Through continued work by many dedicated individuals and agencies, Roseau County may go on to a future with fewer hazards and less effects felt by recurring hazards.

At the beginning of this report, the goal of the hazard mitigation plan for Roseau County was to get people, property, jobs, natural resources, and crops out of harms way. Because of information brought forward in the Profile, Hazard Identification and Risk Analysis sections of this report, the goal has evolved:

Revised Goal: "To access local, state and federal hazard mitigation resources to eliminate or minimize harm done to people, property, jobs, natural resources and crops in Roseau County by natural and manmade hazards."

This goal is long term in nature and will take years to fully complete. In many cases, the goal should be never ending, diligently striving to continue to keep the county safe from disaster by adding new responses when others are completed through the actions of committed citizens and agencies.

Mitigation Partners

Mitigation is often a group effort. Although a single voice can start a movement, the work of many individuals will see a project's conclusion. The following is a list of groups and agencies that have and will continue to strive to make Roseau County a safer place to reside. For more information, plans and programs about hazard mitigation in your area, please visit the following websites or talk to your local officials.

- International Joint Commission (www.ijc.org)
- Red River Basin Commission (www.redriverbasincommission.org)
- Red River Watershed Management Board (www.rrwmb.org/default.htm)
- U.S. Army Corps of Engineers (www.mvp.usace.army.mil/us)
- Fish & Wildlife Service (<http://midwest.fws.gov/>)
- USDA Natural Resources Conservation Service (www.mn.nrcs.usda.gov)
- USDA Farm Service Agency (www.fsa.usda.gov/MN/)
- U.S. Environmental Protection Agency (www.epa.gov/ow/index.html)
- Federal Emergency Management Agency (www.fema.gov)
- U.S. Geological Survey (<http://mn.usgs.gov/>)
- Board of Water and Soil Resources (www.bwsr.state.mn.us)
- Department of Natural Resources (www.dnr.state.mn.us)
- Pollution Control Agency (www.pca.state.mn.us)
- Department of Agriculture (www.mda.state.mn.us)
- Environmental Quality Board (www.mnplan.state.mn.us/eqb)
- Department of Transportation (www.dot.state.mn.us)

- Minnesota Homeland Security & Emergency Management
(www.hsem.state.mn.us/)
- Minnesota Department of Health (www.health.state.mn.us)
- Soil & Water Conservation Districts
- Watershed Districts
- Emergency Management
- Cities & Townships
- Greenbush (<http://www.rrv.net/gbush/>)
- Roseau (<http://www.city.roseau.mn.us/>)
- Warroad (<http://www.warroad.org/>)
- Local Boards and Groups
- County, Township, Federal and State Employees
- Roseau County Residents

Plans, reports, studies and technical information that was reviewed as mitigation includes the following (Information is listed as a source when available):

- Roseau County Emergency Operations Plan
- Roseau River and Two Rivers Watershed Districts Plans
- Careful County All Hazard Mitigation Plan
- Minnesota State All Hazard Mitigation Plan
- Tools for Hazard Mitigation CD (Minnesota Planning)
- NW Minnesota Comprehensive Economic Development Strategy (NWRDC)
- Living with the Red: A report to the governments of Canada and the U.S. on reducing flood impacts in the Red River Basin
- Websites with mitigation information are listed in the above section
- Local Newspapers: Grand Forks Herald, Greenbush Tribune, Roseau Times, Warroad Pioneer

A. New and Expanded Strategies for Roseau County

Existing efforts to protect Roseau County from hazards have been well focused and effective. There is a high level of awareness about the various dangers and the extreme costs involved in not being protected and prepared. Examining background data, talking with agencies and people and taking a close look at current strategies has allowed us to outline on key areas where expanded and new efforts can further decrease the likelihood or degree of damage.

This section places the identified problems into five problem groups to help focus our new efforts:

- A. Emergency Response Preparedness**
- B. Storm Events and Fires**
- C. Contamination and Infectious Disease**
- D. Flooding and Drought**
- E. Subsidence**

The section also examines each strategy with consideration of using the most appropriate approach:

Approach 1, Protect: Physically protect infrastructure and people from potential hazards. If cost effective, the best approach is to remove the danger itself or remove people from the high risk locations.

Approach 2, Educate: Promote public safety by increasing the level of public and governmental awareness concerning existing hazards. Knowledge and personal responsibility are key factors in avoiding danger. In many cases the best efforts of government will fail if individuals refuse to use common sense.

Approach 3, Due Diligence: Pay special attention to vulnerable populations that may lack awareness about or the ability to avoid oncoming hazards.

Approach 4, Emergency Aid: Establish good support systems for emergency officials and other people that respond to disasters so recovery costs can be minimized. Acting quickly in a disaster can greatly reduce recover costs, especially with an educated public.

Hazard responses were labeled either low, medium, high or critical in priority. A low priority ranking can be identified with the phrase "continue existing strategies" because either the hazard was not a top concern or because current strategies and processes were working adequately enough where additional attention was not required.

Hazard priorities were determined partially from meetings with individual people, and city/township/county officials as well as the hazard mitigation team. Critical priority ratings often had high levels of concern from the whole county that could affect many individuals. This information was taken into account and compared to mitigation currently available to either eliminate or lower the hazard occurrence and the risk posed to the surrounding community. A medium priority response would have adequate mitigation levels in place, with only a couple areas lacking. The amount of current mitigation could either lower a high priority or raise a lower one.

The two information groupings were then combined with the Emergency Manager's knowledge about the county's past historical hazards, the current mitigation standpoint, and the planned path to future mitigation projects. The current ratings are a combination of the above three groups and are available to be updated in the next mitigation round so that progress can be documented. The rating system tries to take each individual problem into account, so that a unique county response section is seen and not a generalized one.

Problem Group A - Emergency Response Preparedness

Problem 2, Transportation Access:

Expanded Strategies - Map Creation: To encourage all emergency response departments in the region to create multi-county and departmental map coverage documents.

Lead Agencies: Emergency Response Personnel, NWRDC
Funding: Project Dependent
Priority: Medium
Affected Communities: Emergency Response Personnel
Time: 2005 Until Completed
Approach: Protect

Problem 4, Public Infrastructure Location Data:

Expanded Strategies - GIS/GPS Utilization: Need to create an interest in the GIS/GPS movement so that important information gets documented and spread to the correct people and agencies.

Lead Agencies: All of Roseau County
Funding: Project Dependent
Priority: Medium
Affected Communities: Interested Parties
Time: 2005 & Continuing
Approach: Educate

Problem 5, Communication Upgrades:

Expanded Strategies - Communication Modernization: Continue current funding strategies to ensure that the county and all emergency personnel have a modern communication system that can communicate with many outside agencies easily.

Lead Agencies: Emergency Mgmt., Emergency Response
Funding: Project Dependent
Priority: Critical
Affected Communities: Emergency Response Personnel
Time: 2005 & Continuing
Approach: Protect

Problem 6, Equipment Requirements:

Expanded Strategies - Funding Assistance: Funding assistance on a state or federal level is sometimes necessary for statewide instituted changes that require the total replacement or purchase of new equipment as well as additional training for emergency personnel volunteers.

Lead Agencies: Emergency Response, Emergency Mgmt.
Funding: State or Federal, Project Dependent
Priority: High
Affected Communities: Dependent upon the type of change
Time: 2005 & Continuing

Approach: Emergency Aid

Problem 12, NOAA:

New Strategies - NOAA Tower Resources: Identify funding sources and a location to construct a NOAA tower for Roseau County.

Lead Agencies: Emergency Mgmt.

Funding: Project Dependent

Priority: High

Affected Communities: Emergency Response Personnel, Weather Radios

Time: 2005 Until Completed

Approach: Emergency Aid

Problem 14, Railroad Communication:

Continue Existing Strategies

Problem 17, Oxygen Station Proximity:

New Strategies - Oxygen Station Creation: Support the Warroad Ambulance and first responders groups to help locate an oxygen station in Roseau County.

Lead Agencies: Emergency Response

Funding: Project Dependent

Priority: Medium

Affected Communities: Emergency Response Personnel

Time: 2005 Until Completed

Approach: Emergency Aid

Problem 18, Response Group Communication:

New Strategies - First Responder Purchases: Purchase some communications equipment for the Northern Lights and Wannaska First Responder groups.

Lead Agencies: Emergency Mgmt., First Response Groups

Funding: Project Dependent

Priority: High

Affected Communities: Northern Lights & Wannaska First Responders

Time: 2005 Until Completed

Approach: Emergency Aid

Problem 25, Siren Requests:

Expanded Strategies - Siren Upgrades: Locate funding from multiple local, county, state and federal sources to upgrade sirens in Roseau County to remove or repair older sirens that are in need of maintenance and to provide a backup to all systems to ensure that community notification can occur.

Lead Agencies: Emergency Mgmt., Response Personnel, City Officials

Funding: Project Dependent

Priority: High

Affected Communities: Wannaska, Roosevelt, Badger, Roseau, Greenbush, Warroad

Time: 2005 Until Completed

Approach: Emergency Aid

Problem 26, E911 Address Usage:

Continue Existing Strategies

Problem 27, Generator Requests:

Expanded Strategies - Generator Analysis: Monitor critical infrastructure to make sure that all necessary structures have generator protection, most notably the Roseau County Courthouse. Search for funding.

Lead Agencies: Emergency Mgmt., City Officials
Funding: Time, funding dependent upon findings
Priority: Medium
Affected Communities: All of Roseau County, Courthouse, Warroad
Time: 2005 & Continuing
Approach: Protect

Problem 42, Needs of an Increasing Population:

Expanded Strategies - Road Mitigation Support: Support efforts by MNDOT to fix recognized problems as well as identifying future roadway concerns.

Lead Agencies: MNDOT
Funding: Project Dependent
Priority: High
Affected Communities: Roseau County Roadways
Time: 2005 & Continuing
Approach: Protect

Problem 43, Airport Employment:

Expanded Strategy - Projected Usage: Investigate the number of people that would utilize a fully functional airport and determine what is necessary. Discuss implementation steps as well as cost and funding.

Lead Agencies: Airplane Owners, Airport Supporters
Funding: Project Dependent
Priority: Medium
Affected Communities: Roseau County Airport
Time: 2005 Until Completed
Approach: Due Diligence

Problem 44, Response Times

Continue Existing Strategies

-Any strategy proposed would have to depend on Roseau's action.

Problem Group B - Storm Events and Fire

Problem 3, Weather Unpredictability:

Continue Existing Strategies

Problem 7, Whiteout Peril:

Expanded Strategies - Winter Storm Education: Increase education about oncoming storms to foster a personal responsibility to stay out of harm's way of any storm. Emergency personnel put their lives in jeopardy rescuing stranded people who took unnecessary risks.

Lead Agencies: Emergency Mgmt., Emergency Response
Funding: Time
Priority: Medium

Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Educate

Problem 8, Storm Shelters:

Expanded Strategies - Shelter Location Awareness: Educate county residents and visitors about available storm shelters and their hours of access. Further study and enact plans for cities such as Strathcona and Roosevelt, that do not have any available shelters.

Lead Agencies: Emergency Mgmt., City Officials, Emergency Response.

Funding: Time

Priority: High

Affected Communities: All Cities and Surrounding Townships, Strathcona, Roosevelt, Wannaska, Areas near Lake of the Woods

Time: 2005 & Continuing

Approach: Educate

Problem 11, Natural Storm Mitigation:

Continue Existing Strategies

Problem 13, Icestorms:

New Strategies - Power Companies: Work with the power companies to look at power infrastructure in order to prevent massive outages from ice and windstorms. Identify areas prone to power loss and correlate to strategies that reduce this hazard

Lead Agencies: Power Companies, Emergency Mgmt., City Officials

Funding: Time, funding uncertain

Priority: Critical

Affected Communities: All of Roseau County

Time: 2005 & Continuing

Approach: Protect

Problem 16, Fire Fuel Reduction:

Continue Existing Strategies

Problem 32, Campground Shelters:

New Strategies - Shelter Identification/Construction: Start the movement to help find funding for cities and townships to identify and construct cost-efficient tornado shelters and place them to protect residents and visitors within Roseau County.

Lead Agencies: Shelter Mgmt., Emergency Personnel, Emergency Mgmt., City and Township Officials.

Funding: Time

Priority: High

Affected Communities: All Cities, Warroad

Time: 2005 & Continuing

Approach: Protect

Problem Group C - Contamination and Infectious Disease

Problem 9, Abandoned Wells:

Continue Existing Strategies

Problem 10, Endangerment By Anhydrous Facility:

Continue Existing Strategies

Problem 15, West Nile Virus:

Continue Existing Strategies

Problem 28, Lagoon Maintenance:

Expanded Strategies - Lagoon Portrayal: Continue investigating the Greenbush lagoon, including a list of potential solutions, implementation steps, cost and a funding schedule.

Lead Agencies: Emergency Mgmt., Greenbush Officials

Funding: Time, funding dependent upon findings

Priority: Medium

Affected Communities: Greenbush

Time: 2005 Until Completed

Approach: Educate

Problem 29, Water System Equipment:

Continue Existing Strategies

Problem 30, Railroad Crossing Deterioration:

Expanded Strategies - Railroad Crossing Support: Work with the railroad to identify crossings in Warroad that need maintenance. See if other crossings in Roseau County require a similar course of action.

Lead Agencies: Emergency Mgmt., Warroad Officials

Funding: Time

Priority: High

Affected Communities: Warroad

Time: 2005 Until Completed

Approach: Protect

Problem 31, Water System Replacement:

Expanded Strategies - Water System Depiction: Continue studying the water system replacement issue in Badger, including a list of the potential solutions, implementation steps, cost and a funding schedule.

Lead Agencies: Emergency Mgmt., Badger Officials

Funding: Project Dependent

Priority: Medium

Affected Communities: Badger

Time: 2005 Until Completed

Approach: Educate

Problem 35, Contamination Surveillance:

Expanded Strategies - Source Security: Continue to investigate water sources and openings to identify those that pose a threat to the county. Work with the watersheds and/or landowner to find a solution that increases security as well as potential implementation costs and funding sources.

Lead Agencies: Emergency Mgmt., Watersheds

Funding: Project Dependent

Priority: Medium

Affected Communities: All of Roseau County

Time: 2005 & Continuing
Approach: Educate

Problem 39, Disease Distribution Potential:

Expanded Strategies - Tuberculosis Eradication: Aid the newly organized effort to remove Bovine Tuberculosis from local cattle and deer populations. Quick action is necessary to prevent any further outbreaks, and to deter the spread of the disease to neighboring counties.

Lead Agencies: DNR, State Board of Animal Health, Dept. of Ag.,
Dept. of Health, Cattle Industry
Funding: Project Dependent
Priority: Critical
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Protect

Problem Group D - Flooding and Drought

Problem 1, Culverts:

Expanded Strategies - Mitigation Partnership: Roseau County should create lasting partnerships with the Two Rivers, Roseau River and Warroad Watersheds and other mitigation agencies if one is not already formed and help to complete culvert flooding related strategies.

Lead Agencies: Watersheds
Funding: Project Dependent
Priority: High
Affected Communities: Roseau County Watersheds
Time: 2005 & Continuing
Approach: Protect

Problem 19, Hospital Access:

Continue Existing Strategies

Problem 20, Flood Mitigation:

Expanded Strategies - Flood Mitigation Protection: Continue searching for funding and impoundment locations to complete the flood mitigation plan for Roseau County and reduce or eliminate flooding damage.

Lead Agencies: All of Roseau County
Funding: Listed in the current strategies section listed earlier
in this plan.
Priority: Critical
Affected Communities: All of Roseau County
Time: 2005 Until Completed
Approach: Protect

Problem 21, Dike Maintenance/Replacement:

Expanded Strategies - Roseau Dike Exploration: Research the effects of the new flood mitigation upon the Roseau dike and determine what changes need to be made, funding and what additional protection the dike will provide.

Lead Agencies: Roseau Officials, Roseau River Watershed, USACE
Funding: Project Dependent

Priority: Critical
Affected Communities: Roseau
Time: 2005 Until Completed
Approach: Educate

Problem 22, Flood Mitigation Equipment:

Continue Existing Strategies

Problem 23, Overland Flooding:

Expanded Strategies - Overland Flooding Mitigation: Support efforts made by the watersheds to help eliminate overland flooding.

Lead Agencies: Watersheds
Funding: Depends Upon Lead Agencies
Priority: Critical
Affected Communities: All of Roseau County, Greenbush, Warroad,
Two Rivers and Roseau River Watersheds
Time: 2005 & Continuing
Approach: Protect

Problem 24, Standing Water Reduction:

New Strategies - Standing Water Minimization: Thoroughly look into the standing water problem at Roosevelt, identifying problems caused by the ditch as well as viable solutions the city wants to pursue. Cost and funding should also be looked at.

Lead Agencies: Roosevelt Officials, Railroad
Funding: Project Dependent
Priority: Medium
Affected Communities: Roosevelt
Time: 2005 Until Completed
Approach: Educate

Problem 33, Drought Mitigation:

Expanded Strategies - Drought Damage Elimination: Support efforts made by Roseau County agencies to help eliminate the damage and consequences of a severe drought. Participate in the completion of goals and objectives set forth by various local entities.

Lead Agencies: Many Agencies
Funding: Dependent Upon Project
Priority: High
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Protect

Problem 34, Road Flooding:

New Strategies - Partnered Efforts: Participate in a county, regional and statewide effort to find partnerships and cost effective ways to fix degrading roads in Minnesota.

Lead Agencies: All Interested Parties
Funding: Time, Project Dependent
Priority: Critical
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Protect

Expanded Strategies - Pursue Cost Effectiveness: Actively search for cost-effective methods to repair repetitively damage roadways in Roseau County that will not cause additional hazards.

Lead Agencies: All Interested Parties
Funding: Project Dependent
Priority: Critical
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Educate

New Strategies - Transportation Legislation: Legislation on a statewide level is needed to increase funding for transportation to help fix repetitively damaged roads.

Lead Agencies: State Government Officials
Funding: Time
Priority: High
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Emergency Aid

Problem 36, Flood Gauges:

Expanded Strategies - Gauge Placement: Support the efforts of the Two Rivers, Roseau River and the Warroad Watershed Districts by helping maintain existing gauges and helping to place new gauges (depending on the future plans of the watershed).

Lead Agencies: Emergency Mgmt., Watersheds, Interested People
Funding: Project Dependent
Priority: Medium
Affected Communities: Roseau County Watersheds
Time: 2005 & Continuing
Approach: Protect

Problem 40, Floodplain Management:

Expanded Strategies - Ordinance Support: Support officials in their efforts to identify risks remaining in the floodplain in Roseau County by helping residents reduce contamination and material lost during a flood and abide by current ordinances.

Lead Agencies: Emergency Mgmt., City Officials
Funding: Dependent Upon Identified Risks
Priority: High
Affected Communities: 100-Yr Floodplain
Time: 2005 & Continuing
Approach: Educate

Problem 41, Runoff Prevention:

Expanded Strategies - Runoff/Contamination Prevention: Support efforts made by the watersheds to help eliminate runoff and the related hazards that it poses (including damage done by heavy precipitation).

Lead Agencies: Watersheds
Funding: Project Dependent
Priority: High
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Protect

Problem 45, Blocked Drainage:

Expanded Strategies - Clear Congested Arteries: Support efforts made by the watersheds to help eliminate flooding damage caused by structures blocking drainage, including the search for funding for upcoming projects and to keep the current removal programs active.

Lead Agencies: Watersheds
Funding: Project Dependent
Priority: Critical
Affected Communities: Roseau County Drainage
Time: 2005 & Continuing
Approach: Protect

Expanded Strategies - Up-To-Date Maintenance: Continue to maintain existing drainage systems on a regular basis within the county, eliminating current problems and preventing future ones.

Lead Agencies: Watersheds, Drainage System Landowner
Funding: Project Dependent
Priority: High
Affected Communities: Roseau County Drainage
Time: 2005 & Continuing
Approach: Protect

Problem 46, Agricultural Protection:

Expanded Strategies - Agricultural Flooding Security: Support efforts made by the watersheds and other agencies to help protect agricultural land against flooding.

Lead Agencies: Watersheds, Agricultural Agencies, Landowners, Farmers
Funding: Project Dependent
Priority: High
Affected Communities: Roseau County Farmers
Time: 2005 & Continuing
Approach: Protect

Problem Group E - Subsidence

Problem 38, Subsidence Threats:

Expanded Strategies - Subsidence Minimalization/Elimination: Support efforts made by the Watersheds to help eliminate subsidence and the resulting sedimentation, since waterway bank subsidence is the most common form seen in Roseau County.

Lead Agencies: Watersheds
Funding: Project Dependent
Priority: Medium
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Protect

Expanded Strategies - Subsidence Education: Continue education about this hazard including the changes individuals can make that results in a lesser sediment load in a river or waterway.

Lead Agencies: Emergency Mgmt., Watersheds., DNR
Funding: Time

Priority: High
Affected Communities: All of Roseau County
Time: 2005 & Continuing
Approach: Educate

Project Group F - Terrorism

Problem 37, Border Terrorism:

Continue Existing Strategies

B. Communities and People Working Together

Roseau County Focus:

The hazards that are perceived, alleviated and eliminated in Roseau County all have unique factors that are a necessary remembrance in local mitigation. Topography, weather/hazard patterns, risk and people all play into how a particular event will affect Roseau County. Because hazards and local available responses differ from one area to the next, so must the mitigation action. It is recognized that problems faced may have an increased amount of concern, threat or peril in certain regions, and that boiler plate solutions will not solve acknowledged hazards. Through the intelligence and diligence of local citizens, it is possible that serious problems are both recognized and solved.

Winter and summer storms outlined in the identification section of this report have random occurrences and affect all areas of Roseau County. It is merely meteorologic chance where a thunderstorm will develop or what a tornado will destroy. Many are secondary actions causing another hazard to become more or less severe (Example = decreased visibility causes an increase in traffic accidents). Power outages are of extreme concern because of the multitude of ways that entire populations are affected. Actions of both the county and local cities to provide shelters, education, etc... will lessen potential effects posed by these storms, but they can never be eradicated. The high occurrence rate of these storms in Roseau County is why prevention and warning related responses are of such high importance.

Flooding is a large hazard for Roseau County because of the Red River. Frequent flooding events from 1996 to the present have caused much flood-based mitigation to occur in Roseau County on multiple levels. A meltwater laden Red River in the spring causes trouble for Roseau County, when full drainage ditches have no where to drain and backup on the land. Uneven spring melting and ground saturation also causes water movement to cease. Because the Red River is massive and collects so much drainage during spring from multiple areas, cities in Roseau County are placed at a greater flooding risk when conditions are primed. Flooding in the neighboring Kittson County and Canada also affects Roseau County mitigation. Rivers run through Warroad and Roseau, causing these cities to become additionally susceptible to flooding. Please note that high precipitation can cause flooding in any region in Roseau County as well as affecting existing mitigation equipment, and that overland flooding can have a broad affect upon an area. Because of the Red River flowing in a northerly direction, all upstream mitigation activities affect Roseau County, both positively and negatively. Agriculture activities are delayed/eliminated by flooding/extreme wet conditions, and population loss for Roseau County has been seen partially because of past flooding. Roads are importance to protect, as isolation prohibits emergency response from reaching all areas of Roseau County, and prevents residents from seeking shelter and supplies. The Two Rivers and the Roseau River Watershed Districts are important partners in flood-related mitigation, and are essential partners in future endeavors.

Although the population status of Roseau County may determine that national terrorism is highly unlikely, the border county status with Canada puts Roseau County at a slightly higher terrorism risk than other non-bordering

counties. The border is patrolled at roadways leading into and out of the United States; Roseau County would see potential risk if someone wanted to illegally cross. Human nature is rather unpredictable, and the target may be chosen to foster feelings of insecurity and instability by choosing a smaller populated locale. Local hostility would be the most apt cause for any destruction that could be in relation to terrorism (Examples = deliberate arson, actions against a company or agency). Roseau and Warroad would have the most risks simply because they have larger populations and companies that employ many people. Every city should keep an eye on it's infrastructure, such as water sources, to make sure that citizens are safe. Depending on the action, a terroristic threat would most likely have to address hazardous material spills and contamination also. National security has increased since the 9/11 event, and terrorism is more able to be closely watched by local departments than in the past due to grants and increasingly available technology.

Infectious disease has come into the public eye more and more because of the potential for terrorists to use it to affect multiple populations at once. The risk has always been there, with a potential outbreak and areas affected depending on the type of disease. Bird flu is causing the most national concern because of the possible pandemic flu mutation. Locally, flu shot shortages in recent years have caused concern, as well as the discovery of tuberculosis in local cattle herds, West Nile Virus in mosquitos and chronic wasting disease that affects deer and moose populations. Local parties such as public health, hospitals/clinics, DNR and units of government address citizen concern and provide education. Increased surveillance and education will help to reduce overall risk and to prevent future outbreaks.

Hazardous material spills and contamination could occur in Roseau County because of rail and roadways that cross all cities. The MNN railroad line runs through/near Strathcona, Greenbush, Badger, Roseau and Warroad and the CN railroad line runs through Warroad and Roosevelt. State Highways 32, 11, 89, 308, 310 and 313 have vehicular traffic that connects with all areas of Roseau County through county and township roads. Local sewer and water infrastructure should be checked and monitored, to prevent potential problems. All cities are affected by this as age and extreme water amounts can cause problems to occur. Solutions can be expensive and smaller cities can be overwhelmed if a sudden break is not budgeted for. Massive contamination events could occur to a wide region if flooding was involved, so floodplain management is very important to Roseau County. Subsidence is a problem for Roseau County, the main problems stemming from the natural erosion/sedimentation process. There are currently no cities with massive problems, but neighboring counties in the northwest Minnesota region have urban subsidence problems, so attention should be paid to the locales of current subsidence outbreaks. The problem can come on quite suddenly, with land dropping off with little or no warning. Solutions are quite expensive concerning this problem, and usually involve the displacement of existing structures. Farmers are also concerned, as valuable cropland is disappearing. Attention needs to focus on future population settlements, so that homes are not placed upon susceptible property.

City Focus:

Another level of mitigation activity focuses on the city level and runs

concurrently to any county/regional projects. Cities analyze what risks are occurring, and to what degree they affect local citizens. Solutions for chosen problems must be planned and then budgeted for in advance, as limited funding may require large projects to have loan/grant assistance or wait until a certain time period. City size also may determine how much assistance is needed, as a smaller city has a smaller tax base, and therefore, fewer dollars to use towards a mitigation project.

Strathcona has some sheltering concerns. Even though the population is smaller when compared to other cities, there is not a building within the city limits that can house many people during a threat. Residents would have to drive to Greenbush or Middle River if a serious hazard called for evacuation. A railroad also goes through the city, posing a possible contamination threat.

Greenbush is currently receiving communications equipment upgrades as part of a grant for Roseau County. Upgrades were necessary, as some equipment dated back to the 1960's. The lagoon is also seeping, Greenbush is working with the MPCA and researching potential paths and funding sources. The project is ranked on MPCA's PPL. Emergency response would like an extra water pump for the city in the future and to bury some of the overhead power lines to prevent power loss. It is currently not cost-efficient for the city to proceed with burying lines at the current time, as funding is a prohibiting issue. A potentially hazardous situation that Greenbush identified is the positioning of local anhydrous and urea storage facilities.

Badger is currently researching methods and finances regarding the need for a new iron removal filter and for a larger water system. The current water system pumps slowly. A large fire or other situation that would need a lot of water quickly might put the city in additional peril. The lagoon system was recently expanded. A storm with a strong wind might also prevent portions of Badger from hearing the warning siren.

Roosevelt has a local ditch that is prone to periods of standing water. This influences overland flooding possibilities and increases mosquito populations. The railroad owns the land in question; city officials have recently found a contact within the organization and are in communication about the problem. Some other issues in Roosevelt are that a higher water table that prevents a suitable tornado shelter from being located. The city also has no siren.

Warroad is currently busy constructing a new public safety building, which will house many agencies under one roof. Communications equipment is also being received through the communications grant applied for by the county. The Warroad ambulance and first responders are working to get an oxygen filling station located in Roseau County. A lift station is being upgraded and the lagoon system is being expanded. Warroad is working with the MPCA, and the project is on the PPL. Although the city only has one portable generator, Marvin's Windows and Doors has 100% back-up power, so a total power loss situation would not occur. Some other situations of concern for Warroad include:

1. Warroad is bisected by railroad tracks. Questions about immediate access concerns are raised, should a train be one the tracks for a long

period of time. Hazardous materials are also a question, because an accident in the center of the city would have the possibility to affect many people. Officials in Warroad cite deterioration on some of the crossings, and believe maintenance is needed. Officials would also like additional information about the procedure for splitting of railroad cars and on what is being hauled through Warroad.

2. A trailer park near Warroad has many dry trees surrounding it, making the property more prone to fire damage.

3. Heavy large rains make parts of Warroad more apt to incur flood damage, especially the campground. An extremely heavy rain would work the pumps hard. The campground also is in need of a tornado shelter and cannot hear the siren.

5. Because of increased traffic of commuters to Roseau and Warroad, local highways are cited to need enlargement and maintenance. MNDOT is aware of the situations, and certain portions are cited in work plan projections for the oncoming years.

Roseau is receiving information as part of the communications grant for Roseau County. Polaris is purchasing two sandbag filling machines, one for Roseau County and an additional one for Roseau. The hospital has plans for the construction of another entrance to their facility. During the flood, a temporary access had to be set up to prevent isolation. Lift station repairs and maintenance is being done, and sewer, storm and water pipes that have a documented problem are enlarging their capacity to prevent backup and other related flood damages. Flooding is the major concern for Roseau, who has seen heavy damage in recent years. Plans are in various stages between the watershed districts, the city and the USACE. Various large-scale solutions are being discussed that will benefit all areas of the county. Components of this plan include increased storage opportunities through the construction of impoundments, increased storage at Roseau Lake, a diversion, storm drains gated outlets, ring dikes and the Hay Creek/Norland Project. Bridges and their water restrictiveness during various flood levels are also being studied. The dike is also being looked at, as it is an important piece to Roseau's current flood protection. Originally constructed as a temporary dike in the 1960's, the dike has seepage problems when the weather is warm. Portions of it need maintenance and repair. Other situations in Roseau include:

1. Anhydrous facilities within the city boundaries pose a threat if leakage occurs.

2. Some of the older sirens need maintenance and the spare parts become harder to find as age progresses.

3. Roseau Airport has no daytime personnel.

4. Subsidence threatens a couple of homes

5. Because of increased traffic of commuters to Roseau and Warroad, local highways are cited to need enlargement and maintenance. MNDOT is aware of the situations, and certain portions are cited in work plan

projections for the oncoming years.

Wannaska is very interested in a siren for their city. There is community support, with local groups doing some fund raising. The first responder groups are looking at ways to purchase radios. Places to shelter many people at once is a concern, but several residents have basements, as well as some businesses. A city-wide sewer project is almost complete, with the sewer currently in operation. A dry hydrant was recently installed. A fuel spill site is currently being mitigated.

C. Policy Recommendations

The following section highlights the goals, objectives and strategies which address newly identified issues, highly cost effective solutions, critical problems, or other items that change the policy or direction of hazard mitigation in Roseau County. (Please note that maintaining the high quality of existing hazard mitigation programs is equally or in some cases more important in the long-term mitigation effort). All jurisdictions are included in this section, because the completion of the following problems depends upon the support, efforts and cooperation of cities, townships and the county.

The strategies below have been prioritized based on the potential risks associated with each hazard, the ability of the strategy to minimize or eliminate an identified risk, cost-efficiency, the availability of resources and public concerns. Although all hazards are important to mitigate, for reasons described in the risk analysis section of this report, the top three hazards in Roseau County are natural storms, flooding and tornadoes.

The cost estimates, funding sources, schedules and responsible parties are preliminary and are subject to change based on fiscal and county conditions. It is strongly recommended that these goals and actions are adopted as part of the existing local planning effort when appropriate.

Goals, objectives and policies identified in this plan will be incorporated into other Roseau County Plans. Local jurisdictions undergoing comprehensive planning or land use planning will be strongly encouraged to directly incorporate applicable goals, objectives and policies into their local comprehensive plan or land use plan upon next adoption. Transmittal of the final plan document will include a letter from the Roseau County Emergency Management Director requesting that each participating jurisdiction 1) adopt this Hazard Mitigation Plan as a primary policy document for those communities, and 2) review and incorporate all applicable policies of this document into the community's comprehensive plan or land use plan by inclusion or at least by reference. Each community should also utilize the applicable zoning, subdivision control, and other ordinances to enforce the policies previously described.

Hazard: All

Goal 1: Exercise Current Warning Systems - Northwest Minnesota and Roseau County are very storm ready, but complacency and unanticipated storm events pose an on-going danger, especially during the winter. Improved warning systems, such as the efforts of the National Weather Service should be promoted along with public education on personal responsibility.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Educate the Public	1. Educate on multiple hazards so that individuals take on the responsibility for the actions of themselves and their neighbors/families	Ongoing, Short-Term	Emergency Response Personnel	Staff Time	Entire County	Staff Time
	2. Continue working with the National Weather Service to improve storm warning and awareness	Ongoing, Long-Term	Emergency Response Personnel, NWS	Staff Time	Entire County	Staff Time
	3. Promote the weather radio for homes and businesses	Ongoing, Long-Term	Emergency Response Personnel, NWS	Staff Time, Radios = \$70-\$80	Entire County	Staff Time
	4. Encourage no/limited travel during severe weather conditions.	Ongoing, Short-Term	MNDOT, Emergency Response Personnel	Staff Time	Entire County	Staff Time
	5. Encourage the use of online information	Ongoing, Short-Term	Emergency Response Personnel, NWS	Staff Time	Entire County	Staff Time
	6. Maintain an awareness of new technologies for citizen alert, such as reverse 911 and consider the local benefit.	Ongoing, Long-Term	Emergency Management	Staff Time	Entire County	Staff Time
Continue Response Exercises on Local Through Regional Levels	1. Annually review and update emergency response plans for cities, critical infrastructure and events.	Ongoing, Short-Term	Cities, Businesses	Staff Time	Entire County	Staff Time

	2. Involve all Roseau County emergency personnel for increased preparedness	Ongoing, Long-Term	Emergency Response Personnel	Staff Time	Entire County	Staff Time
	3. Utilize multiple planning scenarios for increased county participation	Ongoing, Long-Term	Emergency Response Personnel	Staff Time	Entire County	Staff Time
	4. Ensure that cities have adequate response levels, and that an immediate response is not dependent on a few people	Ongoing, Short-Term	City Emergency Response Personnel	Staff Time	Cities	Staff Time
	5. Update the Roseau County EOP regularly	Ongoing, Short-Term	Emergency Management	Staff Time	Entire County	Staff Time
Increase Usage of Ham Radios	1. Look to incorporate the already existing ham radio network into more emergency scenarios and routines	Ongoing, Short-Term	Emergency Management, Ham Radio Operators	Staff Time	Entire County	Staff Time
	2. Support ham radio clubs in Roseau County	Ongoing, Long-Term	Emergency Management, Ham Radio Operators	Staff Time	Entire County	Staff Time

Goal 2: Incorporation - The incorporation of all types of existing mitigation for Roseau County will increase hazard preparation/prevention as well as provide a framework of individuals that will keep the area safe from perceived threats.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Incorporate Mitigation From Other Plans to Increase Hazard Safety	1. Incorporate mitigation based on the Roseau County Emergency Operations Plan	Short-Term	Emergency Management	Staff Time	Entire County	Staff Time
	1. Incorporate mitigation based on the Watershed's Water Management Plan	Short-Term	Emergency Management, Watershed	Staff Time	Entire County	Staff Time

	1. Incorporate mitigation based on power company plans.	Short-Term	Emergency Management, Power Companies	Staff Time	Entire County	Staff Time
	1. Incorporate mitigation based on city planning	Short-Term	Emergency Management, Cities	Staff Time	Entire County	Staff Time
	1. Incorporate applicable mitigation based on any planning done internationally (Canada)	Short-Term	Emergency Management, Canadian Agencies	Staff Time	Entire County	Staff Time
	1. Incorporate mitigation based on Emergency Personnel Response Planning	Short-Term	Emergency Response Personnel	Staff Time	Entire County	Staff Time
	2. Amend mitigation plan, if necessary.	Ongoing as needed and required by FEMA	Emergency Management	Staff Time	Entire County	Staff Time

Goal 3: Oxygen Filling Station Construction - During a large emergency situation, oxygen may become a necessity. The closest filling stations are in Grand Forks and Fargo, posing a long wait for refills if Roseau County would ever run out.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Construct a Local Oxygen Filling Station	1. Support Warroad Emergency Response in planning for a local oxygen filling station	Long-Term	Emergency Management, Warroad Ambulance, Warroad First Responders	Staff Time, Info. Not Available At This Time	Roseau County, Warroad	Staff Time, Still Being Researched

Hazard: Tornadoes

Goal 1: Improve Shelter Opportunities - Tornadoes are a threat because of their unpredictable nature and ability to occur anywhere with a short amount of warning time. Winter storms may also require shelter because of power outages and potential isolation. Steps need to be taken to ensure that adequate shelters are available in every city. Special consideration should be given to trailer courts and parks.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Provide unprotected residents a shelter	1. Ensure that nursing homes, hospitals, public events and schools have updated storm plans, creating them if necessary	Long-Term	Emergency Management	Staff Time	Public Locales	Staff Time
	2. Encourage trailer courts to have either an on-site shelter or an evacuation plan to a nearby shelter	Long-Term	Trailer Courts	Staff Time	Trailer Courts	Staff Time
	4. Identify shelters in Roseau County for both tornadoes and winter storms	Short-Term	Emergency Response Personnel	Staff Time	Cities	Staff Time
	5. Encourage individuals to have a shelter plan in place.	Ongoing, Long-Term	Emergency Management	Staff Time	Entire County	Staff Time
	6. Provide information to the public about shelter locations and hours	Ongoing, Short-Term	Emergency Management	Staff Time	Cities, Campgrounds	Staff Time
	Annually Prepare Chosen Shelter Sites	1. Review individual plans regularly so that individuals can gain access to shelters at all hours	Ongoing, Short-Term	Emergency Management	Staff Time	Shelters
2. Assign a person to the facility to prevent damage and control crowds		Short-Term	Emergency Management, Shelter Personnel	Staff Time	Shelters	Staff Time

	3. Keep contact list up to date	Ongoing, Short-Term	Emergency Management, Shelter Personnel	Staff Time	Entire County	Staff Time
Enhance Tornado Protection in Roosevelt	1. Find sheltering for areas with a high water table that may be unable to have a structure with a basement	Long-Term	Cities, Emergency Management	Staff Time, Shelter Dependent	Roosevelt	Staff Time, Budgets, FEMA, HMGP
	2. Provide as much advance notification as possible, in case travel time is needed to drive to a shelter	Long-Term	Emergency Management, Emergency Response Personnel, City	Staff Time	Roosevelt	Staff Time
	3. Publicly educate individuals to be aware of inclement weather and to have a family plan.	Short-Term	Emergency Management, Emergency Response Personnel, City	Staff Time	Roosevelt	Staff Time
	4. Work with neighboring cities to shelter residents	Short-Term	Emergency Management, Cities	Staff Time	Roosevelt, Warroad, Williams	Staff Time
Ensure Shelters Exist for Residents	1. Coordinate in nearby cities in case large scale sheltering for Strathcona is necessary	Short-Term	Emergency Management, Cities	Staff Time	Strathcona, Greenbush, Middle River	Staff Time
	2. Promote storm preparedness for residents, including identifying a shelter. This is important for smaller city residents, who may have fewer shelter options available	Ongoing, Short-Term	Emergency Management, Residents	Staff Time	Cities, Wannaska	Staff Time
Protect Seasonal County Visitors	1. Have a tornado response plan for the Lake of the Woods area, which attracts many out of county people for various water related activities	Ongoing, Short-Term	Warroad, Emergency Management, Emergency Response Personnel	Staff Time	Warroad, Lake of the Woods Area	Staff Time, Budgets

	2. Protect busy trailer courts near Lake of the Woods	Ongoing, Long-Term	Emergency Response Personnel	Staff Time	Lake of the Woods Area	Staff Time
	3. Have available sheltering opportunities for campgrounds	Ongoing, Short-Term	Cities, Campgrounds Campground Management	Staff Time	Campgrounds, Warroad Campground	Staff Time
	4. Ensure that shelters can handle the summer influx population	Ongoing, Short-Term	Emergency Response Personnel	Staff Time	Warroad	Staff Time
	5. Increase public education in the summer for unaware visitors	Ongoing, Long-Term	Cities, Emergency Management	Staff Time	Roseau County	Staff Time
Support Warroad Point Restoration Fund Initiatives	1. Restore areas that were affected by the tornado	Ongoing, Short-Term	WPRF	Dependent	Warroad	Staff Time, WPRF
	1. Provide economic development assistance to organizations helping businesses recover	Ongoing, Short-Term	WPRF	Dependent	Warroad	Staff Time, WPRF
	1. Provide assistance to local non-profit organizations that furnish relief to those affected by the tornado	Ongoing, Short-Term	WPRF	Dependent	Warroad	Staff Time, WPRF
	1. Help recovery and restoration efforts and restore tourism to the area	Ongoing, Short-Term	WPRF	Dependent	Warroad	Staff Time, WPRF

Hazard: Winter Storms

Goal 1: Deter Long-Term Electrical Disruptions - Ice and wind producing storms can cause power outage situations requiring shelter and multiple days without power. Mitigation needs to continue so that residents and communities can be protected from a long-term power loss situation.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Assess Infrastructure Power Concerns	1. Identify critical infrastructure that needs alternative power methods	Ongoing, Long-Term	Emergency Response Personnel	Staff Time	Not Public Info.	Staff Time

	2. Maintain current back up generators so that no unexpected breaks occur	Short-Term	Critical Infrastructure	Staff Time	Entire County	Staff Time
	3. Investigate any potential fund sources for cities to offset expensive line burying costs.	Ongoing, Long-Term	Emergency Management, Power Companies, Cities	Staff Time	Cities, Greenbush	Staff Time, Depends on Strategy Outcome
Work With Local Power Companies, Coops and Utilities	1. Compare emergency management plans with current power company plans, incorporating necessary mitigation actions as appropriate.	Ongoing, Short-Term	Emergency Management, Power Companies	Staff Time	Entire County	Staff Time
	2. Enhance planning that currently takes place for large outage events, if necessary.	Ongoing, Long-Term	Emergency Management, Critical Infrastructure	Staff Time	Entire County	Staff Time
	1. Identify power lines that have an acute need of mitigation	Short-Term	Power Companies	Staff Time	Not Public Info.	Staff Time
Reduce East/West Power Line Vulnerability	2. Bury lines to reduce power outages	Long-Term	Power Companies	Dependent upon lines	Entire County	Budget, FEMA, HMGP, State
	3. Employ above ground improvements	Long-Term	Power Companies	Dependent upon lines	Entire County	State, FEMA, HMPG, Budget

Hazard: Summer Storms

Goal 1: Upgrade Emergency Response Equipment - Investments are often very cost effective strategies, keeping in mind the on-going importance of maintaining and improving all hazard related equipment.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources

Improve Communication Equipment Within Roseau County.	1. Continue participation in the border counties grant including digital system upgrades and new equipment purchases. Gain APCO-25 compliance	Ongoing, Short-Term	Emergency Management	Staff Time, Emergency Management has cost estimates	Roseau County, Roseau, Warroad, Greenbush	HMGP, Budgets, Staff Time
	2. Assess the current communication system for emergency response personnel, making upgrades and changes where necessary	Ongoing, Long-Term	Emergency Response Personnel	Staff Time, Equipment Costs	Entire County	County Budget, HMGP, Grants
	3. Construct a NOAA tower in Roseau County	Long-Term	Emergency Management	Location Dependent	Roseau County	Budgets, HMGP, Grants
	4. Support local first responder groups, including radios and updated communication to squads that are in need.	Short-Term	Emergency Management, First Responders	Dependent on Radio Amounts Needed	All First Responders	Budgets, HMGP, Grants
	5. Decrease the presence of cell phone "blind" spots.	Long-Term	Cell Phone Companies	Dependent	Rural Roseau County	Cell Company Budget
Assess Current City Sirens	1. Assess the current siren warning system for the county on a regular basis	Ongoing, Long-Term	Cities, Emergency Management	Staff Time	Roseau County, Cities	Staff Time
	2. Purchase/update sirens for areas with deficient coverage	Short-Term	City, Emergency Management	Dependent	Wannaska, Roosevelt, Badger, Warroad	City Budget, HMGP
	3. Continually look for older siren replacement parts, as older parts can be hard to find	Ongoing, Long-Term	City, Emergency Management	Dependent	Roseau, Greenbush	City Budget, HMGP
Increase GIS Utilization	1. Utilize GIS technology in emergency management and hazard mitigation when cost-efficient	Long-Term	Emergency Management	Dependent Upon Technology	Entire County	Grants, HMGP

Hazard: Flooding

Goal 1: Reduce Repetitive Damage to Roads - The lack of a focused approach for preventing successive damage to local roads poses the highest threat for future damage, isolation and individual's economic/travel concerns.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Protect Roads From Repetitive Damage From Flooding & Heavy Rains	1. Investigate cost-effective methods for repairing repetitively damaged roads in Roseau County	Ongoing, Long-Term	MNDOT, Roseau County, Emergency Management	Method Dependent, Staff Time	Roseau County	MNDOT/County Funds, FEMA, HMGP
	2. Inventory county roads that suffer continuous damage from flooding events	Ongoing, Short-Term	Emergency Management, MNDOT, Roseau County	Staff Time	Roads	Staff Time
	3. Modify, raise or install drainage upon repetitively damaged roads.	Long-Term	MNDOT, Roseau County	Dependent upon Road	Roads	MNDOT/County Funds, FEMA, HMGP
	4. Ensure that flood mitigation is a factor for newly constructed roadways	Ongoing, Long-Term	MNDOT, Roseau County, Emergency Management	Staff Time	Roseau County	MNDOT/County Funds

Goal 2: Prevent Ag. Flooding Damage - There is a growing concern that flooding in rural areas, especially agricultural lands, is very costly and should be decreased. This involves big ditches, large impoundments, and extensive agricultural system design/management. Counties and townships will need to work more closely with watershed districts, landowners, and Red River Valley level groups on these issues.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Diminish crop damage from standing water.	1. Work with the Roseau Watershed on mitigation strategies outlined in their watershed management plan.	Ongoing, Short-Term	Watershed, Roseau County, Emergency Management	Staff Time, Additional Info. In Watershed Plan	Ag. Land, Waterways	Watershed, County & City Budgets

	2. Identify culverts and bridges that cause ice/log jams and water backup & mitigate.	Long-Term	Roseau County, MNDOT	Staff Time, Additional Info. In Watershed Plan	Waterways	Watershed, County & City Budgets, MNDOT
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Goal 3: Address Flooding Damage - Many inches of water in a short time period can cause massive damage, fast moving runoff and little advance warning. Properties that are repetitively damaged by flooding need mitigation.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Identify At-Risk Structures	1. Utilize the ring dike program, if the program is available.	Ongoing, Short-Term	Emergency Management, Landowners	Property Dependent	Rural Roseau County	State, DNR, Watershed, Landowner, County
	2. Buyout willing landowners if funding is available.	Ongoing, Short-Term	Emergency Management, Land/Homeowner	Property Dependent	100-Year Floodplain	State/County Budget, FEMA, HMGP
	3. Enforce current floodplain ordinances.	Ongoing, Long-Term	Emergency Management, Cities, Roseau County	Staff Time	100-Year Floodplain	Staff Time
Investigate Local Drainage Systems	1. Maintain efficient city drainage and propose solutions to decrease damage done by fast moving water.	Ongoing, Long-Term	Watershed, Cities	Dependent	Cities	City Budget
	2. Reintroduce drainage to a railroad owned ditch, removing standing water. Rework grade if necessary.	Long-Term	Roosevelt, Railroad, Watershed	Dependent Upon A Cost Efficient Solution	Roosevelt	City Budget
	3. Coordinate with the watersheds to place gauges on portions of ungauged waterways	Ongoing, Long-Term	Watersheds	Dependent	Roseau County	Watershed Budgets

	4. Thoroughly study the network of culverts in Roseau County, replacing/repairing/resizing any that inhibit/prevent flow	Long-Term	Roseau River & Two Rivers Watersheds	Dependent upon findings	Roseau County	Watershed Budgets
	5. Remove natural flow inhibitors, such as flood debris, beaver dams and sediment that cause flooding	Long-Term	Watersheds	Dependent upon blockage size	Roseau County	Watershed Budgets
Decrease flooding damage in the 100-year floodplain	1. Enforce current floodplain and building ordinances	Ongoing, Long-Term	Cities, Roseau County	Staff Time	100-Year Floodplain	Staff Time
	2. Floodproof structures already constructed	Ongoing, Long-Term	Structure Owners	Property Dependent	100-Year Floodplain	Homeowner
	3. Compare emergency management plans with current watershed management plans & city plans, incorporating necessary mitigation as appropriate	Ongoing, Short-Term	Emergency Management, Watershed	Staff Time	Roseau County	Watershed, State/County Budget, City Budget, FEMA, HMGP
	4. Advocate for high quality, efficient flood prediction systems to provide advanced flood warning to citizens	Long-Term	Emergency, Watersheds	Staff Time, Dependent Upon Method	Roseau County	Budgets

Goal 4: Enact a County-Wide Flood Protection Plan - Flooding has repetitively damaged Roseau County multiple times over the past decade. In order to protect itself from future flooding episodes, a multiple project approach must be used in order to protect all of Roseau County.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Protect Entire County Utilizing Multiple Approaches	1. Construct upstream impoundments with gated storage, reducing downstream flood peaks.	Long-Term	Roseau River Watershed	\$20 Million for 30,000 to 40,000 ac-ft of storage	Roseau County	Multiple Agency Budgets, Grants

1. Divert water around the city of Roseau	Long-Term	Roseau River Watershed	\$30 Million (est.)	Roseau	Multiple Agency Budgets, Grants
1. Install a storm drain on the west side of Roseau	Long-Term	Roseau River Watershed	\$3 Million (est.)	Roseau	Multiple Agency Budgets, Grants
1. Utilize wetlands restoration and meandering streams to protect farmland and natural resources (Hay Creek/Norland Project).	Long-Term	Roseau River Watershed	\$8.3 Million (est.)	Roseau County	Multiple Agency Budgets, Grants
1. Construct impoundments in necessary locations to provide the correct amount of storage	Long-Term	Roseau River Watershed	See above	Roseau County	Multiple Agency Budgets, Grants
1. Improve storage opportunities at Roseau Lake	Long-Term	Roseau River Watershed	\$15 Million (est.)	Roseau County	Multiple Agency Budgets, Grants
1. Modify the Roseau River, restoring oxbows and other natural features	Long-Term	Roseau River Watershed	\$1 Million (est.)	Roseau River	Multiple Agency Budgets, Grants
1. Install dike/outlets to the Big Swamp area to ensure no damage is done to Canada or the Two Rivers Watershed	Long-Term	Roseau River Watershed	\$8 Million (est.)	Big Swamp Area	Multiple Agency Budgets, Grants
1. Modify Roseau River WMA, adding gated outlets	Long-Term	Roseau River Watershed, DNR	\$500,000 (est.)	Roseau River WMA	Multiple Agency Budgets, Grants
1. Use ring dikes on all endangered rural residences	Long-Term	Roseau River, DNR	\$500,000 (est.)	Roseau County	Multiple Agency Budgets, Grants

Protect the city of Roseau	1. Install a diversion	Long-Term	Roseau, Roseau River Watershed	\$30 Million (est.)	Roseau	Multiple Agency Budgets, Grants
	2. Create permanent in-city levees, replacing the older one with a wider version with more clay material.	Long-Term	Roseau, Roseau River Watershed, USACE		Roseau	Multiple Agency Budgets, Grants
Continue Multiple Partner Approach to Flood Mitigation	1. Continue the Roseau River International Watershed meetings.	Ongoing, Long-Term	Roseau County, Manitoba	Staff Time	Roseau County	Staff Time
	2. Continue aiding the Warroad Watershed District in becoming more active	Ongoing, Long-Term	Watersheds, Roseau County	Staff Time	Eastern Roseau County	Staff Time, Watershed Budgets

Hazard: Subsidence

Goal 2: Supply County-Wide Prevention - Although currently not a large issue, subsidence poses serious problems to areas in Northwest Minnesota. Protection needs to extend to all areas, both to solve existing problems & prevent future ones.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Control new structure and housing placement for future periods of population growth	1. Enforce current building and shoreland ordinances	Ongoing, Long-Term	Cities, Roseau County	Staff Time	Roseau County	Staff Time
	2. Examine the need for changes to current ordinances for increased protection	Short-Term	Roseau County	Staff Time	Roseau County	Staff Time
	3. Utilize buyouts when necessary for affected citizens.	Ongoing, Long-Term	DNR, Emergency Management, Land/Homeowner	Staff Time	Roseau County	Watershed, DNR, State, City, County
	4. Investigate cost-effective methods of stabilizing local eroding riverbanks or ditches. Mitigate if cost efficient.	Short & Long-Term	Emergency Management, DNR, USACE, Watersheds	Staff Time	Roseau County	Staff Time

Hazard: Wildfire

Goal 1: Prevent Wildfires - The many acres of CRP in Roseau County provide the potential for a large fire if local conditions were right.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Minimize the amount of fuel in fire prone areas	1. Utilize fire breaks around affected CRP. The NRCS would need to be contacted.	Ongoing, Short-Term	Landowner, NRCS	Time, Cases & options vary with landowner	CRP	Time
	2. Find cost-efficient methods of removing dry/dead trees that pose a fire threat.	Ongoing, Short-Term	Emergency Management, DNR	Depends on Area	Roseau County, Lake Wood Trailer Park (Warroad)	Dependent on Strategy Solutions
	3. Utilize controlled burns if the option is available. A permit might be required, as well as NRCS approval.	Ongoing, Short-Term	Landowner, NRCS	Time, Cases vary with landowner	Roseau County	Time
	4. Continue identifying high risk rural areas, providing dry hydrants and other mitigation when necessary.	Ongoing, Long-Term	Emergency Management, DNR, NRCS, Fire Departments	Time, Strategy Dependent	Roseau County	Time, Budgets, Grants, HMGP
	5. Provide information to landowners that may not know about fire prevention methods	Ongoing, Short-Term	Fire Departments, Emergency Management, USDA, NRCS	Staff Time	Roseau County	Staff Time

Hazard: Fire

Goal 1: Promote Efficient Fire Responses - The severity of a fire often depends on the local response. A well trained and efficient fire department can significantly reduce fire danger and well maintained equipment can provide a faster response time.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Search For Available Funding	1. Locate available grants and funding so that necessary equipment replacement and purchase can occur.	Ongoing, Long-Term	Fire Departments	Staff Time	Fire Depts.	County/Dept. Budget, Grants, FEMA, HMGP
	2. Utilize county-wide resources and strengthen the local fire response when necessary.	Long-Term & Ongoing	Fire Departments, Emergency Management	Staff Time	Roseau County	County/Dept. Budget, Grants, FEMA, HMGP, Staff Time
Discourage Small Roadways	1. Discourage the construction of small roadways that may pose difficulty to large emergency response vehicles during an event.	Ongoing, Long-Term	Fire Departments, Emergency Management, Residents	Staff Time	Roseau County Homes, Beltrami Island Forest Area	Staff Time

Hazard: Drought

Goal 1: Ensure Necessary Protection - Droughts or extremely dry conditions can occur over multiple years and can cause water shortages, crop/animal death and fire. Although currently in a wet cycle, Roseau County still needs to plan for drought conditions.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Educate residents about fire prevention	1. Enforce any set fire or burning bans	Long-Term	Emergency Response Personnel, DNR	Staff Time	Roseau County	Staff Time
Protect people from drought related damage	1. Work with the USDA & FSA to protect those involved in ranching and agriculture (crop insurance, etc...)	Long-Term	USDA, FSA, Emergency Management	Staff Time	Roseau Farmers & Ranchers	Staff Time

	2. Identify sources of water that could be provided if shortages occur	Long-Term	Cities, Emergency Management	Staff Time	Roseau County	Staff Time
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Hazard: Hazardous Materials and Contamination

Goal 1: Decrease Transportation Contamination & Spill Potential - The high frequency of railroad traffic combined with truck traffic observed on highways put Roseau County at an increased risk for a hazardous material spill and/or contamination events.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Address Access and visibility Issues Caused by Long/Frequent Railroad Traffic	1. Identify deficient rail locations and repair, before a derailment occurs	Long-Term	Railroad Companies	Staff Time, Problem Dependent	Railroad Crossings, Warroad	Railroad Budget
	2. Decrease emergency personal response delays by having access to maps and available routes.	Ongoing, Long-Term	Emergency Response Personnel	Staff Time	Roseau County	Staff Time
	3. Work with the railroad to eliminate long periods of track blockage. Review protocol related to splitting the train	Long-Term	Railroad Companies, Emergency Management, City Emergency Response	Staff Time	Warroad	Railroad Budget, Staff Time
Decrease County Commute Traffic	1. Support the Transportation Advisory Committee (TAC) in studying a proposed conversion of Highway 11 from Greenbush to Warroad into a superhighway	Long-Term	TAC, Engineers, MNDOT	No Associated Cost Yet	Greenbush, Warroad, Roseau, Badger	MNDOT, Budgets
Increase Airport Activity	1. Investigate cost-effective methods for daytime staffing of the Roseau Airport, as well as assuring continued operation	Long-Term	Roseau, Roseau County	Solution Dependent	Roseau County	Staff Time, Budgets

Goal 2: Reduce Hazardous Material Contamination - Although hazardous material can never be totally eliminated, observing safety and security measures and having a response plan will help to ensure a reduction in serious contamination events.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Address problems related to Meth	1. Identify unsecured anhydrous ammonia sources in the region	Long-Term	Emergency Management, Ammonia Retailers	Staff Time	Roseau County	Retailer Budget, USDA
	2. Continue educating residents about Meth labs and what do if one is found	Ongoing, Short-Term	Emergency Response Personnel	Staff Time	Roseau County	Staff Time
Prevent Groundwater & Drinking Water Contamination	1. Ensure groundwater protection by identifying and capping abandoned wells	Ongoing, Long-Term	DNR, MPCA, Watersheds, Department of Health	Staff Time, Well Dependent	Roseau County	Program Funds, Budgets, Grants
	2. Continue water monitoring to secure water quality for Roseau County	Ongoing, Long-Term	Watersheds	Staff Time	Roseau County	Watershed Budget, Staff Time
	3. Locate a new replacement iron removal filter and larger capacity water storage	Short-Term	Badger	Dependent	Badger	City Budget
Complete Projects listed on the MPCA's Project Priority List	1. Rehab/expanded existing system (Ranking based on MPCA's system)	Long-Term	Warroad, MPCA	\$3,715,294	Warroad	MPCA, City Budget
	2. Unsewered area collection/treatment	Long-Term	Lake Twp., Springsteel Island, MPCA	\$1,945,476	Lake Twp., Springsteel Island	MPCA, Budgets
	3. Unsewered area collection/treatment	Long-Term	Lake Twp., Lakewood MPH, MPCA	\$1,958,495	Lake Twp., Lakewood MPH	MPCA, Budgets
	4. Unsewered area collection/treatment	Long-Term	Lake Twp., MPCA, Warroad Estate / Northern Lights MPH	\$3,775,579	Lake Twp., Warroad Estate / Northern Lights MPH	MPCA, Budgets

	5. Sewer Rehabilitation	Long-Term	Greenbush, MPCA	\$244,000	Greenbush	MPCA, City Budget
Compose Hazard Response Plans	1. Compose and update response plans for hazardous material storage facilities.	Ongoing, Long-Term	Storage Facilities	Staff Time	Roseau County, Greenbush, Roseau	Budgets, Staff Time

Hazard: Infectious Disease

Goal 1: Maintain/Increase Surveillance For Potential Threats - Problems in this group are capable of massive destruction, illness and mass injury or casualties, occurring anywhere in the county with little warning. Surveillance and attentiveness are required to keep problems from occurring and to bring unknown problems to the attention of the proper authorities.						
Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Continue involvement in programs that deal infectious disease and population health	1. Continue participation in hospital planning and health efforts	Ongoing, Long-Term	Emergency Response Personnel, Public Health	Staff Time	Roseau County	Public Health, HMGP, FEMA, State
	2. Increase the partnerships currently seen between Emergency Management and Public Health, and incorporate mitigation documented in Public Health planning documents	Ongoing, Short-Term	Emergency Response Personnel, Public Health	Staff Time, Dependent on Mitigation	Roseau County	Public Health, HMGP, FEMA, State
	3. Evaluate current methods of mosquito control in cities, taking action if necessary.	Short-Term	Emergency Management, Cities	Staff Time	Cities	Staff Time
Prevent the spread of animal Tuberculosis	1. Support the DNR in widespread testing of deer and other related programs	Long-Term	DNR	Staff Time	Eastern Roseau County, Skime Area, Roseau, Warroad	Staff Time

	2. Promote inoculation, encourage testing and other proactive measures to prevent TB spread in cattle herds	Long-Term	DNR, USDA, Cattle Owners	Staff Time	Eastern Roseau County, Skime Area, Roseau, Warroad	Staff Time
	3. Monitor where infected deer and cow populations intersect	Long-Term	DNR, USDA, Cattle Owners	Staff Time	Roseau County	Staff Time
Compose a County Response to a Pandemic Flu	1. Add procedures to the EOP detailing instructions and provisions during a flu pandemic period	Long-Term	Roseau County, Public Health, Emergency Management	Staff Time	Roseau County	Staff Time

Hazard: Terrorism

Goal 1: Preserve/Increase Levels of Terrorism Prevention - Terrorism prevention has become a national concern since 9/11. Although Roseau County does not have a large metropolitan population when compared to Fargo/Moorhead or Grand Forks, anti-terrorism efforts must still occur to keep county residents safe.

Objectives	Strategies	Time	Involved Parties	Cost	Affected Areas	Resources
Decrease vulnerability of large public gathering locales.	1. Review facilities and events, ensuring that plans are up to date and changes occur as necessary.	Ongoing, Long-Term	Emergency Management, Event/Facility Coordinators	Staff Time, Location Dependent	Large Events	Staff Time
	2. Continue partnerships to secure the US - Canadian border	Ongoing, Long-Term	Emergency Management, Coast Guard, Govt., Canadian Agencies, MNDOT	Staff Time	Roseau County	Staff Time

* Short-Term is defined as completion occurring between one and five years

* Long-Term is defined as completion occurring between six and ten years

Adoption

The Roseau County All Hazard Mitigation Plan is meant to be utilized as a guiding document for the mitigation of hazards. A many tiered process went into the construction of this plan including: research, education and communication with a wide selection of Roseau County people and agencies. Programs and policies important to county officials, staff and citizens are noted, as well as ideas and directions that are possible routes in the future. It will be used in conjunction with several other plans already approved and employed. If mitigation ideas are integrated with county business, a safer, more resilient community will form. This plan is encouraged to be used or referred to on any level of county, city or township business and will affect the cycle of disaster and rebuild. Emergency management officials are very knowledgeable about county affairs and are responsible for bringing forward the county hazard mitigation plan and the outlining goals and strategies to all related planning efforts. The elected and appointed officials that are in the position to make decisions capable of reducing or eliminating hazards are also a huge part of executing the goals put forth in this plan, as well as various agencies capable of helping the effort.

The Federal Emergency Management Agency (FEMA) has decreed that counties will not receive any funding under the Hazard Mitigation Grant Program (HMGP) unless an approved mitigation plan is in place. Minnesota is encouraging plans to be multijurisdictional, including all cities and townships. Each city and township in the county will get multiple chances to see this document as it is being created. Cities and the county will also pass a resolution stating that they will adopt this plan as their hazard mitigation plan. Cities passing a resolution include the following: Warroad, Wannaska, Roosevelt, Roseau, Badger, Greenbush and Strathcona. Passed resolutions will be included as an appendix to the plan. Because townships fall within Roseau County's jurisdiction for the purposes of this planning effort, separate resolutions of plan adoption will not be sought after from the townships. Many benefits can occur from having a properly written mitigation plan including: increased education, preservation of life and property, acquisition of new partners and beneficial policies, increased funding, faster recovery time and increased public participation.

The process in the preparation of this plan mainly follows the steps listed in the introduction section in the beginning of this report. Step one was done first, then step two, etc... The adoption process will follow when a completed draft plan is produced. A copy will be given to Jeremy Klein to start the process to receive a conditional approval. A public review and comments period will be set up for a month, longer if deemed necessary. Distribution of the plans to both individuals and key locations will ensure that all interested county members will get a chance to view the plan. Upon conditional approval, adoption will start to take place by resolutions passed by cities and the county.

Mitigation responses listed in this plan will be overseen by Gracia Nelson, emergency manager. City, county and township boards will have control over mitigation responses, and actions in this plan may be extended, changed, delayed or denied anytime at their request in order to best serve the citizens of Roseau County. Active participation from county citizens is

encouraged, as well as creative ideas that could be utilized to gain involvement. Good community relationships are an essential part of this plan, for good relations will foster a greater chance of projects getting implemented.

Funding acquisition will be a large part of many mitigation responses. Grant opportunities from state and federal government agencies will be sought after, as well as local/regional grants from companies, foundations, businesses and nonprofit organizations. It is understood that due to budget constraints, some responses may have to have an extended time line or be postponed. All responses are listed as a priority, due to the fact that these projects are protecting the interests of local citizens. Fees, tax, bonds and loans can also be used to fund projects, however the city/county needs to approve of the funding source and project. A positive view of the response is necessary, or the odds of implementation are extremely low. Public participation is also necessary because hazards do not confine themselves to jurisdictional boundaries.

The plan needs to be updated every five years, due to the fact that this is a growing document. Change is expected to occur. This also keeps Roseau County eligible for assistance. In the event of a hazard, mitigation activities must be covered in the plan. If not, the plan can be amended to include changes, creating a sort of evaluation whenever there is a hazard. Future weather and hazard patterns may cause modifications to the risk analysis and response sections of the plan, along with general community actions concerning hazard mitigation. A CD with the plan will be given to emergency management so that change can occur on a continuous basis (if that is necessary) instead of all at once at the end of five years. Changes will be done by Gracia Nelson and the updated plan will eventually be brought up and voted on by the county board. The hazard mitigation team will be contacted during the updating period. Investigations will be done about new/known hazards as well as county goals and strategies. Meetings will be held, and the public will be invited through invitations or a newspaper article. Emergency management and the Northwest Regional Development Commission (NWRDC) hope to continue to be partners in the fight to keep Roseau County safe and will help with any questions or concerns raised after the plan is written and adopted. The NWRDC will work closely with emergency management, assisting in updating meetings when the plan is up for readoption.

Roseau County Emergency Management will work with county, city and township members to develop methods of implementation, identify hazards that need an increased focus and continue to keep Roseau County safe from harm. Emergency management will be the main force in plan monitoring and evaluation. Meetings and public input will be solicited during the five year revision. Meetings will be scheduled at their discretion. Evaluations will be done by multiple parties including townships, cities, Roseau County, FEMA and HSEM to make sure that protection from hazards is extended to all individuals, structures and property.

Public Involvement

The public played a vital part in the composure of this plan. Without the local knowledge given by Roseau County residents, this hazard mitigation plan would certainly be deficient in many areas. Roseau County Emergency Management welcomes the public's opinion concerning hazard mitigation at any time to ensure that the maximum amount of protection can be given. An open invitation was given to anyone interested in mitigation efforts for any part of the county, be it large or small scale. A successful hazard mitigation plan requires an interested base of people that will carry on the mitigation goals long after the plan is completed. Because the field of mitigation is so broad, all people can play a part in mitigating Roseau County, whether it is on a small home setting, a business setting or a county or regional setting.

Public involvement was sought on a variety of levels to get the maximum possible information and concerns of residents to best represent the county. One of the ways this was accomplished was by having a series of hazard mitigation team meetings. The public was invited to every meeting, be it by letter, word of mouth, telephone call or by newspaper article. Prominent members of the county already working on mitigation efforts were encouraged to attend. A personal invitation list for the meetings is listed below. People receiving letters below were invited to tell other mitigation interested individuals to attend, so the list below grew as the project did.

- Roseau Soil and Water Conservation District
- Members from the local watershed
- Roseau city administrator
- Roseau County Sheriff
- Representatives from the Roseau County Police Departments
- Representatives from the ambulatory squads that service the county
- Emergency management staff
- Roseau County Engineer
- Representatives from the fire stations that protect the county
- School district representatives
- Public Health Nursing Director
- Historic Society of Roseau County
- Roseau County Assessor
- Roseau County Extension Service
- Roseau County Township Association Chairman
- Roseau County Board Chairman
- All city clerks in Roseau County
- All township clerks in Roseau County
- Roseau County Water Planner
- Local interested residents and business representatives of Roseau County

Team meetings occurred that collected many residents of Roseau County together in order to talk about hazard mitigation. The first meeting of the Roseau County hazard mitigation team (February 10, 2004 at the Roseau County Courthouse) was a general meeting that introduced the public to the hazard mitigation process that was occurring. The following topics were specifically covered, but the agenda was flexible enough so that any hazard mitigation topic would be talked about.

- Why write an all hazard mitigation plan?
- What will be in the plan?
- What are the hazards facing the county?
- How can we get out of harm's way?
- Can we do more than plan?
- Next steps and other partners.

County residents voiced their opinions on what hazards were the most important to them. Concerns were talked about in reference to hazards that did not seem to have a mitigation solution.

The plan was also talked about at the annual township association meeting (February 10, 2004 at the courthouse); a publicly invited meeting that has representatives from every township in attendance. Topics highlighted include the reason for hazard mitigation in Roseau County, how hazard mitigation benefits the area and an open invitation for anyone interested to join. The effort to include all individuals in the creation of this plan is a high priority. No opinion should be unheard.

The second team meeting (May 26, 2005 at the courthouse) dealt with the risk assessment and response sections of the report. The main topic of the evening was the actions taken to reduce loss and eliminate hazards. Conversation was once again broad so that concerns from team members could all be voiced. Team members looked at the current risk assessment and stated their concerns on whether a change was necessary. Responses were a most important part of the conversation, as team members could look to the section for examples and fashion their own. The subject of adoption was also raised. Questions of what this paper will do in the future and how it will help areas after its written were asked.

In the effort to gain a better understanding in the local sense, many individual meetings were set up with city officials and agencies. Cities in Roseau County could have a plan that has personal responses and also raises awareness for mitigation issues that are of great concern. Present and past mitigation was conversed upon, as well as the plans for the future. There are many groups both in Roseau County and the Red River Valley doing some amazing mitigation for a variety of hazards. Through increased cooperation and awareness of these activities, benefits could be spread through the entire state of Minnesota. The unique and creative thinking that is present in the area could lead to mitigation solutions that are advantageous to many other areas and communities in the United States. The conversations were varied and tailored upon the individual or group that was attending the meeting. Topics frequently conversed upon include:

- Discussion of current mitigation
- Structure vulnerability
- Community, county or area concern
- Loss minimalization
- Barriers that prevent a mitigation solution from developing
- Immediate and long-term community or agency needs
- Most immediate threat to the area, ranking of most hazardous situation

A survey was distributed to every township and city in Roseau County, as well as applicable agencies. Each hazard in the plan was documented. A blank space was left so that residents could describe how a specific hazard had a local effect. There was also a space for hazards previously not listed or

recognized by others. Results from this survey are documented in the response section of this plan. Some townships chose to phone in survey results, some chose to talk with the emergency manager and others voiced their opinions at our team meeting. Individual results were not added as an appendix to this plan simply because they do not adequately judge the levels of participation. This is mainly due to the numerous methods of information retrieval seen during the collection process.

A third team meeting will be assembled when the completed plan is up for adoption by the county, townships and cities. Items discussed will be the process needed to complete the adoption, including the resolution process and addressing some of the goals documented in the plan.

The county board has also been met with. At the beginning of the plan, the county board was approached and was asked for approval to apply for the funding for the mitigation plan on the county's behalf. The second county board meeting entailed asking permission to start the adoption process and to hand out the draft plan. The third meeting will be to ask for a resolution adopting the approved plan. These meetings are open to the public.