

989 **CHAPTER III HAZARD IDENTIFICATION & RISK ASSESSMENT**

990  
991 In order to evaluate various potential hazard mitigation alternatives for Burnett County and select  
992 the most effective and feasible hazard mitigation strategies, the existing potential hazard  
993 problems in the county must first be analyzed and the vulnerability to such hazards documented.  
994 Accordingly, this chapter provides the following:

- 995
- 996 • Identification of the hazards likely to affect Burnett County;
- 997
- 998 • Profiles of the extent and severity of hazard events which have occurred in the county;
- 999
- 1000 • Assessment of the vulnerability and risk associated with each type of hazard; and
- 1001
- 1002 • Identification of the potential for changes in hazard severity and risk under future
- 1003 conditions.
- 1004

1005 ***HAZARD IDENTIFICATION***

1006  
1007 The process of identifying hazards in the BCHMP was based on consideration of a number of  
1008 factors. The process included input from the LEPC, which included a priority rank ordering of  
1009 hazards, review of documentation of past hazard events, and review of related available  
1010 mapping, plans, and assessments.

1011

1012 ***HAZARD IDENTIFICATION SUMMARY***

1013  
1014 The potential Natural Hazards identified by the LEPC included:

- 1015 • Forest Fires
- 1016 • Tornado
- 1017 • Winter Weather Hazard (Blizzard, Ice Storm, Heavy Snow Storm)
- 1018 • Hailstorms
- 1019 • Thunderstorms / Lightning Storms
- 1020 • Flooding (Flash, Riverine, Lake, Dam Failure)
- 1021 • Drought
- 1022 • Extreme Temperatures (Hot & Cold)
- 1023

1024 If disaster damages exceed the capabilities of local communities and state agencies, federal  
1025 assistance will be requested. Federal disaster assistance may be offered through a variety of  
1026 programs. Assistance may be directed to agricultural producers, individuals and families,  
1027 businesses, or local governments. As part of the planning process and in order to estimate  
1028 potential losses to assets and critical facilities currently in Burnett County, an inventory of assets  
1029 was conducted for both public and private buildings in the county. Table 3.3 on the following  
1030 page illustrates the inventory.

1031  
1032 Over the past few years, the Wisconsin Department of Military Affairs has provided Burnett  
1033 County and its municipalities with disaster recovery grants. On May 11, 2001, a major

1034 Presidential disaster declaration was  
 1035 declared for severe storms and floods  
 1036 (Siren Tornado) in Burnett County. The  
 1037 State Agencies (Fund 02) granted Burnett  
 1038 County Health Department three Crisis  
 1039 Counseling grants for mental health  
 1040 totaling \$126,844. For that same  
 1041 declaration, Burnett County Emergency  
 1042 Management received \$25,747 to purchase  
 1043 and distribute weather radios to residents  
 1044 of the county. Under this same declaration,  
 1045 Burnett County was awarded \$26,876  
 1046 from the Hazard Mitigation Planning  
 1047 Grant Program to offset costs associated  
 1048 with completing a FEMA approved All  
 1049 Hazards Mitigation Plan.

1050  
 1051 On June 23, 2000, a major Presidential  
 1052 disaster declaration was declared for tornados, severe storms, and flooding which occurred on

**Table 3.1: Disaster Recovery Grants Received**

<b>Applicant Name</b>	<b>Grant Payment</b>
Burnett County Forestry	\$4,488.75
Burnett County Highway	\$25,823.00
Burnett County Sheriff	\$1,269.63
Town of Daniels	\$3,151.75
Town of Dewey	\$27,498.63
Town of LaFollette	\$116,921.29
Town of Roosevelt	\$64,244.88
Town of Siren	\$3,540.38
St. Croix Chippewa	\$875.00
Town of Trade Lake	\$1,176.05
Town of Union	\$2,551.50
Village of Webster	\$2,503.38
<b>Group Total</b>	<b>\$254,044.24</b>

Source: Wisconsin Emergency Management

**Table 3.2: Public Assistance Grants Received**

<b>Applicant Name</b>	<b>Grant Payment</b>
Burnett County	\$180,851.17
Burnett County Forestry	\$132,739.73
Town of Blaine	\$85,611.75
Town of Daniels	\$187,402.92
Town of Dewey	\$649,667.70
Town of LaFollette	\$968,905.67
Town of Lincoln	\$7,194.25
Town of Meenon	\$3,166.95
Town of Oakland	\$3,202.33
Town of Roosevelt	\$6,701.75
Town of Rusk	\$3,761.40
Town of Siren	\$621,399.44
St. Croix Chippewa	\$22,372.30
Town of Swiss	\$4,932.93
Town of Trade Lake	\$2,717.67
Town of West Marshland	\$2,373.06
Town of Wood River	\$65,832.15
Village of Siren	\$2,872,933.54
<b>Group Totals</b>	<b>\$5,821,766.71</b>

1053  
 May 26, 2000, and continuing. The declaration pertained to 17 counties for Public Assistance, Hazard Mitigation, and Individual Assistance.

On May 11, 2001, a major Presidential disaster declaration was declared for severe storms and floods. The declaration pertained to Burnett County and some local units of government for damage incurred from the 2001 Siren tornado.

Since 2001, Burnett County has not had any declared Presidential Disasters. However, the county has responded to hazards of less epic proportions involving forest fires, winter weather, hailstorms and thunderstorms, flooding, drought, and extreme temperatures.

1077  
 1078

1079 **CRITICAL FACILITIES**

1080  
 1081 The BCHMP identifies critical facilities located in the county. A critical facility is defined as a  
 1082 facility in either the public or private sector that provides essential products and services to the  
 1083 general public, is otherwise necessary to preserve the welfare and quality of life in the city; or  
 1084 fulfills important public safety, emergency response, and/or disaster recovery functions.

1085  
 1086  
 1087 Critical facilities identified in Burnett County include the Burnett County Government Center,  
 1088 Burnett Medical Center, St. Croix Tribal Health Center, all three village halls, nursing homes,  
 1089 airports, and both public and private schools in the county (Map 9). In addition to critical  
 1090 facilities, Burnett County contains “at-risk” populations that were factored into the vulnerability  
 1091 assessment. These include a relatively large population of elderly residents with limited mobility.  
 1092 The Department of Human Services is currently working on a plan for providing emergency  
 1093 assistance to special needs populations.

1094  
 1095 The planning committee used GIS and other resources to identify critical facilities most likely to  
 1096 be affected by hazards. Two hazards, tornados and flooding, were identified as most likely to  
 1097 impact the county’s critical facilities. No critical facilities were identified as being located within  
 1098 a floodplain. In addition to critical facilities, Burnett County “at-risk” populations include a  
 1099 relatively large population of elderly residents, some with limited mobility located in or near the  
 1100 Villages of Grantsburg, Siren, and Webster.

1101  
 1102 A financial assessment of the critical facilities was conducted to establish a replacement cost in  
 1103 the event of a natural disaster. Table 3.3 identifies the approximate values of the critical facilities  
 1104 identified by the identified sources of information.

1105  
 1106  
 1107 **Table 3.3: Inventory of Critical Facilities**

Name of Description of Asset	Sources of Information	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (Sq Ft)	Replacement Value (\$)	Contents Value (\$)	Contact
Burnett County Government Center	Burnett County	✓	✓	✓			54,000	\$65,000,000	\$1,278,356	Lynn Blahnik
St. Croix Tribal Health Center	St. Croix Tribal Office	✓	✓	✓			22,000	\$3,000,000	\$1,500,000	Barb Rivard
Grantsburg Village Hall	Village			✓			26,400	\$3,000,000	\$1,000,000	Jennifer Zeiler
Siren Village Hall	Village			✓			5,316	\$650,000	\$50,000	Martin Shutt
V. of Siren Main. Shop	Village	✓		✓			5200	\$600,000	\$100,000	Martin Shutt
V. of Siren Well 2	Village	✓		✓			700	\$150,000	\$150,000	Martin Shutt

1108 Table 3.3: Inventory of Critical Facilities (continued)

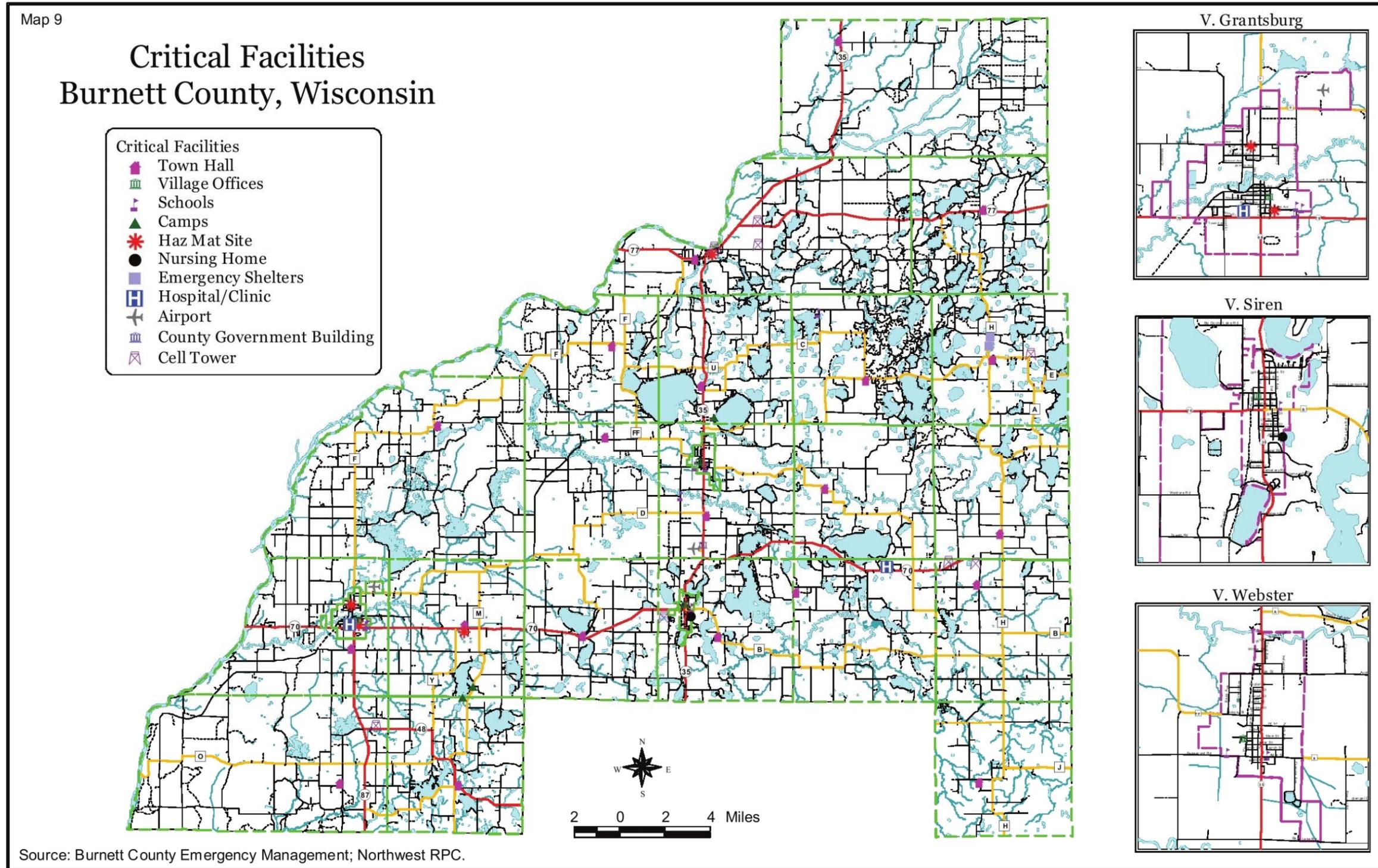
Name of Description of Asset	Sources of Information	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (Sq Ft)	Replacement Value (\$)	Contents Value (\$)	Contact
V. of Siren WWTF	Village	✓		✓			3 small blds	\$2,500,000	N/A	Martin Shutt
V. of Siren Main Liftstation	Village	✓		✓			300	\$50,000	\$400,000	Martin Shutt
V. of Siren Watertower	Village	✓		✓			150k gals	\$450,000	N/A	Martin Shutt
Webster Village Hall	Village			✓			1,300	\$200,000	\$35,000	Patty Bjorklund
Webster Community Center	Village			✓			10,000	\$599,298	\$63,124.00	Patty Bjorklund
Webster Water Tower	Village	✓		✓				\$568,168		Patty Bjorklund
Grantsburg Elementary School	Grantsburg School District	✓	✓	✓	✓		35,227	\$5,395,000	\$999,000	Kerri Oachs
Grantsburg Middle School	Grantsburg School District	✓	✓	✓	✓		88,500	\$11,209,000	\$2,145,000	Kerri Oachs
Grantsburg High School	Grantsburg School District	✓	✓	✓	✓		77,269	\$10,415,000	\$3,156,000	Kerri Oachs
Nelson Elementary School	Grantsburg School District						12,778	\$1,562,000	\$336,000	Kerri Oachs
Siren School	Siren School District	✓	✓	✓	✓		139,526	\$16,481,308	\$1,452,136	Scott Johnson
Webster Elementary School	Webster School District	✓	✓	✓	✓		47,784	\$6,676,234	\$939,140	Kim Johnson
Webster Jr./Sr. High School	Webster School District	✓	✓	✓	✓		134,000	\$19,202,928	\$ 2,820,097	Kim Johnson
Burnett Medical Center	BMC Administrator	✓	✓	✓	✓		92,000	\$30,000,000	\$9,500,000	Charlie Faught
Shady Knoll Home	Shady Knoll Home		✓				4,600	\$225,000	\$30,000	Greg Peer
Burnett County Airport	Burnett County	✓		✓			2,400	\$180,148	\$25,008	Lynn Blahnik
Grantsburg Municipal Airport (3 Buildings)	Village	✓		✓			2,168	\$165,019	\$14,044	Jennifer Zieler
Burnett County Highway Shop	Highway Commissioner	✓		✓	✓		18,720	\$639,035	\$313,865	Lynn Blahnik
Burnett County Highway Office	Highway Commissioner	✓		✓	✓		2,538	\$177,532	\$43,303	Lynn Blahnik
Alternative Learning Center	CESA11 Turtle Lake			✓			5,000	\$160,000	\$51,000	Leslie Seeger

1109

1110 Table 3.3: Inventory of Critical Facilities (continued)

Name of Description of Asset	Sources of Information	Critical Facility	Vulnerable Populations	Economic Assets	Special Considerations	Historic/Other Considerations	Size of Building (Sq Ft)	Replacement Value (\$)	Contents Value (\$)	Contact
Grantsburg WWTF	Village	✓		✓			659	\$58,000	\$41,000	Jennifer Zieler
Grantsburg Water Tower #1	Village	✓		✓			100K gallon	\$422,000		Jennifer Zieler
Grantsburg Water Tower #2	Village	✓		✓			200k gallon	\$500,000		Jennifer Zieler
Webster WWTF	Village	✓		✓				\$ 16,723	\$43,018	Patty Bjorklund
Danbury/St. Croix Chippewa WWTF	Joint Water Quality Commission of Danbury & St Croix Chippewa Indians of Wisconsin	✓		✓				\$2,763,000		Janice Miller
Danbury/St. Croix Chippewa Water Tower	Joint Water Quality Commission of Danbury & St Croix Chippewa Indians of Wisconsin	✓		✓			150k gallon	\$577,000		Janice Miller

- 1111  
 1112 Note:  
 1113 1) Capeside Cove Good Samaritan Center listed in the last plan has ceased operations.  
 1114 2) Data to be updated as better information becomes available.  
 1115



1118 **PAST HAZARD EXPERIENCE**

1119  
 1120 Through the plan development, review and update processes, every attempt was made to find and  
 1121 use the best available historical data.

1122  
 1123 National Climatic Data Center (NCDC) publishes National Weather Service (NWS) data  
 1124 describing past recorded weather events and resulting deaths, injuries, and damages. Since 1994,  
 1125 Burnett County has experienced 147 weather hazard events, as summarized in Table 3.4. To  
 1126 illustrate the broader hazard damage potential, Those hazard events were estimated to have  
 1127 caused almost \$30 million in property damages. The NCDC data shows that thunderstorms and  
 1128 winds, followed by hail and heavy snow, are the most frequent weather hazards; and extreme  
 1129 temperatures, primarily heat, followed by tornados are the most deadly weather hazards over the  
 1130 last 50 years. In addition, it should be noted damages may occur from multiple hazards, such as  
 1131 when hail, rain, wind, and tornados strike during a single storm.

1132  
 1133 Although not  
 1134 specifically listed in  
 1135 Table 3.4, forest fires  
 1136 are a significant hazard  
 1137 in Burnett County.  
 1138 When significant forest  
 1139 fires do occur,  
 1140 regardless of the cause,  
 1141 it is a weather driven  
 1142 event. When nature  
 1143 combines the right time  
 1144 of year (usually spring)  
 1145 with hot, dry, windy  
 1146 conditions, significant  
 1147 and damaging forest  
 1148 fires can occur.

**Table 3.4: Weather Hazard Events Recorded in Burnett County, 1994-2009**

Type Event	# of Events	Death	Injury	Prop \$
Drought	14	0	0	\$ -
Extreme Temp	14	66	0	\$ -
Flood	5	0	0	\$20,250,000
Hail	32	0	0	\$250,000
Thunderstorm	34	0	1	\$315,000
Tornado	5	2	16	\$10,000,000
Winter Storm	43	0	0	\$ -
<b>Total</b>	<b>147</b>	<b>68</b>	<b>17</b>	<b>\$ 30,815,000</b>

Source: The National Climatic Data Center (NCDC)

1149  
 1150 To illustrate the potential frequency of thunderstorms and tornados, a review was made of the  
 1151 convective warnings and watches historically issued by the National Weather Service, as shown  
 1152 in Table 3.5. Over the period from 1990 to 2009, there have been 262 thunderstorm-related  
 1153 watches or warnings and 59 tornado-related watches or warnings issued.

1154  
 1155 Improved weather forecasting and warning systems, as well as more effective building codes,  
 1156 may help explain the decline of tornado mortality rates; although, tornados remain a very serious  
 1157 threat to human life. The sudden emergence of temperature extremes as a cause for mortality is  
 1158 most likely due to a combination of improved record keeping and the longer life expectancy of  
 1159 individuals. Mortality from heat waves affects the elderly disproportionately.

1160

1161 Past experiences with disasters are an indication of the potential for future disasters for which  
 1162 Burnett County would be vulnerable. Accordingly, a review was made of the hazards that have  
 1163 faced Burnett County in the past  
 1164 and a ranking by risk was made  
 1165 based upon disaster history and  
 1166 emergency management  
 1167 experience.

1168  
 1169 Current guidance for all hazard  
 1170 mitigation plans promotes  
 1171 thorough consideration for all  
 1172 natural hazards. These hazards  
 1173 have been ranked by  
 1174 consideration of their frequency,  
 1175 amount of damage, death and  
 1176 injuries, as well as by concerns  
 1177 and degree of importance  
 1178 assigned by the collective  
 1179 judgment of the LEPC.

1180  
 1181 Hazard severity can be assessed  
 1182 and ranked in a variety of ways.  
 1183 The purpose of ranking hazards is  
 1184 to help set priorities and direct  
 1185 available resources to address  
 1186 those hazards of the greatest  
 1187 severity. The type of mitigation  
 1188 actions that will be needed  
 1189 depends on the vulnerability to be addressed. Some hazards, such as excessive heat and  
 1190 lightning, are unlikely to cause a disaster; but they can be fatal and are serious hazards.  
 1191 Vulnerability to such hazards can be addressed by preventative measures, such as public  
 1192 information to encourage hazard awareness and public protection. Other hazards, such as  
 1193 flooding, are pervasive and devastating and may require a variety of actions -- building codes,  
 1194 mapping, zoning laws, insurance, elevation or acquisition of flood prone structures and areas,  
 1195 and public awareness -- to effectively reduce the risk of disaster. However, flooding might not  
 1196 result in more fatalities than a heat wave. In general, ranking hazards by the number of deaths  
 1197 that they cause shifts the focus away from major, and largely avoidable, disasters, such as floods.  
 1198 Therefore, while weather hazards that have caused past Burnett County disasters are probably the  
 1199 hazards that will cause future disasters, the types of natural hazards that result in fatalities remain  
 1200 a public health and safety concern.

1201  
 1202 On July 16, 2003, the LEPC ranked the natural hazards according to how they felt each hazard  
 1203 might affect the county if it occurred. Table 3.6 includes a natural hazards identification and  
 1204 assessment matrix. Columns 2-9 provide criteria that are designed to assist in determining which  
 1205 hazards pose the highest risks to local governments. For each hazard Burnett County is  
 1206 vulnerable to, the planning committee assigned a risk rating of 1 (low), 2 (medium), or 3 (high)

**Table 3.5: Convective Watches and Warnings for Burnett County, 1990-2009**

Year	# Warnings		# Watches	
	Severe Thunderstorm	Severe Tornado	Thunderstorm	Tornado
1990	6	1	*	*
1991	5	1	*	*
1992	4	1	*	*
1993	2	0	*	*
1994	1	0	*	*
1995	4	0	*	*
1996	6	0	9	2
1997	6	3	5	4
1998	12	1	7	2
1999	6	0	4	2
2000	13	6	3	2
2001	9	4	4	1
2002	10	2	3	0
2003	3	1	10	2
2004	6	1	14	5
2005	8	2	16	4
2006	12	0	8	1
2007	11	3	12	4
2008	23	0	7	1
2009	11	1	2	2
<b>Total</b>	<b>158</b>	<b>27</b>	<b>104</b>	<b>32</b>

Source: National Weather Service Forecast Office, Duluth, MN Carol Christenson, [Carol.Christenson@noaa.gov](mailto:Carol.Christenson@noaa.gov), (218) 729-6572 x 726

1207 for each of the risk assessment criterion. With the numerical rating assigned to each criterion,  
 1208 each hazard row is totaled. The hazards with the highest rating in column 10 are deemed the  
 1209 hazards posing the highest risk to Burnett County.

1210  
 1211 Out of a possible high score of 51, forest fire scored the highest at 22, making it the hazard that  
 1212 poses the highest threat to Burnett County. Tornadoes were second with a score of 19, and both  
 1213 hailstorms and heavy snowstorms scored 17. This method of rank was utilized as a tool to help  
 1214 analyze risks and should not be construed as a precise way for determining these risks.

1215  
 1216 During the process for the 2009-2010 plan update, at the 10/13/2009 meeting of the LEPC, the  
 1217 ranking procedure and rankings conducted in 2003 were reviewed and re-affirmed. No changes  
 1218 were made in the scoring or the resulting ranking.

**Table 3.6: Burnett County Natural Hazard and Assessment**

1 Hazard Identification	2 Hazard Frequency	3 Hazard Probability	4 Health & Public Safety	5 Home Damage	6 Business Disruption	7 Public Expenditures	8 Magnitude of population at risk	9 Adjustment	10 Risk Assessment Rating Total
Natural Hazards	Frequency of past hazard occurrence	Probability of hazard occurring in the future	Degree of past hazard events causing injuries,	Degree of past hazard events causing damage to homes	Degree of past hazard events causing damage or interruption to businesses	Amount of local, state, & federal funds expended on past hazard recovery activities	Amount of population still vulnerable to damage from hazard	Future potential for damage and/or destruction	
<b>Forest Fires</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>22</b>
Tornado	2	2	3	3	3	3	3		19
Winter Storms	3	3	1	2	3	2	3		17
Hail Storms	3	3	2	3	2	1	3		17
Thunderstorms/Lightning/High Winds	3	3	1	3	2	1	2		15
Riverine Flooding	2	2	1	1	2	3	2		13
Lake Flooding	2	2	1	2	2	2	2		13
Extreme Cold	2	2	1	2	2	1	2		12
Drought	2	2	1	1	2	2	2		12
Flash Flooding	1	1	1	2	2	2	2		11
Dam Failure/Flooding	1	2	1	1	2	2	2		11
Ice Storm	1	2	1	1	1	1	1		8
Extreme Heat	1	1	1	1	1	1	1		7

Source: LEPC Ranking, 2003 Burnett County Hazard Mitigation Plan

1219 The ranking of Natural Hazard Assessment was reviewed as part of the first update process and  
 1220 determined to still be valid.

1221

1222 ***RISK ASSESSMENT***

1223  
1224 In the previous portion of this chapter, the hazards considered applicable to Burnett County were  
1225 identified and ranked. This section of the report develops a risk and vulnerability assessment for  
1226 the identified hazards, including vulnerable asset identification and description, hazard event  
1227 profiling (history and impact of hazard's occurrence), and estimated loss information. This risk  
1228 and vulnerability assessment provides the basis for developing mitigation goals, actions, and/or  
1229 strategies, which address the identified risks.

1230  
1231 ***NATURAL HAZARD IDENTIFICATION***

1232  
1233 **NATURAL HAZARD IDENTIFICATION -- FOREST FIRE**

1234 **A-Description of Hazard**

1235 Forest fires are one of the most destructive natural forces known to mankind. A forest fire  
1236 is an uncontrolled fire occurring on forest, grass, or woodlands outside the limits of  
1237 incorporated villages or cities. Fires are a natural part of the ecosystem. However, forest  
1238 fires can present a substantial hazard to life and property in rural areas of Wisconsin. The  
1239 likelihood of forest fires in Burnett County can be explained by a number of key factors;  
1240 land use, vegetation, and amount of combustible materials present and weather conditions  
1241 such as wind, humidity, and level of precipitation.

1242  
1243 **B-Historical Data on Hazard Events**

1244 Burnett County is known for its fire history due to the prevalence of sandy soils and  
1245 pine/oak forests. The large yearly planting program of red pine and extensive area of  
1246 solid jack pine form a severe crown fire potential. Over the past 40 years, Burnett County  
1247 has experienced two significant forest fires.

1248  
1249 The West Marshland Fire was initiated on May 1, 1959, by a spark from an over-heated  
1250 chimney. The cause leading to this fire was primary a lack of precipitation. Over a the  
1251 period of January to April, less than two inches of precipitation was received. This  
1252 particular type of fire, known as a "crown" fire, indicates it's a fire that advances from top  
1253 to top of trees, more or less independent of fire on the ground. Crown fires are the fastest  
1254 type of fire and cause complete destruction of anything in its path. The West Marshland  
1255 Fire burned 17,560 acres in five hours. Only two occupied homes were destroyed and  
1256 over three-fourths of the land that was burned was in public ownership, mostly county  
1257 forestland. Townships most affected included Lincoln, Union, and West Marshland. This  
1258 was one of the largest forest fires Burnett County residents have ever seen in terms of  
1259 acreage burned.

1260  
1261 The Ekdall Church Fire originated on April 21, 1980, in a section of slash on the west  
1262 side of County Road F about six miles north of Grantsburg in the Town of West  
1263 Marshland. Causes of this fire were attributed to temperatures soaring to a record 91  
1264 degrees, combined with a very low humidity and a firewood cutting operation. The result

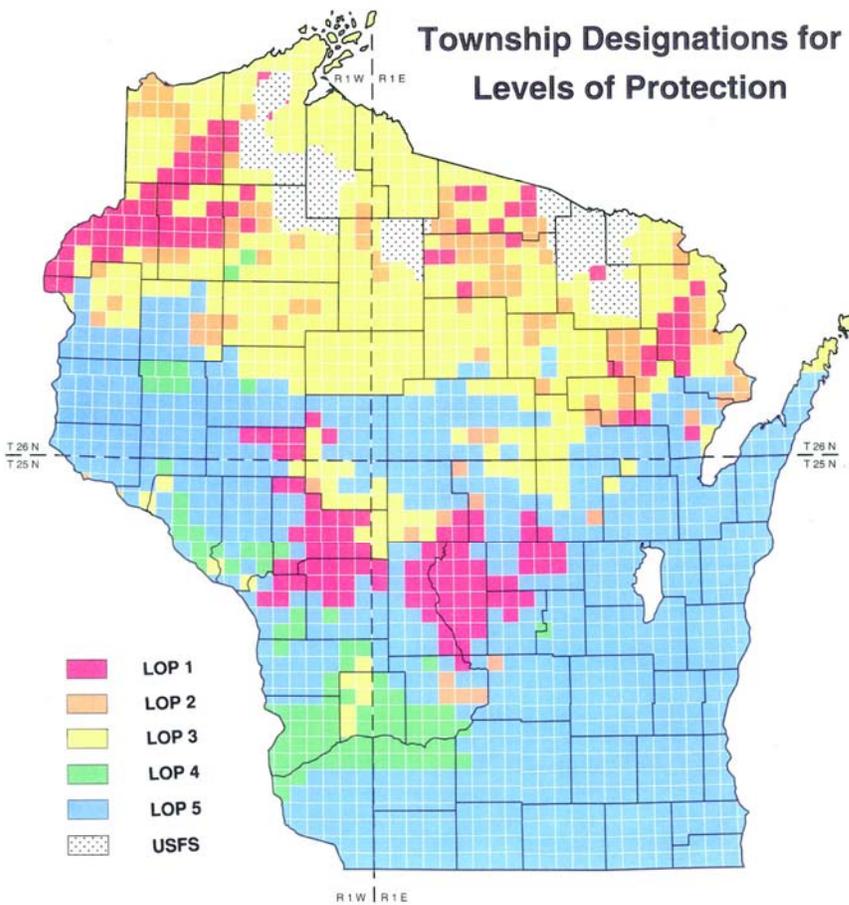
1265 was a fire that burned approximately 4,654 acres, measuring about four miles by about  
 1266 eight miles. The flames took 34 structures including the historic Ekdall Church that  
 1267 would be named after it.  
 1268

1269 **C-Location of Potential Hazard Events**

1270 The **wildland-urban interface** is the place where forest and development meet. Urban  
 1271 development and land use conversions can change forestland to the point that natural  
 1272 resources are altered and forest management is changed. As development spreads further  
 1273 into forested areas, fire becomes a greater risk for forest landowners. Fire in the wildland  
 1274 urban interface may impact individuals, communities, and natural resources. But by  
 1275 educating residents about protective measures and ensuring fire wise development and  
 1276 proper forest  
 1277 management, the risk of  
 1278 wildfires in interface  
 1279 areas can be decreased.  
 1280 Forest fires can affect all  
 1281 areas of Burnett County,  
 1282 although there is a  
 1283 significantly higher risk  
 1284 especially where there  
 1285 are sandy soils in  
 1286 forested areas.

1287  
 1288 In a 1994 study, the  
 1289 Wisconsin DNR  
 1290 evaluated the level of  
 1291 protection that was  
 1292 required by each  
 1293 township in the state. A  
 1294 map of the results of the  
 1295 study is show in Figures  
 1296 3.1 and 3.2. It was  
 1297 determined that the level  
 1298 of protection required  
 1299 was the highest level  
 1300 throughout the county,  
 1301 except for the NW corner  
 1302 of the county and the  
 1303 areas of primarily crop  
 1304 land in the southern edge  
 1305 of the county. Is these  
 1306 areas, the level of protection is at level 2 or 3 on a scale of 5.

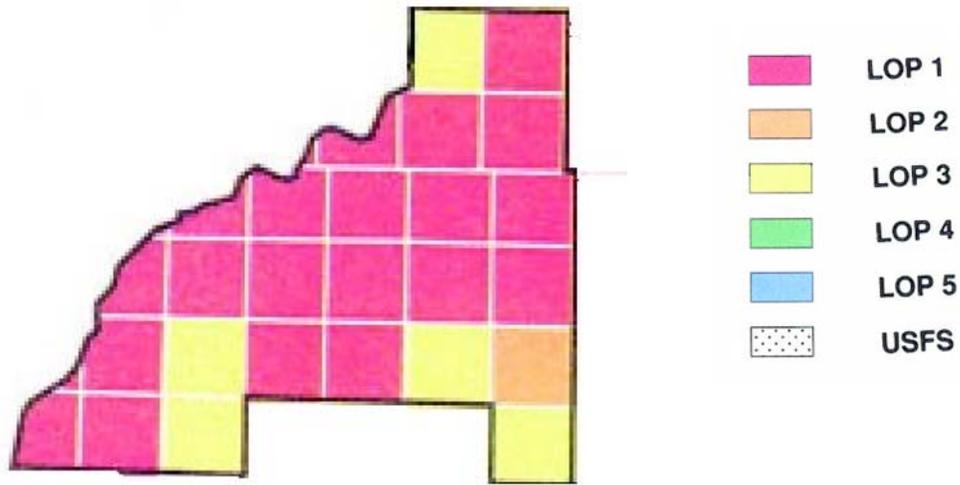
**Figure 3.1: State map of Required Level of Forest Fire Protection for Townships**



Source: Fire Control Study – Phase three, WI DNR 1994

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**Figure 3.2: Burnett County map of Required Level of Forest Fire Protection for Townships**

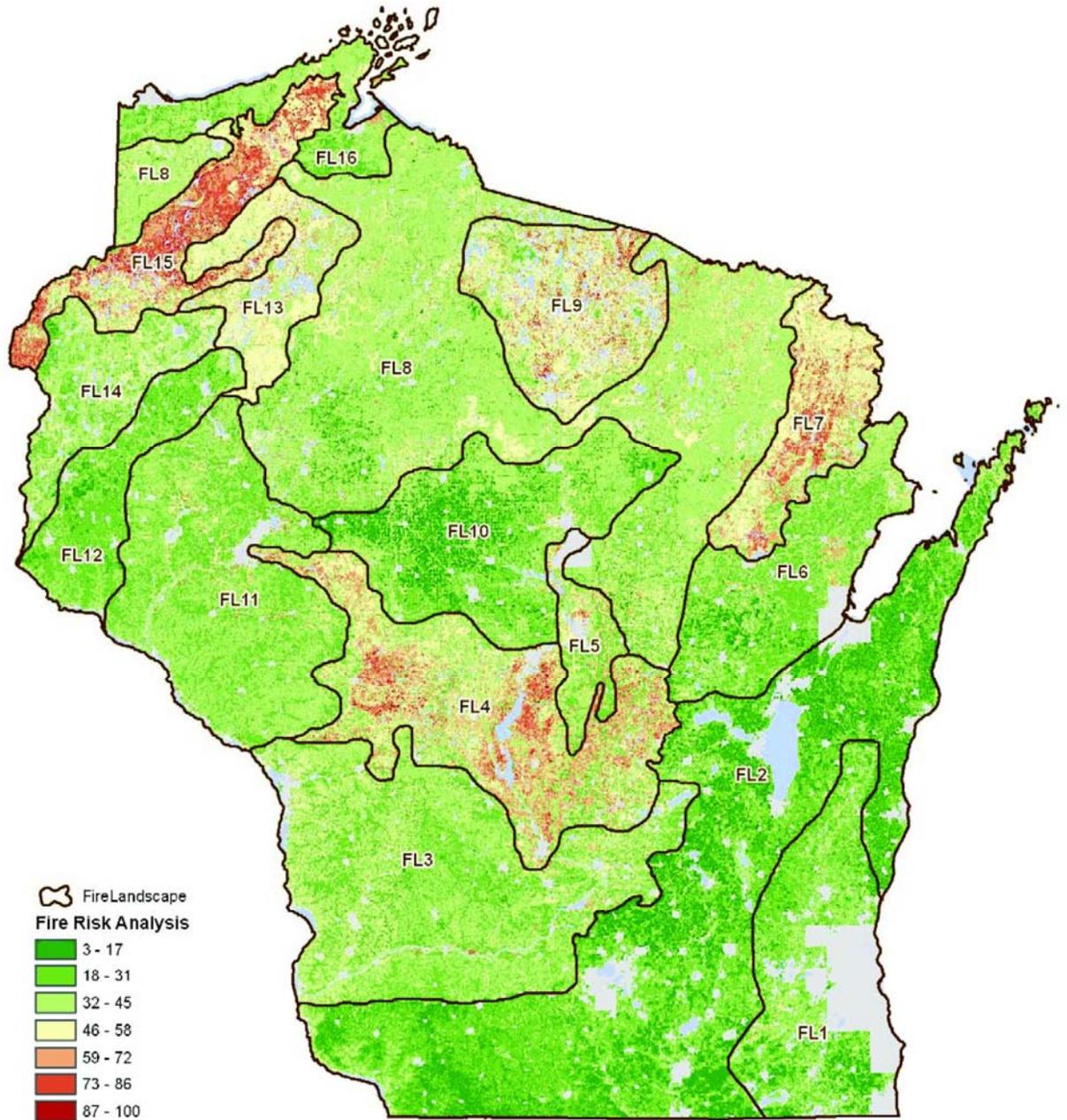


Source: Fire Control Study – Phase three, WI DNR 1994

In a recent study released in March of 2010, the Wisconsin Division of Forestry reviewed the fire risk based on soil type and ground cover. This study is graphically summarized in Figures 3.3 and 3.4. As was found in the 1994 study, Burnett County contains a fair portion of the high risk areas in the state. All three incorporated Villages are in the highest risk areas for Forest Fire danger.

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Figure 3.3: State map of Fires Risk Analysis by the Wisconsin Fire Landscape

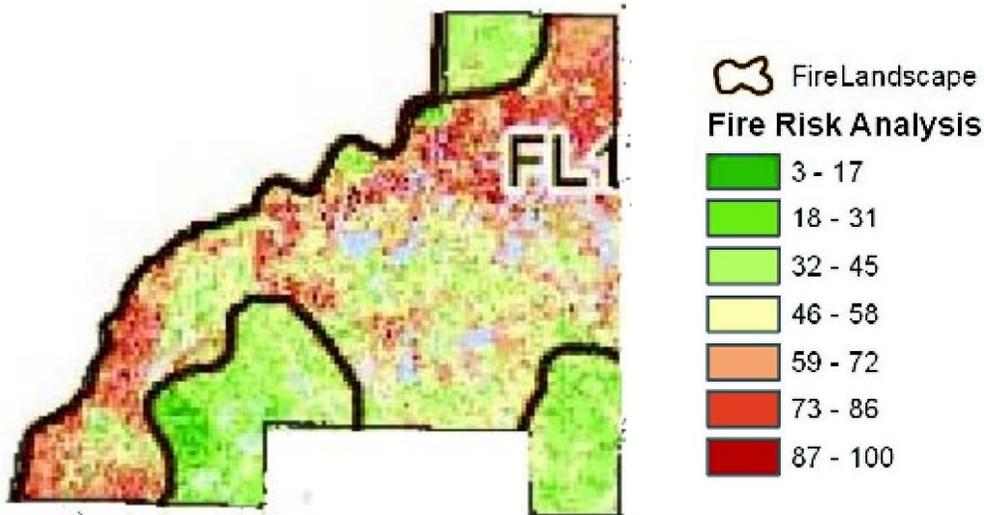


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Source: Wildland Fire Management Program Assessment, Wisconsin Division Of Forestry, March, 2010

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Figure 3.4: State map of Fires Risk Analysis by the Wisconsin Fire Landscape



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Source: Wildland Fire Management Program Assessment, Wisconsin Division Of Forestry, March, 2010

1381 **D-Extent/Magnitude/Severity of Hazard**

1382 Forest Fires are capable of causing significant injury, death, and damage to property.  
1383 Damage potential in Burnett County continues to rise as more recreational properties are  
1384 developed in wooded and remote areas. Also, these types of fires can extensively impact  
1385 the economy, particularly the logging, recreation, and tourism industries.

1386  
1387 The ability to control forest fires depends on the location of the fire, the available fuel  
1388 and the acute and chronic weather conditions in the area as well as accessibility to the fire  
1389 location by emergency personnel.

1390

1391 **E-Probability of Hazard Event Occurring**

1392 According to the WDNR Bureau of Forestry, there have been 15 forest fires in Wisconsin  
1393 1987 - 2009 that have consumed more than 500 acres or 0.68 fires per year.

1394  
1395 As mentioned earlier, Burnett County is known for its fire history. To put this in  
1396 perspective, table 3.7 lists the fires in Burnett and surrounding counties.

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1398

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**Table 3.7: Fires in Burnett and surrounding counties 1987 - 2009**

Fire Size (Acres)	Burnett County	Douglas (north of Burnett)	Washburn (east of Burnett)	Barron (SE of Burnett)	Polk (south of Burnett)
> 100	3	4	1	2	0
40 – 100	8	7	3	2	0
20 – 40	20	10	4	7	3

Source: WDNR - [David.Christenson@Wisconsin.gov](mailto:David.Christenson@Wisconsin.gov)

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Considering Burnett County forest fires more specifically, in the same period (1987 – 2009) there were 3 fires greater than 100 acres, 8 fires that were between 40 and 100 acres, and 20 fires between 20 and 40 acres. This compares with 59 fires larger than 100 acres in the 15 years from 1930 to 1945. The majority of these 59 fires took place in the early 1930's and was attributed to drought conditions and to the fact that fires suppression and prevention practices were still in their infancy. In the 1930's, the DNR was in the beginning stage of organizing an effective fire control program. Once organized and put into effect, the frequency of large forest fires significantly decreased. From 1945 to 2009, just 17 forest fires over 100 acres were reported with the West Marshland Fire and Ekdall Church fires being two of the most significant.

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Forest fires typically occur on an annual basis in Burnett County. While the annual number of large forest fires has greatly decreased as compared to the early 1930's, the potential danger to lives and property has not. Because of the increased human activities in the county, the probability of disastrous forest fires continues to escalate.

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**F-Vulnerability of Area to Hazard Event**

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When Do Fires Occur?

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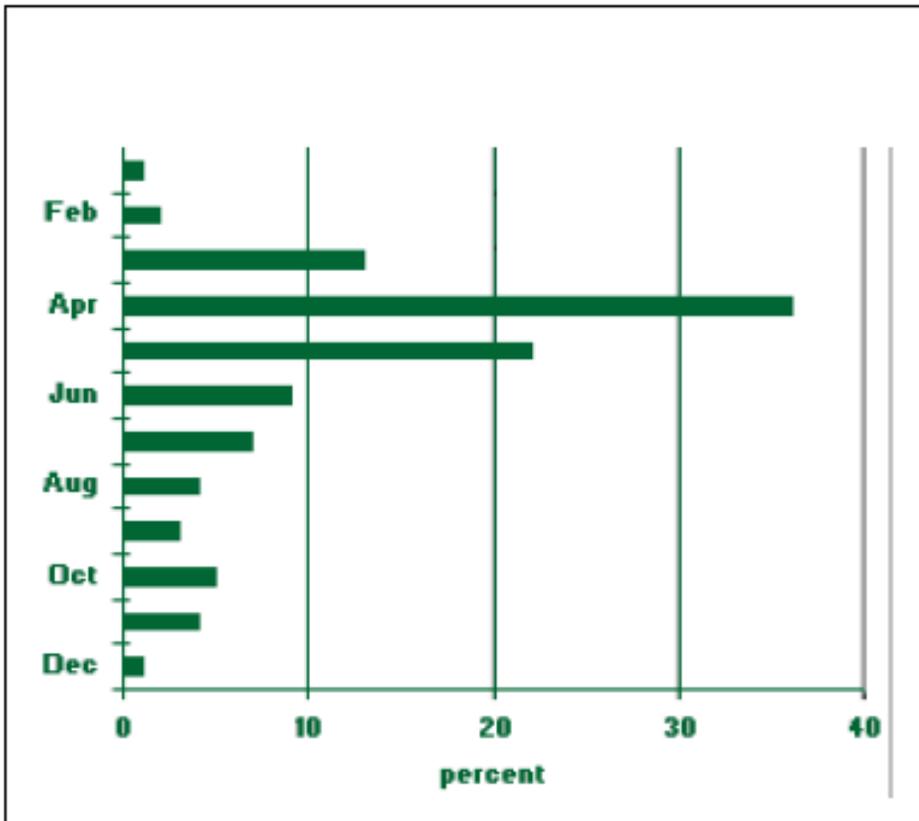
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Forest fires can occur in any month of the year, but there are peak seasons. The highest occurrence of forest or wildfires is in April and May after the snow has left the ground and vegetation is still in dormant stage (Figure 3.5).

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Figure 3.5: Percent of Forest Fires by Month for Wisconsin



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Fire Causes in Burnett County

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Data obtained from the WDNR from 1975 to 2008 shows causes of forest fires in Wisconsin. As is shown in Figure 3.6, debris burning (brush, leaves, grass, trash etc.) is the largest source of forest fires causing approximately 30 % of all forest fires.

1433

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Equipment causing fires (sparks, carbon etc.) is second at 16 percent and third is incendiary (arson) at 12 percent. The "miscellaneous" category would include such things as fireworks, powerlines, ash disposal etc.

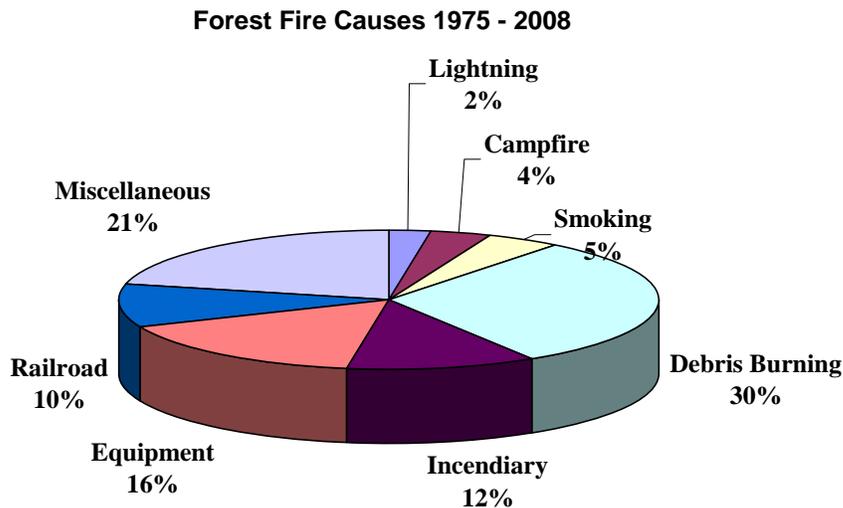
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Figure 3.6: Forest Fires in Wisconsin by Cause 1975-2008



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Source: [dnr.wi.gov/forestry/assessment/docs/C3\\_v4\\_092509.doc](http://dnr.wi.gov/forestry/assessment/docs/C3_v4_092509.doc) - 2009-09-28

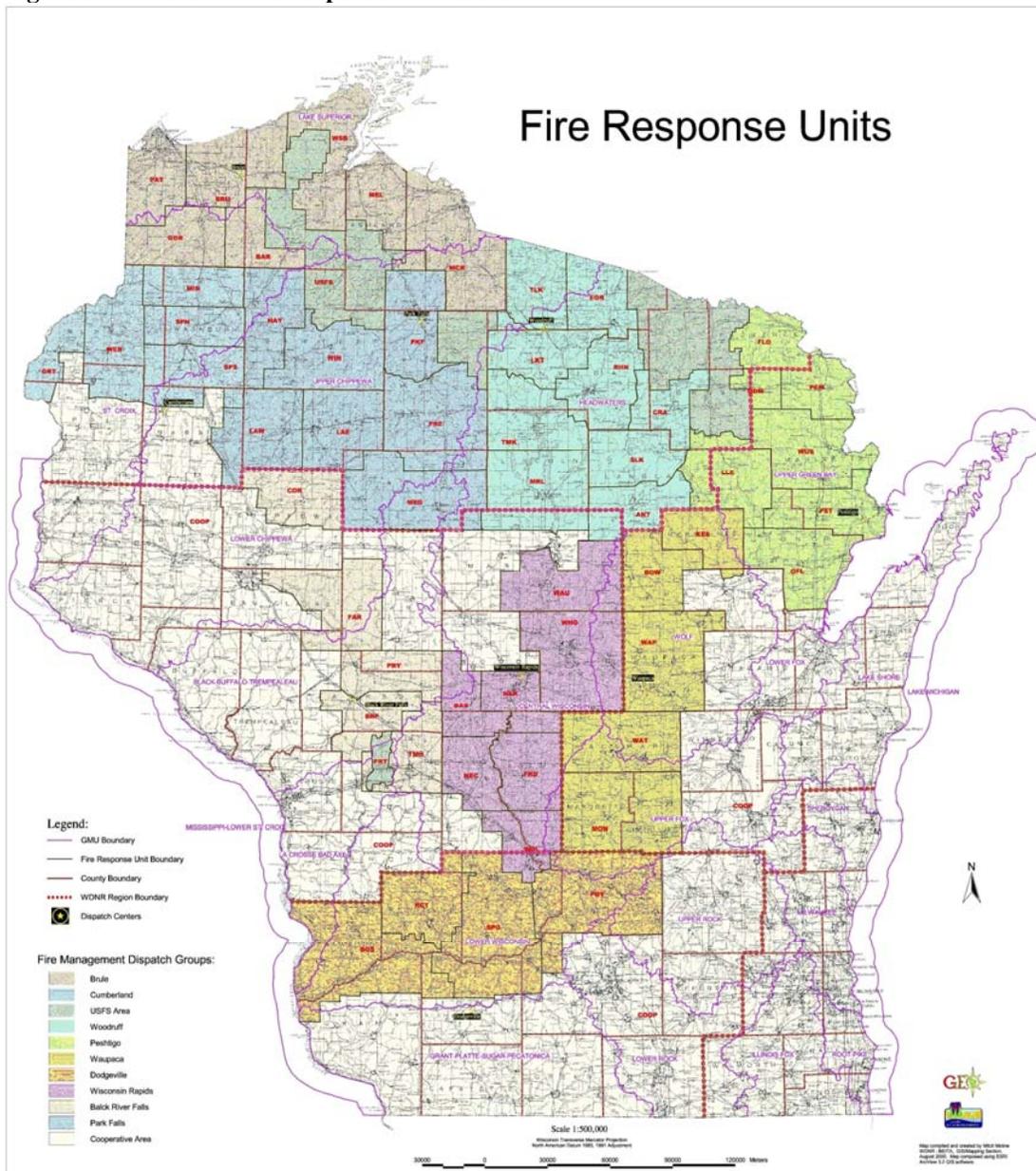
Responsibility for Managing Forest Fires

In Wisconsin, there are three forest fire modes of protection (Intensive, Extensive, and Co-operative). Except for Trade Lake Township, the south half of Wood River Township, and the extreme southeast corner of Grantsburg Township, Burnett County is in the intensive forest fire protection area. In this area, the WDNR is responsible for all forest fire suppression activities. The Trade Lake /Wood River/Grantsburg portion of Burnett County noted above is included in the cooperative forest fire protection area. In these areas, local fire departments are responsible for forest fire suppression activities.

The DNR designated *intensive protection area* -- the most heavily forested area, containing the most fire hazards and risk in the state -- is coordinated through the Cumberland Dispatch Group and is shown in Figure 3.7 and 3.8. DNR Fire response units in Burnett County are located in Grantsburg, Minong, North Spooner, South Spooner, and Webster. Local fire departments within Burnett County also respond to forest fires in the county under a mutual aid arrangement with the WDNR. Twelve fire districts have jurisdiction within Burnett County.

They include from north to south, Dairyland, Danbury, Webb Lake, Webster, Jackson, Scott, Grantsburg, Frederic, Siren, Hertel, Spooner, and Shell Lake. Figure 3.8 depicts fire district boundaries in Burnett County.

Figure 3.7: Wildland Fire Response in Wisconsin

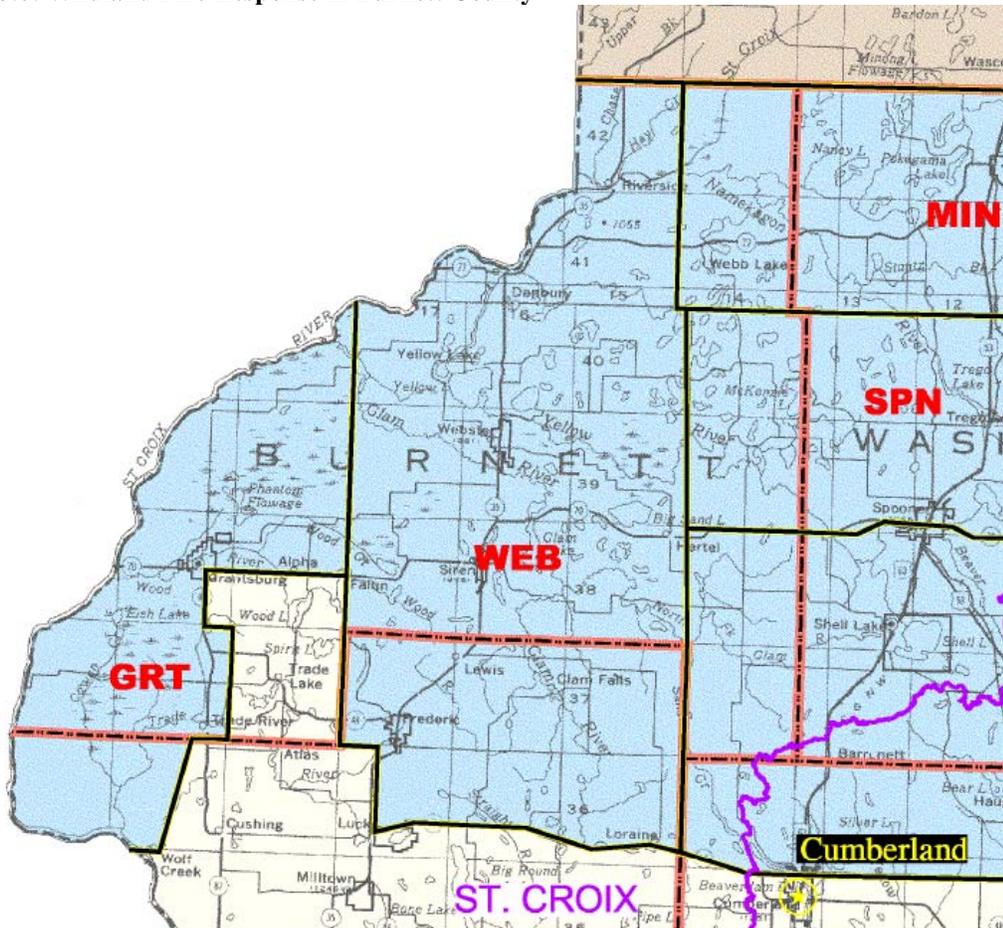


Source:

[http://dnr.wi.gov/forestry/GIS/Data\\_Maps/map\\_gallery/existing\\_maps/response.pdf](http://dnr.wi.gov/forestry/GIS/Data_Maps/map_gallery/existing_maps/response.pdf)

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Figure 3.8: Wildland Fire Response in Burnett County



Legend:

-  GMU Boundary
-  Fire Response Unit Boundary
-  County Boundary
-  WDNR Region Boundary
-  Dispatch Centers

Fire Management Dispatch Groups:

-  Brule
-  Cumberland
-  USFS Area
-  Woodruff
-  Peshtigo
-  Waupaca
-  Dodgeville
-  Wisconsin Rapids
-  Black River Falls
-  Park Falls
-  Cooperative Area

Source:

[http://dnr.wi.gov/forestry/GIS/Data\\_Maps/map\\_gallery/existing\\_maps/response.pdf](http://dnr.wi.gov/forestry/GIS/Data_Maps/map_gallery/existing_maps/response.pdf)

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1494 Burnett County Fire Assessment System

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1496 In the 2004 BCHMP, details of the Burnett County Fire Assessment System were listed.  
1497 In practice, it was determined that this system, while good at the time, and was really  
1498 implemented for firemen safety when the DNR taught aggressive “out-in-front-of-the-  
1499 fire” structural protection tactics. It has been reported that a few property owners objected  
1500 to the system and the manpower requirements of maintaining the system proved to be  
1501 unsustainable.  
1502 In addition, changes in fire fighting tactics – Fighting in the Black – or fighting the fire  
1503 from behind the crown, proved safer and more effective. Therefore, the Burnett County  
1504 Fire Assessment System is no longer used today due to its reduced effectiveness.  
1505

1506 National Fire Danger Rating System

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1508 The National Fire Danger Rating System (NFDRS) is a set of computer programs and  
1509 algorithms that allow land management agencies to estimate today or tomorrow's fire  
1510 danger for a given rating area.  
1511

1512 NFDRS characterizes fire danger by evaluating the approximate upper limit of fire  
1513 behavior in a fire danger rating area during a 24-hour period. Calculations of fire  
1514 behavior are based on fuels, topography, and weather or what is commonly called the fire  
1515 triangle. There are five levels to the system, all which have a color associated with the  
1516 danger. Local DNR ranger stations post these fire danger ratings.  
1517

1518       LOW -- Fire danger negligible.

1519       MODERATE -- Some forest fires possible-average spread and ease of control.

1520       HIGH -- Forest fires start readily from a match. Fires in heavy fuel will be  
1521 difficult to control.

1522       VERY HIGH -- Fires start easily and spread very rapidly. Conditions are  
1523 dangerous and fires are difficult to control.

1524       EXTREME -- Conditions are explosive fire danger severe fuels are tinder dry.  
1525 Outdoor burning of any kind is not recommended.  
1526  
1527

1528 Programs in place to deal with Hazard

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1530  
1531 The WDNR provides grant opportunities through the Volunteer Fire Assistance (VFA)  
1532 program to organize, train, and support county fire associations. A local match of 50  
1533 percent is required for a minimum grant award of \$1,500 (project must have at least  
1534 \$3,000 in eligible project costs) up to a maximum grant award of \$5,000 (project must  
1535 have at least \$10,000 in eligible project costs). The Burnett County Association was  
1536 eligible to apply for these grant monies on a yearly basis. This program was discontinued  
1537 and all the grant money had been rolled into the following program  
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The State of Wisconsin now provides a Forest Fire Protection (FFP) Grant to increase forest fire protection and suppression capabilities through cooperative efforts with local fire departments. Under this program, eligible fire departments can receive a maximum grant award of \$10,000. A local match of 50 percent is required. Since the FFP program started in 1998, Burnett County fire departments have received over \$227,000 in grants to improve their forest fire suppression capabilities. Table 3.8 illustrates a summary of grants awarded to Burnett County fire departments from 1998 through 2009.

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1549

**Table 3.8: Forest Fire Protection (FFP) Grants Awarded To Burnett County Fire Departments 1997-2009**

	Danbury Fire & Rescue	Grantsburg Vol. Fire Dept.	Jackson Vol. Fire Dept.	Scott Vol. Fire Dept.	Siren Fire Dept.	Webb Lake Fire Dept	Webster Rural Fire Assoc.	Burnett County Fire Assoc.	TOTALS
1997		\$ 4,037	\$ 4,611	\$ 1,371	\$ 3,350	\$ 4,360	\$ 3,950		\$ 21,679
1998		\$ 1,229	\$ 1,974	\$ 1,719	\$ 4,725	\$ 3,250	\$ 7,745		\$ 20,642
1999		\$ 2,047	\$ 2,666	\$ 4,230	\$ 2,096		\$ 2,103		\$ 13,140
2000	\$ 1,751	\$ 2,085		\$ 3,565	\$ 2,630	\$ 2,350	\$ 10,000		\$ 22,381
2001		\$ 4,600	\$ 3,198	\$ 2,212		\$ 2,461	\$ 5,150		\$ 17,620
2002		\$ 3,699		\$ 6,515			\$ 6,070		\$ 16,284
2003		\$ 5,604	\$ 2,383	\$ 2,825	\$ 4,882			\$ 5,875	\$ 21,569
2004					\$ 6,329	\$ 2,113	\$ 4,726		\$ 13,167
2005		\$ 6,622	\$ 2,881	\$ 930				\$ 5,649	\$ 16,082
2006			\$ 1,971	\$ 860	\$ 4,945	\$ 2,771	\$ 3,671	\$ 10,000	\$ 24,218
2007		\$ 5,007	\$ 400	\$ 8,256	\$ 3,000				\$ 16,663
2008			\$ 2,810	\$ 5,909	\$ 7,450				\$ 16,168
2009		\$ 772	\$ 2,152	\$ 1,066	\$ 3,553				\$ 7,543
Total	\$ 1,751	\$ 35,702	\$ 25,046	\$ 39,458	\$ 42,960	\$ 17,305	\$ 43,415	\$ 21,524	\$ 227,156

1550 Source: WDNR, Eileen Trainor, Grant Manager,(608) 267-0848,Eileen.Trainor@Wisconsin.gov

1551 The Wisconsin DNR – Division of Forestry is exploring a new program focusing on  
 1552 homes built in or near wildland areas – commonly referred to as the ‘wildland urban  
 1553 interface’. The Firewise Communities/USA recognition program is a proactive  
 1554 opportunity available to fire-prone communities that teaches them to protect themselves  
 1555 from a wildfire before it occurs. This program recognizes communities that have  
 1556 significantly reduced wildland urban interface home loss by focusing on a home and its  
 1557 immediate surroundings. The initiative, with the assistance of the local fire officials,  
 1558 assesses a ‘community’ in terms of its wildfire potential. These ‘communities’ can be  
 1559 defined as a neighborhood, sub-division, home/lake association, or a specified grouping  
 1560 of homes. Managing the wildland urban interface fire issue at home, within a community,  
 1561 is the key to creating a safer, more fire-ready Wisconsin.  
 1562

1563 ***Shelters for Response to Hazard***

1564  
 1565 Burnett County Emergency Management has formal agreements with five (5) institutions  
 1566 for shelters in the occurrence of a forest fire event that would necessitate overnight and  
 1567 prolonged assistance to residents of Burnett County. Burnett County Emergency Places  
 1568 of Shelter are listed in Table 3.9.  
 1569

1570 **Table 3.9: Burnett County Emergency Places of Shelter**

Place	Address	Contact	Cap
Grantsburg Schools	480 James Av	Joni Burgin 715-463-5499	450
Siren Schools	24022 4th Av	Scott Johnson 715-349-2290,	450
Webster Schools	26428 Lakeland	Tim Widiker 715-866-4391	400
Lakeside Community Lutheran Church	28626 Cty Rd. H	Roger Pittman 715-635-7791	200
Sacred Heart Catholic Church	28460 Cty Rd H 2 blocks North of A & H	Rev. Michael Tupa 715-866-7321	225

1571 Note: For locations of these and other critical facilities, see Map 9 of this document.  
 1572

1573 **G-Impact on Area if Hazard Event Occurs**

1574 Burnett County has the ninth largest county forest in the state at 106,068.49 acres,  
 1575 making the timber industry an important part of the county's economy. The forest crops  
 1576 are subject to loss through forest fires and forest fires pose potential hazards to people,  
 1577 homes, property, and businesses. Increased development in Burnett County in recent  
 1578 years has increased the potential impact of forest fires as structures that are located near  
 1579 vulnerable woodlands become vulnerable themselves. More people residing in fire prone  
 1580 areas (especially the Northwest Sands area) present greater opportunities for fire to  
 1581 develop in the future. Based on the natural hazard assessment matrix discussed earlier on  
 1582 page 51, the BCLEPC found that Burnett County's highest hazard is forest fires.  
 1583  
 1584  
 1585  
 1586

1587 Estimating Potential Losses

1588

1589 From 1945 to 2009 (57 years), 17 fires greater than 100 acres were reported in Burnett  
1590 County. Based on this data, Burnett County could expect to see a fire greater than 100  
1591 acres every 3.8 years. It is difficult to determine a dollar value for potential damages for  
1592 forest fires. It ultimately depends on the location and size of the fire. For example, the  
1593 dollar loss due to a relatively large forest fire (100 acres or greater) that occurred in an  
1594 area where many seasonal homes were located would be much larger than a similar fire  
1595 that swept through a parcel of county forest.

1596

1597

1598 **NATURAL HAZARD IDENTIFICATION -- TORNADOS**

1599

1600 **A-Description of Hazard**

1601 A tornado is a violently rotating column of air extending from a thunderstorm to the  
1602 ground. The most violent tornados are capable of tremendous destruction with wind  
1603 speeds of 250 mph or more.

1604

1605 **B-Historical Data on Hazard Events**

1606 At 8:06 pm on June 18, 2001, an F3 tornado touched down two miles east-northeast of  
1607 Grantsburg in western Burnett County. The tornado continued east at an average speed of  
1608 40 mph through the Towns of Grantsburg, Wood River, Daniels, Siren, LaFollette,  
1609 Dewey, and Bashaw; as well as the Villages of Grantsburg and Siren; ending on the west  
1610 edge of the City of Spooner in Washburn County. The most extensive damage was in a  
1611 six block-wide area in Siren, where numerous homes were leveled. The average width of  
1612 the tornado was 1/8 to 1/4 mile, with the widest width being about a half mile.

1613 Preliminary indications are that the path length of the tornado was about 41 miles. Four  
1614 hundred homes were destroyed, 200 in Siren alone, while 280 additional homes, 60  
1615 businesses, and 14,000 acres of trees were destroyed or damaged. Many buildings in the  
1616 path of the tornado through Dewey Township, including the Dewey Town Hall, were  
1617 destroyed as well. Power lines, trees, and buildings were also damaged or destroyed at  
1618 Alpha, Falun, and Mud Hen Lake along the path of the tornado between. Two people  
1619 died as a direct result of the tornado, with another person killed indirectly after the  
1620 tornado. In all, there were 16 injuries as a result of the tornado. With the assistance of a  
1621 HMGP grant, Burnett County was able to purchase and distribute NOAA weather radios  
1622 after the Siren tornado.

1623

1624 Another tornado touch down happened one year later, during the evening of September 2,  
1625 2002. A F-3 tornado (approximately 158-206 mph) created a 4 mile by 14 mile path of  
1626 destruction through the City of Ladysmith in Rusk County approximately 60 miles  
1627 southeast of Burnett County. The Towns of Grant, Grow, and Lawrence, also in Rusk  
1628 County, sustained damage from the tornado.

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Since 1982, seven tornados have been recorded in Burnett County, Wisconsin. Table 3.10 displays information regarding these tornados.

**Table 3.10: Tornados Occurrences in Burnett County 1982 - 2009**

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<a href="#">1 BURNETT</a>	7/20/1987	8:20 AM	Tornado	F0	0	0	25K	0
<a href="#">2 Siren</a>	7/8/2000	5:35 PM	Tornado	F0	0	0	0	0
<a href="#">3 Grantsburg</a>	5/1/2001	5:15 PM	Tornado	F0	0	0	0	0
<a href="#">4 Grantsburg</a>	6/18/2001	7:06 PM	Tornado	F3	2	16	10.0M	0
<a href="#">5 Trade River</a>	4/18/2004	4:25 PM	Tornado	F0	0	0	0	0
<a href="#">6 Trade Lake</a>	4/18/2004	4:30 PM	Tornado	F0	0	0	0	0
<a href="#">7 Hertel</a>	6/7/2005	4:48 PM	Tornado	F0	0	0	0	0
TOTALS:					2	16	10.025M	0

**Mag:**Magnitude, **Dth:**Deaths, **Inj:**Injuries, **PrD:**Property Damage, **CrD:**Crop Damage

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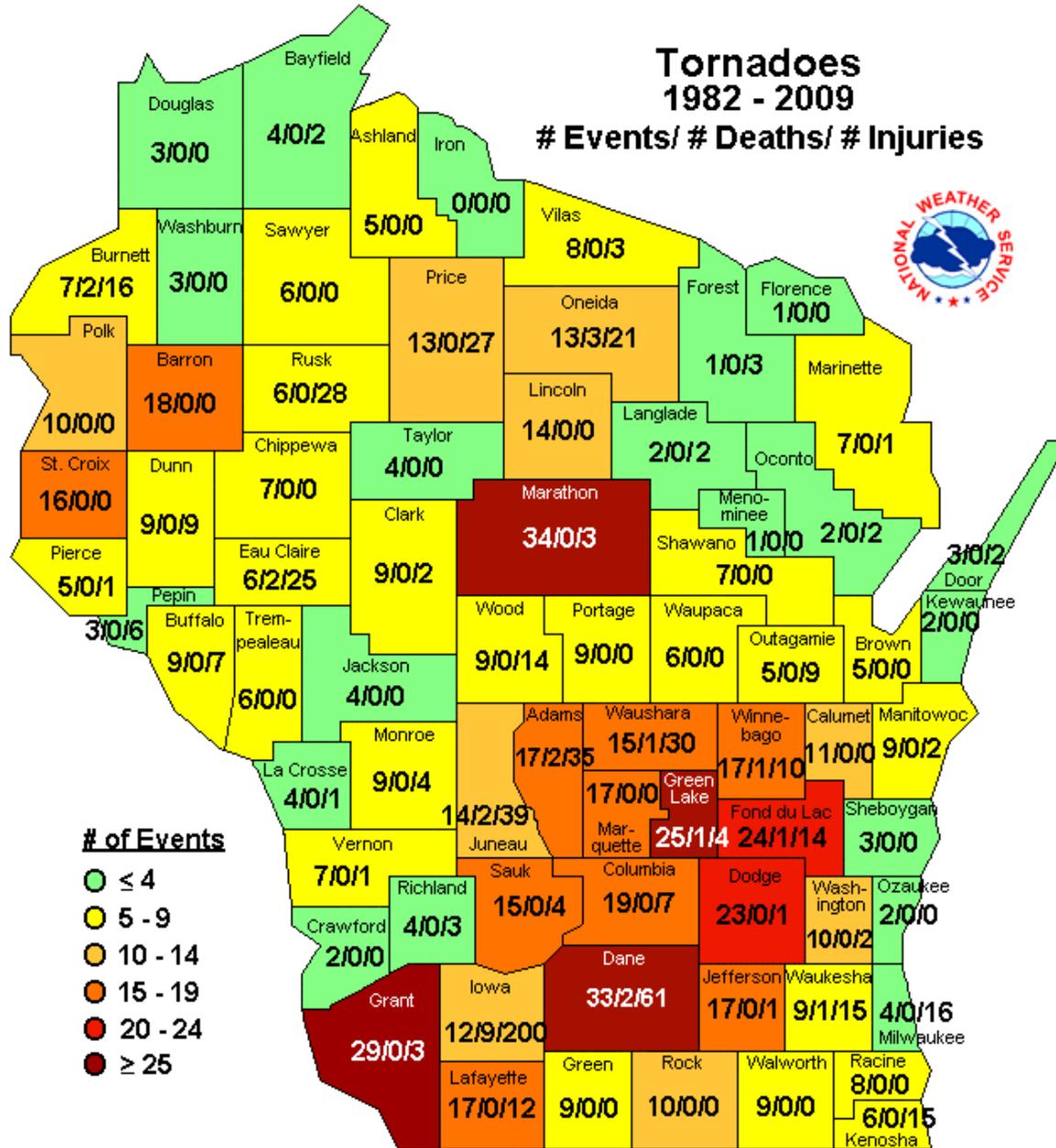
Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

In Wisconsin, tornados usually accompany thunderstorms that form as eastward moving cold fronts strike warm moist air streaming up from the south. Occasionally, multiple outbreaks of tornados occur with this type of weather pattern, affecting large areas of the state at one time.

The southern and west-central sections of the state have had the most number of Tornado occurrences (Figure 3.9).

1647  
1648

Figure 3.9: Wisconsin Tornadoes 1982-2009



<http://www.crh.noaa.gov/images/mkx/severe/tor-event-death-injury.gif>

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1651

1652 **C-Location of Potential Hazard Events**

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The average tornado moves from the southwest to the northeast, but tornadoes have been known to move in any direction. Tornadoes can cut a path of devastation a mile wide. Such a situation would affect large areas of Burnett County. They can range from minimal or no damage to catastrophic and are typically very brief events with long recovery times. All areas of Burnett County are equally at risk.

1659 **D-Extent/Magnitude/Severity of Hazard**

1660 It is possible to predict that a line of thunderstorms is likely to produce tornados; but it is  
1661 not possible to predict well in advance exactly where a tornado will form, where a  
1662 tornado will touch down, or how powerful it may be. Tornados may come with very little  
1663 warning, and so any warning should be heeded and any threat acted upon immediately.  
1664 The first consideration is personal safety. Even an F-1 category tornado, which accounts  
1665 for 40 percent of all tornados nationally, is powerful enough to overturn cars, uproot  
1666 trees, and demolish garages. An F-2 tornado, 24 percent of all tornados nationally, can  
1667 blow the roofs off homes and overturn mobile homes.

1668  
1669 A tornado path averages four miles, but may reach up to 300 miles in length. Widths  
1670 average 300-400 yards, but tornados have cut swaths a mile or more in width, with severe  
1671 tornados or groups of two or three funnels traveling together. On the average, tornados  
1672 move between 25 and 45 miles per hour, but speeds of up to 70 mph over land have been  
1673 reported. Tornados rarely last more than a couple of minutes over a spot or more than 15-  
1674 20 minutes in a ten-mile area, but their short periods of existence do not limit their  
1675 devastation of an area.

1676  
1677 Tornados were previously classified by the Fujita Scale (F-Scale) and now more recently,  
1678 by the Enhance Fujita scale (EF-Scale). In order to review historical data, a comparison  
1679 between the two scales is listed below.

1680  
1681 **Table 3.11: Enhance Fujita Tornado Scale**

Fujita Scale			Enhanced Fujita Scale	
F Number	Fastest 1/4-mile (mph)	3 Sec. Gust (mph)	EF Number	3 Sec. Gust (mph)
0	40-72	45-78	0	65-85
1	73-112	79-117	1	86-110
2	113-157	118-161	2	111-135
3	158-207	162-209	3	136-165
4	208-260	210-261	4	166-200
5	261-318	262-317	5	Over 200

1683 Source: <http://www.spc.noaa.gov/faq/tornado/ef-scale.html>

1684

1685 **E-Probability of Hazard Event Occurring**

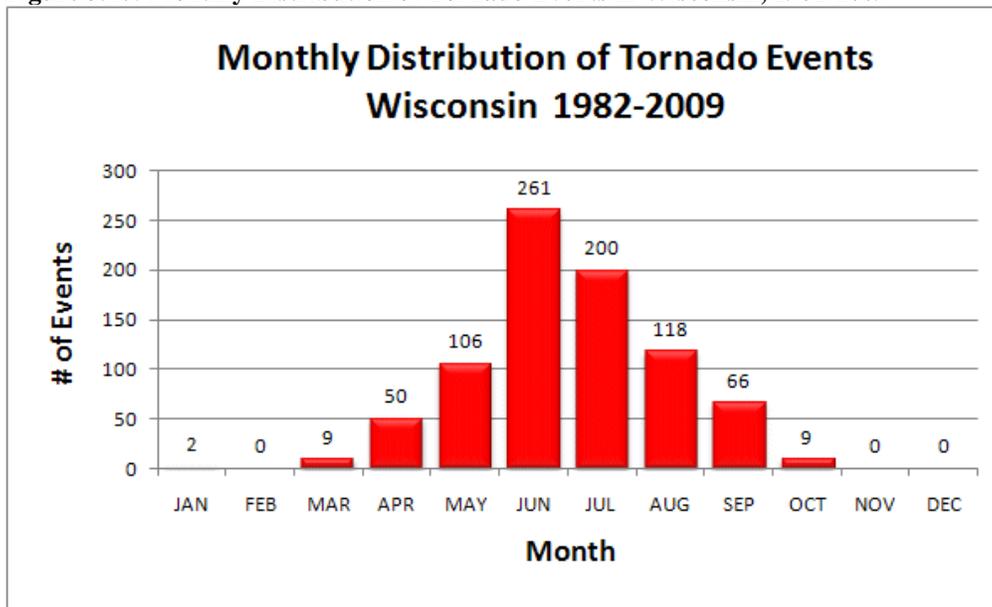
1686 Wisconsin averages almost 20 tornados per year. Seventy-five percent of all Wisconsin  
1687 tornados have struck during mid-afternoon or early evening (3p.m.-7p.m.). The most  
1688 likely time for a tornado is 5 pm. However, tornados may strike at any time, potentially  
1689 with little or no warning.

1690  
1691 The most active tornado months in Wisconsin are (in order of frequency): June, July,  
1692 August, and May.

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Figure 3.10: Monthly Distribution of Tornado Events in Wisconsin, 1982-2009



Source: <http://www.crh.noaa.gov/mkx/?n=storm-init>

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While the overall frequency of tornados in northwestern Wisconsin is relatively low, recent occurrences in the region have caused fatalities and widespread damage. The National Severe Storms Laboratory developed time series plots of the annual cycles of probability for tornados, significant tornados (F2 and greater), and violent tornados (F4 and greater). These graphs depict the probability of a tornado event on any given day for Burnett County. The most likely time of year for tornado activity is roughly between Day 120 and Day 250 (late April mid August). The highest probability of occurrence is from mid-June through early July. The peak probability of a tornado occurrence is roughly 0.41 percent. This means that during this time frame, the chance of a tornado in Burnett County would be about 1 in 250 in any given year.

The probability of a significant tornado (F2 or greater) in Burnett County is significantly lower than the general tornado probability. The 1921-1995 average indicates that the most likely period of occurrence would be about the Day 190 or early July. The peak probability is roughly 0.06 percent. This equates to roughly a 1 in 1,600 annual chance of an F2 event or greater.

Finally, the annual probability of a violent tornado (F4 or greater) is extremely low. The highest probability of this type of event in Burnett County is about 0.01 percent or an annual chance of 1 in 10,000.

Table 3.12: Burnett County Tornado Probability Summary

Type	Strength	Peak Occurrence	Peak Probability	Odds of Occurrence
Tornado (any)	All	June/July	0.41%	1 in 250
Significant	F2 and greater	June/July	0.06%	1 in 1,600
Violent	F4 and greater	June/July	0.01%	1 in 10,000

Source: NOAA National Severe Storm Laboratory

1720

1721

1722 **F-Vulnerability of Area to Hazard Event**

1723 Programs in place to deal with the Hazard

1724

1725 Wisconsin Emergency Management, in conjunction with the National Weather Service,  
1726 Department of Public Instruction, and local emergency management agencies, provides  
1727 tornado awareness and preparedness information to the citizens of Wisconsin. Each  
1728 April, Tornado Awareness Week is conducted educating people on tornado safety and  
1729 increasing their awareness of this significant weather hazard. This campaign also focuses  
1730 on schools and their students. A statewide tornado drill is conducted with the National  
1731 Weather Service commencing this exercise by broadcasting simulated weather bulletins.

1732

1733 As part of these awareness efforts, state and local emergency managers are emphasizing  
1734 the importance of hazard mitigation in reducing the impacts of these devastating storms.  
1735 Local officials are urged to adopt and enforce building codes that make structures more  
1736 resistant to wind damage. Special outreach is encouraged to those who live in mobile  
1737 homes or manufactured housing, as such structures are particularly vulnerable to damage  
1738 in storms that have wind speeds in excess of 80 mph, even when the structures are  
1739 properly anchored. Residents of such structures are advised to leave them immediately  
1740 and seek protection in a suitable shelter. Mobile home park owners are also urged to  
1741 provide residents with such shelters or make arrangements with a nearby facility for that  
1742 purpose.

1743

1744 In the event of a tornado threat, the National Weather Service posts weather bulletins.  
1745 These consist of issuing tornado watches and tornado warnings for areas of the state.  
1746 These bulletins are disseminated over a number of telecommunication channels  
1747 including: National Oceanic & Atmospheric Administration (NOAA) Weather Radio, the  
1748 NOAA Weather Wire, and the state law enforcement Transaction Information for the  
1749 Management of Enforcement (TIME) system. These communications systems are  
1750 routinely monitored by local media, which rebroadcast the weather bulletins over public  
1751 and private television and radio stations.

1752

1753 Burnett County Emergency Management has formal agreements with five (5) institutions  
1754 for shelters in the occurrence of a tornado event that would necessitate overnight and  
1755 prolonged assistance to residents of Burnett County. Burnett County Emergency Places  
1756 of Shelter are listed in Table 3.9. For locations of these and other critical facilities, see  
1757 Map 9 of this document.

1758

1759

1760 **G-Impact on Area if Hazard Event Occurs**

1761 Estimating Potential Losses According to the National Climatic Data Center, in the last  
1762 48 years (from 1953 to 2001) there have been eight confirmed tornados in Burnett  
1763 County. These eight tornados ranging from F-0 to F-3 in scale have caused approximately  
1764 \$12.5 million dollars worth of damage. With eight confirmed tornados in the last 48

1765 years, Burnett County can expect on average, one tornado every six years, each causing  
1766 approximately \$1.5 million dollars damage.

1767  
1768  
1769

## 1770 NATURAL HAZARD IDENTIFICATION -- WINTER WEATHER EVENTS

1771

### 1772 A-Description of Hazard

1773 Winter weather events come in many forms. The National Weather Service  
1774 classifications for winter events includes:

1775  
1776 Heavy snowfall - the accumulation of six or more inches of snow in a 12-hour period or  
1777 eight or more inches in a 24-hour period.

1778  
1779 Blizzard - the occurrence of sustained wind speeds in excess of 35 miles per hour  
1780 accompanied by heavy snowfall or large amounts of blowing or drifting snow.

1781  
1782 Ice storm - an occurrence where rain falls from warmer upper layers of the atmosphere to  
1783 the colder ground, freezing upon contact with the ground and exposed objects near the  
1784 ground.

1785  
1786 Freezing drizzle/freezing rain - the effect of drizzle or rain freezing upon impact on  
1787 objects that have a temperature of 32 degrees Fahrenheit or below.

1788  
1789 Sleet - solid grains or pellets of ice formed by the freezing of raindrops or the refreezing  
1790 of largely melted snowflakes. This ice does not cling to surfaces.

1791

### 1792 B-Historical Data on Hazard Events

1793 Historical Snowfall Data According to the NCDNC's Storm Event database, from 1993 to  
1794 2003 there have been 31 winter weather events recorded in Burnett County including,  
1795 heavy snow (27), ice storms (2), ice/snow event (1), and a winter storm (1). For more  
1796 specific information on one or more of these events, go to:

1797 <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms> .

1798  
1799 Two weather stations located in Burnett County have been collecting information on  
1800 winter weather events since 1950. Tables 3.13 through 3.15 depict snowfall averages and  
1801 extremes at both the Danbury and Grantsburg weather stations. Both stations have been  
1802 similar in snowfall averages and snowfall extremes in past years.

1803

1804 **Table 3.13: Snowfall Averages 1950-2010**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Season
Danbury	0.00	0.00	0.00	0.80	6.95	10.18	11.18	9.33	9.44	3.49	0.20	0.00	48.86
Grantsburg	0.00	0.00	0.00	0.57	6.87	10.85	10.62	8.21	9.25	2.42	0.03	0.00	45.21

1805 Source: National Weather Service Office Duluth, MN

1806

1807

**Table 3.14: Snowfall Extremes (Danbury Station #471978), 1933-2008**

Month	High (In)	Year	1-DayMax (In)	Date
JAN	28.3	1967	13.5	01-15-1953
FEB	27.7	2004	11.5	02-10-1953
MAR	37.5	1951	11.0	03-28-1956
APR	20.5	2008	10.0	04-11-2008
MAY	4.0	1954	3.0	05-03-1954
JUN	0.0	-	-	-
JUL	0.0	-	-	-
AUG	0.0	-	-	-
SEP	0.0	-	-	-
OCT	8.0	1933	7.0	10-30-1951
NOV	38.0	1991	17.0	11-01-1991
DEC	33.6	1968	10.0	12-28-1982

Source: National Weather Service Office Duluth, MN

1808

1809

1810

1811

**Table 3.15: Snowfall Extremes (Grantsburg Station #473244), 1933-2008**

Month	High(In)	Year	1-DayMax(In)	Date
JAN	32.3	1982	13.0	01-23-1982
FEB	23.0	2004	8.0	02-16-1990
MAR	25.9	1951	13.0	03-15-2002
APR	14.3	2008	7.0	04-15-1983
MAY	1.8	1954	1.1	05-02-1954
JUN	0.0	-	-	-
JUL	0.0	-	-	-
AUG	0.0	-	-	-
SEP	0.0	-	-	-
OCT	6.0	2002	6.0	10-21-2002
NOV	41.3	1991	14.0	11-24-1983
DEC	31.0	1969	17.0	12-28-1982

Source: National Weather Service Office Duluth, MN

1812

1813

**C-Location of Potential Hazard Events**

1815 All areas of Burnett County are prone to the effects of winter weather events  
 1816 True blizzards are rare in Wisconsin, but are more likely to occur in northwestern  
 1817 Wisconsin than in southern portions of the state -- even though heavy snowfalls are more  
 1818 frequent in the southeast. Blizzard-like conditions often exist, however, during heavy  
 1819 snowstorms when gusty winds cause the severe blowing and drifting of snow.

1820

1821 Both ice and sleet storms can occur at anytime throughout the winter season from  
 1822 October into April. Early and late season ice and sleet storms are generally restricted to  
 1823 northern Wisconsin, such as the November 7-8, 1943, and April 16-17, 1939, storms.  
 1824 Otherwise, the majority of these storms occur in southern Wisconsin.

1825

1826

**D-Extent/Magnitude/Severity of Hazard**

1828 Storms that affect Wisconsin typically develop over southeast Colorado, northwest  
 1829 Canada, and over the southern plains. These storms move toward the Midwest and use  
 1830 both the southward plunge of cold air from Canada and the northward flow of moisture

1831 from the Gulf of Mexico to produce heavy snow over the region. Winter storms can vary  
1832 in size and strength and include heavy snowstorms, blizzards, freezing rain, sleet, ice  
1833 storms, and blowing and drifting snow conditions.

1834  
1835 Generally, the winter storm season in Wisconsin extends from October through March.  
1836 Severe winter weather has occurred, however, as early as September and as late as the  
1837 latter half of April and into May in some locations in the state. Much of the snowfall in  
1838 Wisconsin occurs in small amounts of between one and three inches per occurrence.  
1839 Heavy snowfalls that produce at least eight to ten inches accumulation happen on the  
1840 average only five times per season. The northwestern portion of Wisconsin receives most  
1841 of its snow during early and late season storms, while southwestern and southeastern  
1842 counties receive heavy snows more often in mid-winter. Snowfall in Wisconsin varies  
1843 between the seasonal average of approximately 30 inches in the south central area of the  
1844 state to over 100 inches a year in the extreme northwestern counties.

1845

#### 1846 **E-Probability of Hazard Event Occurring**

1847 Snowstorms and other winter weather events are nearly certain every year.

1848

1849 In a typical winter season there are three to five freezing rain events and a major ice  
1850 storm occurs on a frequency of about once every other year. If a half-inch of rain freezes  
1851 on trees and utility wires, extensive damage can occur, especially if accompanied by high  
1852 winds that compound the effects of the added weight of the ice. There are also between  
1853 three and five instances of glazing (less than 1/4 inch of ice) throughout the state during a  
1854 typical winter.

1855

#### 1856 **F-Vulnerability of Area to Hazard Event**

1857 Programs in place to deal with the Hazard

1858

1859 Wisconsin Emergency Management, in conjunction with the National Weather Service,  
1860 other state agencies, and local emergency management organizations, provides awareness  
1861 and preparedness information to the citizens of Wisconsin. This information is provided  
1862 in at least two severe weather awareness campaigns conducted annually, each focusing  
1863 on the prevalent weather hazard at that time. In November each year, Winter Awareness  
1864 Week focuses on informing and educating people concerning the hazards presented by  
1865 severe winter weather and information on preparedness for extreme weather conditions  
1866 during winter.

1867

1868 In the event of severe winter weather, the National Weather Service posts winter weather  
1869 bulletins. These bulletins consist of advisories, watches, and warnings that are issued  
1870 concerning expected winter weather conditions. Some are used to alert the public of  
1871 situations such as snow, winter weather, freezing rain or freezing drizzle, and blowing  
1872 snow advisories. Others are used to warn the public of more serious weather situations  
1873 which could pose a threat to life and property: winter storm watch and winter storm,  
1874 heavy snow, blizzard, ice storm, and sleet warnings. There are also bulletins that are not

1875 associated with precipitation but are used to alert and warn like freeze, wind and wind  
1876 chill advisories, and wind chill warnings. These bulletins are disseminated over a number  
1877 of telecommunication channels including the National Oceanic & Atmospheric  
1878 Administration (NOAA) Weather Radio, the NOAA Weather Wire, and the state law  
1879 enforcement Transaction Information for the Management of Enforcement (TIME)  
1880 system. These weather information sources are routinely monitored by local media,  
1881 which rebroadcast the weather bulletins over public and private television and radio  
1882 stations.

1883  
1884 Burnett County Emergency Management has formal agreements with five (5) institutions  
1885 for shelters in the occurrence of a winter weather event that would necessitate overnight  
1886 and prolonged assistance to residents of Burnett County. Burnett County Emergency  
1887 Places of Shelter are listed in Table 3.9. For locations of these and other critical  
1888 facilities, see Map 9 of this document.  
1889

### 1890 **G-Impact on Area if Hazard Event Occurs**

1891 Winter storms present a serious threat to the health and safety of affected citizens and can  
1892 result in significant damage to property.

1893  
1894 Winter storms are a definite hazard to the residents in Burnett County. Winter storms  
1895 present a serious threat to the health and safety of the population and can cause  
1896 significant property damage. For example, after the 1994 Halloween storm, many roads  
1897 and driveways were impassable for up to a week. Due to the time of the month, many  
1898 residents did not have adequate supplies of food, fuel, and medicines. Heavy snow or  
1899 accumulated ice can cause the structural collapse of buildings, down power lines, or  
1900 isolate people from assistance or services.

1901  
1902

## 1903 **NATURAL HAZARD IDENTIFICATION – HAILSTORMS**

1904

### 1905 **A-Description of Hazard**

1906 A hailstorm is a weather condition where atmospheric water particles form into rounded  
1907 or irregular masses of ice that fall to earth. Hail is a product of strong thunderstorms that  
1908 frequently move across the state. Hail normally falls near the center of the moving storm  
1909 along with the heaviest rain; however, strong winds at high altitudes can blow the  
1910 hailstones away from the storm center, causing unexpected hazards at places that  
1911 otherwise might not appear threatened.

1912

### 1913 **B-Historical Data on Hazard Events**

1914 According to the National Climatic Data Center, Burnett County has recorded 41 dates  
1915 with hail between 1955-2009 (Table 3.16). Injuries, deaths, and damage to crops or  
1916 property were not reported.

1917

1918  
1919

**Table 3.16: Hail Events Reported in Burnett County, 1955-2009**

Date	Time	Size	Date	Time	Size
6/13/1956	9:30 PM	1.25 in.	8/14/2000	5:39 PM	1.75 in.
5/10/1959	4:32 PM	0.75 in.	5/1/2001	5:22 PM	1.00 in.
5/5/1964	12:15 PM	1.75 in.	6/18/2001	3:55 AM	1.75 in.
5/23/1964	11:00 PM	1.00 in.	4/18/2002	1:30 AM	1.00 in.
7/15/1965	4:00 PM	1.25 in.	6/25/2002	6:51 PM	0.75 in.
6/25/1973	8:28 PM	1.75 in.	6/24/2003	9:07 PM	0.75 in.
7/14/1980	4:00 PM	1.00 in.	7/3/2003	12:03 AM	0.75 in.
6/30/1983	3:12 PM	0.75 in.	7/20/2003	7:27 PM	0.75 in.
9/5/1987	3:15 PM	0.75 in.	4/18/2004	4:30 PM	2.75 in.
6/25/1990	10:30 PM	1.75 in.	6/7/2005	4:19 PM	0.88 in.
9/3/1996	4:05 PM	0.75 in.	6/27/2005	5:56 PM	0.75 in.
9/10/1996	4:05 PM	1.75 in.	5/29/2006	5:12 PM	1.00 in.
8/3/1997	7:07 PM	0.75 in.	7/25/2006	4:28 PM	0.75 in.
9/1/1997	3:35 PM	0.88 in.	10/3/2006	4:45 PM	1.75 in.
6/15/1998	6:58 PM	1.00 in.	9/13/2007	8:20 AM	0.75 in.
9/25/1998	11:50 PM	1.00 in.	9/21/2007	5:55 AM	1.00 in.
9/26/1998	12:30 AM	1.75 in.	5/25/2008	10:59 AM	0.75 in.
7/9/1999	1:10 PM	1.00 in.	7/25/2008	12:46 PM	0.75 in.
7/8/2000	4:50 PM	1.75 in.	8/3/2008	3:44 PM	0.75 in.
7/25/2000	6:39 PM	0.75 in.	5/5/2009	3:45 PM	1.25 in.
8/8/2000	5:31 PM	2.75 in.			

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

1920  
1921

**1922 C-Location of Potential Hazard Events**

1923 Just as Burnett County is susceptible to thunderstorms, they are also susceptible to a hail  
1924 event in the future. Impacts to the area are generally minor but occasionally severe with  
1925 respect to agricultural crops. The peak hail season is April through August; although,  
1926 hail has been reported with thunderstorms in every month of the year. Any given location  
1927 in Wisconsin will usually experience about three days with hail per year.  
1928

**1929 D-Extent/Magnitude/Severity of Hazard**

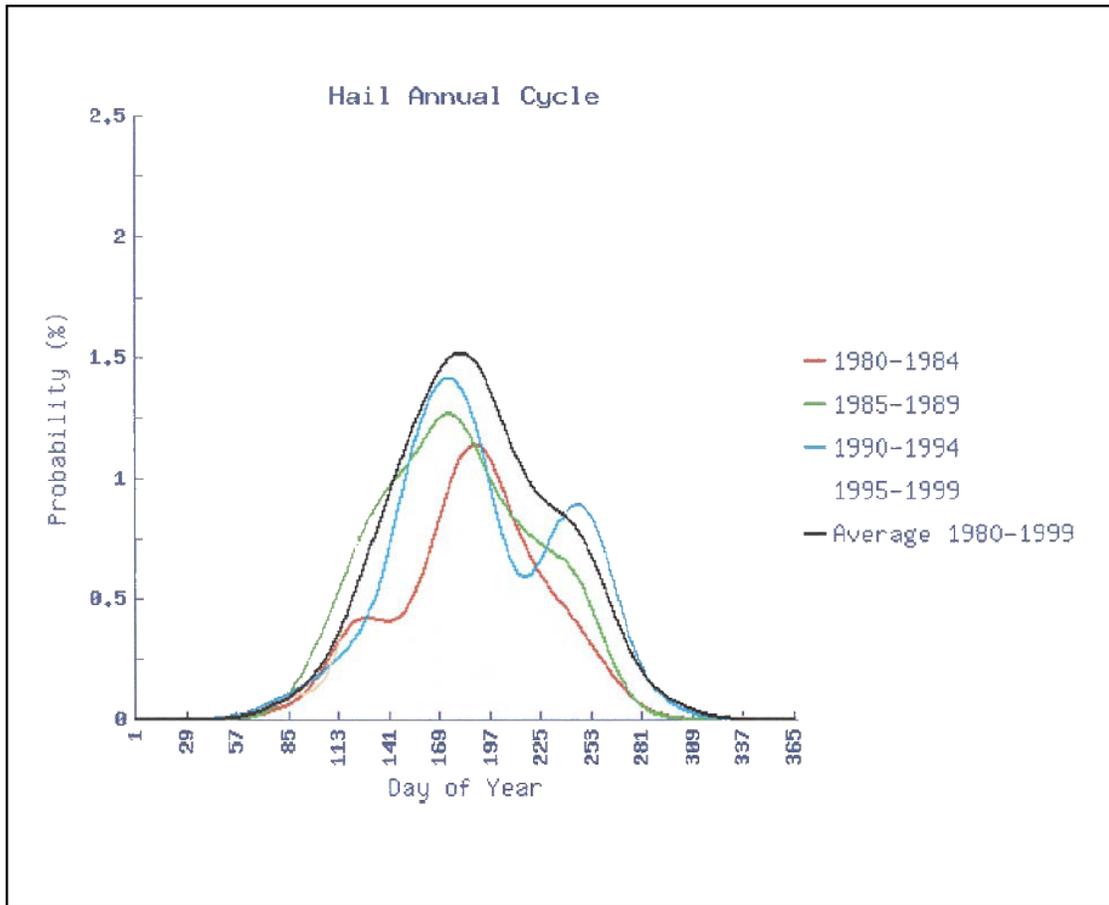
1930  
1931 Hail is considered a severe hazard by the National Climatic Data Center when the hail is  
1932 0.75 inches in diameter or larger.  
1933

1934 **E-Probability of Hazard Event Occurring**

1935 In the 55 years from 1950 to 2004, 41 hail events were reported to the NCDC (National  
1936 Climatic Data Center). In the future, there is a relatively high probability of Burnett  
1937 County encountering a hail event during a spring, summer, or fall thunderstorm. This  
1938 give a probability of .75 hail event per year.

1939  
1940 Figure 3.11 shows the probability of a hail event occurring on any given day for Burnett  
1941 County. For example, Probability of 2 (y-axis value) would indicate a two percent chance  
1942 of receiving a hail event on the day of year indicated by the x-axis value.

1943  
1944 Figure 3.11: Probability of Hail Event in Burnett County



Source: NOAA National Severe Storm Laboratory

1945  
1946  
1947

1948 **F-Vulnerability of Area to Hazard Event**

1949 Burnett County Emergency Management has formal agreements with five (5) institutions  
1950 for shelters in the occurrence of a hail event that would necessitate overnight and  
1951 prolonged assistance to residents of Burnett County. Burnett County Emergency Places  
1952 of Shelter are listed in Table 3.9. For locations of these and other critical facilities, see  
1953 Map 9 of this document.

1954

1955 **G-Impact on Area if Hazard Event Occurs**

1956 Hailstorms are associated with thunderstorms and are the fourth most destructive type of  
1957 weather hazard in Wisconsin. Especially vulnerable are farm crops, the roofs, siding and  
1958 windows of buildings and automobiles.  
1959

1960 **NATURAL HAZARD IDENTIFICATION -- THUNDERSTORMS, LIGHTNING & HIGH**  
1961 **WINDS**  
1962

1963 **A-Description of Hazard**

1964  
1965 A thunderstorm is formed from a combination of moisture, rapidly rising warm air, and a  
1966 force capable of lifting air such as a warm or cold front. Thunderstorms can occur  
1967 anywhere in the world and at any time of the day and may occur singly, in clusters, or in  
1968 lines. Thus, it is possible for several thunderstorms to effect one location in the course of  
1969 a few hours. All thunderstorms produce lightning and thunder, and some have the  
1970 potential to produce damaging straight-line winds, large hail, heavy rain, flooding, and  
1971 tornados.

1972  
1973 A thunderstorm is classified as severe when it contains one or more of the following  
1974 phenomena:

- 1975
- 1976 • Hail 3/4" or greater
  - 1977 • Winds gusting in excess of 50 knots (57.5 mph)
  - 1978 • A tornado
- 1979

1980 Lightning is an electrical discharge that results from the buildup of positive and negative  
1981 charges within a thunderstorm. When the buildup becomes strong enough, lightning  
1982 appears as a "bolt." This flash of light usually occurs within the clouds or between the  
1983 clouds and the ground.

1984  
1985 Frequently, thunderstorm events are accompanied by high winds. These forces are most  
1986 often the cause of widespread damage associated with thunderstorms. The two main  
1987 types of thunderstorm produced wind phenomena are downbursts, or straight-line winds,  
1988 and derechos. A downburst is a small area of rapidly descending rain and rain-cooled air  
1989 beneath a thunderstorm. Wind speeds associated with downbursts can reach 100 to 150  
1990 miles per hour or similar to that of a small tornado. The winds produced from a  
1991 downburst often occur in one direction (straight-line winds) with the worst damage  
1992 usually found on the forward side of the downburst. Derecho winds are created by the  
1993 merging of many thunderstorm cells into a cluster or solid line extending for many miles.  
1994 The width of such a storm can range from 20 to 65 miles and the length can reach 100  
1995 miles or more. The extreme velocity winds produced by a derecho can exceed 150 miles  
1996 per hour and cause extensive damage. A recent example of the impact of derecho winds  
1997 was observed following the storm event of July 4, 1999, which occurred in Minnesota's  
1998 Boundary Waters Canoe Area Wilderness (BWCAW). This event was one of the largest  
1999 blowdowns in North American history, similar in size and severity of a category 3 or 4

2000 hurricane making landfall in a forested region. The storm impacted approximately  
 2001 477,000 acres when winds in excess of 90 miles per hour hit the region.  
 2002

2003 **B-Historical Data on Hazard Events**

2004  
 2005 According to the NCDC, 42 thunderstorms & high wind events have occurred in Burnett  
 2006 County 1982 - 2009. No injuries or deaths were reported from these thunderstorms, but a  
 2007 total of \$250,000 in damages was sustained.  
 2008  
 2009

**Table 3.17: Burnett County Thunderstorms and High Wind Events 1982-2009**

Date	Time	Mag	\$	Date	Time	Mag	\$
3/12/1982	1730	52 kts.	0	6/22/1999	4:50 PM	50 kts.	0
7/6/1982	125	NL	0	7/23/1999	12:50 AM	50 kts.	0
8/18/1982	2210	NL	0	7/25/1999	6:50 PM	50 kts.	0
7/3/1983	1250	NL	0	7/30/1999	4:58 PM	50 kts.	0
8/19/1983	730	NL	0	7/8/2000	7:37 PM	50 kts.	0
8/28/1983	125	NL	0	5/9/2001	8:14 PM	50 kts.	0
6/6/1984	1831	NL	0	6/11/2001	4:10 PM	52 kts.	0
6/26/1984	1500	NL	0	6/18/2001	7:47 PM	70 kts.	0
7/9/1984	1630	NL	0	7/17/2001	10:40 PM	56 kts.	0
6/25/1990	2210	NL	0	7/27/2002	2:00 PM	60 kts.	0
8/25/1991	720	56 kts.	0	7/2/2003	11:35 PM	61 kts.	0
7/10/1995	100	NL	0	4/18/2004	4:55 PM	60 kts.	0
7/21/1995	1930	NL	0	5/29/2006	6:25 PM	60 kts.	0
8/18/1995	2330	NL	250k	7/29/2006	3:40 AM	50 kts.	0
8/6/1996	11:00 PM	50 kts.	0	7/30/2006	3:10 AM	50 kts.	0
6/28/1997	2:40 PM	60 kts.	0	7/26/2007	15:15 PM	52 kts.	0
7/1/1997	9:10 PM	55 kts.	0	8/13/2007	20:20 PM	52 kts.	0
7/13/1997	9:20 PM	56 kts.	0	7/11/2008	19:22 PM	60 kts.	0
8/3/1997	7:15 PM	52 kts.	0	7/16/2008	20:30 PM	52 kts.	0
9/1/1997	2:16 PM	50 kts.	0	7/17/2008	11:30 AM	52 kts.	0
9/26/1998	12:15 AM	50 kts.	0	7/14/2009	20:48 PM	52 kts.	0

NL – Not Listed

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

2010  
 2011  
 2012  
 2013 Three significant lightning events have been recorded in Burnett County -- one causing  
 2014 an injury and one causing \$4,000 in property damage.  
 2015  
 2016  
 2017  
 2018

2019

**Table 3.18: Significant Lighting Events in Burnett County 1982-2009**

Date	Time	Deaths	Injuries	Property Damage
6/17/1994	7:51 AM	0	1	0
6/17/2006	1:00 AM	0	0	0
8/13/2007	8:20 PM	0	0	\$4,000

2020

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

2021

2022

**C-Location of Potential Hazard Events**

2023

2024

2025

2026

2027

Wisconsin sees an average of 30 days a year with thunderstorms, with most occurring during the months of May through September. Most thunderstorms also occur between noon and 10 p.m. The southern parts of the state generally receive more thunderstorm activity than do northern counties.

2028

2029

2030

2031

2032

2033

All areas of Burnett County are susceptible to thunderstorms, lightning, and high winds. These events can range from minimal or no damage to catastrophic, can typically last from a few minutes to hours, and can repeatedly affect a given area over the course of the event.

2034

**D-Extent/Magnitude/Severity of Hazard**

2035

2036

2037

2038

2039

2040

2041

Thunderstorms affect small areas when compared with hurricanes and winter storms. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. One of the nation's worst thunderstorms occurred on July 4, 1977, in northern Wisconsin. Winds reached more than 115 mph in a swath over 150 miles long, flattening hundreds of thousands of acres of forest.

2042

2043

2044

2045

2046

To the general public, lightning is perceived as a minor hazard. Many times, persons are more afraid of thunder because of the sounds associated with it, while lightning is silent. However, lightning-caused damage, injuries, and deaths establish a significant hazard associated with a thunderstorm. Damage from lightning occurs in four ways:

2047

(1) Direct Strike Electrocutation. The most dangerous hazard -- the person, animal, or structure is a direct target for lightning bolts seeking ground.

2048

(2) Vaporization of materials along the path of a lightning strike.

2049

(3) Fire caused by the high temperatures associated with lightning (10,000-60,000°F).

2050

2051

(4) The sudden power surge that can damage electrical/electronic equipment.

2052

2053

2054

2055

2056

An average of 93 people are killed and another 300 injured by lightning each year in the United States. Between 1959 and 1999, lightning killed 49 people in Wisconsin (29th in the nation) and injured 230 people (19th in the nation). Wisconsin has a high frequency of

2057 property losses due to lightning. Insurance statistics show that 2 out of every 100 farms  
2058 are struck by lightning or have a fire that may have been lightning-caused each year. It is  
2059 estimated that in northern Wisconsin there are between two and five lightning-caused  
2060 fires per million acres of forested lands every year. In Wisconsin from 1982 to 1999,  
2061 there were 18 fatalities directly caused by lightning (Rusty Kapela, NWS 2000).

2062  
2063 One of the country's worst thunderstorm windstorms occurred on July 4, 1977, in  
2064 northern Wisconsin. Winds reached more than 115 mph in a swath over 150 miles long,  
2065 flattening hundreds of thousands of acres of forest. In 1998, thunderstorm winds were  
2066 responsible for 1 death and 59 injuries in Wisconsin, mostly due to the widespread  
2067 derecho wind event on May 30 and 31 across the southern and central portions of the  
2068 state. In 1999, thunderstorm winds resulted in two deaths and four injuries in Wisconsin.  
2069

### 2070 **E-Probability of Hazard Event Occurring**

2071  
2072 Thunderstorms, lightning, and high winds are likely to occur in any given year.  
2073 Thunderstorms, (which usually have lightning and high winds associated with them) have  
2074 a frequency that is measured in terms of incidents observed per day. Wisconsin averages  
2075 between 30 and 50 thunderstorms per year. In Burnett County, there are typically 15  
2076 severe thunderstorms per year. Thunderstorms can occur throughout the year, with the  
2077 highest frequency during the months of May through September. The majority of storms  
2078 occur between the hours of noon and midnight.

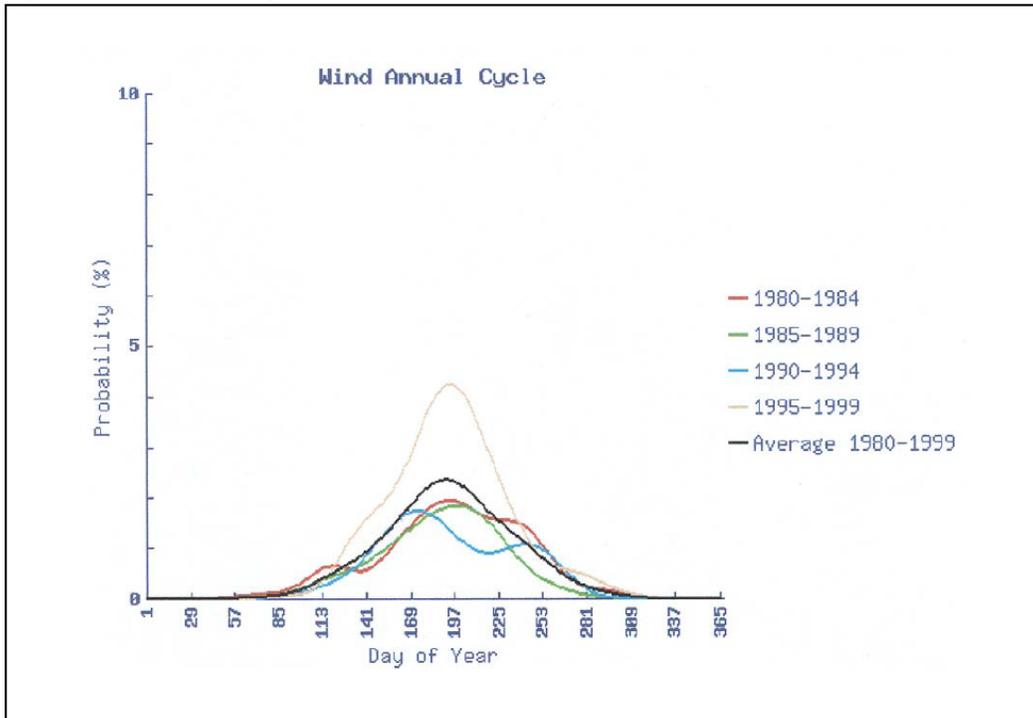
2079  
2080 The National Severe Storms Laboratory (NSSL) produces graphs that depict the  
2081 probability of a wind event on any given day for Burnett County. The lines on each graph  
2082 correspond to a specific time period indicated by the legend on the right of each graph.  
2083 The black line is always the average of all the time periods.

2084  
2085 Based on Figure 3.12, the most likely time of year for a high wind event is on average  
2086 between the 145<sup>th</sup> day and the 235<sup>th</sup> days of the year (late May mid August). The peak  
2087 probability of a wind occurrence is roughly 2.5 percent. This means that during this time  
2088 frame, the chance of a wind event in Burnett County would be about 1 in 25 in any given  
2089 year.

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**Figure 3.12: Probability of a Wind Event**



Source: NOAA National Severe Storm Laboratory

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2096 **F-Vulnerability of Area to Hazard Event**

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Thunderstorms can be detected using a variety of tools. Radars depict where rain and hail are located in the storm. Doppler radars allow visualization of how the wind is blowing within and near the storm.

Burnett County Emergency Management has formal agreements with five (5) institutions for shelters in the occurrence of a thunderstorm, lightning, or wind event that would necessitate overnight and prolonged assistance to residents of Burnett County. Burnett County Emergency Places of Shelter are listed in Table 3.9. For locations of these and other critical facilities, see Map 9 of this document.

2108 **G-Impact on Area if Hazard Event Occurs**

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As mentioned earlier, every thunderstorm produces lightning, and lightning kills more people each year than tornados. Heavy rain from thunderstorms can lead to flash flooding. High winds, hail, and tornados are also dangers associated with some thunderstorms. The rapid heating and cooling of air near lightning causes thunder.

2116 **NATURAL HAZARD IDENTIFICATION – FLOODING**

2117 **A-Description of Hazard**

2118  
2119 Floods are the most common and widespread of all natural disasters after fire. Most  
2120 communities in the United States have experienced some kind of flooding, after spring rains,  
2121 heavy thunderstorms, or winter snow thaws. A flood, as defined by the National Flood  
2122 Insurance Program (NFIP) is: "A general and temporary condition of partial or complete  
2123 inundation of two or more acres of normally dry land area or of two or more properties (at  
2124 least one of which is your property) from:

- 2125
- 2126 • Overflow of inland or tidal waters,
  - 2127 • Unusual and rapid accumulation or runoff of surface waters from any source, or
  - 2128 • A mudflow.
- 2129

2130 Flash Flooding

2131 Flash flooding, which usually results from surface run-off after intense rains or the failure  
2132 of water control structures, also poses a threat to all areas of Wisconsin. This is an  
2133 extremely dangerous form of flooding because it is not very predictable. It can occur very  
2134 quickly, precluding evacuation to higher ground to prevent loss of life. Small and  
2135 normally calm rivers and streams will rise very rapidly when surrounding soil and terrain  
2136 are unable to accommodate intense precipitation. Raging torrents of water can rip through  
2137 waterways, surging well beyond normal banks and sweeping away everything in their  
2138 path. Houses, structures, bridges and boulders can be tossed and rolled by a flash flood.  
2139 The strength of the water current, carrying debris and surging through an area, can cause  
2140 serious injuries and death. It can also interrupt power, disable fuel sources, make roads  
2141 impassable, hamper response efforts, and strand people in their homes awaiting rescue.

2142

2143 Riverine Flooding

2144 Riverine flooding is the most common and can be the most powerful of flood events.  
2145 Every river, stream, and creek can potentially flood. The maps on the following pages  
2146 delineate major water resources and watersheds in Burnett County. The St. Croix River  
2147 borders almost the entire western edge of Burnett County and is surrounded by federally  
2148 owned land.

2149

2150 Lake Flooding

2151 Lake flooding occurs when water overflows the banks of a lake, which causes or  
2152 threatens damage to property.

2153

2154 Dam Failure Flooding

2155 A dam failure flood involves the uncontrolled release of stored water due to the breaching  
2156 of a water control structure, resulting in rapid downstream flooding. These failures can be  
2157 caused by excessive rainfall or melted snow, poor construction or maintenance, flood  
2158 damage, earthquake activity, weakening caused by burrowing animals or vegetation,  
2159 surface erosion, vandalism or a combination of these factors.

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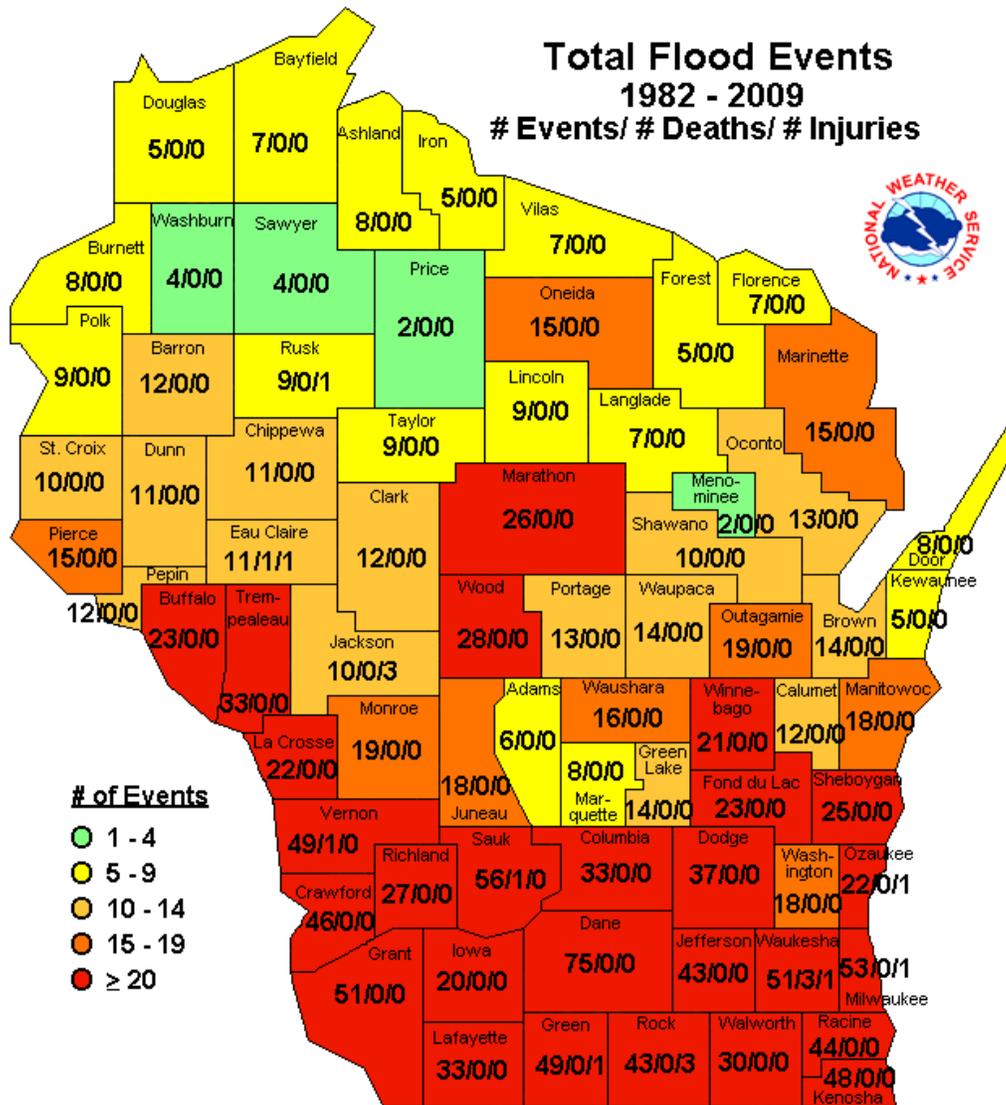
2161 **B-Historical Data on Hazard Events**

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Major floods in Wisconsin tend to occur either in the spring, when melting snow adds to runoff from rain, or in summer and early fall, after intense rainfalls. Flooding which occurs in the spring due to snowmelt and/or a prolonged period of heavy rain is characterized by a slow buildup of flow and velocity in rivers and streams over a period of days. This buildup continues until the river or stream overflows its banks for as long as a week or two. The water then slowly recedes slowly to its original level. The expected occurrence and location of this type of flooding is fairly predictable; and normally, there is sufficient time for the orderly evacuation of people and property.

Figure 3.13 shows the distribution of flood-related emergencies and disasters by county in Wisconsin from 1982 to 2009.

**Figure 3.13: Flood Emergencies and Disasters 1982 – 2009**



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Source: <http://www.crh.noaa.gov/images/mkx/severe/flood.gif>

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In 2000 and 2001, Burnett County encountered flooding problems due to storms and winter runoff. Both resulted in presidential disaster declarations. Damage to private homes was isolated to several lake owners, but public damage to roadways and bridges was extensive. Nearly \$500,000 in FEMA funds was needed due to disaster flooding in 2001.

Five major flood events were recorded in the National Climate Data Center storm events database for Burnett County 1950 - 2009. These events are listed in Table 3.19 and are also described below.

**Table 3.19: Flood Events in Burnett County 1950 - 2009**

Location	Date	Time	Type	Property Damage
Danbury	9/15/1994	12:30 PM	Dam washed out taking out a section of Hwy 35.	\$20 Million
Grantsburg to Siren	8/7/1995	9:00 AM	Flooding washed out roads and small bridges, flooded basements, swept cars into ditches, and disrupted phone service.	\$200 K
Hertel	7/8/2000	7:00 PM	A bridge on county highway EE over the Clam River was washed out.	\$680 K
Siren	9/1/2002	9:00 PM	A six-foot section of road was washed out.	
Wood River Township	10/4/2005	9:00 AM	Damage was done to roadways from erosion along the Wood River.	\$50 K

Source: NCDC

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Dam Failure Flood Events

From June 11 to June 13 in 1984, more than 11 inches of rain fell in three days. The heavy runoff caused widespread washouts and damage to state and county highways, as well as township roads throughout Burnett County. Many road culverts washed out and bridges were damaged. On June 13 the Grettum Flowage on Fish Lake Wildlife Area washed out, causing damage to township roads downstream. Since that time a second emergency spillway was constructed on Grettum Flowage, doubling the hydrologic capacity of this impoundment.

In 1993, a private dam partially broke during a heavy rainfall and rainy season. The dam took out the bridge on Highway 35 north of Danbury.

In 2001, spring rains caused a rapid snowmelt and some flooding from April 11 to April 15. A week later heavy rains raised the St Croix River and other rivers and streams in Burnett County to near record levels. There was significant damage countywide to roads, culverts, and bridges. Recreational facilities in the St Croix National Scenic Riverway and in Governor Knowles State Forest suffered significant damage. Heavy runoff resulted

2210 in some damage to dikes on state wildlife areas. FEMA payments were made to the  
2211 county, several townships, as well as the National Park Service and DNR. FEMA may  
2212 have an estimate of total damages.  
2213

2214 **C-Location of Potential Hazard Events**

2215  
2216 Burnett County covers 821 square miles and contains 1,861 census blocks. There are over  
2217 7 thousand households with a population of 15,674. Burnett County consists of 0 cities, 6  
2218 villages, and 21 towns. There are an estimated 12,110 buildings in the region with a total  
2219 building replacement value (excluding contents) of 1,853 million dollars. Approximately  
2220 99.7% of the buildings (and 81.7% of the building value) are associated with residential  
2221 housing. (2000 Census Bureau Data).  
2222

2223 Burnett County can experience flooding in any town or village. One great  
2224 misunderstanding is the belief that floods only happen in the floodplain. With sufficient  
2225 rain, almost any area will experience at least pockets of surface flooding or overland  
2226 flooding. In addition, heavy rain in urbanized areas with extensive paved and impervious  
2227 surfaces can easily overwhelm stormwater facilities resulting in localized flooding,  
2228 basement flooding, and sewer back-up. Overland flooding in rural areas can result in  
2229 erosion, washouts, road damage, and loss of crops.  
2230

2231 Basements are especially vulnerable to flooding and subject to intense hydrologic  
2232 pressure when the surrounding soil is saturated. A great deal of flood damage in  
2233 Wisconsin is a result of basement flooding.  
2234

2235 Low lying areas adjacent to rivers are periodically inundated by floodwaters, especially  
2236 in the early spring when the snow melts. Properties adjacent to the lakes studied in detail  
2237 are also subject to some spring flooding, as well as flooding from rising water tables.  
2238 The Rivers historically causing the most flood damage are the St. Croix River, Trade  
2239 River, and Wood River.  
2240

2241 **D-Extent/Magnitude/Severity of Hazard**

2242  
2243 Estimating Potential Losses  
2244 According to the National Climatic Data Center, between 1950 and 2009, there have been  
2245 five documented floods (four flash floods and one flood) recorded in Burnett County  
2246 totaling over 20 million dollars in property damage. Based on this information, Burnett  
2247 County could expect a major flood about once every ten years totaling nearly two million  
2248 dollars in damages.  
2249

2250

2251 **E-Probability of Hazard Event Occurring**

2252

2253 Small scale "flash flooding" is very likely to occur in any given year. Heavier flooding  
2254 can be expected to occur about once every ten years or .10 floods per year. The degree of  
2255 development greatly influences flood damage potential and impact.

2256

2257 **F-Vulnerability of Area to Hazard Event**

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2259 **S-MH Hazard Analysis**

2260 Flood analysis for Burnett was performed using HAZUS-MH MR3 released in July 2007.  
2261 The bundled aggregated general building stock was updated to Dun & Bradstreet 2006.  
2262 Building valuations were updated to R.S. Means 2006. Building counts based on census  
2263 housing unit counts are available for RES1 (single-family dwellings) and RES2  
2264 (manufactured housing) instead of calculated building counts.

2265 The site specific inventory (specifically Schools, Hospitals, Fire Stations, Emergency  
2266 Operation Centers and Police Stations) was updated using the best available statewide  
2267 information.

2268 HAZUS-MH was used to generate the flood depth grid for a 100-year return period  
2269 calculated by clipping the USGS 30m DEM to the DFIRM boundary.

2270 Figure 3.14 depicts the flood boundary from the HAZUS-MH analysis. The majority of  
2271 flooding occurs along the St. Croix River, Trade River, and Wood River.

2272 **HAZUS-MH Aggregate Loss Analysis**

2273 HAZUS-MH was used to estimate the damages for a 100-year flood event in Burnett  
2274 County. An estimated 162 buildings will be damaged totaling in \$37 million in building  
2275 losses and \$65 million in total economic losses. The total estimated number of damaged  
2276 buildings, total building losses, and estimated total economic losses are shown in Table  
2277 3.20.

2278 HAZUS-MH estimates 4 census blocks with losses exceeding \$1 million. The  
2279 distribution of losses is shown in Figure 3.15.

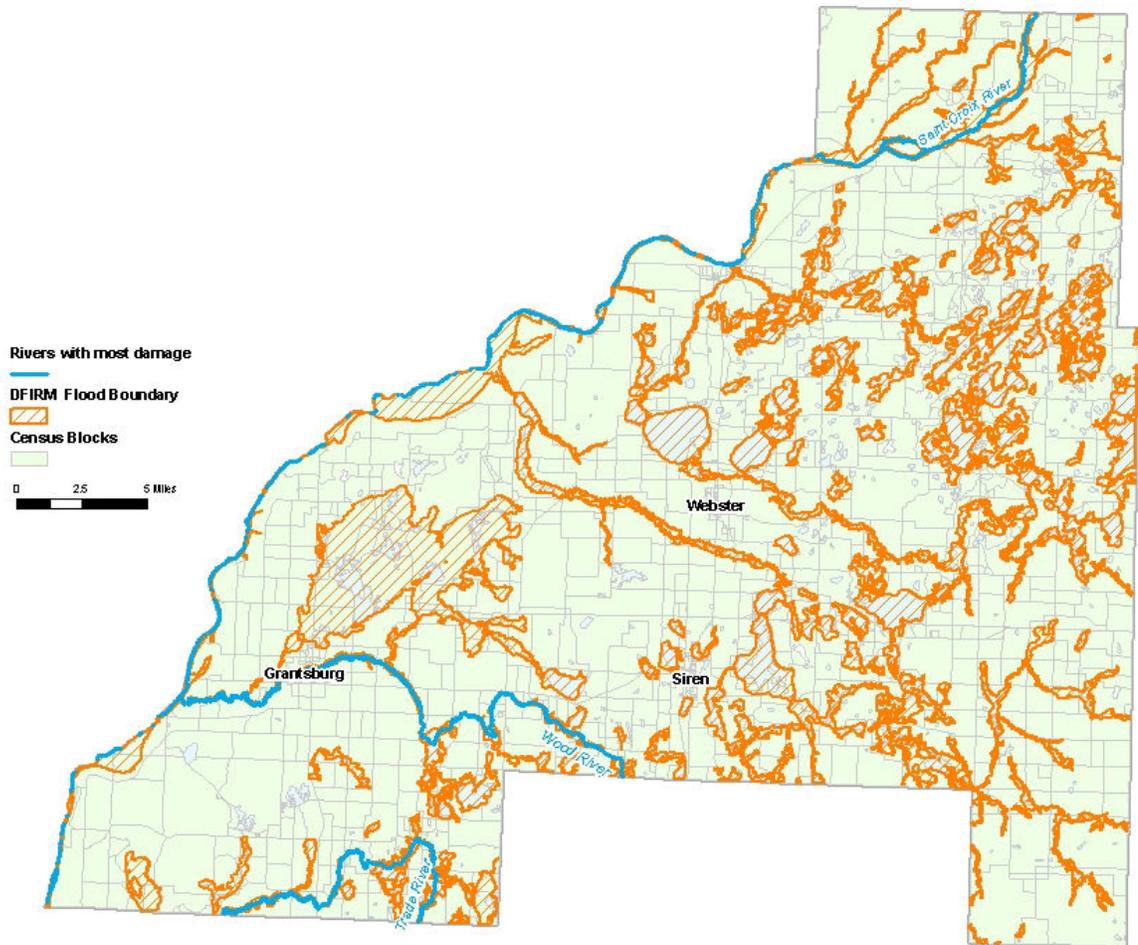
2280 HAZUS-MH aggregate loss analysis is evenly distributed across a census block. Census  
2281 blocks of concern should be reviewed in more detail to determine the actual percentage of  
2282 facilities that fall within the flood hazard areas. The aggregate losses reported in this  
2283 study may be under or overstated. Examples are provided in Figure 3.

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Figure 3.14: Burnett County HAZUS-MH Analysis (100-Year Flood)



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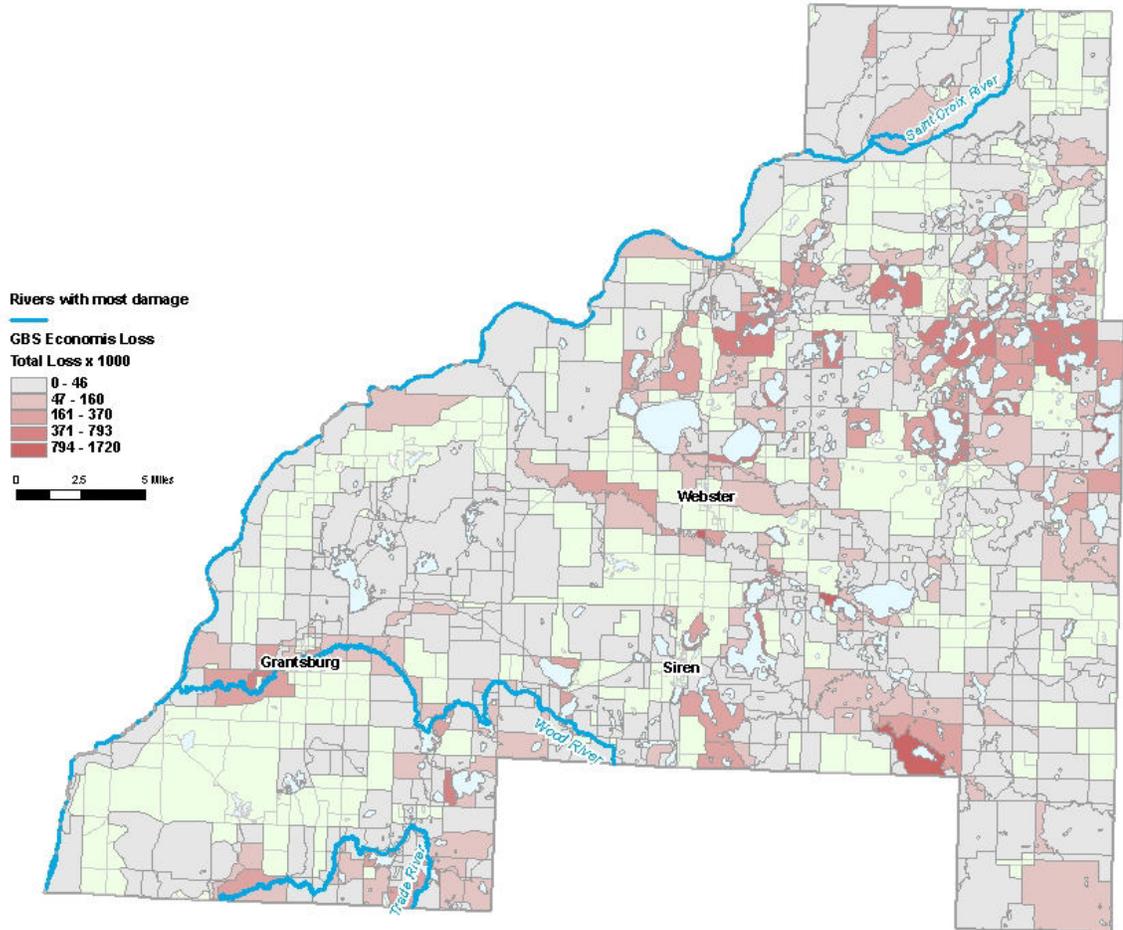
Table 3.20: Burnett County Total Economic Loss - 100-Year Flood

General Occupancy	Estimated Total Buildings	Total Damaged Buildings	Total Building Exposure X 1000	Total Economic Loss X 1000	Building Loss X 1000
Agricultural	0	0	\$19,718	\$1,058	\$317
Commercial	35	0	\$191,803	\$7,154	\$1,855
Education	0	0	\$12,772	\$0	\$0
Government	3	0	\$14,880	\$590	\$57
Industrial	1	0	\$65,472	\$2,666	\$828
Religious/Non-Profit	0	0	\$34,782	\$1,631	\$218
Residential	12,071	162	\$1,514,012	\$52,134	\$33,670
<b>Total</b>	<b>12,110</b>	<b>162</b>	<b>\$1,853,439</b>	<b>\$65,233</b>	<b>\$36,945</b>

2289

2290 The reported building counts should be interpreted as degrees of loss rather than as exact  
2291 numbers of buildings exposed to flooding. These numbers were derived from aggregate  
2292 building inventories which are assumed to be dispersed evenly across census blocks.  
2293 HAZUS-MH requires that a predetermined amount of square footage of a typical building  
2294 sustain damage in order to produce a damaged building count. If only a minimal amount  
2295 of damage to buildings is predicted, it is possible to see zero damaged building counts  
2296 while also seeing economic losses.

2297 **Figure 3.15: Burnett Total Economic Loss - 100-Year Flood**



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**Figure 3.16: Flood Damage Exposure in Siren**

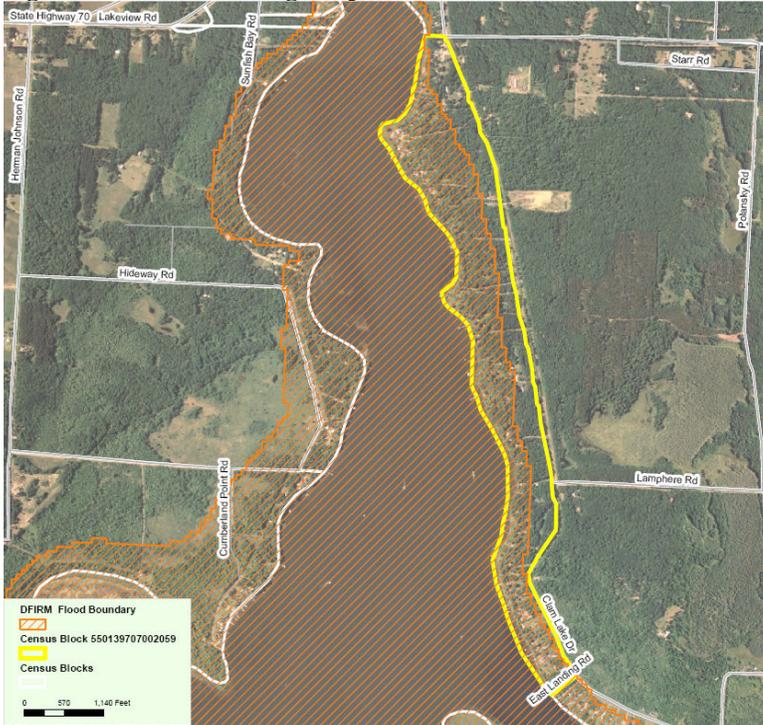


Figure 3.16 shows census blocks overlaid with the flood boundary and orthophoto in Siren. Census block 550139707002059 has an estimated building loss of \$432 thousand with a combined replacement cost of \$734 thousand. HAZUS-MH estimates that only 36 residential buildings out of the 68 total are within the calculated flood boundary for this block. However, the overlay of the flood boundary with the aerial

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2321

photo shows that most of the residential buildings lie inside the calculated flood boundary for this block.

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**Figure 3.17: Flood Damage Exposure in Siren**



Figure 3.17 shows census blocks overlaid with the flood boundary and orthophoto of Siren. Census block 550139704002228 has an estimated building loss of \$343 thousand and a combined replacement cost of \$707 thousand. HAZUS-MH estimates that 21 residential buildings are within the calculated flood boundary for this block. However,

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the overlay of the flood boundary with the aerial photo shows only a few buildings are in the calculated flood boundary for this block.

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2343 **HAZUS-MH Essential Facility Loss Analysis**  
 2344 An essential facility would encounter many of the same impacts as any other building  
 2345 within the flood boundary. These impacts include: structural failure, extensive water  
 2346 damage to the facility, and loss of facility functionality (i.e. a damaged police station will  
 2347 no longer be able to serve the community).

2348 The HAZUS-MH analysis identified no essential facilities that may be subject to  
 2349 flooding. A list of the essential facilities within Burnett County is included in Tables  
 2350 3.21.

2351 **Table 3.21: Burnett Essential Facility Loss - 100-Year Flood**

Class	Building Count	At Least Moderate Damage	At Least Substantial Damage	Loss of Use
Care Facilities	3	0	0	0
EOC	0	0	0	0
Fire Stations	8	0	0	0
Police Stations	8	0	0	0
Schools	12	0	0	0
<b>Total</b>	<b>31</b>	<b>0</b>	<b>0</b>	<b>0</b>

2352  
 2353 **HAZUS-MH Shelter Requirement Analysis**  
 2354 HAZUS-MH estimates the number of households that are expected to be displaced from  
 2355 their homes due to the flood and the associated potential evacuation. HAZUS-MH also  
 2356 estimates those displaced people that will require accommodations in temporary public  
 2357 shelters. The model estimates 487 households will be displaced due to the flood.  
 2358 Displacement includes households evacuated from within or very near to the inundated  
 2359 area. Of these, 135 people (out of a total population of 15,674) will seek temporary  
 2360 shelter in public shelters..

2361  
 2362 **HAZUS-MH State Property Loss Analysis**  
 2363 The flood boundaries were overlaid with State of Wisconsin property boundaries as  
 2364 provided by the Department of Natural Resources within Burnett County. Table 3.22  
 2365 provides the names of state properties that overlay with the HAZUS-MH flood boundary.  
 2366 Figures 3.18 and 3.19 show examples of the inundated areas.

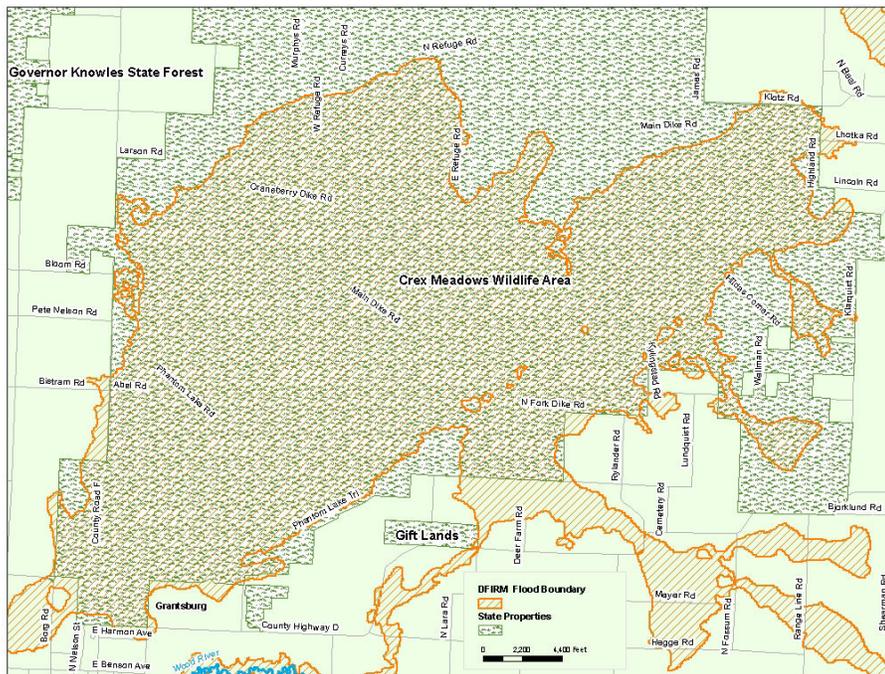
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**Table 3.22: Burnett State Property Flood Inundation**

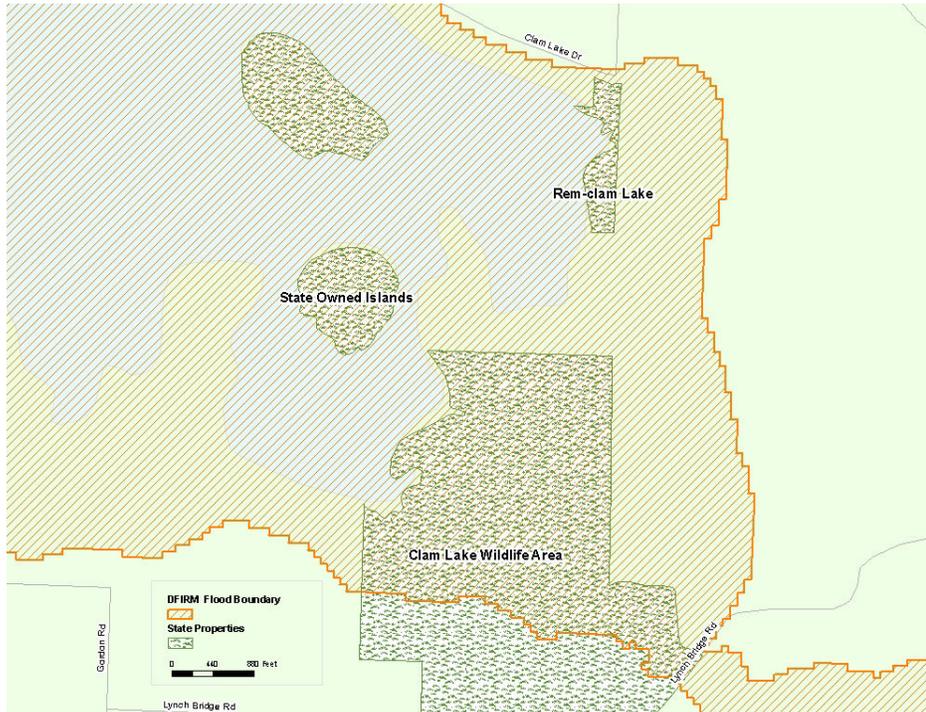
State Property	Percent Inundated	Acres Inundated
Crex Meadows Wildlife Area	60%	16573
Governor Knowles State Forest	33%	4979
Clam River Fishery Area	26%	636
Statewide Habitat Areas	94%	222
Clam Lake Wildlife Area	71%	187
Danbury Wildlife Area	4%	96
State Owned Islands	75%	77
Sand Creek Fishery Area-polk	9%	64
Lup Grants	37%	48
Rem-Sand Lake	74%	32
Spring Creek Fishery Area	39%	28
Statewide Public Access	81%	26
Amsterdam Sloughs Wildlife Area	0%	25
Rem-Round Lake	100%	24
Culbertson Springs Fishery Area	55%	22
Scattered Forest Lands	27%	20
Rem-Yellow River	43%	17
Sand Creek Fishery Area	41%	15
Rem-Clam Lake	100%	9
Gandy Dancer State Trail	3%	8
Gift Lands	2%	3
Rem-Clam River	6%	1

**Figure 3.18: Boundary of 100-Year Flood Overlaid with State of Wisconsin Properties**



2373

**Figure 3.19: Boundary of 100-Year Flood Overlaid with State of Wisconsin Properties**



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2376

**Dam Failure Flooding**

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In order to help protect people and property from dam failure flooding, the WDNR may perform a dam failure analysis on dams to bring them up to full compliance with NR333.

2378

Dam failure analysis is normally required on all large dams at time of inspection or reconstruction.

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2380

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**Dams with Significant or High Hazard Potential**

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According to Table 3.23, Significant Dams in Burnett County, two dams are rated as having significant hazard potential and one with high hazard potential. The Fish Lake WLA/Grettum Flowage dam (Significant Hazard Potential) is surrounded by public land (DNR) ½ mile on both sides has no structures within its floodplain zone. The Clam Dam (Significant Hazard Potential) has no structures within the dam shadow or floodplain zone and has very high banks with little wetlands surrounding it. The Gomulak and Profitt Dam is a private dam with no structures in the floodplain. The only thing at risk of being damaged if this dam broke is STH 35, which was rebuilt in 2003. See Map 10 for dam locations.

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**Table 3.23: Significant Dams in Burnett County**

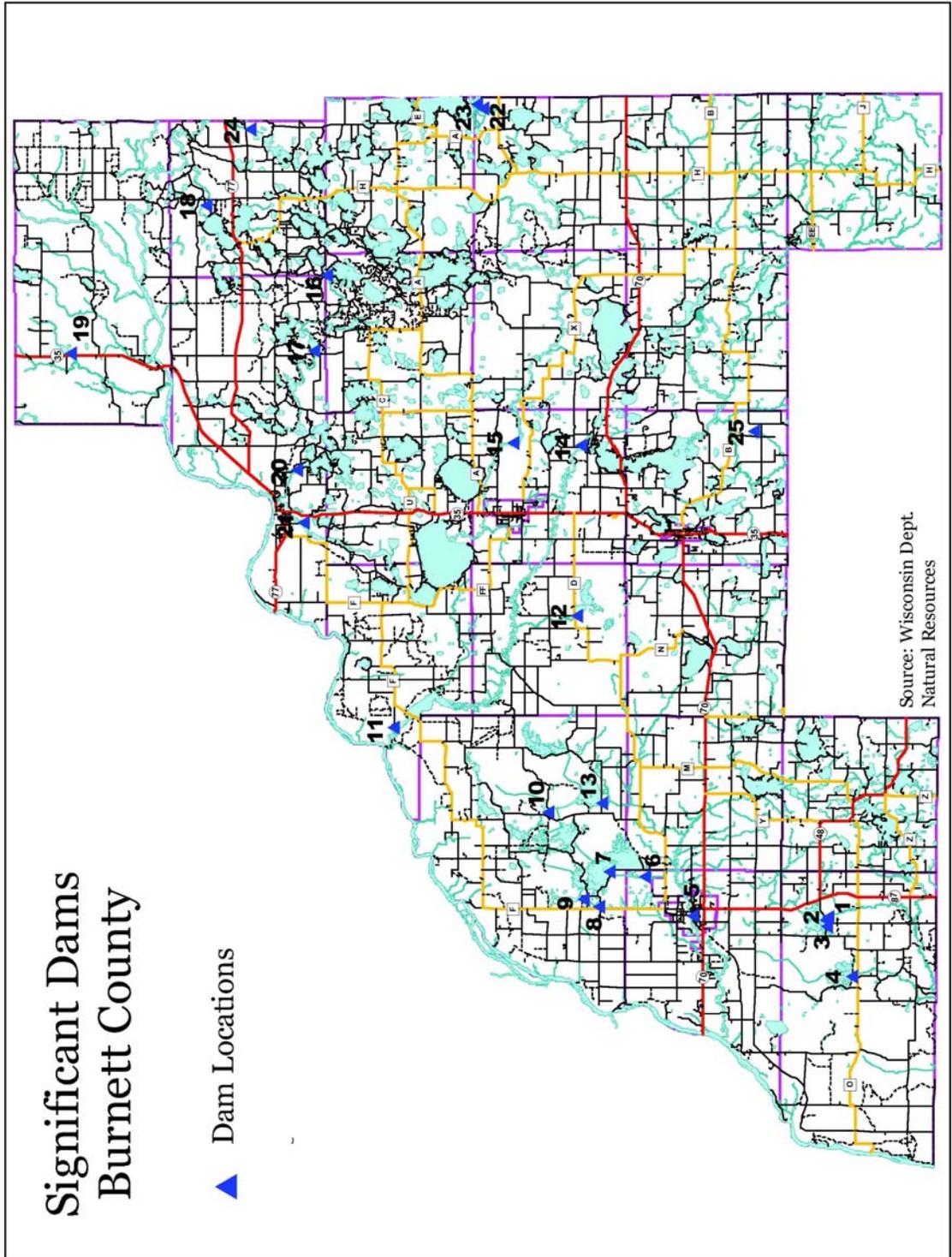
Map Ref #	Official Name	Owner	Impound (Acres)	Max Impound (Acres)	Structure Height	Hazard Level	Last Update
1	FISH LAKE WLA CANUTE FLOWAGE	WI DNR - PROPERTY SUPERVISOR	360	2400	14.3	Low	10/09/02
2	FISH LAKE WLA GRETTUM	WI DNR - PROPERTY SUPERVISOR	501	1670	12.2	Sig	10/29/02
3	FISH LAKE WLA DANIELS FLOWAGE	WI DNR - PROPERTY SUPERVISOR	67	179	7.5	Low	07/19/08
4	LOGGING CREEK DIKE	WI DNR - PROPERTY SUPERVISOR	1600	14600	21	Low	10/29/02
5	HICKERSON ROLLER MILL	VILLAGE OF GRANTSBURG	10	50	13	Low	08/24/07
6	CREX MEADOWS PHANTOM LAKE DEV	WI DNR - PROPERTY SUPERVISOR	2200	12000	13.6	Low	10/09/02
7	CREX MEADOWS PHANTOM LAKE DEV	WI DNR - PROPERTY SUPERVISOR	2200	15000	7.8	Low	10/29/02
8	CREX MEADOWS DIKE 9 FLOWAGE	WI DNR - PROPERTY SUPERVISOR	60	190	7.5	Low	10/18/04
9	CREX MEADOWS DIKE 6	WI DNR - PROPERTY SUPERVISOR	400	1000	7.9	Low	10/09/02
10	CREX MEADOWS WLA DIKE # 1	WI DNR - PROPERTY SUPERVISOR	200	865	6.1	Low	10/09/02
11	CLAM RIVER	NORTHWESTERN WI ELECT CO	359	5600	45	Low	08/24/07
12	AMSTERDAM SLOUGH	WI DNR - PROPERTY SUPERVISOR	473	3000	14.4	Low	10/09/02
13	CREX MEADOWS NORTH FORK DIKE	WI DNR - PROPERTY SUPERVISOR	1500	3800	13	Low	10/29/02
14	CLAM LAKE	BURNETT COUNTY	1207	9600	10	Sig	08/24/07
16	LOON LAKE	BURNETT COUNTY	228	3800	13	Low	08/24/07
18	WEBB LAKE	BURNETT COUNTY	759	2375	7	Low	08/15/97
19	GOMULAK AND PROFITT		34	360	17	Low	06/02/08
20	MINERVA	BURNETT COUNTY	245	3000	14	Low	02/03/04
21	DANBURY	NORTHWESTERN WI ELECT CO	2891	32500	35	Low	08/24/07
22	SOUTH MIDWEST CRANBERRY COMP.	MIDWEST CRANBERRY CO	61	540	9	Low	10/18/94
23	NORTH MIDWEST CRANBERRY COMP.	MIDWEST CRANBERRY CO	61	300	9	Low	04/06/94
24	LOWER LOST LAKE	TOWN OF WEBB LAKE	248	1300	9	Low	02/11/02
25	DAHL-MERKLEY	C. W. MERKLEY	20	140	15	Low	07/24/06
26	CREX MEADOWS REFUGE EXTENSION	WI DNR - PROPERTY SUPERVISOR	617	370	10	Low	07/19/08
27	TREGO	XCEL ENERGY	451	7030	36	Sig	01/07/08

Note: These dams were queried from a much larger list organized by the dam size and its hazard level.

Source WI DNR -- <http://dnr.wi.gov/org/water/wm/dsfm/dams/datacentral.html>

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2394  
2395

**Map 10: Significant Dams**



2400 Flooding Vulnerability is a major component of flood-hazard assessment. It combines the  
2401 analysis of the floodplain boundary with an inventory of the property within the  
2402 floodplain. Understanding the property associated and exposed to flooding will assist in  
2403 reducing risk from the hazard in the future. Because site-specific inventory data and  
2404 inundation levels for a flood event (100-year, 500-year) are not readily available,  
2405 calculating a community's vulnerability to flood events is not straightforward.

2406  
2407 It should be noted that, with a few exceptions, all of these structures were identified as  
2408 being in the floodplain based upon the best available FEMA maps. Field surveys would  
2409 be required to determine the precise relationship to the floodplain. Some structures may  
2410 be found to be outside the flood hazard areas, and some others may be inside a floodplain  
2411 based upon detailed field survey data. At the time of this analysis, digital floodplains in  
2412 Burnett County were not available. When this information becomes available, a more  
2413 thorough analysis of structures within the floodplains of Burnett County and their values  
2414 could be conducted and included in this plan.

2415  
2416 In August, 2008, a Flood Insurance Study funded by FEMA was released covering the  
2417 three villages in the county as well as the unincorporated areas of the county. These maps  
2418 are available for viewing in the Zoning Administrator's office at the Burnett County  
2419 Government Center.

2420 It is difficult to say how many new structures have been erected in floodplains in any  
2421 town in Burnett County, because records of this don't always exist. Burnett County  
2422 regulates developments within the floodplain by following the state's mandatory  
2423 floodplain ordinance approved by FEMA and the DNR. The County enforces the  
2424 floodplain ordinance through a land use permitting process. The only structures that may  
2425 be built in a floodplain are those permitted through the DNR and FEMA.

2426  
2427 Currently, there are no structures that are considered by FEMA to be repetitive or  
2428 substantial loss properties in Burnett County. Repetitive loss structures are those that  
2429 have two or more flood insurance claims of at least \$1000 each.

2430  
2431 Strategies for Reducing Flood Vulnerability:

- 2432 ✓ Promote floodplain management including strong enforcement of zoning and  
2433 development ordinances;
- 2434 ✓ Promote the mapping of floodplains and other flood problem areas such as  
2435 stormwater problem areas;
- 2436 ✓ Encourage community participation in the National Flood Insurance Program;
- 2437 ✓ Support flood insurance for homes and businesses including sewer back-up riders  
2438 available for homeowners' insurance policies;
- 2439 ✓ Reduce stormwater inputs into village sanitary sewer systems;
- 2440 ✓ Maintain stormwater facilities and keep storm creeks clear of debris;
- 2441 ✓ Promote low cost measures to reduce basement flooding such as back-flow  
2442 valves; and
- 2443 ✓ Encourage the use of green space around creeks, streams, marshes, drainage  
2444 areas, and known floodplains to minimize local flood damage and reduce the  
2445 downstream impact of local flooding.

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Programs

The Wisconsin Department of Natural Resources, working with local governments, is identifying special flood hazard areas in the state. Local government bodies are responsible for enacting floodplain zoning ordinances which comply with state and federal regulations. State floodplain management regulations are found in Chapters 30.27, 59.971, 61.351, 62.231, 87.30 and 144.26, Wisconsin Statutes and Chapters NR 115, 116, 117 and 118 of the Wisconsin Administrative Code. Federal requirements for floodplain management are set forth in the National Flood Insurance Act as amended, EO 11988 and EO 11990.

After the 1993 Midwest floods, U.S. Congress authorized a special appropriation to aid flood victims and assist communities in recovering from the widespread devastation. The Federal Emergency Management Agency (FEMA) created the Wisconsin Interagency Disaster Recovery Group (WIDRG) to coordinate the distribution of these funds. Following a disaster, WIDRG assists local units of government in their recovery effort and promotes disaster resistance during new construction. The WIDRG and State Hazard Mitigation Team have now been combined into the Wisconsin Hazard Mitigation Team that continues to develop and promote a statewide mitigation program.

The Hazard Mitigation Grant Program (HMGP), administered by Wisconsin Emergency Management (WEM), provides funding for reducing flood-related disaster losses. WEM also administers the Flood Mitigation Assistance Program (FMAP), which provides funding for flood mitigation planning and projects. A newly created program in 2001, the Pre-Disaster Mitigation Program (PDM), provides funding opportunities for local units of government to produce comprehensive hazard mitigation plans for hazard mitigation projects. The National Flood Insurance Program (NFIP) is a pre-disaster flood mitigation and insurance protection program designed to reduce the increasing cost of disasters. The NFIP, which is a voluntary program, makes federally backed flood insurance available to residents and business owners in communities that agree to adopt and adhere to flood mitigation measures that guide development in its floodplains.

Effective in the 1990's, the Flood Insurance Rate Maps (FIRM) for Burnett County is the most recent source for identifying areas subject to flooding. These maps can be viewed in the zoning office at the county courthouse in Village of Siren. The FIRMs are intended to be interim maps prior to the completion of a more detailed study and may not include all flood hazard areas in the county. Additional field checking may be required to determine whether or not a given area is in the floodplain before development would be authorized or denied. The Wisconsin Department of Natural Resources coordinates the NFIP in Wisconsin. Table 3.25 shows Burnett County's flood insurance statistics.

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**Table 3.24: Burnett County Communities Participating in the National Flood Insurance Program, NFIP**

Municipality	Date of Entry	Date of Effective Map
Burnett County	11/20/91	11/20/91
Village of Grantsburg	02/02/89	02/02/89
Village of Siren	08/19/08	08/19/08
Village of Webster	08/19/08	08/19/08

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**Table 3.25: Burnett County National Flood Insurance Program Statistics (As of 12-31-02)**

Policies In- Force	Insurance In-Force	Written Premium In-Force	Total Losses	Total Payments	As of
74	\$7,458,400	\$34,704	23	\$105,052.46	12-31-02
153	\$23,333,300	\$101,975	25	\$119,700.82	01-31-10

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Source: <http://www.fema.gov/business/nfip/statistics/pcstat.shtm>

Burnett County Emergency Management has formal agreements with five (5) institutions for shelters in the occurrence of a flood event that would necessitate overnight and prolonged assistance to residents of Burnett County. Burnett County Emergency Places of Shelter are listed in Table 3.9. For locations of these and other critical facilities, see Map 9 of this document.

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**G-Impact on Area if Hazard Event Occurs**

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The effects of flooding can be devastating. Although the probability of serious injury and loss of life is often low, personal property damage is usually heavy due to long periods of inundation. Flooding increases the likelihood of long-term health hazards from waterborne diseases, mold, mildew, insect infestation, and contaminated drinking water. Long-term damage to the environment may also result from flooding of sites containing hazardous materials or waste.

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Dam failures can cause loss of life and significant property damage in an extensive area downstream of the dam. Currently, Burnett County owns and maintains four dams.

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**NATURAL HAZARD IDENTIFICATION -- DROUGHT**

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**A-Description of Hazard**

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Drought is a normal, recurrent feature of the Midwest's climate. It occurs in virtually all-climatic zones, but its characteristics vary significantly from one region to another. Drought is a temporary aberration; differing from aridity, which is restricted to low rainfall regions and is a permanent feature of climate.

2523 Climatologists define drought as a period of abnormally dry and/or unusually hot weather  
2524 sufficiently prolonged for the corresponding deficiency of water to cause a "serious  
2525 hydrologic imbalance." When a serious hydrologic imbalance occurs in Wisconsin, soil  
2526 moisture reserves, groundwater supplies, lake levels, and stream flows are negatively  
2527 influenced. Water-dependent industries, including agriculture, public utilities, forestry,  
2528 and tourism can potentially be affected. Two types of drought are experienced in  
2529 Wisconsin, including Burnett County: agricultural and hydrologic. Agricultural drought  
2530 is a dry period of sufficient length and intensity that markedly reduces crop yields.  
2531 Hydrologic drought is a dry period of sufficient length and intensity to affect lake and  
2532 stream levels and the height of the groundwater table. These two types of drought may  
2533 but do not necessarily occur at the same time.  
2534

2535 **B-Historical Data on Hazard Events**

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2537 Historical Frequency and Significant Incidents

2538 Small droughts of shortened duration have occurred at an interval of about every ten  
2539 years since the 1930's. Extended, widespread droughts have been infrequent in  
2540 Wisconsin. The six most significant droughts, in terms of severity and duration, are:  
2541 2006-2010, 1987-1988, 1976-1977, 1955-1959, 1948-1950 and 1929-1934.  
2542

2543 Some believe the drought of 1987-1988 was the most severe ever experienced in  
2544 Wisconsin and much of the Midwest. It was characterized not only by below normal  
2545 precipitation but also by persistent dry air and above normal temperatures. All Wisconsin  
2546 counties were designated eligible for this drought assistance. The current drought is more  
2547 significant in NW Wisconsin, including Burnett County.  
2548

2549 **C-Location of Potential Hazard Events**

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2551 Droughts can severely impact an area, especially with respect for agricultural crops.  
2552 Droughts can also be minor, creating a nuisance for residents and concern for farmers or  
2553 major, creating water shortages, health and economics concerns and losses.  
2554

2555 **D-Extent/Magnitude/Severity of Hazard**

2556  
2557 Typically, droughts occur in Wisconsin on average about once every 10-12 years. The  
2558 state's longest recorded period of drought occurred during the "dust bowl" years of the  
2559 1930's, when the state had eight consecutive years of below average precipitation. The  
2560 50-year rainfall average is 31.68 inches per year for all of Wisconsin. Rainfall will vary  
2561 by region within the state.  
2562

2563

2564 **E-Probability of Hazard Event Occurring**

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2566 All areas of Burnett County are prone to droughts. Drought conditions generally last for  
2567 extended periods of time extending weeks, months, or years. Drought is likely to occur in  
2568 Burnett County. These types of events are generally not easily predictable.

2569

2570 **F-Vulnerability of Area to Hazard Event**

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2572 Data from the National Drought Mitigation Center complements the U.S. Drought  
2573 Monitor and the USDA National Agricultural Statistics Service Weekly Crop and  
2574 Weather Bulletin by outlining drought recovery areas, detailing state-by-state drought  
2575 impacts, and providing information on how states are preparing for and responding to  
2576 drought. This is only a "snapshot in time" of drought recovery areas and should be  
2577 updated and used as a point of reference. <http://drought.unl.edu/monitor/monitor.htm>

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2579 **G-Impact on Area if Hazard Event Occurs**

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2581 Droughts have impacted crops and reduced milk production in the past, though good  
2582 agricultural practices can mitigate these to some extent.. Private tree plantations can also  
2583 be substantially affected by drought if poorly managed. Water quantity shortages can  
2584 impact fire protection and, in some cases, limits new development. These water quantity  
2585 shortages are further exacerbated under drought conditions.

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2588 **NATURAL HAZARD IDENTIFICATION -- EXTREME TEMPERATURES**

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2590 **A-Description of Hazard**

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2592 Heat waves are defined as prolonged periods of very high temperatures combined with  
2593 high humidity

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2595 Extreme Cold is when winter temperatures drop significantly below normal.

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2598 **B-Historical Data on Hazard Events**

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**Table 3.26: Burnett County Extreme Temperature Events 1982 - 2009**

Date	Time	Type of Extreme Temperature Event
1/13/1994	6:00 AM	Cold
6/14/1994	12:00 PM	Heat Wave
2/10/1995	9:00 PM	Cold
10/12/1995	2:00 PM	Record Warmth
2/2/1996	12:00 AM	Extreme Cold
1/15/1997	5:00 AM	Extreme Windchill
1/14/2005	3:00 AM	Extreme Cold/wind Chill
2/17/2006	6:00 PM	Extreme Cold/wind Chill
2/3/2007	8:00 PM	Extreme Cold/wind Chill
1/30/2008	12:00 AM	Extreme Cold/wind Chill
2/10/2008	12:00 AM	Cold/wind Chill
1/13/2009	12:00 AM	Extreme Cold/wind Chill

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Source: <http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms>

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2604 **C-Location of Potential Hazard Events**

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Extreme temperatures affect all areas of Burnett County.

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2608 **D-Extent/Magnitude/Severity of Hazard**

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Based on the latest research findings, the National Weather Service has devised the "Heat Index", (sometimes referred to as the "apparent temperature"). The HI, given in degrees Fahrenheit, is an accurate measure of how hot it really feels when the relative humidity (RH) is added to the actual air temperature.

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The National Weather Service (NWS) issues Heat Advisories when it expects daytime highs to equal or exceed 105 for three hours or more while nighttime highs equal or exceed 80 (75 for South-central and Southeast Wisconsin), for any 24-hour period. The NWS may issue an "Excessive Heat Watch" 24 to 48 hours in advance of heat wave conditions.

2621 **E-Probability of Hazard Event Occurring**

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Heat waves are likely to occur in the future during the summer months in most years. Extreme cold temperatures are likely to occur in the future during the winter months in

2625 most years. Extended periods (week or longer) of extreme temperatures may occur once  
2626 every decade or approximately 0.1 events per year.  
2627

## 2628 **F-Vulnerability of Area to Hazard Event**

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### 2630 **Programs**

2631 The National Weather Service (NWS) issues advisory statements to media, emergency  
2632 management, and public health officials in advance of and during conditions of excessive  
2633 heat. Heat waves cannot be prevented; therefore, it is important to provide notice of  
2634 adverse conditions so that the public can anticipate and avoid health-threatening  
2635 situations.  
2636

### 2637 **Summary of National Weather Service's Alert Procedures**

2638 The NWS will initiate alert procedures (advisories or warnings) when the Heat Index is  
2639 expected to have a significant impact on public safety. The expected severity of the heat  
2640 wave determines whether advisories or warnings are issued. Some regions and  
2641 municipalities are more sensitive to excessive heat than others. The alert procedures:

- 2642 ✓ include Heat Index values in zone;
- 2643 ✓ issue special weather statements and/or public information statements presenting  
2644 a detailed discussion of (1) the extent of the hazard including Heat Index values,  
2645 (2) who is most at risk, (3) safety rules for reducing the risk;
- 2646 ✓ assist state and local health officials in preparing civil emergency messages in  
2647 severe heat waves. Meteorological information from special weather statements  
2648 will be included as well as medical information, advice, and names and telephone  
2649 numbers of health officials; and
- 2650 ✓ release to the media and over NOAA's own weather radio all of the above  
2651 information.  
2652

2653 Burnett County Emergency Management has formal agreements with five (5) institutions  
2654 for shelters in the occurrence of a extreme temperature event that would necessitate  
2655 overnight and prolonged assistance to residents of Burnett County. Burnett County  
2656 Emergency Places of Shelter are listed in Table 3.9. For locations of these and other  
2657 critical facilities, see Map 9 of this document.  
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## 2659 **G-Impact on Area if Hazard Event Occurs**

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2661 Excessive heat poses a risk to human health, particularly to the young, elderly, and those  
2662 with health problems. Risks from excessive heat include: heatstroke/sunstroke, heat  
2663 cramps, and heat exhaustion. The problems associated with excessive heat can be  
2664 exacerbated by power outages resulting from the high electric consumption for air  
2665 conditioning.  
2666

2667 When winter temperatures drop significantly below normal, staying warm and safe can  
2668 become a challenge. Extremely cold temperatures often accompany a winter storm and

2669 potential hazards that they raise. In addition, the risk on hazards due to attempts to keep  
2670 dwellings warm included house fires and carbon monoxide poisoning from  
2671 malfunctioning heating units. Exposure to cold temperatures, whether indoors or outside,  
2672 can cause other serious or life-threatening health problems. Infants and the elderly are  
2673 particularly at risk, but anyone can be affected. Wind chill, while not a health concern in  
2674 and of itself, is a phenomenon based on the rate of heat loss from exposed skin caused by  
2675 combined effects of wind and cold. As the wind increases, heat is carried away from the  
2676 body at an accelerated rate, driving down the body temperature – which is a health  
2677 concern. Animals are also affected by wind chill.

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2679 Frostbite is damage to body tissue caused by that tissue being frozen. Frostbite causes a  
2680 loss of feeling and a white or pale appearance in the extremities, such as fingers, toes, ear  
2681 lobes, or the tip of the nose.

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2683 Hypothermia: or low body temperature can result in uncontrollable shivering, memory  
2684 loss, disorientation, incoherence, and if left untreated, death.

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