

Chapter 1

Introduction

Communities everywhere face different hazards and have different resources and interests to handle these situations. Planning is one of the best ways to recognize the hazards and to produce a program of activities that will best mitigate the impact of hazards on the community.

This mitigation plan, required for Federal mitigation funds, is being developed to recognize the needs for Mackinac County and provide a basis for obtaining pre-disaster mitigation funds.

This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural hazards. The plan focuses on the major hazards that face Mackinac County, fills the Federal mitigation planning requirements, and provides the County and its municipalities with a blueprint for reducing the impacts of these natural hazards on people and property.

Planning Approach

The Eastern U.P. Regional Planning and Development, along with the Mackinac County Office of Emergency Services, have undertaken the project of developing a hazard analysis of Mackinac County, including the past history of disasters, assessing the hazard risks and vulnerabilities of the County and developing goals and objectives to mitigate these disasters.

The Mackinac County Board of Commissioners passed a resolution to have the Eastern Upper Peninsula Regional Planning and Development Commission undertake this Hazard Mitigation Plan. Upon meeting with the Director of Office of Emergency Services a list of contact people was developed which is included as Appendix A. Also included in Appendix A is a listing of the Hazard Analysis Working Group and the Mackinac County Local Planning Emergency Committee who diligently worked on creating this Plan for Mackinac County.

During the planning process a survey was sent out to the list of contacts, requesting information on any known hazards, past history and concerns. The survey was sent to the contact list as well as to clerks, supervisors, and managers of the local municipalities within the County. Survey responses are included as Appendix B.

Other information was gathered from several sources including the Michigan State Police Emergency Services Division, National Weather Service, USDA Resource Development, Federal Emergency Management Agency, United States Coast Guard, Michigan Department of Natural Resources, Michigan Department of Environmental Quality, Hiawatha National Forest Service, Michigan Department of Transportation, Mackinac Island State Historic Parks Commission and the local newspaper, The St. Ignace News.

Several departments within the County were contacted for information. These departments included the County Administrator, Health Department, Equalization Department and Road Commission. Building Departments within the County's governmental units were also contacted for information. Information was gathered also through land use, comprehensive, or master plans, zoning ordinances, and regional plans from local municipalities within the County. (See Appendix C.)

The EUP Regional Planning staff contacted each municipality within the County and when possible met directly with township supervisors, clerks, public work departments, and emergency departments such as fire and ambulance services.

Public Participation

As well as contacting community leaders and citizens who have direct interests in the Plan, the planning process also included a submittal of a news release to the area's newspaper the St. Ignace News with information on who to contact for more information on the Hazard Mitigation Plan, why it is important, and how to be involved in the planning process.

Towards the end of the planning process, the draft Plan was sent to all units of government and municipalities within the County and was available at those locations for public review. The Plan was also made available to the public at the Mackinac County Courthouse and Public Library centrally located in the County. The draft Plan was also sent to Central U.P. Planning and Development in Escanaba, Michigan and Northeast Council of Governments in Gaylord, Michigan. Plans were sent to Chippewa, Luce, Schoolcraft, Alger, Cheboygan and Emmet County Board of Commissioners as neighboring communities for their review. A public hearing was held on August 25, 2005 to review the draft Plan and receive comments. (See Appendix D.) All comments received were recorded and incorporated into the Plan. After review from the MI State Police Emergency Management Division and revisions were made, the final draft of the Plan was sent to local units of government. EUP Regional Planning staff as well as the Mackinac Co. Office of Emergency Management staff continued to attend meetings explaining the Plan and seeking local adoption.

Hazard Assessment

A comprehensive hazard analysis was made by the Mackinac Co. Office of Emergency Services and EUP Regional Planning to determine:

- 1) what hazards threaten the community
- 2) how often they are likely to occur
- 3) how severe the situation is likely to get, and
- 4) the impact on the community.

During the development of this hazard analysis, all events which could pose a threat to Mackinac County were analyzed and rated according to the following aspects, and since some criteria were considered more important than others, each of these aspects was assigned a weight to balance the total score.

- 1) Historical Occurrence (frequency of event) = Excessive (10 pts), High (7 pts), Medium (4 pts), Low (1 pt) [Weight = 15%]
- 2) Affected Area (size of geographic area impacted) = Large Area (10 pts), Small Area (7 pts), Multiple Sites (4 pts), Single Site (1 pt) [Weight = 15%]
- 3) Speed of Onset (warning time) = Minimal/No (10 pts), More than 12 Hours (7 pts), 12-24 Hours (4 pts), Less than 24 Hours (1 pt) [Weight = 10%]
- 4) Population Impact (# of casualties) = High 10+ (10 pts), Medium 6-10 (7 pts), Low 1-5 (4 pts), None (1 pt) [Weight = 20%]
- 5) Economic Effects (monetary damage losses incurred) = Significant (10 pts), Medium (7 pts), Low (4 pts), Minimal (1 pt) [Weight = 5%]
- 6) Duration (time period hazard is actively present and causing damage) = Long (10 pts) Medium (7 pts), Short (4 pts), Minimal (1 pt) [Weight = 10%]
- 7) Seasonal Pattern (degree to which hazard occurs in one particular season) = Year-round (10 pts), Three Seasons (7 pts), Two Seasons (4 pts), One Season (1 pt) [Weight = 5%]
- 8) Predictability (ease with which hazard can be predicted in terms of time, location, magnitude) = Unpredictable (10 pts), Somewhat Unpredictable (7 pts), Predictable (4 pts), Highly Predictable (1 pt) [Weight = 5%]
- 9) Collateral Damage (possibility of hazard causing secondary damage/impacts) = High (10 pts), Good (7 pts), Some (4 pts), No (1 pt) [Weight = 5%]
- 10) Availability of Warnings (ease with which the public can be warned of hazard) = Unavailable (10 pts), Generally Not (7 pts), Sometimes (4 pts), Available (1 pt) [Weight = 5%]
- 11) Mitigative Potential (ease with which hazard can be mitigated against) = Impossible (10 pts), Difficult (7 pts), Possible (4 pts), Easy (1 pt) [Weight = 5%]

Based upon these criteria, the hazards that could affect Mackinac County were ranked as follows:

Hazard	Occurrence	Area	Onset Speed	Population	Economic	Duration	Seasonal	Predictability	Collateral	Warning	Mitigative Potential	Total Score	Ranking
Nuclear Attack	.2	1.5	.7	2	.5	1	.5	.2	.35	.2	.35	7.45	1
Fixed Site – Hazardous Material Incident	.2	1.05	1	1.2	.35	.4	.5	.5	.2	.2	.2	5.75	2
Thunderstorms – Lightning, Tornadoes, Severe Winds, Hail	.6	1.5	.7	.8	.2	.4	.2	.2	.2	.2	.2	5.2	3
Terrorism/Sabotage/WMD/School Violence	.2	.15	1	1.4	.2	.7	.2	.35	.2	.35	.35	5.05	4
Pipeline Accidents	.2	.6	1	.8	.2	.4	.5	.5	.2	.5	.2	5.05	4
Infrastructure Failures	.2	1.5	.7	.2	.35	.7	.5	.35	.2	.2	.2	5.05	4
Accidents –Transportation Haz. Materials, Air, Land, Water	.2	.15	1	1.4	.2	.4	.5	.35	.2	.2	.35	4.9	5
Fire – Wildfires, Structural Fires	.6	.6	1	.8	.05	.7	.35	.2	.2	.05	.35	4.9	5

Hazard	Occurrence	Area	Onset Speed	Population	Economic	Duration	Seasonal	Predictability	Collateral	Warning	Mitigative Potential	Total Score	Ranking
Public Health Emergencies	.2	1.05	.1	.8	.2	.7	.5	.5	.2	.2	.2	4.6	6
Severe Winter Weather – Snowstorms, Ice/Sleet Storms	.6	1.5	.7	.2	.2	.7	.05	.2	.2	.05	.2	4.6	6
Civil Disturbances	.2	.15	1	1.4	.35	.4	.05	.2	.2	.2	.35	4.45	7
Subsidence	.2	.15	1	.8	.35	.4	.2	.5	.2	.35	.2	4.3	8
Extreme Temperatures	.6	1.5	.7	.2	.2	.4	.05	.2	.35	.05	.2	4	10
Flooding – Shoreline Erosion	.2	1.5	.1	.2	.2	.7	.5	.05	.2	.05	.2	3.85	11
Drought	.2	.6	.1	.2	.2	.7	.05	.05	.2	.05	.2	3.1	12
Dam Failure	0	0	0	0	0	0	0	0	0	0	0	0	
Scrap Tire Fires	0	0	0	0	0	0	0	0	0	0	0	0	

Mackinac County is susceptible to numerous potential natural and man-made hazards. Technological or man-made hazards rank the highest. The majority of the technological hazards are due to the natural hazards that affect the County, for example, power outages are often due to lines down from wind or ice damage or transportation accidents due to severe winter weather. This Plan concentrates more on the natural hazards that can affect the County. Chapter 2 discusses each hazard, what causes it and the likelihood of occurrence, the impact of the hazard on human development, potential losses and how vulnerable Mackinac County is to damage.

Goals & Objectives: Based upon the hazard analysis section, goals were developed which were then reviewed, discussed and revised by the hazard analysis working group. The working group then developed three to four specific objectives to accomplish each goal that was set for the County. The Mackinac County Local Emergency Planning Committee then reviewed these goals and objectives, discussed and revised as needed. These goals and objectives are discussed in Chapter 3.

Action Plan: Once the goals and objectives were set for the County, the working group brainstormed on how to achieve those goals and drafted an “action plan”. The Action Plan items were then evaluated for feasibility and cost benefits. The working group then specified recommended projects, which agency/department is responsible for implementing them and a timeline for when they are to be done. Governmental officials were contacted for discussion of specific projects in their jurisdiction. The goals and mitigation actions are discussed in Chapters 4-7 following up with a cost/benefit analysis and an Action Plan with designation of responsible agencies in Chapters 8, 9 and 10.

Historical Overview

The Straits of Mackinac is located at the southern tip of Michigan's Eastern Upper Peninsula where the Great Lakes Huron and Michigan meet. The area around this five mile band of water separating the Upper and Lower Peninsulas has a rich history dating back well before European exploration.

Jean Nicolet passed through the Straits around 1634 in search of a route to the Orient. Although he failed in his quest for the Northwest Passage, other explorers and missionaries soon followed him. Father Jacques Marquette founded Michigan's first mission at Sault Ste. Marie. He was later forced to move his mission to St. Ignace on the north shore of the Straits.

The Native American tribes of Huron, Ottawa, Sioux, Sauk, Fox, and others have lived off the bounty of this land. The French arrived in 1715 to build Fort Michilimackinac at what is now Mackinaw City. The British later took possession of the fort bringing with them their language and culture. Finally, in 1796, the Americans took possession of the newly built fort on Mackinac Island. Fort Mackinac would play an important part in the War of 1812. On July 17, 1812 the American forces garrisoned there were unaware that war had been declared. By the end of the day they had surrendered to British forces who had attained the heights of the Island. Two years later, American forces attempted to retake the fort. A skirmish between the two forces occurred and the Americans were forced to retreat. The British continued to hold the fort until peace was declared in 1814. Fort Mackinac remained an active American post until it was turned over to the State of Michigan. Today Fort Mackinac is part of the Mackinac State Historical Parks.

Originally part of the Indiana Territory, Mackinac County became part of the Michilimackinac Region in 1818. By 1852 the Upper Peninsula was divided into five counties: Chippewa, Mackinac, Marquette, Houghton, and Ontonagon. Mackinac County was established in 1849.

Fur trading was the basis of the economy of the first white settlers in the area. The fur trade flourished until the early 1800's when the supply of fur-bearing animals rapidly dwindled because of over extensive trapping and hunting. Lumbering took over as the area's primary economic producer at this time, and it predominated until the early 1900's at which time the quality timber supply had been virtually depleted by wholesale cutting practices and a poor reforestation program. About this same time, large copper and iron ore deposits were discovered in the Western Upper Peninsula. These events opened up the area even more, and the growing demand for the natural resources of the Upper Peninsula increased the population and the economic activity.

Commercial fishing was also a major industry from the early 1800's until the early 1940's. It was dealt a crushing blow in 1959 when the opening of the St. Lawrence Seaway brought an abundant supply of lamprey and alewives, two deadly enemies of fresh water fish. Within five years thereafter the supply of lake trout and whitefish, the two prime species of commercial fish, dwindled to the extent that commercial fishing was no longer profitable.

Several governmental projects developed during the mid 1950's and early 1960's which somewhat helped to relieve the economic depression of the area. In 1954 construction started on the Mackinac Bridge and by November 1, 1957 the five-mile-long bridge spanning the Straits opened. The linking of the two peninsulas further increased the tourist trade for the county.

Mackinac County has been summer resident and tourist-oriented since the late 1800's. A substantial number of families come and reside in the region for two to three and one-half months during the late spring, summer and early fall. A large number of tourists visit this area in all seasons, attracted by the woods, waters, and wildlife that offer a great variety of recreational activities and tourist attractions. Lake Michigan, Lake Huron, the Les Cheneaux Islands, and Mackinac Island are some of the main attractions. Mackinac County's location at the gateway to the Upper Peninsula, and its natural beauty, make it an ideal tourist mecca.

Setting

Mackinac County is in the south eastern part of the Upper Peninsula. It has an area of about 1,014 square miles. Mackinac County area is spacious, thinly-populated and for the most part, unsettled land. It is 85 miles in length and has more than 100 miles of Great Lakes shoreline along the mainland. There are 36 islands in the county. Bois Blanc is the largest at 25,000 acres. Mackinac County is bordered by Chippewa and Luce County to the north, Schoolcraft County to the west and by Lakes Michigan and Huron to the south. (See Map 1 - Location)

The county seat is St. Ignace, which is the first city reached when the Mackinac Bridge is crossed to the Upper Peninsula. The government is made up of 11 townships and two cities. Portage and Newton Townships make up the western border, Garfield, Hudson, Hendricks, Moran, Brevort, St. Ignace, Marquette, and Clark continue eastward. Bois Blanc Island Township is slightly southeast of the Cities of St. Ignace and Mackinac Island. (See Map 2 - Governmental Units) Information on each unit of government is listed below.

Government Unit	Phone Number	Office Location	Community
Mackinac County	(906) 643-7300	100 Marley Street	St. Ignace
Bois Blanc Township	(231) 634-7275		Bois Blanc Island
Brevort Township	(906) 643-8098	4020N Church St.	Moran
Clark Township	(906) 484-2672	208 Blind Line Rd.	Cedarville
Garfield Township	(906) 477-6481		Engadine
Hendricks Township	(906) 595-7217	N7302 Town Hall Rd.	Naubinway
Hudson Township	(906) 595-7315	Church Street	Rexton
City of Mackinac Is.	(906) 847-3702	Market Street	Mackinac Is.
Marquette Twp.	(906) 647-5220	7177 E. James St.	Pickford
Moran Township	(906) 643-8027	1358 West US-2	St. Ignace
Newton Township	(906) 477-6410	N6164 S. Gould City Rd.	Gould City
Portage Township	(906) 586-9522		Curtis
City of St. Ignace	(906) 643-8545	396 N. State St.	St. Ignace
St. Ignace Township	(906) 643-8935	Route 1 Gorman Rd.	St. Ignace

From the City of St. Ignace the City of Marquette lies 162 miles northwest, Sault Ste. Marie 52 miles to the north and Escanaba 143 miles west. The distance to travel to larger cities below the Mackinac Bridge such as Traverse City is approximately 109 miles south, or Detroit just under 300 miles south (See Map 3 - City Distance Map).

Climate

The annual average temperature ranges from 41 degrees to 43 degrees F. The average winter temperature is 17.3 degrees F and the average daily minimum temperature is 9.4 degrees. The lowest temperature on record, which occurred on January 26, 1927, is -30 degrees. In summer, the average temperature is 62.2 degrees and the average daily maximum temperature is 73.7 degrees. The highest recorded temperature occurred on July 13, 1936, at 103 degrees.

Growing degree days are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 32.36 inches. Of this, 18.18 inches, or about 56 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall on record was 4.10 inches on September 1, 1937. Thunderstorms occur on about 29 days each year, and most occur in June.

The average seasonal snowfall is about 112.6 inches. The greatest snow depth at any one time during the period of record was 43 inches. On the average, 125 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in mid-afternoon is about 67 percent. Humidity is higher at night and the average at dawn is about 85 percent. The sun shines 59 percent of the time possible in summer and 37 percent in winter. The prevailing wind is from the northwest. Average wind speed is highest, 10.4 miles per hour, in April.

Geology

Bedrock is the name given to the solid rock formations which are under, near, or at the earth’s surface. It is usually covered by an unattached layer of loose fragmented rock or soil. This covering, or mantle, was formed by decomposition of the underlying parent bedrock, or by an accumulation of foreign fragments which were transported and deposited by wind, water or ice.

Mackinac County is part of a bowl-shaped bedrock complex called the Michigan Basin. Located near the northern edge of the Michigan Basin the oldest sedimentary rock deposits are exposed. The rock sediments are mainly sand and marine organisms which are compressed to form various sandstones and limestones. The various bedrocks form a pattern of wavy bands that extend across the region in an east to west direction.

The surface features of Mackinac County were formed by glaciers and the melt waters that followed. The Nipissing glacial lake was the last major recessional lake. It occurred about 3,000 years ago (Smith, 1936). The elevation of the county ranges from 480 feet at the Lake Huron shoreline to 1,000 feet at Maple Hill in the north-central part of the county.

The surface features of the county include several lakebed plains; gently rolling plateaus intersected and pitted by broad swamp valleys and lakes; isolated low rounded ridges or hills rising conspicuously above adjacent plains; and lakeshore features consisting of beach ridges, low sand dunes, marshes, and bluffs and escarpments (Larsen, 1987; Smith, 1936).

Mackinac County has limestone bedrock, limestone breccia and soft shale bedrock. The Rexton area, the Engadine to Gould city area, the Cedarville area and the East Lake to Hill Lake area have thin glacial till over limestone bedrock or have exposures of the bedrock. There are several limestone quarries in the county. They range in size from 20 acres to more than 500 acres. The St. Ignace peninsula and Mackinac Island have the limestone breccia outcropping or a thin mantle of glacial till over the bedrock. The St. Ignace breccia is broken and re-cemented salt beds that were dissolved during the Silurian Age Group (Vanlier and Deutsch, 1958). The Moran, St. Ignace and Point Aux Chenes areas have red to green, soft shale bedrock. The glacial till in these areas is shallow to moderately deep over bedrock.

Land Use Patterns

About 81 percent of the county, or about 550,000 acres, is forested according to Michigan Resource Information System data compiled from 1978 aerial photography. The next largest land use in Mackinac County is wetlands which comprise about 5.25 percent or about 357,000 acres. Water and open areas each comprise about 4 percent of the land area with agricultural land at about 3.6 percent. Urban or built up areas is at about 2 percent of land area, with barren land at less than .25 percent. (See Map 4 - Land Use Map.)

The county has about 151,000 acres of National forest land and about 200,000 acres of State forest land. (See Map 5 – Public Land Ownership Map.)

Information on land use is currently being updated from 1998 photographs. It is assumed that this update will show an increase in urban/built up areas with forested and wetland areas decreasing.

Soils

Mackinac County is made up of about 63 different kinds of soil that vary widely in texture, natural drainage, slope, and other characteristics. For the general purposes of this report the soil surface texture has been mapped in the following categories: Complex (mixture of more than one type), Sandy, Gravel, Loam, Muck, Peats, Quarry, Entisols, Ponged and Water. (See Map 6 -Soils.)

Population and Housing

The County has seen moderate increases in populations during the past three decades, much of this could be attributed to the increase in seasonal residents or retirees. Because of the County's heavy reliance upon the tourism industry for wages and employment, this accounts for the seasonality of the population increases.

MACKINAC COUNTY POPULATION 1960 - 2000

Mackinac County			% Dif/		% Dif/		MI %
	1970	1980	1970*	1990	1980*	2000	Growth 1980-2000
	9,660	10,178	5.4%	10,674	4.9%	11,943	0.35%

*Figure shows percent difference from year indicated. Source: U.S. Bureau of the Census

Overall the population has increased nearly 5 percent since the 1990 Census; this followed an increase in population from 1970 to 1980 of 5.4 percent. According to population projections, developed by the U.S. Bureau of the Census, by 2010, the County will rise to over 12,700 persons, an increase of 24.8 percent since 1980.

The age of the residents in Mackinac County continues to rise. As evidenced by the table below, over 61% of the total population falls between the ages of 35 years and older. This represents an increase of 207% since the 1990 Census. The County continues to lose its younger population, as the age group of 20-34 year olds decreased by 28.8% in 2000. The median age in the County is 42.8, compared to 35.8 for the State of Michigan.

<u>MACKINAC COUNTY 2000 POPULATION BY AGE</u>			
2000	#	%	% DIFF.
Under 5	561	4.7	-23.0
5 to 9 yrs.	740	6.2	-1.6
10 to 14 yrs.	863	7.2	7.3
15 to 19 yrs.	743	6.2	4.6
20 to 24 yrs.	466	3.9	-10.4
25 to 34 yrs.	1,221	10.2	-18.4
35 to 44 yrs.	1,778	14.9	23.2
45 to 54 yrs.	1,823	15.3	60.8
55 to 59 yrs.	793	6.6	30.0
60 to 64 yrs.	777	6.5	17.9
65 to 74 yrs.	1,249	10.5	17.6
75 to 84 yrs.	701	5.9	18.8
85 +	228	1.9	39.0
Total			

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

<u>MACKINAC COUNTY MEDIAN AGE 1970-1990</u>			
1980	1990	2000	MI: 2000
28.1	37.1	42.8	35.8

The 2000 Census counted 5,067 households in the County. On average, there were 2.28 persons in each household, owner-occupied unit houses registering 2.34 persons and renter-occupied units housing 2.22 persons. The average household size decreased by 7.1% from 1990, however, the number of households in the County increased by 19.5% during the same period.

Renter-occupied housing accounts for nearly 21 percent of the housing in the County (significantly higher than the State's level of 15 percent) and 79 percent of units were owner-occupied. It could be presumed that, due to the lower cost of living in this region, more people are able to afford their own homes, median mortgage costs (in dollars) for Mackinac County, were \$763 in 2000, compared to \$972 for the State, during this same period. Median rent costs were \$429 in the County, compared with \$546 for the State. In 2000, the County had 4,346 vacant housing units, which translated into 46.2% of the total housing stock. Of these vacancies, 3,945 (or 91%) were seasonal, recreational or occasional use facilities. This information is important for estimating the number of persons at risk in any areas identified as hazard-prone.

The 2000 Census counted 11,943 residents in Mackinac County. Eleven thousand seven hundred forty six lived in households, and 197 lived in group quarters. Of this group quarters population, 138 (70%) were institutionalized; 17 (8.6%) in correctional institutions, and 121 (61.4%) in nursing homes. Of the 59 persons in the non-institutionalized population, 3 were housed in some type of military quarters and 56 (95%) in some other type of non-institutionalized group quarters. Of the 5,067 households, 67.3% were families, 55.6% married couples, and 32.7% non-family households. There were 603 households with individuals 65 and over, accounting for roughly 12% of the total.

The majority of the County's 9,413 housing units were 1-unit, detached structures (82.2%), and a much smaller number of denser living arrangements (2 units or above attached), made up roughly 7 percent of the total. There were a significantly higher number of units listed under the mobile home heading, with 8.9%. The age of the housing structures in the County is another statistic that should be considered when factoring in hazard risks. The majority of the structures within the County were constructed prior to 1960, with 5,172 falling into this category (54.9%). Extreme weather circumstances, or other naturally occurring hazards, could have a significant impact upon these aging structures.

The median value of owner-occupied housing units, according the 2000 Census, was \$91,800, considerably less than the State's median value of \$115,600 (-21%). The distribution of values compared to the State's can be found in the table below:

Housing Characteristics - 2000	Mackinac County		DIFF%	Michigan	
	Number	%		Number	%
Specified owner-occupied units	2,747	100.0%		2,269,175	100.0%
VALUE		0.0%			0.0%
Less than \$50,000	371	13.5	3.4%	224,603	9.9%
\$50,000 to \$99,999	1,209	44.0	12.6%	711,648	31.4%
\$100,000 to \$149,999	554	20.2	-6.4%	603,454	26.6%
\$150,000 to \$199,000	276	10.0	-5.0%	339,716	15.0%
\$200,000 to \$299,999	214	7.8	-3.3%	252,044	11.1%
\$300,000 to \$499,999	93	3.4	-1.2%	104,079	4.6%
\$500,000 to \$999,999	15	0.5	-0.7%	27,642	1.2%
\$1,000,000 or more	15	0.5	-0.2%	5,989	0.3%
Median (dollars)	\$91,800			\$115,600	

Source: U.S. Bureau of the Census, Census 2000, DP-4.

The most valuable of these properties were located in Clark Township, Mackinac Island City, Moran Township, and St. Ignace Township. Within the County, there were 48 lacking complete plumbing facilities (0.9%), 27 that lacked complete kitchen facilities (0.5%) and 172 without telephone service (3.4%). All of the aforementioned percentages are comparable to the State's levels, excluding lack of telephone service, which was 2.6% for the entire State. This is due to the vast geography and natural features found in this area, with some areas being incapable of hosting the necessary infrastructure needed to have telephone service. These areas are prone to isolation in emergency situations and will require special efforts to ensure their needs are met. This is increasingly important given the frequency and severity of winter weather situations throughout the region.

In the entire State of Michigan, 78.2% of all occupied housing units use utility gas as the primary heating source. In Mackinac County this percentage was only 22.2%. The primary type of heating fuel used within the county was Bottled, Tank or LP Gas (32%), other primary type of heating fuels used were: Electricity 19.3%, Fuel Oil/Kerosene 13.9%, Wood 11.9%, and other 0.4%. It could be said the because the county has less reliance on utility fuel, aside from those reliant upon electricity for heating, it is less prone to infrastructure failures than urban areas. The nature of these heating sources requires education and awareness of both maintenance and handling, in order to reduce the risks of structural or other fires.

Seasonal Population Analysis

In 2000, there were 4,436 housing units (46.2% of the county's total) listed as "seasonal, recreational or occasional use", which shows a substantial seasonal flow of people into and out of the county, depending on the time of year (season). Throughout the County, the percentage of seasonal homes continued to be high, with the lowest percentages found in the City of St. Ignace (4.1%), St. Ignace Township (28.1%), and Moran Township (32.6%). The highest percentages were found in Bois Blanc Township (88.1%), Hudson Township (56%), Portage Township (53%), City of Mackinac Island (53%), and Hendricks Township (50%); four other townships had seasonal housing percentages above 40%. The influx of population is believed to be highest during the summer months, and can be directly correlated with the holidays (Memorial Day, Independence Day and Labor Day). However, in many areas throughout the County, to the east of Interstate 75, including Clark Township and all Townships to the west of Interstate 75, seasonal increases are also being found during the winter months, as snowmobiling has increased exponentially in popularity in recent years. Another seasonal increase can be found during the late fall when hunting season formally begins statewide.

Housing Units for Seasonal, Recreation or Occasional Use

	Number	%
Bois Blanc Twp.	370	88.1
Brevort Twp.	271	48.3
Clark Twp.	953	48.6
Garfield Twp.	431	41.9
Hendricks Twp.	87	50.3
Hudson Twp.	128	56.4
Mackinac Island City	300	53.1
Marquette Twp.	203	43.5

Housing Units for Seasonal, Recreation or Occasional Use Cont.

	Number	%
Moran Twp.	241	32.6
Newton Twp.	172	45.6
Portage Twp.	569	53.7
St. Ignace City	51	4.1
St. Ignace Twp.	169	28.1
TOTAL	3945	41.9

Assuming that there are 2.22 persons per seasonal, recreational or occasional household in Mackinac County when utilized, and that the vacancy rate of these units at the peak of their occupancy is equivalent to the rental vacancy rate of 9.4%, the second table illustrates the resulting population estimates for each minor civil division, and for the county as a whole.

Given the projected population estimates listed below, the County could expect to see an increase of nearly 8,000 people, especially during peak tourism times.

Population Estimates	Perm. Pop	Seasonal Housing Units	Seasonal Pop. Inc.	Estimated Peak Pop.	% DIFF
Bois Blanc Twp.	71	370	744	815	1048.2%
Brevort Twp.	649	271	545	1194	84.0%
Clark Twp.	2200	953	1917	4117	87.1%
Garfield Twp.	1251	431	867	2118	69.3%
Hendricks Twp.	183	87	175	358	95.6%
Hudson Twp.	214	128	257	471	120.3%
Mackinac Island City	523	300	603	1126	115.4%
Marquette Twp.	659	203	408	1067	62.0%
Moran Twp.	1080	241	485	1565	44.9%
Newton Twp.	356	172	346	702	97.2%
Portage Twp.	1055	569	1144	2199	108.5%
St. Ignace City	2678	51	103	2781	3.8%
St. Ignace Twp.	1024	169	340	1364	33.2%
TOTAL	11943	3945	7935	19878	66.4%

Close consideration should also be given to camps and campground facilities throughout the county, which also temporarily house large numbers of people throughout the peak times in the tourism season. These individuals are not accounted for in the Census figures because they do not reside in housing unit structures. Rather, persons and families would be staying in the County in tents or campers or other makeshift or portable shelters. The nature of many of these recreational shelters makes them more vulnerable to certain weather and hazard events.

Transportation Network

Highways

Every community, with the exception of a few island settlements, is linked together by a good system of paved highways, ranging from lightly-traveled county roads to a heavily-traveled, four-lane, limited access federal interstate highway.

This highway network provides an excellent means of transportation from any area to another throughout the Eastern Upper Peninsula. The ease of access from one area to another is further enhanced by the favorable topographic conditions and ease of traffic flow.

The only real “need” is a four-lane divided highway to run east and west across the Upper Peninsula. This would provide a much stronger link with major market areas in the Western Upper Peninsula, Wisconsin, Minnesota, and Illinois. It would also provide a desperately needed “safe” east-west traffic flow across the Upper Peninsula. Currently, the use of passing lanes along US-2 is easing this burden.

The state and federal highway network traverses Mackinac County with Interstate-75 running north from the Mackinac Bridge. US-2 travels west from the City of St. Ignace while Hwy M-134 travels east. Other major highways include M-123 traveling northwest to tie into Hwy M-28 and Hwy M-117 traveling north/south which also connects Hwy M-28 to US-2.

Primary and secondary county roads provide for transportation links between communities and major highways. County Road H-40, also known as Hiawatha Trail, provides for an east-west transportation link between the communities of Engadine, Garnet and Rexton and further east into Chippewa County. County Road H-33 travels north-south between US-2 and M-28 with County Road H-42 traveling east-west from Curtis to tie into Hwy M-77 in Schoolcraft County.

Air Service

Mackinac County has a public use airport located in the City of St. Ignace. It has a 3,800' x 75' cement runway with a fixed base provider Great Lakes Air. This airport provides charters to anywhere and is used by many companies traveling through the area.

Mackinac Island has an airport with a 3,500' paved runway. It provides service to commuter planes (8-10 seaters), turbo prop planes, and can handle small jets.

Bois Blanc Island has a 2,400' grass runway with lights expanding to 3,500' black top proposed in 2004. Great Lakes Air from St. Ignace, Michigan and Hoffman Flying Service, from Cheboygan, Michigan are service providers.

Clark Township operates the A.J. Lindberg airport in the community of Hessel located just west of Cedarville which has a 3,700' x 60' asphalt runway.

The Hiawatha Club in Garfield Township has a private grass runway airport which also handles small planes from the occasional club member.

Seaways

The Cedarville area is home to a deep-water harbor at the Limestone Quarry located just east of town.

Small boat harbors of refuge are located at Naubinway on Lake Michigan and at the City of St. Ignace, Mackinac Island, Bois Blanc Island, and Hessel and Cedarville on Lake Huron.

Passenger ferry service is provided to Mackinac Island through three private companies with docks in the City of St. Ignace in Mackinac County and Mackinaw City, in Cheboygan County. Car/Passenger service is provided to Bois Blanc Island through two service providers located in Cheboygan, Michigan.

Railway

Canadian National Railroad travels east-west through Mackinac County daily, transporting many types of freight including hazardous materials.

Bus Service

The only bus service that is currently available in Mackinac County is a Specialized Service through Chippewa, Luce, Mackinac Community Action Agency based in the City of St. Ignace. It provides service to senior citizens throughout the City of St. Ignace as well as Moran, Brevort and St. Ignace Townships.

Greyhound passenger bus service is available daily with a stop in downtown St. Ignace. Indian Trails passenger bus service is also provided two times a day. There is currently a need in the community for a facility to replace the curbside bus stop.

There also is also the Transportation to Work Program that provides bus service to and from Kincheloe located in Chippewa County. This program is dependent upon grant funding which may or may not continue in any given year.

Horse-drawn/Bicycles

Two modes of transportation that are predominant on Mackinac Island that should be mentioned are bicycle and horse riders, or horse-drawn buggies, taxis, carriages, and drays. These modes of transportation continue to be a significant part of the transportation history on the Island. The Mackinac Island Carriage Tours has been providing continuous livery service on the Island since 1872. During the summer, Mackinac Island is home to approximately 600 horses, two-thirds of which are associated with the Mackinac Island Carriage Tours, the remaining third are associated with other commercial and service companies, or with private owners. Horse drawn vehicles provide sightseeing tours, taxi service, deliveries and shuttle services along with recreational use. (See Map 7 - Transportation Network.)

Critical Facilities

When dealing with natural disasters, some development is more important than others, and these are considered to be “critical facilities.” Critical facilities are buildings and infrastructure whose exposure or damage can affect the well being of a large group. For example, the impact of a flood or tornado on a hospital is greater than on a home or most businesses.

Generally, critical facilities fall into two categories:

1. Buildings or locations vital to public safety and the disaster response and recovery effort, such as police and fire stations and telephone exchanges, and
2. Buildings or locations that, if damaged, would create secondary disasters. Examples of such buildings or locations are hazardous materials facilities and nursing homes.

Critical facilities are not strictly defined by any agency. For this mitigation planning effort, eight categories of critical facilities were used:

1. Hazardous materials sites.
2. Health facilities: hospitals and nursing homes.
3. Emergency response facilities: police and fire stations, public works sites, etc.
4. Utilities: water and wastewater treatment plants, electrical substations, etc.
5. Schools.
6. Places of assembly, such as township halls, churches, community buildings, casinos or campgrounds.
7. Transportation - Bridges and dams.
8. Historical Structures

The distribution of these facilities by municipality is shown on the table on the next page and plotted on Maps 8-15. The full list of each category is included as Appendix E.

Critical Facilities								
	Hazard Material Sites	Health Facilities	Emergency Facilities	Utilities	Schools	Assembly	Transportation	Historical Structures
Bois Blanc Twp.		1	2			3		
Brevort Twp.			1	2		1	1	
Clark Twp.		1	3	2	2	11		2

Critical Facilities								
	Hazard Material Sites	Health Facilities	Emergency Facilities	Utilities	Schools	Assembly	Transportation	Historical Structures
Garfield Twp.	1	1	5	2	1	7	2	1
Hendricks Twp.			1	1			1	
Hudson Twp.			1	1				
Mackinac Island City	5	1	5	7	1	5		10+
Marquette Twp.		1				1		
Moran Twp.			1	1	1	3	2	1
Newton Twp.			1	1				
Portage Twp.			2		1		1	
St. Ignace City	2	2	7	4	4	13		2
St. Ignace Twp.						1		

Chapter 2 discusses critical facilities that are impacted by each natural hazard. For some hazards, such as floods, affected critical facilities can be readily identified since we can predict where a flood is likely to be. For other hazards, such as tornados, the impact on critical facilities can only be broadly identified. But for all hazards and for all critical facilities, hazard mitigation measures can be identified and this is done throughout Chapters 4-7.

