

AN INVENTORY AND STUDY OF THE  
HISTORICAL DEVELOPMENT OF THE MAJOR  
RESOURCES OF MARQUETTE COUNTY, MICHIGAN

Thesis for the Degree of Ph. D.  
MICHIGAN STATE UNIVERSITY

Roger Lawrence Norden

1960



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OF THE MAJOR RESOURCES OF MARQUETTE COUNTY, MICHIGAN

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AN INVENTORY AND STUDY OF THE HISTORICAL DEVELOPMENT  
OF THE MAJOR RESOURCES OF MARQUETTE COUNTY, MICHIGAN

By

Roger Lawrence Vorden

AN ABSTRACT

Submitted to the School for Advanced Graduate Studies of  
Michigan State University of Agriculture and  
Applied Science in partial fulfillment of  
the requirements for the degree of

DOCTOR OF PHILOSOPHY

Department of Fisheries and Wildlife

1960

Approved



AN ABSTRACT

The management or wise use of our natural resources is one of the major problems of the world today. An area can realize its potentialities only through planning based on a knowledge of the nature and extent of its natural resources obtained from a detailed survey of their major resources.

The major resources of Marquette County with which this survey is concerned include the minerals, water, soils, fish, wildlife, forests, and the human resource. The present status of the resource in Marquette County is given in this report along with the history of its development, and the economic implications for the future.

This survey could serve as a guide in the future planning and utilization of the resources of the county. By providing concise information on the major resources of the county, this report should help further the instruction of conservation in the schools of the area.

Marquette County, located in the north-central part of the Northern Peninsula of Michigan, is Michigan's largest county. It contains 1,841 square miles with sixty-eight miles of shoreline on Lake Superior. The population of the county, according to the 1950 census was 47,654. It was estimated that on January 1, 1958 there was a population of 50,500 in the county.

The major findings of this report show that Marquette County is bountifully endowed with natural resources, particularly iron, forests, water, fish, wildlife, and recreational features.

Within its borders are found more inland lakes (835) and more miles of stream (1,906) than are found in any other county of Michigan. The abundant supply of fresh water for industrial purposes represents one of the county's principal long-range attractions for industry. Natural gas is foreseen as a future source of power.

Iron ore provides the main source of income in the county. More than 275 million long tons of ore have been produced on the Marquette Range since iron was first discovered here in 1844. It is believed that the iron ore reserves in this county are sufficient for many decades of continued mining activity, especially with the continued research in the field of beneficiation.

More than ninety per cent of the county is considered forest land. Of this forest area, commercial forest land occupies 1,121,300 acres. This provides forest products, considerable areas for wildlife production, and recreation. The tourist and resort industry is rapidly becoming one of the major sources of income in the county.

Because of the topography, sandy soils, and the short growing season, much of the land is not suited to intensive agriculture. The principal agricultural enterprises are dairying and potatoes. Of the total employed in the county, only three and one-half per cent are employed in agriculture. Marquette County was the first in Michigan to produce a one-thousand bushel per acre yield of potatoes.

In conclusion, this is a county rich in natural resources, scenic beauty, historic lore, and containing a vast potential for future development.

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## I. INTRODUCTION

### The Problem, Its Description and Importance

The management or wise use of our natural resources is one of the major problems of the world today. Each nation, state, county, and community should be concerned about the status of its natural resources. It is the ultimate hope that in time each community and county, each state and nation, will make a detailed survey of its major resources which should guide it in its future plans and utilization of its resources. It was to meet this need for one of the 83 counties of Michigan that this problem, "An Inventory and Study of the Historical Development of the Major Resources of Marquette County, Michigan", was undertaken.

The people of an area can realize its potentialities only through planning based on a knowledge of the nature and extent of its natural resources, and how they fit in with today's trends and needs. It is hoped that this report will provide a stimulus to the people of this region, as well as those of other regions, in taking a serious look at their natural resources and in making the best decisions regarding their use. This report should be of invaluable assistance in both public and private planning for the future.

The major resources of Marquette County with which this report is concerned include the minerals, water, soil, forests,



fish, wildlife and the human resource. The present status of each resource is given along with the history of its development in the county, and the economic implications for the future. Many of the minor resources which are of great importance in the overall picture were not included in this study.

This report should help further the instruction of conservation in the schools of Marquette County, and in the teaching of conservation courses at Northern Michigan College, Marquette, by making available information on the major resources of the county.

#### Previous Research

Many agencies and departments, such as the Michigan Department of Conservation, the United States Geological Survey, Soil Service, Forest Service, and Fish and Wildlife Service, have conducted or are conducting studies on some of the resources of the Upper Peninsula of Michigan, including Marquette County. An engineering study of the economic resources of Michigan's Upper Peninsula was conducted by Ebasco Services, Incorporated, and submitted to the governor in 1953. No detailed survey, such as this, however, has ever been conducted on Marquette County.

#### Procedure, Materials, and Methods

All available reports on the major resources of Marquette County were reviewed, plus many on the Northern Peninsula and on the entire state of Michigan. Much of the material for

this report was obtained from local and state conservation files, history and library references, census figures, economic development data sheets, Michigan statistical abstracts, publications of previous surveys on certain resources, and from local observations, study and interviews.

### Location of Marquette County

Marquette County is located in the north-central part of the Northern Peninsula of Michigan between 46 and 47 degrees north latitude and between 87 and 88 degrees west longitude. The northern border of the county is made up of sixty-eight miles of shoreline on Lake Superior. It is bounded on the east by Delta and Alger counties, on the west by Baraga and Iron counties, and on the south by Dickinson, Menominee and Delta counties (see Figure 1).

### Size of County

Marquette is Michigan's largest county containing 1,841 square miles. It is larger in land area than the state of Rhode Island (1,058 sq. mi.), and is about equal in size to the state of Delaware (1,978 sq. mi.). It extends from north to south for a total distance of approximately sixty-four miles, and it is forty-eight miles in width from east to west. Within its borders are a total of 1,178,240 acres of land<sup>1</sup> resources, plus an additional 23,680 acres of water resources. Ninety-two per cent of its lands are in forest areas.

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<sup>1</sup>1940-16th Census of the United States. Land area excludes water bodies in excess of forty acres.

# MICHIGAN

Scale of Miles  
10 0 10 20 30 40

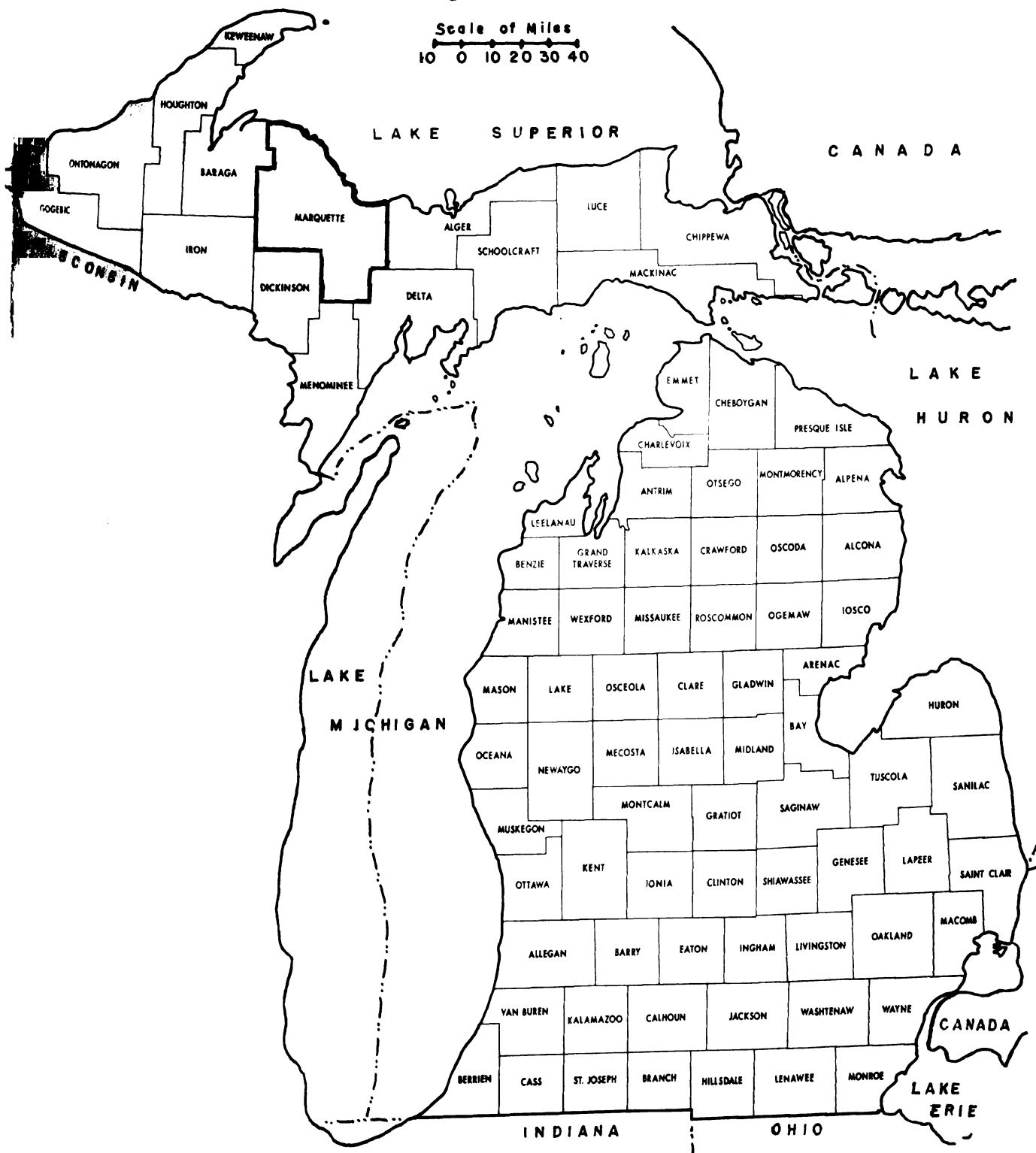


Figure 1. Location of Marquette County.

### Topography

The general elevation of the eastern part of Marquette County ranges from 602 to 1,150 feet above sea level. This area is underlain by sandstone and limestone. Most of the western part of the county, for the most part composed of igneous and metamorphosed pre-Cambrian rocks, is situated on elevations ranging from 1,300 to 1,700 feet above sea level. The elevations vary, however, from sandy benches rising only a few feet above Lake Superior to the Huron Mountains which attain a height ranging from 1,800 and 2,000 feet above sea level.<sup>1</sup> The Huron Mountains form the second highest land area in Michigan and are only exceeded by the Porcupine Mountains of Ontonagon County.

The entire area was covered during the Pleistocene Age by ice sheets which left a heterogeneous mantle of rocky drift of various thicknesses and composition. The area is essentially a part of a deeply dissected highland plateau featured by rock knobs, deep valleys filled with glacial debris, high sandy hills, sand plains, and plains representing old glacial lake levels, all of which are featured by swamps and lakes. Marquette County contains 835 inland lakes and about 1,906 miles of streams, which in both cases, is more than any of the other counties in the state of Michigan.

### Climate

A common conception concerning Marquette County, as well

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<sup>1</sup>Frank Leverett, Surface Geology of Michigan (Pub. 25; Lansing: Michigan Geological Survey, 1937), p.53.

as of the entire Northern Peninsula, is that of a remote, heavily forested area, with an extremely cold, rugged climate. One of the efforts of economic and industrial development programs is to dispel this conception. Economists claim that stories on weather endeavor to portray the unusual. Consequently the occurrence of an occasional low winter temperature or a heavy snowfall is read and interpreted with considerable misunderstanding. Even under these unusual conditions, transportation, industrial, business and social activities continue normally. According to a recent survey<sup>1</sup>, a 12-inch snowfall or a 20-below temperature in the low-humidity Northern Peninsula causes much less inconvenience than two or three inches of snow or a damp 20 above in many Metropolitan areas farther south.

For comparative purposes, the following tabulation of long time Weather Bureau data provides average July and January temperatures for several industrial cities:

TABLE 1.

## COMPARATIVE TEMPERATURES OF SOME CITIES

<u>City</u>	<u>July Average Temperature</u>	<u>January Average Temperature</u>
Marquette, Michigan	65.3	17.4
Detroit, Michigan	73.1	25.5
Flint, Michigan	71.8	22.9
Milwaukee, Wisconsin	70.1	20.6
Minneapolis, Minnesota	73.2	13.1
Chicago, Illinois	75.5	25.3

<sup>1</sup>A Survey Report by the National Society of Industrial Realtors, Industrial Location Advantages of Michigan's Upper Peninsula, February, 1955, p.4.

According to the published records of the United States Weather Bureau station located at Marquette, the average annual temperature, as based on the period 1921-1950, was 42.2 degrees Fahrenheit. Based on the 40 years prior to 1957, at Marquette, the average July temperature was 65.3 degrees, and the average January temperature was 17.4 degrees. The extremes in temperature during the period 1921-1950 in Marquette include the record high of 108 degrees, and the record low of 27 degrees below zero.

The temperatures recorded at Marquette might appear extreme, but they are not as extreme as those in other states of similar latitude, because Lake Superior moderates the extremes of heat and cold. In summer, the air passing over the lake is cooled before reaching the shores. In winter, although ice forms along the shores, Lake Superior remains above the freezing point even in the coldest weather. The typical cold wave moving down from the northwest crosses Superior's comparatively warm water and is much milder when it hits the south shore. The temperature of the Arctic air mass is often raised twenty degrees by the lake, so the area south of the lake doesn't get the low temperatures to be found to the east and west.

As with temperature, the amount of precipitation and snowfall varies greatly within short distances, especially in the hilly areas, throughout the 1,841 square miles of Marquette County.

At Marquette, the average annual precipitation, based on

the period 1921-1950, was 31.24 inches. February is normally the driest month, and July the wettest. The maximum monthly rainfall for the past 20 years was 10.2 inches and occurred in July, 1949. The minimum monthly rainfall for the same period was 0.21 inches and occurred in October, 1956.

Lake Superior is considered the Midwest's greatest snow-maker. As the dry, cold Arctic air mass is warmed by the lake, its capacity for holding water vapor is increased and it picks up a considerable quantity in its passage over the lake. As it reaches land, the air in the lowest level is warmer than the earth's surface and it cools the moisture that has been picked up in crossing the lake, forming snowflakes that blanket the south shore. Snowfall averages more than 100 inches along Lake Superior each winter. In the southern Upper Peninsula counties, it is less than 50 inches. (The greatest snowfall in the Upper Peninsula is along Lake Superior on the Keweenaw Peninsula. An average of 184 inches has fallen at the airport near Calumet.)

At Marquette, the snowfall for the past 40 years prior to 1957, averaged 113.3 inches. Since 1904, the annual snowfall at Marquette has ranged from 53.4 inches in the winter of 1940-41, to 188.0 inches in the winter of 1949-50. The snowfall for the past three winters at Marquette was as follows: 1956-57 - 108.7 inches; 1957-58 - 121.6 inches; and 1958-59 - 104.0 inches.

#### Population of Marquette County

The population of Marquette County, according to the U.S. Census of 1950, was 47,654. This was an increase of 1.1 per cent



1. The Huron Mountains of Marquette County.



2. Winter at Northern Michigan College.



from the 1940 census figures. It was estimated that on January 1, 1953, there was a population of 50,500 in the county.<sup>1</sup> With a land area of 1,841 square miles, this would be a population density of 25.9 persons per square mile in 1950. Stated in another way, there are 24.2 acres of land per person in Marquette County.

Marquette is the largest city in the county as well as the county seat. It had a population of 17,202 in 1950. In 1958, an estimate of the population of the county was 18,400.

Ishpeming is the next largest city with a population in 1950 of 8,962. Negaunee had a population of 6,472 in 1950. Marquette, Ishpeming and Negaunee are the only cities of the county. The populations of the various communities of the county are included with the population of the political townships. These statistics are given in Table 2, page 24.

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<sup>1</sup>John P. Henderson (ed), Michigan Statistical Abstract (2nd. ed., M.S.U. 1958), p.6. Based on a Survey of Buying Power, Sales Management. May 10, 1958.

## II. THE HISTORY OF MARQUETTE COUNTY

### Pre-historic Metal Workers

The history of Marquette County begins with the earliest inhabitants of this region who were perhaps the pre-historic Mound Builders--a civilization antedating the Indians. These pre-historic miners worked the copper lodes in Michigan, by shallow excavations, and made arrow heads and other artifacts of the native copper. These copper implements were dropped here and there on Presque Isle and elsewhere within Marquette County. These ancient peoples are supposed to have come from Mexico and to have been driven southward, or perhaps exterminated, by the Indians who may have come from Asia across Bering Strait. These earliest inhabitants disappeared about ten thousand years ago.<sup>1</sup>

### Indians of Marquette County

At the time the white men arrived the native Indians of Marquette County were the Chippewa, also known as the Ojibway. The Ojibway Indians were a branch of the powerful Algonquin tribe of the New York and the St. Lawrence River regions. The Ojibways were then slowly driving the Dakotah (Sioux) Indians westward, for the Sioux Indians once roamed from Minnesota as far east as Lake Michigan. The Chippewa (Ojibway) tribe was

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<sup>1</sup>Lake Superior Iron Ore Association, Lake Superior Iron Ores (Cleveland: Hanna Building, 1938), p.14.

closely related to the Ottawa and Potawatomi tribes. Perhaps in early times they had been a single tribe. Recognizing this relationship, they called themselves the "Three Fires", and the Chippewa were known as the "Elder Brothers".<sup>1</sup> These three tribes, with the Miami and the Menominee tribes, which were among the six principal tribes found in Michigan, belonged to the Algonquian language group. The Algonquian group usually lived in wigwams, low dome-shaped huts made of saplings bent over and covered with bark or with mats woven from reeds. The Wyandots, the only principal Indian tribe of Michigan that did not belong to the Algonquian language group, had been driven out of the Northern Peninsula of Michigan at an earlier time. (The Wyandots, belonging to the Iroquoian language group, and like the Iroquois to whom they were related, built long houses, sometimes more than one hundred feet in length.)<sup>2</sup>

In Marquette County, mostly within the limits of what is now the city of Marquette, there were six Indian villages and two burying grounds.<sup>3</sup> Another Indian village was located in what is now Powell Township, at the mouth of the Pine River (near the present location of the Huron Mountain lodge). This village was nearly forty miles by Indian trail from the village at the mouth of the Chocolay River.

Four main trails branched from the Indian villages

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<sup>1</sup>F. C. Bald, Michigan in Four Centuries (New York: Harper and Brother, 1934), pp.8-17.

<sup>2</sup>Ibid.

<sup>3</sup>W. B. Hinsdale, Archaeological Atlas of Michigan (Ann Arbor: Univ. of Mich. Press, 1931), p.25.

located at the present city of Marquette. One went northwest through the Hunch Mountains; another west to the head of Keweenaw Bay; the third southwest to the Escanaba River; and the fourth went southeast to Grand Island. The western trail divided near Negaunee into two parallel spurs and united again at the northern end of Lake Michigamme, where a canoe trail swung downriver to the Menominee River.<sup>1</sup>

Although there were several Indian villages, there were not many Indians within the present limits of Marquette County. In fact, there were not many found along the entire south shore of Lake Superior. It is probable that there was no concentrated tribal settlement of the Upper Peninsula. In 1798, the Canadian furtrader and surveyor, David Thompson, who passed this way, estimated that there were not more than 130 Indian families in the whole region south of the lake.

The scarcity of villages and Indians was believed due mainly to the lack of available food. The deer appear to have migrated southward where browsing conditions were more favorable. Beaver seem to have been relatively abundant. Fish were abundant and were caught in the summer as well as through the ice in the winter. This might explain the presence of the Indian settlement at the mouth of the Carp River in Marquette County where agricultural operations were also carried on. The principal Indian crop was corn. In 1845, the first United States surveyors found the Indians growing potatoes near Ives Lake (T51N, R28W) in Marquette County.

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<sup>1</sup>Hinsdale, op.cit., p.28.

Early Explorations

Like many other sections of North America, this region owes its earliest explorations to the world-wide demand for furs and to the search for a shorter route to the Orient. Before any white men had penetrated as far as the Great Lakes, Indians were making the long, difficult canoe passage from Northern Michigan all the way to Montreal. Here French traders provided a ready market for their furs. It was inevitable that some of the Frenchmen should attempt to reach the country from which Indians came with rich furs. So, the early history of this region begins with the travels of French fur traders, adventurers, and missionaries of the Christian faith.

It is difficult to say who was the first white man that visited Marquette County. Many of the early explorers, missionaries and fur traders probably spent at least one night's stop-over within the bounds of Marquette County as they skirted the southern shores of Lake Superior. A day's canoe journey is limited to about 50 miles (16 leagues). As Marquette County has 68 miles of shore-line on Lake Superior, it would have necessitated their debarking on the shores of this county, even if they were not grounded by the severe weather conditions occasionally found on Lake Superior.

It is believed that two Frenchmen, Etienne Brule and a companion named Grenoble, were the first Europeans to visit Michigan. From 1610 to 1618,<sup>1</sup> Brule, a member of Champlain's

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<sup>1</sup>C. W. Butterfield, History of Brule's Discoveries and Explorations, 1610-1626, p.20, cited by Michigan Historical Records Survey Project, Marquette County, No.52, p.7.

expedition, spent eight years living among the Indian tribes of Northern Michigan, learning their languages and customs, visiting their copper mines along the shores of Lake Superior, and exploring four of the five Great Lakes.<sup>1</sup>

The next visitors to Michigan were two Jesuit missionaries, Father Isaac Joques and Charles Raymbault, who went to the eastern part of Lake Superior in 1641.

As early as 1654, Medard Chouart, who assumed the title Sieur des Groseilliers, was on Lake Superior and returned with 1,656 canoes loaded with valuable furs. In 1658, he, with his brother-in-law, Pierre Esprit Radisson, went again to the Lake Superior region. Returning in 1660, they described the majestic splendor of the Pictured Rocks (Alger County) and other sites. The wild beauty of the Lake Superior scenery so impressed them that some of the places mentioned are easily identified.<sup>2</sup>

The Jesuit missionary, Father Rene Menard, reached the head of Keweenaw Bay late in the autumn of 1660, no doubt stopping enroute in Marquette County. Also in 1660, the Franciscan Father, Louis Hennepin, took the St. Louis River-Sandy Lake-Mille Lacs route from the western end of Lake Superior southerly.<sup>3</sup>

Father Claude Allouez, in 1665, went to the western end of Lake Superior and was active in establishing missions along the south shore of Lake Superior.

During 1668, the Jesuit Father Jacques Marquette, after

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<sup>1</sup>Bald, op.cit., p.23. Claims Brule reached the Northern Peninsula of Michigan in 1622.

<sup>2</sup>Ibid. p.26.

<sup>3</sup>Lake Superior Iron Ore Association, op.cit., p.14.

whom the county and city of Marquette were named, successfully established a permanent mission at Sault Ste. Marie, at the eastern extremity of the Northern Peninsula of Michigan. This mission served as a stopping place and in this way substantially aided those making subsequent voyages by appreciably shortening the tremendous distances involved. (This was nearly 40 years before outposts in Lower Michigan were established. Detroit was founded by Cadillac, who went from the settlement of St. Ignace in 1701.) During 1669, Father Marquette skirted the southern shores of Lake Superior to LaPointe du Esprit in Wisconsin, where he re-established the mission begun there in 1665 by Father Allouez. As previously stated, a canoe journey was limited to a maximum of 50 miles per day, and so it is believed that Father Marquette, enroute to his new mission, must have stopped to preach to the Indians of the villages of Marquette County.

#### The Discovery of Iron Ore

For nearly two hundred years, the explorations were almost wholly by Frenchmen, this region being part of New France. In 1763, Louis XV ceded the part east of the Mississippi River to George III of England, who, twenty years later, lost it to the Colonies at the close of the Revolutionary War.

It was nearly 150 years after the beginning of the French explorations in this region before any mention was made of seeing iron ore. The first note of its occurrence in the Lake Superior region was at Gunflint Lake (partly in Minnesota and partly in Ontario) in 1780. No attention was paid to it as the

French had come to this region to conquer, to preach, and to obtain furs.

The Indians were the original proprietors of these lands and from them, by a series of treaties, the United States secured the area which includes the present Marquette County. The land in Marquette County east of the Chocolay River had been ceded in 1836, and the remainder of Marquette County was included in the treaty made with the Indians at LaPointe, Wisconsin, in 1842. Settlement could not legally or safely be made here until these cessions took place.

Lewis Cass, territorial governor of Michigan, sent expeditions accompanied by geologists to study the south shore of Lake Superior. To him credit is due for much of the early detailed explorations of the shores of Lake Superior.

Before 1820, navigators had observed conspicuous rock masses along the shores of Lake Superior. In 1821, Henry R. Schoolcraft, who was commissioned by the government to conduct explorations, made camp in Marquette Bay and noted the occurrence of granite there. Dr. Douglas Houghton, who, in 1838, was to become the first State Geologist, was with Schoolcraft at Marquette Bay. In 1841, Houghton made some observations in the vicinity of Marquette and found hematite, but he did not think it valuable because it was disseminated in schists.<sup>1</sup> This was the first reference to iron-bearing minerals in this county. It was also the first in the Lake Superior region since the French mentioned seeing iron ore at Gunflint in 1780.

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<sup>1</sup>Lake Superior Iron Ore Association, op.cit., p.16.



Also, before settlement could take place, the region had to be surveyed and subdivided into townships and sections. W. A. Burt and his surveyors began subdividing land in Marquette County in August, 1844. They proceeded first to establish the township lines, and it was while establishing the east-west line between Township 47 North and Township 48 North in September, 1844, that they located iron ore near Teal Lake. The presence of iron was indicated prior to its discovery by the gyrations of the magnetic compass, but W. A. Burt had invented a solar compass, which used the sun and not terrestrial magnetism to determine directions. With this solar compass the surveyors had continued their work.

#### Mining and Early Developments

It was in 1845, the year following the surveyor's discovery, that the search for iron began in earnest. P. M. Everett was conducted to the site of the discovery by Indian Marge Gesik. Everett organized a company, known as the Jackson Company, and acquired one square mile adjacent to the present city of Negaunee. Mining started at the Jackson Mine in 1846. This was the first mining in Marquette County, as well as the first in the Lake Superior area. It was not far from this Jackson Mine--near the Carp River within the present limits of Negaunee--that the first settlement was made in Marquette County (1846).

Because of the poor transportation facilities, it was very difficult to ship the bulky ore. Men first attempted to make iron at the location of the mine rather than to ship the ore out of the area. In 1847, the first metallic iron in the Lake

Superior district was made in a forge on the Carp River in the vicinity of Negaunee. It was the forerunner of about 16 small forges or blast furnaces which later appeared in the district. These early operations used charcoal for fuel and tremendous quantities of hardwood were consumed in running the furnaces. Many of the early smelting operations failed during the first few years. Ultimately, they all failed.

The first settlement on the site of the present city of Marquette was made in 1849 to set up a forge for processing ore from the Jackson Mining Company. In 1849, the Cleveland Mine near Ishpeming was developed by the Marquette Iron Company, and up to 1854, hauled ore by wagon to Marquette for use in the forges operating there.

With the development of mining, the importance of the city of Marquette's location on Marquette Bay became significant. As a protected inlet from eleven to twenty feet deep and a mile and a half long, the bay was unique in requiring no dredging.<sup>1</sup> In 1853, the Cleveland Iron Mining Company built a loading dock at Marquette, and in September of that year, shipped 152 tons of ore to Sharon, Pennsylvania.

For a number of years, efforts had been made to build a canal around the St. Mary's Rapids between Lake Superior and Lake Huron. The first iron ore shipped out of the Lake Superior region was from the Marquette Range and required a portage around the rapids. Congress authorized the building of the

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<sup>1</sup>Michigan Historical Records Survey, Inventory of the County Archives of Michigan (No.52-Marquette County; Detroit: 1940), p.56.

Soo Locks that same year and work started the next year (1853). The Locks were completed in 1855, providing the transportation link between Lake Superior and Lakes Huron and Michigan.

The first railroad in the county, also the first in the Northern Peninsula of Michigan, was the Iron Mountain Railroad from Marquette to Negaunee and Ishpeming, completed in 1857. This railroad was extended to L'Anse in 1872; to the Copper Country in 1883; to Chicago, via the North-Western Line in 1872; and to the Straits and Detroit in 1881.

Before the occurrence of the Panic of 1873, iron mines and mining companies in Marquette County had appeared also at Clarksburg, Champion, Michigamme, and Republic. In 1873, there were 23 iron mines in the county and five million tons of iron ore had already been shipped.

Minerals other than iron ore received early attention. The boom in the Copper Country in the 1840's led to the organization of copper mining companies along the Dead River in Marquette County. The minerals silver and lead were sought on Presque Isle (1845), north of the city of Marquette, where the old shafts may still be seen. There was a gold excitement in the late 1880's, and the Ropes Gold Mine near Ishpeming, between 1883 and 1897, produced some \$650,000 worth of gold bullion.<sup>1</sup> The Michigan Gold Mine nearby produced a smaller quantity. Building stone of the brown and raindrop sandstone was quarried near Marquette from the 1870's and shipped to distant outside points. The old Waldorf-Astoria Hotel in New York was reported

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<sup>1</sup>Alfred C. Lane, Sixth Annual Report of the State Geologist (Lansing: Mich. Geol. Survey Div., 1904), p.157.

to have used it. Verde Antique marble close to the Ishpeming gold deposits, along with talc, have received sporadic attention.

The county was originally covered with a dense forest, including pines, hardwoods, and swamp conifers. The removal of the pine forest started about 1870. The demand for charcoal to be used in the manufacture of pig iron led to the utilization of large quantities of hardwood during the early period of settlement, but the exploitation of the hardwood forests for the production of lumber did not begin until about 1900.

From the outset, Lake Superior fish were in demand and eventually were shipped outside the county on a commercial basis. With the decline of the fur trade about 1840, the American Fur Company turned their attention from furs to fishing, and packed and shipped out large quantities of Lake Superior whitefish.

In the early years there was very little agriculture in the county. However, many part-time farmers were located near the mining communities.

Since the coming of the settlements, the people of the area were promoting the tourist industry. The Lake Superior Journal in 1857 speaks of the county as a mecca for tourists with hotel accommodations at Marquette for 200. Mrs. Abraham Lincoln is said to have spent a summer in Marquette following her husband's assassination.

Although native Americans made up most of the original settlers, the Cornish were soon to arrive. Later the Finnish and Swedish peoples, the Germans, French, and other immigrants sought a living within the county and have had a very important part in developing its resources.

### III. THE POLITICAL ORGANIZATION OF MARQUETTE COUNTY

The entire Upper Peninsula of Michigan was divided into six counties under an act of the Legislature passed March 9, 1843. Marquette was one of the six designated at this time.

The first political unit to be organized within the county of Marquette was Marquette Township, established in 1850. The organization of the county was completed in 1851 and included a part of what is now Dickinson County. The present boundaries were established in 1891 (see Figure 2).

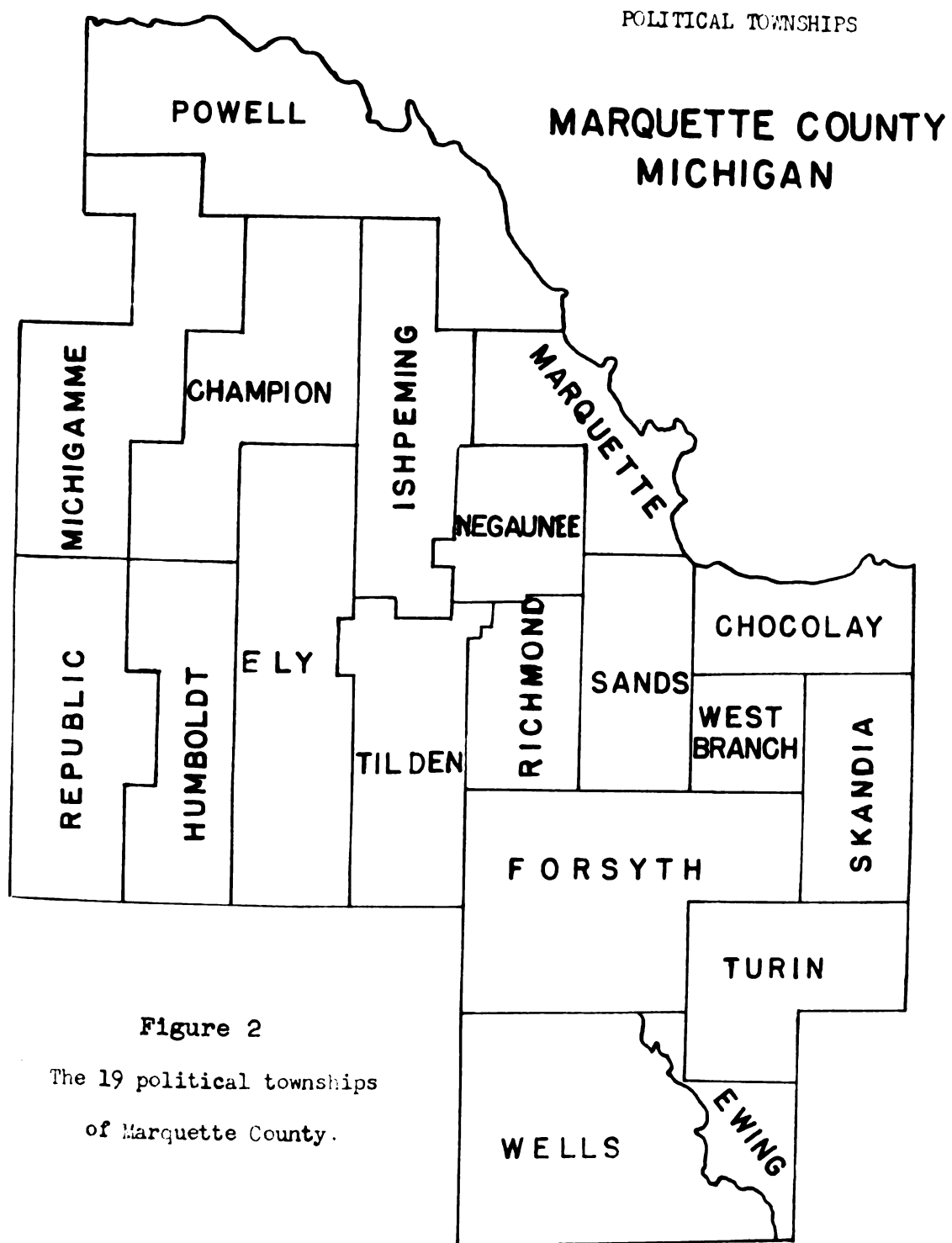
As the population at the three principal centers grew, village governments were established--at Marquette in 1859, Negaunee in 1865, and Ishpeming in 1871. City governments were soon organized--Marquette in 1871, and at Negaunee and at Ishpeming in 1873.

The County of Marquette is now divided into 19 political townships and three cities. The names and respective populations of these townships and cities are shown in Table 2, page 24 .<sup>1</sup>

County government is a composite of related yet partly distinct authorities. Each township has one member on the county board of supervisors, and each supervisor is the assessor of the township. Marquette County has 44 supervisors. Nineteen

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<sup>1</sup>Michigan Historical Records Survey, op.cit. pp.17-29, Contains historical sketch of each township in Marquette County.



**Figure 2**  
The 19 political townships  
of Marquette County.

are from the townships, and 25 are from the cities. Ishpeming has ten, and Negaunee has five--one from each of the wards in each city. Marquette has ten supervisors--one from each precinct.

TABLE 2

## POPULATION OF TOWNSHIPS AND CITIES IN MARQUETTE COUNTY

Township and City	Population by Years			
	1890	1910	1930	1950
Champion -----	2,622	1,069	634	559
Chocolay -----	1,235	852	636	1,109
Ely -----	694	922	407	678
Ewing -----	---	---	249	238
Forsyth -----	270	2,402	2,307	1,730
Humboldt -----	608	604	558	436
Ishpeming City ----	11,197	12,448	9,238	8,933
Ishpeming -----	904	587	1,064	1,422
Marquette City ----	9,023	11,503	14,789	17,325
Marquette -----	268	155	133	1,287
Michigamme -----	1,435	846	461	453
Negaunee City ----	6,076	8,460	6,552	6,300
Negaunee -----	333	157	277	841
Powell -----	---	736	1,020	615
Republic -----	2,594	2,420	1,422	1,492
Richmond -----	1,132	911	1,182	1,197
Sands -----	---	159	156	180
Skandia -----	---	546	707	633
Tilden -----	908	1,150	898	907
Turin -----	100	202	461	217
Wells -----	---	306	638	431
West Branch -----	---	304	287	256
Total County -----	39,521	46,739	44,076	47,284

Source: U.S. Bureau of the Census, as quoted in Marquette Planning Board, Marquette, Michigan City Plan, 1951, p.34.

Marquette is the county seat and the largest city in the county. It is located on Lake Superior about 411 miles from Lansing, and 451 miles from Detroit. It is located about half-way between the east and west extremes of the Upper Peninsula.

Marquette is about 166 miles from Sault Ste. Marie, and 151 miles from Ironwood.



#### IV. GROWTH AND ECONOMIC DEVELOPMENT OF MARQUETTE COUNTY

##### Developments to Improve Transportation and Shipping

The Harbor.--Marquette has a good harbor. The United States government was called upon to improve the port of Marquette to facilitate shipping by building breakwaters. This was first authorized by Congress in 1868 and completed for 2,000 feet in 1875. Also to facilitate navigation on Lake Superior, the first United States lighthouse in the county was completed in 1853. The Life-saving Station, now the Coast Guard was located here in 1891. The U.S. Weather Bureau was established in Marquette in 1871. The present harbor contains two large ore docks from which the major part of the iron ore mined in the Marquette Range is shipped to the lower Lake ports.

Railroads.--The county is well supplied with railroad facilities, as five railroad companies pass through portions of the county. The main line of the "Duluth, South Shore and Atlantic Railroad Company" connecting St. Ignace and Duluth traverses the entire width of the county. "The Lake Superior and Ishpeming Railroad" carries the iron ore from the mines in and near Ishpeming and Negaunee to the loading docks at Marquette. Branches of this railroad extending from Marquette to Big Bay and to Munising serve as local outlets for forest products. Negaunee is the northern terminus of the "Chicago



3. The ore dock in south Marquette harbor.



4. The ore dock in north Marquette harbor.



and North Western Railroad Company" from Chicago. Although some ore from the Marquette Range is transported over this line to the ore docks at Escanaba, the delivery of forest products from the many local landings comprises a greater part of the business.

Champion and Republic are located on the "Chicago, Milwaukee, St. Paul, and Pacific Railway" which extends from Chicago to Houghton, Hancock and Calumet in the Copper Country. "The Escanaba and Lake Superior Railroad" provides transportation facilities for the forest products of the Watson, Arnold, and Northland communities.

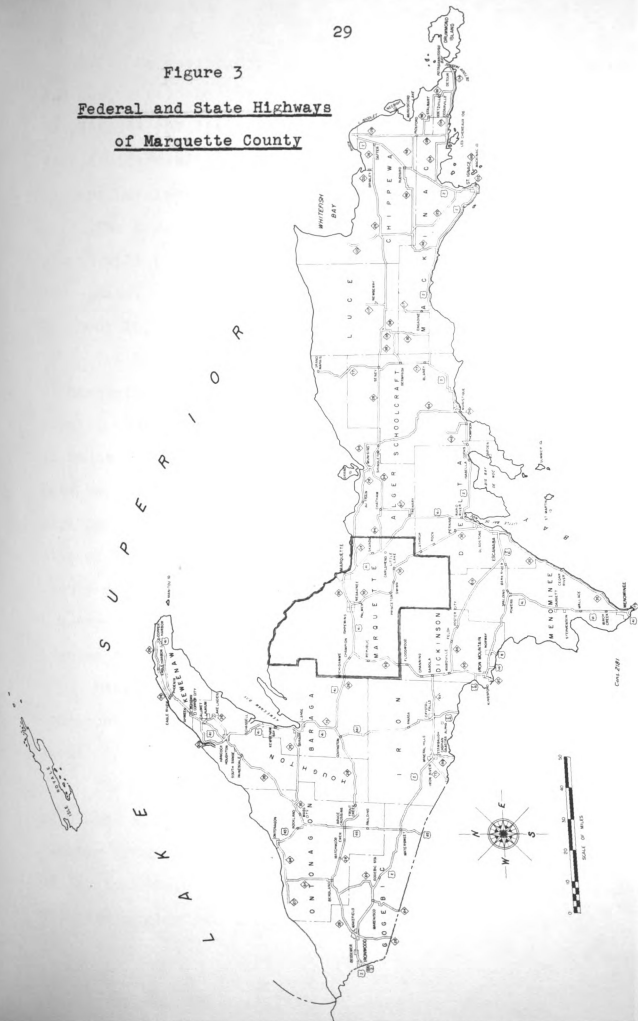
Roads and Highways.--The settled sections of the county are supplied with improved gravel and hard-surface roads. United States Highway 41, a highway extending from Florida, through Chicago to the Copper Country, traverses the central part of the county passing through Marquette, Ishpeming, and Negaunee. State Highways M-28, M-35, M-94, and M-95 also serve the county. The Upper Peninsula map (Figure 3) locates these State and Federal highways in Marquette County.

In addition to the Federal and State highway system, the county has constructed hard-surface and gravel roads. The roads of the county are given snowplow service during the winter months.

Airports.--There are three airports in the county: the K. I. Sawyer Air Base, the Marquette County Airport, and the Ishpeming-Dexter Airport.

Figure 3

Federal and State Highways  
of Marquette County



The Marquette County Airport is located between Negaunee and Marquette. During the year 1958, North Central Airlines completed 4,087 flight operations (landings or takeoffs). Last year (1958) was the first full calendar year that the county airport handled all civilian flight operations for the county.

The biggest factor in Marquette County's anticipated growth will be the activation and operation of the Sawyer Air Force Base. It is expected to increase the county's population by about 10,000 by 1961.

The K. I. Sawyer Air Force Base, located 20 miles south of Marquette and seven miles north of Gwinn, in Marquette County, contains 4,400 acres. It is located on flat sand plains in Sands Township and has a 12,300 foot runway. The Air Force Base has been under construction for four years. It became an Air Force Base officially only recently after it had been the site of K. I. Sawyer Airport, a Marquette County facility. The county received approximately half a million dollars to build a modern airport near Negaunee when it turned the Sawyer site over to the government.

Between 2,000 and 3,000 persons have been employed on construction projects at the base during the last two years; about 60% have been drawn from the local labor supply.

The base was activated on April 8, 1956. Three squadrons of planes will be stationed at Sawyer. Included will be a fighter group, a squadron of heavy jet bombers, and a squadron of jet tankers. The fighter group will begin operations at the base during the latter part of this year (1959).

Under construction or already completed are 575 houses for married military personnel, and the construction of an additional 260 units has been approved. Four barracks, each accommodating 200 men already have been completed; four more of the same size and an 1,800-man dining hall are now under construction. About 400 vehicles will be stored at the base's motor pool; more snow-plowing units than the Marquette County Road Commission uses will be available for clearing runways and streets. Completed or still under construction are such buildings as a church, library, theater, clubs, gymnasium, 50-bed hospital, stores, hangars, nose docks for planes, and warehouses.

The center of the operation is a top secret building, 150 by 270 feet, three stories high, with walls six feet thick and without windows, which has been completed. This building houses the semi-automatic ground environment (SAGE) unit. SAGE is an electronic system for almost instantaneously correlating and transmitting data from air detection centers to air defense centers. This IBM (International Business Machines) unit is the fourteenth such system placed into operation and over 30 are planned for the nation. With its intricate computer equipment, the SAGE building will cost 60 million dollars. Six hundred persons, including 120 civilians--mostly International Business Machines engineers--will be on duty there.

Educational needs associated with the growing base have resulted in construction of a 13-classroom elementary school



5. The SAGE Building at K. I. Sawyer Air Force Base.



6. State House of Correction and Branch Prison.



at Gwinn. Another school, also to be erected with government funds, will go up nearer the base soon.

"The military-civilian payrolls will, of course, provide an important economic prop for the county and Peninsula. K. I. Sawyer Air Force Base will become the largest "industry" in the immediate area, larger even than the iron mining industry."<sup>1</sup>

#### State Institutions at Marquette

Two state institutions were established at Marquette: the State House of Correction and Branch Prison in 1886, and Northern Michigan College, as it is now called, in 1899.

State House of Correction and Branch Prison.--By authority of a joint meeting of the State boards in 1897, the Marquette penitentiary was made the State's Incurable Prison. In January, 1959, the inmate population of this State Prison reached an all-time high when 1,450 prisoners were listed, including 1,170 in the prison proper, and 280 in the four corrections-conservation camps in the Upper Peninsula. In 1959, the prison employed 250 people.

Northern Michigan College.--Originally established in 1899 as a teacher education institution, Northern has become a multi-purpose college granting degrees in Liberal Arts, Business Administration, Medical Technology and Social Service while continuing to enrich its teacher education program. The

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<sup>1</sup>"What Does Sawyer AFB Mean to Marquette County and the U.P.?", The Mining Journal, May 29, 1959.

college offers pre-professional study in Conservation, Forestry, Agriculture, Engineering, Medicine, Law, Architecture, Dentistry and Nursing.

The college now has a 157-acre campus containing 22 buildings. Construction of a new student union building and another dormitory for women was started in the summer of 1959. This was one college of 125 colleges throughout the country where summer science institutes were held in 1958 and 1959. The federal government in 1950 set up the National Science Foundation to increase the reservoir of scientifically trained persons in the nation. One of the ways the Foundation assists in training is through these summer institutes.

Enrollment at Northern Michigan College, which increased nearly 30% in the fall of 1958, reached the record figure of 1,743. An enrollment of 2,000 by 1960 and 3,000 by 1975 is anticipated.

#### Headquarters for State and Federal Agencies

Because of the central location of Marquette County, the state has placed at Marquette, branch services of various state agencies, such as the State Department of Agriculture, the Regional Headquarters of the Michigan Department of Conservation, and the Upper Peninsula headquarters of the Extension Services of Michigan State University.

Other state and federal offices located here are: Soil Conservation Service, Federal Fish and Wildlife Service, Forest Service, Internal Revenue, State Tax Division, Michigan Employment Security Commission, Social Security, National Guard,

U.P. State Police Headquarters, Office of Vocational Rehabilitation, U.P. Child Guidance Center, Michigan Children's Aid Society, Bureau of Probation, County Red Cross, Boy Scouts, Catholic Social Services, Blue Cross, and White Cross. Many of these are the only ones in their respective fields in the Upper Peninsula.

Marquette County has one of the three tuberculosis sanatoria in the Upper Peninsula. It is the Morgan Heights Sanatorium between Negaunee and Marquette. In January, 1959, of the 97 beds in the Sanatorium, 70 were occupied with tuberculosis patients.

#### Bay Cliff Health Camp

Near Big Bay in Marquette County, is located the Bay Cliff Health Camp. It is unique in that it is a summer camp for under-privileged and handicapped children of all faiths from the 15 counties of the Upper Peninsula. It is supported by public-spirited citizens and civic organizations. It is a completely non-profit institution that exists exclusively for the health, happiness and welfare of physically handicapped children.

Six-week sessions have been held annually for 25 years (1959 was the 26th) at the Bay Cliff Health Camp, with an average of 160 children enjoying this program each year. Bay Cliff accepts children with virtually any physical handicap.

Of the 174 that attended camp in 1959, 54 were orthopedic cases, 75 suffered speech defects, 33 had hearing disabilities, and 12 were cardiacs and regular campers. One of the campers

was a deaf and blind child. To serve them was a staff of 86 persons, including two speech therapists, one teacher of the deaf and hard-of-hearing, one remedial instruction teacher, two registered occupational therapists, one occupational therapy student and one registered physical therapist. Many of the staff members were college students. Bay Cliff has affiliation with Northern Michigan College and Wayne State University. Under this arrangement students are able to receive college credit while serving at the camp.

At Bay Cliff a program fitted to the special needs of the individual camper is conducted for children who otherwise would never know the joy of attending a summer camp. A great deal of the credit for this wonderful opportunity for handicapped children goes to Miss Elba Morris, R.N.

#### Number Employed in Major Industry Groups

Mining.--The number of employees in major industry groups by Michigan Counties in 1950<sup>1</sup> shows that of the 15,808 employed in Marquette County, 3,408 were employed in mining. This was the major industry in Marquette County in 1950, employing more people than any other industry in the county.

This is not surprising, as Marquette County leads all counties of Michigan in mineral production, with a total value of \$49,250,069.<sup>2</sup> Iron ore held top position in value of all

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<sup>1</sup>John P. Henderson, Michigan Statistical Abstract (2nd. Ed.; East Lansing: Michigan State University, 1958), pp.64-65.

<sup>2</sup>Harry O. Sorensen, and Emery T. Carlson, Michigan Mineral Industries 1956 (Lansing: Geological Survey Division, Department of Conservation, 1958), p.50.

minerals produced in Michigan in 1956. Iron production in Michigan is principally from four counties--Dickinson, Iron, Gogebic, and Marquette, with Marquette ranking first--producing about 45% of the total. The eleven underground and six open pit mines in the Marquette Range shipped 5,689,013 long tons of iron ore in 1956.<sup>1</sup>

Iron from the Marquette Range has been a very important mineral in the industrial development of the county, state, and nation. According to Robert J. Furlong, Executive Secretary, Michigan Tourist Council: "There are those who will argue that the (iron) industry had its birthplace in Minnesota, but they forget that the last spike that joined the east and west was driven into a Union Pacific railroad tie in 1869. The Minnesota iron ranges were not discovered until 1884."<sup>2</sup>

Other Industries.--The number of employees in Marquette County in major industry groupings for 1950 is given in the table on the following page.<sup>3</sup>

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<sup>1</sup>Ibid., p.10.

<sup>2</sup>Robert J. Furlong, Marquette County (Lansing: Michigan Tourist Council, No date, 3 pp. Mimeographed), p.2.

<sup>3</sup>Henderson, Michigan Statistical Abstract, op.cit., pp.64-65.

TABLE 3

NUMBER EMPLOYED IN MAJOR INDUSTRY GROUPS  
MARQUETTE COUNTY--1950

Mining -----	3,408
Manufacturing -----	2,811
Trade, Wholesale and Retail -----	2,714
Utilities, Transportation, Communication, and other ---	1,659
Other Services, Medical and Health, Educational, etc. -	1,472
Business and Personal Service -----	1,375
Public Administration -----	876
Construction -----	710
Agriculture -----	556
Industry not reported -----	179
Forestry and Fishing -----	48
Total -----	<u>15,808</u>

Industries involving forests have continued in the county since the early settlers arrived. Today, the forests are being cut for pulpwood, railroad ties, poles, mining timber, and fence posts. However, as noted in Table 3, the number employed directly as foresters or lumbermen is small in the county. However, with manufacturing, trade, construction, and other areas of employment, the forest industry still plays a very important role.

Regarding the type of employees found in Marquette County and in the Upper Peninsula, the Ebasco report on Michigan's Upper Peninsula claims: "The people themselves and their way of life constitute one of the most valuable of the Upper Peninsula resources. Here is a labor force composed of workers who believe in giving a full day's work for their day's pay. They are held in high regard for the quality and quantity of their productive efforts not only by Upper Peninsula employers but also by industrialists and businessmen in the Lower

Peninsula and surrounding states."<sup>1</sup>

Marquette Employers.--There is a great diversification and stability of employment in Marquette. Employment at the Cliffs Dow Chemical plant, the largest chemical wood distillation plant in the Upper Peninsula, exceeded 400 persons in May, 1959. Included in the list of major Marquette employers are the Duluth, South Shore and Atlantic Railroad, Lake Superior and Ishpeming Railroad, the college, prison, St. Luke's and St. Mary's Hospitals, and city, state and federal departments. Other important and consistent employers would include the telephone company, the Mining Journal, radio and television stations, Schneiders, Raish, and Ahonen Saw Mills, Brebner Machinery Company, U.P. Generating Company, the bakeries, dairies, merchants, and many others just as important. Marquette has become the headquarters of wholesale firms, general insurance, finance, and audit companies.

#### Economics of Tourism in Marquette County

In recent years the influence of the vacationists has made its mark on the economy of people in the county. By using milk as an example of one basic commodity of the farmers in the area, the influence of the tourist trade can be illustrated. The following figures are from the summary of milk handled through the Marquette market by the Michigan

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<sup>1</sup>Ebasco Services Inc., Michigan's Upper Peninsula  
(Lansing: Michigan Department of Economic Development, 1953)  
p.32.

Milk Producers Association:<sup>1</sup>

<u>1955</u>	<u>Class 1 Pounds</u>
January ----	1,639,142
February ---	1,470,068
March -----	1,634,503
April -----	1,635,813
May -----	1,744,432
June -----	1,721,089
July -----	2,118,855
August -----	2,145,914
September --	1,778,906
October ----	1,774,906
November ---	1,838,060
December ---	1,767,640

The above table indicates an approximate maximum difference of 700,000 pounds of class one milk between the low month of February and the high tourist month of August. One could expect a similar difference in other basic commodities.

Figures supplied by the Our Own Bakery of Marquette indicate similar comparisons. There is nearly a doubling of the sales of bread, rolls and other bakery products during the months of high tourist influx.<sup>2</sup>

A recent publication by Robert W. McIntosh<sup>3</sup> points out the importance of "tourism". "Tourism", as defined by McIntosh, is the business of accommodating and otherwise serving the vacationing public. He states that the recent opening of the Straits of Mackinac Bridge has focused attention on the Upper Peninsula and prospects for its future development. Since

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<sup>1</sup>Melvin N. Nyquist, Marquette County Agricultural Agent, Know Marquette County, mimeographed report, 1956.

<sup>2</sup>Ibid.

<sup>3</sup>Robert W. McIntosh, "Measuring the 1957 Tourist and Resort Business in Michigan's Upper Peninsula," Business Topics, Volume 6, Number 1, July, 1958.



1945, McIntosh states, tourism has grown rapidly in the Upper Peninsula becoming a major part of the economy.

Recent sales taxes collected on food sold in the Upper Peninsula varied considerably by months during the year. The differences between the cost of food purchased yearly by permanent residents and actual total food sold was attributed essentially to food purchased by tourists and vacationists.<sup>1</sup>

The principal tourist months for most of the Upper Peninsula are July and August. There is also an influx of hunters during the Michigan deer season in the latter part of November. Much emphasis is currently being made of the equally advantageous times to visit the county during the "color season" in September and October. Winter sports are also receiving increased emphasis with the addition of facilities for skiing and other winter activities.

#### Economic Side of Movie Filmed in Marquette County

The decision of Hollywood Director-Producer Otto Preminger to film practically all of the scenes of the movie "Anatomy of a Murder" in Marquette County was of economic importance to this area. The filming of the show was to result in \$200,000 to \$250,000 being left in the county during the period in which the company was here (Spring, 1959).

About two months was required to complete filming of the picture locally. During that time between 75 and 100 members of the movie colony stayed in Ishpeming and Marquette. These

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<sup>1</sup>Ibid.

included actors, actresses, various directors, and technicians. Approximately 160 Marquette County extras, some having selected parts, were employed by the movie company. The majority of the extras appeared as spectators at the trial scenes.

John D. Voelker, Michigan Supreme Court Justice, formerly of Ishpeming, author of this "book of the year" (Anatomy of a Murder), based the story on a 1952 court trial in Marquette.

#### The Effects of the St. Lawrence Seaway

The St. Lawrence Seaway is expected to start a regional boom of trade and traffic along some of the ports of the Great Lakes. This might affect the ports of Marquette County. Vessels under foreign registry would be able to dock in the county and an increase in lake shipping could be expected.

Harbors of refuge are to be located not more than sixty miles apart along the lake, so that no boat in tow will be more than thirty miles from a harbor.

A \$704,000 project is slated for the Big Bay area as a harbor of refuge. The harbor of refuge at Big Bay will be constructed near Squaw Beach. It will have a channel eighty feet wide and twelve feet deep. Also a small boat facility, fifty feet wide on the north and south sides of the harbor of refuge and 100 feet on the east side, will be constructed. The Big Bay Harbor of Refuge is designed to break up the long distance between Marquette's harbors and Portage Entry at Hancock and Houghton.

### Natural Gas for the Upper Peninsula

The Upper Peninsula has been seeking a natural gas line for years to fuel lean iron ore beneficiation plants and serve other industrial and domestic markets. Its hopes for natural gas, its first in history, rest on the outcome of negotiations over its cost to consumers. The gas is Western Canada's, now ready to be tapped for feeding to mines and other industry above the Straits of Mackinac. Governor M. Williams said the gas could mean a rebirth of the mining industry and would permit Upper Michigan to compete successfully with foreign sources of iron ore.<sup>1</sup> This certainly would have a beneficial effect on the economy of Marquette County.

### Atomic Energy for the Upper Peninsula

Michigan Insurance Commissioner Frank Blackford sees in the two projects to generate electricity from atomic energy in the Lower Peninsula of Michigan, vast possibilities of future industrial growth in the Upper Peninsula. He believes that electric power from atomic energy can make the Upper Peninsula an industrial area.<sup>2</sup>

A plant is being built on Lake Erie, near Monroe, to generate electricity with atomic energy. Physicists and engineers at this plant said that Michigan is going to be one

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<sup>1</sup>"Natural Gas for U.P. Hinges on Consumer Cost," The Mining Journal, Marquette, March 19, 1959.

<sup>2</sup>"Atomic Energy Seen Industrializing U.P.," The Mining Journal, Marquette, March 23, 1959.

of the outstanding status of the nation in the present use of atomic energy. This will be true because of Michigan's abundant water supply from the Great Lakes. This plant at Monroe is scheduled to produce electricity experimentally in September of 1960 and commercially in September of 1961. A second plant is to be built at Petoskey. Therefore, it is possible that electricity from atomic energy will be utilized in Marquette County in the future. However, at present, high costs of producing electricity from atomic energy would seem to prohibit any extensive use.



## V. THE GEOLOGY OF MARQUETTE COUNTY

The geology of Marquette County is recorded in the rocks found in this county. As Marquette County contains some of the oldest rocks found in Michigan, its geology dates back about two billion years to those pre-Cambrian rocks. The pre-Cambrian rocks are often divided into three great series--the Archean, Huronian, and Keweenawan. Each series contains many smaller units, which represent different stages of sedimentary rock depositions, igneous intrusion, mountain building, and erosion. The Archean and Huronian are found in Marquette County and the Keweenawan is found to the northwest in the Northern Peninsula of Michigan.<sup>1</sup>

### Archean Era

According to geologists during the Archean era the Great Lakes area was a basin-shaped lowland (now known as the Michigan Basin) of granitic rocks bordering a granitic highland known as the Canadian Shield--the core of the North American continent. The rim of this basin, consisting of Archean formations, can be seen in Marquette County (see Geological Maps, Figures 4 and 5).

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<sup>1</sup>Helen M. Martin, Outline of the Geologic History of Michigan (Lansing: Geological Survey Division, Department of Conservation), pp.2-6.

**Geological Map of Michigan**  
Helen M. Martin  
1955

A revision of the Centennial Geological Map

### Legend

- ### Pennsylvanian

- Red Beds, Grand River Group Pgr  
Saginaw Parma Group Ps

## Mississippian

- Bayport ls  
Michigan series  
Napoleon-Marshall ss  
Coldwater sh  
Berea-Bedford  
Ellsworth sh

## Mississippi-Devonian

- Antrim sh DM

## Devonian

- Traverse fm  
Rogers City ls  
Dundee ls  
Detroit River group  
Bois Blanc fm  
Sylvania ss  
Garden Island fm  
Mackinac breccia

- Silurian

- St. Ignace fm  
Pointe aux Chenes fm  
Engadine dol  
Manistique series  
Burnt Bluff ls  
Mayville fm

## Ordovician

- Richmond  
Trenton  
Black River

## zarkian

- Hermansville

ambrian

- Lake Superior ss  
Igonkian  
Killarney granite  
Keweenawan  
Freda ss, Nonesuch  
shales  
Huronian  
Huronian iron fms  
Archean  
Laurentian  
Keewatin

- Sp  
Se  
Sm  
ibb  
me

- OR  
OT  
BR

- DH

- CLS

- 1994

- Ak

- ku

- Ah

- 

- RL

- RK

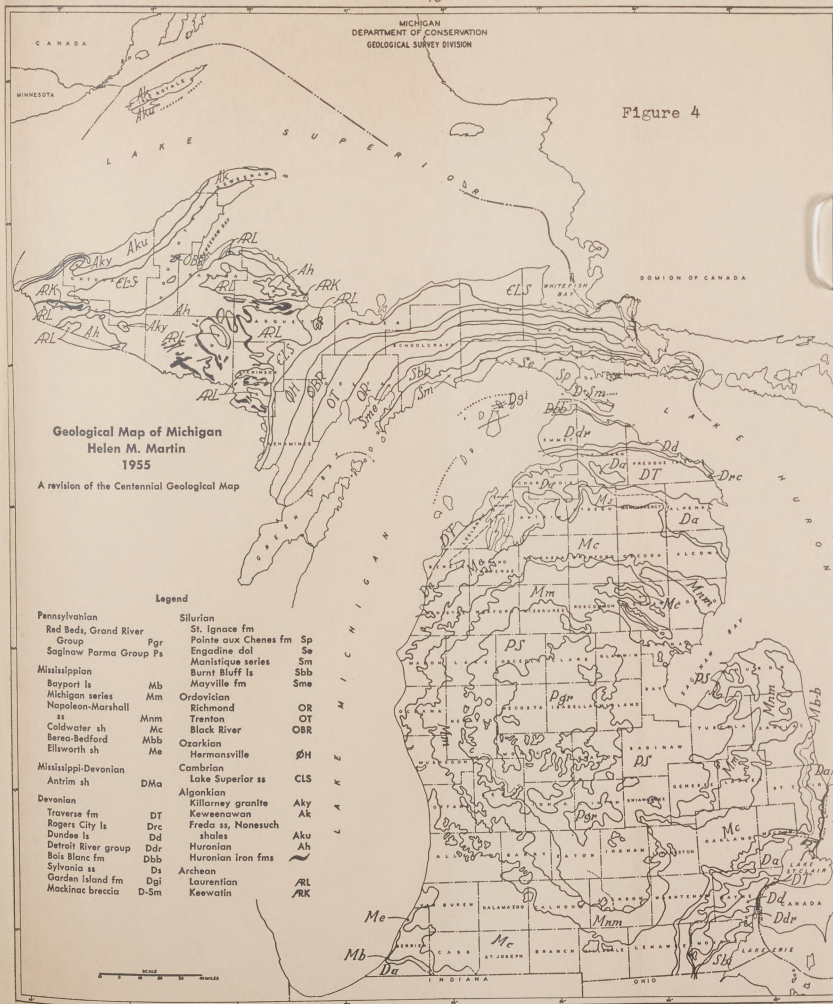




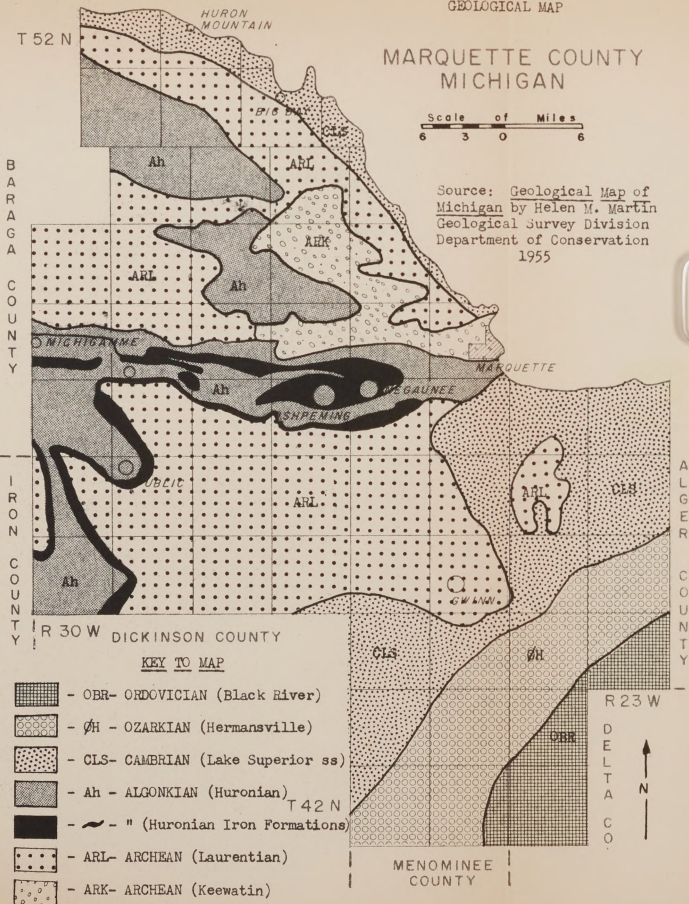


Figure 5  
GEOLOGICAL MAP

MARQUETTE COUNTY  
MICHIGAN

Scale of Miles  
6 3 0 6

Source: Geological Map of  
Michigan by Helen M. Martin  
Geological Survey Division  
Department of Conservation  
1955



Keewatin Period of Archean Era.--The Keewatin Period is estimated to have occurred about two billion years ago. Rocks formed during this period are the oldest known rocks in Michigan. Rock types of this period include greenstone, schist, jaspillite and slate.

Laurentian Period of Archean Era.--The Laurentian Period occurred about 1,200 million years ago. Rock types typical for this period include schist, granite and gneiss. The dominant life during this period was blue-green algae and possibly single-celled marine animals.

### Algonkian Era

Huronian Period of Algonkian Era.--Overlying and overlapping the Archean rocks of the Canadian Shield are the next in age, the Huronian formation. The Huronian Period began about 1,050 million years ago. A shallow sea covered much of what is now the Northern Peninsula of Michigan. Weathering produced sediments that were washed into the seas. Primitive plants and animals appeared in the seas. Bacteria and chemical processes removed and deposited iron and lime salts from solution. The Huronian iron formation was laid down at this time, as well as the thick sedimentary rocks--limestone, shale and sandstone. Iron formation is a banded sedimentary rock commonly composed of layers of silica alternating with layers of iron minerals. Four separate zones of iron formation are in the Huronian but only two have furnished commercial ore.

Pre-Cambrian banded iron formations are found in only a

few other places on the earth's surface,<sup>1</sup> principally Labrador-Quebec, Manchuria, India, Brazil, and the Krivoy Rog area in Russia.

Later intrusions of granite changed some of the Huronian sedimentary rocks to marble, iron ore, slate, schist, and quartzite. The Huronian period lasted 250 million years and ended with movements of the earth's crust and volcanic activity.

Keweenaw Period of Algonkian Era.--The Keweenaw Period which followed lasted for 250 million years. It was a period of volcanism followed by quiet lava flows of copper-bearing magma, alternating with times of erosion of the lavas, which produced sandstones and conglomerates. Although the Keweenaw rocks are not exposed in Marquette County, the iron formation and other Huronian rocks were complexly folded during these pre-Cambrian stages of mountain building and volcanism. From this period on, the area of the Michigan Basin (east of the meridian of Marquette) slowly sank.

#### Paleozoic Era

During the Paleozoic Era mountain building and deposition were going on in eastern North America. During the Paleozoic, the seas made six major incursions into the Michigan Basin with many minor ebbs and flows, so that for more than 315 million years the Michigan Basin was at times filled with a sea, and

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<sup>1</sup>Reed, Robert C., Michigan Iron Mines (Lansing: Geol. Survey Div., Mich. Dept. of Conservation, 1957), p.3.

at times was land, desert, and swamp. Plants lived on land and in the sea. Animals became air breathers on land in the middle of the Paleozoic time. At times, the seas teemed with life and the muds at the bottom of the seas became cemeteries as corals, clams, snails, shelled creatures and others died. As seas ebbed, sediments hardened to rocks that became the floor of the next invading sea.

Cambrian Period of Paleozoic Era.--The Cambrian Period was the first period of the Paleozoic Era. It began about 550 million years ago. It was during this period that the Cambrian Lake Superior sandstone, which is very prominent in Marquette County, was laid down as sands. This sandstone is economically important as a source of fresh water and building stone. Shale is also a rock type of this period. The first invertebrates appeared during this period and trilobites were dominant. The climate was mild.

Ozarkian Period of Paleozoic Era.--The Ozarkian Period is not considered a major period of the Paleozoic Era. However, in Marquette County, the Hermansville Formation of the Ozarkian Period is an important formation in the southeastern part of the county. Dolomite, sandy dolomite, and sandstone are the dominant rock types of this period.

Ordovician Period of the Paleozoic Era.--Rocks of the Ordovician Period are found in the southeastern corner of Marquette County. They are chiefly limestone and dolomite. Marine invertebrates abounded in the mild climate of the

Ordovician and the first primitive vertebrates appeared. Fossils of these early forms are found in the limestone rock. This period began about 445 million years ago and ended about 375 million years ago.

The ordovician is the youngest rock formation found in Marquette County. (The four remaining major periods of the Paleozoic are younger in age--the Silurian, Devonian, Mississippian, and Pennsylvania. These rock formations are not found in this county but do occur farther south and east in the Northern Peninsula, but mostly in the Southern Peninsula of Michigan, more toward the center of the bowl-like basin.) See Figure 4.

#### Mesozoic Era

There is no fossil record of the Mesozoic Era in Michigan. The Mesozoic was the age of dinosaurs. The rocks in Michigan were subjected to erosion during this period and the geologic record is lost. Elsewhere, the Rocky Mountains were uplifted. It began about 200 million years ago.

#### Cenozoic Era

No records of the Early Cenozoic are found in Michigan. It was the age of the early mammals. After the bedrock had eroded to roughly the present altitudes, the Pleistocene Period began.

Pleistocene Period of the Cenozoic Era.--The Pleistocene Period, or the Ice Age, began about one million years ago and

lasted to less than 35,000 years ago. During this period several large continental glaciers spread over much of the North American continent. Two or more advances of the ice over Marquette County are indicated by the direction of the striae carved on the bedrock, by the elongated axes of certain eroded bedrock masses in the direction of the movement, and by the tails of glacial materials deposited in the lee of bedrock knobs. The Pleistocene was the stone age of human history. Man was the dominant life.

Recent Period of the Cenozoic Era.--Geologists claim that the Recent Period began about 35,000 years ago with the melting of the glaciers. The melting of thousands of feet of snow and ice left the area a lake or swamp except for the higher knobs of rock and glacial drift. The Great Lakes stood at higher levels immediately following the melting of the ice than they do today. Lakes Brule, Ontonagon, Duluth, Algonquin, and Nipissing were the ancestral Lake Superior.<sup>1</sup> The beaches of former lakes Algonquin and Nipissing can be found in Marquette County as their water levels were higher than those of the present Lake Superior. Some of these beaches are indicated on the "Surface Formations Map of Marquette County", Figure 6.

It is certain that many more inland lakes existed at an earlier time in this period than exist today. This is evidenced by the many swamps, peat bogs, marl beds, and muck lands which

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<sup>1</sup>Helen M. Martin (ed), They Need Not Vanish (Lansing: Mich. Dept. of Conservation, 1942), p.57.

today contain little or no visible water. It is also apparent that many lakes were larger than at present.

As the glaciers melted they left behind as hills and plains such unconsolidated materials as sand, gravel and boulders. The glacial deposits filled the deeper bedrock valleys and occur as a covering over most of the remainder of the area. In Michigan, the thickness of this covering of glacial drift ranges from a few inches to one thousand feet. In Marquette County, the greatest known thickness is 285 feet.<sup>1</sup> Deposits of two or more advances of the glacier are common, and the interglacial erosion of these deposits is indicated in several areas by reworked till and outwash deposits overlain by a younger till.

The Recent Period lasts until the present. Erosion of glacial drift and of bedrock; the procession of the shallow lakes to swamps, bogs, or marshes; and the formation of organic soils are some of the geological processes continuing to change the physical features of the county.

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<sup>1</sup>W. T. Stuart, E. A. Brown, and E. C. Rhodehamel, Ground Water Investigations of the Marquette Iron-Mining District (Technical Report 3; Lansing: Geol. Survey Div., Mich. Dept. of Conservation and U.S. Dept. of Interior, 1954), p.34.

## VI. SURFACE FORMATIONS OF MARQUETTE COUNTY

### Rock At or Near the Surface

The surface formations of the northern half of Marquette County consist primarily of the numerous outcrops of pre-Cambrian rocks. The generally strong resistance of these rocks to degradation and weathering has resulted in an area of high bedrock altitudes resembling a plateau with locally rough topography. The tops of most of the highland masses range from 1,600 to 1,800 feet in altitude and are covered with a thin layer of glacial debris. In general, the local relief of the bedrock is moderate, the valleys being about 200 to 300 feet deep. However, cliffs of 783 feet are found in the county.<sup>1</sup> The relatively nonresistant rock formations have been partially eroded forming depressions which filled with glacial sediments.

The surface materials of the county, except for the bedrock outcrops, may be roughly classified into three types: moraines (till), outwash, and lake (lacustrine) deposits.

### Moraines or Till

The rock debris the glaciers carried and deposited is known as glacial drift or till. Areas of stagnation of the ice mass is marked by a ridge of unstratified soil materials

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<sup>1</sup>W. T. Stuart, et al., Ground Water Investigations, op.cit. p.34.





7. Cliffs of bedrock near Marquette.



8. Outcrops of Pre-Cambrian rock.

dumped by the glacier. These ridges or high knolls of till are called moraines. The moraines are scattered throughout Marquette County (see Surface Formation Map, Figure 6).

The till which formed in the moraines may have been deposited on land or in water. When deposited in the water, the till became somewhat stratified. These moraines are called water-washed moraines. They are found over a considerable portion of central Marquette County.

The ground moraines or till plains were formed as the glacier retreated (melted) dropping an uneven load of debris. The till consists of unsorted to roughly sorted mixtures of glacial sand, gravel, and clay, usually associated with cobbles and boulders. In the areas of the ground moraines, the surface is moderately rolling to flat.

#### Outwash and Glacial Channels

The outwash is stratified, fairly clean, coarse sand, gravel, cobbles and boulders laid down by streams and melt-water from the glacier. The general lack of concentrations of fine materials, such as clay and silt, is characteristic. The major areas of outwash are characterized by fairly large flat plains or aprons. In some places these plains are dimpled with pits caused by melting blocks of ice deposited with the sand and gravel. This form is called a pitted outwash plain.

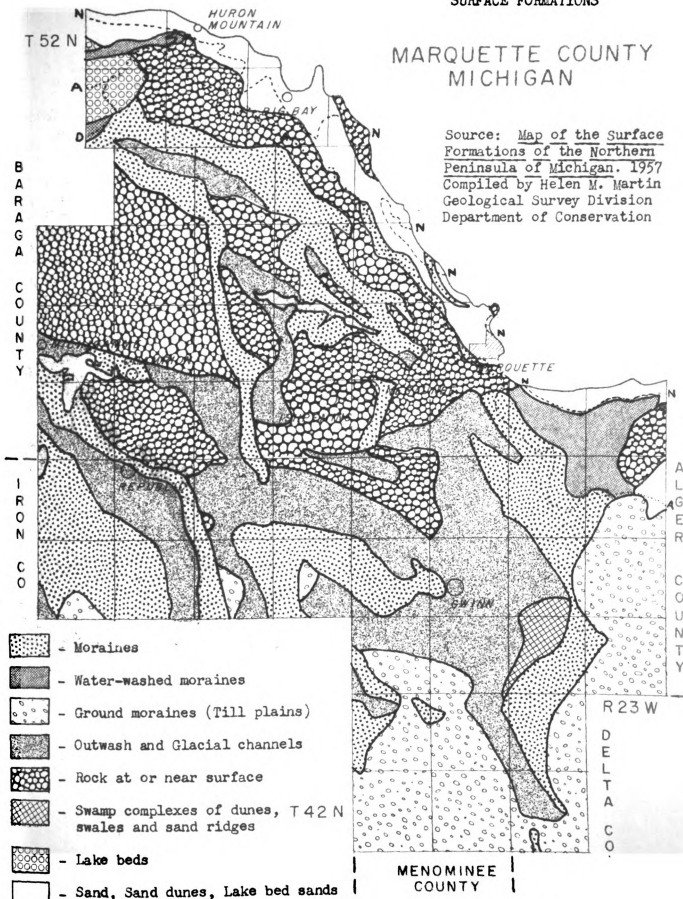
Several topographic forms resulted from the deposits of sediment-laden glacial streams of water in and under the ice. Eskers and kames are examples of these found in Marquette County.

Figure 6

## SURFACE FORMATIONS

MARQUETTE COUNTY  
MICHIGAN

Source: Map of the Surface Formations of the Northern Peninsula of Michigan. 1957  
 Compiled by Helen M. Martin  
 Geological Survey Division  
 Department of Conservation



----- - Glacial lake shore lines (N -Nipissing, A -Algonquin, D -Duluth)

Glacial channels may appear as long, narrow, winding ridges of sand, gravel and boulders. These are called eskers. Eskers in this area are about 200 to 1,000 feet long and rise from about ten to thirty feet above the surrounding land surface.<sup>1</sup> These ridges were formed by deposition of sand and gravel in streams, presumably entrenched, within or below the glacier. As eskers were not designated on the Surface Formation Map, locations of a few eskers found in Township 47 North, Range 27 West, of Marquette County follow: One esker in the northwest one-quarter of Section 5, trends in a north-northwest direction for 1000 feet. It is between ten and 200 feet wide and 15 feet in height. Another esker in the north one-half of the south one-quarter, of the northeast one-quarter, of Section 5, is 400 feet long, twenty to fifty feet in width, and about 15 feet in height.<sup>2</sup>

Outwash also occurs in the form of kames. Kames are knolls of irregular shape containing roughly sorted sand and gravel. They are often deposited in potholes near the edge of the glacier. Locations of two kames found in Township 47 North, Range 26 West, in Marquette County follow: In the south one-half, of the southeast one-quarter of Section 8, trending in a north-south direction, is found a kame 50 feet in height. It is 500 to 600 feet in length and 50 to 300 feet in width. One nearby with the same legal description is 400 feet in length, 15 to 25 feet in width, and 15 to 25 feet in height.

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<sup>1</sup>W. T. Stuart, et al., op.cit., p.23.

<sup>2</sup>Ibid., p.31.

It also trends in a north-south direction.<sup>1</sup>

Other land forms common to the outwash deposits are flat-topped terrace remnants along the former drainageways and sluiceways. Sluiceways are fairly long, narrow, and rather steep-sided valley channels having either small streams or no streams at all. The terrace remnants were formed by erosion of the surrounding outwash, and the sluiceways are valleys scoured out by glacial meltwaters. Sluiceways are common in the valley lowlands west of Ishpeming. They mark the location of glacial streams usually of considerable size concentrated in a small area. In many instances they are the long, narrow extensions of swamp-type deposits leading into outwash deposits.

Swamp-type deposits can be classified into two basic types: (1) those in the morainal areas, having a surface deposit of decayed vegetal debris and underlain by till, and (2) those in the outwash plains, generally at lower altitudes. The latter contain several types of surface deposits which may be sand, gravel, decayed vegetal matter and muck, resembling muskeg, usually underlain by outwash.

Lake beds composed of lacustrine deposits possess the characteristic topographic form of a plain resulting from the flat-lying beds. They may be formed from glacial lake deposits or from post-glacial lake deposits. If formed from the glacial lake deposits they may be composed predominantly of clays. If formed from post-glacial lake deposits they may consist primarily of bedded sand and gravel which includes decayed

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<sup>1</sup> Ibid., p.31.

vegetation. Lake bed deposits form a small percentage of the area in Marquette County.

### Sand, Sand Dunes, and Lake Bed Sands

Wherever large lakes develop, waves and currents wash sands on shore. The wind piles the dry sands into hills known as dunes. For many miles along the Lake Superior shoreline in Marquette County, the wind has piled up sand and sand dunes.

Not all the sand dunes are along the lake shores, for some are many miles inland. These were placed there by the winds of ancient times on the shores of ancient lakes, such as Lake Algonquin and later by Lake Nippissing. The largest dunes in Michigan were made in Lake Nippissing times. Dunes usually have gentle windward and steep leeward slopes. Most of the inland sand and sand dune areas in Marquette County are well covered with vegetation.

## VII. MINERALS--A MAJOR RESOURCE OF MARQUETTE COUNTY

### The Iron and Iron Ore of Marquette County

Iron occurs in over 1,000 known minerals and is found in small amounts in almost every known type of rock. In only a few of these minerals, however, is the iron present in sufficient amounts or in the proper form to permit economical extraction by industry. Iron Ore is that portion of an iron-bearing rock formation which is economically available for use in the manufacture of metal. Iron ore has been the leading mineral product of Michigan for the last forty years. It is also the leading mineral of Marquette County.

The chemical analysis, rather than the mineral composition, is of most significance to the users of iron ore. Hence, chemical analyses are made routinely in connection with the mining, marketing, and smelting operations. These analyses are standardized and consist of determinations of the percentages of those constituents in the ore which are of most importance to the iron and steel metallurgist, i.e., iron, phosphorus, silica ( $\text{SiO}_2$ ), manganese, alumina ( $\text{Al}_2\text{O}_3$ ), lime ( $\text{CaO}$ ), magnesia ( $\text{MgO}$ ), sulfur, and also the amounts of volatile matter and of moisture. In special instances, determinations are made also of titanium, lead, zinc, copper and arsenic, and less

frequently of some of the numerous rarer elements present.<sup>1</sup>

### Formation of Iron Ore Deposits

Geologists tell us that about a billion years ago the Lake Superior Region was under a shallow, marine sea. The highland rock masses surrounding the area were attacked by weathering. The highlands wore down so that finally the streams were too sluggish to carry any materials except those in solution or suspended in the water. Iron and silica compounds were deposited on the bottom. The iron-rich sediments accumulated, either by chemical action, by the work of bacteria, by both, or perhaps by some other force. Gradually over a span of many millions of years the iron and silica deposits which were build up in some places reached a thickness of 2,000 feet. This sequence containing 20-25% iron is what we now refer to as iron formation.

The period of quiet deposition of iron formation came to an end when movement of the earth's crust formed new highlands. Rapid erosion was resumed and layer after layer of muck and sand accumulated on top of the iron formation. In some places volcanic action added layers of molten or igneous rock. (In the Marquette area, however, igneous activity was limited to the intrusion of dikes and sills into the Huronian rocks.) Eventually, the iron formation was covered to a great depth.

Under the weight of the overburden, the iron-bearing muds were compressed. Then vast mountain-building forces crumbled,

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<sup>1</sup>Lake Superior Iron Ores, op.cit., p.63.



squeezed, shattered and elevated the formations. Pressure and heat changed or metamorphosed the sedimentary rocks. Injections of molten masses affected their chemical composition and grain size.

Weathering and erosion began wearing down the new structures. As the overlying rocks were removed, the iron formation was exposed in places to the chemical action of surface waters. Some of the iron minerals that had been deposited on the sea bottom in the absence of any oxidizing action were not stable in the presence of oxygen. They combined with it to form other minerals. These other minerals are the iron oxides, hematite and goethite.

The silica in the iron formation was replaced in some areas by these newly formed iron oxides. Where this happened to a sufficient degree, the iron content in the rock increased from an original 20-25% to 50-60%. This silica replacement by oxidized iron within the iron formations took place where proper conditions existed. Therefore, the present mineable ore bodies are often widely scattered masses found within the bands of iron formation. It has been estimated that less than one per cent of the iron formation has been converted to useable ore.<sup>1</sup>

Finally, about ten to twenty thousand years ago, the advance of the glaciers left large parts of the area covered by a mantle of boulders, gravel, sand and clay, thus today

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<sup>1</sup>Michigan's Upper Peninsula Iron Ore Industry (Cleveland: Cleveland-Cliffs Iron Company, et al., 1958), p.5.

making it more difficult to determine accurately the position of the iron formation. However, outcroppings of iron ore appeared in places on the surface, and it was here that the original mines were developed, following the outcroppings.

### The Location of the Marquette Iron Range

The outcroppings of iron ore occur as edges of a canoe-shaped syncline extending from the shore of Lake Superior near Marquette, through the Ishpeming-Negaunee area, westward to Lake Michigamme where it opens into a broad basin. The syncline contains the great body of iron ore deposits that comprise the Marquette Iron Range.

The structures within the syncline are extremely complicated, with many folds, faults, and intrusions. The tightly folded basin of iron formations and associated rocks is approximately 33 miles in length and three to six miles in width. The vein of iron is from 1000 to 15,000 feet thick, and is found at distances varying from 2,600 to 4,000 feet below the surface.<sup>1</sup> It is richest below the east-central part of the county, and becomes less so westward.

In the vicinity of Palmer, a faulted segment from the main range is called the Palmer district. To the south of Lake Michigamme and extending south-east to Republic, a tightly folded trough of iron formation and its southern extension is called the Republic district.<sup>2</sup> The outline of

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<sup>1</sup>C. R. VanHise and W. S. Bayley, The Marquette Iron-Bearing District of Michigan (Vol. XXIII; Washington, D.C.: Dept. of the Interior, 1897), p.2.

<sup>2</sup>Robert C. Reed, Michigan Iron Mines, op.cit., p.10.





9. The Marquette Iron Range--Mather "B" Mine.



10. Iron mines near Ishpeming--Cliffs Shaft Mine.

the Marquette Iron Range is shown in Figure 7, page 65.

Shipments of Iron Ore from the Marquette Iron Range

Mining on the Marquette Iron Range has continued steadily since 1849. Through 1955, shipments from this range totaled 233,680,605 tons; 244,268,577 tons from the main basin, 12,785,258 from the Gwinn district, 8,731,002 tons from the Republic district, and 17,895,678 tons from the Palmer district.<sup>1</sup>

During 1955, 6,639,966 tons of ore were shipped from eleven mines, three siliceous open pits, and two concentration plants.

A summary of the iron ore shipments through 1955 from the Marquette Iron Range is shown below in Table 4. The active and the abandoned mines are listed with their gross tonnage, and the years when shipments were made from the mines. The active mines are indicated in the Table by an asterisk following the name of the mine.

TABLE 4

IRON ORE SHIPMENTS THROUGH 1955  
MARQUETTE IRON RANGE, MARQUETTE COUNTY  
MARQUETTE DISTRICT

Mine	Gross Tons	Years of Shipments
Adams	242,348	1913-1924
American-Boston	1,846,643	1880-1896, 1906-1922
Athens-Bunker Hill*	13,612,100	1918-1955
Barasa	8,768	1903

<sup>1</sup>Robert C. Reed, Iron Ore Shipments Through 1955  
(Geological Survey Division, Department of Conservation,  
Unpublished, 1956), p.8.

TABLE 4-Continued.

<u>Mine</u>	<u>Gross Tons</u>	<u>Years of Shipment</u>
Barnes-Hecker	419,433	1923-1927
Beaufort	354,654	1882-1887, 1900-1905
Bessie	59,097	1891, 1902-1906
Blueberry*	6,077,871	1929-1955
Cambria-Jackson <sup>a*</sup>	15,711,758	1874-1955
Champion* <sup>b</sup>	5,602,503	1868-1910, 1949-1955
Chase Group <sup>b</sup>	305,263	1883-1897, 1913-1916
Cleveland Lake	16,315,316	1854-1927
Cliffs Shaft* <sup>c</sup>	24,433,170	1868-1955
Curry	16,671	1889
Detroit	140,841	1882-1890
East Champion	76,002	1873-1883
Edison (Concentration)	893	1889
Empire	768,474	1907-1928
Excelsior	17,939	1872-1879
Fitch	40,263	1890-1892
Foster	351,713	1868-1903
Foxdale	31,447	1901-1905
Gibson	16,357	1885-1887
Goodrich	49,754	1873-1882
Greenwood*	1,935,088	1932-1955
Hortense	30,574	1887-1890
Howell-Hopppock	2,206	1873-1874
Humboldt <sup>d</sup>	1,368,546	1865-1892, 1908-1917
Humboldt* (Concentration)	327,292	1954-1955
Imperial	2,057,781	1882-1892, '99-13, '22-33
Jackson	4,357,256	1846-1924
Lackawanna	17,780	1886-1888
Lake Angeline	9,319,679	1864-1922
Lake Sally	35,434	1865-1916
Lake Superior Group	25,103,189	1858-1937
Lloyd*	9,573,401	1911-1955
Lucy	622,797	1870-1913
Maas*	13,672,886	1907-1955
Marquette	268,071	1860-1892
Mary Charlotte <sup>e</sup>	6,918,663	1872-1948
Mather* <sup>f</sup>	14,463,564	1888-1905, 1943-1955
Michigamme	935,880	1872-1905
Michigan	4,439	1872-1873
Milwaukee-Davis	533,022	1879-1915
Mitchell	233,750	1872-1913
Morris*	9,463,749	1912-1955
National	155,884	1878-1884
Negaunee	22,735,479	1887-1949
Negaunee Construction Works (Concentration)	12,708	1882-1886
New England	110,506	1866-1873
New York	1,124,182	1864-1919
Nonpareil	23,395	1882-1887
Norwood	5,753	1887-1888

TABLE 4-Continued.

<u>Mine</u>	<u>Gross Tons</u>	<u>Years of Shipment</u>
Ogden	657,024	1897-1928
Ohio	477,803	1907-1920
Ohio (Concentration)*	406,175	1952-1955
Pascoe	59,806	1882-1886
Pendill	45,993	1878-1884
Phoenix	59,114	1881-1887
Pioneer	15,409	1886-1888
Portland	272,036	1909-1915
Quartz	491	1889
Rolling Mill <sup>S</sup>	2,997,802	1871-1935
Queen Group	8,195,123	1886-1917
Saginaw	451,424	1872-1891
Salisbury	4,489,102	1872-1924
Section 12	21,887	1879-1882
Spurr	164,244	1873-1886
Steward	2,937	1874-1878
Taylor	32,970	1880-1883
Tilden*	4,436,649	1929-1955
Titan	90,371	1882-1888
Tracy Group <sup>h*</sup>	1,804,372	1870-1937, 1955-
Webster	34,999	1882-1900
Winthrop	2,590,560	1870-1903

TOTAL

244,268,577

GWINN DISTRICT

Archibald	1,881,606	1911-1937
Austin	1,589,156	1905-1929
Francis	503,818	1918-1939
Gardner-Mackinaw	1,326,440	1919-1941
Princeton	3,221,583	1872-1947
Stegmiller	418,417	1909-1917
Stephenson	3,844,233	1907-1941

TOTAL

12,785,258

REPUBLIC DISTRICT

Columbia	94,813	1873-1883
Erie	9,194	1876-1883
Magnetic	292	1906
Republic	8,563,170	1872-1937
Republic Reduction Co.	47,174	1887-1890
Riverside	16,160	1888-1893
North Republic	289	1888

TOTAL

8,731,092

TABLE 4-Continued.

PALMER DISTRICT

<u>Mine</u>	<u>Gross Tons</u>	<u>Years of Shipment</u>
Carr	2,380	1873-1874
Isabella	1,965,929	1916-1934
Maitland	1,021,189	1918-1928
Moore	87,769	1873-1904
Platt	73,844	1892-1896
Primrose	6,040	1896
Richards	8,261	1837-1897
Richmond, New*	4,224,437	1927-1955
Richmond, Old	3,604,913	1896-1926
Star West	209,115	1873-1911
Volunteer, New*	4,985,830	1926-1955
Volunteer, Old	1,705,971	1871-1916
TOTAL	17,895,678	

## SUMMARY

Marquette District .....	244,268,577 tons
Gwinn District .....	12,735,258 "
Republic District .....	8,731,092 "
Palmer District .....	17,895,678 "

TOTAL MARQUETTE RANGE: 283,680,605 tons

<sup>a</sup>Includes Lillie and Hartford Mines

<sup>b</sup>Includes Dey and Dexter Mines

<sup>c</sup>Includes Barnum, Moro, and Bancroft Mines

<sup>d</sup>Includes Sampson and Washington Mines

<sup>e</sup>Includes Allen, Chicago, East Chicago, Himrod and Bay State Mines.

<sup>f</sup>Includes Ames and East New York Mines

<sup>g</sup>Includes Kraze Mine

<sup>h</sup>Includes Breitung-Hematite, Lucky Star, and Manganese.

Source: Data on shipments were compiled from Lake Superior Iron Ores, 1938 and 1952, published by the Lake Superior Iron Ore Association. Data since 1952 were taken from annual reports of the Lake Superior Iron Ore Association. Quoted from: Iron Ore Shipments Through 1955, compiled by Robert C. Reed, Geological Survey Division, Department of Conservation, Lansing.





11. Loading ore into pockets on the ore dock.



12. Loading ore from the dock into ore boat.

Mining Companies.--The value of the iron ore produced in Marquette County in 1956 amounted to over 48 million dollars. It was produced by six mining companies. These companies are listed in the table below along with the active mines they operate and the location of these mines.

TABLE 5

## MINING COMPANIES AND LOCATION OF MINES

1. The Cleveland Cliffs Iron Company, Cleveland, Ohio

Bunker Hill Mine, Negaunee, Sec. 6, T47N, R26W  
 Cambria-Jackson, Ishpeming & Negaunee, Sec. 35, 36, T48N, R27W  
 Cliffs Shaft Mine, Ishpeming, Sec. 3, 9, 10, T47N, R27W  
 \*#Humboldt Open Pit, Humboldt Twsp., Sec. 10, 15, T47N, R29W  
 Lloyd-East Lloyd Mine, Ely Twsp., Sec. 6, T47N, R27W  
 Maas Race Course Mine, Negaunee, Sec. 31, T48N, R26W  
 Mather "A" Mine, Ishpeming, Sec. 2, T47N, R27W  
 Mather "B" Mine, Negaunee, Sec. 1, T47N, R27W  
 \*#Republic Open Pit, Republic Twsp., Sec. 7, T46N, R29W  
 #Tilden Open Pit, Tilden Twsp., Sec. 26, T47N, R27W

2. M. A. Hanna Company, Cleveland, Ohio

#New Richmond Open Pit, Richmond Twsp., Sec. 27, T47N, R27W

3. Inland Steel Company, Chicago, Illinois

Greenwood Mine, Ely Twsp., Sec. 14, 23, T47N, R23W  
 Morris Mine, Ely Twsp., Sec. 1, 2, T47N, R23W

4. Jones and Laughlin Steel Corporation, Pittsburgh, Penn.

Tracy Mine, Negaunee, Sec. 7, 8, T48N, R26W

5. North Range Mining Company, Negaunee, Michigan

Champion Mine, Champion Twsp., Sec. 31, T48N, R29W

6. Pickands Mather and Company, Cleveland, Ohio

#Volunteer-Maitland Open Pit, Richmond & Tilden Twsp.,  
 Sec. 25, 30, T47N, R26W

\*Low Grade Iron Ore Development

#Open Pit Mines

Source: Geological Survey Division, Michigan's Mineral Resources (Department of Conservation; 1958), p.50.

Production of Individual Mines.--A comparison of the tons of iron ore mined and the tons shipped from the mines of the Marquette Iron Range is shown in the table which follows:

TABLE 6  
TONS OF IRON MINED AND SHIPPED  
FROM THE MARQUETTE RANGE  
1957

<u>Mine</u>	<u>Tons Mined</u>	<u>Tons Shipped</u>
Athens-Bunker Hill	488,897	402,067
Cambria-Jackson	169,400	176,687
Champion	195,377	172,029
Cliffs Shaft	760,695	670,983
Greenwood	62,384	40,256
Humboldt	283,206	179,185
Maas	436,638	353,683
Mather "A"	1,350,201	1,361,260
Mather "B"	1,296,499	1,248,311
Morris	309,150	295,686
Ohio Concentrator	116,701	116,701
Republic	323,860	226,335
Tilden	201,161	192,527
Tracy	522,886	467,380
Volunteer	86,891	88,891
Lloyd	-----	-----
Total	6,655,946	5,992,772

Source: H. J. Hardenberg, and R. C. Reed, 1957 General Statistics Covering Costs and Production of Michigan Iron Mines (Geological Survey Division, Department of Conservation; Mimeographed tabulation, 1957), p.1.

Three of the mines, Cliffs Shaft, Greenwood, and Champion, produce a very hard hematite, much of which is of the lump variety.<sup>1</sup> The lump ore is desirable because it can be fed directly into the open hearth furnace, thus bypassing reduction in the blast furnace.

The Republic, Humboldt, and Ohio mines are associated

<sup>1</sup>Robert C. Reed, Michigan Iron Mines, op.cit., p.9.

with concentration plants where the lower grade iron formation is made into a saleable product by separating the iron from the undesirable silica.

A siliceous iron ore is produced from the Tilden, Volunteer and Richmond open pits. A small amount of this ore is required in blast furnace operation.

A direct shipping soft red hematite is produced from the other operating mines. Most of the soft hematite ore comes from the northeastern part of the main iron range in the vicinity of Ishpeming and Negaunee.

#### The Beneficiation of Low Grade Ores

In the Lake Superior Region, there were three minerals which formed the bulk of the iron ores that were mined; namely, magnetite, hematite, and goethite. These are all chemical compounds of iron and oxygen and in their pure state contain about 72%, 70%, and 63% of iron respectively.

More recently, through expensive research and technical developments, some parts of the iron formation which contain less iron (25-30%) have become economic ores. These are the taconite ores in Minnesota and the jasper ores (jaspilite or non-magnetic taconites) in Michigan.

Taconite and jasper are so constituted that the iron oxide minerals in them can be physically separated from the silica. The process of concentrating these low-grade ores into a material suitable for blast furnaces is called beneficiation. While the methods for separating iron oxides from the silica compounds vary with the special properties of the iron

oxides, in the end, a concentrate around 60% iron is obtained.

Briefly stated, the processing of jasper ore, which previously had not been commercially possible, involves the crushing and pulverizing of the rock to powder fineness to separate the particles of iron ore and waste rock. Then the iron ore particles are extracted by flotation methods.

The froth-flotation process is one by which the finely ground rock is treated with chemicals and oils having an attraction for the iron minerals and having little or no effect on the much greater amount of waste material. The chemicals form a water-repellent film over the iron oxide mineral. In a mixture of properly conditioned ore and water, air bubbles are generated. The water-repellent iron minerals attach themselves to the bubbles and rise to the surface. They are then skimmed off as iron ore concentrate. The waste material remains submerged and is carried away in a fluid form to disposal areas especially prepared for the waste. (It has been estimated that 50 tons of water are required to process each ton of concentrated ore.) Finally, the iron powder is roasted into solid balls (pellets) about the size of a large marble suitable for shipment to the blast furnace.

The first commercial beneficiation plant in Michigan, the Ohio, located just west of Michigamme in Baraga County, began production in 1952. This plant beneficiated low grade ore by a method involving crushing and heavy media separation. In 1954, the first plant utilizing jasper ores went into operation.



13. In the Mather "B" Mine. The author is on the left.



14. Pellets of iron--the final product of beneficiation.

Michigan now has two open pit, low-grade mines with beneficiation plants utilizing jasper ores. Both are located in Marquette County. The first to start operations was the Humboldt Mine in 1954, followed by the Republic Mine in 1956. The pelletizing plant for the Republic operation is at Eagle Mills, east of Negaunee.

#### Gold in Marquette County

The first discovery of gold in Michigan was made by State Geologist Douglass Houghton in Marquette County in 1845 near the very region where gold was later mined. The location was northeast of Teal Lake, near Negaunee and Ishpeming.

Gold was found in quartz veins in the ancient Keewatin rocks, or in veins of peridotite. The gold is native or "free" gold.

Ropes Gold Mine.--The most famous and productive gold mine was the Ropes Gold Mine from which over \$625,000 worth of gold was taken. In 1881, Julius Ropes, of Ishpeming, opened the Ropes Gold and Silver Mining Company on the south half of the northwest one-quarter of Section 29, Township 48 North, Range 27 West. In 1886, from 6,959 tons of rock, the mine produced \$43,499.93, or \$6.20 per ton net, or \$8.10 per ton gross. In 1891, 31,578 tons of rock yielded \$65,240.67 net. The mine continued in operation until 1897, having produced \$647,902.37 out of the \$666,485.73 with which Marquette County (the Ishpeming gold field) is credited.<sup>1</sup>

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<sup>1</sup>Alfred C. Lane, Sixth Annual Report of the State Geologist, op.cit., p.157.

The Ropes Mine had sunk about (15 levels) 850 feet and had drifted 400-500 feet.

No gold has been produced in the state since the closing of the Ropes Mine in 1897, except some gold obtained by a reworking of some of the tailings of this mine. When the price of gold was increased in the 1930's, many individual prospectors worked the tailings at the mine, in some instances panning out day wages from the discarded ore.<sup>1</sup>

Other Gold Mines in Marquette County.--About two miles and a half west of the Ropes Mine, on Section 35, Town 48 North, Range 28 West, was the Michigan Gold Mine, discovered in 1888. This property produced some of the finest specimens of free gold.<sup>2</sup> However, it only yielded a total of about \$90,000. In 1932, a stock company reopened the mine, and produced about \$6,000 in bullion. This second attempt ended in the fall of 1937.

Just west of the Michigan Mine was Gold Lake Mine which was not as extensive as the other two because the vein pinched out at a depth of 60 feet.<sup>3</sup>

Two other mines, the Superior in Section 35, Township

<sup>1</sup>Michigan State Administrative Board, Michigan, A Guide to the Wolverine State (New York: Oxford University Press, 1947), p. 565.

<sup>2</sup>R. C. Allen, (director) Mineral Resources of Michigan with Statistical Tables of production and value of mineral products for 1910 and prior years (Pub. 8, Geol. Series 6; Lansing: Geol. and Biological Survey, Dept. of Conservation, 1912) p. 359.

<sup>3</sup>Geological Survey Division, Production and Value of Mineral Products in Michigan for 1924, 1925, 1926 and Prior Years (Pub. 37, Geol. Series 31; Lansing: Dept. of Conservation, 1928) p. 137.



48 North, Range 28 West, and the Peninsula Mine in Section 25, in the same township, were started about the same time. Neither were of any particular importance.

The Dead River area north of Ishpeming was the scene of other gold discoveries. This river basin is located about eight miles north of Ishpeming. The Fire Center Mining Company put down two shafts in Section 35, Township 49 North, Range 27 West. Work was started here in 1892 and abandoned in 1898. Some of the ore found here showed very encouraging results.

There have been a few other reported occurrences of gold in the Dead River area, but none of these have developed beyond the prospecting stage. With cessation of work at the Ropes, Michigan and the Fire Center mines, interest gradually dropped in the possibility of finding a profitable gold mine in the region and very little further prospecting has been carried on. "This does not mean that this area does not contain profitable deposits of gold and silver but merely indicates that the old ventures were not able to survive under the conditions that were in existence at that time."<sup>1</sup>

Gold has been reported in other parts of Michigan but there has been no occurrences that compare with the discoveries around Ishpeming. Most of these other reported finds of gold are placer or stream deposits. "It is possible that workable deposits of placer gold may be found in and around the Ishpeming area but it is very unlikely that any gold of commercial importance will be found in the stream gravels of the lower

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<sup>1</sup>Ibid., p.138.

peninsula."<sup>1</sup>

Other Minerals Found in Marquette County

Copper, Zinc, Lead, and Silver.--The richest copper deposits in the Upper Peninsula of Michigan are found in the range that forms the backbone of the Keweenaw Peninsula, but copper appears in Marquette County to some extent both in ore and in natural form. Zinc and copper ores occur at varying depths throughout the peninsula, while veins of native copper and silver break the surface all along the northern shore. The occurrence of naturally refined silver is rare, but the native copper found in the county is malleable and very pure.<sup>2</sup> Lead has also been found in Marquette County. On the north side of Presque Isle Park, north of the city of Marquette, is the site of a silver and lead mine, active in 1845.

The summary of mineral products of Michigan for 1910 listed a quantity of 262,200 fine ounces of silver, with a value of \$141,600.<sup>3</sup> However, the locality of the mine in the Upper Peninsula was not reported in the summary.

Marble.--Verde Antique and white marbles are found in Marquette County. The Michigan Verde Antique Marble Company opened a quarry and began operations in 1914. Production, however, was intermittent due to lack of transportation facilities and labor shortages. The material shipped consisted

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<sup>1</sup>Ibid.

<sup>2</sup>Michigan Historical Records Survey, op.cit., p.5.

<sup>3</sup>Michigan Geol. & Biol. Survey, 1912, op.cit., p.442.

chiefly of stone for terrazzo and stucco. No shipments have been reported since 1923.<sup>1</sup>

Sandstone.--"Marquette Brownstone" (Cambrian Sandstone), a dark, reddish-brown, ferruginous (iron cemented) sandstone was formerly quarried at Marquette and shipped to various cities on the Great Lakes. It was used extensively as a building stone in the era when brownstone fronts were in vogue. Many of the older buildings in Marquette and other Northern Peninsula towns were constructed of this sandstone.

In 1926, the only sandstone quarried in the city of Marquette was produced for concrete aggregate. According to Geological Survey reports, the decline of the sandstone industry cannot be attributed to inferior qualities of stone, but rather to changing styles in building stone. The competition from brick and other artificial rock products was a factor in the decline of the sandstone quarrying industry.<sup>2</sup>

Stone.--Stone has been an important product in Marquette County. In 1956, from Marquette County, the Bacco Construction Company produced about 63,614 tons of crushed dolomite stone. This was valued at \$63,614.<sup>3</sup>

Sand and Gravel.--According to the report of Michigan's Mineral Resources for the year 1956, Marquette County produced 477,470 tons of sand and gravel at a value of \$548,875. The

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<sup>1</sup>Michigan Geol. Survey, Pub. 37, Series 31, 1928. op.cit., p.87.

<sup>2</sup>Ibid., p.84.

<sup>3</sup>Sorenson and Carlson, Michigan's Mineral Resources (1958), op.cit., p.50.

producers of sand and gravel in Marquette County in 1956 that contributed production data to the Geological Survey Division include the following: Lake Superior and Ishpeming Railway Company; A. Lindberg and Sons, Incorporated; Marquette County Road Commission; and the Michigan State Highway Department.<sup>1</sup>

Miscellaneous Minerals Found in Marquette County.--Many other minerals, and some gem stones are found in Marquette County. Talc and asbestos are found in the rocks north of Ishpeming. Slate and graphite also are found in the Huronian rocks. Garnet and tourmaline are found near Champion. Quartz, tourmaline, beryl, and topaz may be found in the pegmatite rocks, such as those found near Republic.<sup>2</sup> Veins of green epidote, an inch or more in width, show in the granite cuts of Sugar Loaf Mountain, a few miles north of Marquette.<sup>3</sup> Serpentine, barite, chlorite, and staurolite are other minerals found in Marquette County much to the delight of collectors.

The above minerals, although of little commercial importance, do provide a source of entertainment for many local rock and mineral collectors, as well as for many vacationers. The bulletin "Rocks and Minerals of Michigan"<sup>4</sup> provides an excellent guide for a collector touring Michigan and Marquette County.

<sup>1</sup>Ibid., p.50.

<sup>2</sup>Robert W. Kelley, and Harry J. Hardenberg, "Pebbles to Pendants," Michigan Conservation, (July-August, 1953), pp.7-9.

<sup>3</sup>Geological Survey Division, Rocks and Minerals of Michigan (Pub. 42; 3rd. ed.; Lansing: Dept. of Conservation; 1952), p.62.

<sup>4</sup>Ibid. 124 pp.

## VIII. SOIL--A MAJOR RESOURCE OF MARQUETTE COUNTY

### Soil

Soil Defined.--Soil may be defined as the collection of natural bodies occupying portions of the earth's surface that may support plants. The soil has layers, or horizons, whose properties are the result of the integrated effect of climate and living matter (especially vegetation), acting upon parent material, as conditioned by relief, over periods of time.

The Formation of Soils in Michigan.--Soils in Michigan were developed chiefly from glacial till parent material. They are between ten and fifteen thousand years old. The major local differences in Michigan soils are associated with variations in the texture (coarseness or fineness) of their parent materials and the drainage conditions under which the soils were formed.

Characteristics of Marquette County Soils.--The soils of Marquette County are characterized by a great diversity in texture, drainage conditions, chemical compositions, and productivity. As for soil texture, sands make up 24 per cent of the total area of the county; sandy loams and loams, 30 per cent; rock dominant areas, 24 per cent; and organic soils

(swamps), 22 per cent.<sup>1</sup> Stones and boulders are associated with most of the mineral soils except on the sand plains and the organic soils. Stones and boulders are prevalent in the rolling and hilly soils in the western half of the county. In many sections, this condition makes the land unsuited for crop cultivation. Highly calcareous soils are located in the southeastern part of the county, but in other sections, most of the soils are acid.

### Soil Classification

Because of the great diversity of soils, a taxonomic system of soil classification has been devised, corresponding in some respects to the classification system used for plants or animals. A comparison of botanical and pedologic (soil) classification systems follows:<sup>2</sup>

#### Botanical Classification

Phylum....Spermatophyta  
Order.....Angiospermae  
Class.....Dicotyledoneae  
Family.....Fagaceae  
Genus.....Quercus  
Species...alba  
Variety.....

Common Name--White Oak

#### Pedologic Classification

Order.....Zonal  
Suborder.....Forest  
Great Soil Group.Gray-Br. Podzolic  
Family.....Miami  
Series.....Hillsdale  
Class.....Sandy loam  
Phase.....Hilly

Common Name--Hillsdale sandy loam

### The Podzol Soil Region

Marquette County lies within the Great Soil Group known

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<sup>1</sup>I. F. Schneider, J. T. Stone, C. R. Humphrys, and R. Ulrich, Reconnaissance Soil Survey of Marquette County, (Unpublished, Michigan State University, 1939-1940), p.161.

<sup>2</sup>C. E. Millar, and L. M. Turk, Fundamentals of Soil Science, (Second edition; New York: John Wiley & Sons, Inc., 1951), p.79.



as the Podzol Soil Region of north-central and north-eastern United States (see Figure 3). Podzol soils are formed in humid areas under coniferous forest type vegetation. The surface soil is dark. The surface of virgin soils are featured by a layer of forest litter and humus. Just below this layer, in the A<sub>2</sub> horizon, is a very light gray, leached soil layer. An accumulation of iron and clay may be found in the B horizon. Soluble mineral materials, especially carbonates, have been leached from the upper soil horizons.

Podzol soils differ from the Gray-Brown Podzolic Region of southern Michigan in that the Gray-Brown Podzolic has been formed primarily under a deciduous forest type vegetation. The surface soil is dark with the A<sub>2</sub> horizon a light yellowish-brown, rather than bleached like the A<sub>2</sub> horizon of the Podzol Region.

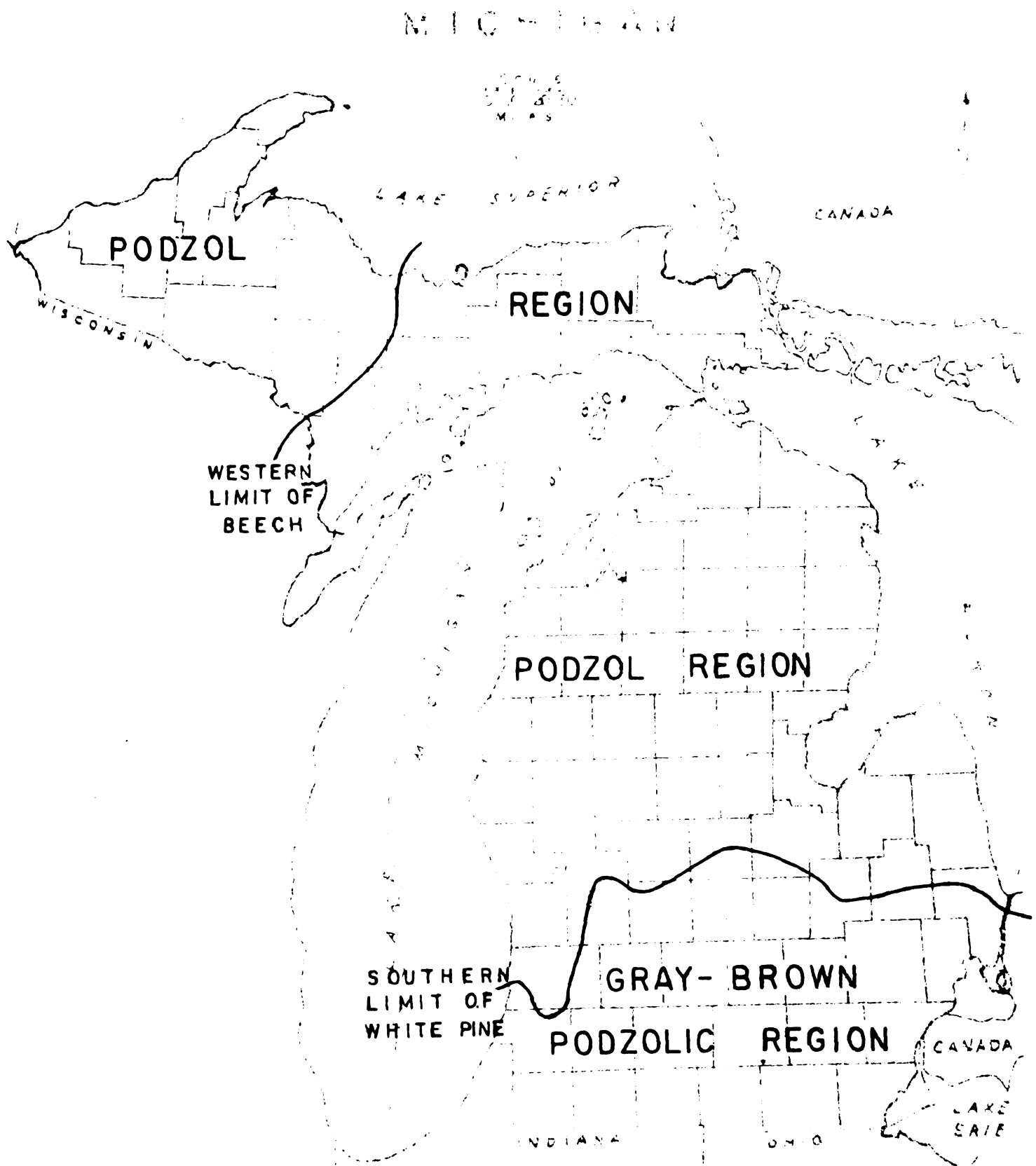
The southern limit of white pine coincides closely with the boundary between the Gray-Brown Podzolic and the Podzol Regions. The western limit of beech in the Northern Peninsula (in Marquette County) is approximately the division between the non-limy parent materials to the west and the limy parent materials to the east (note Figure 8).

#### Soil Mapping and the Soil Survey

At the turn of the century there was an increasing awareness of the relationship between land and society. In an attempt to find the causes of some agricultural problems and in an effort to build a solid foundation for future research, the United States Department of Agriculture, in



Figure 8  
SOIL REGIONS OF MICHIGAN



Soil regions of Michigan and approximate limit of native white pine and beech vegetation.

Source: Soils of Michigan, E. P. Whiteside, I.F. Schneider, and R.L. Cook. Special Bulletin 402. Soil Science Department, Michigan State University, East Lansing, Michigan. 1956. Page 9.

cooperation with the various state experiment stations, began a systematic investigation of our soil resources. This investigation assumed the form of a national inventory and survey.

The Soil Survey.--Soil surveying involves the classification and mapping of soils in the field. Soils are examined at frequent intervals either by making borings with a soil auger or by studying road and railroad cuts. These inspections usually reveal a number of distinct layers or horizons, which taken as a unit are called the soil profile. The separate soil horizons and the underlying parent material are carefully studied and such things as texture, structure, consistency, porosity, color, amount of organic matter, and extent of root penetration are described. Tests are made to determine the acidity or alkalinity of the soil and the nature of the drainage of the soil profile is noted. The slopes are also classified and the natural vegetation is observed. Special attention is given to the factors which influence the adaptation of the soil for growing crops and trees.

The Soil Series.--The soils are identified and grouped into soil series. The soils of a series are similar in their important characteristics such as color, structure, natural drainage, and in the arrangement of the horizons in the soil profile, largely because they are derived from similar parent materials and formed under similar climate, topography and vegetation over the same amount of time.

A soil series has usually been given the name of a town,

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11-  
12-  
13-  
14-  
15-

16-  
17-  
18-

19-  
20-  
21-  
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23-

24-  
25-

26-  
27-  
28-  
29-

30-  
31-  
32-

river or other geographical or political feature near which it was first identified or mapped. Examples of soil series found in Marquette County are the Baraga, Champion, Gogebic, Hiawatha, Keweenaw, Iron River, Trenary, and the Marenisco soil series. (Over thirty soil series are included in the Marquette County Soil Associations Map, Figure 9, page 91.

Soil Type.--To the soil series name is added the texture of the plow soil or the texture of the upper seven or eight inches. This gives the soil type. There are over 300 soil types recognized in Michigan.

The Survey of Michigan Soils.--As a result of the co-operative efforts during the last 55 years of the Michigan Agricultural Experiment Station, the Michigan Department of Conservation, and the United States Department of Agriculture, general information on the kinds of soils in many parts of Michigan is now available.

A land type or reconnaissance soil survey was conducted on Marquette County in 1939 and 1940 by I. F. Schneider, J. T. Stone, C. R. Humphreys, and R. Ulrich. The 162-page report of this survey, to date, is unpublished. This report, and the Natural Land Type Maps of Marquette County, may be reviewed at the office of the Soil Science Department, Michigan State University, East Lansing, Michigan. A brief summary of this survey, as well as the summary of the major land divisions and soil associations of Michigan which apply to Marquette County, are included in this report.

A detailed soil survey of the cleared land of Marquette County is currently in progress.

### Major Soil Associations and Divisions of Marquette County

Soil Associations.--In describing the soils of a large area, it is often necessary to combine a number of separate but related soil series that occur in definite associated patterns. This broader grouping is called a soil association. A soil association may be defined as a group of defined and named taxonomic soil units (such as soil series) occurring together in an individual and characteristic pattern over a land area. In classifying the soils of Michigan, J. O. Veatch listed 64 soil associations on his soil map.<sup>1</sup>

In a study of Michigan soils, I. F. Schneider and E. P. Whiteside combined the soil series of Michigan into 43 soil associations.<sup>2</sup> The map of Major Soil Associations of Marquette County, Figure 9, is based on the study made by Schneider and Whiteside. Seventeen of their 43 Michigan soil associations are represented in Marquette County.

Land Divisions.--From the study made by Schneider and Whiteside, the 43 soil associations of Michigan were further grouped into 26 Land Divisions. These major land divisions have been distinguished on the basis of the textural character

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<sup>1</sup>J. O. Veatch, Soils and Land of Michigan (East Lansing: Michigan State College Press, 1953), 241 pp.

<sup>2</sup>E. P. Whiteside, I. F. Schneider, and R. L. Cook, Soils of Michigan (Special Bulletin 402; East Lansing: Michigan State University, 1956), Map following p. 52.

KEY TO MAP: MAJOR SOIL ASSOCIATIONS, MARQUETTE COUNTY, MICHIGAN













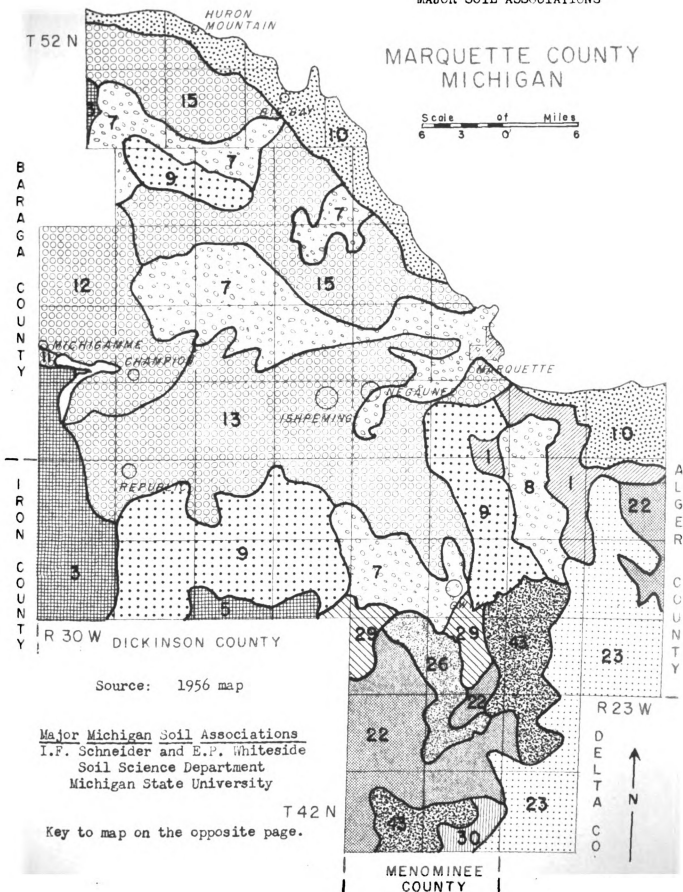
<u>LAND DIVISION</u>	<u>AREA NUMBER</u>	<u>SOIL ASSOCIATIONS</u>
<b>I. PODZOL REGION (Non-Limy Materials)</b>		
 A	1	Munising, Keweenaw, Skanee
 B	3	Iron River Loam
	5	Gogebic, Trenary, Hiawatha
 C	7	Marenisco, Gogebic, Vilas
	8	Keweenaw, Munising, Hiawatha
 D	9	Rubicon, Omega, Pence
 E	10	Onota, Waiska
 F	11	Baraga, Champion, Peats
	12	Champion, Rock Knobs, Peats
	13	Iron River, Gogebic, Rock Knobs
	15	Vilas, Munising, Rock Knobs
<b>II. PODZOL REGION (Limy Materials)</b>		
 J	22	Onaway, McBride, Guelph, Peats
 K	23	Angelica, Richter, Peats
 L	26	Montcalm, Kalkaska, Emmet, undulating
 P	29	Roscommon, Au Gres, Peats
 Q	30	Longrie, Summerville, St. Ignace
<b>III. PODZOL REGION (Mucks and Peats)</b>		
 Z	43	Organic Soils

Figure 9

MAJOR SOIL ASSOCIATIONS







of soils, bedrock, surface relief, drainage, and natural vegetation. Twelve of the 26 land divisions of Michigan are represented in Marquette County.

On the following pages, the soils of Marquette County are described under the 12 major land divisions found in the county, and their agricultural relationships are discussed.<sup>1</sup> Their location and distribution are shown on the soil map of Marquette County, Figure 9, page 91.

### Podzol Region (Non-Limy Materials)

Land Division A.--This land division coincides with Soil Association number one on Figure 9. The principal soil series of this division are the Munising, Keweenaw, Skanee and Gay. This division includes the level to rolling soils developed from red, acid, sandy loams and loamy sands. The soils which are pinkish or pale reddish in color show the strong influence of Lake Superior sandstone. The soils are strongly acid to a depth of several feet. Sandstone bedrock actually outcrops or is close to the surface in many places. These soils occur on benches or plains from 50 to 500 feet above the level of Lake Superior.

The value of the land for farming is lowered by the slopes, stoniness and associated poorly-drained soils. Only a small percentage of the land is cleared. In this land division, timothy, alsike clover, oats, and potatoes are the principal crops. Dairying and part-time farming are the

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<sup>1</sup>E. P. Whiteside, et al., Soils of Michigan, op.cit., 52 pp.

principal types of farming.

Land Division B.--This land division includes Soil Association numbers three and five on Figure 9. The Iron River, and Gogebic are the dominant soil series in this division found in Marquette County. This land division occupies the rolling to extremely hilly medium-textured uplands at elevations of 1,300 to 1,900 feet above sea level. Either gravelly or organic soils occupy a considerable acreage in the valleys and plains. The surface soils range from sandy loams to silt loams. The soils are acid in reaction.

The agricultural use of the land is affected by the unfavorable slopes, stoniness and the shortness of the growing season. Hay and pasture, oats, and potatoes are the main crops.

Land Division C.--This land division includes Soil Associations number seven and eight on Figure 9. The dominant soil series in this division are Marenisco, Vilas and Gogebic in the uplands, and Stambaugh and Pence in the valleys.

The topography varies from gently rolling to extremely rough uplands with associated level valleys with either silty or organic soils. This land division occurs at elevations of 1,400 to 1,800 feet above sea level. The soils in this group have been developed from acid, stony sand to sandy loam parent material.

Only small areas near mining locations are utilized for farming purposes. The value of the land for crops and pasture is lowered by the variability of the soil textures, the steep-

ness of the slopes, the excessive amounts of stones and boulders and the shortness of the growing season. The best use for most of the land at the present time is for forestry and recreation.

Land Division D.--This land division coincides with Soil Association Area nine on Figure 9. The principal soil series are Rubicon, Omega, and Fence.

The soils of this land division are mainly level to hilly dry sands. These well-drained sands are strongly acid and are low in organic matter. Organic soils and lakes are common in this land division. The limiting factors for agricultural uses are low natural fertility, low moisture-holding capacity and wind erosion. The best land use is for forestry and recreation, although most of the forests are second growth.

Land Division E.--This land division coincides with Soil Association Area number ten on the map. Onota and Waiska are the principal soil series in this division.

This land division includes gravelly, stony sandstone benches along Lake Superior. The soils are mainly sandy loams and loams.

Forestry and recreation are the primary uses for the land. The land is not well-suited for agriculture because of the stoniness and the closeness of the bedrock to the surface. The farming areas are limited to those locations which have a thicker soil covering over the bedrock.

Land Division F.--Soil Association Areas number 11, 12, 13, and 15 comprise this land division. The major soil series are Baraga, Champion, Gogebic, Vilas, Iron River and Munising.

This land division includes the mountainous-like areas including the Iron ranges, and the Huron Mountains. The areas occur at elevations of 1,200 to 2,000 feet above sea level. The soils, **in general**, are excessively stony and boulder-filled with rock knobs, ledges and outcrops common.

This land has very low agricultural value. A very limited amount of part-time farming is found adjacent to the mining locations and the communities. Other than the mineral resources, the chief value of the land is for forestry and recreation. This is the most extensive land division of Marquette County.

#### Podzol Region (Limy Materials)

Land Division J.--This land division coincides with Soil Association Area 22. Onaway, Trenary, McBride, Guelph, Posen, Emmet, and Eark River are the dominant upland soil series. The associated organic soils are largely Carbondale and Carlisle.

The mineral soils of this land division were developed from limy sandy loam to loam till material. This division is largely well-drained, level to rolling till plains.

The high lime, relatively fertile soils with high moisture retaining capacity, are ideal for alfalfa. Dairying is the principal type of farming. Small grains, corn and

potatoes are the other principal crops. Stones in some localities are sufficiently numerous to interfere with cultivation.

Land Division K.--This land division includes Angelica and Richter as the dominant soil series in Soil Association 23, as indicated on the soils map.

The soils of this division were developed under very poor natural drainage conditions from either stone-free silts and very fine sands, or from loamy till material. Organic soils are common in this division. The topography is nearly level with some low swells and narrow sandy ridges.

The soils are cold and wet in the spring and the growing season is short. Consequently, the land is largely in second-growth forest or is utilized for pasture.

Land Division M.--Land Division M coincides with Soil Association 26 on the soils map. Kalkaska, Mancelona, Emmet, Montcalm and Blue Lake are the dominant soil series in this land division.

The soils are mainly sands, loamy sands and sandy loams occupying level to rolling locations. The original forest was largely hardwoods, mainly sugar maple. The soils are generally slightly to strongly acid. The sandy loam parent materials, however, are limy.

The soils are not highly productive and require very careful soil management to obtain satisfactory crop yields. The soils in general are low in organic matter, are easily tilled, warm up rapidly in the spring, and are very responsive

to fertilizer and manure. The sandy loam soils are excellent for potato production and produce fair yields of alfalfa, mixed hay and oats.

Land Division P.--This land division coincides with Soil Association 29 on the soils map. The dominant soil series are Roscommon, Au Gres, Arenac, Spaulding, Rifle and Greenwood.

This land division comprises mixed wet and dry sands with closely associated peats. The mineral soils have developed from sandy parent material. The poorly drained sandy soils (Roscommon and Kinross) have a thin peaty surface with the water table at or near the surface. The imperfectly drained sands (Au Gres) have well-developed brown subsoils. The well-drained sands (Weare-Wallace-Rubicon) occur as ridges or plains.

The combination of wetness and sandy textures results in a soil having little value for general farm crops. However, some part-time farming is carried on. Large tracts are in second growth forest.

Land Division Q.--This division coincides with Soil Association 30 on the soils map. Longrie, Summerville and St. Ignace are the dominant soil series in this land division.

The soils are mainly sandy loams and loams. The land is used primarily for pasture or forests because of the stoniness and the closeness of the limestone bedrock to the surface. The agricultural value of the land is further reduced by the associated dry, gravelly ridges and intervening wet areas which are both mineral and organic in character. The farming

areas are limited to those locations which have a thicker soil covering over the bedrock.

### Podzol Region (Mucks and Peats)

Land Division Z.--Soil Association 43 on the soils map coincides with this land division.

This organic soil division includes areas which are largely occupied by mucks or peats in sufficiently large bodies to be delineated on the soil association map. Smaller areas of organic soils are found, however, in most of the other broad land divisions.

Two organic soils were mapped in the county. They are the Carbondale muck--Rifle peat complex, in which the timbered swamps were dominant, and the Greenwood peat complex, in which bog vegetation or a growth of sedges and marsh grasses were the dominant growth.

The frost hazard limits the use of the area for truck crops, so timber products and cover for wildlife is the greatest use. Limited areas are used for pasture. Open marshes and leatherleaf bogs occupy some of the area.

### Summary of Reconnaissance Soil Survey of Marquette County

In the Reconnaissance Soil Survey of Marquette County, Michigan conducted by I. F. Schneider, et al.<sup>1</sup>, soil complexes, or natural land types, were used as mapping units, as well as the individual soil types. The broader soil complexes are

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<sup>1</sup>Schneider, op.cit., 162 pp.





made up of a number of separate soil types, occurring in definite associated patterns.

The report of this soil survey of Marquette County shows an arbitrary separation of the land into three classes.<sup>1</sup> This classification is based primarily on relief, productivity, and tillage qualities of the land.

A summary of this classification of land in Marquette County into three classes follows:<sup>2</sup>

Class 1.--Soils of medium to high productivity, moisture good, not swampy, slopes not excessively steep. separate bodies large enough to warrant agricultural development, either not stony or other factors sufficiently favorable to warrant clearing of stones.

The approximate size of this class or area in Marquette County is 60,000 acres.

Regarding the present use and ownership, 60 to 65 per cent of this class is in farms. Farming is not highly prosperous but is comparatively successful. It is estimated that 20 to 30 per cent is cleared land. The remainder is mainly second growth forest or recently cut-over land. A small percentage is in stump pasture, and less than five per cent is in virgin forest.

The major soil types that make up this class include the Trenary, Munising, Chatham, Bohemian, Stambaugh, and Iron

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<sup>1</sup>Ibid., Table 4, p.25.

<sup>2</sup>Ibid., Table 4, p.25.

River soils.

Class 2.--Class 2 includes soils of medium productivity. Land value is depreciated, however, because of stones, steep slopes, hilly relief, or poor drainage. Part of the land is level but plant growth is limited by low moisture supply.

Approximately 210,000 acres of Marquette County are included in this class.

Regarding the present use and ownership, it is estimated that less than two per cent of the land is cleared and placed under cultivation. The land is owned in large tracts and valued chiefly for hardwood timber. Cut-over land remains largely under private ownership, but is owned in part by the State.

The soil types for this class are mainly Hiawatha, Longrie, Menominee, Strongs, Kalkaska, Iron River, Champion, Munising, Munuscong, Brimley, and Au Train soils. Some of the sandier and more steeply sloping land is excluded.

Class 3.--The land value of Class 3 is lowest because of low productivity, rock knobs, excessive stoniness, rough topography, swamps, excessive dryness, occurrence in small bodies, or a combination of these factors.

The approximate area of Class 3 land in Marquette County is 910,000 acres, or nearly three-fourths of the county.

As for present use and ownership, less than one per cent is in farms. Some valuable virgin forests still remain, but 80 to 90 per cent is cut-over land which is still held in



part in large tracts by mineral, land, and timber companies. It is estimated that 15 to 20 per cent is owned by the State, and a part is held by private hunting and fishing clubs.

Soil types for this class are mainly Omega, Crystal Falls, Peshekee, Ishpeming, Saugatuck, Onota, Sheldrake, Vilas, Newton, Wallace, Ruse, and alluvial soils, peats and mucks.

Conclusions Drawn from Classification.--Although the classification is not based primarily on the present money value, a fairly close relationship exists between the three classes of land in their present assessed values. Such classifications as this are not precisely quantitative and are subject to change as economic conditions and agricultural practices change. Values based on standing timber, minerals, urban land, and resorts and club use are excluded in this land classification.

The major conclusions drawn from this classification were:<sup>1</sup>

- (1) A considerable acreage of wild land exists which is arable and locally first-class in productivity. (On a state-wide basis, the amount of first-class land would be smaller.)
- (2) A large acreage of second-class wild land exists which has little present agricultural value but which might be brought to a productive state if needed for agriculture.
- (3) A very large acreage of wild land exists which is third-

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<sup>1</sup>Ibid., p.26.

class and would seem to have little possible use other than for forestry, recreation and game purposes.



## IX. AGRICULTURE IN MARQUETTE COUNTY

### Types of Farming Areas

In the bulletin, "Types of Farming in Michigan", the state was divided into 17 type-of-farming areas, as shown in Figure 10.<sup>1</sup> These areas were largely based on the sources of farm income and the prevailing kinds of crops and livestock. The divisions between the areas were not so definite as the boundary lines would indicate. The transition from one area to the next was usually a gradual one.

Marquette County lies mainly in Area 17 with a small portion in the southern part of the county extending into Area 16.

The major farm products of Area 16 are dairy and potatoes. The type of farming for Area 17 includes dairy, potatoes, part-time farming, and forestry. Area 17 comprises most of the Upper Peninsula of Michigan. There is considerable variation in soils, climate and markets within this large area.

Typically, in Area 17, about 65 to 80 per cent of the tillable farm land is in hay and pasture; one to six per cent in potatoes; and 15 to 20 per cent in small grains, mostly oats and mixed oats and barley.

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<sup>1</sup>Elton B. Hill, and Russell G. Mawby, Types of Farming in Michigan (2nd Revision; Special Bulletin 206; East Lansing: Michigan State University, 1954), p.25.

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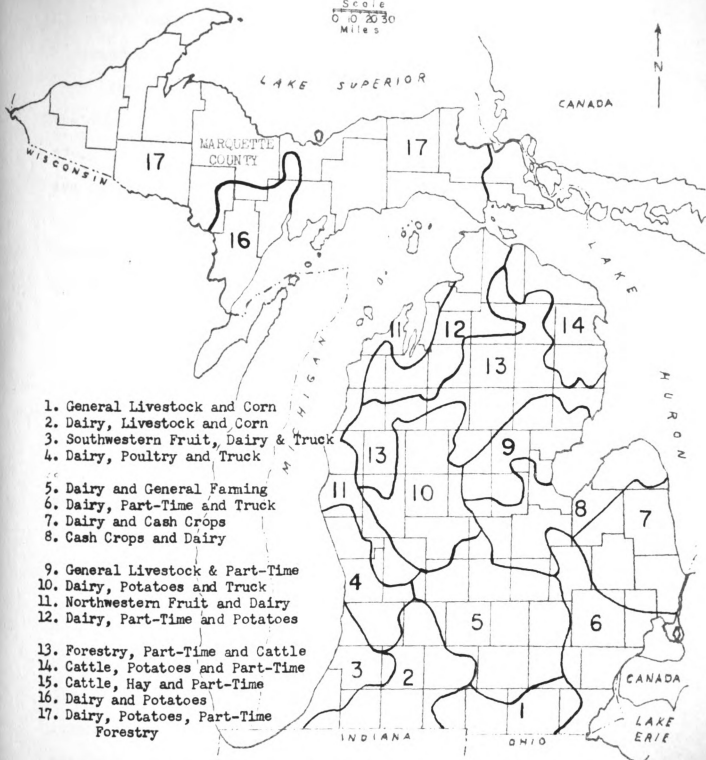


Figure 10

TYPE-OF-FARMING AREAS IN MICHIGAN  
(Areas on a natural-line basis)

MICHIGAN

Scale  
0 10 20 30  
Miles



1. General Livestock and Corn
2. Dairy, Livestock and Corn
3. Southwestern Fruit, Dairy & Truck
4. Dairy, Poultry and Truck
5. Dairy and General Farming
6. Dairy, Part-Time and Truck
7. Dairy and Cash Crops
8. Cash Crops and Dairy
9. General Livestock & Part-Time
10. Dairy, Potatoes and Truck
11. Northwestern Fruit and Dairy
12. Dairy, Part-Time and Potatoes
13. Forestry, Part-Time and Cattle
14. Cattle, Potatoes and Part-Time
15. Cattle, Hay and Part-Time
16. Dairy and Potatoes
17. Dairy, Potatoes, Part-Time Forestry

The 83 counties in Michigan are here grouped into 17 type-of-farming areas on the basis of the amounts and kinds of crops and livestock produced.

Source: Types of Farming in Michigan, E. B. Hill and R. G. Mawby. Special Bulletin 206. Michigan State University, East Lansing, Michigan. 1954 Page 25.



Locally, there are some good farming areas in the region and, where the soils are adapted, excellent production results. Marquette County was the first in Michigan to produce a one-thousand bushel per acre yield of potatoes.

Farming in the region is largely restricted to the land that has the better soils, without too many stones or excessively steep slopes, and where drainage and land clearing costs are not excessive.

The locations of a few of the better agricultural communities in Area 17 in Marquette County are around Skandia and Champion. Also, the Watson locality in Area 16 is famous for its large yields of potatoes.

#### Length of Growing Season in Marquette County

The three physical factors important in determining the best type-of-farming to follow in Michigan are climate, soils and topography. The major climatic factor affecting the selection of crop and livestock enterprises in Michigan is the length of the growing season. Michigan has a wide range in the length of growing seasons (see Figure 11.)

Marquette County, also, has a wide range in the length of growing seasons. As indicated in Figure 11, the length of the growing season in Marquette County extends from about 90 days to over 150 days. The average length of the growing season in Marquette County is 113 days. The longest growing season has been 158 days in Marquette County, and the shortest season has been 60 days. The years when the growing season extends over 130 days compares favorably with the average

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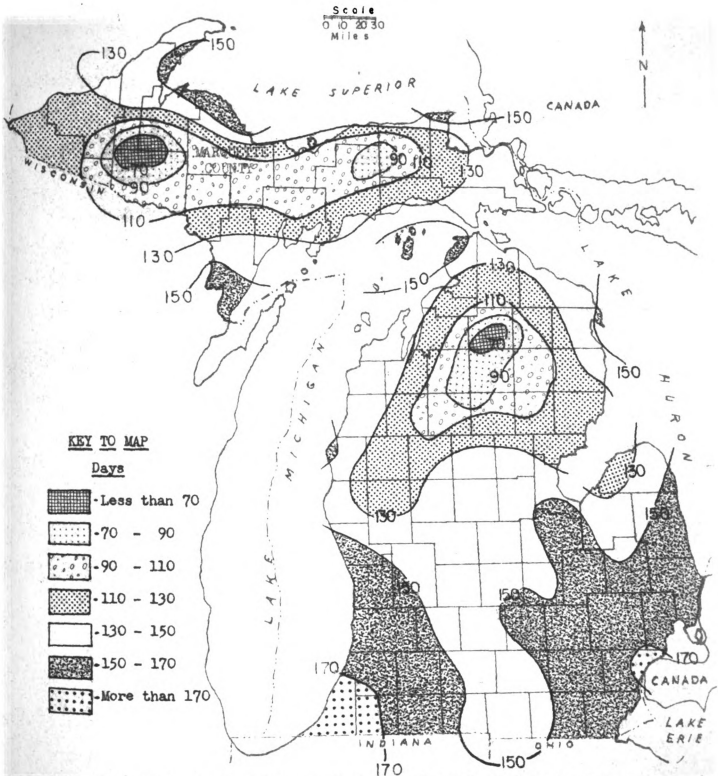
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Figure 11

LENGTH OF GROWING SEASON

# MICHIGAN



The number of days from average date of the last freezing temperature (32 degrees or colder) in the spring to the average date of the first freezing temperature in the fall.

Source: Types of Farming in Michigan, E.B.Hill and R.C. Mawby. Special Bulletin 206. Michigan State University, East Lansing, Michigan. 1954. Page 12.



length of the growing season in the southern part of the state.

A great many variations in the length of the growing season are found in Marquette County. These are due to the Great Lakes, the variation in latitude and the variation in elevation. Of the three, the influence of Lake Superior and the variation of elevation are most pronounced and important. Lake Superior, after being warmed by the summer sun, retains its heat during the autumn. As a result, the autumns are usually long and mild. After the water in the lake is finally cooled during the winter, it remains cold until late spring or early summer. Therefore, large bodies of water, like Lake Superior, have a decided effect on the dates at which late spring and early fall killing frosts are experienced.

Lake Superior lengthens the crop growing season on its southern border in Marquette County. Frosts do not usually occur after May 15 along the lake, while they are common further inland until June 10. In the fall, frost seldom occurs on the land near Lake Superior before October 1st, but in the elevated interior regions, frost will occur between September 1 and 15.

#### Agricultural Statistics on Marquette County

Of the total population of Marquette County (approximately 48,000) only 2,500, or about 5.2 per cent, were listed from farms. For the year 1954, the following census statistics apply to agriculture in Marquette County:

There were 387 farms in Marquette County comprising a total of 71,000 acres. This means there was only six per cent





of the land of the county in farms. The average size of the farm was 184 acres. (The average size of a farm in Michigan in 1954 was 118 acres.) (The United States Census definition of a farm is "places of three or more acres with an annual value of agricultural products for home use or sale, exclusive of home-garden products, or \$150 or more. Places of less than three acres were counted as farms only if the annual sales of agricultural products amounted to \$150 or more."<sup>1</sup>)

Of the 184 acres of farm land, 64 acres were considered cropland. For the state, 66 per cent of the total farm land is in cropland; for Marquette County only 35 per cent. (Cropland includes cropland harvested, cropland used only for pasture, and cropland not harvested and not pastured. It is the workable land of the farm and from which most of the farm income is derived.)<sup>2</sup>

The percentage of the total cropland in the major crops grown in Marquette County are as follows: Hay--35%; Pasture--30%; Oats--10%; and Potatoes--4%. About 76% of the farms have milk cows and 58% raise poultry.

Part-time and residential farms make up 176 of the total 387 farms of the county. The census defines part-time farms as "farms with a value of sales of farm products of \$250 to \$1,199 provided the farm operator reported (a) 100 or more days of work off the farm in 1954, or (b) the non-farm income

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<sup>1</sup>U. S. Department of Commerce, Bureau of the Census, 1954 Census of Agriculture, Series AG 54.

<sup>2</sup>Ibid.



received by him and members of his family was greater than the value of farm products sold."<sup>1</sup>

The number of commercial farms with the value of produce sold, listed by the 1954 Census of Agriculture, records Marquette County as having the following:

5 farms sold produce valued at \$25,000 or more  
 8 farms sold produce valued at \$10,000 - \$24,999  
 38 farms sold produce valued at \$ 5,000 - \$ 9,999  
 156 farms sold produce valued at \$ 250 - \$ 4,999

Only two per cent of the farmers, or eight farmers, are farm tenants; 308 are full owners of their farm. In 1954, about 95% of the farms had electricity, and 49% had telephones.

The average value of a farm in Marquette County in 1954 was \$8,301.

#### Major Sources of Farm Income in Marquette County

The major sources of farm income in the county are from the sale of dairy products, cattle, poultry and potatoes. Potatoes are the best cash crop. Important hay and grain crops are alfalfa, barley, oats, and grass. Vegetables for local consumption are grown quite generally on the farms throughout the county. Important cash crops are head lettuce, rutabagus, green or wax beans, cabbage and beets.

The value of farm products sold in Marquette County in 1954 amounted to \$980,300. Crops amounted to 40.6% of this amount, or about \$398,000. Livestock and dairy products sold

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<sup>1</sup>Ibid.



amounted to about 48.2% of this total.

The types of farm products sold and the per cent of the total farm products sold in Marquette County in 1954 are shown in the table below:

TABLE 7  
VALUE OF FARM PRODUCTS SOLD IN MARQUETTE COUNTY IN 1954

<u>Types of Products Sold</u>	<u>Value</u>	<u>Per Cent of Total Farm Products Sold</u>
Dairy Products-----	\$357,613	36.5%
Field Crops-----	291,892	29.8
Forest Products-----	102,704	10.5
Horticulture Specialties-----	86,290	8.8
Livestock and Livestock Products	75,291	7.7
Poultry and Poultry Products----	46,219	4.7
Vegetables-----	13,606	1.4
Fruits and Nuts-----	6,685	0.7

The larger cities of the area provide an outlet for the sale of fluid milk from a number of farms. Other dairy products are marketed through local milk condenseries, creameries, and cheese factories. Most of the potatoes are shipped to out-of-state or to southern Michigan markets.

#### Agricultural Trends in Marquette County

Among the big changes in the agriculture of this region in the last ten years has been the consolidation and enlargement of farms. The result is fewer farms with more adequate



acreage. The family size farm must be big enough to support a family. Increased mechanization makes a large unit feasible. The increase in acres per farm in Marquette County in 15 years has been 84 acres per farm. This is nearly double the size of the 1940 farm. However, there are still many small and part-time farms. According to the 1950 Census of Agriculture, 61% of the farms of Marquette County had farm sales of less than \$1,200 in 1949.

The Table below gives a comparison of agricultural developments in Marquette County as taken from the Census figures. Although the period covered is relatively short, it does indicate a definite trend.

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TABLE 8  
AGRICULTURAL TRENDS IN MARQUETTE COUNTY

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	1940	1945	1950	1955
Number of farms	1011	860	584	387
Size of farms (acres)	101	113	136	184
Per cent land in farms	8.9	8.3	6.8	6.0
Land in farms (acres)	104,838	97,623	79,575	71,325
Milk cows	3,613	3,450	2,253	2,193
Milk produced for sale (pounds)	7,595,280	10,049,476	9,305,942	10,114,840
Oats (acres)	1,236	2,072	2,204	2,411
Potatoes (acres)	1,529	2,311	1,466	968

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Agricultural Stabilization and Conservation Committee

The Agricultural Stabilization and Conservation (ASC) Committee administers Federal agricultural action programs of the United States Department of Agriculture. Stabilization of prices and production of agricultural commodities and also the conservation of agricultural resources are the objectives of the various programs.

Conservation of soil and water resources is obtained by means of the Agricultural Conservation Program (ACP) and the Soil Bank Program. Cost-sharing under these programs was made to farmers for performing certain conservation practices.

The several programs administered by ASC in Michigan are wholly voluntary with the exception of compliance with wheat allotments of over 15 acres.

The Federal Government shared with 13,891 Michigan farmers in the cost of carrying out needed soil and water conservation practices on 18,543 farms. The total gross amount of assistance under the 1957 program amounted to \$4,972,865 of which \$4,687,530 were made in direct payments to farmers in Michigan in 1958.<sup>1</sup>

County programs are developed and administered by county ASC committees in cooperation with local representatives of the Soil Conservation Service, Forest Service, Extension Service, local soil conservation districts, farm organizations and other interested groups.

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<sup>1</sup> Agricultural Stabilization and Conservation, U. S. Dept. of Agriculture, ASC Michigan Annual Report 1958 (Lansing) p.1.

For 1958, of the 387 farms in Marquette County with 71,325 acres in farmland and 24,944 acres in cropland, the following number of farms participated in various programs of ASC on the stated number of acres, resulting in the allotted monetary assistance as shown in the following Table:

TABLE 9  
AGRICULTURAL AND CONSERVATION PRACTICES\*  
IN MARQUETTE COUNTY 1957

1957 Agricultural and Conservation Practices	Number of Farms Participating	Units Used (Acres)	Amount of Assistance to Farmers
Vegetative Cover-----	7	89	\$ 590
Liming-----	15	238	3,660
Contour and Field Stripcropping-----	3	34	109
Tree and Shrub Planting-----	13	48	958
Forest Improvement-----	8	30	616
Sod Waterways & Special Purpose Vegetation-----	1	23	147
Structures & Erosion Control and Farm Ponds-----	4	5	1,692
Open Ditch & Tile Drains-----	2	16	219
Conservation Practices with Benefits of Limited Duration	20	371	1,393

\*Source: Ibid., pp.9, 13, 17.

#### The Soil Bank Program in Marquette County

The Soil Bank Program was initiated late in 1956 to reduce production of surplus farm commodities and to promote



conservation of the Nation's land resources. The Conservation Reserve and the Acreage Reserve Programs make up the Soil Bank Program. The Acreage Reserve Program is a year-to-year program designed primarily to reduce the production of basic commodities which includes wheat and corn in Michigan. (Neither of these crops affected Marquette County, and no payments have been made in this county for this part of the Soil Bank Program.) However, the Conservation Reserve Program has affected Marquette County. The cumulative totals for the county from inception of program in 1956 to date shows the following:<sup>1</sup>

Number of contracts in effect-----	21
Acreage under contract at Diversion Rate-----	154
Acreage under contract at Non-Diversion Rate-----	657
TOTAL annual payments (1958)-----	\$3,544.00

#### The Marquette County Soil Conservation District

Farmers in Marquette County agreed and voted to organize a Soil Conservation District. Prompting the organizers were reforestation needs, problems in drainage, erosion, general land management, and a desire to use the land to its fullest capabilities.

The Marquette County Soil Conservation District was organized in October, 1955. Instrumental in organization plans were the U.S. Soil Conservation Service, Michigan State University Extension Service, U.S. Agricultural Stabilization

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<sup>1</sup>Ibid, p.61.



and Conservation Committee, Farm Home Administration and the Michigan Department of Conservation.

A landowner who desires to participate in soil conservation work may voluntarily become a member of the Soil Conservation District. Landowners or farmers who become members are called cooperators. As of January, 1959, there were 61 such cooperators in Marquette County who were signed up in the program. The Soil Conservation Service offers technical aid to these farmers interested in soil conservation.

Soil conservation practices established by the Marquette County Soil Conservation District included contour farming, cover cropping, strip cropping, rotation grazing, tree planting, terracing, farm drainage, and conversion of cropland to grass and croplands to woods.



## X. FORESTS--A MAJOR RESOURCE OF MARQUETTE COUNTY

### The Forest Area of Marquette County

Marquette County has a total land area of 1,179,240 acres. Of this land area, four and one-half per cent is non-forest and ninety-five and one-half per cent is forest land.<sup>1</sup>

For an area to be considered "forest land area", it must meet the following criteria: "All wooded areas, cut-over lands, and the intermingled and adjacent open areas obviously suitable for timber production and not devoted to other uses. Minimum size area is two and one-half acres; minimum width strip is two chains (A chain is 66 feet.). Excluded are marshes, areas of prairie grass, and wooded pasture less than ten per cent stocked with tree growth."<sup>2</sup>

The forest area of Marquette County consists of 57,100 acres of farm woods, and 1,063,000 acres of non-farm woods. The non-forest area consists of 28,100 acres in cropland and farms; 12,400 acres in other non-wooded farm land; and 12,700 acres in cities, villages, industrial sites, etc.<sup>3</sup>

Of the forest area, commercial forest land occupies 1,121,300 acres, and forest land not capable of producing

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<sup>1</sup>Michigan Department of Conservation, Timber Resources of Marquette County, Michigan, 1948, p.1.

<sup>2</sup>Ibid., p.46.

<sup>3</sup>Ibid., p.1.





commercial wood products occupies 3,800 acres.<sup>1</sup>

Commercial Forest Land of Marquette County

The timber stand of the commercial forest area of Marquette County is made up of the following size classes:<sup>2</sup>

	<u>Acres</u>	<u>Per Cent</u>
Saw Timber-----	209,000	19
Pole Timber-----	217,000	19
Satisfactorily Stocked Seedlings and Saplings	320,000	29
Poorly Stocked and Denuded Areas-----	375,000	33

The county may be divided by horizontal lines into three zones or belts (see Figure 12), each differing considerably from the other in forest composition and condition of timber stand.<sup>3</sup>

The northernmost division is mostly rough or rolling land. It has not been developed much for agriculture. (Only six-tenths of one per cent of the land is in farms.) It has comparatively few roads and lumbering has not progressed as far as in the rest of the county. Seventy-two per cent of the saw timber stand is in this northern area. This northern division has relatively little pulpwood other than hemlock of sawlog size which has been classed as saw timber. This division is owned mostly by private individuals or companies. (Ninety-four per cent of the forest land in the northern district is privately owned.)

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<sup>1</sup>Ibid.

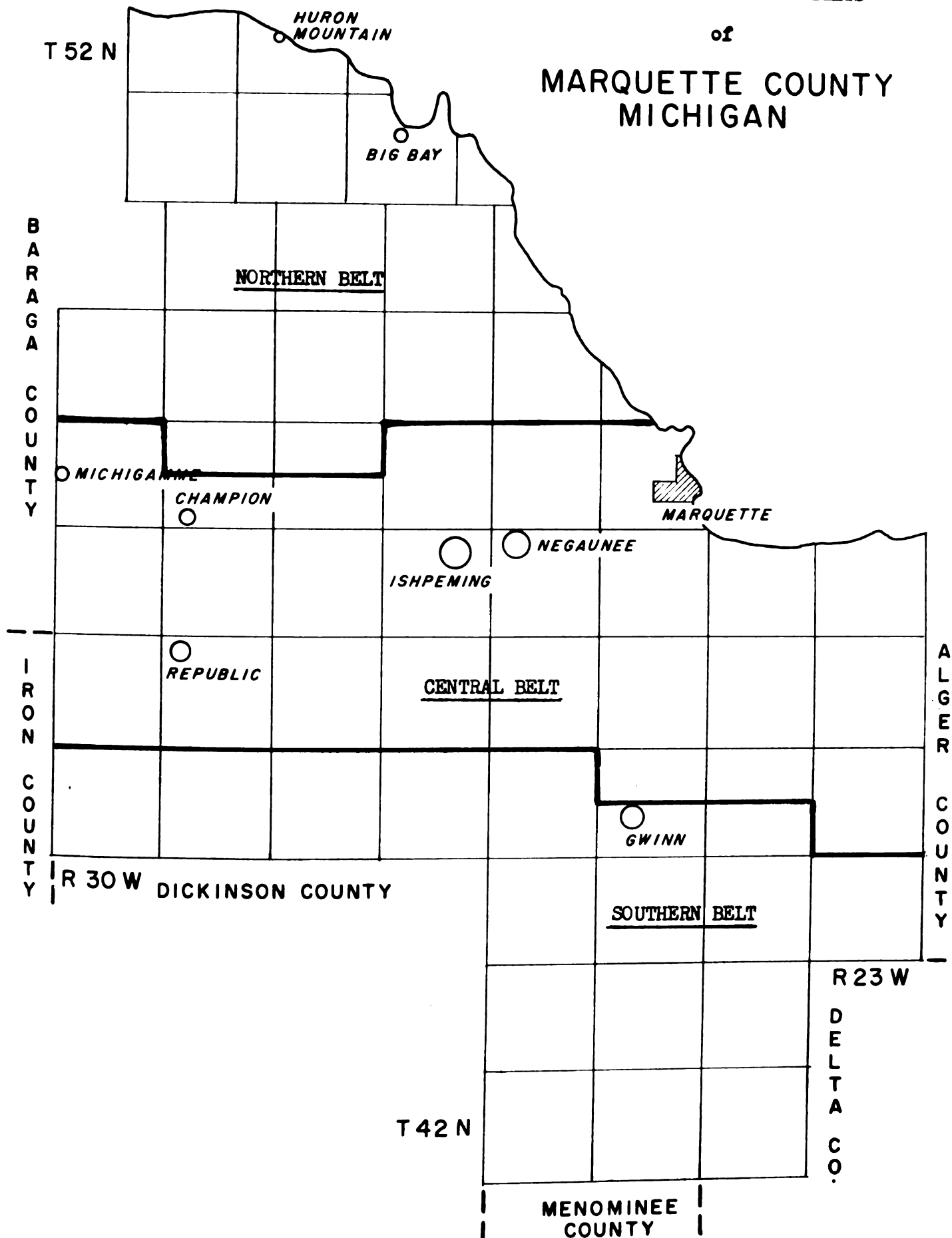
<sup>2</sup>Ibid., p.vi.

<sup>3</sup>Ibid., pp. 2-13.

Figure 12

## THE THREE MAJOR FOREST BELTS

of

MARQUETTE COUNTY  
MICHIGAN

The central belt is gently rolling and includes most of the industrial lands and a majority of urban development. It includes a few well-developed agricultural areas but is still primarily forest. (Five and seven-tenths per cent of the area is in farms.) The area has been largely stripped of mature timber and is covered with young second growth in which aspen predominates. The acreage of saw timber stands in this central area is about 53,100 acres or 25 per cent of the area. However, 105,800 acres of pole-timber stands are located in this area. About three-fourths of this division is owned by farmers or other private owners, and one-fourth is owned by the State.

The southern belt, likewise, has been cut over but because of its general swampy character and lack of mineral deposits, the land has not been converted to other uses. It includes many swamp conifers in its second growth. About two per cent of the area is in farms, and three per cent in saw timber stands. The balsam and spruce species predominate as pole-timber stands in this area. About two-thirds of this belt is privately owned and one-third is owned by the State.

#### The Forest Types of Marquette County

The forests of Marquette County are composed of eleven forest types or forest cover types. The size of these types in acres and the stand size class for each forest type is given in Table 10.<sup>1</sup>

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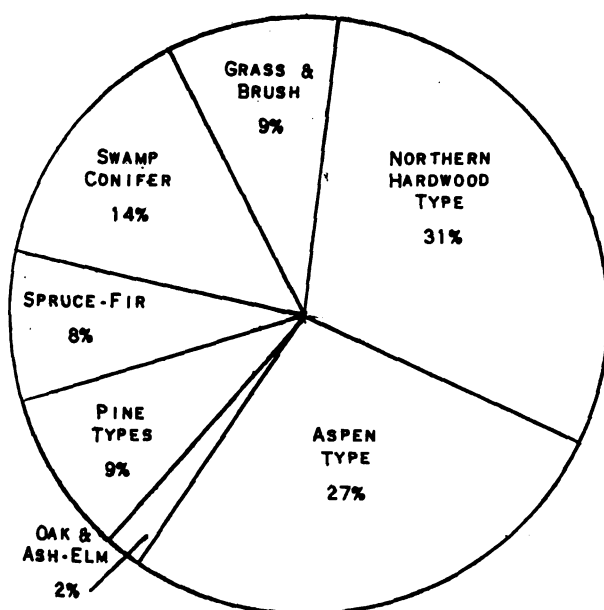
<sup>1</sup>Ibid., p.3.

**TABLE 10**  
**AREAS OF FOREST TYPES AND STAND SIZE CLASSES,**  
**MARQUETTE COUNTY, MICHIGAN--OCTOBER, 1946**

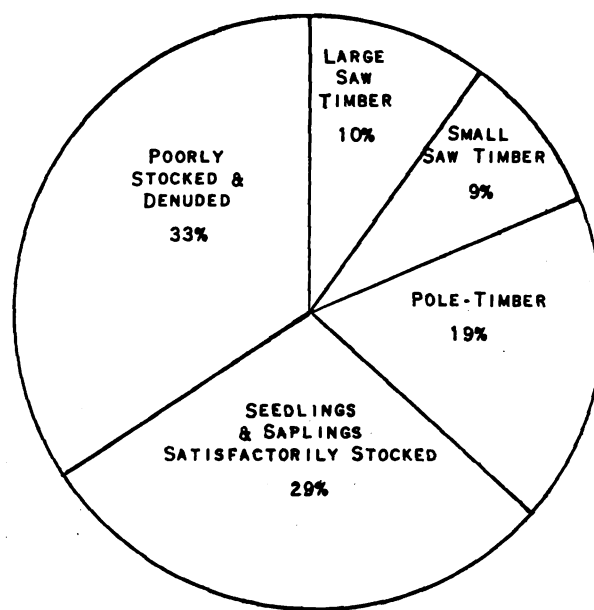
COVER TYPE	TOTAL	LARGE SAW- TIMBER	SMALL SAW- TIMBER	POLE TIMBER	SEEDLINGS AND SAPLINGS		DENUDED <sup>2</sup>
					SATIS- FACTORILY STOCKED <sup>1</sup>	POORLY STOCKED	
Thousand Acres							
NORTHERN HARDWOODS.....	341	105	43	41	132	12	8
ASPEN.....	306	0	20	85	103	54	44
WHITE PINE.....	19	4	15	0	0	0	0
RED PINE.....	1	0	1	0	0	0	0
JACK PINE.....	78	0	1	10	5	11	51
BLACK SPRUCE.....	79	0	0	27	21	25	6
CEDAR.....	71	1	6	19	28	16	1
TAMARACK.....	8	0	0	1	5	2	0
SPRUCE-FIR.....	94	0	6	31	16	37	4
BOTTOM-LAND HARDWOODS.....	15	0	6	1	8	0	0
OAK.....	6	0	1	2	2	1	0
GRASS AND BRUSH.....	103	...	..	..	...	..	103
TOTAL.....	1,121	110	99	217	320	158	217

<sup>1</sup> SEEDLING AND SAPLING AREAS AT LEAST 40 PER CENT STOCKED.

<sup>2</sup> FOREST AREA LESS THAN 10 PER CENT STOCKED WITH COMMERCIAL TREE SPECIES.



**TYPES**



**SIZE CLASSES**

The Northern Hardwood type is by far the most extensive and the most valuable type. This type covers 341,000 acres or almost one-third of the commercial forest area. It includes 105,000 acres of large saw timber. It is composed mainly of sugar maple and yellow birch with beech coming in from the East, basswood coming in from the West, hemlock and red maple common on wet sites, and white pine scattered thinly throughout. Several other species occur in lesser amounts.

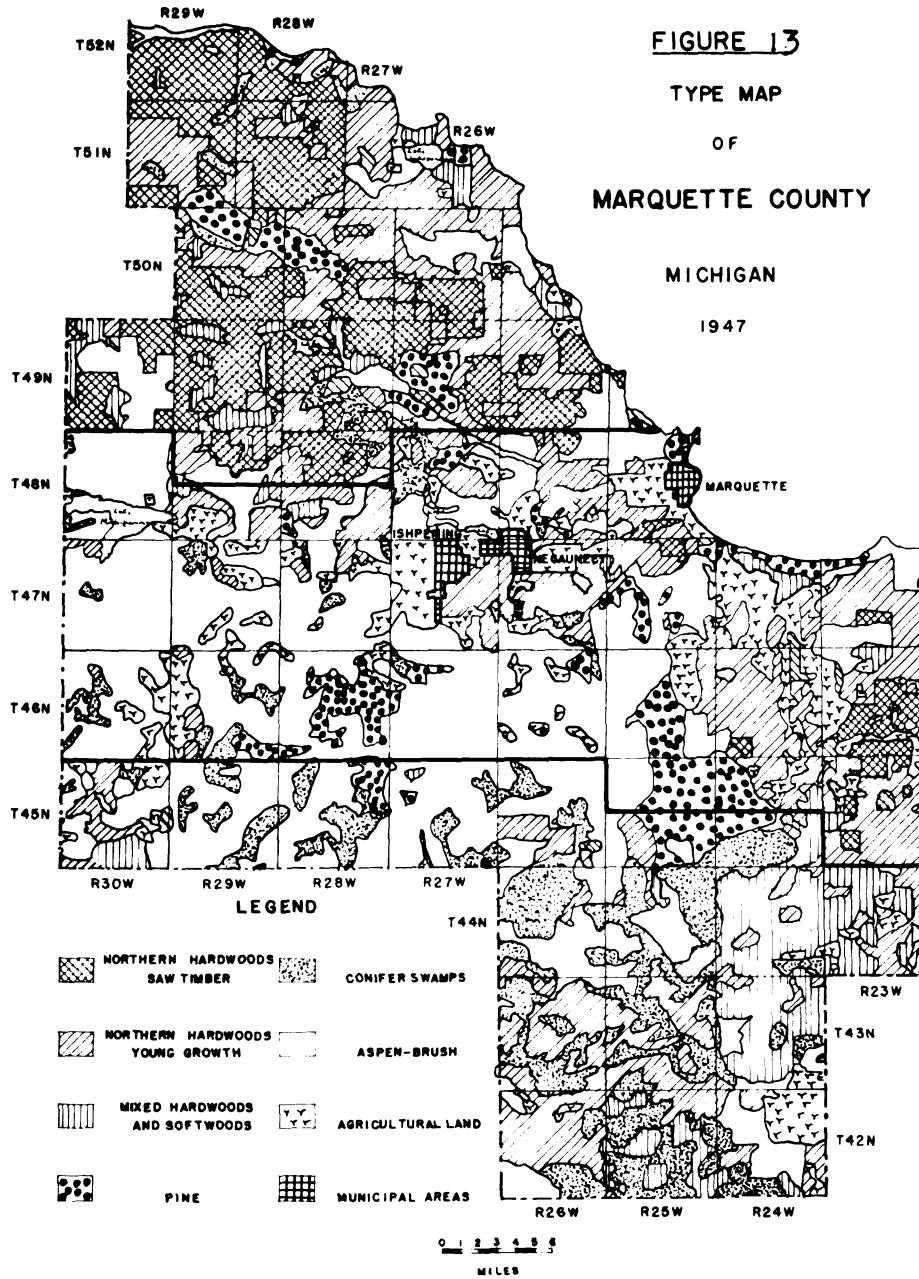
The aspen type is the second most common type. It occupies 306,400 acres within the county, or 27 per cent of the commercial forest land. It has 20,000 acres in saw timber and 85,000 acres in pole timber. It is composed chiefly of trembling aspen and paper birch, but also includes large volumes of big-tooth aspen and balsam poplar (Balm-of-Gilead), and other species such as balsam fir and red maple.

The pine types include the three native pines. The Jack pine type consists of 78,000 acres; the white pine type of 19,400 acres, and the red pine type of slightly less than 1,000 acres. The remaining six tree cover types include the following types: black spruce, cedar, tamarack, spruce-fir, bottom-land hardwoods, and oak.

#### Timber Species in the Forest Cover Types

Figure 13 gives the location in Marquette County of the major forest types. The timber species found in those types referred to in this figure might be summarized as follows:

Northern Hardwoods Saw Timber.--Upland forest of sugar maple, yellow birch, hemlock, elm, beech, basswood, white



PCB- 1947

Source: Michigan Department of Conservation, Timber Resources of Marquette County, Michigan, 1948, Table 1.

pine found either in pure stands or in a mixture. The trees are mainly ten to thirty inches in diameter. The stands range from 2,000 to 12,000 board feet per acre.

Northern Hardwoods Young Growth.--This is an upland forest with the same species combination as the old-growth hardwood except little hemlock or white pine is present. The trees are mainly ten inches or less in diameter. The stands average less than 2,000 board feet per acre.

Mixed Hardwoods and Softwoods.--Spruce, balsam fir, white cedar, aspen and paper birch are the chief species found on uplands in this type; and a mixture of elm, soft maple, yellow birch, balm-of-Gilead and black ash on the lowlands. The trees are mainly twelve inches or less in diameter.

Aspen-Brush Type.--Aspen, paper birch, scrub oak or pin cherry; and deforested lands, covered with brush, ferns or grass, is found on the uplands and lowlands in this type. The trees are mainly eight inches and less in diameter.

Pine Types.--Jack, white and red pines are found in these types. Young growth, ten inches or less in diameter, predominate.

Conifer Swamps.--Black spruce, white cedar, tamarack and balsam fir are the chief species of timber trees in this forest cover type. The trees are mainly eight inches or less in diameter.



Timber Volumes<sup>1</sup>

The total saw-timber volume for Marquette County forests is estimated to be 2,097,700,000 board feet international one-quarter-inch rule. This is composed of 1,174,100,000 board feet of hardwood and 923,600,000 board feet of softwood species. The northern-hardwood type contains 1,558,900 board feet. Private owners control 1,963,000,000 board feet which is 94 per cent of the saw timber.

Cordwood estimates include the volume of 3,092,600 cords of pole timber; 2,609,500 cords of tops and limbs of saw-timber trees; and 1,624,300 cords of cull trees. This makes a total volume of cordwood of 7,326,400 cords.

The net growth of saw timber is roughly calculated to be 41,000,000 board feet.

Forest Industries in Marquette County

The forest industries in Marquette County in 1948 consisted of 60 sawmills, one wood-distillate plant, one flooring mill, and two wood-turning mills. There were also about 15 large and a number of small logging operators in the county.<sup>2</sup>

The wood-distillate plant in Marquette is operated by the Cliff-Dow Chemical Company for the production of charcoal, methanol, acetic acid, and related minor products. It uses

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<sup>1</sup>Timber Volume refers to the quantity of wood in trees or stands. It is measured by board feet, cords, or cubic feet. Source of these timber volumes: Ibid., pp. 11-12.

<sup>2</sup>Ibid., p. 24.

about 80,000 cords of low-quality wood, much of which could not be sold elsewhere. Maple, yellow birch, and beech are the main raw materials, together with minor quantities of other high-density hardwoods. Large quantities of slabs and veneer cores are used. As old-growth hardwood stands decrease, the company expects to obtain its raw material increasingly from improvement cuttings in the second-growth stands. Approximately 400 people are employed at this plant.

The Robbins Flooring mill at Ishpeming is a very modern mill, built in 1946. This company is the largest individual manufacturer of hardwood maple flooring in the world.<sup>1</sup> (They also have a plant in Reed City, Michigan.) The Ishpeming plant employs about 115 people twelve months of the year.

Schneider Brothers Lumber Company operate a turning plant in connection with their sawmill at Marquette. They employ about fifty people. The type of production at this mill includes rough and finished lumber, rough bowling and duck pins, and custom orders for lumber materials.

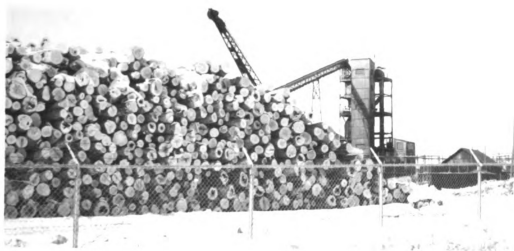
The Munising Wood Products Company makes handles, furniture, dimension stock, knobs and other turnings at its Marquette plant.

The "Directory of Michigan Sawmills" for 1956 listed the following sawmills for Marquette County:<sup>2</sup>

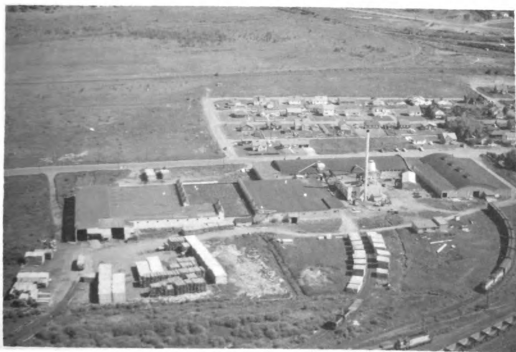
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<sup>1</sup>Ibid., p.24.

<sup>2</sup>Forestry Division, Michigan Department of Conservation, Directory of Michigan Sawmills, April, 1956.



15. The Cliff-Dow Chemical Company uses cull hardwood.



16. The Robbins Flooring Mill at Ishpeming.

TABLE 11  
SAWMILLS OF MARQUETTE COUNTY  
1956

Mill Size  
Class

V. E. Ahonen Lbr. Co., Star Route 550, Marquette	---A
Ervin Coleman, National Mine	-----E
Cram & Crocher, Big Bay (two sawmills)	-----A
Freis Brothers, Dukes	-----C
A. J. Firley Sawmill, Republic	-----E
Gannon Sawmill, L. F., Marquette	-----A
William Heikkinen, Turin, Route #1, Rock	-----E
John Kanerva, Gwinn	-----E
L. B. & Byron Ingalls, Skandia	-----C
Munising Wood Products, Marquette	-----B
Edlore Patient, Arnold	-----E
Raish's Sawmill, Marquette	-----A
Schneider Bros. Lbr. Co., Marquette	-----A
Seth Wixtrom, Republic	-----E

Mill Class Annual Production (M.b.m.)--thousand board feet:

A--	3,000 plus
B--	1,500 - 3,000
C--	750 - 1,500
D--	350 - 750
E--	100 - 350

Those less than 100 M.b.m. annually were omitted.

### Forest Ownership<sup>1</sup>

Forest ownership in Marquette County is not as complex as in many counties of the Upper Peninsula, since the federal, county, and municipal governments hold title to a very small acreage.

The Federal Government owns about 9,000 acres, mostly in the Upper Peninsula Experimental Forest at Dukes. The State of Michigan owns approximately 260,000 acres of commercial forest land. These are found mainly in the Michigamme

<sup>1</sup>Mich. Dept. of Cons., Timber Resources of Marquette County, op.cit., p. 10.

State Forest and the Escanaba River State Forest (see Figure 14.)

Three-fourths of the forest lands of this county are in private ownership, with 57,000 acres in farms and 795,000 acres in other private lands.

Expressed on a percentage basis, ownership of commercial forest land in Marquette County would be as follows:

Federal ownership-----	1%
State ownership-----	23%
Farm ownership-----	5%
Other Private ownership-----	71%

Of the privately owned commercial forest land: twelve per cent consists of large saw timber; ten per cent small saw timber; 20 per cent pole timber; 28 per cent seedlings and saplings; and 30 per cent poorly stocked and denuded forest lands.

Of the publicly owned commercial forest land: six per cent is in saw timber; 19 per cent in pole timber; 31 per cent in seedlings and saplings; and 44 per cent in poorly stocked and denuded areas.

#### Report on Michigamme State Forest

A report on the Michigamme State Forest was made by Clayton M. Schooley, District Forester for the Michigamme State Forest. A summary of this report follows:<sup>1</sup>

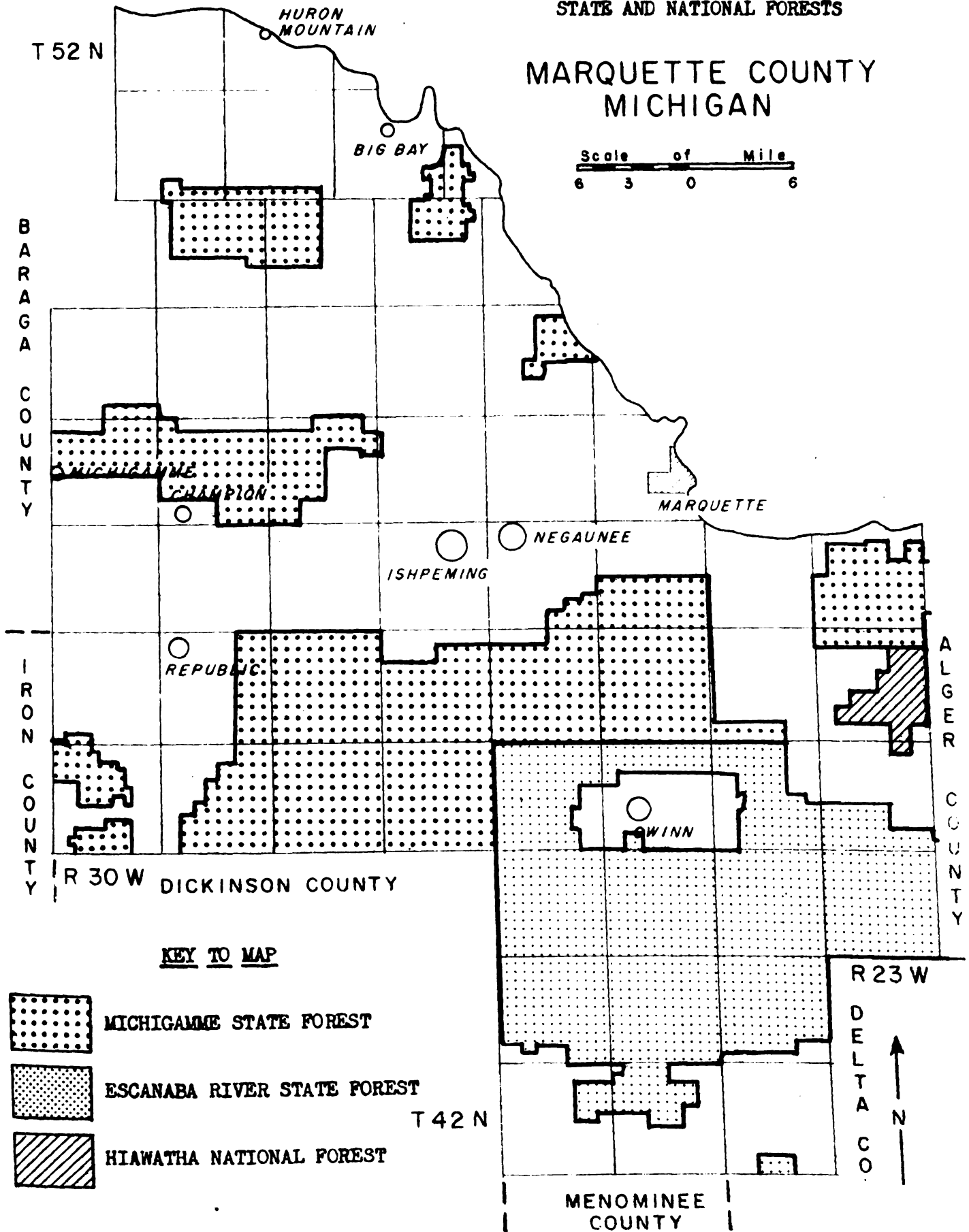
The acreage of the Michigamme State Forest includes

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<sup>1</sup>Letter from Donald G. Zettle, Regional Forester, Department of Conservation, Marquette, Michigan, July 30, 1958.

Figure 14

## STATE AND NATIONAL FORESTS

MARQUETTE COUNTY  
MICHIGAN

116,838.82 acres, all of which lies within Marquette County. The chief uses of the State Forest are a source of timber products from timber sales, for hunting, fishing and camping. Permits issued for various uses on this State Forest for the years 1955 through 1957 include:

<u>Permits Issued</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Timber-----	26	32	20
Use <sup>1</sup> -----	2	2	3
Free Timber-----	2	2	5
Mineral-----	1	2	2
Road-----	2	3	3
Grazing-----	0	1	1

Types of timber cuttings on this State Forest include thinning of jack pine and the seed tree method of cutting jack pine. Also some clear cutting of jack pine in strips have been tried. A few marked hardwood sales have been made. The balance of cuttings are diameter limit sales and clear cutting of aspen.

The annual income from timber sales from this State Forest for the years 1954 through 1957 was as follows:

1954 --	\$ 2,363.99
1955 --	8,858.34
1956 --	18,881.75
1957 --	20,010.38

Timber products cut from the Michigamme State Forest for the years 1956 and 1957 were as follows:

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<sup>1</sup>Use permits are issued for certain privileges on state forests. They could include such special uses as areas for timber decking and loading sites, for stockpiling gravel, for dump ground purposes, for agriculture, or for the removal of hay.

TABLE 12

PRODUCTS CUT FROM MICHIGAN STATE FOREST  
1956-1957

	<u>1956</u>		<u>1957</u>	
	<u>Cords</u>	<u>Value</u>	<u>Cords</u>	<u>Value</u>
Jack Pine	1,297	\$4,255	1,302	\$4,092
Aspen	1,808	4,063	2,442	5,870
Balsam	476	1,822	1,173	4,681
Spruce	500	3,222	594	4,110

According to Schooley, "The trend in Marquette County is definitely toward more intensive forest management. More and more people, because of the educational efforts of State and Federal agencies, are coming to accept thinning, improvement cuts and selective logging. These same people were thinking only in terms of clear cutting just a very few years ago. With the acceptance of modern forestry techniques for more intensive management, the outlook for the timber resources of Marquette County is very encouraging.

"If more of the small timberland owners can be encouraged to follow the lead of the larger operators, the timber business should continue to be a major factor in the economy of Marquette County indefinitely. One of our big problems seems to be the conversion of the old-time lumberjacks to these new cutting methods.

"One indication of the trend toward more intensive management is the rapid increase in the number of applications for assistance in tree planting and woodlot management. These requests have grown from four or five per year five years ago,



to 40 or 50 per year now. There is every indication that this increase will continue."<sup>1</sup>

There is a great variety of forest types found within the Michigamme State Forest. The forest types found in this State Forest, with size of this type in acres and the percentage of the total area, is given in the table below:

TABLE 13

FOREST TYPES FOUND IN MICHIGAMME STATE FOREST<sup>a</sup>

<u>Forest Type</u>	<u>Thousand Acres</u>	<u>Percentage</u>
Aspen-----	27.9	23.9
White Birch-----	10.1	8.7
Oak-----	2.1	1.8
Northern Hardwood-----	6.9	5.9
Red Maple-----	7.3	6.3
Hemlock-----	1.9	1.6
Swamp Hardwood-----	0.1	0.1
Jack Pine-----	12.9	11.0
Red Pine-----	1.0	0.8
White Pine-----	1.3	1.1
Spruce-Fir-----	5.7	4.9
Black Spruce-----	7.0	6.0
White Cedar-----	1.4	1.2
Tamarack-----	0.8	0.6
<b>Total</b>	<b>86.4</b>	<b>73.9</b>
Open-----	13.2	11.3
Upland Brush-----	1.2	1.0
Lowland Brush-----	10.2	8.8
Marsh-----	0.4	0.3
Muskeg-----	2.5	2.1
Non-meandered Water-----	2.3	2.0
Roads and Rights-of-Way-----	0.7	0.6
<b>Total</b>	<b>30.5</b>	<b>26.1</b>
<b>All Types</b>	<b>116.9</b>	<b>100.0</b>

<sup>a</sup>Source: Adapted from Table 1.-Distribution of Area by Forest Types for Upper Peninsula State Forests, 1957, Forestry Division, Department of Conservation, 1958.

<sup>1</sup>Ibid.

Report on Escanaba River State Forest

A report on the Escanaba River State Forest was made by Arne A. Metsa, District Forester for the Escanaba River State Forest. A summary of this report follows:<sup>1</sup>

The total acreage of dedicated State Forest land in the Escanaba River State Forest is 163,681.72 acres. A small part of this is found in Alger County, but the majority is located in Marquette County. State Forest lands get very much use by the public for such uses as hunting, fishing, camping, boating and canoeing. Three campgrounds are located in this State Forest and maintained by the Forestry Division. Fishing is available at all three sites. The State Forest campgrounds and their location are given in the table below:

TABLE 14

STATE FOREST CAMPGROUNDS IN MARQUETTE COUNTY <sup>a</sup>

<u>Name of Campground</u>	<u>General Location</u>	<u>Exact Location</u>
Anderson Lake	10 miles southwest of Gwinn on County Road 557 on east side of lake.	SE $\frac{1}{4}$ of SE $\frac{1}{4}$ Section 12 T44N, R26W
Escanaba River	9 miles west of Rock and one mile north of Escanaba River.	NW $\frac{1}{4}$ of NW $\frac{1}{4}$ Section 32 T43N, R24W
Little Lake	6 miles east of Gwinn on Highway M-35 on east end of lake.	NW $\frac{1}{4}$ of SE $\frac{1}{4}$ Section 20 T45N, R24W

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<sup>a</sup>Forestry Division, Department of Conservation, Michigan State Forest Campgrounds, 15 pp. bulletin. No date, p.11.

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<sup>1</sup>Letter from Don Zettle, op.cit.

Special use permits are issued in certain instances in the multiple uses of the Escanaba River State Forest. These are for such uses as dumping ground sites for communities and a rifle range for the National Guard. Controlled grazing permits are also issued to farmers where the grazing does not damage normal tree growth and reproduction, and where it does not interfere with other uses of the state land involved. Free timber permits are issued to local people for domestic use--for firewood of cull trees, dead and down trees, or slash material left after a regular timber sale. Mineral permits for gravel are issued free to County and other public agencies. Cost mineral permits are issued to private individuals and contractors.

The annual income for the years 1954 through 1957 from the Escanaba River State Forest was as follows:

1954 --	\$55,295.97
1955 --	45,256.53
1956 --	39,499.63
1957 --	26,043.35

The following is a summary of income from timber sales for the years 1956 and 1957 for the three major species of timber sold:

TABLE 15

TIMBER PRODUCTS FROM ESCANABA RIVER STATE FOREST  
1956-1957

	<u>1956</u>		<u>1957</u>	
	<u>Cords</u>	<u>Value</u>	<u>Cords</u>	<u>Value</u>
Aspen	5,542	\$12,907	2,993	\$ 7,235
Spruce	795	5,196	508	3,359
Balsam	4,472	17,041	2,580	9,849

The decline in total volumes sold is not due, according to Metsa, to the fact that there was a lesser amount of stumpage available, but rather to the shortage of woodworkers that occurred during the years of high employment in other industries in the county. The present economic recession is going to have an effect on the amount of stumpage sold this year (1958) since there will be a limited demand for pulpwood, lumber, and mining timbers. All pulpwood and cedar cuttings are made by stump diameter specifications. Hardwood and hemlock sales are made by marking of all trees to be cut.<sup>1</sup>

The last time that cones were purchased for seed on this State Forest was in 1951 when \$3,102.50 worth of red pine cones were purchased. Prior to that, red pine, white pine, and spruce cones had been purchased.

No serious forest insect, or disease, has been encountered thus far in this State Forest. However, for the last few years the larch sawfly has increased enormously, and if this trend continues, we can expect some mortality of tamarack due to defoliation by this insect.<sup>2</sup>

As in the Michigamme State Forest, there is also a great variety of forest types found within the Escanaba River State Forest. The forest types found in this State Forest, with the size of this type in acres and the percentage of the total area, is given in the table which follows:

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<sup>1</sup>Report by Arne A. Metsa, District Forester, in letter from Donald Zettle, op. cit.

<sup>2</sup>Ibid.

TABLE 16

## FOREST TYPES FOUND IN ESCANABA RIVER STATE FOREST

<u>Forest Type</u>	<u>Thousand Acres</u>	<u>Percentage</u>
Aspen-----	30.4	18.5
White Birch-----	3.8	2.3
Northern Hardwood-----	24.8	15.2
Red Maple-----	3.9	2.4
Hemlock-----	1.6	1.0
Swamp Hardwood-----	7.4	4.5
Jack Pine-----	1.3	0.8
Red Pine-----	0.5	0.3
White Pine-----	0.6	0.4
Spruce-Fir-----	22.4	13.7
Black Spruce-----	13.2	8.1
White Cedar-----	23.0	14.0
Tamarack-----	3.1	1.9
<b>Total</b>	<b>136.0</b>	<b>83.1</b>
Open-----	11.9	7.2
Upland Brush-----	0.1	0.1
Lowland Brush-----	11.0	6.7
Marsh-----	0.6	0.4
Muskeg-----	2.4	1.5
Non-meandered Water-----	0.9	0.5
Roads and Rights-of-Way-----	0.8	0.5
<b>Total</b>	<b>27.7</b>	<b>16.9</b>
<b>All Types</b>	<b>163.7</b>	<b>100.0</b>

Source: Department of Conservation, Distribution of Area by Forest Types for Upper Peninsula State Forests, 1957, op.cit.

### Forest Diseases and Insect Enemies

Most of the major insect enemies of the forest are at a low population level in Marquette County with the exception of the Larch Sawfly (*Pristiphora erichsonii*). The Larch Sawfly is causing serious defoliation of tamarack in the west end of the county. The Red-headed Pine Sawfly (*Neodirprion lecontei*) is causing rather serious damage in small, localized areas. The Jack Pine Budworm (*Choristoneura pinus*) has been

reported in the central and western parts of Marquette County. New areas of light defoliation were reported in these areas.<sup>1</sup>

Hypoxylon canker is causing serious defect and mortality in aspen stands on the poorer sites. The necteria canker also attacks aspen, but does not seem to be as serious. The sweetfern rust is causing some defect in jack pine, but very little mortality. White pine blister rust seems to be causing considerable defect in many of the white pine stands in the county.<sup>2</sup>

### Forest Fires in Marquette County

In few states have forest fires been more numerous or more destructive than in Michigan. The county of Marquette was not spared and had its share of forest fires. A record of major forest fires which occurred in Michigan lists several from Marquette County.<sup>3</sup> A few of those listed include:

(1) In October of 1896, a fire started on the Dead River north of Ishpeming and burned through to Lake Superior in the vicinity of Big Bay "denuding the mountains" and covering an estimated 100 square miles of the virgin wilderness. As there was no organized protection and few tools available, all the few settlers could do was to backfire around their clearings when the fire threatened in an attempt to save their property.

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<sup>1</sup>Forestry Division, Dept. of Conservation, Michigan Forest Pest Detection Program, Report for 1957, 22pp., p.8.

<sup>2</sup>Report by C. Schooley in letter from D. Zettle, op.cit.

<sup>3</sup>Michigan Department of Conservation, Forest Fires and Forest Fire Control in Michigan, 1957, 12pp., p.7-10.

As a result, this fire burned unchecked for ten days until the fall rains put it out. Other major fires include:

- (2) May 28, 1926 - 9,520 acres burned in a major fire in Marquette County.
- (3) August 1, 1936 - 1,587 acres burned.
- (4) August 8, 1936 - 1,702 acres lost in the Echo Lake area.
- (5) October 6, 1943 - 1,200 acres burned in the county.

The following table lists the total number of fires that occurred in Marquette County, and the acreage burned from 1931 through 1958:<sup>1</sup>

TABLE 17  
TOTAL FIRES AND ACREAGE BURNED IN MARQUETTE COUNTY  
1931-1958

<u>Year</u>	<u>Number of Fires</u>	<u>Acreage</u>	<u>Year</u>	<u>Number of Fires</u>	<u>Acreage</u>
1931	157	17,274	1947	87	348
1932	95	918	1948	81	1,324
1933	285	6,930	1949	40	290
1934	144	3,991	1950	26	61
1935	58	386	1951	13	192
1936	92	5,418	1952	58	130
1937	109	3,532	1953	53	262
1938	49	360	1954	32	152
1939	58	532	1955	39	192
1940	36	90	1956	23	50
1941	88	676	1957	36	71
1942	37	5,999	1958	43	86
1943*	64	7,085			
1944-45-46**	--	-----			

\*1943--includes West half of Alger County, generally about ten per cent of the total in this area.

\*\*1944-46--no records kept for the county as a unit.

The average number of fires and acreage burned in

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<sup>1</sup>Compiled from files of Field Administration Division, Department of Conservation, Marquette, Michigan.

Marquette County for the ten-year period 1949-1958 was 36.3 fires, and 148.6 acres burned.

Forest Fire Statistics for 1958.--The Field Administration Division of the Michigan Department of Conservation, Marquette, records the following forest fire statistics for the year 1958:

TABLE 18  
FOREST FIRE STATISTICS FOR 1958

	<u>Marquette County</u>	<u>Upper Peninsula</u>	<u>Total Michigan</u>
Number of Fires	43	302	1,251
Acres Burned	86	2,199	11,992
Cost of Damage	\$3,992	\$10,501	\$135,320

Of the 86 acres burned in Marquette County during 1958, 77 acres were forest land, and 9 acres were classed as non-forest land. The ownership of the 86 acres showed that 19 acres were State owned and 67 were privately owned. The table which follows gives the causes of the 43 fires which burned in Marquette County in 1958:

TABLE 19  
CAUSES OF 1958 FOREST FIRES IN MARQUETTE COUNTY

<u>Causes of Fires</u>		<u>Responsibility Class</u>	
Smokers	15	Fisherman	10
Campfire	7	Traveler	8
Debris Burning	5	Not man-caused	4
Lightning	4	Berry Picker	2
Railroad	3	Road Crew	1
Lumbering	2	Hunter	1
Incendiary	1	Woods Worker	1
Miscellaneous	6	Farmer	0
	<u>43</u>	Section Crew	0
		Other	16
			<u>43</u>



Forest Fire Control in Marquette County.--Forest fire control in Marquette County, as well as throughout the State, has a most commendable record. The area under fire protection is large, distances are great, and terrain is often hazardous or impassable. Yet the number of fires and acreage burned has been greatly decreased. It is usually a few large fires annually that are responsible for the bulk of the area burned and the loss. It is important to get early control of the fire, as well as to have an equipped, well-trained fire fighting organization, such as is found in Marquette County.

The Field Administration Division of the Michigan Department of Conservation operates seven fire towers in Marquette County. These seven fire towers are: the Turin (two and one-half miles west of McFarland), the Gwinn (three miles southwest of Gwinn), the Arnold (two miles north of Arnold), the Cliff (south of Negaunee and Ishpeming), the Hairpin (15 miles north of the mid-point between Negaunee and Marquette), the Panorama (in the northwest corner of the county), and the Skandia Fire Tower (south of Skandia).

The Field Administration Division at Marquette also maintains four fire stations. They are located at Marquette, Gwinn, Big Bay, and at Champion. At these fire equipment stations was located (as of July, 1958) the following fire fighting equipment:<sup>1</sup>

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<sup>1</sup>The information for the following table was obtained from the office of John Anguilm, Assistant Regional Supervisor, Field Administration Division, Marquette, as compiled by Howard Houlmont, Officer Manager, Field Adm. Div., Dept. of Conservation, Marquette, Michigan, July, 1958.

TABLE 10

MARQUETTE COUNTY'S FOREST FIRE FIGHTING EQUIPMENT  
MICHIGAN DEPARTMENT OF CONSERVATION--JULY, 1958

5 Trucks, Stake	5 Trailers, Utility
4 Trucks, Pickup	1 Trailer, House
4 Trucks, w/Semi Trailer	2 Trailers, w/2000 ft. of Pipe
6 Trucks, Dump	3 Pumps, Trailer Mounted
2 Wagons, Station	6 Pumps, Portable
1 Car	4 Fire Trucks w/Tanks & Pumps
4 Tractors, w/Pump, Tanks, Plow	1 Crane, Truck Mounted
2 Tractors, w/Plows	2 Loaders, Tractor-type
2 Tractors, Wheel	31 Plows, Fire
5 Bulldozers	1 Well-Sinking Rig, Trailer-mounted
2 Trailers, w/Tanks & Pump	1 Airplane, Cessna
6 Trailers, w/Tanks	

23,130 feet of Fire Hose.

Miscellaneous Machine Tools, Hand Pumps, Hand Tools, etc., to value of \$100,000.

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### Forestry Problems and Recommendations

The forestry problems of the Upper Peninsula of Michigan apply to Marquette County. These problems can best be summarized by authorities in the field of forestry working in this area. According to Harold Nygren, Supervisor for the Upper Michigan National Forests: "Forestry in the Upper Peninsula has many problems, but lack of markets is the main one. Only about half of the allowable cut is being harvested. If there was far more demand for forest products in the Upper Peninsula, forest practices in this area would improve. Investment of capital in forest improvement is good business only when the demand for forest products justifies the investment. The market for forest products in the Upper Peninsula has not reached this point yet.

"Generally speaking, the marketing problem of Upper

Peninsula forests is too much wood of the wrong species. As an example, the most plentiful product on the Upper Michigan National Forests is aspen pulpwood. The annual cut of this product is only about one third the amount that should be cut. Local mills use only a small amount of aspen and the Wisconsin mills have plenty of aspen close to home. Aspen pulp timber is in long supply throughout the Lake States."<sup>1</sup>

According to S. R. Gevorkiantz, Forester for the Lake States: "In the Lake States northern hardwoods are easily accessible and can be handled by relatively small timber sales. What are needed most are better markets for inferior species and logs. Along with this need is the necessity for good markets for the various products resulting from the use of inferior logs and species.

"There is enough hardwood fiber, but a definite shortage of good quality logs. Before good quality wood can be grown, however, poor timber must be cut. The need for good quality logs will become more pressing as time goes on. The present shortage of veneer and number one sawlogs will continue unless efforts are made to improve the quality of present-day stands. This can be accomplished through good management extended over large areas."<sup>2</sup>

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<sup>1</sup>Harold Nygren, Supervisor, Upper Michigan National Forests, "U.P. Forestry Lag Retarding Area's Industry," The Mining Journal, August 12, 1959.

<sup>2</sup>S. R. Gevorkiantz, "Managing Hardwoods for Quality Increment," Journal of Forestry, Vol. 54, No. 12, December, 1956. pp. 836-840.

Management Recommendations.--Carl Arbogast, Forester in Charge, Upper Peninsula Forest Research Center, Marquette, makes the following recommendations for the northern hardwood type of forest: "What we are recommending under ideal market conditions for the management of northern hardwoods is this: First, cut enough so that sufficient sunshine can reach the ground to permit seeds to grow and develop into trees, but not enough to let sprouts take over the young portion of the stands. Second, leave the right number of the best young trees in all sizes to insure that new trees will become mature for each periodic cut and that the quality of the young trees is maintained or improved. And third, harvest the mature trees."<sup>1</sup>

Recommendations which followed the Forest Survey of Marquette County completed in 1948 by the Michigan Department of Conservation's Forestry Division may be summarized as follows:<sup>2</sup>

1. Industrial adjustments to use less northern hardwood and more aspen saw timber.
2. Change from clear cutting to selective cutting whenever feasible.
3. Increase use of small bolts and low-grade wood.
4. Begin improvement cuttings as soon as possible.
5. Reduce fire loss.

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<sup>1</sup>Carl Arbogast, Jr., "Basic Principles of Forest Management in Northern Hardwood," Mimeographed 6-page copy of paper presented at the fall meeting of Northern Hemlock and Hardwood Manufacturers Association, Land O'Lakes, Wis., Sept. 12, 1956.

<sup>2</sup>Mich. Dept. of Conservation, Timber Resources of Marquette County, Michigan, op.cit., p.vii.

- <sup>x</sup>  
6. Plant trees.
7. Organize action by local people.

## XI. WATER--A MAJOR RESOURCE OF MARQUETTE COUNTY

One of Marquette County's most valuable resources is her abundant supply of fresh water. The many valuable services provided by fresh water are well known. Water is used for power and navigation. Besides for domestic and agricultural uses, water is necessary for industry, forests and other vegetation, wildlife, and many forms of recreation. Recreation, such as swimming, boating, fishing and camping, requires that the waters be free from pollution. In winter, frozen waters give snow and ice for other forms of recreation, such as skating, skiing, and tobogganning. The tourist and resort business depends, among other things, upon the highest possible quality and quantity of our natural waters.

### Lake Superior

Marquette is most fortunate in being located on the shores of Lake Superior. Lake Superior, the largest body of fresh water in the world, and listed as one of the ten greatest lakes in the world,<sup>1</sup> extends for over 60 miles as the northern boundary of Marquette County. This lake tempers the climate of the county, making it warmer in winter and cooler in summer.

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<sup>1</sup>Merriam-Webster, Webster's New Collegiate Dictionary, (2nd. ed.), 1958, p.331.

The navigation on Lake Superior has been a great asset in the development of the county and of its resources. It is a supply of fresh water for domestic and industrial uses. Lake Superior makes possible commercial fishing and many forms of recreation.

#### The Inland Lakes of Marquette County

Of the 11,037 inland lakes in Michigan, 4,303 are located in the Northern Peninsula of Michigan. Of this number, 835 are found in Marquette County. These are more inland lakes than are found in any other county in Michigan. Only seven counties have more than 300 lakes. They are as follows: Marquette, 835; Luce, 571; Iron, 528; Gogebic, 488; Oakland, 447; Schoolcraft, 340; and Barry, 327.<sup>1</sup>

Of the 835 inland lakes in Marquette County, only three are artificial lakes. Of these three, one is over 200 acres in area. Of the 832 natural lakes, 15 are over 200 acres in area and four of these are between one and five thousand acres in area.

The total area of the lakes in Marquette County is 30,168 acres, or 47.1 square miles. This means that 2.5% of the county is covered by lakes.<sup>2</sup>

The inland lakes of Marquette County are varied. They may be deep, cold-water lakes with rocky shores, or "pit" lakes with sandy shoals and pulpy peat bottoms. Many are

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<sup>1</sup>C. J. D. Brown, Michigan Lakes and Streams, #24, Michigan Department of Conservation, p.2.

<sup>2</sup>C. J. D. Brown, op.cit., p.4.

acid bog lakes. Some of these colored, soft-water bog lakes have floating bog mats that extend for a considerable distance on the lake.

County Lake Maps of 94 Marquette County lakes are available from the Michigan Department of Conservation. The list follows:





MICHIGAN DEPARTMENT OF CONSERVATION

FISH DIVISION

Marquette

Table 21

COUNTY LAKE MAPS

February 10, 1958

NAME OF LAKE	LOCATION			AREA	PRICE
	T.	R.	SECTION	ACRES	
Airport	45N	25W	23	6.7	1.00
Anderson	44N	25, 26W	7, 12	50	0.50
Arfelin	49N	30W	21	66.5	1.00
Baldwin Kiln	48N	26W	21	8.6	1.00
Bancroft	47N	27W	3, 4, 9, 10	28.5	1.00
Bass	45N	26W	29, 30	77.0	1.00
Bass	45N	24, 25W	30, 31, 25, 36	271	1.00
Bat	45N	30W	23	64.5	1.00
Bedspring	45N	30W	21	5.2	1.00
Bertrand	45N	25W	26, 27	28.5	0.25
Bobs	44N	25W	18	7.2	1.00
Bobs, Big	44N	26W	13	20.4	1.00
Boston	48N	28W	32, 33	50.5	1.00
Camp 5	45N	30W	3	2.2	1.00
Chain of Lakes, West	45N	29W	28	2.8	1.00
Chain of Lakes, Middle	45N	29W	28	5.4	1.00
Chain of Lakes, East	45N	29W	28	10.4	1.00
Clear	48N	29W	5	32.5	1.00
Cooper	47, 48N	27W	5, 32	34.0	1.00
Cranberry	45N	30W	10	2.8	1.00
Crooked	45N	26W	29, 30	56.2	1.00
Engman's	46N	24W	32, 33	43.0	1.00
Farmer	45N	24W	16, 17	37.0	0.50
Fence (Iron Co.)	45N	30W	30	174	1.00
Fish	47N	29W	5, 6, 8	156	1.00
Flopper Pond	45, 46N	27W	4, 33	6.8	1.00
Goat, Little White	49N	30W	32, 33	108	1.00
Goldmine	48N	28W	26, 35	27.0	1.00
Grant	46N	30W	21, 28	67.0	1.00
Gunpowder	47N	27W	11	13.9	1.00
Harlow	49N	25, 26W	19, 24	75.0	1.00
Hasscib	49N	30W	23	41.0	1.00
Hawkins Pond	46N	27W	26	5.4	1.00

MICHIGAN DEPARTMENT OF CONSERVATION  
FISH DIVISION

Marquette - 2

## COUNTY LAKE MAPS

February 10, 1958

NAME OF LAKE	LOCATION			AREA	PRICE
	T.	R.	SECTION	ACRES	
Haywire	45N	30W	11	3.7	1.00
Horseshoe	45N	30W	22	123	1.00
Independence	51N	27W	Many	1,860	1.00 *
Indian	48,49N	30W	5,32	86.0	1.00
Irene	45N	25W	23,24	11.1	1.00
Island	45N	30W	22,27	45.5	1.00
Island	45N	30W	14	19.2	1.00
Johnson	45N	25W	27	73.0	1.00
Kawbawgam	47N	23,24W	18,13	153	1.00
Keewayimin (& Baraga Co.)	47N	30W	31	151	1.00
Lilly	45N	30W	10	7.3	1.00
Little	45N	24,25W	Many	443	1.00
Log	48N	29W	3,4,10	158	1.00
Lowmoor	47N	28W	8	36.0	1.00
Mehl	45N	25W	24,25	91.5	0.50
Michigamme	47,48N	30,31W	Many	4,360	1.00 *
Miller	47N	27W	13	32.0	1.00
Miller	45N	26W	35,36	32	0.50
Moccasin	45N	24W	7	6.3	1.00
Morbit	45N	24W	20,29	34.5	1.00
Mud	45N	26W	14,15	87.5	1.00
Mud	45N	30W	22,23	21.4	1.00
Nash	49N	26W	31	3.7	1.00
Noren	45N	25W	13,14	22	0.25
North	47N	28W	1,2	10.7	1.00
Northwestern	45N	24W	21	8.2	1.00
Orchard	47N	24W	23	6.6	1.00
Pelesier	47N	25W	9,10,16	83.5	1.00
Pelesier, Little	47N	25W	4,9	9.0	1.00
Perch	45,46N	30W	4,33	23.7	1.00
Pike	45N	26W	28,29	87.5	1.00
Porterfield	45N	29W	28,29	26.0	1.00
Powell	46N	25W	8,9	26.5	1.00

ATTACHED SHEET OF INSTRUCTIONS FOR FURTHER  
FORMATION ON AVAILABILITY OF ABOVE MAPS.

\* Also in reduced scale.

MICHIGAN DEPARTMENT OF CONSERVATION

FISH DIVISION

Marquette - 3

Table 21-Continued.

COUNTY LAKE MAPS

February 10, 1958

NAME OF LAKE	LOCATION			AREA	PRICE
	T.	R.	SECTION	ACRES	
Quantz	47N	24W	8	3.7	1.00
Rice	45N	25W	35	78.0	1.00
Rock	47N	27W	5,8	26.5	1.00
Round	45N	28,29W	1,6	11.4	1.00
Sagola, North	45N	28W	6	8.2	1.00
Sagola, South	45N	28W	5	7.7	1.00
Section 14	45N	30W	14	4.8	1.00
Section 28	45N	30W	28	3.4	1.00
Shag, Big	45N	26W	25,26,36	194	1.00
Shag, Little	45N	25,26W	30,31,25,36	103	1.00
Simons	45,46N	30W	5,32	64.0	1.00
Sleeman Pond	46N	28W	10	14.5	1.00
Sleighrunner	44N	25W	6	12.6	1.00
Sporley	45,46N	24W	5,31,32	76.5	1.00
Spring	45N	25W	23,24	11.2	1.00
Spring	45N	26W	29	19.9	1.00
Squaw	45N	30W	9,16,21	221	1.00
Stump	45N	25W	2,11	33.5	1.00
Swanzy	45N	25W	13	20.4	1.00
Teal	48N	26,27W	31,35,36	505	1.00
Tilden	47N	27W	23	53.0	1.00
Trout, Big	46N	24W	32	26.7	0.50
Twin	45N	29,30W	13,18,24	47.0	1.00
Twin	45N	30W	22,23,26,27	21.5	1.00
Uncle Tom's Pond	46N	25W	17	4.5	1.00
Voelker, East	46N	27W	22	13.7	1.00
Witch	45N	30W	23,24,25,26	210	1.00
Wolf	48,49N	29W	2,35	124	1.00



The Rivers and Streams of Marquette County

Marquette County has the greatest mileage of streams of all counties in Michigan with a total of 1,906 miles. (Ontonagon, Gogebic and Sanilac are the only other counties in Michigan that have more than one thousand miles of streams. They have 1,282, 1,204, and 1,007 miles respectively.)<sup>1</sup>

A larger number of river drainages (14) are found in Marquette County than in any other county in Michigan. Chippewa, Ontonagon, and Alger each have ten or more. Several counties in Michigan fall entirely within the drainage of one river system. The map on page 151 shows the river basins of Marquette County.

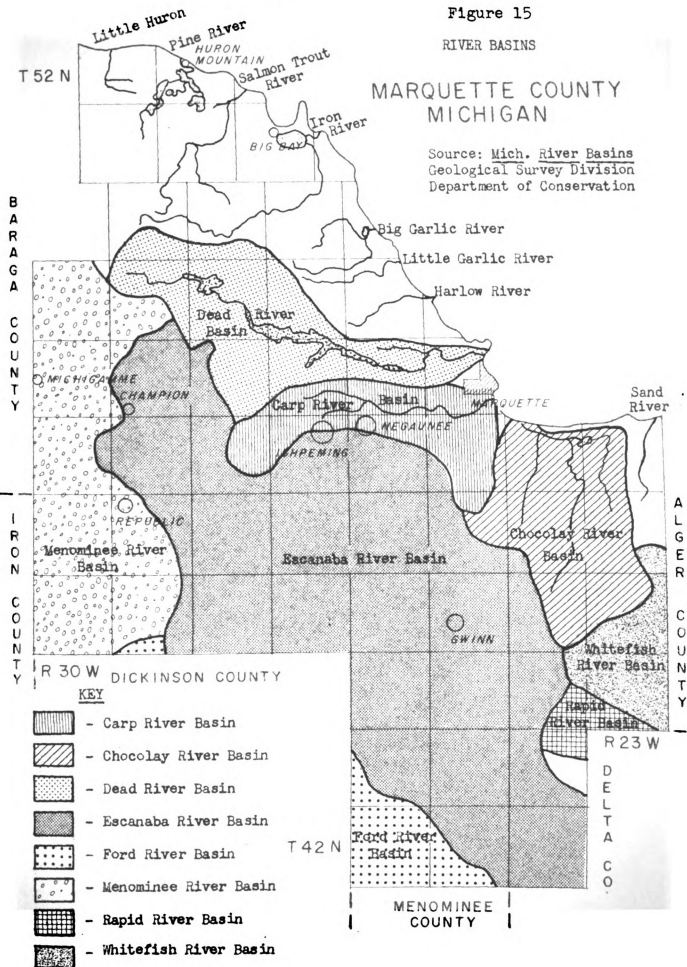
The rivers of Marquette County empty into Lake Superior and into Lake Michigan. The rivers flowing north, northeast, and east into Lake Superior are short in length, while those which flow southward into Lake Michigan are longer and wider. The Big and Little Garlic Rivers arise in a highland at elevations from 1,300 to 1,700 feet and flow rapidly a distance of ten to thirty miles to empty into Lake Superior. Big Creek, Cherry Creek, Cedar Creek, Chocolay River and Sand River have their sources at elevations from 800 to 1,100 feet and flow from ten to twenty miles to join Lake Superior. The Chocolay River basin, all of which lies within Marquette County, drains an area of approximately 94,000 acres of land. Dams constructed on the Carp and Dead Rivers are the sources of electricity for mining industries and municipalities of

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<sup>1</sup>C. J. D. Brown, op.cit., pp.6-7.

Figure 15

RIVER BASINS

MARQUETTE COUNTY  
MICHIGANSource: Mich. River Basins  
Geological Survey Division  
Department of Conservation

the county.

Nearly all of the streams which flow into Lake Michigan have their headwaters in large swamp areas. The Escanaba, Ford, Rapid, and Whitefish Rivers flowing into Lake Michigan are examples of this type. These streams drain lowlands in the central and southern parts of the county. The Michigamme River arises in Lake Michigamme and provides drainage for most of Michigamme, Humboldt, and Republic Townships before converging with the Menominee River to empty into Lake Michigan. The Michigamme is a long, swift-flowing river with rapids in places where the river bed is narrowed by rock crops. Power dams are also located on the Escanaba and Michigamme Rivers.

#### Ground Water

Ground water is the water below the surface which supplies wells and springs. The original source of most ground water is precipitation which has seeped beneath the land surface and saturated all the porous formations below the water table. Where the pore spaces are freely interconnected, circulation is active to and from the ground-water reservoirs. The principal source of ground-water in this county is the rain and snow that falls on the immediate area.

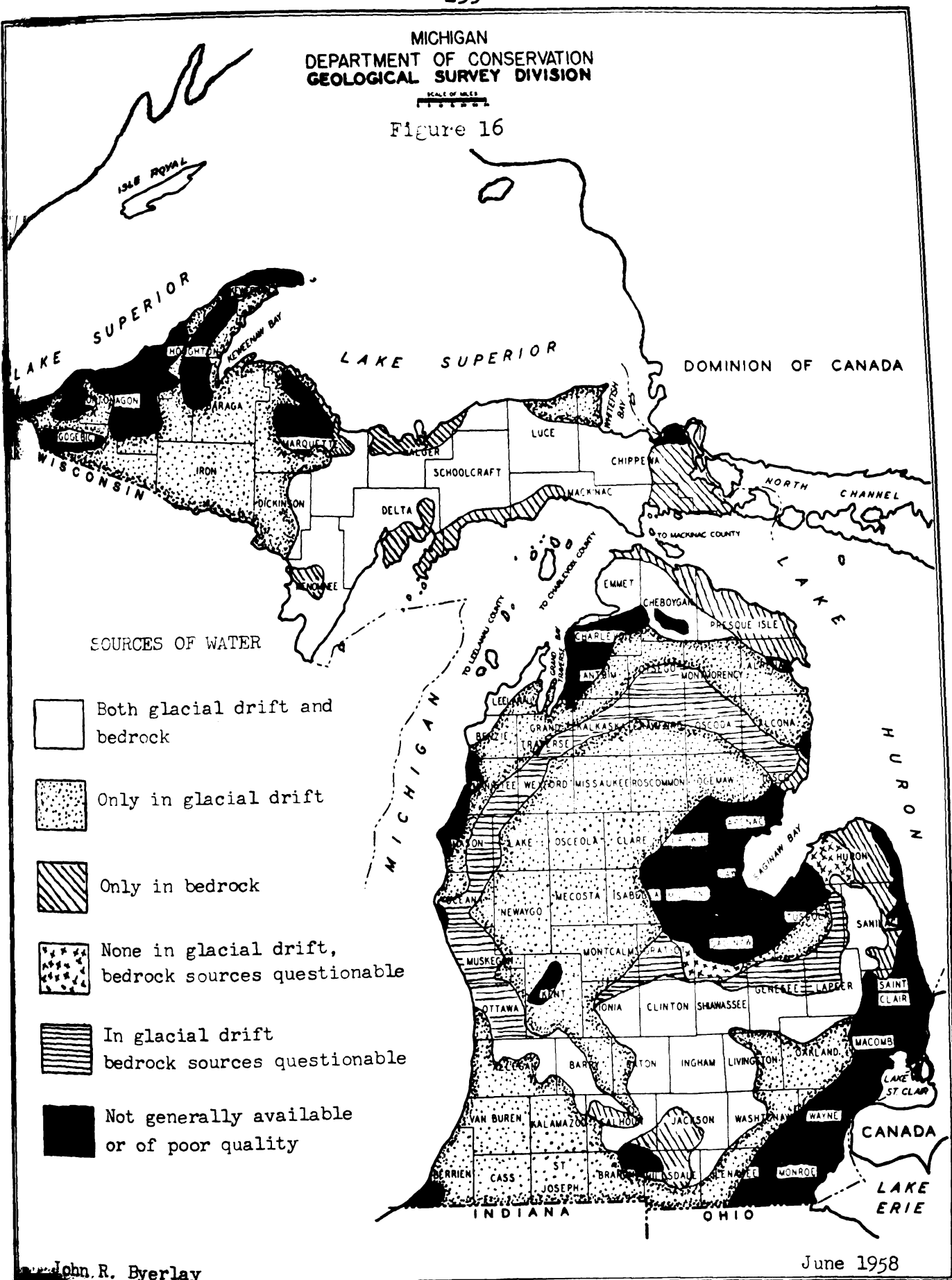
The Ground-Water Availability Map, which follows, was prepared by the Geological Survey Division of the Michigan Department of Conservation. It shows that about one-third of the county has its sources of ground-water from both glacial drift and bedrock. Another approximately one-third





MICHIGAN  
DEPARTMENT OF CONSERVATION  
GEOLOGICAL SURVEY DIVISION







Figure 16

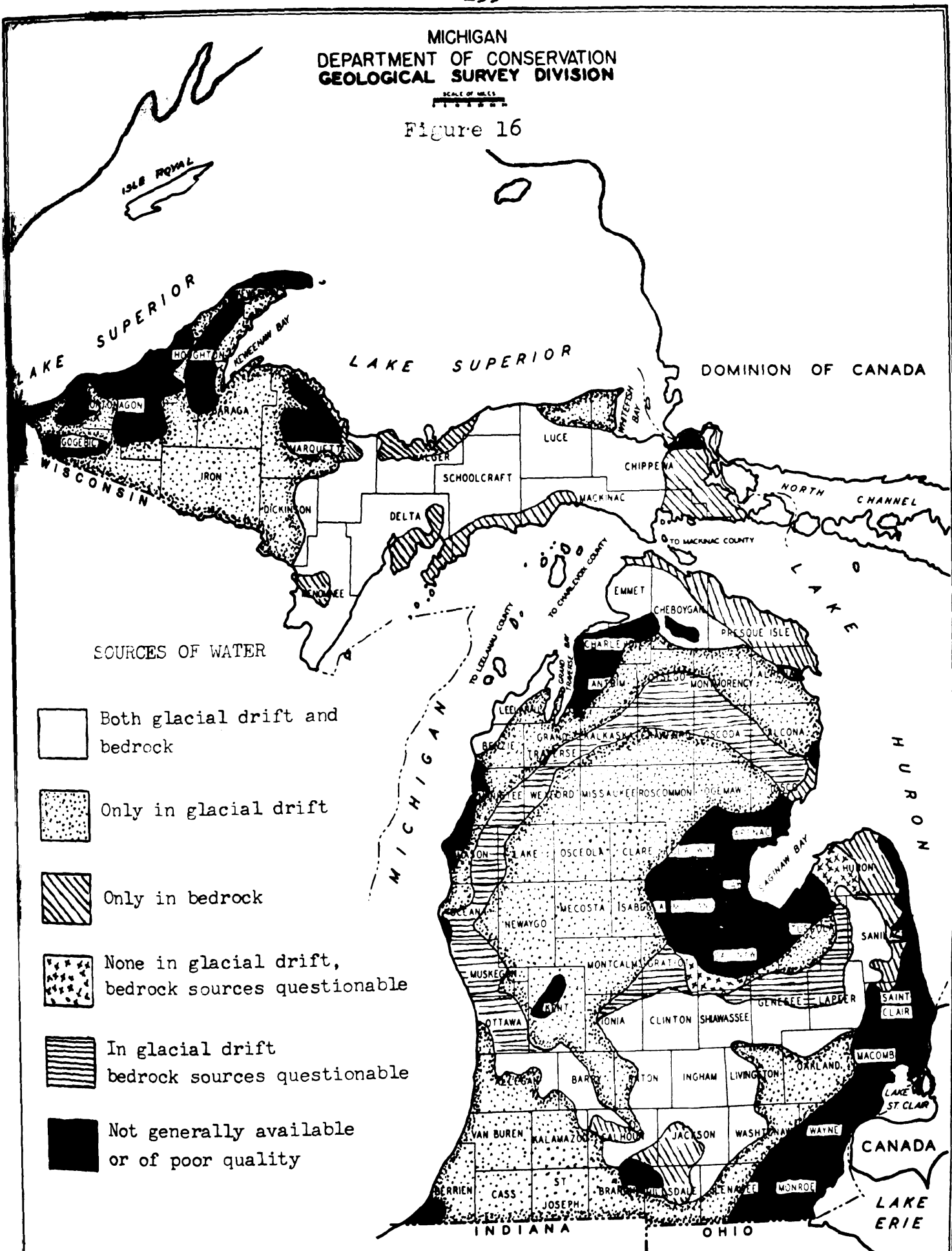


June 1958



## SOURCES OF WATER

-  Both glacial drift and bedrock  
 Only in glacial drift  
 Only in bedrock  
 None in glacial drift, bedrock sources questionable  
 In glacial drift bedrock sources questionable  
 Not generally available or of poor quality



John R. Byerlay

June 1958

Map showing groundwater availability in Michigan



of the county has its source of ground-water only in glacial drift. This map also shows that a large portion of the county is in the area where ground water is not generally available or of poor quality. A small portion of the county has its only source of ground-water from the bedrock.

From the study of the geology of Marquette County, it was shown that a large part of the county has bedrock at or near the surface. The porosity of the bedrocks vary considerably from one formation to another. Only those pores which are larger than a certain size release water by gravity to any opening or formation. In the Marquette district, the number and size of the pores differ from rock to rock. In general, very little water is transmitted through the pore structure of the rocks, because the pores are small or are not interconnected. Therefore, only a small amount of water is stored in this type of bedrock. However, other openings, such as solution channels and fractures in the bedrocks, give a formation some degree of permeability, so that it may transmit considerable water.

Groundwater found in the glacial deposits is more abundant. The unconsolidated deposits, because of their relatively coarse, well-sorted character, have a higher degree of interconnection of pore spaces and are better adapted than the bedrocks to yield water to wells or drainage structures.

An investigation of ground-water conditions near the iron mines in the Marquette iron range was begun in July, 1945, by the United States Geological Survey in cooperation with the

Geological Survey Division of the Michigan Department of Conservation. The purpose of the investigation of ground-water conditions near the iron mines was to acquire enough data to be able to predict with some degree of confidence, how successful a program of control of ground-water would be, and how much water must be considered. The investigation was summarized in 1954, and some of the conclusions were: "Water in the bedrock is usually in minor amounts except in certain cases where it is stored within the fractures and supercapillary systems of the bedrock structure. The bedrock permeability as determined from field tests and laboratory tests on cores is low, and except where subsidence has broken the structure and increased the permeability the amount of water entering a typical mine is only a few hundred gallons a minute."<sup>1</sup>

#### Problems of Management of the Water Resources

The problems of managing the water resources of Marquette County are similar to those of other areas of the United States. For the most part, the waters of the county are clean and uncontaminated. The major problem is to keep them that way. Pollution from sewerage, industrial wastes, and the development of the mineral resources have caused some limited damages to the waters in certain local areas. Bacterial contamination of sources of water supply, and the imparting to them of injurious or objectionable chemical constituents which

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<sup>1</sup>W. T. Stuart, et al., Ground Water Investigations of the Marquette Iron-Mining District, op.cit., p.90.

would impair both public and industrial uses of the water must be prevented. Pollution must be constantly guarded against, for with an increasing population, sanitation and pollution will become greater public problems. Erosion of stream banks, causing a silt or soil pollution of streams and lakes, is also a problem of concern in some areas of Marquette County. Such erosion has destroyed feeding and spawning areas for fish, and has done damages in other ways.

Another water problem is that of public access to waters--to our lakes and streams. This problem is not prevalent in the county at present, although thousands of acres, including many lakes and streams, are already fenced off for private use. The problem of public access to waters is discussed under Public Fishing Sites on pages 164-167.



## XII. FISH--A MAJOR RESOURCE OF MARQUETTE COUNTY

### The Fishery Resource

With the abundance of fresh waters in and bordering Marquette County, the fishery resource in the area is very important. The Indians and early settlers made good use of this resource and fish was an important food in the lives of these people. Shortly after the decline of the fur industry, commercial fishing began. Although the commercial fishing industry has recently declined, Marquette County still has an ample quantity of fish for food, commercial fishing, and especially for recreation.

Marquette County has much to offer the sports fisherman. With 835 lakes, many of them trout lakes, with hundreds of miles of cold, clear streams, and with more than sixty miles of coastline along Lake Superior, Marquette County provides the fisherman a wide choice of waters in which to fish.

### Species of Fish Found in Marquette County

\* A great many species of fish are found in the waters of Marquette County. The following table is a list of those species of fish reported to be found in Marquette County. It was compiled from species listed in fisheries surveys and other scientific reports of Marquette County. Also, those species of fish that were known to occur in Marquette County,

TABLE 22

## SPECIES OF FISH FOUND IN MARQUETTE COUNTY

Family and Common Name	Scientific Name
<b>PETROMYZONTIDAE</b>	
Northern Brook lamprey	<i>Ichthyomyzon fossor</i>
Sea Lamprey	<i>Petromyzon marinus</i>
American brook lamprey	<i>Lampetra lamottenii</i>
<b>ACIPENSERIDAE</b>	
Lake sturgeon	<i>Acipenser fulvescens</i>
<b>AMIIDAE</b>	
Bowfin (Dogfish)	<i>Amia calva</i>
<b>COREGONIDAE</b>	
Cisco (Lake Herring)	<i>Coregonus artedii</i>
Ives Lake cisco	<i>Coregonus hubbsi</i>
Cisco (Chubs)	<i>Coregonus</i> (several species)
<b>SALMONIDAE</b>	
Brown trout	<i>Salmo trutta</i>
Rainbow trout (Steelhead)	<i>Salmo gairdneri</i>
Brook trout (Speckled)	<i>Salvelinus fontinalis</i>
Lake trout (Mackinaw)	<i>Salvelinus namaycush</i>
Splake--hybrid	
<b>OSMERIDAE</b>	
American smelt	<i>Osmerus mordax</i>
<b>UMBRIDAE</b>	
Central mudminnow	<i>Umbra limi</i>
<b>ESOCIDAE</b>	
Grass or Mud pickerel	<i>Esox americanus vermiculatus</i>
Northern pike	<i>Esox lucius</i>
<b>CATOSTOMIDAE</b>	
Redhorse	<i>Moxostoma</i> (several species)
Hog sucker	<i>Hypentelium nigricans</i>
White sucker (Common)	<i>Catostomus commersoni</i>
Longnose (Sturgeon) sucker	<i>Catostomus catostomus</i>
<b>CYPRINIDAE</b>	
Carp	<i>Cyprinus carpio</i>
Golden shiner	<i>Notemigonus crysoleucas</i>
Northern Creek chub	<i>Semotilus atromaculatus</i>
Northern pearl dace	<i>Semotilus margarita nachtriebi</i>
Redside dace	<i>Gila elongata</i>
Finescale dace	<i>Chrosomus neogaeus</i>
Northern redbelly dace	<i>Chrosomus eos</i>

TABLE 22-Continued.

<u>Family and Common Name</u>	<u>Scientific Name</u>
Lake chub	Hybopsis plumbea
Hornyhead chub	Hybopsis biguttata
Western blacknose dace	Rhinichthys atratulus meleagris
Longnose dace	Rhinichthys cataractae
Emerald shiner	Notropis atherinoides
Common shiner	Notropis cornutus
Blackchin shiner	Notropis heterodon
Spottail shiner	Notropis hudsonius
Northern mimic shiner	Notropis volucellus volucellus
Blacknose shiner	Notropis heterolepis
Brassy minnow	Hybognathus hankinsoni
Bluntnose minnow	Pimephales notatus
Fathead minnow	Pimephales promelas
Central stoneroller minnow	Campostoma anomalum pullum
ICTALURIDAE	
Black bullhead	Ictalurus melas
Brown bullhead	Ictalurus nebulosus
CYPRINODONTIDAE	
Western banded killifish	Fundulus diaphanus menona
Blackstripe minnow	Fundulus notatus
GADIDAE	
Burbot (Lawyer)	Lota lota
PERCOPSIDAE	
Trout-perch	Percopsis omiscomaycus
ATHERINIDAE	
Brook silverside	Labidesthes sicculus
CENTRARCHIDAE	
Small-mouth bass	Micropterus dolomieu
Large-mouth bass	Micropterus salmoides salmoides
Warmouth	Chaenobryttus gulosus
Green sunfish	Lepomis cyanellus
Pumpkinseed	Lepomis gibbosus
Bluegill	Lepomis macrochirus
Northern rock bass	Ambloplites rupestris rupestris
White crappie	Pomoxis annularis
Black crappie (Calico bass)	Pomoxis nigromaculatus
PERCIDAE	
Yellow walleye	Stizostedion vitreum
Sauger	Stizostedion canadense
Yellow perch	Perca flavescens
Northern logperch	Percina caprodes semifasciata
Johnny darter	Etheostoma nigrum

TABLE 22-Continued.

<u>Family and Common Name</u>	<u>Scientific Name</u>
Iowa darter	Etheostoma exile
Least darter	Etheostoma microperca
COTTIDAE	
Mottled sculpin (Muddler)	Cottus bairdi
Slimy sculpin (Common)	Cottus cognatus
GASTEROSTEIDAE	
Brook stickleback	Eucalia inconstans
Ninespine stickleback	Pungitius pungitius

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in addition to those reported in scientific papers, were added to this list. The list was carefully checked by James Scully, Regional Fisheries Supervisor, Michigan Department of Conservation, Marquette.

One of the best sources of information for the fish species found in Marquette County was Miscellaneous Publication Number 87, of the Museum of Zoology, University of Michigan. It was entitled Records of Fishes in the John N. Lowe Collection from the Upper Peninsula of Michigan. This report, prepared by William R. Taylor in 1954, listed all species of fish in Dr. Lowe's collection at the University and the county or locality where the specimen was collected. Dr. Lowe was a biology professor at Northern Michigan College and had acted as a Biological Advisor to the Department of Conservation. He was an extensive collector of fish, turning the bulk of his collections and notes over to the University of Michigan.

#### Trout Fishing in Marquette County

Practically all running waters in the county have from



one to three species of trout.

Trout Streams in Marquette County.--A list of the better trout streams in Marquette County should include the Dead River, between its several reservoirs, which yields brook, brown and rainbow trout; the Chocolay River, east and south of Marquette; the Escanaba River at points south of Ishpeming and Negaunee and in the Gwinn area: the Peshekee River near Champion; the Michigamme near Republic; the Big West south of Gwinn; West Branch and Flatrock Creeks south of Ishpeming; the Yellow Dog River at Big Bay; the East Branch of the Escanaba in the Sands area; and the Schweitzer Creek south of Palmer. In addition, there are countless smaller tributary creeks which, while brushy and hard to fish and not easily reached, will furnish good trout fishing.

Brook Trout Lakes.--Most popular and productive of the brook trout lakes are Moccasin and Swarzy Lakes in the Gwinn area; Island, Just, Section 14, and Haywire Lakes in the Republic district; and Baldwin Kiln Lake and Hawkins and Morgan Ponds in the vicinity of Negaunee. From Ishpeming west to the county line are located Tilden Lake, which in addition to brook trout also contains lake trout and splake; and Rock, North, and Log Lakes, all with excellent possibilities for the trout fisherman.

"Coasters" (large brook trout found in Lake Superior) can be taken at various places along the Lake Superior shore.



Rainbow Trout Lakes.--Among the better lakes given over to rainbow trout are: Johnson Lake near Gwinn; Squaw, Witch, and Twin Lakes out of Republic; Brocky, Angeline, and Silver Lakes in the Ishpeming area; and the Hoist and McClure Basins north of Negaunee and Ishpeming. Rainbows can be taken also along the Lake Superior shore north of Marquette.

In addition to the above waters, there are scores of small, unnamed ponds, both natural and beaver-made, in out-of-the-way areas, which contain trout.

#### Designated Trout Lakes in Marquette County

According to the 1959 Michigan Fish Law Digest (Michigan Department of Conservation), Marquette County has 32 designated trout lakes.

Designated trout lakes contain one or more species of trout. Besides the brook, brown, or rainbow trout, often lake trout and splake, a hybrid created by crossing a lake trout with a brook trout, are found in these lakes. Nearly all designated lakes are accessible to the general public, and most of them permit approach through public fishing sites.

Special regulations for fishing are given for the designated trout lakes. For example, on most designated trout lakes it is unlawful to use any kind of live fish or to use or possess any live, dead or preserved minnows for bait. It is also unlawful to take more than five trout or ten pounds and one trout from these lakes.<sup>1</sup>

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<sup>1</sup>1959 Fish Law Digest, Department of Conservation.



Local provisions also apply to two lakes in Marquette County. It is unlawful to take brook trout from Swanzy Lake (Sec. 13, T45N, R25W) and Airport Lake (Sec. 23, T45N, R25W) except from May 15 to October 15, inclusive.<sup>1</sup>

The designated trout lakes listed for Marquette County in the 1959 Fish Law Digest are: Airport, Angeline, Arfelin, Baldwin Kiln, Brocky, Clear, Cliff, Club, Cranberry, Hasscib, lakes, Hawkins Pond, Haywire, Hemmings or Flopper, Island, Just, Log, Long (Secs. 32, 33, and 5, T46, 47N, R27W), and Moccasin lakes, Morgan Pond, Nash, North, Penglase (Sec. 29, T46N, R30W), Rock, Section Fourteen, Section Twenty-eight (Sec. 28, T45N, R30W), and Swanzy lakes, Sepals Pond, Sporley, Tilden, Twin (Secs. 22, 23, 26, 27, T45N, R30W), and Big Trout (Sec. 32, T46N, R24W) lakes and Blair Pond.

#### Warm Water Fishing in Marquette County

While Marquette County is dominated by trout fishing, it also provides excellent sport with bass, northern pike, walleyes, and various panfishes.

Lake Michigamme is noted for its walleyes, pike and bass. Pike also abound in Sauxhead Lake, north of Marquette; Goose Lake, southeast of Negaunee; Conway Lake near Big Bay; Cataract Reservoir, north of Gwinn; Michigamme Reservoir, at Republic; and Bush Lake, near Champion.

Excellent walleye fishing can be had at Teal Lake near Negaunee; Lake Independence at Big Bay; Michigamme River and

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<sup>1</sup>1959 Fish Law Digest, Department of Conservation, p.9.

Reservoir in the vicinity of Republic; and Little Lake, south of Gwinn.

For the bass fisherman, best prospects in Marquette County are: Silver Lake, north of Ishpeming; the Shag Lakes, Grass Lake, Bass Lake and Little Lake, near Gwinn; Lake Michigamme; Perch and Fish Lakes, south of Champion; Martell's, Sunson, and Perch Lakes, in the Republic area; and Bass Lakes, south of Ishpeming.

Some exceptional jumbo perch fishing can be had at Goose and Teal Lakes, Sauxhead Lake, Lakes Independence and Michigamme, and the Michigamme River above Republic. Yellow perch abound in nearly any lake not designated as a trout lake.

Top crappie waters in this area are: the Michigamme River, Fish Lake and Sunson Lake near Republic. For bluegills, Goldmine Lake near Ishpeming and Twin Lakes, west of Witch Lake, are good.<sup>1</sup>

#### Public Fishing Sites in Marquette County

The list of the 38 public fishing sites in Marquette County is found in Table 23. These sites consist of frontages on lakes and streams throughout Marquette County which have been acquired by the Michigan Department of Conservation. These frontages were acquired to provide public access to fishing waters. The majority of these were purchased with money from the game-protection fund which is derived from fishing and hunting licenses. The Conservation Department is

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<sup>1</sup>Marquette County Tourist Guide (Ishpeming: Globe Printing, 1959), pp. 6-7.

acquiring additional sites yearly as funds permit.

The primary purpose of the program of public fishing sites is to provide access for fishermen to fishing waters. The Conservation Department has adopted a policy of keeping the developments at these sites to allow fishermen to drive on the site, place their boat in the water, and park their car and trailer while fishing. Sanitary facilities are provided and the sites are marked for identification. No picnic tables or stoves are provided.

Camping is permitted on all public fishing sites in Marquette County. A written permit must be secured from an authorized representative of the Conservation Department to camp longer than twenty days.

The following table indicates the general condition of each site as of January 1, 1959. Those marked "N.U." (not usable) are sites which have not been improved to date, and in their present condition, do not provide a suitable place for the entrance or parking of cars. Those marked "U" (usable) are sites which do provide for a limited use by the public although not improved since their acquisition by the state. Those improved are indicated as "Imp.". Improvements will be made on all acquired sites as fast as time and funds will permit.

More detailed information concerning these sites may be secured from the Fisheries Supervisor or Conservation Officer in the area or from the Lansing office of the Michigan Department of Conservation.



TABLE 23

PUBLIC FISHING SITES OF MARQUETTE COUNTY  
January 1, 1959

<u>Water</u>	<u>Sec.</u>	<u>Town</u>	<u>Range</u>	<u>Acreage</u>	<u>Front- age</u>	<u>Condi- tion</u>
Big Shag Lake	25	45 N 26 W		4.0	300	Imp.
Wilson (Big Trout) Lake	32	46 N 24 W		5.5	1,500	Imp.
Swanzy Lake	13	45 N 25 W		43.0	4,500	Imp.
Johnson Lake and Flat Rock Creek	19,30	45 N 28 W			10,000	N.U.
Camp 11 Creek	25	45 N 28 W	(2,597.9)		1,500	N.U.
Camp 11 Creek	29,32	45 N 27 W			1,500	N.U.
N.Br. of W.Br. Escanaba River	27,34	45 N 27 W			9,000	N.U.
Pike Lake	27,28,33	45 N 26 W		31.9	1,000	N.U.
Bass Lake	30	45 N 24 W		1.0	250	Imp.
Squaw Lake	16	45 N 30 W		16.0	750	N.U.
Michigamme Lake	27	48 N 30 W		28.0	700	Imp.
Engman's Lake	32	46 N 24 W		4.65	802	Imp.
Bass Lake	29	45 N 26 W		15.0	1,000	U.
Cranberry Lake	10	45 N 30 W		36.9	1,304	N.U.
E.Br.Escanaba River	15	45 N 25 W		40.0	1,000	U.
Lilly Lake	10	45 N 30 W		37.5	1,130	N.U.
E.Br.Escanaba River	4	45 N 25 W		161.4	4,000	U.
M.Br.Escanaba River	3	45 N 26 W		299.2	6,500	U.
Island Lake	14	45 N 30 W		40.0	1,100	U.
Wolf Lake	2	48 N 29 W		38.0	2,240	N.U.
Chocolay River	24	47 N 24 W		15.0	1,250	U.
Michigamme River	30	45 N 29 W		24.5	2,600	U.
Deer Creek	28	49 N 27 W		40.0	1,350	U.
Sporley Lake	31	46 N 24 W		78.0	600	Imp.
Michigamme River	36	45 N 30 W		64.5	3,194	U.
Chocolay River	25	47 N 24 W		1.04	308	U.
Johnson Lake	27	45 N 25 W		4.11	150	Imp.
Chocolay River	13	46 N 24 W		80.0	2,300	N.U.
Cherry Creek	18	47 N 24 W		36.0	1,660	U.
Engman's Lake	32	46 N 24 W		1.9	250	N.U.
Section 14 Lake	14	45 N 30 W		1.0	200	U.
Twin and Mud Lakes	22	45 N 30 W		22.2	1,715	Imp.
Arfelin Lake	21	49 N 30 W		0.64	255	N.U.
Granite Lake	29	47 N 29 W		2.5	400	N.U.
Chocolay River	13	47 N 24 W		40.0	1,400	N.U.
Trout Falls Creek	13	46 N 30 W		40.0	2,100	N.U.
Witch Lake	26	45 N 30 W		10.0	242	N.U.
Little Shag Lake	36	45 N 26 W		1.99	150	N.U.

Source: Michigan Department of Conservation, Public Fishing Sites, January 1, 1959. (The above listing follows the order and organization of Marquette County from 52-1 to 52-38 as given in this source.), pp.13-14.

In addition to the waters available for fishing at the public fishing sites, there are many lakes and hundreds of miles of stream frontage on state-owned land. These public lands are dedicated for state forests, parks, and other public conservation uses. The waters fronting on the National Forests are also open to the public.

The locations of state and federal lands, of lakes and streams, are indicated on individual county maps prepared by the Conservation Department (see maps on pages 207-209). Copies of reasonable numbers of these county maps will be furnished free of charge upon receipt of the request specifying the areas or counties desired. The State Highway Department also furnishes maps which would aid in determining the general location of state lands that may be open to fishing, or to help find lakes and streams.

\* Fish Plantings in Marquette County in 1958

Each year the Fish Division of the Michigan Department of Conservation stocks, with various species of trout, certain designated trout lakes, and many other lakes and streams. Occasionally a lake in Marquette County is stocked with warm-water species of fish. As an example of how intensive this program of fish planting is, the following pages of 1958 Fish Plantings, Marquette County (obtainable from the Department of Conservation), is included in this report. As will be noted, the fish are planted in many lakes and streams and that a total of 95,055 brook trout, 25,600 brown trout, and 77,500 rainbow

Year	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

Table 24

MARQUETTE COUNTY  
1958 Fish Plantings

<u>Brook Trout</u>		<u>Weight</u>	<u>Number</u>	<u>Size</u>
Airport Lake	T45N-R25W Sec. 33	126#	3,150	SL
Alder Creek	T51N-R27W Sec. 26	42	200	L
Lake Arfelin	T49N-R30W Sec. 21	200	5,000	SL
" "	T49N-R30W Sec. 21	180	1,000	L
Baldwin Kiln	T48N-R26W Sec. 21	43	4,300	F
Barnhardt Creek	T48N-R27W Sec. 6	60	300	L
" "	T48N-R28W Sec. 1	60	300	L
Bass Lake	T45N-R26W Sec. 29	50	5,000	F
Black River	T47N-R29W Sec. 34,35	72	400	L
Caps Creek	T45N-R29W Sec. 5,6	36	200	L
Carp River	T47N-R26W Sec. 2	18	100	L
" "	T47N-R27W Sec. 17	36	200	L
" "	T48N-R26W Sec. 29,30,33,34	286	1,500	L
Chandler Brook	T44N-R26W Sec. 23,26	84	400	L
Chocoley River	T46N-R24W Sec. 1,13,14	285	1,450	L
" "	T47N-R24W Sec. 25	107	550	L
Chocoley Rv., W.Br.	T46N-R24W Sec. 14,22,23	152	800	L
Chocoley Rv., E.Br.	T45N-R24W Sec. 2,12	128.5	625	L
" " "	T46N-R24W Sec. 23,25,26,36	165.5	875	L
Clear Lake	T48N-R29W Sec. 5	70	1,000	SL
Compeau Creek	T48N-R25W Sec. 4	42	200	L
Cranberry Lake	T45N-R30W Sec. 10	14	1,400	F
Dead River, Little	T48N-R27W Sec. 17	98	500	L
Dishno Creek	T48N-R29W Sec. 6	54	300	L
" "	T48N-R30W Sec. 1	36	200	L
" "	T49N-R29W Sec. 32	54	300	L
Escanaba River	T43N-R25W Sec. 10,14	90	500	L
" "	T44N-R25W Sec. 4,9,16,21,22	486	2,700	L
" "	T45N-R25W Sec. 21	108	500	L
Escanaba Rv., E.Br.	T45N-R25W Sec. 4,10,15,16,21	414	2,100	L
Escanaba Rv., M.Br.	T45N-R25W Sec. 21	66	300	L
" " "	T46N-R27W Sec. 17,18	81	450	L
" " "	T46N-R28W Sec. 3,11,13	81	450	L
" " "	T47N-R28W Sec. 33,34	54	300	L
Escanaba Rv., N.Br.of Big W.Branch	T44N-R26W Sec. 18,28	84	400	L
Escanaba Rv., W.Br.of Big W.Branch	T44N-R26W Sec. 28	108	500	L
Escanaba Rv., Big W.Br.	T43N-R25W Sec. 4,5	48	200	L
Flopper Pond	T45N-R27W Sec. 4	10	1,000	F
Furnace Creek	T48N-R29W Sec. 32	22.5	125	L
Garlic Rv., Big	T50N-R26W Sec. 33	102	500	L
Garlic Rv., Little	T49N-R26W Sec. 3	72	350	L
Green Creek	T47N-R28W Sec. 36	27	150	L
Greens Creek	T46N-R26W Sec. 35	62	300	L
Halfway Creek	T45N-R25W Sec. 21,22	54	300	L
Hasscib Lake	T49N-R30W Sec. 23	380	6,000	L
Hawkins Pond	T46N-R27W Sec. 26	45	250	L
Haywire Lake	T45N-R30W Sec. 11	80	2,000	SL
Island Lake	T45N-R30W Sec. 14	384	9,600	SL
Just Lake	T45N-R30W Sec. 25	585	4,500	SL
Michigan Creek	T46N-R30W Sec. 19	72	400	L
Moccasin Lake	T45N-R24W Sec. 7	80.4	2,010	SL
Partridge Creek	T47N-R27W Sec. 11	18	100	L
Sec. 14 Lake	T45N-R30W Sec. 14	100	2,500	SL



Table 24-Continued.

Marquette County Cont'd.

<u>Brook Trout (Cont'd)</u>			<u>Weight</u>	<u>Number</u>	<u>Size</u>
Sec. 28 Lake	T45N-R30W Sec. 28		80#	2,000	SL
Peshekee River	T48N-R30W Sec. 1		71	350	L
" "	T49N-R30W Sec. 6,8,9,15,26,35		335	1,750	L
Pike Lake	T45N-R26W Sec. 29		50	5,000	F
Springhole Lake	T45N-R30W Sec. 5		10	1,000	F
Spruce River	T47N-R30W Sec. 20		36	200	L
Squaw Lake	T45N-R30W Sec. 16		300	1,000	L
Stickney Creek	T49N-R25W Sec. 32		9	50	L
" "	T49N-R26W Sec. 24		18	100	L
Swanzy Lake	T45N-R25W Sec. 13		224.8	6,120	SL
Sweitzer Creek	T46N-R26W Sec. 10		80	400	L
Tilden Lake	T47N-R27W Sec. 23		260	2,000	SL
Trout Falls Creek	T46N-R30W Sec. 14,23		72	400	L
Uncle Tom's Pond	T46N-R25W Sec. 17		10	1,000	F
Warner Creek	T46N-R26W Sec. 4		58	300	L
" "	T47N-R26W Sec. 32		22	100	L
West Branch Creek	T46N-R28W Sec. 26,27		54	300	L
Wilson Creek	T50N-R26W Sec. 29		102	500	L
Yellow Dog River	T50N-R27W Sec. 3,9,10,16,17,18		561	2,850	L
" " "	T50N-R28W Sec. 13,19,20		108	600	L
" " "	T50N-R29W Sec. 13		54	300	L
TOTALS			8,727.7#	95,055	

Brown Trout

Escanaba River	T43N-R25W Sec. 10,14		100#	500	L
" "	T44N-R25W Sec. 4,9,16,21,22		200	1,000	L
Escanaba Rv., M.Br.	T46N-R27W Sec. 17,18,27		312	1,400	L
" " "	T46N-R28W Sec. 3		480	2,100	L
" " "	T47N-R28W Sec. 6,7,28,33,34		660	3,000	L
" " "	T47N-R29W Sec. 1,2		60	300	L
Hampton Lake	T48N-R26W Sec. 13		500	2,500	L
Forrestville Basin	T48N-R25W Sec. 8		200	1,000	L
Michigamme River	T45N-R29W Sec. 30,31		300	1,500	L
" "	T45N-R30W Sec. 36		100	500	L
" "	T46N-R30W Sec. 1		40	200	L
" "	T47N-R30W Sec. 16,21,27,34,35		220	1,100	L
Peshekee River	T48N-R30W Sec. 1,2		120	600	L
" "	T49N-R30W Sec. 6,8,9,10,15,22,26		300	1,500	L
Peshekee River, W.Br.	T49N-R30W Sec. 28		80	400	L
Sundstrom Lake	T48N-R26W Sec. 8		400	2,000	L
" "	T48N-R27W Sec. 10		300	1,500	L
Trout Lake, Big	T46N-R24W Sec. 32		260	2,000	SL
Wolf Lake	T48N-R29W Sec. 2		110	500	L
Yellow Dog River	T50N-R27W Sec. 9,10,16,17,18		280	1,400	L
" " "	T50N-R28W Sec. 13,19,20		120	600	L
TOTAL			5,142#	25,600	

## Table 24-Continued.

Marquette County Cont'd.

			<u>Weight</u>	<u>Number</u>	<u>Size</u>
<u>Rainbow Trout</u>					
Lake Angeline	T47N-R27W Sec. 10		480#	2,000	L
Arfelin Lake	T40N-R30W Sec. 21		90	5,000	F
" "	T40N-R30W Sec. 21		240	1,000	L
Barnhardt Creek	T48N-R27W Sec. 6		30	150	L
" "	T48N-R28W Sec. 1		30	150	L
Bass Lake	T45N-R26W Sec. 29		90	5,000	F
Brocky Lake	T48N-R28W Sec. 7		240	1,000	L
Chocolay River	T46N-R24W Sec. 1,12,13,14		450	1,850	L
" "	T47N-R24W Sec. 24,25		140	550	L
Chocolay Rv., E.Br.	T45N-R24W Sec. 2,12		120	400	L
" " "	T46N-R24W Sec. 23,36		240	900	L
" " W.Br.	T46N-R24W Sec. 14,22,23		240	800	L
Clear Lake	T48N-R29W Sec. 5		130	1,000	SL
Dead River, Little	T48N-R27W Sec. 17		40	200	L
Escanaba River	T42N-R24W Sec. 17		214	1,150	L
" "	T43N-R24W Sec. 32		198	1,050	L
" "	T43N-R25W Sec. 3,10,14		500	2,400	L
" "	T44N-R25W Sec. 4,9,16,21,22		604	2,500	L
" "	T45N-R25W Sec. 21		56	200	L
Escanaba Rv., E.Br.	T45N-R25W Sec. 4,15,16,21		300	1,300	L
Escanaba Rv., M.Br.	T46N-R27W Sec. 8,17,18		200	650	L
" " "	T46N-R28W Sec. 11,13		120	450	L
" " "	T47N-R28W Sec. 34		40	200	L
Forrestville Basin	T48N-R25W Sec. 8		600	1,500	L
Hampton Lake	T48N-R26W Sec. 15		1,760	7,500	L
Hasscib Lake	T49N-R30W Sec. 23		90	5,000	SL
" "	T49N-R30W Sec. 23		240	1,000	L
Johnson Lake	T45N-R25W Sec. 27		528	2,200	L
Michigamme River	T45N-R29W Sec. 30,31		252	1,100	L
" "	T45N-R30W Sec. 36		272	1,200	L
Nash Lake	T49N-R26W Sec. 30		27	1,500	SL
Peshekee River	T48N-R30W Sec. 1,2		96	400	L
" "	T49N-R30W Sec. 6,8,9,10,15,22,26		552	2,200	L
Pike Lake	T45N-R26W Sec. 29		90	5,000	SL
Squaw Lake	T45N-R30W Sec. 16		240	1,000	L
Sundstrom Lake	T48N-R26W Sec. 7,8,9		2,040	8,500	L
Trout Lake, Big	T46N-R24W Sec. 32		260	2,000	SL
Twin Lake	T45N-R30W Sec. 23		240	1,000	L
Witch Lake	T45N-R30W Sec. 24		720	3,000	L
Wolf Lake	T48N-R29W Sec. 2		120	500	L
Yellow Dog River	T50N-R27W Sec. 3,9,10,16,17,18		488	2,000	L
" " "	T50N-R28W Sec. 13,19,20		150	650	L
" " "	T50N-R29W Sec. 13		82	350	L
TOTALS			13,649#	77,500	

	<u>LAKES</u>	<u>STREAMS</u>	<u>TOTAL</u>
Brook Trout	66,830	28,225	95,055
Brown Trout	9,500	16,100	25,600
Rainbow Trout	54,700	22,800	77,500
	131,030	67,125	198,155



trout were planted in Marquette County in 1958.

### Lake Surveys Conducted in Marquette County

Lake Surveys.--Lake surveys reveal a detailed report of many physical and chemical characteristics of a lake. For example, in lake mapping, the area of the lake, its depth, all inlets, outlets, the drainage area, shoal types, and bottom soil types are all recorded. Such biological factors as the species of fish, aquatic fish foods, both plant and animal, fish parasites, and fish predators are recorded. Also the spawning conditions for the fish present are noted. As the temperature and chemical conditions influence the kind and abundance of plants and animals, these conditions must be checked. Surface and bottom temperatures of the water are recorded at various depths. Low water temperatures inhibit luxuriant growth of plants, bottom foods, and warm water fish.

As for checking the chemistry of the water, the oxygen content of the water is made from water samples taken at various depths and at different seasons of the year. The carbon dioxide content of the water is also taken. The water is also checked for acidity or alkalinity. Neutral or slightly alkaline waters are generally the most productive.

Methyl orange alkalinity tests are made to determine the amounts of certain minerals and buffer salts in the water. Waters lacking these minerals are called soft and those with sufficient quantities are called hard. Water that is moderately hard is generally associated with good productivity.



(Hardness is an expression of the amount of dissolved mineral salts.) The softness of the water is one of the important factors limiting production. Since plants and animals require mineral salts for their life processes, the amount of salts influences the abundance of plants and animals. Calcium, potassium, magnesium, and sodium salts are necessary in the physiology of plants and animals. When present in sufficient quantities, these metallic salts foster good plant, plankton, and fish food production. In addition to being necessary to the life in the lake, some of these salts condition the acidity of the water by taking the acidifying agents into chemical union, thus temporarily removing their action from the water.

Methyl orange alkalinity tests have shown the waters of many Marquette County lakes to be quite soft. Many of these soft water lakes had a dissolved salt and mineral content of from 19 to 20 parts per million. Ordinarily from 100 to 200 parts per million are considered best for high productivity, other factors being favorable. This is more true when the management of warm-water fish is being considered than it is in the case of trout, for many of Michigan's outstanding trout-producing lakes have a methyl orange alkalinity test of around 20 parts per million.<sup>1</sup>

Lakes Surveyed in Marquette County.--As of January 1, 1959, approximately 119 lakes in Marquette County had been

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<sup>1</sup>Paul Eschmeyer, A Fisheries Survey of Sporley Lake, Marquette County, Report No. 739, 1942, (Unpublished. Conservation Department files, Marquette), 15 pp.

surveyed by fisheries survey crews from the Institute of Fisheries Research or by fisheries biologists from the Michigan Department of Conservation. The reports of these surveys may be studied at the Regional Conservation headquarters at Marquette. Lake maps are available for 94 of the lakes surveyed in Marquette County. These are listed in Table 21. All of the reports of lakes surveyed in Marquette County have been reviewed for this report and a few comments on the results of these studies follow:

Pollution was seldom a problem in the lakes surveyed in Marquette County.

The lakes of Marquette County are varied in that they may be deep, cold water lakes with rocky shores; they may be "pit" lakes with sandy shoals having the bottom types quite often a pulpy peat; or they may be acid bog lakes. Results of the surveys conducted show a high percentage of the lakes were acid, soft-water lakes. Some of these colored, soft-water bog lakes had floating bog mats along their shores. Sometimes these mats extended a considerable distance on the lake.

A false bottom was found in some lakes, as for example, in the Sagola Lakes.<sup>1</sup> A lake with a false bottom is usually unproductive both of vegetation and bottom food organisms. Inability for plants to anchor is believed responsible for the low productivity and counterbalances the usually beneficial effects of shallowness.

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<sup>1</sup>E. W. Roelofs, and F. E. Locke, A Fisheries Survey of Sagola Lakes, Marquette County, Report No. 770, 1942, 7 pp. (Unpublished. Conservation Department files, Marquette.)

Some of the deep, cold-water lakes showed thermal stratification. Of the lakes surveyed in the county, Squaw and Witch Lakes could be considered as examples of the deep, cold-water lakes that show thermal stratification.<sup>1</sup> During the summer, these lakes have a warm surface layer (epilimnion), a deeper zone of rapid temperature change (the thermocline), and a cold zone below the thermocline (the hypolimnion). The surface waters are warm and well aerated and suited for warm-water fish. Trout require well aerated water at a colder temperature (below 75 degrees Fahrenheit). Such conditions are found in the thermocline region of both these lakes. In the hypolimnion, the water is cold and there is not sufficient oxygen to maintain fish.

\* The survey showed that the physical qualities of these lakes do not favor high productivity. Large and deep lakes are usually less productive than small or shallow ones.

From the survey of Swanzy Lake it was found that from the standpoint of temperature and chemical conditions, this lake was suitable for both warm and cold water fish.<sup>2</sup> Most lakes are considered either suited for warm-water species or for trout.

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<sup>1</sup>E. W. Roelofs, A Fisheries Survey of Squaw (Long) and Witch Lakes, Marquette County, Report No. 779, 1942, 9 pp. (Unpublished. Conservation Department files, Marquette.)

<sup>2</sup>E. W. Roelofs, and F. E. Locke, A Fisheries Survey of Swanzy Lake, Marquette County, Report No. 746, 1942, 6 pp. (Unpublished. Conservation Department files, Marquette.)



Aquatic Vegetation.--The table which follows lists some of the aquatic vegetation found in lakes in Marquette County according to the lake surveys conducted. The list is alphabetized by scientific names.

TABLE 25

## AQUATIC VEGETATION FOUND IN LAKES IN MARQUETTE COUNTY

<u>Scientific Name</u>	<u>Common Name</u>
<i>Anacharis canadensis</i>	Waterweed (Elodea)
<i>Brasenia shreberi</i>	Watershield
<i>Carex lenticarpa</i>	Sedge
" <i>lenticularis</i>	"
" <i>substricta</i>	"
<i>Chamaedaphne culyculata</i>	Leatherleaf
<i>Chara</i> sp.	Stonewort and Muskgrass
<i>Dulichium arundinaceum</i>	Spike rush
<i>Eleocharis olivacea</i>	" "
" <i>palustris</i> var. <i>major</i>	" "
<i>Eriocaulon septangulare</i>	Pipewort
<i>Equisetum fluviatile</i>	Horsetail
" <i>limosum</i>	"
<i>Glyceria borealis</i>	Manna Grass
<i>Hypericum ellipticum</i>	St. John's Wort
" <i>punctatum</i>	" "
" <i>virginicum</i>	" "
<i>Isoetes braunii</i>	Quillwort
<i>Juncus balticus</i>	Rush
<i>Lemna</i> sp.	Duckweed
<i>Leptodictum riparium</i>	Moss
<i>Lycopus americana</i>	Water horehound
<i>Lysimachia terrestris</i>	Loosestrife
<i>Mimulus rigens</i>	Monkey flower
<i>Myrica</i> sp.	Sweet Gale
<i>Myriophyllum spicatum</i>	Water milfoil
<i>Najas flexilis</i>	Bushy Pondweed
<i>Nuphar variegatum</i>	Yellow water lily
<i>Nymphaea odorata</i>	White water lily
<i>Nymphaea advena</i> (Nuphar)	Yellow water lily
<i>Osmunda regalis</i>	Royal Fern
<i>Phragmites communis</i>	Reed Grass
<i>Polygonum natans</i>	Smart Weed
<i>Potamogeton amphifolius</i>	Pondweed, Large-leaved
" <i>epiphydrus</i>	" , Celery-leaved
" <i>foliosus</i>	" , Leafy
" <i>gramineus</i>	" , Variable
" <i>natans</i>	" , Floating-leaved

TABLE 25-Continued.

<u>Scientific Name</u>	<u>Common Name</u>
Potamogeton panormitanus	Pondweed
" pectinatus	Pondweed, Sago
" praelongus	Pondweed, White-stemmed
" richardsonii	Pondweed, Claspingleaved
" zosteriformis	Pondweed, Flat-stemmed
Ranunculus reptans	Buttercup
Sagittaria latifolia	Duck Potato
" l. var. gracilis	Arrowhead
Scirpus acutus	Tall Bulrush
" cyperinus	" "
Sium suana	Water Parsnip
Sparganium subulata	Burreed
Typha latifoliata	Cattail
Utriculatia intermedia	Bladderwort
" vulgaris	"

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Certain plants grow best in hard alkaline water while these conditions prevent the growth of others. However, most plants will live and reproduce under a wide range of temperatures and chemical conditions.

A scarcity of plant species is generally associated with an acid bog lake. There may be an abundance of plants of one or two species so that the total crop is fairly large, but there is less diversity than in lakes more nearly neutral (pH 7). As many lakes in Marquette County are acid lakes, the number of species of aquatic vegetation was limited on these lakes. However, others almost neutral or alkaline had a greater number of species of aquatic plants.

Fish-Food Organisms.--It is almost invariably true that the number of fish-food organisms is directly correlated with the abundance of vegetation. Those lakes lacking vegetation

are never as productive of food as those containing it. The abundance of species and numbers varies with the chemistry and physical characteristics of the lake.

Some of the lakes of Marquette County, because of the physical and biological characteristics of the lakes, lacked vegetation. Therefore, only a small quantity of aquatic animal life which could serve as fish food is produced. In other lakes, where conditions were conducive to such organisms, fish food was abundant.

Examples from lake survey reports of Marquette County lakes include the following notations:

(1) On Sagola Lakes, the chemical conditions favored high productivity. Bottom organisms were varied but not numerous. In these lakes such foods as the following were found: midge larvae (Chironomidae), phantom midge (Corethra), free-swimming flatworms, aquatic earthworms, snails, scuds, water mites, mayfly nymphs, and caddisfly larvae.<sup>1</sup>

(2) From the report on Swanzy Lake: "The shoal areas were quite productive of bottom foods. Damselfly, dragonfly, and mayfly nymphs, and caddisfly and midge larvae made up the bulk of the bottom food supply."<sup>2</sup>

(3) From the Lake Michigamme report: "The microscopic and semi-microscopic animals and plants, such as water-fleas, rotifers and algae, were fairly abundant. The predominating

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<sup>1</sup>E. W. Roelofs, and F. E. Locke, A Fisheries Survey of Sagola Lakes, Marquette County, op.cit., p.4.

<sup>2</sup>E. W. Roelofs, and F. E. Locke, A Fisheries Survey of Swanzy Lake, Marquette County, op.cit., p.4.

fish-food organisms found on the shoals were mayfly nymphs and caddisfly larvae, while on the bottom in the deeper areas midge larvae were most abundant. Fresh water shrimp (Ampipods) were fairly common on the bottom between the 30 and 60 foot contours."<sup>1</sup>

(4) From Indian, Little White Goat, and Keewaydin Lakes the survey report states: "Bottom samples produced little in the way of food. Corethra, Phantom midge larvae, and Chironomid (midge) larvae were the only two forms found."<sup>2</sup> Plankton samples indicated average production at the time of the survey on these lakes.

Fish Parasites.--According to fisheries surveys conducted on the inland lakes in Marquette County, the following fish parasites have been recorded:

Black spot Neascus

Yellow grub Clinostomum

Bass tapeworm Proteocephalus amblopletes

Gill lice Copepoda

Tapeworms in suckers and perch

The Black spot, Yellow grub, nor the bass tapeworm are known to affect trout, and none will affect man.

From the survey report of Twin Lake: "Brook trout was

<sup>1</sup>C. J. D. Brown, Fisheries Survey of Lake Michigan, Marquette and Baraga Counties, Report No. 604, 1940, 16 pp. (Unpublished. Conservation Department files, Marquette.) p.10.

<sup>2</sup>E. Roelofs, A Fisheries Survey of Indian and Little White Goat Lakes in Marquette County, and Keewaydin Lake in Marquette and Baraga Counties, Report No. 745, 1942, 11 pp. (p.7).



infected with gill lice. This certain species of gill parasite (Copepoda) is specific to the brook trout."<sup>1</sup>

According to the survey report on Lake Michigamme: "Some of the small-mouth bass were infected with the bass tapeworm (Proteocephalus). The presence of this parasite did not seem to seriously affect natural propagation since many small bass were observed. This parasite cannot attack man. Sometimes the bass tapeworm is very damaging to the reproductive organs of the fish and may produce sterility. There is no known practical method for the control of this parasite."<sup>2</sup>

Regarding the parasite Black spot, from the same report: "Nearly all of the game species present had the parasite known as Black spot. These in small numbers certainly have little if any effect on the fish, and under no circumstance are they able to attack man."<sup>3</sup>

In Lake Superior, the worst parasite which has affected fish populations within recent times has been the sea lamprey. It has invaded Lake Superior and destroyed a great percentage of the trout and whitefish populations in the lake. The lamprey problem is discussed later under a separate heading.

Predators of Fish.--Fish predators are not abundant enough in Marquette County to necessitate any methods of

<sup>1</sup>J. W. Moffett, and F. E. Locke, A Fisheries Survey of Twin Lake, Marquette County, Report No. 658, 1941, 12 pp. (p.10).

<sup>2</sup>C. J. D. Brown, Fisheries Survey of Lake Michigamme, op.cit., p.16.

<sup>3</sup>Ibid., p.15.

control according to most survey reports. Some of the fish predators found in this county, as reported in the survey records, include such bird predators as the kingfisher, loons, gulls, great blue heron, osprey, eagles, grebes, and mergansers. Mink and otter, as well as snapping turtles and painted turtles, are known to prey on fish. None of these predators are considered harmful enough to fish populations to be concerned with, except perhaps at the Fish Hatchery. Where stunted populations of warm-water fish are found, additional predators might be welcomed. The native predaceous fish species, such as bass and pike, help control overpopulations of such fish as perch and members of the sunfish family, and also make for good sport fishing.

#### Lake and Stream Improvement in Marquette County

Lake Poisoning.--A number of lakes have been treated in Marquette County with rotenone to remove the fish population so that they might then be planted with trout. Some of the lakes so treated include Perch Lake, Island Lake, O'Neil Lake, and Sporley Lake. The District Fisheries Supervisor has the responsibility of managing the lake after treatment. Toxaphene has been used on some lakes, including Sporley Lake, which was treated in August, 1955. Toxaphene has the advantage of ensuring a better kill on the deeper lakes. However, toxaphene acts more slowly and the time before restocking can take place is much greater.

Brush Shelters.--Brush shelters were installed in Little

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Lake and Lake Michigamme. Their purpose was to concentrate the fish and provide cover for small fish. No evaluation was made on them.<sup>1</sup>

Construction of Dams.--A small dam was constructed on Morgan's Pond (between Marquette and Negaunee). The purpose of this dam was to raise the water level four feet and increase the surface acres. It was then planted with trout.

Stream Improvement.--Stream improvement structures were installed in the Chocolay River before the Dingell-Johnson program became effective. Therefore, it was not carried on as a watershed project, but merely as channel improvement. There were 157 structures built between the junction of the East and West Branch of the Chocolay, which makes up the Main Chocolay, and the bridge on U.S. 41. These structures were designed to protect banks from erosion, dig pools, provide cover, and where the river was wide and shallow, to concentrate the water in one channel. The river is subject to a terrific runoff in the spring as well as from a moderate rain. Therefore, there are serious limitations on the type of structures to be installed. Further, the bottom type varies from rock to very coarse gravel. This also limits the installation of structures. There were some 700 pine tree seedlings, as well as some willow cuttings, planted on the stream banks of the Chocolay River.

No scientific evaluation was made of the project but a

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<sup>1</sup>Letter from Arthur Feldhauser, Lake and Stream Improvement Technician, Marquette, August, 1958.



visual inspection periodically of the physical conditions of the banks and pools show fair to good results. Tree plantings were not too successful as the area is in farm land and used for pasture. No streamside fences were constructed; therefore, most of the trees were trampled.<sup>1</sup>

### The Lamprey Problem

The parasite of fish, which has within recent times caused the most concern and greatest damages, has been the sea lamprey.

Life History of the Sea Lamprey.--The sea lamprey (*Petromyzon marinus*) belongs to an almost extinct order of vertebrate animals known as Cyclostomes. It is an eel-like creature which may attain the length of twelve to twenty-four inches. It has a slim, round snake-like body which is dark above and whitish beneath. It has seven gill slits or openings which are not covered by an operculum. Unlike a fish, it has no paired fins, no scales, and no movable lower jaw. Its round mouth is lined with rows of sharp, horny knobs which serve as teeth. During the parasitic phase of its life, the sea lamprey feeds on the blood and body juices of fish. It attaches itself to its victim by means of its sucker-like mouth and with its sharp "teeth", rasps a hole in the body of the fish.

The sea lamprey must enter streams in spring to spawn. An adult female deposits an average of 61,500 eggs. Following spawning, the adults die. Eggs hatch in two to three weeks.

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<sup>1</sup>Ibid.

The young move downstream to the nearest silt bed where they burrow into the soft mud. After five to seven years as harmless, burrowing larvae, they transform into adults about five inches long, move to the lake during the winter and early spring, and parasitize fish for 12 to 20 months. Each mature lamprey is said to destroy twenty pounds of fish in order to reach maturity. The following spring they cease feeding, move to the stream mouths, and then, when the water temperature reaches about 50 degrees, migrate upstream to spawn.

The Invasion of the Sea Lamprey from the Atlantic Ocean.--

The sea lamprey is not native to the Great Lakes. It probably entered the Great Lakes through the Welland Canal about 1921. Between 1938 and 1947, Lake Huron trout production dropped from five million pounds to less than 400,000. It is now nil in Lake Huron proper. In Lake Michigan, production dropped from 6.5 million pounds in 1944 to 400 pounds in 1953. Fishermen lost an annual income of more than 5.5 million dollars. Losses to sport fisheries are inestimable.

Lampreys had trouble going through the locks in St. Mary's River to reach Lake Superior. The sea lamprey was first reported from Lake Superior in 1945. By 1947, enough of them had reached Lake Superior to establish a rapidly growing population.

Decrease in Lake Trout Production in Lake Superior.--

Lake trout production dropped from an average of 4.4 million pounds per year to less than half that figure by 1956. The

downward trend of production in Lake Superior continues, as is seen in the following record of take (thousands of pounds) in different areas of Lake Superior from 1950-1956:<sup>1</sup>

TABLE 26

LAKE TROUT TAKEN FROM LAKE SUPERIOR, 1950-1956  
(thousands of pounds)

	<u>Michigan</u>	<u>Wisconsin</u>	<u>Minnesota</u>	<u>Ontario</u>	<u>Total</u>
1950	2,400	591	202	1,506	4,699
1951	2,174	504	233	1,273	4,184
1952	2,074	521	243	1,389	4,227
1953	1,746	450	217	1,371	3,784
1954	1,609	395	202	1,266	3,472
1955	1,378	553	170	1,003	3,104
1956	1,224	479	109	527	2,339

Not only did the total commercial catch of lake trout decrease, but more trout were taken bearing ugly lamprey scars. These scars decreased the commercial value of the fish sold. From data obtained from commercial catches of lake trout landed at Marquette, the percentage of scarred lake trout taken increased from 1950-1957, and especially in 1956 and 1957. The month of the year when the greatest percentage of the trout caught were scarred by lamprey is shown for the years

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Information from Minutes Annual Meeting, Upper Great Lakes Fishery Committee, Milwaukee, Wisconsin, 1957, as received from W. M. Marquette, Fishery Research Biologist, Fish and Wildlife Service, Marquette.

1950-1957:<sup>1</sup>

October, 1950	---	7%	(Percentage of scarred lake trout obtained from commercial catches landed at Marquette, Michigan.)
October, 1951	---	12%	
October, 1952	---	23%	
November 1953	---	13%	
November 1954	---	22%	
November 1955	---	36%	
November 1956	---	69%	
November 1957	---	74%	

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The Campaign Against the Lamprey.--The sea lamprey problem was fought on an international scale, with Canada and the United States tackling the difficult problem.

Headquarters for a large portion of this campaign have been located in Marquette. Here the United States Fish and Wildlife Service has operated its Upper Peninsula office for the past several years. The battle to combat the lamprey has progressed in three directions:

It was necessary to prevent adult lampreys from spawning. At first, the fight was concentrated on trying to prevent the adult sea lampreys from spawning. Electro-mechanical weirs were developed to be operated on lamprey spawning streams flowing into the Great Lakes. The weirs intercepted the lampreys on their upstream spawning runs and diverted them into traps, from which they were removed and killed. The pilot model for these weirs was tested on the Chocolay River, here in Marquette County.

Sea lamprey weirs installed in streams in Marquette

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<sup>1</sup>Information from Minutes Annual Meeting, Upper Great Lakes Fishery Committee, Milwaukee, Wisconsin, 1957, as received from W. M. Marquette, Fishery Research Biologist, Fish and Wildlife Service, Marquette.

County consist essentially of two types. Type "B" consists of one row of electrodes hanging from a suspension and one row of pipe on the stream bottom five to eight feet upstream or downstream from the hanging electrodes. Type "C" consists of two rows of pipe, five to eight feet apart, on the stream bottom. Type "C" is used where shallow water conditions exist up to three feet deep, and type "B" is used where water depths exceed three feet. Electricity used to maintain an electrical field in the water is obtained from commercial power sources where possible and a standby generator is also installed on the river, so that, should the commercial power source fail, the standby generator will automatically take over until the commercial power comes back on. Upon the return of commercial power, the standby automatically turns off. Where commercial power is not available, two generators are installed on the river, a main and a standby. Thus an effective barrier can be maintained and complete power losses are not common.

All weirs are operated from the time the ice leaves the streams in the spring until lampreys stop running, usually late July or September. The table below shows the effectiveness of these weirs:

TABLE 27

TOTAL SEA LAMPREY CAPTURED IN ELECTROMECHANICAL WEIRS  
ON STREAMS TRIBUTARY TO LAKE SUPERIOR IN MARQUETTE  
COUNTY, THROUGH DEC. 31, 1958.<sup>a</sup>

<u>Stream</u>	<u>Type</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Sand	B		0	-	-	-	-
Chocolay	*	281	1227	3350	6888	8096	6221



TABLE 27-Continued.

<u>Stream</u>	<u>Type</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Carp	C		0	2	1	4	0
Harlow	C		1	1	0	3	3
Little Garlic	B		0	0	-	-	-
Big Garlic	C		54	89	154	270	262
Iron	B		67	206	335	737	428
Salmon-Trout	B		1	0	0	-	-
Pine	B		10	12	18	34	22
Little Huron	C		0	-	-	-	-

\*Type of weirs installed on Chocolay River described in discussion on weirs.

<sup>a</sup>Source: Letter received from W. M. Marquette, Fishery Research Biologist, Fish and Wildlife Service, Bureau of Commercial Fisheries, Marquette, Michigan, July 15, 1958. (Telephone conversation with H. Moore, F. & W. Biologist for 1958 statistics.)

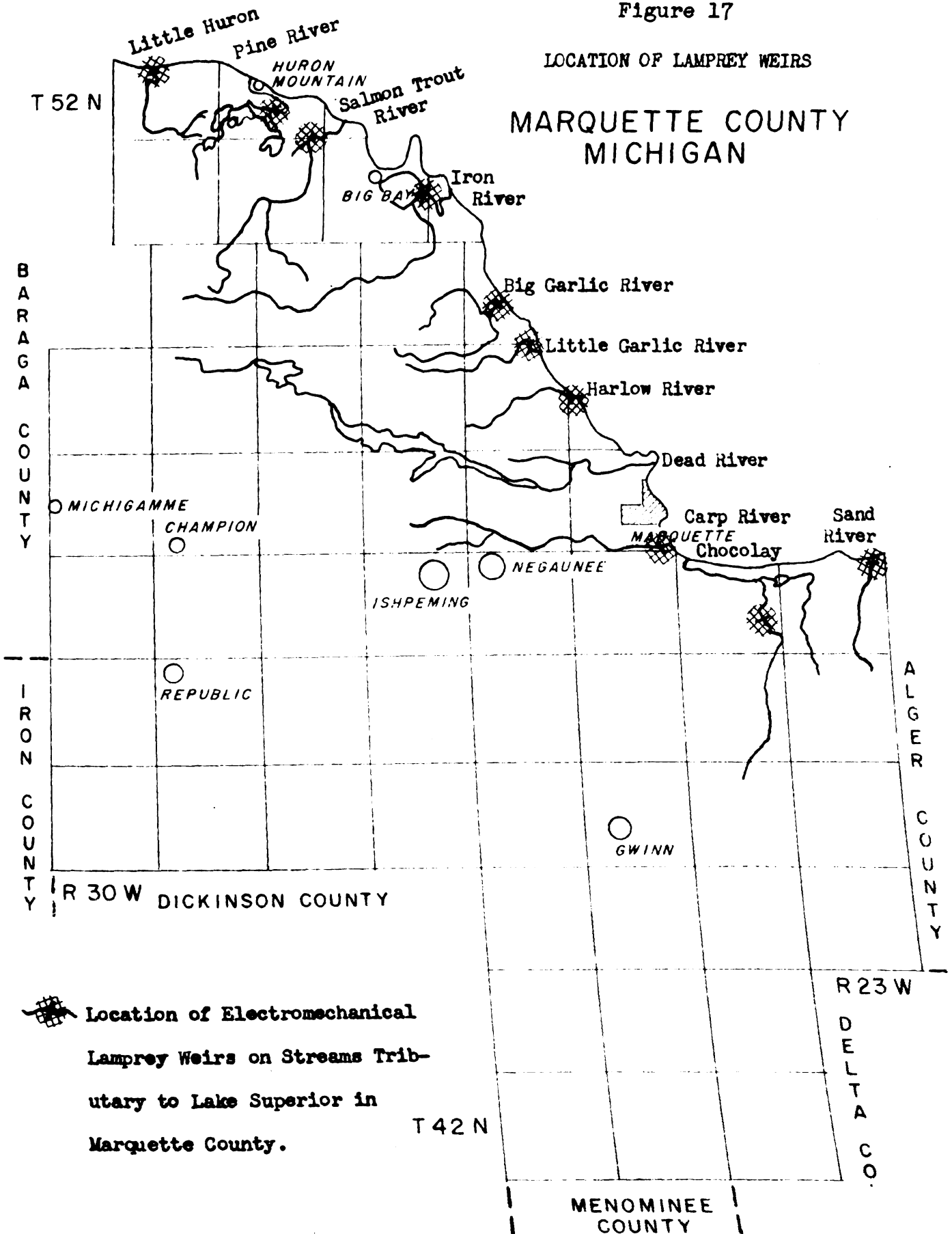
The weirs on the Sand, Little Garlic, Salmon-Trout, and the Little Huron were placed on standby status when lamprey failed to appear in them. The streams are kept under constant observation in case lamprey should begin to utilize them.


The first weir installed was installed on the Chocolay River in 1951. During that year 401 lamprey were taken. It was operated as an experimental weir. This experimental weir was a Berkey Electric screen and was installed just above the M-28 bridge. A temporary mechanical weir was operated at Green Garden as a check weir. The Burkey Electric screen essentially consists of one row of hanging electrodes and two rows of pipe on the stream bottom either above or below the

Figure 17

LOCATION OF LAMPREY WEIRS

MARQUETTE COUNTY  
MICHIGAN



 Location of Electromechanical  
Lamprey Weirs on Streams Trib-  
utary to Lake Superior in  
Marquette County.



hanging row. The principle of this unit was to stop the lampreys but allow the fish to pass upstream through it. It did not prove satisfactory. This unit was also operated in 1952 and 1953. In 1954, a concrete and steel mechanical weir was installed at Mangum, but it was not designed to handle the large spring run-offs of this river and escape of lampreys occurred. In 1955, a type "B" weir was installed and experimentation was begun to devise an electrical unit to divert large runs of fish away from the electrical field and towards the trap. Experimentation of a direct current diversion unit interfered with the sea lamprey catch that year. Since 1956, the Chocolay has been operated as a Type "B" with a direct current diversion unit.

The Pine and Sand rivers are the only streams in Marquette County where generators are the only source of power.

The remaining weirs have always been operated as the type indicated, and have been very efficient in preventing lampreys from escaping upstream to spawn.<sup>1</sup>

The second method of attack against the sea lamprey was to kill selectively the immature, or larval, lamprey by treating the streams with a chemical without affecting other aquatic life. If scientists should be successful in this attempt, they would be able to eliminate generations of young lampreys before they migrated into the Great Lakes to begin their life of predation on game and commercial fishes.

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<sup>1</sup>Letter from W. M. Marquette, July, 1958, op.cit.

It took three years of testing some 6,000 chemicals before nitrophenols containing halogens were found to be effective in killing the young lampreys and still be harmless to game fish. One of the chemicals, developed in cooperation with Dow Chemical Company of Midland and known as Dowlap, has been found to be virtually 100 per cent effective against larvae. Then in 1958, another chemical, called Lamprecid 2770 and manufactured by the Hoechst Chemical Corporation, West Warwick, Rhode Island, was tested on the Mosquito River in Alger County and the Silver River in Baraga County. It proved to be so successful, killing almost all sea lampreys and harming few, if any, fish, that Fish and Wildlife Service officials are planning widespread use of the chemical.

In Marquette County, the following streams have been treated to destroy the young lampreys: The Iron River was treated 9/15/58; Chocolay--10/29/58; Big Garlic--5/11/59; Pine--7/25/59; and the Harlow--8/21/59.<sup>1</sup> The success of those treated in 1959 cannot be determined at this date, but the two streams treated in 1958 show very favorable results.

The third phase in the long-range program to restore the lake trout fishery is the propagation of these fish in hatcheries like the one at Marquette, and their release into the Great Lakes, beginning with Lake Superior. The decision to rear lake trout stock in the Marquette fish hatchery was made eleven years ago. By 1960, it is expected that about three

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<sup>1</sup>Conversation with John H. Howell, Biologist, U.S. Fish and Wildlife Service, Marquette, Michigan, September 2, 1959.

million fry-size young lake trout will be produced for planting purposes.

The first plantings in this restocking program was completed in June, 1959, when lake trout were stocked in Keweenaw Bay and in Marquette Bay. Within a few years it should be possible to arrive at some estimate of how successful this vast program will be.

#### The Commercial Fish Industry in Marquette County

Marquette County, with its frontage on Lake Superior, has always played a leading role in the commercial fishing industry. In 1950, in Marquette County, there were 31 commercial fishing licenses issued. Commercial fish production in the county in 1950 amounted to 287,634 pounds with an estimated value of \$84,888. This was a 52.2% decrease from the commercial fish production in the county for 1940. The losses experienced from the Lake Superior ports of the county were in the more valuable lake trout and whitefish catches.<sup>1</sup>

The Biennial Report of the Michigan Department of Conservation lists the commercial fisheries catch in pounds from the Michigan waters of Lake Superior for the years 1956 and 1957. A portion of the table appears on the following page:

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<sup>1</sup>Ebasco report on Michigan's Upper Peninsula, op.cit. p.161.

TABLE 28

COMMERCIAL FISHERIES FROM THE MICHIGAN WATERS OF LAKE  
SUPERIOR---1956-1957

	<u>1956-Lbs.</u>	<u>1956-Value</u>	<u>1957-Lbs.</u>	<u>1957-Value</u>
Lake herring	3,719,225	\$204,557.38	5,016,789	\$275,923.40
, Lake trout	1,223,932	526,290.76	848,778	393,832.99
Lake whitefish	373,746	168,185.70	236,057	132,664.03
Chubs	88,197	14,023.32	67,545	9,794.03
Round whitefish	13,256	1,723.28	25,553	3,040.81
White and red- horse suckers	10,627	637.62	24,285	2,282.79
Smelt	3,616	224.19	34	1.02
Yellow perch	3,011	304.11	1,794	202.72
Yellow pike	918	235.93	365	127.02
Longnose suckers	259	14.25	479	38.32
Lake sturgeon	76	45.45	385	239.85
Burbot	44	.53	263	2.87
Northern pike	29	5.95	50	5.90
Sauger	4	.47	29	7.05
Carp	-	--	3	.09

Source: Department of Conservation, Nineteenth Biennial Report, 1957-1958, pp. 93-94.

### XIII. WILDLIFE--A MAJOR RESOURCE OF MARQUETTE COUNTY

#### Wildlife Defined

Wildlife actually includes all living things which live on the land or in the water without the control or direction of man. As this report deals primarily with the major economic resources of Marquette County, many of the minor forms of wildlife, many of which are extremely important, must be omitted. The wildlife resource in this report is confined to the mammals and the game birds.

#### Hunting License Sales

Michigan is a leading state for the hunting of wildlife as shown by license sales. The table below shows the trend to ever increasing license sales from 1930 to 1950:

TABLE 29

#### MICHIGAN LICENSE SALES FOR 1930, 1940, 1950\*

<u>Type of License Sold</u>	<u>1930</u>	<u>1940</u>	<u>1950</u>
Resident Small-game	332,726	537,655	627,415
Non-resident Small-game	1,843	2,909	4,844
Resident Deer	76,339	176,314	379,375
Non-resident Deer	201	1,456	7,311

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\*Source: Game Division, Michigan Department of Conservation, Lansing.

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The 1958 License Receipts.--The total receipts from the sale of resident deer licenses in Michigan in 1958 amounted to \$2,026,685.22. The non-resident deer licenses sold amounted to \$303,433.12. The bow and arrow deer licenses sold brought in \$213,786.97. The receipts in 1958 for the resident small game licenses sold in Michigan amounted to \$1,951,561.97, and \$116,731.97 from the sale of non-resident small game licenses. Trapping licenses brought in an additional \$29,065.34 to Michigan in 1958.<sup>1</sup>

#### Values of the Wildlife Resource

From the above figures alone, the value and importance of the wildlife resource in Michigan is obvious. In Michigan, a fur crop worth about two million dollars is produced annually. The meat value of game animals taken in the state is even larger. About two and three-fourths million dollars worth is harvested each year. An annual income of four and one-half million dollars in fur and meat from wild mammals means that the people of Michigan have a tremendous investment in this wildlife resource.

Controlling Man's Enemies.--According to W. L. McAtee of the Fish and Wildlife Service, in the more humid parts of the eastern United States, the annual value of wildlife averages about 14 cents per acre per year for meat, and 23 cents per acre for the destruction of insects and other pests which hinder or retard crop production. These estimates

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<sup>1</sup>Department of Conservation, Nineteenth Biennial Report, 1957-1958, p.24.

suggest values that run into millions of dollars.<sup>1</sup>

The Aesthetic Value of Wildlife.--The economic importance of wildlife is evident, but wildlife has other less tangible values. Besides the birds and mammals doing much to control the insect and rodent populations, a recent survey showed that farmers enjoyed having game animals and birds on their land whether they hunted or not. In other words, seeing and hearing the wildlife is sufficient reason for encouraging wildlife on their farms. Watching the wildlife gives moments of relaxation and enjoyment which otherwise would not be possible. The tourist also is thrilled to see wildlife.

The wildlife resource is partially responsible for making the tourist industry the second largest industry in Michigan.

Marquette County, with its thousands of acres of state-owned public hunting grounds and the many additional acres of private lands which have few or no restrictions, is an ideal area for hunting, trapping, and enjoying the many forms of wildlife that abound in the county.

#### Mammals of Marquette County

Table 30 which follows, lists 49 mammals found in Marquette County. The list was compiled mainly from William H. Burt's comprehensive study of the mammals of Michigan,<sup>2</sup> and

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<sup>1</sup>P. E. McNall, Our Natural Resources (Danville, Ill.: The Interstate, 1954), p.202.

<sup>2</sup>William H. Burt, The Mammals of Michigan (Ann Arbor: University of Michigan Press, 1946), 288 pp.

TABLE 30

## THE MAMMALS OF MARQUETTE COUNTY

Order	Scientific Name	Common Name
Insectivora	<i>Condylura cristata</i>	Star-nosed mole
	<i>Sorex cinereus</i>	Masked shrew
	<i>Sorex arcticus laricorum</i>	Saddle-back shrew
	<i>Sorex palustris hydrobadistes</i>	Water shrew
	<i>Microsorex hoyi</i>	Pygmy shrew
	<i>Blarina brevicauda kirtlandi</i>	Short-tailed shrew
Chiroptera	<i>Myotis lucifugus lucifugus</i>	Little brown bat
	<i>Myotis keenii septentrionalis</i>	Keen bat
	<i>Lasiorycteris noctivagans</i>	Silver-haired bat
	<i>Eptesicus fuscus fuscus</i>	Big brown bat
	<i>Lasiurus borealis borealis</i>	Red bat
	<i>Lasiurus cinereus</i>	Hoary bat
Carnivora	<i>Ursus americanus americanus</i>	Black bear
	<i>Procyon lotor lotor</i>	Raccoon
	<i>Mustela cicognanii cicognanii</i>	Short-tailed weasel
	<i>Mustela frenata noveboracensis</i>	Long-tailed weasel
	<i>Mustela rimosa allegheniensis</i>	Least weasel
	<i>Mustela vison</i>	Mink
	<i>Lutra canadensis canadensis</i>	River otter
	<i>Mephitis mephitis hudsonica</i>	Striped skunk
	<i>Taxidea taxus taxus</i>	Badger
	<i>Vulpes fulva</i>	Red fox
	<i>Urocyon c. cinereoargenteus</i>	Gray fox
	<i>Canis latrans latrans</i>	Coyote
	<i>Canis lupus lycaon</i>	Timber wolf
	<i>Lynx canadensis canadensis</i>	Lynx
	<i>Lynx rufus rufus</i>	Bobcat
Rodentia	<i>Marmota monax</i>	Woodchuck
	<i>Citellus t. tridecemlineatus</i>	Striped ground squirrel
	<i>Eutamias minimum jacksoni</i>	Least chipmunk
	<i>Tamias striatus</i>	Eastern chipmunk
	<i>Tamiasciurus hudsonicus</i>	Red squirrel
	<i>Sciurus carolinensis</i>	Gray squirrel
	<i>Glaucomys sabrinus macrotis</i>	Northern flying squirrel
	<i>Castor canadensis michiganensis</i>	Beaver
	<i>Peromyscus maniculatus gracilis</i>	Woodland deermouse
	<i>Synaptomys cooperi cooperi</i>	Bog lemming
	<i>Clethrionomys g. gapperi</i>	Red-backed vole
	<i>Microtus p. pennsylvanicus</i>	Meadow vole
	<i>Ondatra zibethica zibethica</i>	Muskrat
	<i>Rattus norvegicus</i>	House rat
	<i>Mus musculus</i>	House mouse



TABLE 30-Continued.

Order	Scientific Name	Common Name
Rodentia x	<i>Zapus hudsonius</i>	Meadow jumping mouse
	<i>Napaeozapus insignis frutectanus</i>	Woodland jumping mouse
	<i>Erethizon dorsatum dorsatum</i>	Porcupine
Lagomorpha	<i>Lepus americanus</i>	Snowshoe hare
	<i>Sylvilagus floridanus mearnsii</i>	Cottontail
Artiodactyla	<i>Odocoileus virginianus borealis</i>	White-tailed deer
	<i>Alces americana americana</i>	Moose

from Dr. Richard Manville's study of the small mammal population of the Huron Mountain area of Marquette County.<sup>1</sup> Game Division files of the Michigan Department of Conservation, and personal observations also helped to determine the mammals that were found in the county.

The abundance of many of the game mammals harvested in Marquette County is given later in this report along with hunting and trapping statistics. Certainly the following mammals could be included as those commonly found in the county: white-tailed deer, black bear, beaver, otter, red fox, coyote, raccoon, mink, weasel, skunk, bobcat, woodchuck, red squirrel, gray squirrel, porcupine, muskrat, and snowshoe hare.

According to Manville,<sup>2</sup> the woodland deermouse appears to be the most abundant mammal of the Huron Mountains of

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<sup>1</sup>Richard H. Manville, A Study of Small Mammal Populations in Northern Michigan (Misc. Pub. 73; Ann Arbor: University of Michigan, 1949), 83 pp.

<sup>2</sup>Ibid., pp. 32 and 70.

Marquette County, comprising nearly 50% of the small mammal population. The red-backed vole is also very abundant in that region of the county.

\* Species of mammals found rarely in Marquette County might include the badger, gray fox, lynx, and moose. The rare species of small mammals trapped or observed by Manville in the Huron Mountain area included the star-nosed mole, water shrew, woodland jumping mouse, and the pygmy shrew--the smallest of Michigan mammals.

Table 30 includes such species as the saddle-back shrew, silver-haired bat, red bat, hoary bat as being found in Marquette County. According to Burt,<sup>1</sup> these species are found in the Upper Peninsula of Michigan, although no positive proof of their being found in Marquette County was given. This is also true of the least weasel which, according to Burt,<sup>2</sup> probably occurs over the entire state.

Omitted from the table of the list of the mammals found in Marquette County are several species which are found in the Upper Peninsula. The marten was recently introduced into the Porcupine Mountains State Park in the western part of the Peninsula. The table also excludes such species as the prairie deer mouse and the white-footed mouse which are found in Menominee County in the Upper Peninsula. There is a possibility that they could have extended their range to Marquette County. Since both have a more southern distribution

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<sup>1</sup>Burt, op.cit.

<sup>2</sup>Burt, op.cit., p.139.

and occupy more southern areas of the state, they were excluded from the Marquette County list until positive proof is found. The European hare, a rare exotic species, has been found occasionally in Michigan. One specimen was taken in Ontonagon County in the Upper Peninsula. It, too, was omitted from the list of mammals of Marquette County, but could accidentally be present.

The mammals which are found in Michigan, but are not found in the Upper Peninsula, according to Burt,<sup>1</sup> include the opossum, prairie mole, least shrew, Indiana bat, evening bat, southern flying squirrel, prairie vole, pine vole, and elk.

Other mammals listed in Burt's book<sup>2</sup> which are no longer found in Michigan are the fisher, wolverine, caribou, bison, and cougar. Occasional reports have been made of a cougar being seen in this area, but none have been substantiated.

#### The White-tailed Deer in Marquette County

Deer as a Resource.--Michigan's deer herd is one of the State's great natural resources. The herd in Michigan of about a million animals provides recreation annually for about 400,000 hunters. Its aesthetic value throughout the remainder of the year is enjoyed by many thousands of residents and tourists. The income to Michigan people, directly or indirectly, because of the deer herd runs into millions of dollars

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<sup>1</sup>Ibid.

<sup>2</sup>Ibid.

annually. The deer herd is also an important resource of Marquette County.

History of Deer Herd.--The history of deer and their range in Marquette County follows the pattern and trends of northern Michigan. It is believed that deer were scarce in Michigan 100 years ago. There were endless miles of dense forests of pine, hardwood, hemlock, and heavily timbered swampland. Deer found poor winter cover and almost no winter food under this big timber as dense shade produces no food for deer.

During the past one hundred years, northern Michigan has witnessed drastic changes from vast areas of primeval forest where deer were scarce, to the more fortunate situation which followed the logging operations. Young tree growth provided abundant food, and the deer herd increased in numbers.

In spite of the abundance of good habitat, deficiencies began to appear in some of the deer ranges. Surveys revealed a shortage of winter food in a number of deeryards. As the deer had increased in numbers, the staple winter food, cedar, having been overbrowsed for many years, failed to grow back within reach of deer. The Upper Peninsula deer herd apparently reached a peak in about 1949, and has declined somewhat since.

Deer Hunting Regulations.--Marquette County, like the entire Upper Peninsula, has always had an open season for the hunting of deer. However, in certain areas under the "Buck Law of 1921", the deer herd had become too large for the

available winter food supply, so that starvation of deer was prevalent.

In 1952, Michigan had its first major "any deer" season. An "any deer" season in Michigan implies the hunting of bucks, does, and fawns in certain designated areas. The designated areas in 1952 were located only in the Lower Peninsula of Michigan.

The intensive sampling search for dead deer conducted in the spring of 1956 found evidence that about 74,000 deer had been lost due to starvation in the Upper Peninsula.

In the fall of 1956, the first special season area was assigned in Marquette County. The area included a small part of the county in the south-western portion. It was a part of a larger area known as Area 21 which extended through Dickinson County into Iron County. During this special season 210 deer were killed in the Upper Peninsula. However, those recorded taken in Marquette County amounted to only 15 deer-- 6 fawns, 1 buck and 8 does.<sup>1</sup>

Marquette County had no special season areas in 1957. In 1958, Michigan had 37 special season areas open to the taking of any kind of deer. Hunting was by permit only, with quotas set for each area. All of the areas in northern Michigan (Areas 2-37) were open concurrently so that permit holders could take any kind of deer in the area for which they held a permit during the regular November 15-30 deer season.

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<sup>1</sup>Lee Eberhardt, Game Division, Deer Biological Data (Report No. 2135; Lansing: Department of Conservation, July, 1957), p.57.

Of the 37 areas, two of these included portions of Marquette County. Area 32, which consisted of 449 square miles, was found almost exclusively in Marquette County. The quota of permits for this area was 1,996, but the estimate of the number of hunters that used the permit was 1,930. The antlerless deer and bucks with sub-legal antlers (less than three inches) killed in this area in 1958 was 900. The legal bucks taken by permittees and other hunters were recorded in Report number 2221 on regular season kill.<sup>1</sup> Including the legal bucks killed in this area by permittees, it was estimated that the total deer killed in Area 32 by permittees was 1,160. This would mean an overall hunting success of permittees of 69%. The number killed was approximately what game biologists had expected for this area.<sup>2</sup>

Area 31 also included a portion of Marquette County for the special season in 1958. Area 31 extended from Alger County into the northeastern part of Marquette County. It consisted of 278 square miles and had a quota of 1,030 permits. The estimate of the actual number of hunters in this area was 1,010, and the estimate of the actual kill of antlerless deer and bucks with sub-legal antlers was 480. The overall hunting success of permittees was 58%.<sup>3</sup>

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<sup>1</sup>Lee Eberhardt, Game Division, 1958 Regular Season Deer Kill Estimates (Report No. 2221; Lansing: Department of Conservation, May 18, 1959), 2 pp.

<sup>2</sup>Lee Eberhardt, Game Division, Deer Kill Estimates--1958 Special Seasons (Lansing: Department of Conservation, May 18, 1959), p.4.

<sup>3</sup>Ibid.

For 1959, the Upper Peninsula "any deer" area was increased from 3,600 square miles in 1958 to 7,150 square miles in 1959. All told, 35,160 permits will be offered in the 15 special permit areas in the Upper Peninsula in 1959. Biologists hope the permit holders will harvest 14,340 deer.<sup>1</sup>

Three special areas, of the above 15, extend into Marquette County. They include the Huron Mountain Area of 154 square miles in size; the Ralph Area with 1,161 square miles; and the Whitefish Area of 1,078 square miles. These three areas will account for an "any deer" season in the northern, southern, and eastern portions of Marquette County. Only the western and central part of the county remains as a "buck only" area.

Deer Hunting Success in Marquette County.--Deer hunting in Marquette County ranks with the best in the state. Though not hunted as heavily as some other areas, this county, in numbers of deer killed and in hunter success ratio, ranks among the leaders. For the years 1948-1951, the percentage of hunters successful in Marquette County was estimated to range from 36.7 to 43.3%. For comparison, in 1951, only three counties in the Lower Peninsula had percentages over 30%. They were Alcona with 31.0%, Alpena with 36.2%, and Presque Isle County with 38.0%.

Deer hunting information for the years 1948-1951 follows. It was compiled from deer hunters' report cards of the kill

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<sup>1</sup>"U. P. 'Any Deer' Area Increased to 7,150 Square Miles in 1959," The Minings Journal (Marquette), August 21, 1959, p.14.

during the gun season, November 15-30 inclusive.

TABLE 31  
DEER HUNTING INFORMATION FOR MARQUETTE COUNTY  
1948-1951

Year	Hunters	No. Deer Killed	Hunters Successful	Hunters per sq. mi	Deer kill per sq. mi.
1948	9,229	3,593	39.0%	5.0	2.0
1949	9,127	3,950	43.3%	4.9	2.1
1950	9,096	3,771	41.5%	4.9	2.0
1951	8,292	3,041	36.7%	4.5	.16

To get better information on the results of deer kill, and on the new 1952 "any deer" season regulations, the Conservation Department used several new methods of obtaining results. Of special importance was a statistically reliable post-card poll of deer hunters. Most of the figures before 1952 were from hunters' voluntary report cards, which probably have tended to indicate kills somewhat higher than the actual numbers.

For the regular deer hunting seasons for the years 1952-1957, the Marquette County deer kill, using the new system of estimating deer kill, records the figures as shown in the Table which follows:



TABLE 32  
DEER HUNTING INFORMATION FOR MARQUETTE COUNTY  
1952-1957

Year	Marquette County Hunters	Marquette County Deer Kill	U. P. Deer Kill	Michigan Deer Kill
1952	10,230	1,730	19,260	61,600
1953	12,310	2,790	26,340	70,450
1954	10,840	2,730	24,360	53,870
1955	11,540	3,300	29,160	73,620
1956	11,500	2,530	24,220	60,940
1957	11,650	2,465	21,740	62,560

Source: Game Division, Department of Conservation,  
Deer Kill Estimates by County, Regular Seasons--1952 to 1957,  
Report No. 2183, June 5, 1958.

Food and Cover Conditions for Deer in Marquette County.--

Summer food and cover for deer is abundant in Marquette County. There is some deer damage to farm crops in local areas, but with such a small percentage of the area of the county in agriculture, the damage is not extensive. In many areas the forest is in all stages of growth, from open grass, to uncut, big timber.

In the Upper Peninsula, only 10% of the summer range has cover suitable for winter use. Special surveys by game men and conservation officers have recorded 298 different winter deer-yarding areas in the Upper Peninsula totaling 1,689 square miles.<sup>1</sup>

<sup>1</sup>I. H. Bartlett, Game Division, Michigan Deer (Lansing: Michigan Department of Conservation, 1950), p.17.

In winter, yarding areas of heavy cover provide deer with protection from storms as well as food. The deeryards in Marquette County are generally cedar swamps. These may be conifer swamps with cedar varying in amount from none to solid stands. They may be a mixture of swamp conifers and lowland and upland hardwood. Or these yards may be upland hardwoods with a mixture of conifers. The conifer mixture may include cedar, spruce, balsam or hemlock.

Of the 298 deer-yarding areas found in the Upper Peninsula of Michigan, 33 of these are located in Marquette County. The following maps locate these deeryards in the county as well as indicate their condition as of January 1, 1953. Although one of the maps has the date of January 1, 1954, the explanation for this according to Edmund J. Tucker, Game Biologist, is as follows: "The maps of southwest Marquette County, dated January 1, 1954, are actually correct up to January 1, 1953. We have had no change in food conditions in that portion of the county for several years now, so subsequently the Department felt that it would be a waste of money to reprint the map just to make a date change."<sup>1</sup>

On the maps, the food conditions are rated as "Good", "Medium", or "Poor". According to Ilo Bartlett,<sup>2</sup> these rating terms have the following meaning:

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<sup>1</sup>Letter from Edmund J. Tucker, Game Biologist, Department of Conservation, Escanaba, August 14, 1959.

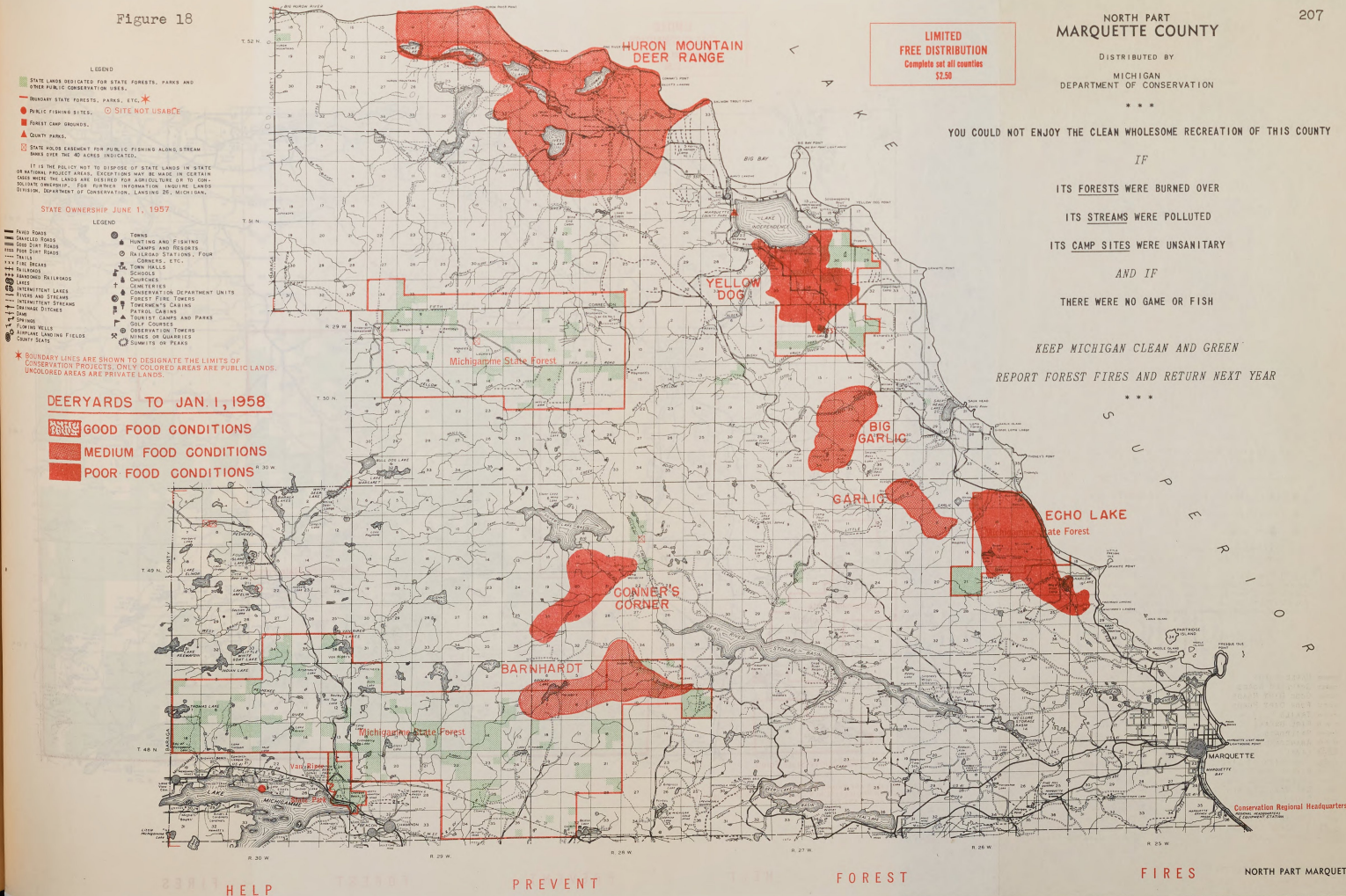
<sup>2</sup>Conversation with Ilo H. Bartlett, Deer Investigations Specialist, Game Division, Department of Conservation, Lansing, August 22, 1959.

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# SOUTHWEST PART MARQUETTE COUNTY

DISTRIBUTED BY  
MICHIGAN  
DEPARTMENT OF CONSERVATION

\*\*\*

YOU COULD NOT ENJOY THE CLEAN WHOLESOME RECREATION OF THIS COUNTY

IF

ITS FORESTS WERE BURNED OVER

ITS STREAMS WERE POLLUTED

ITS CAMP SITES WERE UNSANITARY

AND IF

THERE WERE NO GAME OR FISH

KEEP MICHIGAN CLEAN AND GREEN

REPORT FOREST FIRES AND RETURN NEXT YEAR

\*\*\*

## LEGEND

STATE LANDS DEDICATED FOR STATE FORESTS, PARKS AND OTHER PUBLIC CONSERVATION USES.

BOUNDARY STATE FORESTS, PARKS, ETC.★

● PUBLIC FISHING SITES. ○ SITE NOT USABLE

■ FOREST CAMP GROUNDS.

▲ COUNTY PARKS.

☐ STATE HOLDS EASEMENT FOR PUBLIC FISHING ALONG STREAM BANKS OVER THE 40 ACRES INDICATED.

IT IS THE POLICY OF THE STATE TO DISPOSE OF STATE LANDS IN STATE OR NATIONAL PROJECT AREAS. EXCEPTIONS MAY BE MADE IN CERTAIN CASES WHERE THE LANDS ARE DESIRED FOR AGRICULTURE OR TO CONSOLIDATE OWNERSHIP. FOR FURTHER INFORMATION INQUIRE LANDS DIVISION, DEPARTMENT OF CONSERVATION, LANSING 26, MICHIGAN.

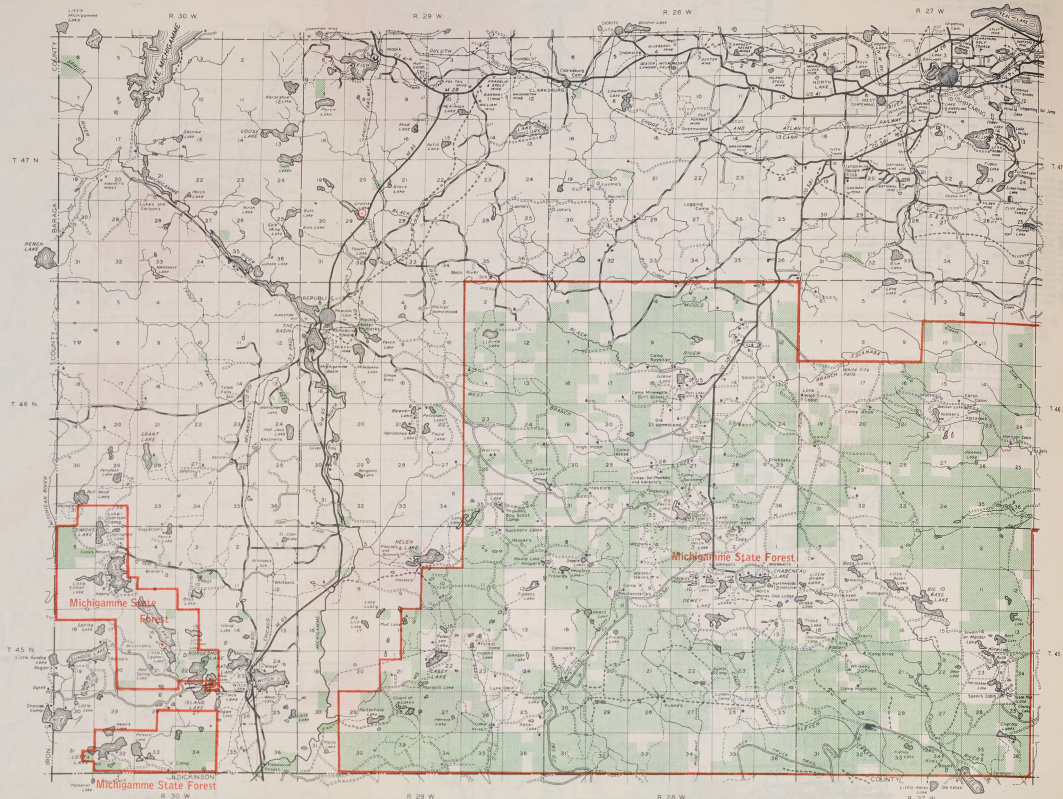
STATE OWNERSHIP JUNE 1, 1957

## LEGEND

PAVED ROADS  
GRAVELLED ROADS  
GOOD DIRT ROADS  
POOR DIRT ROADS  
TRAILS  
FIRE BREAKS  
RAILROADS  
ABANDONED RAILROADS  
LAKES  
INTERMITTENT LAKES  
RIVERS AND STREAMS  
INTERMITTENT STREAMS  
DRAINAGE DITCHES  
DAMS  
SPRINGS  
FLOWING WELLS  
AIRPLANE LANDING FIELDS  
COUNTY SEATS

TOWNS  
HUNTING AND FISHING CAMPS AND RESORTS  
RAILROAD STATIONS, FOUR CORNERS, ETC.  
TOWN HALLS  
SCHOOLS  
CHURCHES  
CEMETERIES  
CONSERVATION DEPARTMENT UNITS  
FOREST FIRE TOWERS  
TOWNMEN'S CABINS  
PATROL CABINS  
TOURIST CAMPS AND PARKS  
GOLF COURSES  
OBSERVATION TOWERS  
MINES OR QUARRIES  
SUMMITS OR PEAKS

LIMITED  
FREE DISTRIBUTION  
Complete set all counties  
\$2.50



★ BOUNDARY LINES ARE SHOWN TO DESIGNATE THE LIMITS OF CONSERVATION PROJECTS. ONLY COLORED AREAS ARE PUBLIC LANDS. UNCOLORED AREAS ARE PRIVATE LANDS.









# SOUTHWEST PART MARQUETTE COUNTY

DISTRIBUTED BY

MICHIGAN  
DEPARTMENT OF CONSERVATION

\*\*\*

YOU COULD NOT ENJOY THE CLEAN WHOLESOME RECREATION OF THIS COUNTY

IF

ITS FORESTS WERE BURNED OVER

ITS STREAMS WERE POLLUTED

ITS CAMP SITES WERE UNSANITARY

AND IF

THERE WERE NO GAME OR FISH

KEEP MICHIGAN CLEAN AND GREEN

REPORT FOREST FIRES AND RETURN NEXT YEAR

\*\*\*

## LEGEND

- STATE LANDS DEDICATED FOR STATE FORESTS, PARKS AND OTHER PUBLIC CONSERVATION USES.
- STATE LANDS RESERVED FOR EXCHANGE WITH FEDERAL GOVERNMENT FOR NATIONAL FOREST PURPOSES.
- UNDEDICATED STATE LANDS SUBJECT TO SALE OR EXCHANGE APPLICATION.
- BOUNDARY STATE FORESTS, PARKS, ETC. \*
- BOUNDARY NATIONAL FORESTS. \*
- PUBLIC FISHING SITES. ○ SITE NOT USABLE
- FOREST CAMP GROUNDS.
- STATE PARKS.

IT IS THE POLICY NOT TO DISPOSE OF STATE LANDS IN STATE OR NATIONAL PROJECT AREAS. EXCEPTIONS MAY BE MADE IN CERTAIN CASES WHERE THE LANDS ARE DESIRED FOR AGRICULTURE OR TO CONSOLIDATE OWNERSHIP. FOR FURTHER INFORMATION INQUIRE LANDS DIVISION, DEPARTMENT OF CONSERVATION, LANSING 13, MICHIGAN.

STATE OWNERSHIP JUNE 1, 1952

## LEGEND

- PAVED ROADS
- GRAVELED ROADS
- GOOD DIRT ROADS
- POOR DIRT ROADS
- TRAILS
- RAILROADS
- ABANDONED RAILROADS
- INTERMITTENT LAKES
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- DRAINAGE DITCHES
- DAMS
- SPRINGS
- FLOWING WELLS
- AIRPLANE LANDING FIELDS
- COUNTY SEATS
- TOWNS
- HUNTING AND FISHING CAMPS AND RESORTS
- RAILROAD STATIONS, FOUR CORNERS, ETC.
- TOWN HALLS
- SCHOOLS
- CHURCHES
- CEMETERIES
- CONSERVATION DEPARTMENT UNITS
- FOREST FIRE TOWERS
- TOWNMEN'S CABINS
- PATROL CABINS
- TOURIST PARKS AND PARKS
- GOLF COURSES
- OBSERVATION TOWERS
- MINES OR QUARRIES
- SUMMITS OR PEAKS

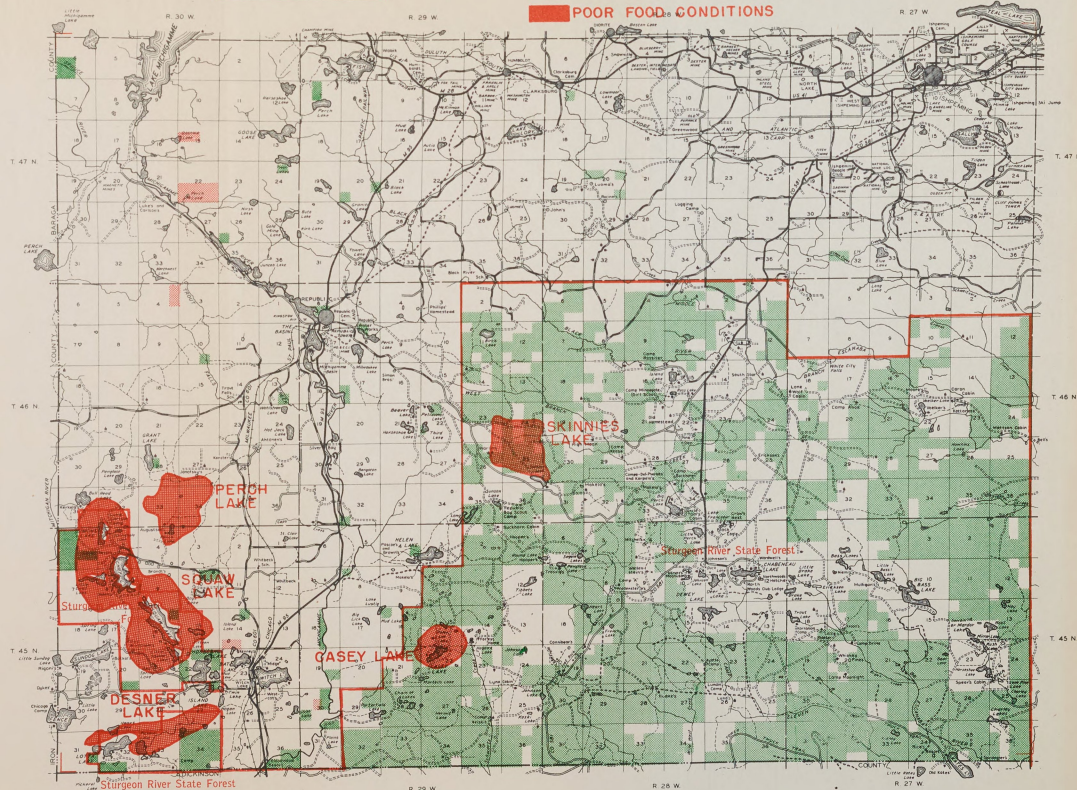
## FREE DISTRIBUTION

Complete set all counties  
\$2.50

DEERYARDS TO JAN. 1, 1954

- GOOD FOOD CONDITIONS
- MEDIUM FOOD CONDITIONS
- POOR FOOD CONDITIONS

Figure 20



\* BOUNDARY LINES ARE SHOWN TO DESIGNATE THE LIMITS OF CONSERVATION PROJECTS. ONLY COLORED AREAS ARE PUBLIC LANDS. UNCOLORED AREAS ARE PRIVATE LANDS.

HELP

PREVENT

FOREST

FIRES

SOUTHWEST PART MARQUETTE



Good--More food is present in the deeryard than the deer eat each year. The yard could carry more deer than are presently using the yard.

Medium Food Conditions--When an average winter prevails, the deer will survive. But during a severe winter, many deer will be lost. The surplus winter food has been browsed or self-pruned, but the annual growth each summer is sufficient to sustain the resident herd each winter.

Poor Food Conditions--More deer are using the yard each winter than the food will sustain. All of the old surplus food is gone. The annual increase in the herd is greater than the annual growth of food. This leaves more deer each year than the food in the yard will support.

As of January 1, 1953, the deeryards of Marquette County are rated as following: three good, 15 medium, and 15 poor. The name of the deeryards of the county and their rating is shown in the table which follows:

TABLE 33

## DEERYARDS OF MARQUETTE COUNTY AND FOOD CONDITIONS

<u>North Part of Marquette County</u>	<u>Food Conditions</u>		
	<u>GOOD</u>	<u>MED.</u>	<u>POOR</u>
Huron Mountain Deer Range-----	X		
Yellow Dog-----			X
Big Garlic-----	X		
Garlic-----	X		
Echo Lake-----			X
Conner's Corner-----			X
Barnhardt-----	X		
<u>Southeast Part of Marquette County</u>			
Sand River-----	X		
Libby-----			X

TABLE 33-Continued.

	Food Conditions		
	GOOD	MED.	POOR
Bear Creek-----		X	
Gwinn-----		X	
Halfway-----		X	
Chandler-----			X
East End Lake-----			X
Gillis-----			X
Bob's Creek-----	X		
Landing Camp-----			X
Slater's-----			X
Northland-----			X
Werner's Creek-----	X		
Sharkeys-----	X		
McFarland-----			X
Larsons-----			X
Ewing Township-----		X	
Little West-----			X
Neglected-----			X
Arnold-----			X
Mashek-Watson-----		X	

Southwest Part of Marquette County

Perch Lake-----	X
Squaw Lake-----	X
Desner Lake-----	X
Casey Lake-----	X
Skinnies Lake-----	X

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Deer Health.--The health of the deer in Marquette County, as in the state as a whole, is considered excellent. Among large numbers of deer autopsies, no serious parasite or disease has been found. Nose or throat bots, liver flukes, and lung worms are present in numbers varying from year to year, but are not a serious menace to the welfare of the herd. Hunters need have no fear of venison from deer infested with these parasites.

Normal temperatures occurring in the Upper Peninsula are not critical for deer. While long periods of sub-zero weather

are detrimental to their welfare, even such occurrences are not necessarily critical if good winter food is plentiful and obtainable, and the deer are in good physical condition at the beginning of the cold period.

Deer Management.--The future of the deer herd in Marquette County, like that of the entire state, depends upon proper game management. Tomorrow's herd will depend upon its food supply. The food supply can be assured only if the herd is successfully managed.

Much research has been, and is being, conducted regarding the proper management of the deer. Some of the methods used to better determine populations of deer are deer drives, pellet surveys, employees deer counts, and highway deer kills.

Management through cuttings of merchantable timber is still the best tool for preserving and improving range. Every effort should be made to maintain as short a rotation of timber as is possible, consistent with other multiple uses of the land. This is not only necessary for deer but for many other species of wildlife.

Other tools for range management include herbicide spraying, controlled burning, and disking along deeryards to increase suckering of favored tree species.

A necessary companion to range management is control of the size of the deer herd. Neither can be successful without the other. A balance between the range, food, and size of herd is essential.

A conclusion drawn from the facts on the deer herd of

Michigan by Lee Eberhardt, Game Biologist and Statistician, was that, "From a biological standpoint, our recent deer hunting regulations have been very conservative. Undoubtedly Michigan's deer herd not only could support a much larger legal deer harvest, but it would also be benefited by such a harvest--in physical condition, fawn production, and condition of the winter range."<sup>1</sup>

#### Moose in Marquette County

The moose, the largest member of the deer family, has been seen recently in Marquette County. Moose had been released in the Upper Peninsula between 1934 and 1937 from the starving herd on Isle Royale. Some of these were seen in Marquette County at that time.

Moose had been seen quite frequently in the eastern Upper Peninsula for the past few years. However, they were not reported in Marquette County since 1937, until the fall of 1958. At this time a large bull moose was sighted near the southeastern city limits of Marquette, near the junction of highways M-28 and U.S. 41.<sup>2</sup>

In the spring of 1959, a moose was seen in the neighborhood of the Sagola Swamp, near the Marquette-Dickinson County line. Then a moose was observed south of Princeton, near Gwinn, in Marquette County. In May, 1959, a moose was sighted

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<sup>1</sup>Lee Eberhardt, Game Division, Deer in 1958, Significance of Recent Information (Game Division Information Circular-113; Lansing: Department of Conservation, August, 1958), p.24.

<sup>2</sup>Files of William E. Laycock, Regional Game Supervisor, Department of Conservation, Marquette, Michigan. June, 1959.

in Marquette County by several authorities. This adult moose was seen in the eastern part of Marquette County, southeast of Dukes.

The moose sighted are believed to be animals that migrated into the Upper Peninsula from Ontario via the St. Mary's River, or their descendants. Over fifty reports of moose in the Upper Peninsula were made by reliable authorities in 1953, most of these from the eastern part of the Upper Peninsula.<sup>1</sup> It is believed that the moose have become established in the Upper Peninsula as the reports included bulls, cows, and calves.

William E. Laycock, Regional Game Supervisor for the Michigan Department of Conservation, Marquette, believes that the habitat in the Marquette area may not be entirely to the liking of moose, which, he thinks, may have caused the animals to range more widely than they would normally. Thus, perhaps, one or two moose could account for all the sightings that have occurred in the county.

#### The Black Bear in Marquette County

The black bear is a common big game animal found in Marquette County. They are occasionally seen crossing the highways, and are quite an attraction for tourists and residents at some of the garbage dumps. Marquette County has no record of a bear attacking or injuring a person, although the black bear has been known to be both troublesome and dangerous in certain parts of the United States. It is the same species of

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<sup>1</sup>Ibid.

black bear found in Marquette County as that reported to be so harmful in some of the National Parks of the West. According to Trippensee, grizzly bears at the National Parks have, to date, given very little trouble to humans. It is the handling of the black bear in the National Parks that has been the problem. Park officials are making every effort to keep down the numbers of persons injured and property damaged.<sup>1</sup> Therefore, people in Marquette County should be warned that it is dangerous to approach bears too closely at feeding areas, such as at garbage dumps. They should also realize that the presence of the black bear need not interfere with the enjoyment that can be found in the out-of-doors and in wilderness areas.

History of Bear Regulations.<sup>2</sup>—Prior to 1925, bears were unprotected in Michigan and could be taken by any means at any time of the year. The bear was designated as a game animal in 1925 and given state-wide protection by the Legislature. Between 1925 and 1934, the state-wide season on bear occurred during the deer season and trapping of bear was prohibited. The bag limit was set at one bear per year during the open season.

In 1927, the Legislature passed a law providing payment for damage done by bears. This law was repealed in 1933; passed again in 1937; and finally repealed in 1939.

<sup>1</sup>Reuben E. Trippensee, Wildlife Management (New York: McGraw-Hill Book Co., Inc., 1948) p.176.

<sup>2</sup>Game Division, History of Bear Regulations (Report #2177; Lansing: Department of Conservation, 1957), 7 pp.



In 1937, there was a special season for taking bear and deer with the bow and arrow. In 1939, the Legislature removed all protection on bear but the authority was given to the Conservation Commission to furnish protection. The Commission adopted a policy, which was retained until 1953, of providing protection only in those counties for which the Board of Supervisors requested protection.

Although by 1952, ten of the 15 counties of the Upper Peninsula had no protection on bear, Marquette County maintained its protection, allowing the hunting of bear only during the regular hunting seasons.

In 1953, bear were again given protection throughout the state. Besides the regular season during the deer season, an additional special fall bear season was provided at this time. Also in 1953, a spring and summer bear season was provided to the Upper Peninsula region.

The Michigan Game Law Digest for 1958 lists the following bear hunting regulations and seasons for Marquette County: (These same seasons and regulations apply to the other counties of the Upper Peninsula.)

September 1-15: Under small game license. Use of dogs permitted.

October 1-November 5: Under small game license. Use of dogs permitted.

October 1-November 5: Under bow and arrow deer hunting license. Use of dogs prohibited.

November 15-30: Under regular deer hunting license. Use of dogs prohibited.

The bag limit for the entire state is one bear per person



per calendar year. It is unlawful to trap bear except under special permit. It is also unlawful to possess a live bear taken in this state.

Bear Kill Statistics.--Marquette County ranks high for the number of bear killed each year, although it is difficult to determine the actual numbers killed within the county.

Records of bear killed in Marquette County since 1936 are included with the other counties of the Upper Peninsula to give the bear kill statistics shown in Table 34. The totals for the Lower Peninsula and for the State are given for comparison. Since 1953 the mail survey (by post cards) of deer hunters has included a question on bear kill. These reports cover only the bear killed by deer hunters and does not include the bear killed under a small game license.

TABLE 34

## BEAR KILL STATISTICS\*

<u>Year</u>	<u>Upper Peninsula</u>	<u>Lower Peninsula</u>	<u>State Totals</u>
1936	306	302	626
1937	248	315	563
1938	270	328	598
1939	336	292	628
1940	556	233	789
1941	419	366	785
1942	354	303	657
1943	346	385	731
1944	608	410	1,018
1945	546	470	1,016
1946	593	697	1,650
1947	900	839	1,739
1948	938	562	1,550
1949	382	334	716
1950	815	364	1,179
1951	749	361	1,110
1952	840	317	1,157
1953	987	224	1,211
1954	690	500	1,190

TABLE 34-Continued.

<u>Year</u>	<u>Upper Peninsula</u>	<u>Lower Peninsula</u>	<u>State Totals</u>
1955 -----	310 -----	310 -----	620 -----
1956 -----	490 -----	320 -----	810 -----
1957 -----	620 -----	200 -----	820 -----

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\*Source: Game Division, History of Bear Regulations, Report #2177, op.cit. p.7.

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### The Bountied Predators

Bounties have cost the State of Michigan over three million dollars since the first bounty was established in 1838. As these bounties are now paid out of the Game and Fish Protection Fund (financed largely by hunting and fishing license money) the sportsmen of Michigan have been paying about \$200,000 annually for the so-called control of foxes, coyotes, bobcats, and wolves.

The number of predators that were turned in for the collection of the bounty in Marquette County for the ten-year period 1949-1958 are given in Tables 35-38.<sup>1</sup> Some of the animals that were turned in for the collection of the bounty in Marquette County may have been taken in the surrounding counties, although this is usually not the case. Regardless, these figures would show the relative abundance of these predators in the Marquette County area.

Red Fox.--The current red fox bounty has cost the sportsmen of Michigan over one million dollars since it took effect

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<sup>1</sup>Obtained statistics for these tables from the files of Raymond D. Schofield, Predator Research Specialist, Game Division, Department of Conservation, Lansing, Michigan.

in 1947. The bounty on the red fox in Michigan is five dollars. Marquette County averaged 253.5 foxes per year for the past ten years (1949-1958). This however, is not as large as many counties in the northern part of the Lower Peninsula. (There is no bounty on the gray fox, although occasionally one is trapped in the county.) See Table 35.

Coyote.--The coyote bounty was established in Michigan in 1935. Since its incurrence, over one million dollars was spent for the bounty of this animal. Michigan bounty trappers have harvested about 3,000 coyotes annually. The average number harvested in Marquette County for the past ten years has been 273.7 coyotes. The bounty on the coyote has been \$15 for a male and \$20 for the female. Bounty figures indicate Michigan's coyote population has remained at a stable level during recent years (see Table 36). The bounty trapping of coyotes does not seem to be making any progress in reducing the breeding stock, but only removes the surplus.

Bobcats.--The bobcat has a peculiar status in Michigan. It carries a bounty of \$5.00 in the Upper Peninsula and is protected in the Lower Peninsula, except during the December 15 to March 15 hunting season. Protection for the bobcat in Lower Michigan resulted from increased interest in winter hunting of bobcats as a sport. In recent years about 800 bobcats are bountied annually in the Upper Peninsula at a cost of about \$4,000 each year. The bounty seems to have no visible effect on the population of bobcats in the Upper Peninsula. When it was removed for three and one-half years and then

TABLE 35

FOXES BOUNTIED FOR THE TEN-YEAR PERIOD 1949-1958

Year	Marquette County	Upper Peninsula	Michigan
1949	299	3,479	24,621
1950	327	2,970	21,124
1951	247	3,110	18,681
1952	232	3,078	16,461
1953	194	3,453	19,532
1954	329	3,870	26,964
1955	173	2,521	25,157
1956	162	2,875	28,476
1957	275	2,960	27,629
1958	297	3,168	31,942

TABLE 36

COYOTES BOUNTIED FOR THE TEN-YEAR PERIOD 1949-1958

Year	Marquette County	Upper Peninsula	Michigan
1949	253	2,740	3,130
1950	135	2,925	3,229
1951	361	2,937	3,231
1952	273	2,691	2,939
1953	225	2,941	3,148
1954	330	3,510	3,715
1955	257	2,982	3,181
1956	276	3,092	3,352
1957	314	3,564	3,859
1958	308	3,335	3,663

reinstated, bounty records failed to note any increase in the bobcat population while the bounty was off. It has often been recommended that the bobcat be removed from the bounty list. The average number of bobcats bountied in Marquette County for the past ten years has been 65.3 (see Table 37).

Wolves.--The wolf bounty, oldest of its type, has been in effect since 1833, except for the 1921-1934 period when all bounties were lifted. Mammalogists, some sportsmen, and conservationists were seeking the elimination of the bounty in recent years because of the waning wolf population. The bounty on the wolf of \$15 for the male, and \$20 for the female, was removed by Legislative action during the spring of 1959. From the figures in Table 38, it can be noted the small numbers that were bountied. The average number of wolves bountied in Marquette County for the past ten years was only 1.1. So few wolves remain in Michigan that it is certain they could not be a serious menace to the deer herd.

All of Michigan's timber wolves are found on the Upper Peninsula mainland or on Isle Royale in Lake Superior. Biologists say wolves now are restricted to seven remote areas in the Upper Peninsula and to Isle Royale. There has been no record of a wolf being killed in the Lower Peninsula of Michigan since 1907.

#### Major Small Game Species in Marquette County

The major small game species in Marquette County include the snowshoe hare, ruffed grouse, ducks, cottontail rabbit, geese, coots, gray squirrels, woodcock, raccoon, and the black

TABLE 37

BOBCATS BOUNTIED FOR THE TEN-YEAR PERIOD 1949-1958

<u>Year</u>	<u>Marquette County</u>	<u>Upper Peninsula</u>	<u>Michigan***</u>
1949	47	454	454
1950	83	642	642
1951	84	690	690
1952	83	833	833
1953	2*	58*	58*
1954	61**	627**	627**
1955	102	846	846
1956	51	763	763
1957	54	761	761
1958	86	804	804

\* Bounty removed after January 31.

\*\* Bounty off from Jan.-July. Bounty restored August 1.

\*\*\* No bounty on bobcats in the Lower Peninsula of Michigan.

TABLE 38

WOLVES BOUNTIED FOR THE TEN-YEAR PERIOD 1949-1958

<u>Year</u>	<u>Marquette County</u>	<u>Upper Peninsula</u>	<u>Michigan*</u>
1949	0	40	40
1950	4	28	28
1951	1	27	27
1952	1	27	27
1953	2	27	27
1954	2	23	23
1955	0	24	24
1956	1	30	30
1957	0	7	7
1958	0	6	6

\* No wolves have been taken from the Lower Peninsula since 1907.

squirrel. Other species are found to a limited extent, but cannot compare in importance to those named. Table 39 gives estimates of the 1958 harvest of these major small game species with comparative data from the 1954, 1955, 1956, and 1957 seasons for the Upper Peninsula. These statistics are given for the Upper Peninsula rather than for Marquette County because after 1953, most statistics on the small game harvest were not kept by the Game Division on a county basis, but rather on a District and Regional basis. As all of the species listed in Table 39 with the exception of fox squirrel, are found in Marquette County, these figures for the Upper Peninsula will probably show relative abundance of the species in this area.

The figures for this table were derived from mail card surveys. These post-card surveys are based on a systematic sampling of duplicate copies of all small game license files. Both resident and non-resident hunters are included. Basic information on the surveys shows that in 1958, there were 4,294 cards mailed out with 3,918 cards returned. This meant that the percentage of cards delivered was 94% for 1958. The per cent return of cards mailed to hunters for the years 1954 to 1958 was all over 90%.

TABLE 39

SMALL GAME HARVEST FOR THE UPPER PENINSULA\*  
1954-1958

<u>Species</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Ruffed Grouse	180,310	157,650	177,050	202,530	185,850
Snowshoe Hares	173,140	146,250	144,950	162,630	211,370

TABLE 39-Continued.

<u>Species</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Ducks	51,220	55,110	50,110	55,810	102,430
Cottontails	30,510	34,780	34,350	38,750	29,520
Gray & Fox Squirrel	14,530	6,830	10,700	2,720	8,880
Geese	1,100	2,210	2,060	2,690	10,390
Woodcock	6,620	3,320	9,170	9,050	7,530
Raccoon	190	370	960	190	2,910
Coots				3,330	9,230
Black Squirrel					1,080

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\*Source: Lee Eberhardt, Game Division, Preliminary Estimates of 1958 Small Game Kill from Mail Surveys (Report #2223; Lansing: Department of Conservation, 1959).

Snowshoe Hares.--Snowshoe or varying hares appear to be the most abundant small game species in Marquette County. Most spruce and cedar swamps contain a population of them.

During 1958, the hunting season in the entire Upper Peninsula on the snowshoe hare, as well as on the cottontail rabbit, extended from October 1 to March 1. The limit was five per day with a maximum of ten in possession of hares or rabbits combined. The season limit was 50 rabbits or hares.

The calculated kill of snowshoe hares in Marquette County according to the Game Division's estimates for the 1953-54 season was 12,228. Marquette County was only surpassed in total snowshoe hares killed during this season by five counties in Michigan. Three of these were Upper Peninsula counties, and the remaining two were Montmorency and Cheboygan counties in the Lower Peninsula.

Cottontail Rabbit.--The cottontail rabbit is not as abundant in the Upper Peninsula as it is in the southern part



of the State. Since the cottontail is a farm-game animal, and not a forest-game species like the snowshoe hare, one would not expect to find the cottontail commonly in a county like Marquette which has about 95% of the county classed as forest land.

However, in 1953, it was estimated that 858 cottontails were harvested in Marquette County; 17,425 in the Upper Peninsula; and 1,616,919 in Michigan. For the numbers harvested during the years 1954-1958 in the Upper Peninsula, see Table 39. The season on the cottontail is the same as that on the snowshoe hare.

Game Squirrels.--The game squirrels in Marquette County include the gray and black squirrels. The fox squirrel is not believed to be found in this county and only rarely in the Upper Peninsula. The gray and black squirrels are commonly found in Marquette County.

In 1958, the hunting season in the Upper Peninsula on the gray and black squirrels extended from October 1 to November 10, and allowed a limit of five squirrels per day; ten (combined) in possession; and 25 per season.

The black squirrel is merely a color phase of the gray squirrel, but has been protected by law for many years in Michigan. There was an open season on the black squirrel in 1958. During the 1958 season, 1,080 black squirrels were harvested in the Upper Peninsula.

Woodchuck.--The woodchuck, the largest member of the

squirrel family in Michigan, is commonly found in Marquette County, especially along roadways and in farming areas. Although protected in the Lower Peninsula, the woodchuck has no protection in the Upper Peninsula and may be taken at any time. It is not considered an important game species in the county. During 1953, it was estimated by the Game Division that 154 woodchucks were taken in Marquette County, 3,515 in the Upper Peninsula, and 6,740 in Michigan.

Ruffed Grouse.--The ruffed grouse, often called "pat" or "partridge" is the chief game bird in Marquette County. It is found throughout the county, but is most abundant in the mixed timber areas where there are second growth hardwoods mixed with evergreens and alder swamps, close to water.

In 1958, the hunting season on the ruffed grouse in the Upper Peninsula extended from October 1 to November 10. The limit per day was set at five birds, the possession limit was set at ten, and the season limit at 25.

The harvest of ruffed grouse for the Upper Peninsula is shown in Table 39, page 223. In 1953, the harvest of ruffed grouse in Marquette County was calculated to be 21,181. During that season Marquette County ranked fourth in the Upper Peninsula counties, and eighth highest in the state in numbers of ruffed grouse killed by hunters.

Sharp-tailed Grouse and Prairie Chickens.--Sharp-tailed grouse and prairie chicken are birds of the open. The prairie chicken prefers wild grasslands. The sharp-tail likes wild

grasslands with some brush and shrubs, but not dense forest land. The sharptail is not native to Michigan but came into the western Upper Peninsula as a result of the large openings created by fires following the logging operations.

The prairie chicken are rare in the Upper Peninsula and it is not known if any are still present in the county.

Some of the sharp-tailed grouse are found in the south-central part of the county, where dancing grounds for these birds are located. The author and his conservation classes last checked a dancing knoll near Sands (Marquette County) in the spring of 1959 and counted 13 grouse on the booming knoll at one time on several occasions. This count compared favorably with the counts made by the author and his students in 1957.

In 1958, the hunting season in the Upper Peninsula on the prairie chicken and on the sharp-tailed grouse extended from October 1 to November 10. The limit for these species was three per day; six combined in possession limit; and 15 per season.

Spruce Grouse and Pheasant.--The spruce grouse, although found to some extent in Marquette County, is a protected game bird throughout the state. It is a bird of the coniferous forest areas.

The ring-necked pheasant is occasionally seen in Marquette County. It is protected in this county as it is in most of the Upper Peninsula. The lack of available food, such as is found on farm lands in southern Michigan, and the deep

snows, are considered limiting factors prohibiting the establishment of the pheasant in this county.

Migratory Game Birds of Marquette County.--The hunting seasons and regulations for the migratory game birds, which includes the waterfowl, rails, snipe, and woodcock, are set by the United States Fish and Wildlife Service, Washington, D.C. In addition to the regular small game license in Michigan, a Federal Migratory Waterfowl Stamp is required of persons over 16 for hunting ducks and geese.

The 1958 season on ducks, geese, and coots extended from October 1 to December 9, and set the daily bag limits at four ducks, five geese, and ten coots. The possession bag limits was set at eight ducks, five geese, and 25 coots. There was no open season on wood ducks, or Ross' geese, and certain restrictions were made on the number of certain species of ducks and geese.

Table 39 on page 224 gives the kill figures on the migratory game birds for the Upper Peninsula. The great increases in numbers of geese and ducks killed in 1958 should be noted. The kill of woodcock, which has a hunting season corresponding to those of the upland game birds, has remained quite constant for several years.

It is known that several species of waterfowl nest in Marquette County on the many lakes, ponds, and rivers. Many others pass through the county on their migratory routes. The headquarters of the Seney National Wildlife Refuge, a 96,000 acre tract, is located about 80 miles east of the city

of Marquette. The Refuge is administered by the Fish and Wildlife Service, United States Department of the Interior. It is the only Federal waterfowl refuge in the Upper Peninsula. At the Refuge, during the period 1935 to 1954, a bird list of 203 different species of birds was compiled. From this list, some of the migratory birds and their status and abundance are given in the table which follows:<sup>1</sup> (As the western boundary of this Refuge is less than 45 miles from the east boundary of Marquette County, it might be assumed that the same migratory game birds might be found in Marquette County as have been recorded at the Refuge.)

TABLE 40

SOME OF THE MIGRATORY GAME BIRDS RECORDED  
AT THE SENEY NATIONAL WILDLIFE REFUGE  
FROM 1935-1954

<u>Common Summer Resident</u>	<u>Uncommon Transient Visitor</u>
Canada Goose	Whistling Swan
Mallard Duck	Snow Goose
Black Duck	Blue Goose
Blue-winged Teal	Pintail Duck
American Widgeon	Lesser Scaup
Wood Duck	Bufflehead
Ring-necked Duck	
Common Goldeneye	<u>Rare Transient Visitor</u>
Hooded Merganser	Gadwall Duck
Common Merganser	Shoveler Duck
American Woodcock	Canvasback
Wilson's Snipe	Ruddy Duck
	Red-breasted Merganser
<u>Occasional Summer Resident</u>	<u>Occasional Transient Visitor</u>
Green-winged Teal	Redhead Duck
	American Coot

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<sup>1</sup>Department of the Interior, Birds of the Seney National Wildlife Refuge (RL-118; Washington, D.C., 1954), 4 pp.

### Fur Trapping in Marquette County

Besides the bountied predators, the following mammals are the chief fur-bearers trapped in Marquette County: beaver, otter, muskrat, mink, weasel, raccoon, and skunk.

The Beaver.--The beaver has been an important fur-bearer in Marquette County since before our early settlers arrived. It is still one of the most important in the county. It is believed that there is a high beaver population throughout most of the northern Peninsula. With a few local exceptions, the colonies are fairly evenly distributed. In a few areas, beaver numbers are below the desirable level and they should be permitted to increase. In many of these areas, beaver benefit both fish and waterfowl populations.

Because of the similar nature of beaver and otter trapping techniques, an otter season concurrent with that on beavers has been the policy.

The beaver and otter trapping seasons were closed in the Upper Peninsula during the years 1947, 1948, and 1949. In the Marquette County area for the years 1951 through 1957, the bag limit was set at six beavers and three otters. In 1958, in this area, the limit on beaver was raised to eight beavers. The limit of three otter remained. The length of the season in this area has usually been about three weeks. Regulations make it unlawful to set traps within 50 feet of a beaver lodge, home or hole. In the following table, the beaver trapped in Marquette County for the years 1950-1959 are given along with the totals for the Upper Peninsula and for the State:

TABLE 41

## THE BEAVER HARVEST FOR 1950-1959

<u>Year</u>	<u>Marquette County</u>	<u>Upper Peninsula</u>	<u>Michigan Totals</u>
1950	794	6,844	8,053
1951	1,370	12,859	14,871
1952	388	3,768	5,509
1953	1,299	14,245	17,517
1954	1,144	6,294	8,493
1955	983	13,413	16,704
1956	603	10,671	13,327
1957	501	4,316	7,674
1958	1,710	15,916	19,585
1959	1,569	13,189	

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The populations of beaver are believed to be quite consistent. The variations in numbers harvested from year to year are often due to low prices for pelts or to a poor trapping season due to unfavorable weather conditions.

Otter.--Although otters are secretive, far-ranging, and difficult to observe, some idea of their population can be obtained by analyzing a large number of reports from department personnel and reliable trappers, and by considering such facts as their life history and reproductive rate. In spite of recent relatively heavy takes, there appears to be little change in otter numbers.

The trapping season and bag limits for the otter were stated with those of the beaver. In the table which follows, the otter trapped in Marquette County for the years 1950-1959 are given along with the totals for the Upper Peninsula and for Michigan.

TABLE 42

## THE OTTER HARVEST FOR 1950-1959\*

<u>Year</u>	<u>Marquette County</u>	<u>Upper Peninsula</u>	<u>Michigan Totals</u>
1950	21	212	327
1951	15	205	339
1952	15	167	329
1953	38	344	533
1954	30	241	434
1955	34	378	609
1956	31	360	668
1957	22	313	577
1958	52	549	885
1959	54	531	

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\*Statistics on otter and other fur-bearers obtained from files of and interview with David H. Jenkins, Mammalogist, Game Division, Department of Conservation, Lansing, July, 1958. Recent (1959) statistics from Conservation office, Marquette.

Muskrat.--Although more muskrats were killed in Marquette County than in any other county in the Upper Peninsula in 1956, the majority of the muskrats trapped in Michigan are trapped from the Lower Peninsula counties. The 1956 and the 1957 computed muskrat kill as compiled by the Game Division, Department of Conservation, Lansing, shows that 6,210 were trapped in Marquette County in 1956 and 2,117 in 1957. According to Game Division computers, these figures are not considered to be exact, but do give relative abundance and indicate relative trends when taken over a period of many years.

The trapping season on muskrats in Marquette County in 1958 was the same as for the remainder of the Upper Peninsula. It extended from November 1 to 30. A license was required to trap muskrats and traps could not be set within six feet of a muskrat house, hole, or home.



Mink.--The computed mink kill as compiled by the Game Division showed that 158 mink were trapped in Marquette County in 1956, and 785 in 1957.

The 1956 trapping season and regulations on the mink were the same as for the muskrat. However, there was a hunting season on mink in addition to the trapping season. In 1958, in this county, the hunting season on mink was from November 1 to December 31.

Weasel.--The weasel is not protected in Michigan, although it should be trapped only when the fur is prime. The computed weasel kill in Marquette County during the winter of 1953-54 was estimated by the Game Division to be 789.

Raccoon.--In recent years the raccoon appears to be increasing in numbers in Marquette County as well as in the Upper Peninsula. Table 39 shows the increase in raccoons harvested in the Upper Peninsula within recent years. In Marquette County in 1953, the number of raccoons trapped was estimated to be only 77 and the number hunted to be 17.

In 1958, the hunting season for the raccoon in the entire Upper Peninsula extended from October 1 to December 15. The trapping season for the same year and area extended from November 1 to 30.

Skunk.--The skunk is abundant in Marquette County although not usually hunted nor trapped. The latest report designating harvest by counties from the Michigan Department of Conservation showed that, in 1953, 189 skunks were killed

by hunters in Marquette County. During the same year, 960 were killed in the Upper Peninsula and 8,918 in Michigan.

The season on the skunk (as well as on the badger) for the year 1958 was from November 1 to January 31. (Badgers are seldom seen or taken in Marquette County. However, they have been reported occasionally.)

#### Game Law Enforcement in Marquette County

Marquette County has a record of some of the worst crimes committed in the history of game law enforcement. A few of the most notorious will be briefly mentioned.

On September 29, 1926, Arvid Erickson and Emil Skoglund, two deputy game wardens for the Conservation Department were shot by a game law violator, after being apprehended in the Gwinn District of Marquette County.

Hundreds of people searched for these officers for two weeks without finding them. Finally, an ex-convict, Roy Nunn, was identified with the crime and was arrested. Eight days after his arrest, Nunn went with the officers to the scene of the crime in a search for the bodies. He finally directed them to the spot where he had placed their bodies in Lake Superior. One of the officers was shot in the back of the head, and the other in the chin and neck. The crime was an atrocious one. Two men were killed outright by a man who had never seen them before the day of the crime. Nunn was convicted in Marquette on December 13, 1926 of murder in the

first degree and sentenced to life in prison.<sup>1</sup>

Another notorious case occurred on October 20, 1936 when conservation officer Andrew Schmeltz was murdered. The slaying occurred in Negaunee Township, Marquette County, a few miles north of Negaunee on the Carp River. Parts of his body were found the next day by members of a searching party. On October 23, State Police took Raymond Kivela, age 27, into custody. Kivela, in a confession to the County Prosecutor, stated he killed Schmeltz about 11 A.M. on October 20.

Schmeltz had been investigating a report of illegal trapping and met Kivela along the trail carrying a .22 rifle without a permit. In the process of arresting him, Kivela struck the officer and knocked him to his knees, and fired two shots into his chest. He then dragged the body about 157 feet to the edge of a swamp. He returned home and purchased 50 pounds of dynamite for the purpose of disposing of the body. That night, he returned to the swamp and set off 70 sticks of dynamite on the body of the officer. Kivela was sentenced to life in prison for first degree murder on December 14, 1936.<sup>2</sup>

\* Current Game Law Violations.--At present, Marquette County is located in District three for purposes of administration by the Michigan Department of Conservation. District three includes, besides Marquette County, Delta County and the west half of Alger County.

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<sup>1</sup>Summarized from the files of Field Administration Division, Department of Conservation, Marquette, Michigan.

<sup>2</sup>Ibid.

According to John Chriske, District 3 Supervisor, Field Administration Division, Escanaba, the number of cases of game law violations in this district for the years 1948 through 1957 have averaged 315. (Of this total, about 97 are handled in Marquette County courts.)<sup>1</sup>

In breaking down the average as to type of cases of game law violations, Chriske gives the following percentages:

Deer -----	35%
Gun -----	25%
License -----	14%
Inland Fish ---	10%
Commercial Fish	5%
Trapping -----	3%
Fire -----	2%
Trespass -----	1%
Miscellaneous -	4%
	<u>100%</u>

#### Habitat Improvement in Marquette County

One of the basic principles of game management is that proper habitat is necessary for the existence of a game species.

During the past one hundred years, northern Michigan has witnessed drastic changes from vast areas of primeval forest where deer, grouse and rabbits were scarce, to the more favorable situation for wildlife, of areas containing a great variation of openings, brushy areas, seedlings and saplings characteristic of the young forest. From this transformation it was learned that the young stage in the development of a forest is the most productive of our native game species.

Twenty years or more of experimentation in habitat work

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<sup>1</sup>Letter from John Chriske, District Supervisor, Field Administration Division, Department of Conservation, Escanaba, July 7, 1958.

in northern Michigan has shown that cuttings, tree and shrub planting, herbicide spraying, and controlled burning are some of the tools that can be used to improve habitat. Of these, cutting is by far the best.

Cutting of Timber--A Management Practice.--As woodland areas mature, the utilization of merchantable timber will steadily gain in importance. The logging of an area is the cheapest and, at the same time, one of the most effective ways to make an area more productive of game. Most mature trees, except mast-producing species and den trees, do very little for game, but the brush and sprouts that result from a logging operation produce optimum conditions for wildlife.

Since 1940, the Game Division has carried on wildlife habitat improvement cuttings through timber sales on the state lands in northern Michigan, including Marquette County. An example is the deeryard cuttings made in deer yarding areas. Deeryard cuttings are defined as any winter logging activity within the boundary of a deeryard or within one mile of the deeryard.<sup>1</sup>

Controlled Burning--A Management Practice.--Controlled burning for the purpose of maintaining openings and controlling the size and density of brushy areas is considered a useful tool in game management. It is about the best tool for improving the habitat for such species as the sharp-tailed

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<sup>1</sup>Game Division, Wildlife Habitat Improvement (Report No. 2187; Lansing: Department of Conservation, 1958), p.3.

grouse. Burning in poor aspen stands also produces sprouts for deer. Controlled burning has been carried on in Marquette County. In the spring of 1957, in Section 31, Town 46 North, Range 27 West, 250 acres were burned to improve sharp-tailed grouse habitat.<sup>1</sup> Another 400 acres of controlled burning is proposed in Marquette County in Sections 9 and 10, Town 43 North, Range 25W.

Herbicide Spraying--A Management Practice.--Herbicide spraying is done to create sharp-tailed grouse habitat by killing a fairly well-stocked area of poor quality aspen. Sprouts grow up from the top-killed trees and the deer may feed where practically no browse was available before.

Thinning and clearing with herbicides was done in Marquette County by the aerial spraying of 640 acres in Town 43 North, Range 25 West.<sup>2</sup> This spraying was done for sharp-tailed grouse, ruffed grouse, and other wildlife.

Flooding Project--A Management Practice.--On the whole wildlife flooding projects in Michigan have produced spectacular results. Because of careful selection of sites to be flooded, the resulting habitat has proven attractive to breeding ducks, and in nearly all cases have been occupied almost immediately after development.

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<sup>1</sup>Department of Conservation, Nineteenth Biennial Report (Lansing: 1957-1958), p.146.

<sup>2</sup>Interview with Ben C. Jenkins, Habitat Management Specialist, Game Division, Department of Conservation, Lansing, July, 1958.

One Pittman-Robertson flooding project was completed in Marquette County in 1953 at a cost of \$10,478.30. It was the Mud Lake Flooding Project near Kawbawgam Lake. Here 190 acres were flooded for waterfowl, fur-bearing animals, and other wildlife.<sup>1</sup>

Herbaceous Seeding--A Management Practice.--Herbaceous seeding in the development of food patches for geese was being carried on in 1958 and 1959 on six acres in Section 9 and 10, Town 43 North, Range 25 West, in Marquette County.<sup>2</sup>

The Soil Bank Program and Game Management.--Recently, the Department of Conservation has extended its cooperation with the Conservation Reserve phase of the Soil Bank Program in an effort to encourage active cooperation on the part of landowners in the Fish and Wildlife phases under this Federal Act. It is hoped that this program will stimulate an active interest among the farmers of all counties of the state in helping to conserve the wildlife resources commonly found on farm lands. Many game management practices including food plots, meadow seeding, and tree and shrub plantings are cost-shared by the Federal Government.<sup>3</sup> (The Soil Bank program in Marquette County is further discussed along with the section

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<sup>1</sup>Interview with M. L. Petoskey, Pittman-Robertson Coordinator, Game Division, Department of Conservation, Lansing, July, 1958.

<sup>2</sup>Ibid.

<sup>3</sup>Game Management, Wildlife Habitat Improvement (Report No. 2187), op.cit., p.16.

on agriculture.)

Conclusion.--Wildlife on the farm brings enjoyment and a sense of satisfaction to those who have expended time and effort to perpetuate a continuous supply. It is hoped that habitat improvement practices will be continued to aid in maintaining or increasing the populations of desired wildlife.



#### XIV. THE RECREATIONAL RESOURCES OF MARQUETTE COUNTY

##### The Need for Recreation

Human beings represent both a major resource and the reason for using other resources wisely. The chief reason for conserving, developing and using our natural resources is to better safeguard the continued advancement of the greatest resource of all--humanity.

America has been a leader in creating time-reducing, labor-saving, or otherwise desirable devices for the comfort, convenience or enjoyment of its people. All of these cultural advances--higher incomes, faster travel, and more leisure time--have given people more time for recreation.

Today, recreation is accepted as a basic requirement of mankind. Outdoor recreational resources improve the bodies of persons who enjoy them, thereby fitting such persons for greater application to their work and more constructive citizenship generally.

##### Types of Outdoor Recreation

The American people, in great numbers, have always sought recreation in the outdoors--in the fields and woods, in the forests, along streams, and on the lakes. Some people get their recreation from viewing beautiful scenery, others from nature study, or from exploring wilderness. Hunting, fishing,

skiing, camping, picnicking, and many other forms of outdoor recreation are enjoyed wherever conditions favor them.

A nation-wide survey completed before World War II showed that touring and sightseeing, fishing, picnicking, and swimming were the most popular outdoor American pastimes. Camping, hiking, boating, nature study, sports and games, and horseback riding stood high in popularity. Hunting, photography, arts and crafts, sketching and painting, and other interests also brought many enthusiasts to the outdoors.<sup>1</sup>

Playgrounds, amusement parks, golf courses, swimming pools, athletic fields and other constructed recreational facilities also serve for the recreation of many.

#### Marquette County's Recreational Facilities

Marquette County, containing 1,178,240 acres of scenic land, with 68 miles of shoreline on Lake Superior, having within its borders 835 inland lakes, and some 1,906 miles of rivers and streams, certainly offers a great opportunity for all of the forms of outdoor recreation previously mentioned.

The Waterfalls of Marquette County.--One of the many scenic attractions enjoyed by many are waterfalls. There are over 150 waterfalls in the Upper Peninsula of Michigan. Of this number, Marquette County has 26. One of these, the Laughing Whitefish Falls, a series of cascades on Laughing Whitefish River, has a total drop of nearly 100 feet. At

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<sup>1</sup>Ruben L. Parson, Conservation American Resources (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1956), p. 235.

present, this area is proposed as a future State Park, and an attempt is being made to acquire more land near the falls to supplement the property given to the state by Celotex Corporation. The list of the falls found in Marquette County follow:

TABLE 43

## THE WATERFALLS OF MARQUETTE COUNTY

<u>Falls</u>	<u>River</u>	<u>Location</u>		
		<u>S.</u>	<u>T.</u>	<u>R.</u>
Upper	Chocolay	2	45N	24W -NW of Carlshend
Frohling	Silver Lead Cr.	29	46N	24W -NE of Gwinn
Little Boney	Escanaba	34	44N	25W - S of Gwinn
First	Escanaba	21	45N	25W - at Gwinn
Second	Esc. E. Branch		45N	25W - near Gwinn
Switzer	Esc. E. Branch	10	45N	25W - N. of Gwinn
Jeell	Esc. E. Branch	28	46N	25W - N. of Gwinn
Cataract	Escanaba	11	45N	26W - NW of Princeton
Escanaba	Escanaba	30	46N	26W - NW of Princeton
Warner	Warner Creek	31	47N	26W - S. of Negaunee
Ely	Ely Creek		47N	27W - S. of Ishpeming
White City	Black River	17	46N	27W - S. of Ishpeming
Black River	Black River	10	46N	28W - SW of Ishpeming
Caps. Cr. Falls	Caps Creek	5	45N	29W - S. of Republic
Trout Creek	Trout Creek	13	46N	30W - SW of Republic
Morgan Creek	Morgan Creek	33	48N	25W - SW of Marquette
Morgan Creek	Morgan Creek	30	48N	25W - SW of Marquette
Carp River	Carp River	29	48N	26W - W. of Marquette
Reany	Reany River		48N	26W - NW of Marquette
Big Garlic	Garlic	5	49N	26W - NW of Marquette
Yellow Dog	Yellow Dog	16	50N	27W - NW of Marquette
Slate	Yellow Dog	21	50N	28W - NW of Marquette
Alder	Alder Creek	27	50N	28W - NW of Marquette
Ives	Outlet Ives Lake	34	52N	28W - S. of Big Bay
Mountain Stream	Mountain Stream	29	52N	28W - NW of Big Bay
Cliff	Cliff	10	51N	29W - W. of Big Bay
Peshekee	Peshekee			

Source: Upper Peninsula Development Bureau, Upper Peninsula Waterfalls (Marquette: Mimeographed 7 page report), p. 6-7.

The Sport of Hunting.--With the thousands of acres of state-owned public hunting grounds and the many additional acres of private lands upon which there are few or no hunting

restrictions, Marquette County is an ideal area for hunting, trapping, and enjoying the many forms of wildlife that abound in the county. The sales of hunting licenses will attest to the popularity of this sport.

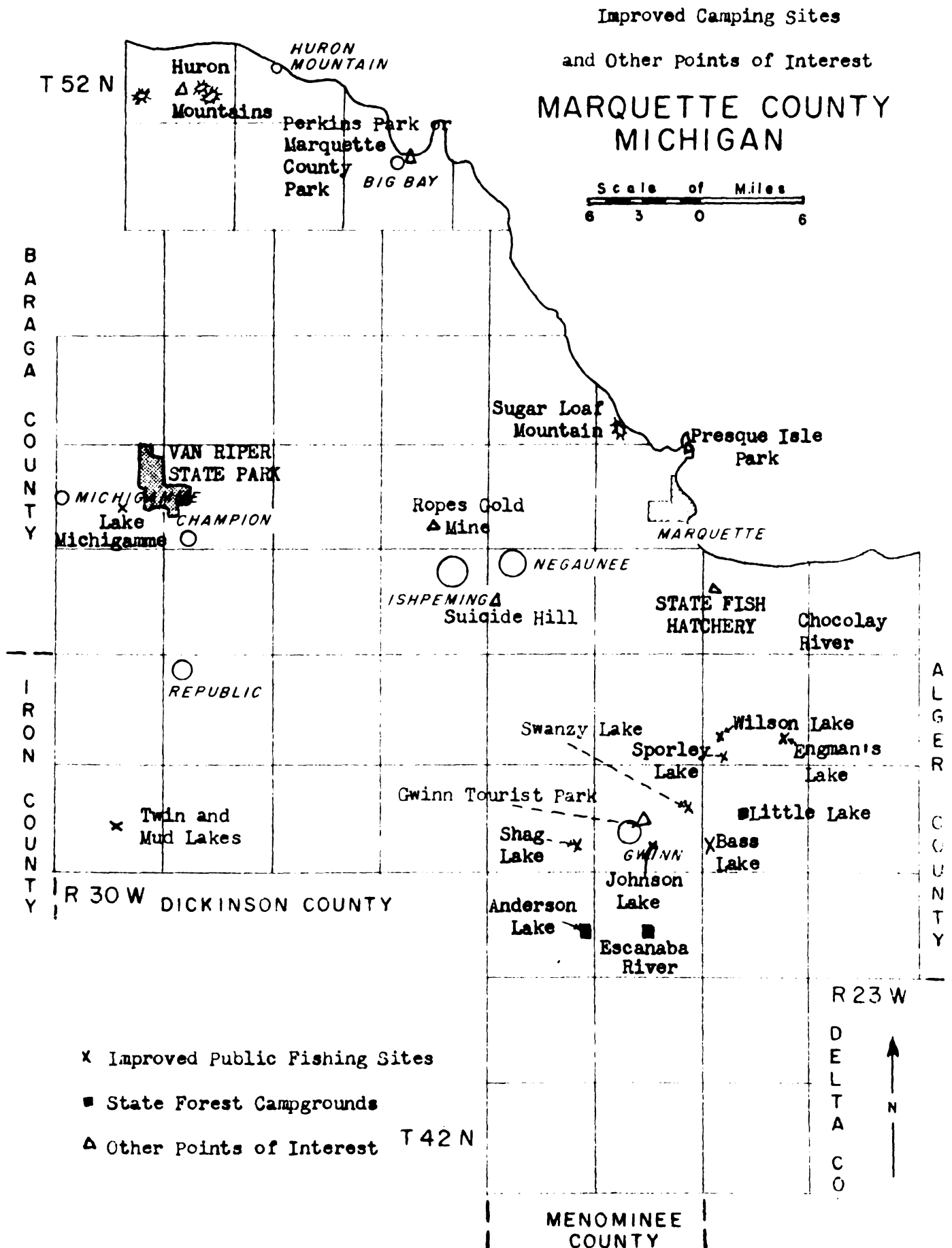
The Sport of Fishing.--The sport of fishing in Marquette County includes deep-sea trolling on Lake Superior, as well as fishing on the inland lakes and streams.

Marquette County is fortunate in having 38 public fishing sites. Of these 38, nine are improved to accommodate campers. (Figure 21 on the following page will help locate these recreational sites.) These improved fishing sites have been developed to facilitate the placing of a boat in the water, provide parking, camping, and sanitary facilities.

Camping and fishing are also available at the three State Forest Campgrounds, namely on Anderson Lake, on the Escanaba River, and on Little Lake. Their locations are indicated on Figure 21. The facilities at the State Forest campsites include water, toilets, stoves and tables.

The State Park in Marquette County.--For those that like to go camping, swimming, and boating, in addition to fishing and other outdoor sports, at one spot, Marquette County has a State Park. It is Van Riper State Park. It is located two miles west of Champion and twenty miles west of Ishpeming on U.S. 41. The park contains 840 acres with one-half mile of frontage on the east end of Lake Michigamme, and one and one-half miles of frontage on the Peshekee River. The facilities

Figure 21





at this park include excellent swimming and picnic facilities, electrical service for campers, running water, and bathhouse. Camping is increasing to the capacity of the park. The figures for 1958 show the attendance at Van Riper to have been 132,150, and 2,023 camps.

According to Regional Parks Supervisor Glenn Gregg, it is planned that additional land will be secured in the future. Also, the present county road through the park will be re-routed out of the heavy use area, and additional campground and picnic areas will be developed. A new parking lot is now under development.<sup>1</sup>

County and City Parks in Marquette County.--Besides the State Park, the county has a park system, as well as city parks in Marquette, Ishpeming and Negaunee. The county parks include: Perkins Park, also known as the Marquette County Park, located at Big Bay; and the Gwinn Tourist Park. There is also a park at Republic. At these parks, camping is permitted. Camping is also permitted in the Marquette Tourist Park, a city park in Marquette.

As an example of some of the recreation areas provided by the city of Marquette, the Marquette Planning Board, in 1951, listed the following facilities, along with the size of the area:<sup>2</sup>

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<sup>1</sup>Letter from Glenn C. Gregg, Regional Parks Supervisor, Department of Conservation, Marquette, Michigan, July 8, 1958.

<sup>2</sup>Marquette Planning Board, Marquette, Michigan, City Plan, 1951, Table 10, p. 55.

Athletic Field -----	9.62 acres	Quarry Pond -----	13.90
Harlow Park -----	4.51 "	Shiras Park -----	23.35
Hurley Field -----	1.88 "	Marquette Tourist Park	51.15
Lakeside Park -----	1.12 "	Williams Park -----	3.24
Palestra -----	2.75 "	Ski Tow Area -----	2.08
Presque Isle Park --	209.10 "	Kirlin Hill -----	80.00
Total - 402.70 Acres			

#### Winter Recreational Facilities in Marquette County.--

Marquette County is a good example of what is meant by the claim that Michigan is an all-year playground. At Ishpeming, the winter sport enthusiasts will find a 300-acre winter playground. Here is found superb ski hills with tow, slalom runs, and toboggan slides. It was at Ishpeming in 1887, that a group of Swedish and Norwegian immigrants organized the Norden Ski Club, believed to be the first ski club in Michigan. The first Ishpeming ski tournament was held in that year. It was at Ishpeming on February 21, 1904, that the National Ski Association was founded. In 1954, in Ishpeming, the National Ski Association dedicated the National Ski Museum and Ski Hall of Fame. In this building is kept the National trophies, plaques, publications on skiing, both foreign and American, and relics and displays of skiing equipment.

The nationally famous Suicide Hill is located on Cliffs Drive, midway between the cities of Ishpeming and Negaunee. Here each year, outstanding ski jumpers from throughout the nation and world compete. The ski jump, built in 1925, has a vertical height of 280 feet and a length of 860 feet. The



original slide had a gap of 78 feet between the take-off and the landing hill, earning for it the name of "Suicide Hill". This gap was later filled in to avoid accidents.

Just south of Marquette on highway 553 is located the Cliffs ski area. A 1550-foot Constam T-Bar and three rope tows add to the skiing pleasure on these hills. Cliffs Ridge offers hills for the expert or beginner. "Suicide Run" for experts is one mile long. Also for experts is the "Rocket Run", 1600 feet long, and the "Chute", 2600 feet long. The "Contour" is a 2800 feet long hill for the intermediate skier, and the "Ridge Run", 3600 feet long, for the novice skier. There are also cross-country trails, and a beginners area.

Additional Recent Developments.--Besides the many forms of recreation possible in Marquette County, some new tourist attractions were developed in the county for the summer of 1959. One of these was the Ropes Gold Mine development, about five miles north of Ishpeming. This abandoned mine was operated from 1883 to 1897 and produced about \$650,000 worth of gold in that period. After the mine was closed, about \$160,000 worth of gold was recovered from the tailings. A guided tour of this mine is now offered.

Surface tours of iron mines in Ishpeming and Negaunee, at the Mather "A" and "B" shafts were conducted during the summer of 1959.

Another tourist attraction, new in 1959, was the Mount Marquette scenic drive, just south of Marquette. The scenic drive leads to the crest of Mt. Mesnard--about 1,125 feet



17. The Cliffs Ridge Ski Area south of Marquette.



18. A 1550-foot Constam T-Bar adds to skiing pleasure.

above sea level. Here one can get a panoramic view of the city of Marquette, of numerous hills and valleys, and many miles of Lake Superior's shore.

These developments are indicative of a growing awareness in this county of the importance of the tourist trade and of recreation to meet the needs of the vacationers.

Future Recreational Prospect.--Legislation before the United States Congress in July, 1959, proposes the federal acquisition of ten ocean and lake shore recreation lands. They would be called national shore areas. Included, in these ten, are 90,000 acres of the Huron Mountains in northern Marquette County, and 100,000 acres of the Pictured Rocks-Grand Sable Dunes area in Alger County--just east of Marquette County.

Should the Huron Mountains area become a part of the National Park Service, it would open up much of the nearly inaccessible, rugged, Huron Mountains wilderness. The Huron Mountains has peaks ranging in height from 1,800 to 2,000 feet above sea level. These mountains form the second highest land area in Michigan and are only exceeded by the Porcupine Mountains in Ontonagon County. Acquisition of the Hurons area would be a difficult task since most of the land is in private ownership. The Huron Mountain Club is the largest development there. Its holdings cover 26,000 acres and contain lodges erected by the small group of rich executives who belong to the organization. The Ives Lake Resort, northwest of Big Bay, is the only resort in this huge area that is open to the public.

## XV. CONSERVATION EDUCATION IN MARQUETTE COUNTY

### Emphasis on Conservation Education

One of the major promises for a successful future for Marquette County lies in the careful management and wise use of its natural resources. Most conservation authorities are agreed that the only hope of getting people to practice wise use management of resources is through effective conservation education.

Citizens of Marquette County have been aware of this to a great extent. The various conservation agencies have long stressed the importance of conservation education and have endeavored to insist that their employees give high priority to requests for assistance in conservation education lectures, demonstrations, field trips, and outdoor education programs, especially when teacher groups were involved.

Radio and television programs have been devoted to conservation education as well as to other phases of conservation. A weekly television program is currently being sponsored by the Michigan Department of Conservation headquarters in Marquette.

The local daily newspaper, The Mining Journal, has carried an outstanding weekly feature entitled "Outdoor Page", edited by Kenneth Lowe. This "Outdoor Page" has brought acclaim to the editor by winning an award for having the best outdoor page

of the State newspapers. Besides the Outdoor Page, numerous conservation articles and editorials emphasize conservation education.

Several of the communities in Marquette County have organized conservation or sportsmens' clubs and many are very active in conservation affairs.

Scout groups, 4-H clubs, extension clubs and other groups have often devoted much time and effort to conservation activities and the acquiring of conservation knowledge.

### Conservation Education in the Schools

Northern Michigan College, Marquette.--The need for teachers capable of teaching conservation as a course and of integrating conservation into the various classes has been partially met by Northern Michigan College.

A student at this college, under the General Curriculum or<sup>a</sup> under a teaching curriculum, may obtain a major or a minor in the field of conservation. Also, two-year pre-professional programs in conservation, forestry, and agriculture are offered here.

Prior to 1951, Northern Michigan College has required that all candidates for the Secondary Teachers Provisional Certificate take at least one course of three-semester hours credit in conservation. (This condition has been waived for students who have taken forty or more semester hours of science credits.) Many students in the elementary curriculum have elected conservation as a course to fulfill their science

requirement. However, there is decidedly a need here for curriculum revision in order to take a course in conservation and still complete their rigid course requirements in four years.

Northern has been fortunate in obtaining the Munuscong Conservation Laboratory, near Pickford in Chippewa County, where they have conducted field courses in conservation for teachers since 1947. This has provided an opportunity for many teachers who lacked training in conservation to acquire such knowledge.

Pilot School in Conservation Education.--The Graveraet High School in Marquette is one of two high schools in the Upper Peninsula of Michigan chosen to participate in a state-wide pilot project in conservation education. The other is Sault Ste. Marie. This pilot project is sponsored by the Michigan Department of Public Instruction in cooperation with the Michigan Department of Conservation and other agencies and colleges. Through faculty committees, a system of conservation teaching, especially through the integration of conservation into the various grades and courses, is formulated and later tried in the classrooms.

How conservation education is being integrated, or woven, into studies in various areas in the Marquette Public School system was graphically demonstrated recently in a project of the eleventh grade United States history classes at Graveraet High School. A mock television set was used to illustrate the role of natural resources in American history. Class members

also prepared papers in which the relationship between conservation and history was brought out.

Reaction of pupils to the project was enthusiastic. As was quoted in The Mining Journal,<sup>1</sup> one student said: "I think our conservation project was very worthwhile to the entire student-teacher body as it showed that conservation can be taught in any class. It also proved that students are interested in conservation, even though they don't actually take the subject in school." Another student was quoted as saying: "By linking conservation with history, we see the mistakes made in the past and what needs to be done in the future. What we do now to further conservation is important, as it will be history itself tomorrow. If records had not been kept to illustrate the waste of our natural resources, I am sure that little would be done today to protect them. I am sure that anyone who has come in contact with parts of our conservation projects will be far more conservation-conscious in the future."

Besides the emphasis on the integration of conservation, Graveraet High School is the only school in the Upper Peninsula that offers three or more courses of conservation as regular high school courses. It also offers an extensive firearm safety program each fall to any interested student and is required of those that plan to hunt deer.

Schools of Marquette County Rated.--Rodney Smith, Conservation Education Consultant for the Michigan Department of

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<sup>1</sup>"History, Conservation Studies Integrated in Graveraet Classes," The Mining Journal, Marquette, April 17, 1959.

Conservation, Marquette, visits and surveys all of the schools of the Upper Peninsula (as the author did as Conservation Education Consultant for the six-year period 1949-1955.) In 1958, Mr. Smith rated the schools of the Upper Peninsula as to their conservation education accomplishments. Marquette County schools rated as follows for the year 1957-1958:

TABLE 44

CONSERVATION EDUCATION IN THE SCHOOLS OF MARQUETTE COUNTY<sup>1</sup>

<u>Marquette County School</u>	<u>Course</u> <u>High School</u>	<u>Conservation</u> <u>Integration</u>	
		<u>Elementary</u>	<u>Secondary</u>
Champion (Humboldt Twsp.)-----		Fair	Fair
Gwinn (Forsyth Twsp.)----- Yes -----		Fair	Fair
Ishpeming High School-----		Good	Good
Marquette:			
Bishop Baraga High School-----		Fair	Good
Graveraet High School----- Yes -----		Excellent	Excellent
J. D. Pierce High School-----		Good	Good
Michigamme High School-----		Fair	Fair
National Mine High School-----		Good	Good
Negaunee High School-----		Fair	Good
Republic High School-----		Fair	Fair
St. Paul's (Negaunee)-----		Fair	Good

<sup>1</sup>Source: Rodney Smith, School Visits, U.P., 1957-58.

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Besides the acquiring of knowledge regarding the natural resources and their wise use, often many conservation problems can be solved through conservation education in the schools. For example, vandalism in parks can be minimized and more co-operative attitudes toward conservation agencies and toward research can be developed. This has been evidenced in Marquette County by letters to the editor of the local newspaper from students expressing a more cooperative view of current



conservation measures.

### School and Community Forests

The following school and community forests were recorded for Marquette County, about 1950, in the office of Roy Skog, Extension Forester, Michigan State University Extension Service, Marquette:

#### 1. School Forests.

Forsyth Township Schools (Gwinn)---	200 acres
Humboldt Schools (Champion)-----	40 acres
Ishpeming Schools-----	40 acres
Marquette Public Schools-----	80 acres
Michigamme Public School-----	40 acres
National Mine High School-----	40 acres
Negaunee High School-----	52 acres
North Lake School-----	40 acres
Republic High School-----	40 acres
Richland Township School (Palmer)--	40 acres

#### 2. Community Forests.

Marquette Boy Scouts-----	20 acres
Marquette, City of-----	240 acres
Marquette County Road Commission---	14,200 acres
West Branch Township-----	80 acres
Republic Township-----	74 acres
County of Marquette-----	7,297 acres

The above acreages in school and community forests in Marquette County is an indication of the interest in forest management in the county. As poor forest management on private forests and on small woodland acreages is an area that needs attention, these school and community forests should serve as a good example of what should be done on private forest lands. Some of these forests listed above are currently used for various forestry and conservation practices other than just the planting of seedling trees.

Problems in Conservation Education

A problem in conservation education is to have a people well-informed concerning the many phases of conservation, but especially in those areas of greatest concern to the welfare of the immediate community. This could be brought about through more active adult education programs in conservation, plus a vigorous program of conservation education in the schools and colleges of the State.

A major problem in conservation education seems to be the lack of understanding by so many educators of the importance of conservation and of the necessity of such training in the schools. As an example, the college located in Marquette County has many on its faculty staff, including some in administrative roles, that either do not know enough about conservation education to realize its importance or else do nothing about their obligation. Curriculum requirements for teachers have been rigidly set allowing little freedom for students to elect a course in conservation. If the present autocratic system of curriculum requirements does not evolve into a more democratic system, or if conservation is not added to this autocratic system as a requirement, future teachers will graduate as unprepared to cope with the problem of conservation education as have the teachers of the last few decades.

It is hoped that those in Curriculum Committees and in Administrative positions will not overlook their obligations of seeing that all teachers are adequately trained in this important phase of learning.

Proper land use, especially in the area of tourist attractions, has been gaining momentum in Marquette County, but more is desired in this area in order to further the economic stability of the county. The solution to this problem, besides the training in schools, is primarily one of adult education with the assistance of Chambers of Commerce, and the Upper Peninsula Development Bureau.

## XVI. SUMMARY, CONCLUSIONS, AND FUTURE OUTLOOK

### Summary

Marquette County, located in the north-central part of the Northern Peninsula of Michigan, is Michigan's largest county. It contains 1,841 square miles with sixty-eight miles of shoreline on Lake Superior.

The general elevation of the eastern part of Marquette County ranges from 602 to 1,150 feet above sea level. This part is underlain by sandstone and limestone. Most of the western part of the county is situated on elevations ranging from 1,300 to 2,000 feet above sea level. This western part is composed for the most part of igneous and metamorphosed pre-Cambrian rocks. The entire area was covered during the Pleistocene Age by ice sheets which left a heterogeneous mantle of rocky drift of various thicknesses and composition. The area is essentially a part of a deeply dissected plateau highland featured by rock knobs, deep valleys filled with glacial debris, high sandy hills, and sand plains, all of which contain many lakes and swamps.

Marquette County was laid out by the Legislature in 1843 and its rich iron ore deposits were discovered the following year near Negaunee. Settlement followed promptly.

Marquette County had a population of 47,654 people as of April 1, 1950 (U.S. Bureau of Census). The city of

Marquette is the county seat and the largest city of the county. It had a population of 17,202 in 1950. Marquette has two of the longest iron ore docks in America from which vast quantities of iron ore are shipped. Ishpeming and Negaunee are the other incorporated cities of the county. Both are centers of the iron mining industry. Michigamme, Republic, Champion, Gwinn, Humboldt, National Mine, Palmer, North Lake, and Greenwood are or were mining locations in the county.

Marquette County is bountifully endowed with natural resources, particularly in iron, timber, water, fish, wildlife, and recreational features which attract tourists. Within its borders are found more inland lakes (835) and more miles of stream (1,906) than are found in any other county in Michigan. Marquette County's water resources are important today, but will become increasingly valuable. The abundant supply of water for industrial purposes represents one of the county's principal long-range attractions for industry.

Over ninety per cent of its lands are in forest areas. This provides forest products and considerable areas for wildlife production. During recent years, wildlife improvement has become one of the major programs of the Game Division. The various habitat improvement programs in Marquette County include tree and shrub planting for wildlife, improvement cuttings, controlled burning, herbicide spraying, disking and flooding projects.

Iron ore provides the main source of income in the county. More than 275 million long tons of ore have been produced on

the Marquette Range. The yearly production is approximately five million tons of ore valued at \$28,000,000.

### The Future of the Iron Ore Industry

It is believed that the iron ore reserves in this county are sufficient for many decades of continued mining activity. Extensive research on the beneficiation of low grade iron ores has been developed to the extent that beneficiation plants now are in production.

Harry Hardenberg, Mining Geologist for the Geological Survey Division, Michigan Department of Conservation, estimated the 1958 iron ore reserve of Michigan to be 150,091,140 tons, a value of \$93,912,400.<sup>1</sup> In addition, it has been estimated that Michigan has some two billion tons of low grade iron ore reserves. Some of these reserves are of the type now being utilized; others cannot now be economically processed by known methods. That portion of the total amount of iron formation which is economically concentratable today is relatively small. However, through continued research in the field of beneficiation, there is the possibility in the future that methods will be improved so that this vast formation may also be mined as economic iron ores.

Competition from foreign ores, many of which are of higher grade than Michigan ores, offers a constant threat to the continued economy of the iron ore industry. The nation's

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<sup>1</sup>H. J. Hardenberg, and R. Reed, General Statistics Covering Costs and Production of Michigan Iron Mines, Lansing: Department of Conservation, 1957, Table VIII.

steel industry consumed more than 33 million tons of foreign ores in 1957, contrasted to less than a fifth of that amount imported just a few years ago. If the mining industry is to survive all mining costs must be kept to a minimum and it must be prepared to supply the steel industry with high quality products. Continued exploration and research by the iron mining companies is necessary to keep the industry in a strong competitive position.

### The Outlook for Agriculture

Agriculture is rather general in the county. Much of the land is not suited to intensive agriculture because of the topography, sandy soils and the short growing season. The average length of the growing season in Marquette County is 113 days. Where the soils are adapted, good production of agricultural crops results. The principal agricultural enterprises are dairying and potatoes.

As climatic conditions limit the type of crops which can be successfully grown, no great variation in crops grown has occurred over a period of years. The 1980 census reported hay, oats, and potatoes as the principal crops. The 1950 census showed the same crops to be the principal ones grown.

The climate and soil in several sections of the county are excellent for the growth of high grade potatoes. The agricultural soils in general are quite acid in the county. This is a desirable condition for the production of white skinned potatoes. The Ebasco report suggested: "There would seem to be an opportunity to publicize Upper Peninsula potatoes

in the same manner that Idaho and Maine potatoes have been. Upper Peninsula potatoes are claimed to be sweeter in flavor than others, making them particularly desirable for potato chips--an advantage not commonly promoted."<sup>1</sup>

The climate of Marquette County is also suited to strawberry and raspberry production, especially near the Lake Superior shores. The amounts produced in the county at present are not sufficient to satisfy local consumption demands.

Farm authorities in the Northern Peninsula believe that dairying is the type of farming that has the greatest commercial potential. About eighty per cent of the eggs and poultry meat are imported at the present time.

In some sections of the county there is much low-grade, cleared farm land formerly devoted to farming, which is now abandoned. The best use for this land is probably for forestry and wildlife purposes. Part-time farming and forest tree farming are becoming more important in the county.

#### The Outlook for Forestry

Marquette County is the most heavily forested of any of the state's eighty-three counties. More than 95 per cent of the county is considered forest land. Of this forest area, commercial forest land occupies 1,121,300 acres.

The main problem in forestry in Marquette County and in the Upper Peninsula is the lack of markets. Upper Michigan

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<sup>1</sup>Ebasco Report, op. cit., p.69.



sends about 63% of its pulpwood into Wisconsin for manufacture.<sup>1</sup> West Coast and Southern pulpwoods are now displacing some Upper Peninsula pulpwood. The Upper Peninsula, unable to market all its pulpwood, is now watching its surplus grow.

According to Harold Nygren, Supervisor, Upper Michigan National Forests, the marketing problem of Upper Michigan forests is too much wood of the wrong species. As an example, the most plentiful product is aspen pulpwood. The annual cut of this product is only about one-third the amount that should be cut. Local mills use only a small amount of aspen and the Wisconsin mills have plenty of aspen close by. If the demand for forest products of all kinds were greater in the Upper Peninsula, forest practices in this area would improve. Investment of capital in forest improvement is good business only when the demand for forest products justifies the investment. The market for forest products in the Upper Peninsula has not reached this point yet.<sup>2</sup> What are needed most, in this area, are better markets for inferior species and logs. Before good quality wood can be grown, poor timber must be cut.

E. L. Demmon, U.S. Forest Service, recommends that all forestry operations should be integrated to cut down waste and to obtain fuller utilization of all material harvested. Industry should promote good forestry practices on all forest lands, regardless of ownership. All should cooperate to assure

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<sup>1</sup>W. Paul Strassmann, Economic Growth in Northern Michigan, East Lansing: Michigan State University, 1959.

<sup>2</sup>Harold Nygren, Supervisor, Upper Michigan National Forests, The Mining Journal, Marquette, August 12, 1959.

that the forest resource is utilized conservatively and to the greatest good.<sup>1</sup>

### The Outlook for the Tourist and Resort Industry

The tourist and resort industry is rapidly becoming one of the major sources of income in the county. The climate and scenic attractions of the county are becoming better known, and Marquette County welcomes an increasing number of vacationists each year providing services for the tourists, hunters, fishermen, and winter sports enthusiasts. With the construction of the Mackinac Bridge completed, it is expected that the tourist trade will continue to increase.

One of the most comprehensive recent studies of the prospects for the growth of the Upper Peninsula was made by W. Paul Strassmann of Michigan State University.<sup>2</sup> He believes that tourism is more profitable for Northern Michigan than either mining, manufacturing or agriculture. He believes that the same factors that discourage intensive agriculture and industrialization, should make Northern Michigan attractive to people seeking vacations. Strassmann claims: "People do not travel to Northern Michigan to eat cherry pies, to sleep in motels or to buy what the people of the north have to sell. They mainly come to enjoy what is freely available: cool air, forest scenery, blue water. It is the supply of these freely

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<sup>1</sup>E. L. Demmon, Forest Situation in the Lake States, Station Paper No. 13; Lake States Forest Experiment Station, Forest Service, U.S. Department of Agriculture, Sept., 1948, p. 6.

<sup>2</sup>W. Paul Strassmann, Economic Growth in Northern Michigan, op. cit. (2/27/59).

available attractions which must be maintained, in terms of conservation and access, if sales of other goods are to rise."<sup>1</sup>

For boating, fishing and swimming, new lands must be acquired if the public is to enjoy remote shores made accessible by new highways. If supply does not keep up with demand, if tourists get less for their money in Michigan, they will go elsewhere.

### Future Expressways and Tourism

An expanded resort area penetration will result from the completion of an expressway-type highway from Michigan's southern border to Sault Ste. Marie, according to a preliminary report submitted by Dr. Frank Suggitt, Michigan State University professor, to the Michigan Good Roads Federation.<sup>2</sup> Suggitt pointed out that the expressway and expressway connections will permit out-of-state tourists from Cincinnati, for example, to travel into areas as distant as Marquette County in the same time period as present routes permit them to cover the distance to Houghton Lake. As a result of this future time-distance change, Suggitt predicts a great increase in Michigan's tourist-resort business.

The time-distance change will also provide a market area expansion of five million more people in Illinois, Kentucky, and West Virginia, who will be as close time-wise as Cincinnati is today.

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<sup>1</sup> Ibid.

<sup>2</sup> "Future Expressways in Michigan Plan to Shrink Distances," The Mining Journal, November 10, 1958.

The expressway-type highways will shrink the distance time-wise between the industrial area of Detroit and the recreational area of the northern part of the state by one-third to one-half over present routes. The savings in transportation costs and time and increased tourist and recreational trade resulting from the shrinking distance effects, will add much to Michigan's economic standing and to that of Marquette County.

#### Effects of Sawyer Air Force Base

It is predicted that the K. I. Sawyer Air Force Base will become the largest "industry" in the area, larger even than the iron mining industry.

The Sawyer Air Force Base is one of the major links in the nation's chain of defense. It is located twenty miles south of the city of Marquette on a 4,400 acre site in Sands Township. The base was activated in 1956 and has been under construction for four years. Three squadrons of planes will be based at Sawyer. Included will be a fighter group, a squadron of heavy jet bombers, and a squadron of jet tankers.

More than 6,000 military and civilian personnel will be stationed or employed there. With their families, this will mean a population increase of nearly 10,000 (about 20%) for Marquette County.

For any county in the Upper Peninsula to gain 10,000 in population in three years is almost unheard of--at least since the days of the copper rush. In other words, within three years, Marquette County will be gaining the equivalent in population of another entire county. (The 1950 census showed

four counties in the Upper Peninsula to have had less than 10,000 people. These were Keweenaw, with 2,912; Baraga, 8,037; Luce, 8,147; and Schoolcraft, 9,148. Two other counties, Alger and Ontonagon, had only slightly over 10,000.)

Projects planned for the next fiscal year call for ten million dollars of work and for the two succeeding years, over four million dollars and five million dollars of work, respectively. Operation and maintenance of the base, when it becomes fully operational, will involve annual expenditures of around six million dollars. Air Force officers say about half of this will be spent locally. It can be concluded that the activation and operation of the K. I. Sawyer Air Force Base has had, and will continue to have, a great impact on the economy of Marquette County.

#### The Upper Midwest Economic Study

The Ford Foundation has appropriated \$350,000 for a four-year study of general economic conditions including the business and industrial structure of the Upper Midwest. The study includes Minnesota, Upper Michigan (Marquette County), Montana, North and South Dakota, and western Wisconsin. The study is being conducted by the University of Minnesota and the Upper Midwest Research and Development Council. This is a pilot study and it is hoped it will be useful in guiding future similar investigations in other areas of the United States.

"Every activity which contributes to wealth-making in the area will be examined in the study from the standpoint of its present position and future possibilities and the relation

of each to the others. The character and capabilities of the region's labor supply will be considered. The research project also will cover mineral and other material resources, water supply, power and transportation facilities."<sup>1</sup>

Analysis of information obtained is expected to yield two principal products: (1) An understanding of all factors which either contribute to the economic welfare of the region and its people, or which detract from it. (2) A forecast of the future place of the region in the economy of the United States, taking into account shifts in population and changes in inter-regional competition, changing demands for goods and services and recommendations for action needed to accelerate sound economic growth of the region.

No thorough economic study of a large American regional economic unit, such as the Upper Midwest has yet been made. Completion of such a study will furnish the basic information needed for designing similar studies for other regions and for the nation as a whole.

It is hoped that the same functions served by the above study will also result from this dissertation "An Inventory and Historical Development of the Major Resources of Marquette County, Michigan".

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<sup>1</sup>"Northern Peninsula Included in Upper Midwest Economic Study," The Mining Journal, Marquette, December 15, 1958.

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