# GREAT LAKES REGION - ISLAND POTENTIAL

# BEAVER ARCHIPELAGO

By

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A COMPREHENSIVE PROBLEM REPORT

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# PREFACE

There exist in the Great Lakes many islands, some possessing the landscape character once captured in the poems by the romantic poets such as Thoreau, Whitman, Longfellow, and Emerson. Their poetic verse portrayed the ideals of nature, man partaking as an insignificant being. Today there is a cry for a man-nature companionship. Such need is ever apparent and vast problems are created in man's pursuit for a harmonious relation with nature. In the following verse, concerning the Apostle Islands in Lake Superior, a contemporary poet has captured this relation.

> On these rocks the Chippewa built their fires
> and watched for their enemies on the mainland.
> On these rocks the French voyageurs rested,
> repairing their canoes and dreaming of riches
> worth a queen's ransom.
> On these rocks the French priests and soldiers
> signed the treaties in the name of their king.
> Now they are gone.
> Scattered and buried and blown away on the timeless
> winds.
> Only the rocks remain.
> The rocks and the great inland seas.

The reasons for my choice of this topic are capsulized in the above verse. Interest in individual island land forms, their origin and cultures, and their current and future use has prompted my investigation of the Great Lakes Region, the Great Lakes and the islands existing within the limits of the shoreline of the Great Lakes. The unique physical aspects of the islands are their isolation by way of natural zoning, and the aesthetic qualities of water orientated landforms. This provides a superlative area for educational and recreational use.

The cultural heritage, as suggested in the above poem, is also a unique aspect of the islands. Each past cultural activity on the islands in the Great Lakes has indicated a need for the isolation provided by an island. Today the isolation factor is of equal importance. Because of this factor, only a limited amount of activity can be expected.

It is unfortunate that some of these islands are receiving intensive development, thus destroying an ideal environment for education and recreation for the present and future populous. For this reason, I selected to pursue for my comprehensive problem, a topic that focuses upon guiding considerations of the unique qualities of islands. It brings together certain criteria for consideration in the effective use of these islands where the aesthetic values of the natural landscape are sought as a goal.

It is hoped that this comprehensive problem will act as a catalytic agent and that further unguided development of the islands, such as that occuring on Beaver Island, as discussed, be discouraged. And that these guiding considerations are suggestive of the need for planning recreational and educational features in the Islands of the Great Lakes.

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## STATEMENT OF THE PROBLEM

Guiding considerations for a man-nature type use of the islands in the Great Lakes are the primary functions of this comprehensive problem. It is written for those who are interested in preserving the more unique aesthetic values of the environs for educational and recreational use.

The author wishes to emphasize the influence of the Great Lakes Region and the Great Lakes in determining the potential use of these islands. It is in this consideration when interwoven in a design study of the islands heritage, form and character that the value of these islands can be found.

The regional development has been influenced to a great extent by its physical features and cultural heritage. When examined, these two features illustrate the reasons for the dispersal of today's population. The region's population, way of life, and mode of transportation, upon further examination, are suggestive of the quantity and quality of people who have this need - a companionship with nature.

Increasing numbers of forest areas, state parks and private recreational centers have originated in hopes of fulfilling this need for a man-nature experience. The current and proposed park system on the mainland will satisfy the major activities in recreation such as swimming, picnicking, and boating, but the more intimate experiences of nature such as wilderness areas need further study. Because of the isolation factor, many of the Great Lakes islands resemble in character a wilderness state. How can man take part

in a nature type companionship in these wilderness areas, not destroying their true character? This question remains.

It is suggested in this comprehensive problem that the cultural heritage and physical features should be the governing criteria in designating a use for the Great Lakes islands.

Today these natural qualities can be discovered on the islands, but how long are they to remain? What is needed to preserve this type of recreational and educational feature? Should development occur, if so, to what degree?

Chapter I Great Lakes Region

While the concern of this paper is oriented towards a form-use design study of the Great Lakes islands, this cannot be fully realized without the knowledge of the total influences of the Great Lakes Region. In this chapter discussion will deal with two key aspects (face to face), the region defined, its location and size, its formation and settlement; the Great Lakes, their location, size and use.

The size of the Great Lakes Region as defined by its drainage basin includes portions of Minnesota, Wisconsin, Illinois, Indiana, Ohio, Pennsylvania, New York, the provinces of Quebec and Ontario, and the entirety of Michigan. Some 292,000 square miles are included of which approximately 94,620 square miles represent the areas of the five Great Lakes. (Figure 1).

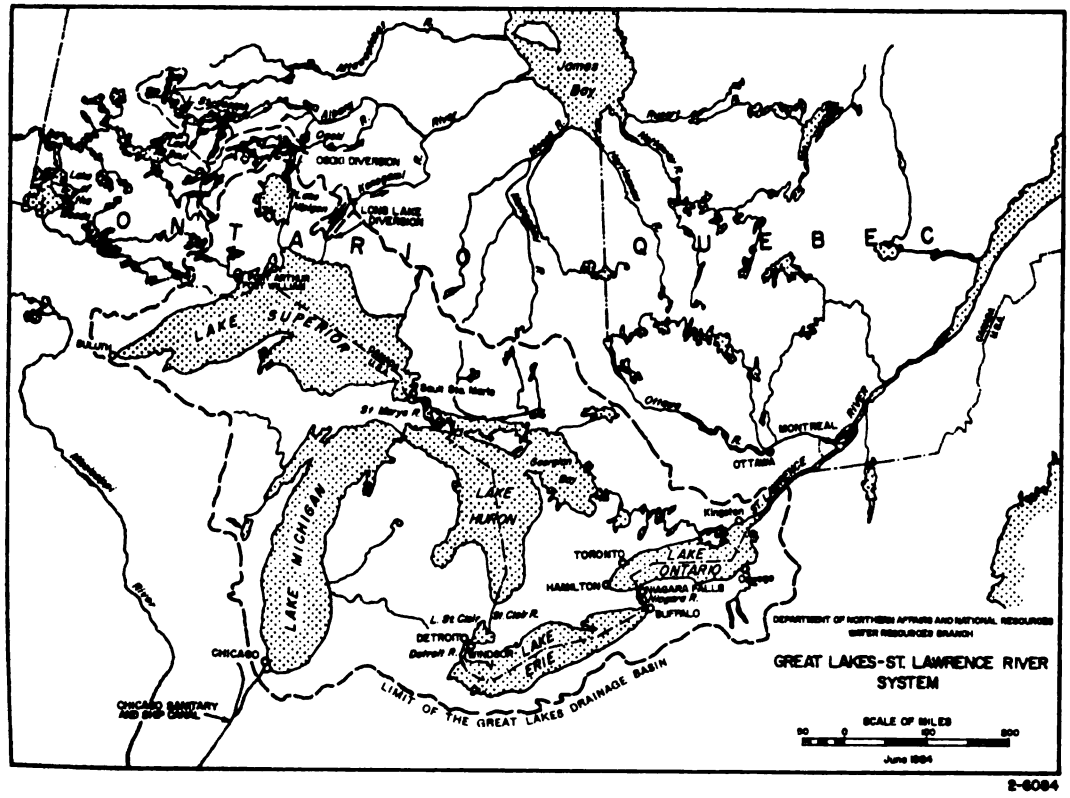


Figure 1

Of this total land area there are 4,971 miles of shoreline in Canada and a total of 9,763 miles of Great Lakes shoreline.[1]

Table 1. Shoreline of the Great Lakes, United States Lakes Survey, 1955

| States | Superior | Michigan | Huron | St. Clair | Erie | Ontario | Total |
|---|---|---|---|---|---|---|---|
| Minn. | 189 | | | | | | 189 |
| Wis. | 325 | 495 | | | | | 820 |
| Mich. | 917 | 1,058 | 934 | 120 | 54 | | 3,083 |
| Illinois | | 63 | | | | | 63 |
| Indiana | | 45 | | | | | 45 |
| Ohio | | | | | 312 | | 312 |
| Pa. | | | | | 51 | | 51 |
| New York | | | | | 77 | 331 | 408 |
| U.S. Total | 1,431 | 1,661 | 934 | 120 | 494 | 331 | 4,971 |
| Ontario | 1,549 | | 2,416 | 66 | 366 | 395 | 4,792 |
| Total | 2,980 | 1,661 | 3,350 | 186 | 860 | 726 | 9,763 |

Sources: U.S. Lakes Survey, Michigan figures slightly revised by Michigan Department of Conservation.

Table 1 indicates the shoreline of the eight Great Lakes States on each of the six Great Lakes (including Lake St. Clair). Lake St. Clair is actually not considered a Great Lake because of its size. The Region as defined by its potential user, those who work or vacation in the area, is much larger than that of its drainage basin and one of diverse complexity. Access to this region whether by air, boat or highway, provides guide lines for the volume of users. The developed region, in turn, provides the type of use and significantly implies the quantity of users. As the growth of this region occurs, consideration of various uses such as industry, agriculture and recreation is essential. Figure 2 illustrates the concentration of populous in the Great Lakes region.

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[1] Howard J. Pincus, Great Lakes Basin, American Association For the Advancement of Science (No. 71), (Washington, D.C.: 1962), p. 218.

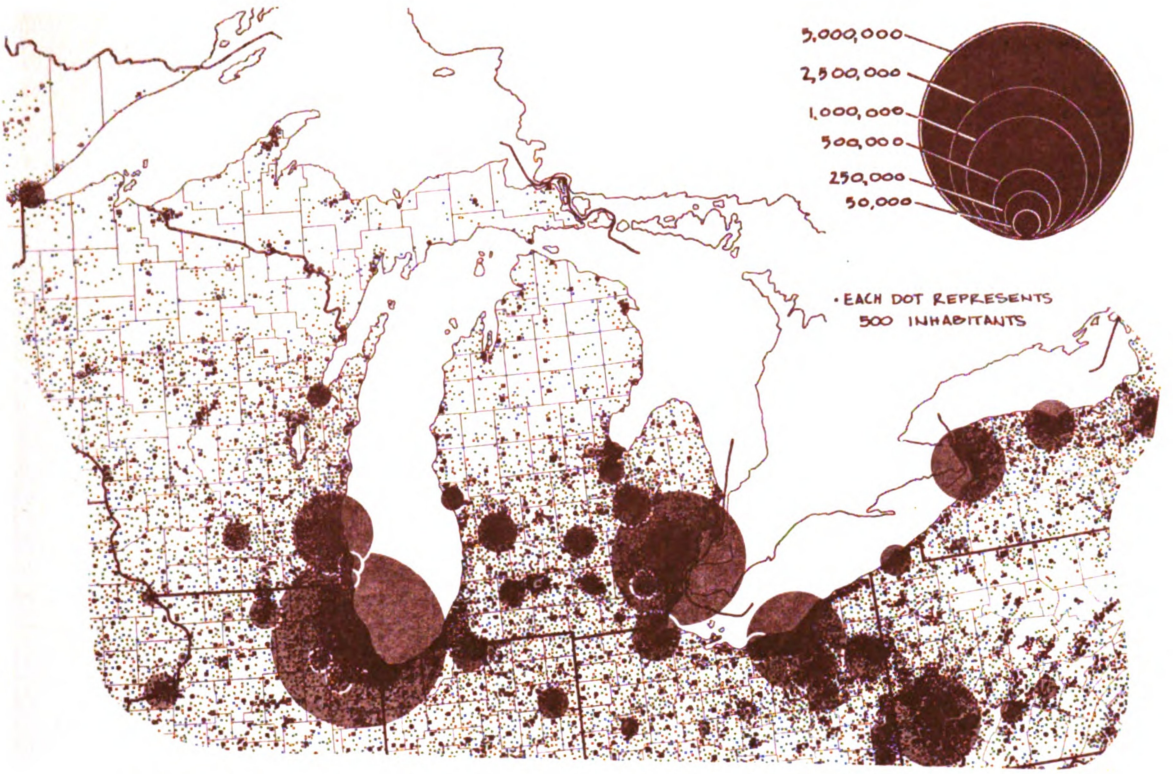


Figure 2

Present growth trends indicate there will be some 350 million people in the United States by the year 2000, and that 97% of the interim increase will concentrate in urban areas. Already two-thirds of our more than 180 million people are urban dwellers. Supercities already forming will stretch for unbroken hundreds of miles along all our great watercourses, coasts and major highways. The Great Lakes States, with a present population of more than sixty-six million, will have their share of this gigantic growth. [2]

Table 2 indicates the past, present and future populations of these Great Lakes States. If, in the Great Lakes States, the transportation network continues to improve and expand, and if the population and urban growth pattern continues, a metropolitan area will eventually stretch from Milwaukee to Chicago, around the southern edge of Lake

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[2] Ibid., p. 282

TABLE 2. Populations of the Great Lake States 1800 - 1960, Project 1975.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mich. | | 9 | 212 | 749 | 1,637 | 2,421 | 3,668 | 5,256 | 6,372 | 7,823 | 10,683 | 22.8 |
| Minn. | | | 6* | 172 | 781 | 1,751 | 2,387 | 2,792 | 2,982 | 3,414 | 3,931 | 14.5 |
| Wisc. | | | 31 | 776 | 1,315 | 2,069 | 2,632 | 3,138 | 3,435 | 3,952 | 4,826 | 15 |
| Ohio | 45 | 581 | 1,519 | 2,339 | 3,198 | 4,157 | 5,759 | 6,908 | 7,947 | 9,706 | 12,251 | 22.1 |
| Ill. | | 55 | 476 | 1,712 | 3,078 | 4,822 | 6,485 | 7,897 | 8,712 | 10,081 | 12,060 | 14.6 |
| Ind. | 6 | 141 | 686 | 1,350 | 1,978 | 2,516 | 2,930 | 3,428 | 3,934 | 4,662 | 5,891 | 18.5 |
| Pa. | 602 | 1,049 | 1,724 | 2,906 | 4,283 | 6,302 | 8,720 | 9,900 | 10,498 | 11,319 | 13,415 | 18.5 |
| N.Y. | 589 | 1,373 | 2,429 | 3,881 | 5,083 | 7,269 | 10,385 | 13,479 | 14,830 | 16,782 | 20,774 | 13.2 |
| | 1800 | 1820 | 1840 | 1860 | 1880 | 1900 | 1920 | 1940 | 1950 | 1960 | 1975 | % Increase 1950-1960 |

* 1850

Source: Statistical History of U.S. from Colonial times to the Present time. (except the 1975 estimate which comes from the U.S. News and World Report, 9, Aug., 1957).

Michigan; secondly, from Detroit around Lake Erie to Toledo and Cleveland; and thirdly, from Buffalo to Rochester. This nebulous structure or supercity could form what noted scholar J. Gottmann refers to as, a Megalopolis. According to Gottmann, the idea of a city being a tightly settled and organized unit in which people, activities, and riches are crowded into a very small area clearly separated from its non-urban surroundings must be abandoned. Rather, a city in this region spreads far and wide around its original nucleus; it grows amidst an irregularly colloidal mixture of rural and suburban landscapes; it melts on broad fronts with other mixtures, of somewhat similar though different texture, belonging to the suburban neighborhoods or other cities.[3]

Whether the growth pattern of these Great Lakes States be called a Megalopolis, a Supercity or simply a nebulous structure, it is most clear that this growth will eventually occur, and bring with it all the problems inherent in any large city. However, these problems will be on a more diverse and larger scale. Three distinct areas will occur in forming this Megalopolis: (1) the urban structure, (2) the agricultural area, and (3) the recreational area. Figure 3, illustrates the location of these areas. Existing conditions concerning population, current land use, soils, land forms, vegetation, and transportation networks have been used in the formulation of these areas.

How this extraordinary complex of land and water came to be is a part of the history of the Great Lakes. It is a part that goes back millions of years into the geologic history of the region. It is

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[3] Jean Gottmann, Megalopolis, Twentieth Centure Fund, (New York: 1961), p. 5.

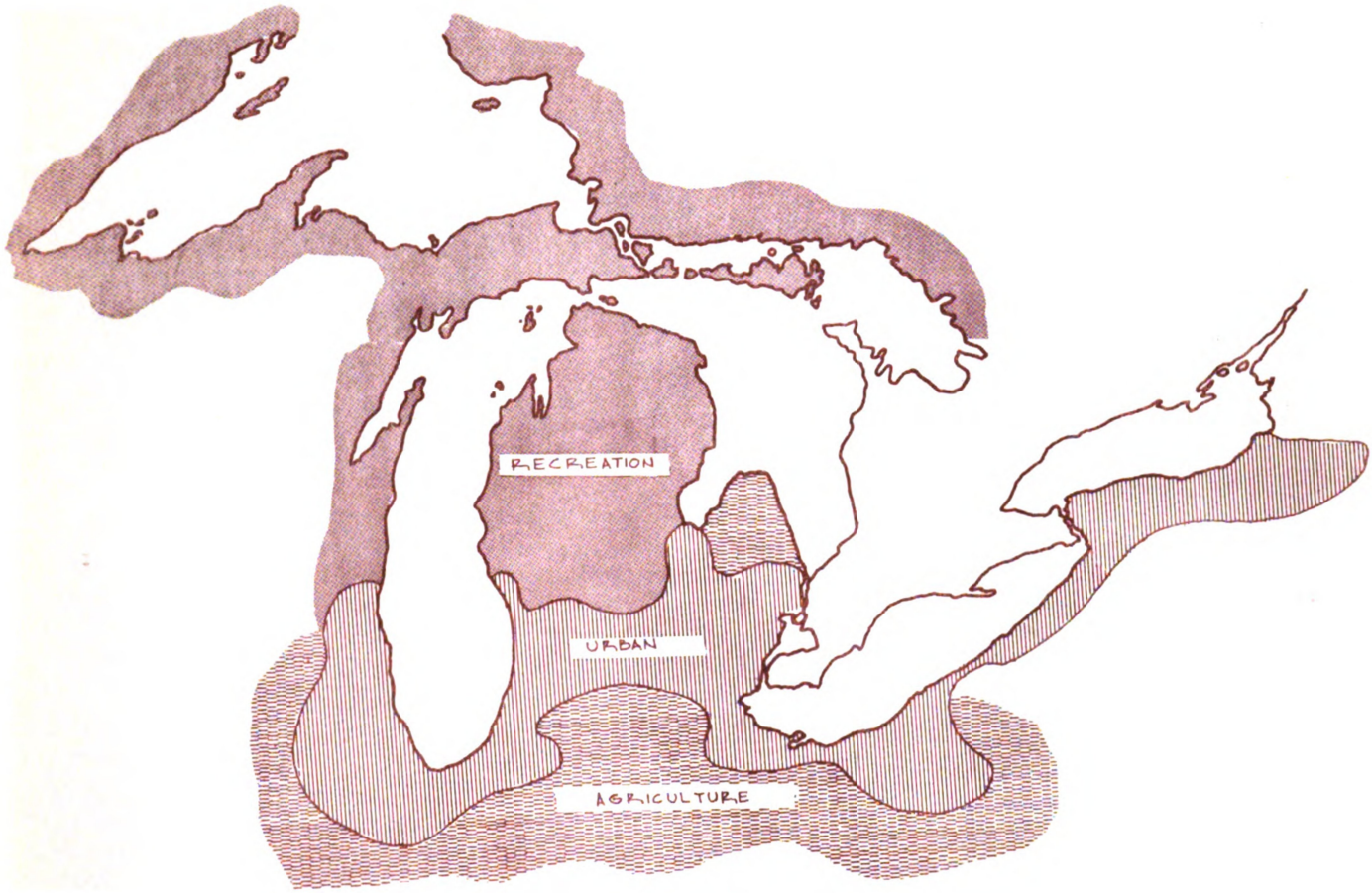


Figure 3

important to note the bedrock formations below the surface, the relief patterns, and the mineral content of this region because of economic factors and land use value involved. Certain bedrock and relief pattern have not only an economic mineral value, but also have a recreational value, Two examples of these values are Niagara Falls located between Lake Erie and Lake Ontario and the Pictured Rocks in the Upper Peninsula of Michigan. The simplified version of the geological map (Figure 4) is useful in showing the relationship

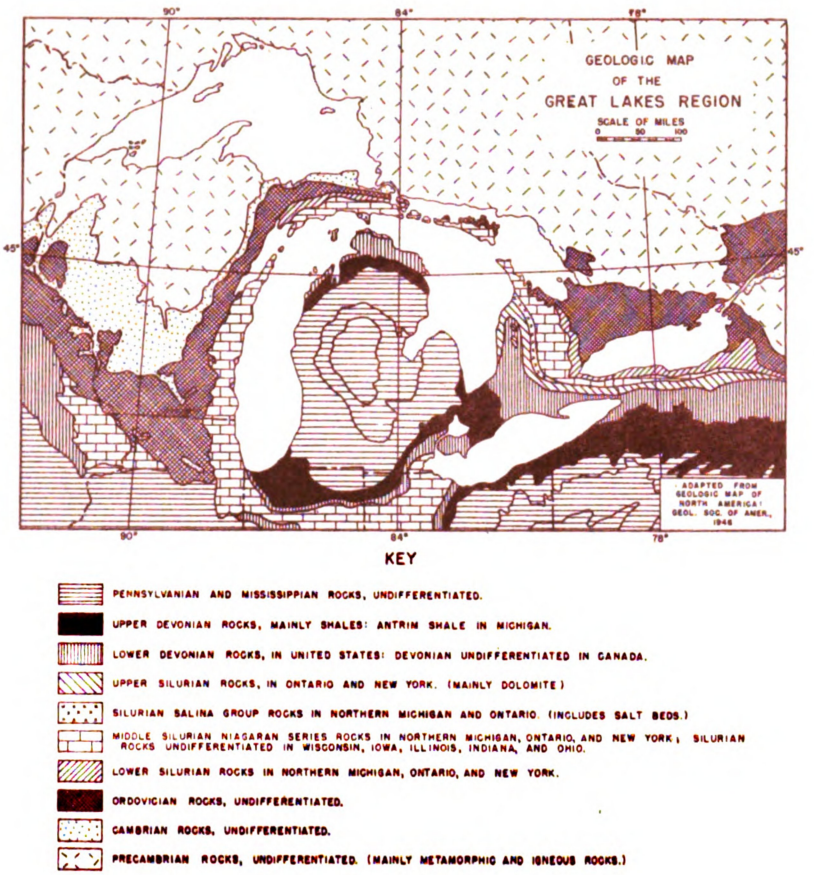


Figure 4

between the bedrock types and the locations and forms of the lake basins. Rocks of the Pre-Cambrian period are mainly hard and dense metamorphic and igneous rocks which form the Canadian Shield that lies north of the lakes and extends southward into central Wisconsin. The Niagaran dolomite forms the western shore of Lake Michigan and the Door Peninsula, which separates Green Bay from Lake Michigan; it occurs along the northern shore of Lake Michigan and extends eastward, it forms the islands which separate Lake Huron from the North Channel and Georgian Bay. Curving southeastward, it forms Saugeen Peninsula between Lake Huron and southern Georgian Bay, and further south it forms the highlands of southern Ontario. Extending eastward the dolomite forms the cuesta between Lake Erie and Lake Ontario, over which the Niagara River drops at Niagara Falls. Onto the east it parallels the southern shore of the Ontario basin.

The land surface reflects the bedrock surface below; the effects of glacial erosion and deposition on the latter, and the extensive preglacial lakes which spread far outside the present Great Lakes shores. Major features of preglacial bedrock relief dominate the landscape in but few places, mainly near the margins of the present Great Lakes. The land surface within the Great Lakes Region is generally a plain with minor land forms developed by glacial erosion or deposition. In the area immediately north of Lakes Superior, Huron and Ontario in Canada, and in northern Wisconsin and Michigan in the United States, there are large areas in which glacial deposits are thin or absent. Here also the bedrock surface may show vertical relief of up to 300 feet. The sparse glacial deposits have blocked drainage and created numerous minor lakes and swamps. Glacial drift deposits dominate the landscape mainly south of this area. Land forms include linear belts of end moraine, generally rough, having local relief of 30 to 100 feet or more and extensive undulating till plains with local relief of 10 to 50 feet. Flat outwash plains are extensively local but generally less so than are till plains.

Indication of the extent of the lake waters at higher stages is evident by examining the lacustrine plains which extend inland from the present Great Lakes shores at many places. Certain topographic features commonly occur in these lake plains. The land forms are generally flat and have a gentle slope toward the present lakes. Dunes commonly occur on these plains. There are low gravel ridges which mark the era of glacial advance or retreat. Lacustrine plains, although numerous, do not occur at all points along the present Great Lakes shoreline. In some places steep bluffs have developed because of wave action and bedrock location. These appear along many

stretches of the eastern and western shorelines of Lake Michigan and along the southern shores of Lake Erie and Lake Superior, whereas the gentle slopes spotted by long stretches of dunes occur on the northwest side of Lake Superior and to the east of Lake Michigan and further eastward to Lake Huron. Fairly broad lacustrine plains surround the areas of Saginaw Bay, Lake St. Clair and Detroit, and extend some 50 miles east of Georgian Bay. Lake plains generally extend or surround the remainder of the Lake Erie and Lake Ontario area.[4]

The geological events have given this region certain characteristics nowhere else apparent. The physical features and the qualities of the Great Lakes and the many rivers and lakes provided a catalysis for man's eventual discovery and settlement. These natural features were important factors in the establishment of the original inhabitants, the Indians, as well as the white man who followed. The assets of this region, for those who followed the Indian, were the waterways for easy transportation, the animals for fur trade, the fish for commercial fishing, the forests for lumbering, and the fertile soils for farming.

During the historic period the principle Indian tribes were the Chippewa, the Ottawa, the Potawatomi, the Maimi, the Menominee, the Wyandots or Huron, and the Iroquois. Their friendship or hostility with the white man generated different eras of settlement. There were, however, many other factors which influenced the eventual settlement of this region such as (1) the surrounding geography, (2) policies for land acquisition, (3) rivalry of the French, English and Americans, and (4) frontier expansion.

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Subsequent information extracted from:

[4]Howard J. Pincus, op. cit.

The early 17th Century was the era of Great Lakes exploration. The French established fur trading posts but did little to actually penetrate into the depth of the region. The British soon realized the economic value of this region, and England, by way of a treaty ending the Seven Year's War with France, gained its claim to the Great Lakes Region. The British Regime, lasting approximately forty years, ended with the frontier expansion of the American settler in the early 1800's. Expansion occurred first in the southern portion of the Great Lakes Region. The soils here were suitable for good farmland and easily accessible on route from the New England Colonies either by way of the Great Lakes or by way of the Cumberland Gap through the Appalachian Mountains. The remaining Great Lakes provided an avenue for expansion as settlements slowly began to advance northward along the shore of the Great Lakes and eventually inward following either river channels or old Indian trails.

The numerous physical features of the region attracted a mixture of inhabitants consisting of English, Scotch, Irish, Dutch, French, Americans from different states, and the different Indian tribes previously mentioned. There were assorted goals and values in each nationality. Some were farmers: crop, fruit and dairy; some were traders; some were lumbermen; and some were fishermen; each seeking a new place to settle. The locations of the physical features and natural resources accounted for the dispersal of the nationalities throughout the region.

The remaining process is all too well known. Man became industrialized and the small cities of yesteryear became the booming metropolis of today. The narrow pathways and roadways of the Indians

and settlers became the freeways and expressways of today. The occupations of the inhabitants have somewhat changed, but the region is still growing and projections indicate that it will continue to grow.

This specific region just discussed is unique, both in origin and character. It contains more lakes in its area than are found anywhere else in the world, countless thousands, many linked by channels to the Great Lakes themselves. Innumerable lakes are located in the whole region north of the Great Lakes in Canada. Equally numerous are the lakes of northern Minnesota and northern Wisconsin, with many lakes on both the northern and southern peninsulas of Michigan.

Some sources credit Michigan alone with more than 10,000 lakes; however, the Michigan Lakes and Stream Directory published in 1931 by the Magazine of Michigan Company lists Michigan as having 4,189 lakes with names.

A description of all the inland lakes and streams tributary to the Great Lakes cannot be attempted in this paper. A list of those lakes of 10 square miles or more in Michigan (Table 3) and a brief consideration of those streams tributary to Lake Michigan alone will serve as an example.

> More than 100 streams enter Lake Michigan of which about 60 are called 'rivers' and the rest 'creeks'. The Chicago River, originally a tributary, has been reversed and now withdraws water from the lake. Only eight rivers have an average flow of more than 1000 c.f.s.. The largest of these is the Fox River in Wisconsin, with an average of 4300 c.f.s..[5]

In this Great Lakes Region, there are five Great Lakes; Superior, Michigan, Huron, Erie, and Ontario, all of which are

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[5] Ibid., p. 34.

Table 3 Natural Fresh Water Lakes of 10 square miles or more in Michigan.

| Lake | Area (square miles) |
|---|---|
| St. Clair * | 460 |
| Houghton | 31 |
| Torch | 29 |
| Charlevoix | 27 |
| Burt | 27 |
| Mullet | 26 |
| Gogebic | 21 |
| Manistique | 16 |
| Black | 16 |
| Crystal | 15 |
| Portage | 15 |
| Higgins | 15 |
| Hubbard | 14 |
| Leelanau | 13 |
| Indian | 12 |
| Elk | 12 |
| Glen | 10 |

* Michigan and Ontario ownership

Source: Principal Lakes of the United States.

connected by series of waterways and locks which ultimately journey into the seaway. The area of these Great Lakes is 94,710 square miles, the largest fresh water basin in the world.[6]

As discussed earlier the Great Lakes came into existence as a result of the great ice age. Recently evidence has been discovered that indicates that these basins may have been cut down to their present depths by the streams that flowed through them before the ice age, and that the scouring acting of the glaciers may not have been as great as was once believed. Regardless of the origin of these great depressions, they were filled with water when the glaciers melted and retreated.

The Great Lakes underwent many changes before they reached their present outline. At one time before the close of the ice,

[6] Conrad D. Bue, Principal Lakes of the United States, Geo-

Lakes Superior, Michigan and Huron were a single lake, which had been name Lake Algonquin. It had an area of 100,000 square miles, as compared to the present area of the three lakes which is 77,230 square miles. The lake was more than 1,500 feet deep in places, as compared with 1,300 feet, the present maximum depth of Lake Superior.[7] (See Table 4 for the present general lake dimensions and elevations.)

The St. Lawrence Seaway, previously discussed as an avenue of early settlement and travel, plays a dominant role in the commerce of the Great Lakes.

> In the whole Seaway project, there are 15 locks permitting ships to reach a level of 602 feet above the sea, the greatest part of that lift supplied by the Welland Ship Canal (all within Canada), by-passing the falls of Niagara, and lifting vessels 326 feet.
>
> During 1962 the St. Lawrence section of the seaway carried more than 25 million tons of cargo, the Welland Canal carried 35,000,000 tons, and the locks at Sault Ste. Marie carried about 80 million tons.[8]

A descriptive passage about each Great Lake follows and illustrates the impact and influence these water basins have on the adjacent land.

## LAKE ONTARIO

> Most eastern of the Great Lakes, Ontario, is the smallest; 7,520 square miles in area, length of 193 miles, and maximum width of 52 miles. But Ontario's depth (778 feet) is much greater than that of Lake Erie, after they have dropped 326 feet through the spectacular Niagara gorge with its falls and rapids, entering Ontario from a dramatically scenic gorge in the western end of its southern shore. At the eastern end of Ontario, all the waters of the Great Lakes combine in one wide and beautiful channel to make the St. Lawrence River, flowing northeast to the sea, hundreds of miles away, dropping through turbulent rapids more than 200 feet in about 100 miles of channel.

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[7] Ibid., p.2.

[8] Andrew Hepburn. Complete Guide to the Great Lakes.

Lake Ontario is bordered by fewer different areas than any of the other Great Lakes. Its entire southern and eastern shores are New York; its northern and western shores, Ontario. The shores of the lake and the lands behind them are fairly rugged on the south, particularly near the eastern end, pleasantly rolling along the north, flat in the west. Near the western end, on both sides of the lake, are big urban districts around the Canadian cities of Hamilton and Toronto, largest of Canada, to touch the shores of the Great Lakes.

In addition to its urban centers, the shores of the lake are devoted to highly productive farming districts, particularly fruit and dairying. Commercial traffic on Lake Ontario, greatly increased through the operation of the St. Lawrence Seaway, is aided by the Welland Canal by-passing the Niagara River.

The first of the Great Lakes to be discovered, Ontario is believed to have been visited by Etienne Brule in 1615, and later the same year by Champlain. There are no islands of importance in the lake and few natural harbors along its shore. But two manmade harbors, Hamilton and Toronto, account for much commercial traffic.[9]

## LAKE ERIE

Shallowest of the Great Lakes (210 feet), Lake Erie is the fourth largest; 241 miles long, 57 miles across at its greatest width, and has 9930 square miles of surface. Erie's surface is 572 feet above sea level, 326 feet higher than the next lower lake, Ontario, to the east.

Lake Erie is rounded on the south by portions of New York, Pennsylvania, and Ohio. Its western end has Michigan, and its entire northern shore is the Canadian province of Ontario. The shores of Lake Erie and the lands near them are generally level, heavily populated and cultivated, more than any others around the Great Lakes. There is a big city at either end: Buffalo, New York, at the east, and Toledo, Ohio, at the west. Along its southern shore is a chain of cities, including the metropolis of Cleveland, Ohio.

Except for the Niagara River at its eastern end, the only unusual natural feature of Lake Erie is a cluster of islands, quite rugged and picturesque, just off the southern shore near its western end. Near them, during the War of 1812, was fought the only naval engagement of any consequence on the Great Lakes, when Commodore Oliver H. Perry defeated the British at Put-in-Bay with a fleet of little warships he had built on the shore of Lake Erie.

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[9] Ibid., p. 36.

Curiously, but for a practical reason, the existence of Lake Erie was not known to Europeans until many years after it was partially explored. The reason was that early explorers considered the Niagara River and its falls to be quite impossible to pass. They were correct. The first European believed to have visited Lake Erie and travel its waters was Louis Joliet in 1669. An event which was to make Lake Erie more important than any other of the Great Lakes for many years thereafter was the opening of the Erie Canal in 1823-25. As a result, Lake Erie became the principle route for the migration and settlement of the whole midwest area.

Though the most southern of the Great Lakes, normal navigation is generally closed from about mid-December to about the end of March, owing to ice. Navigation is also impeded at times by violent, often dangerous storms, partially the result of the lake's shallow depth. There are few good harbors along its shore, but most of the larger cities have man-made harbors that account for a heavy commercial traffic, particularly in coal, iron ore, and grain.[10]

## LAKE HURON

Only one of the Great Lakes to receive the waters from two of the other lakes of the group, Huron is the second largest of the lakes, with a surface area of 23,010 square miles. It is 206 miles long and 183 miles wide. Its maximum known depth is 750 feet, its surface 581 feet above sea level, Like Lake Michigan, to which it is linked by a wide channel, the Straits of Mackinac, it is the only natural deep-water passage between two of the Great Lakes that requires no dredging, canals, or locks to maintain.

Lake Huron is bordered on the north and east by Ontario, on the west by Michigan. Its shoreline, more broken and varied than that of any of the other lakes, includes the expanse of Georgian Bay on its eastern side. Within Lake Huron there are more and bigger islands than in any of the Great Lakes, among them, Manitoulin, largest lake island in the world (about 1,600 square miles), and historic Mackinac Island, one of the country's most important resorts.

At either end of Lake Huron is a strategic channel, each improperly called rivers. At the north is St. Marys River by which the cold waters of Lake Superior drop about 20 feet in turbulent rapids, now by-passed by the canal and locks of Sault Saint Marie, which carries more commercial traffic (about 100 million tons a year) than any other canal in the world. At the southern end the channel of the St. Clair River, and the Detroit River, carries the waters of Lake Huron to Lake Erie, dropping without turbulence eight feet in the process.

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[10] Ibid., p. 66.

Though Lake Huron itself carries an enormous commercial traffic (all that passes out of Lake Superior and Lake Michigan), there are no large cities around its shores and few really good harbors. The largest city close to the lake is Detroit, near its southern end, on the Detroit River.

Lake Huron was one of the first of the Great Lakes to be seen by Europeans. Etienne Brule is believed to have entered Georgian Bay, coming through a series of channels and lakes out of Lake Ontario, in 1612. The great Champlain followed him over the same route a few years later. Lake Huron's position thereafter became strategic, resulting in fortified control points at either end, Mackinac and Detroit.

The shores of Lake Huron are varied. In the south, east, and west, in Ontario and Michigan, relatively low and stripped of the super forests which one covered the land, they are devoted to farms. But around the north end of the lake, along the shores of Georgian Bay, much of the shore is dramatically rugged, and the lands that stretch back from it still are largely wilderness, and some of the finest hunting and fishing regions in the country.[11]

## LAKE SUPERIOR

Largest fresh-water lake in the world, Lake Superior is the most western and northern of the Great Lakes, as well as the coldest and deepest, 350 miles long, from Duluth at its extreme western end to Sault Ste. Marie at the eastern end. In width it is 160 miles. It covers 31,820 square miles. The surface of Superior is 602 feet above sea level, maximum depth, 1,333 feet.

Superior is bounded on the south by Wisconsin and Michigan, on the northwest by Minnesota, and on the north and east by Ontario. The shoreline is rugged, picturesque, often dramatically so. The land around the lake, once primeval forest wilderness, is in part, still wilderness, a rugged forest land studded with innumerable lakes, many linked by channels. Near the shore, chiefly on the south and the west, are some of the world's richest mineral deposits, chiefly iron and copper, as well as most of the lake's commercial traffic, from such ports as Ashland and Superior, Wisconsin; Duluth, Minnesota, most important ore port in the world.

The twin Canadian ports, Port Arthur and Port William on the north shore, are together the largest grain shipping points in the world. But shipping on Lake Superior occurs only about six months of the year.

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[11] Ibid., p. 96.

Historically, Superior, particularly the southern shore, was the hunting ground for Longfellow's romantic Indian hero, Hiawatha, but the first European believed to have seen its shining vastness was the French explorer, Etienne Brule. The first settlement on its shores is believed to have been Ashland, Wisconsin, where Father Ailcuez started a wilderness mission in 1665.

A unique natural feature of Superior is Isle Royale only national park in the Great Lakes area, one of the few accessible primitive wilderness areas in the United States.[12]

## LAKE MICHIGAN

Only one of the Great Lakes wholly within the United States, and the only one of access to which does not require locking through a man-made channel, Lake Michigan is the third largest of the lakes, 307 miles long, 118 miles wide. Its greatest depth is 923 feet, its surface 580 feet above sea level, its area 22,400 square miles.

Lake Michigan is bordered on the east and north by Michigan, which it splits into two sections, upper and lower peninsulas, on the west by Illinois and Wisconsin, on the south by Indiana. Much of the shoreline is set with bluffs, fringed by beaches often with giant dunes, which in part, account for the fact that Michigan, more than any other of the Great Lakes, is a vacation area, particularly in the northern part.

Along its southern and western shore is a chain of cities and industrial districts, including Chicago, largest city on the Great Lakes and second largest in the United States, as well as the unique industrial complex of the Calumet district around Gary, Indiana, largest steel and iron making center in the world, using ore from the ranges along the north shore of Lake Superior. Much of the land which borders Lake Michigan,once forest, is now among the richest agricultural regions in the country, devoted particularly to dairying and fruit growing.

Lake Michigan was discovered by a French explorer, Jean Nicolet, in 1634. Some years later, through it passed Marquette and Joliet, who, traveling from the lake to the west, discovered the Mississippi River in 1673.

In the exploration and development of the lake region, Michigan was strategic, with French explorers moving down the lake from the Straits of Mackinac, and from the lake entering Wisconsin, Illinois, and Indiana, and the Mississippi Valley to the Mississippi River. Though Etienne Brule may have preceeded him, the French explorer Nicolet is thought to have been the first to see Lake Michigan.[13]

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[12] Ibid., p. 126.

[13] Ibid., p. 160.

Table 4. DATA ON THE GREAT LAKES SYSTEM

| General Lake Dimensions | Superior | Michigan | Huron | Erie | Ontario |
|---|---|---|---|---|---|
| Length (in miles) | 350 | 307 | 206 | 241 | 193 |
| Breadth (in miles) | 160 | 118a | 183b | 57 | 53 |
| Length of coastline (in miles) (including islands) | 2,980 | 1,660 | 3,180c | 856 | 726 |
| Areas in square miles: | | | | | |
| Water Surface, United States | 20,700d | 22,400e | 9,100f | 4,980 | 3,600g |
| Water Surface, Canada | 11,700d | ---- | 13,900f | 4,930 | 4,000g |
| Drainage Basin Land, U.S. | 16,700d | 45,500e | 16,200f | 18,000 | 15,200g |
| Drainage Basin Land, Canada | 31,500d | ---- | 33,400f | 4,720 | 12,000g |
| Drainage Basin Land, Total | 48,200d | 45,500e | 49,600f | 22,700 | 27,200g |
| Drainage Basin, Total (Land & Water) | 80,000d | 67,900e | 72,600f | 32,600 | 34,800g |
| Maximum Depth, Feet | 1,333 | 923 | 750 | 210 | 802 |
| Average Depth, Feet | 487 | 276 | 195 | 58 | 283 |
| Mean elevation | 600.4 | 578.8 | 578.8 | 570.4 | 244.8 |

a. Measured at wide point through Green Bay.
b. Measured at wide point through Georgian Bay.
c. Includes Georgian Bay and North Channel.
d. Including St. Marys River above Falls.
e. Lake Michigan including Green Bay.
f. Including St. Marys River below Falls, North Channel and Georgian Bay.
g. Lake Ontario including Niagara River and St. Lawrence River to Iroquois Dam.

Source: United States Lake Survey, Detroit, Michigan. February, 1964.

To many, the water supply of the Great Lakes is seemingly inexhaustable, but in effect this is an erroneous statement. Much research has been done in hopes of answering many of the water problems created by the explosive population growth in the Great Lakes States. Papers by Arve H. Dahl and H.W. Poston, delivered at the American Association for the Advancement of Science Conference, December 29-30, 1959, indicate many tense, highly competitive pressures which claim even more water for various uses; domestic, industry, power, agriculture, navigation, recreation, and fish and wildlife. At the same time the articles indicate that far too much water is made useless by pollution. Many committees have been formed, numerous public hearings have been held in cities such as Detroit, Milwaukee, Chicago, Toledo, Cleveland, and Buffalo in hopes of solving the problem of the appropriate use of the Great Lakes water. The concern of both articles is water quantity and quality, each showing great concern in the problems involved in the municipal use of water. Poston also shows concern in the recreational aspects of water indicating that recreation is one of the largest businesses in the Great Lakes areas and states, that Michigan alone does a business worth $650 million a year. Without good water quality this recreation could not exist.

In a similar study, G.R. Gadzikowski indicates the impact on the economy if additional water is diverted from the Great Lakes for municipal use. The study concerns additional diversion of Lake Michigan water at Chicago. He states that the water diversion of the requested 8,000 c.f.s. at Chicago would lower Lake Michigan and Lake Huron by eight inches and Lake Erie and Lake Ontario by five inches. The loss of annual income to the economy of Michigan via water-borne commerce, as a result of additional diversion, lies between 3.1 and 10.7 million dollars under the conditions of commercial

navigation which prevailed in the year 1956; under the conditions of commercial navigation projected for the year 1985, the loss of annual income to the economy of Michigan lies between 1.6 and 5.4 million dollars. The loss of asset value to Michigan's recreation and conservation facilities lies within the range of 13 to 21 million dollars. This is based on an $8.9 million to $16.1 million estimate to restore the capacity of Michigan's public beaches.[14]

Material presented at the 1959 American Association for the Advancement of Science Conference by Stanly A. Crain, Professor, Department of Conservation at the University of Michigan, indicates the seriousness of the recreational problems generated by the Great Lakes and their shoreline. Figures are supplied for the resources available, participation in various recreation activities and various other activities influencing recreation in the area. From these figures and the discussion of their significance it is concluded that the type of recreation supplied by the Great Lakes is an integral part of our way of life, and if need be, these should be protected even if at great expenditure, in relation to other more familiar and more easily qualified economic development. Some key tables (Tables 5, 6, 7 and 8) extracted from the article by Professor Crain indicate the importance of recreation in the Great Lakes States.

In this chapter, seven major aspects of the Great Lakes Region, its location and size, formation, settlement, and Great Lakes location, size, and use have been discussed. It is important that the regional influences be considered if the islands within this region are to be properly used. The potential of these islands is analysized and discussed in the following chapters.

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14 Gilbert R. Gadzikowski, Impact of the Economy of Michigan of Proposed Additional Diversion of Lake Michigan Water at Chicago.

TABLE 5. Forest land in the western Great Lakes States

| States | Forest Acreage | Per Cent of Total Land Area | Approximate Acres per Capita |
|---|---|---|---|
| Minnesota | 19,344,000 | 38 | 5.7 |
| Wisconsin | 16,535,000 | 47 | 4.2 |
| Michigan | 19,322,000 | 53 | 2.5 |
| Illinois | 3,933,000 | 11 | 0.4 |
| Indiana | 4,103,000 | 18 | 0.9 |
| Ohio | 5,446,000 | 21 | 0.6 |

Source: U.S. Forest Service, Forest Resources Report No. 14, January, 1958.

TABLE 6. State and federal shoreline on Michigan's Great Lakes waters. (in miles)

| Types of Ownership | Superior | Michigan | Huron | Total |
|---|---|---|---|---|
| State Forests | 25.12 | 69.41 | 56.11 | 150.64 |
| State Parks | 42.56 | 38.37 | 5.73 | 89.34 |
| Game areas | — | 40.70 | 19.65 | 109.95 |
| Public fishing sites | — | 0.46 | 0.03 | 1.09 |
| Other public water access | 2.52 | 2.06 | 0.38 | 5.07 |
| State land in National Forests | 0.40 | 0.53 | 0.25 | 1.18 |
| Total state-owned frontage | 70.20 | 151.80 | 82.12 | 355.37 |
| National Forest ownership | 20.00 | 12.70 | 8.45 | 41.15 |
| Total state and federal | 90.20[a] | 164.50 | 90.57 | 396.52[a] |

Source: Michigan Department of Conservation and U.S. Lake Survey
[a] Exclusive of Isle Royale National Park

Table 7. Relation of publicly owned shoreline to toal shoreline, Michigan Great Lakes

| | Public Shoreline[a] (miles) | | Total Shoreline (miles) | | | Per Cent of Shoreline (miles) | |
|---|---|---|---|---|---|---|---|
| Lake | State Parks | Total | Mainland | Islands | Total | State Parks | All Public Ownership |
| Superior | 42.56 | 90.20 | 583 | 334 | 917 | 4.64 | 9.83 |
| Michigan | 38.37 | 164.50 | 862 | 196 | 1,058 | 3.63 | 15.40 |
| Huron | 6.28 | 90.57 | 622 | 312 | 934 | 0.67 | 9.70 |
| St. Clair | — | 37.55 | 44 | 76 | 120 | 0.00 | 31.29 |
| Erie | 1.54 | 13.70 | 36 | 18 | 54 | 2.25 | 25.37 |
| Total | 89.34 | 396.52 | 2,147 | 936 | 3,083 | 2.90 | 12.86 |

Sources: U.S. Lake Survey and Michigan Department of Conservation
[a] Exclusive of Isle Royale National Park

Table 8. Recreational Activities, Great Lakes States (in thousands)

| States | Duck Stamps 1955 | Hunting Licenses 1955 | Fishing Licenses 1955 |
|---|---|---|---|
| Minnesota | 144 | 493 | 1,375 |
| Wisconsin | 127 | 586 | 1,085 |
| Michigan | 130 | 1,186 | 1,188 |
| Illinois | 111 | 516 | 882 |
| Indiana | 40 | 415 | 624 |
| Ohio | 39 | 636 | 878 |
| Pennsylvania | 100 | 900 | 740 |
| Pennsylvania | | | |
| New York | 75 | 936 | 811 |

Source: Marion Clawson, Statistics on Outdoor Recreation, Resources for the Future, 1958.

Chapter II Island: Heritage, Form and Use

The form of islands and the natural condition of islands in relation to their potential use should be considered. Two major factors must be examined: cultural heritage and the physical features of land form suggestive of potential use. This analysis of an island form-use relation concerns those islands in the Great Lakes. It is, however, apparent that the same techniques of analysis could be applied to islands about the world.

Through the cultural heritage of islands it is evident how their form influences their use. Without exception in the past, the only means of communication to an island was by boat, therefore, it is obvious that community life would develop at all large, natural harbors. Most harbors because of their climatic conditions and geologic formation exist on relatively flat topography and gravelly or sandy soil. By citing this one example, it is easy to see how physical features and cultural heritage predetermine certain use areas of an island.

The use of islands in the Great Lakes has varied, paralleling the type of cultural activity. There were the Indians, some of whom worshipped many of the islands as religious tribal grounds, and the French and English who sought only the animal pelts used in commercial fur trading. Trapping, the first commercial activity on the Great Lakes islands, occurred in the 1850's, and was soon replaced by the commercial fishing of the early Americans. In the late 1800's, logging brought economic stimulation to the area. Lumber mills and railroads, used in moving the timber, were then constructed. Activity in and around the Great Lakes influenced the economic stability

of the islands. On some islands, small communities developed to support trapping, logging, and commercial fishing. Others became stopping points for steamships so the ship could take on more wood used for fuel. These economic activities no longer exist because no longer is there the animal to trap or the fish to catch, and lumbering is no longer economically practical. There is almost no year-around community life on the islands because of these factors.

Nevertheless, the heritage of many of the islands - the Indian burial grounds, the old lumber mills, the old trading posts and fortifications, the fishing shacks with idle boats and nets lying upon drying racks, and the old light houses with their inactive light beacons-remains even today as a symbol of the past cultures and their way of life.

Today, those who still remain on the islands earn their income during a six month recreation season. This has been made possible by better transportation to the islands (air travel, bridge, and ferry service) and by those tourists who visit the islands. The islands which have better communications and transportation generate more tourist travel. This type of trade has, unfortunately, brought with it many of the activities which tend to encroach upon an island and destroy its character. Examples, all of which are too common on the mainland, include upsetting relationships between the various plant and animal communities, litter and unsightly signs.

Is this type of conflict with nature necessary or is man-nature cooperation possible? According to Eugene P. Odum, Professor of Ecology at the University of Georgia, speaking at Michigan State University on April 14, 1966, on the topic "Man and Nature: Cooperation or Conflict": man can and must cooperate with nature.

Professor Odum brought out the following points:

> Nature sometimes must struggle to survive man's manipulation, contrary to the popular belief that it is always man who struggles to survive in nature.
>
> That, as a part of nature and also as a manipulator of nature, man has a dual role in his relationship with his environment and should seek cooperation rather than conflict with nature.
>
> Man has a tendency to take from nature and never to give to nature.
>
> That the warlike approach, where man beats nature into submission, is less useful and less effective than it used to be, and that man's power is large, and irreversible mistakes can be made.
>
> That man should strive to be a functional part of nature, cooperating rather than conflicting with it, and he should always keep in mind that he is a part of nature and largely dependant on nature.
>
> That man's drive and self- interest lead to certain ways of dealing with nature when nature has a different way of dealing with the same situation. As a result, nature's harmony has been upset.
>
> And that man is beginning to pay for artificial systems of doing what nature would have done free.

If the points expressed by Odum influence man's future use of these Great Lakes islands, there definitely is an opportunity for a man-incorporated natural wilderness.

Almost all the islands in the Great Lakes have a unique and irreplaceable quality of primitive wilderness due primarily to their isolation, lack of development, and general visual appearance. There are, however, several factors that impose restrictive limitations on how these islands may best be used. As discussed in Chapter I, the population of the Great Lakes Region is growing at a tremendous rate, largely due to the recreation potential of the northern area of this region. Most of the islands in the Great Lakes occur in this region. Are these islands to become cities for "urban recreational sprawl"

or should they remain a partial wilderness? How may these islands be best used and what factors influence the type of use? What are the answers to questions like the above and others of similar context? The remainder of this chapter will examine the factors to be considered in suggesting a potential use for these islands. Any suggestions are only general. More specific suggestions will follow in an individual island study in the final chapter of this paper.

## Physical Features

A list of those physical features that are necessary in considering and determining how the islands in the Great Lakes may be used is as follows:

(1) Regional Location
(2) Island Size
(3) Accessibility
(4) Island to Island Relationship
(5) Mineral Resources
(6) Slopes, Soils, and Vegetation
(7) Wildlife

The psychological aspects concerning the physical features necessary of consideration are discussed in Chapter III.

### Regional Location

The current use of islands is mostly governed by the isolation factor. Those which exist reasonably near the mainland and centers of population are more developed than those which are more distant. More developed, tends to mean that little public land is available and much of what once supported island life, nature, no longer exists. This description suggests that when an area becomes developed, one of the primary values, nature is destroyed. This currently is the case, but it does not imply that a harmonious relationship of man and nature cannot exist. Man needs a rude awakening. He must realize

exactly what his values and goals are and encourage himself to support a man-nature relationship, especially on these islands.

> Every process in nature has its necessary form. These processes always result in functional forms. They follow the law of the shortest distance between points: cooling occurs only on surfaces exposed to cooling, pressure only on points of pressure, tension on lines of tension; motion creates for itself forms of movement - for each energy there is a form of energy.
>
> All technical forms can be deduced from forms in nature. The laws of least resistance and of economy of effort make it inevitable that similar activities shall always lead to similar forms. So man can master the powers of nature in another and quite different way from what he has done hitherto.
>
> If he but applied all the principles that the organism has adopted in its striving toward useful ends, he will find there enough employment for all his capital, strength and talent for centuries to come. Every bush, every tree can instruct him, advise him, and show him inventions, apparatuses, technical appliances without number. [15]
>
> Raoul France

Island Size:

Size, second in importance only to regional location, is a major determinant in the use of islands. Because many of the islands in the Great Lakes are relatively small and have limited land area, extensive physical development on them would tend to destroy their wilderness character. The larger islands can withstand development only if man strives for this man-nature relation. He must so design his "intervention time" so it will not interfere with the ways of nature. Size should be determined from an island to island relation. However, because of the complexity involved, in this paper islands having an area of less than 2,000 acres are classified as being small, 2,500 - 10,000 acres as medium size, and an area greater than 10,000 acres as being large.

---

[15] John O. Simonds, Landscape Architecture, The Shaping of Man's Environment, McGraw-Hill Co., Inc., (New York,

Accessibility:

Access to most islands in the Great Lakes, at the present time, is very difficult. Since this is one of the key factors in determining their future use, the various alternatives should be carefully evaluated. The qualities many of these islands now possess might have been lost forever had they been more easily reached. It would seem that many of these islands are definitely restricted by laws of natural zoning. If the islands are to be developed to any degree, the matter of access, whether by air, boat, or car, must be considered a detrimental liability. If, however, development is not desired and every aspect of the wilderness quality is to be preserved for future generations, these islands must remain isolated with difficult accessibility.

Island to Island Relationship:

The relationship of one island to another has certain physical effects on their use. The proximity of islands to each other influences physically both the depth of the water between adjacent islands which determines accessibility by boat and the type of physiography which determines both wildlife and vegetation. The greater the number of islands in a group, the more numerous are the possibilities for their use. It is in the assorted types of physical contributions that the designed use must be formulated. The natural organization of these islands provides different design solutions for their use. The size is also an important consideration in this group relation. Each island could be used to depict intricate features of nature, while the total complex would symbolize a compromise of man and nature. It is important that the natural physical features be preserved but it is unjust to prohibit man's minor intrusion - simply of being with nature.

The following list is only suggestive of a few combinations:

Assorted cluster formations of small sized islands with a large island centrally located.

Assorted cluster formation of small islands.

A chain of small islands.

A chain of small islands with some large islands intermittently located.

A large island with small islands placed about it at random.

If the proximity of islands within this grouping was considered, the list would have been considerably lengthened.

Mineral Resources:

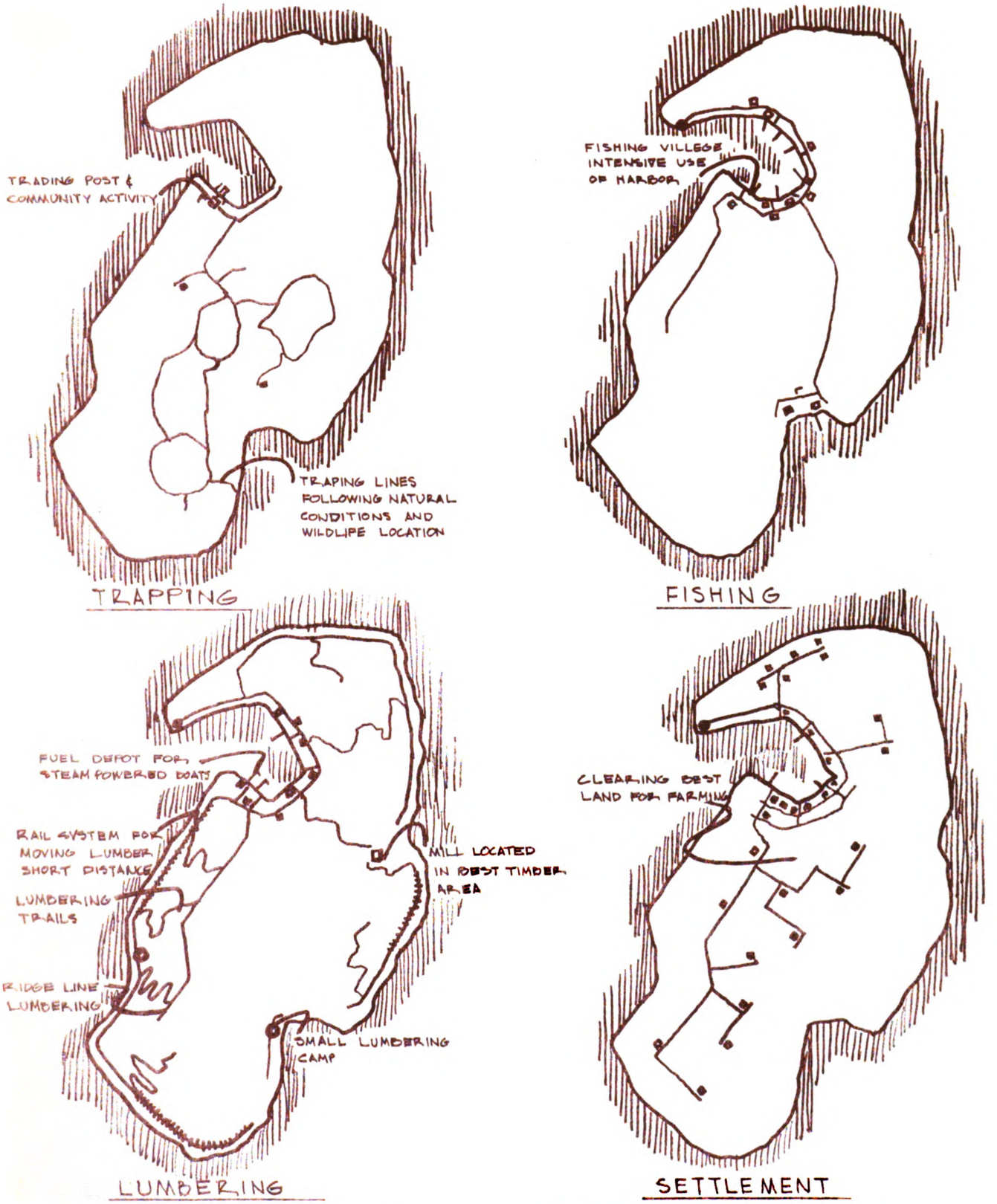
It is this inert resource which can destroy much of the character of the island. Mining is dependent upon the physical features and geological history. It tends to destroy the natural physical features in its way, seeking only the monetary value of the minerals. There are few islands which have valuable mineral resources.

Slopes, Soils, and Vegetation:

Slopes, soils, and vegetation are dependent upon each other. Slopes on the islands are generally similar to those on the adjacent mainland, as are the soil and vegetation. These resources are most important in man's use of the individual land parcels. It is the consideration of these three factors that predetermine a satisfactory use of the island land parcels.

Wildlife:

Relationships between the various plant and animal communities are delicately balanced. To maintain this biological balance, special care must be taken in order that those resources are not disturbed.




CULTURAL DEVELOPMENT

Figure 5

Cultural Heritage

The past and present type of society that lived on the islands, their way of life, and their forms of communication have been discussed earlier in this chapter. It is important, however, to note how the three factors; society type, occupation, and communications, influence the physical structure of the community and the total development of the island. More knowledge of the physical communities, their communication and their development is necessary if a clear understanding of the potential use of the island is to be reached. In succession, the community types were: trapping communities, commercial fishing communities, lumbering communities and settlement type communities. (Figure 5)

Trapping Communities were located near the best harbor facilities. Any trails providing communication generally followed the easiest route accessible to the trapping locations.

Fishing Communities were also located near the best harbor facility. Development of the village tended to encircle the harbor. Here, the community facilities were generated by the actual harbor shoreline. It was only when the harbor was small and the number of fishermen great that the village expanded outwardly from the harbor. However, this expansion still conformed to the outline of the harbor's shore.

Lumbering Communities, because of access to the island, remained near the best harbor facility. The smaller bays did, however, become small camps. Major types of communication were located near the shoreline because of their relatively flat topography. Because the best timber (the climax forest) generally occurs on

higher land, the lumberjacks' trails tend to weave back and forth across the hillsides. Few straight trails existed with the exception of those existing on long ridge lines.

Settlement (the act or state of becoming fixed, stationary or permanent; establishment in life or business) Type Communities were the outcome of the trapping, fishing, and lumbering communities. Because the harbor provided the easiest access point, the community remained adjacent to the harbor facilities. In the process of settlement, communication lines tended to become more direct, generally originating at the community development. Agriculture, subsidized by trapping, fishing, and lumbering, was an important aspect in the settlement process. The community had to be as self-sufficent as possible. Because of the physical make-up of the majority of the Great Lakes islands, agriculture as a form of industry was not possible; therefore, few islands were permanently settled.

These physical and cultural factors have a definite influence in the way the islands should be used. Each in itself exhibits a specific value and goal sought by man. Because of the various activities available on all the islands in the Great Lakes and because of the variety sought by man, it is impossible to classify specific individual uses for each island. A discussion of the activities enjoyed by those who visit the island wilderness appears in the final chapter.

Island community life today is economically impossible, other than that of limited recreational or retirement type life. If man, seeking escape from "city life", is to use these islands, he must choose the proper channels of development. Man must

restrict his developments to the larger islands for here is where man is welcome and here is where man can be of most help to nature by bandaging the wounds already inflicted by man. Nature has already relinguished: (1) the animal life for income, (2) the clearing of land for agriculture, communications, communities and homes, and (3) the shorelines for harbor facilities. It is time for man to rejuvenate nature by living with nature. He must leave the smaller islands to acclaim the wilderness of nature. These smaller islands have a scientific and educational value and are significantly important due to the interesting geological and biological resources. This undisturbed character offers a unique opportunity for study and observation. How should the larger islands be developed? This question remains.

Assuming that state and federal governments will not purchase all these large islands and that private enterprise is going to be responsible for the development, certain guide lines need be established. The entire northern region of the Great Lakes has a strong attraction for vacationers and other outdoor recreation oriented people. Studies concerned with the existing recreational areas on the mainland indicate that these facilities are generally in very heavy use, especially during the summer months when the waters of the Great Lakes attract many, In these same studies, ORRRC Report and Our Fourth Shore, it was also revealed that the proposed and potential mainland recreation areas could accommodate their share of the expected increase in normal recreation pressures, such as camping, picnicking and swimming. The recreational demands that are more unique and require specific facilities such as wilderness camping and exploring nature will not be as easily satisfied. The islands, if preserved in their

natural condition, could fulfill this need. If, in the development of these islands, the idea of "living with nature" is the paramount goal, the island development could be a unique recreation experience. the following criterion should be set as goals for island development:

(1) The smaller islands should have no physical community development.

(2) Only the larger islands should be developed.

(3) All the physical and cultural aspects of the islands should predetermine the use.

(4) Man should not come into conflict with nature. He should not disturb the vegetation, soils, and slopes.

(5) Man should not be wasteful in his development. He should examine all the possibilities of design. For example, cluster design used in cabin development.

(6) Man should build few new roads and should use those already present.

(7) All building materials for shelters should be of a harmonious material and individual site selection should be well planned.

(8) Recreational facilities and use of the land should be indigenous to the island.

(9) If signs become necessary, they should be of an indigenous material and design. No signs for commercial advertising should be permitted.

If this criterion were used by private developers, the ideals sought by those who visit the islands would remain for future generations.

Too often the paramount reasons for area development lead to its ultimate distruction. If one is to see the natural environs for what they are, there is no need for extensive development and commercial activity.

The islands should not become cluttered with all the gimicks of urbanized recreation (golf courses, heated swimming pools), but rather the natural waters, land surface, slopes, and vegetation should be the symbols of island recreation.

## Chapter III Aesthetic Considerations of Island Character

Of all the physical features discussed in the previous chapter, the aesthetic phonomena in the use of specific land parcels is most apt to be missing. The planning of space sequences, land forms, and use relations is often not planned or conceivably not understood. All the aesthetic qualities concerning the physical features of the flora and fauna in nature must be considered when designating their use.

> In other words, rather than to have merely scientific knowledge of all the facts, we must strengthen our instinctive communications with nature so as to learn to feel her.[16]
>
> Eliel Saarinen

The land forms and other natural aspects of this land are gifts made available to man - he need only know how to manipulate his needs in relation to nature's efforts. Nature has done its part; the creation of a jewel in the midst of a seemingly endless body of water. Man must not come into conflict with this, but should seek this harmonious relationship - Man and Nature, in equal efforts, to provide an everlasting symbiotic relationship.

Before discussing how man aesthetically experiences island character, it is important to note characteristics of the physical features considered and the aesthetic values and psychological implications within these physical features.

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The references of quote sources in this chapter are found in the following, unless otherwise noted:

[16] John O. Simonds, Landscape Architecture, The Shaping of Man's Environment, McGraw - Hill Company, Inc., (New York, Toronto, London, 1961).

The topography (the scientific description of a particular place; the features of a region or locality) is confined within the limits of the shoreline of the island. Within the outline form are contained the elevational changes in land form which determine the type of soil; both determine the type of vegetation.

Man receives this pleasing comprehension of the physical features of nature in the aesthetic qualities and psychological phenomena of color, texture, line quality, and the change in time and space.

It is important to realize, in considering the psychological implications (the mental phenomena as shown in traits and feelings) and the aesthetic qualities (appreciation of or response to the beautiful in art or nature) that the phenomena one individual experiences may not be experienced by another person in a similar situation. It is, however, possible to establish certain positive criterion concerning these aesthetic phenomena as experienced by the majority.

(1) Color: is most important in the union of the vegetation and land forms. Plant material, even evergreen that displays the same foliage color yearlong are subject to color variations depending on the environmental activities of soil, climate, season, light and individual location.

Color has three dimensions or attributes: Hue is the name of a color and indicates the warmth or coolness of a color; red is hot, blue is cold, and green is intermediate. Value refers only to the lightness or darkness of a color. Intensity describes any color's degree of purity, strength, or saturation.

> Like sound, color is a sensation. To the eye color is a matter of sensation causing emotional responses, associations, and mental judgements. It is gay or depressing, exciting or subduing, restful or stimulating.[17]

Some colors and their dimensions may be associated with mental frameworks and moods. Tables 9 and 10 illustrate some of the psychological stimulations and effects generally perceived from certain colors and their dimensions, respectively.

(2) Texture: deals with the sense of sight as well as touch. Classified as being fine, medium, and coarse, it exists in individual and combinations of individual landscape features. If considered as a visual feature, it will vary by the distance of the observer from the landscape feature.

The natural landscape has unlimited combinations of textural events.

This textural composition is ever changing in relation to the movement of the observer. The changing four seasons add to the versatility of texture and are most evident in the changes exhibited in plant material. For example, a locust tree has a fine texture in spring foliage, but a very coarse winter branch structure.

(3) Line Quality: is most apparent in individual plant forms. However, the total perspective of viewing and the sequential experiences of form and space are greatly influenced by line quality. Line quality, like texture and color, is capable of suggesting different moods. For example, the line pattern of the weeping willow and the land form of a rolling landscape, each significantly imply a somber mood.

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[17] William E. Berry, Esthetic Considerations in the Effective Use of Plant Material, Michigan State University (Thesis) (East Lansing:

Table 9. Psychological Stimulations of Color

| | |
|---|---|
| White | purity, possible from the association of fresh snow, cleanliness |
| Blue | cold, serene, depressing, sedate. Deepness of water or shadows at night |
| Green | cool, life, restful, well understood when considering the use made by nature |
| Yellow | stimulating, easily associated with fun and the sun and its warmth |
| Red | exciting, danger, closely related to blood |

Source: William E. Berry, Esthetic Considerations in the Effective Use of Plant Materials, 1962.

Table 10. Psychological Effects of Color

| | Hue | Value | Intensity |
|---|---|---|---|
| Size | Warm hues increase apparent size of objects. | High values increase apparent size, but strong contrast with backgrounds can have similar effect. | Full intensities increase apparent size. |
| Distance | Warm hues bring objects forward, cool hues make them recede. | Low values advance, high values recede. Marked value contrasts within an object bring it forward. | Full intensities decrease apparent distance. |
| Outline or Contour | Warm hues soften outlines slightly more than do cool hues; contrasting hues make outlines clearer than do related hues. | Value contrasts emphasize outlines. | Intensity contrasts emphasize outlines. |

Source: R. Faulknew, E. Ziegfeld, Art Today, New York: 1956.

(4) Change in Time and Space: is the greatest asset of all the aesthetic experiences. It is in the change of time (the four seasons of spring, summer, fall, and winter) that color, texture and line quality contribute most to the natural environment. It is in the sequential experiences of this natural environment that man becomes visually aware of these aesthetic values, and their eminent contributions. The changes in topography provide the needed variety and nature itself constitutes the unity and harmony.

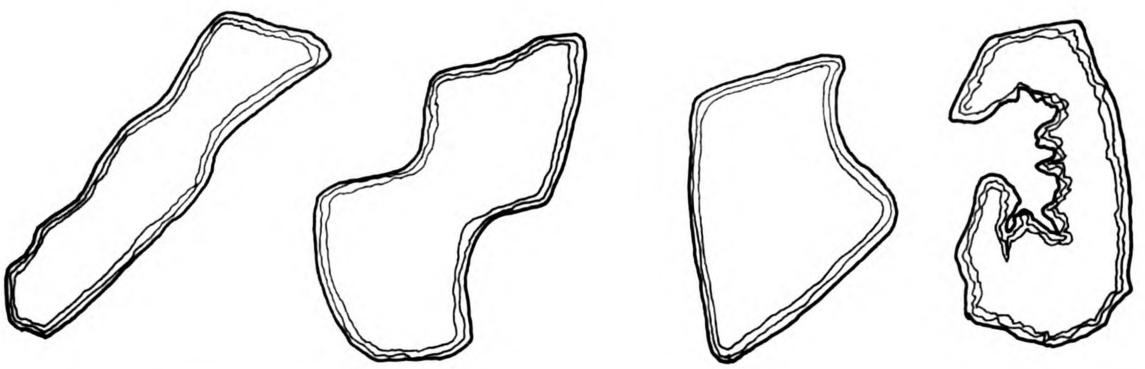
> Esthetic values are inherent in things. Things emanate from them, somewhat as odors do from food or from flowers. And like tangible perfumes they determine our sensitive or emotional reaction.
>
> Esthetic impacts influence us at all moments. Consciously, or in most cases subconsciously, they provoke friendly or hostile reactions. They escape from our rationalistic strongholds, directly back to our emotions and therefore out of our control.
>
> This means esthetic values are no simple trimmings but indeed have their roots in the depth of the soul. Their impact on man's decisions reach even into the most practical problems, into the shaping of things of daily use -- cars, bridges - and above all, of our human environment.
>
> Siegfried Giedion

The actual outline form of the island or island complex is visually suggestive of many aesthetic considerations which are more apparent in an intimate investigation of the phenomena of nature. Therefore, the actual approach to an island is second only to the importance of sequential space-form experiences on the island itself. It is in the approach and arrival that man first receives the impression of an island.

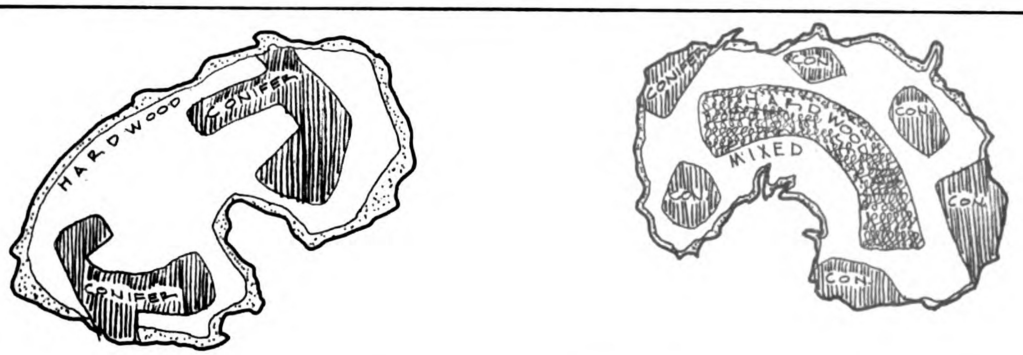
> The psychology of arrival is more important than you think. No matter how warm your hearth, or how beautiful your view, the overall effect will be influenced by the first events of arrival.
>
> Thomas D. Church

The Approach:

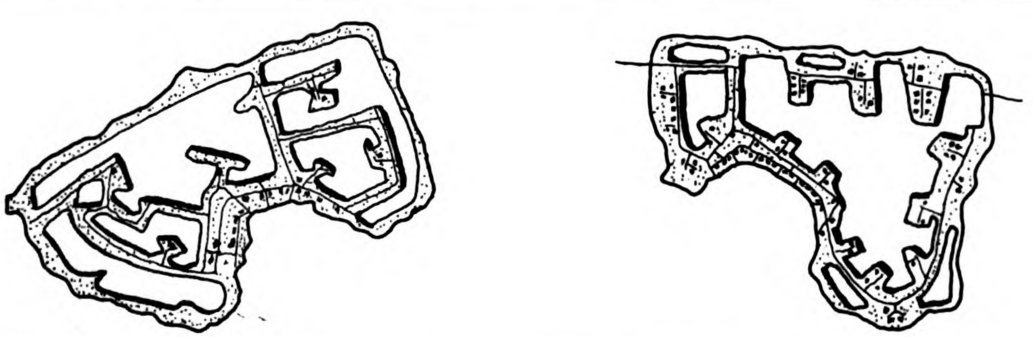
There are three means of access to an island: by air, bridge, and boat. Air access is the most dynamic and inclusive in experiencing (1) the actual island form, (2) different individual land forms, as depicted by colors and textures of vegetation, and (3) cultural activity, as indicated by roadways, land use and community development. (Figure 6).



ISLAND FORM: SHORE OUTLINE




ISLAND FORM: NATURAL FEATURES



ISLAND FORM: CULTURAL ACTIVITY

Figure 6

The other two means of approach, by bridge and boat, have fewer aesthetic experiences, viewing only segments of the total island at any one time. The bridge approach is least desirable, having the fewest aesthetic considerations. Access is too direct and the possibilities of viewing the island, its form and character, are impossible. Approach by boat, although similar to bridge type access, is more rewarding because of the freedom of movement and the interplay and undulation of the water and boat. The reward gained by approaching an island by boat is a symbolic feeling of union; water being the access mode of man and the island harbor portraying nature.

Sequential Space-Form Experience

It is in man's sequential experiences that the island environs differ most from that of the mainland. Here, no matter where man journeys in the natural environment, depending on the actual size of the island, he will soon approach water. Water, is the unifying directional surface, capable of possessing all the aesthetic qualities that man could possibly visualize.

The shoreline of an island with the serene interplay of the waters of the Great Lakes is one of the key interest aspects of an island. The land forms and vegetation which rise from the shoreline vary considerably in relatively short distances possessing an inexhaustible combination of interesting and intriguing features. Much of the vegetation and land forms are similar to that of the mainland and provide similar experiences with nature. However, no area could conceivably dramatize its natural characteristics with the aesthetic value of an inland sea. What other aspect of the environ-

ment is more powerful than that of water? It is the relation of shoreline and land mass which provides an island with its unequaled character.

> We need sequences of space which arouse ones curiosity, give sense of anticipation, which beckon and impel us to rush forward to find that releasing space which dominates, which climaxes and acts as a magnet, and gives direction.
>
> Paul Rudolph

It is indeed in the sequential experience with nature that man receives his reward: the walking along nature's meandering trails; the view of a playful shadow cast from foliage canopies; an area view from a natural vantage point; the feeling of the clean morning dew or the refreshing air from the surrounding water. It is in the mental appreciation of nature that man will find the true meaning of nature.

> The material part of art can be bought with money, that is true, but the spiritual part of it can be had only through mental appreciation.
>
> Eliel Saarinen

## Chapter IV Beaver Archipelago Study

Before considering a design solution for the Beaver Island group, it is important that one realize that: 1) there are more than 200 islands in the Great Lakes; 2) some are very small - Psimire Island, 2.5 acres and Shoe Island, 3.2 acres; some medium - South Manitou Island, 5,030.4 acres and North Fox Island, 894.7 acres; while others are very large - Drummond Island, 82,000 acres and Isle Royale, 134,000 acres; 3)their current developed use varies from festive public sight-seeing areas (Mackinac Island), to private ownership and summer retreats (Washington Island), and to almost complete wilderness areas (Isle Royale).

Any potential that the very small islands might have would be in research and this use is rather dubious. Therefore, the major concern is the medium and large islands. The medium sized, especially those distant from the mainland, are unique research and experiential locations for wildlife study. Those medium sized islands near the mainland often become summer retreat locations; however, a more appropriate use would be recreation areas because of the public need for water oriented recreation and unique recreation experiences.

One existing example of this unique experience on a medium sized island is Mackinac Island in Lake Huron. As indicated by the increased tourist trade on Mackinac Island over 130,000 in 1966 and the population trends (Chapter I), it is evident that these islands are of great value to the public.

The greatest potential in island recreational use is in the larger islands. It is here that the natural conditions can be preserved, yet a number of tourists can be accommodated and enjoy a man-nature companionship. These larger islands offer to the tourist or vacationer this symbiotic relation. Therefore, any development which would tend to destroy this relation should be discouraged. An existing example of this recreational experience is Isle Royale in Lake Superior. Many of the visitors' reaction implications suggested in the report "Isle Royale Visitor Study" are used in the design study of the Beaver Archipelago.

The more isolated these larger islands are from the centers of population, the fewer tourists there will be. However, as population growth continues and transportation facilities improve as indicated in Chapter I, this isolation factor will become less significant.

## Beaver Archipelago

The Beaver Island group has been chosen for a typical island study because: 1) it has an excellent potential for both scientific study and recreational activities; 2) unguided development is currently destroying much of its heritage and character; and, 3) because of its proximity to the writer. (Because of its closeness, I was able to visit the island group in all four seasons, spending the entire month of August, 1965, on Beaver Island). A small portion of the island character is recorded on slides available at the main desk at the School of Urban Planning and Landscape Architecture, Michigan State University under the following slide numbers:

| | | |
|---|---|---|
| A-B 386-430-01 | A-B386-126-01 | C-B386-310-01 |
| 386-430-02 | 386-934-01 | 386-310-02 |
| 386-200-01 | 386-934-02 | 386-310-03 |
| 386-467-01 | 386-934-03 | 386-310-04 |

| | | |
|---|---|---|
| C-B 386-310-05 | C-B386-520-01 | C-B386-520-05 |
| 386-310-06 | 386-520-02 | 386-520-06 |
| 386-310-07 | 386-520-03 | 386-520-07 |
| 386-310-08 | 386-520-04 | |

The Beaver Island group is comprised of nine islands, all politically attached to Charlevoix County, located in northwestern Michigan. The island group has similar climate to that of the mainland, with these exceptions. The climate shows a growing season 14 percent longer than mainland Emmet County, Michigan, at approximately the same latitude. The average yearly temperature is 42.8°F, with extremes of 97° and -28°. The average annual rainfall is 24.66 inches.

Beaver Island, the largest of the group, has an area of 35,466 acres and is 19 miles west of the nearest point of the Lower Peninsula mainland. The remaining eight islands have a total of approximately 10,500 acres and are located about the northern end of Beaver Island.

Gull Island, is the most remote, lying 11 miles west of Beaver Island, and has an area of 240 acres. Slightly nearer than halfway between Beaver Island and Gull Island lies High Island with an area of 3,562 acres. Trout Island, with an area of 80 acres lies two miles north of the northwest corner of High Island. Garden Island, with an area of 4,701 acres, lies one and a half miles slightly east and north of the northeastern tip of Beaver Island. Whisky Island, with an area of 96 acres, lies about four miles west of Garden Island and Squaw Island, with an area of 69 acres lies about three miles northwest of the northwest tip of Garden Island. Hog Island, with an area of 2,358 acres, lies about four miles east of Garden Island and five and one-half miles northeast of the northeastern tip of Beaver Island. Hat

Island, with an area of $11\frac{1}{2}$ acres, lies two and three-fourths miles east of the northern end of Hog Island.

In the general vicinity of these islands are several reefs or bars projecting out of the water. The bars above water for the most part are sand and of fractional acre size, without vegetation, while there are several small islands around Garden and Hog Island of half to one acre in size having some clumps of woody vegetation. There are large areas of shoal water in this part of Lake Michigan forming rather prolific fishing grounds and the area was quite intensely fished by commercial fishermen before the lamprey era.

Because of their size and inter-island relationship this study is concerned with a design solution for four of the islands in the group of nine: Beaver Island, Hog Island, High Island and Garden Island. (Figure 7) The inter-island relationship is generally that of aesthe-

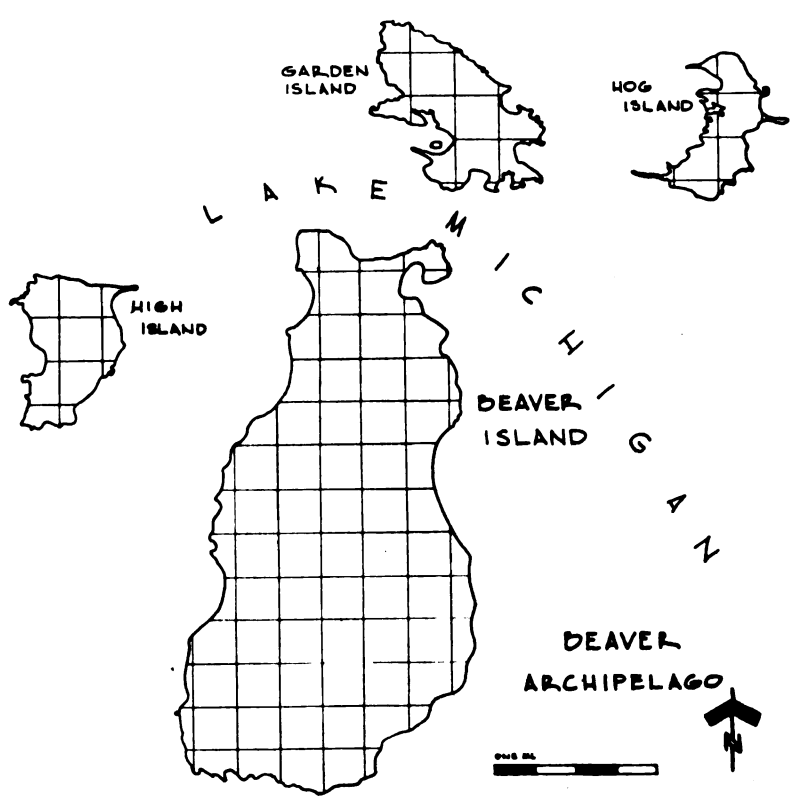



Figure 7

tics, viewing a landmass on the horizon, however, some links are physical such as wilderness camping and research activity.

The State of Michigan ownership of these islands is high - 100% High Island, 90% Garden Island, 80% Hog Island, and 30% Beaver Island. Because of this, the state has a high degree of development control. High, Garden, and Hog Islands are being used as research areas by the Michigan Conservation Department in the study of the ruffed grouse populations.

In this study, concentration is centered on Beaver Island because at this time it has no designated use. In short, it is becoming an island for conglomerate, diverse activities; many of which tend to destroy the natural assets of this island.

The analysis of this group consists of the following:

Natural Existing Conditions
Cultural Activities
Design Proposal

## Natural Existing Conditions

### Wildlife:

The wildlife present on these islands is very similar with the exception of that on Beaver Island. The animal population on the Beaver group is mostly the result of accidental dispersal from the mainland.[18] Adequate information is lacking concerning the past and present animal life on Hog, Garden and High Islands. However,

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[18]Robert T. Hatt, Island Life: A Study of the Land Vertebrates of the Islands of Eastern Lake Michigan. Cranbrook Institute of Science (Bulletin No. 27) (Cranbrook Press, 1948) p. 148.

studies by Robert T. Hatt in 1938 indicate that fox, snowshoe hare, and gray squirrel exist on these islands and that in addition to these, deer existed on Garden Island. An extensive study was undertaken on Beaver Island which indicated an abundance of bird life, a considerable number of amphibians and reptiles, and numerous mammals.

A list would be incomplete at best because of the diversity of change with man's introduction of several species and the occasional dispersal of animal life now in existence on the adjacent mainland. Table 11 indicates the diversity of faunas in relation to the diversity of plant communities existing on the adjacent mainland and Beaver Island.

Table 11. Flora and fauna diversity

| | Beaver Island | Adjacent Mainland |
|---|---|---|
| Plant Communities | 30 | 33 |
| Land Vertebrates | 120 | 203 |
| Mammals | 9 | 44 |
| Breeding Birds | 95 | 126 |
| Reptiles | 7 | 17 |
| Amphibians | 9 | 16 |

Source: Factor of Distribution - Hatt, p. 147.

Hatt's study entitled "Island Life" indicated a complete list of those animals in existence in 1938 and James J. Strang stated in his "Remarks on the Natural History of Beaver Island 1853," that red, black, and gray hare, chipmunk, otter, geese, brant, duck, loons, gulls, crows, hawks, woodcock, fox, pigeons, blackbird, robin, red-headed woodpecker, snipe, snowbird, and pewee were present on the island.

The Michigan Conservation Department has recently established

a grouse population on Beaver (1948), High (1956), Garden (1959), and Hog (1958). Also established on Beaver Island was a deer population (1927) and a wild turkey population (1960). The wild turkey number over one hundred and the deer herd is over one thousand.[19]

Physiography, Soils, and Vegetation:[20]

From a geological and soils standpoint Beaver Island is made up of a relatively thick layer of glacial drift having no marked drainage pattern. Boulders are numerous and the texture of the material is dominantly of sandy clay to clayey sand so that much of the resultant soil is sandy loam to loamy sand over sandy clay at varying depths. The maximum elevation above Lake Michigan is about 200 feet, but the greater part of the island does not exceed 80 feet. In general, it lacks the bold bluffs and areas of blowing sand encountered on High Island. "Mount Pisgah" is, however, a well marked, captured dune and back from the west shore is a complex of small dunes. The shores vary from broad to narrow and are variously of sandy and marshy, or in one place, of bedrock. The land rises gradually to the higher areas of the interior.

There is a natural harbor located on the northeastern shore and it is often referred to as the harbor of refuge because of its easterly facing direction - high storms originate from the northwest. The

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[19]Information gained from William Wagner, Conservation Office, Beaver Island; interviewed on August 11, 1965.

[20]Information gained from personal surveys in 1965 and discussions with personnel at the Department of Conservation, Lansing, Michigan.

best sand beach areas are located on the northeastern and western shores. Sand Bay area is the best beach area.

There are eight lakes and ponds with a total surface of 6.5 square miles. The lakes are shallow, some with firm sand shores, others with boggy shores and soft bottoms, abundantly vegetated, such as Barney's Lake and Miller's Marsh.

The vegetation of Beaver Island approaches the diversity of the mainland. The climax forest here is beech maple. Typical plants of the forest in sandy areas are red pine and red oak, while spruce, fir, hemlock, arbor vitae, and birch predominate in the moist areas. Cedar swamps exist in areas of peaty soils.

Using the above criteria, concerning the vegetation and its respective location, the soils map (Figure 8) and description of the soils (Table 12) best describe the island. These become partial determinants for use areas in the design proposal.

Table 12. Description of Soil Separation made on Big Beaver Island

| | |
|---|---|
| 6. | Bridgman, Eastport, coastal beach complex. |
| | This separation is used to cover areas predominantly rolling ridgy sand dune area, most of which is covered with timber, brush or shrub growth. It occurs along Lake Michigan beach, and includes long strips of coastal beach from 10 to 50 yards wide as well as intermediate areas as regards elevation above the lake and length of time covered by vegetation. The chief value of this soil is for cottage sites and recreational purposes as is illustrated in the design scheme. Some timber is produced but special problems are involved in harvesting, making it of but small value. There are about 3,000 acres of this separation or approximately 9% of the Island. |

3. Eastport, Rubicon, coastal beach complex.

This separation is used to cover the areas of undulating moderately ridged areas of sand adjoining much of the margin of the Island that is not typically dunes, and still does not have a good soil profile developed. The topography is quite smooth, making road and house construction less difficult than in the Bridgman, Eastport complex.

Most of this separation is well drained and free of stones or boulders, but there are areas having numerous boulders, while others have cobbly or coarse gravelly ridges. Narrow strips of wet or poorly drained sand are quite common, especially along the southern 3/4 of the Island. There are about 5,000 acres of this separation or about 14% of the total Island.

36. Saugatuck, Newton, Rifle complex.

This separation covers some areas of imperfectly drained sand soil associated with small areas of poorly drained sand and peat. The topography is generally undulating and some small ridges of dry sand are included. The chief value of this type is for forestry and game cover or possible hunting camp sites.

A total of 700 acres was mapped or about 2% of the Island.

58. Kalkaska, Mancelona, Alpena complex.

This type is mapped chiefly along the west side of Beaver Island to cover the hardwood sand plain. The surface soil where plowed ranges from a loamy sand, low in organic matter, to a light sandy loam fairly high in organic matter. Under virgin conditions there is from 2 to 4 inches of nearly pure organic matter over sand subsurface layers to a depth of several feet.

Stone and boulders in sufficient numbers to hinder cultivation are scattered over and through this type. Small areas are scattered throughout the area where coarse gravel occurs from 2 to 3 feet below the surface.

Much of the original organic accumulation is usually lost in clearing operations and fertility deteriorates rapidly under cultivation. A small part of the farming practiced on the island is on this type but mo that is cleared appears to be used for pasture and hay. As a rule, Kalkaska loamy sand is too low in moisture holding capacity and essential plant nutrients for economical farming after a few years of cultivation.

The area of this separation mapped on the Island is 9,000 acres or approximately 25% of the total.

26. Emmet, Onaway, Rifle complex.

This separation was used to cover a moraine-like area in the southwest central part of the island. It appears to lay higher than the surrounding area and ranges from undulating to gently rolling, or has slopes from 7% to 15% with the major part of the area, ranging in slopes from 7% to 12%. Stone and boulders are quite numerous over the entire surface. The surface soil is generally 2 to 4 inches of organic matter over 18" to 24" of sandy to loamy sand material underlain by coarse sandy clay. In a large percentage of this area clay seems to be 3 feet or more below the surface. There are limestone fragments scattered over and through the soil, suggesting a moderately high calcium content.

Included in this type, as mapped, are numerous small wet spots of peat or other poorly drained soils that are not separated on this reconnaissance map.

4. Poorly drained Onaway sandy loam, Arenac, Ogemaw and Rifle complex.

This is the most important soil separation on the Island from the standpoint of the area and its value for agricultural use. There are about 10,775 acres mapped as this type or 30% of the Island.

Topographically, this separation is a moderately high bench-like area lying 20 to 50 or more feet above Lake Michigan. It is an undulating or slightly sloping area with scattered, low, ridge-like variations of sandy or gravelly material. These ridge-like variations usually have slopes of less than 7% and the average slope of the separation is probably between 3% and 5%.

The soil consists in general of from 18" to 36" of rather loose sandy loam material over compact rather coarse sandy clay. Over the surface and throughout the soil are many stones and boulders. The most conspicuous stones range from 4" to 8" in diameter size, up to boulders of one to two cubic yard size, or stones and boulders of size and numbers to be considerably handicapped to cultivation. The compact nature of the clayey subsoil retards downward movement of water and makes for a poorly drained situation, especially during the spring season. The inherent fertility of the soil is moderately high and it should be fairly easy to maintain, but stone, boulder removal and drainage problems indicate it to be of questionable value for agriculture.

The state of development of this soil on Beaver Island for agriculture and the economic location probably indicates it to be fourth rate or sub-marginal for agricultural uses under present economic conditions and present transportation systems, in spite of indicating it on the map as third rate land.

20. Rifle peat, Lupton muck, Newton, Saugatuck complex.

This type as mapped covered the timbered swamps of the interior part of the island. The soil in these locations is dominately organic to a depth of two or more feet. These soils are not con sidered to be useful for agriculture in these northern parts of Michigan. There are 3,000 acres of this type mapped or about 9% of the Island.

10. Greenwood peat, Newton, Saugatuck complex.

This is the open bog type of swamp soil where the cover consists chiefly of leatherleaf cranberry and some marsh grasses. The soil is dominately organic and strongly acid. In some parts of the United States it is used for cranberry and blueberry production but is generally considered of very slight value in northern Michigan. There are 600 acres of this soil mapped or about 2% of the Island.

7. Maumee, Newton, Eastport complex.

This soil was mapped to cover the areas covered with swamp conifer vegetation on the comparatively recent lake beach positions. These areas lay comparatively close to lake level (10 to 20 feet above) and tend to be poorly or slowly drained. The soil for the most part consists of 6" to 12" of organic matter over sand with large numbers of boulders scattered over much of it. This soil has no prospective value for agriculture due to short life of the organic layer under cultivation, water table control, stone removal problems, etc.

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Source: Michigan Conservation Department.

High Island resembles Beaver Island from a geological and soils standpoint being made up of a relatively thick layer of glacial drift. Boulders are also numerous and the texture of the material seems to be dominantly of sandy clay to clayey sand as indicated on Beaver Island.

The central part of the island is a relatively high plain with loamy sand to sandy loam surface soil with considerable numbers of glacial stone and boulders. This soil ranges from moderately well drained to poorly drained.

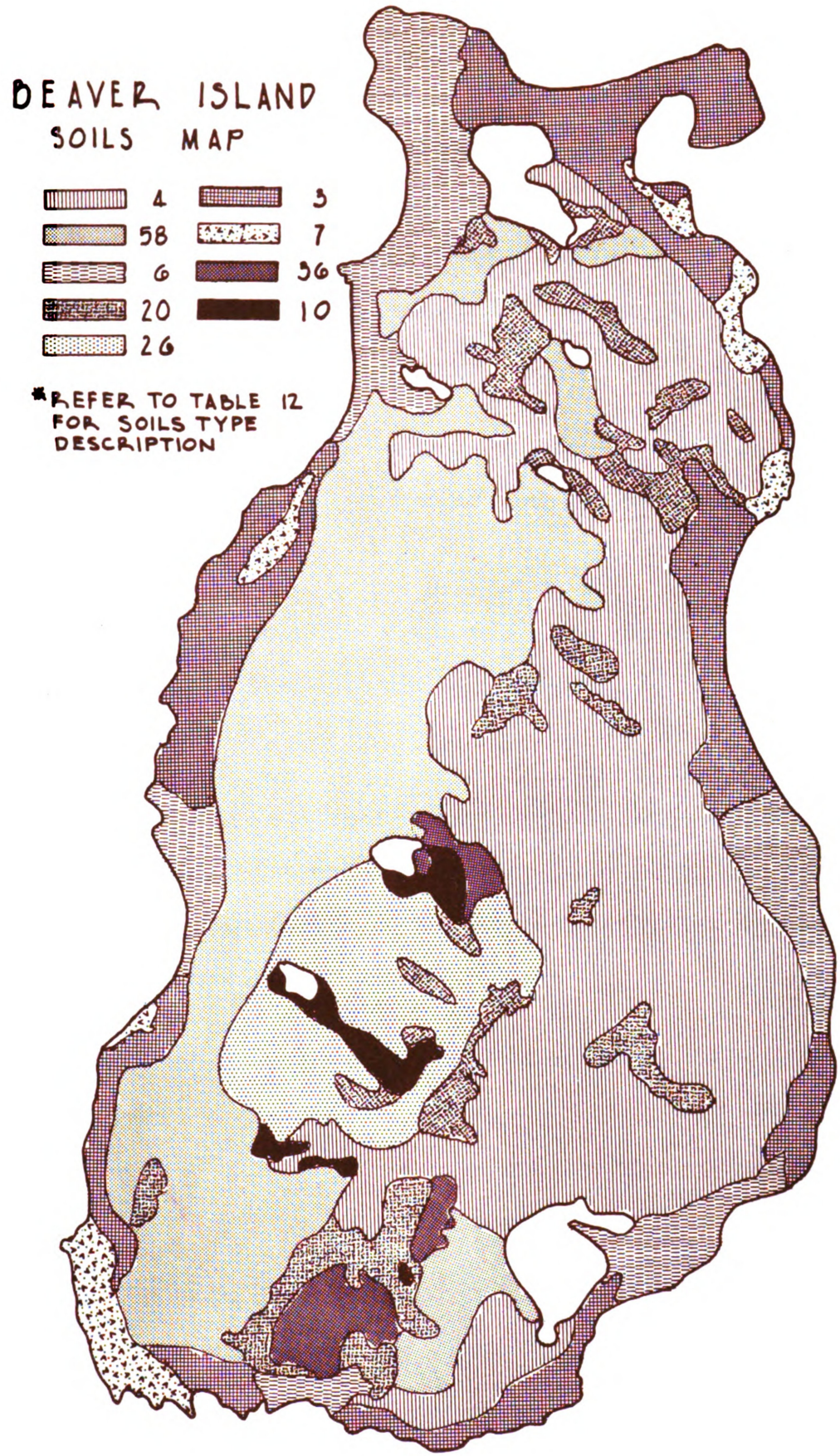

BEAVER ISLAND
SOILS MAP
4
58
6
20
26
3
7
36
10
*REFER TO TABLE 12 FOR SOILS TYPE DESCRIPTION

Figure 8

The highest plain of the island is separated from the lower parts by an escarpment ranging in height from a few feet to upwards of 150 or more feet on the southwest. In some parts of the west side, this escarpment is covered with rather high dunes. Between the escarpment and the lakeshore is an area of sandy and gravelly beach ridges of former lake levels. Inter-ridge areas may be wet but dominant areas of this section of the island are well drained.

There is a good landing for ships on the northern part of the eastern side of the island with protection from storms except those of easterly direction.

There is one inland lake of about 12 acres which has a sand margin for over half of its shoreline and only a thin deposit of organic matter over the remainder.

The beach of the northern half is for the most part sand. There are but short gravelly stretches of rounded gravel and in the central part of the eastern side, water reaches directly to the foot of an escarpment 10 to 20 feet high.

The acreage and cover type distribution is as follows:

| Cover Type | Acres | Percent of Total |
|---|---|---|
| Aspen-birch-conifer | 1,525.50 | 42.8 |
| Northern hardwoods | 1,171.17 | 32.9 |
| Grass-openings | 287.63 | 8.1 |
| Coniferous | 155.42 | 4.4 |
| Beach types | 349.75 | 9.8 |
| Upland pine | 58.03 | 1.6 |
| Lakes and ponds | 14.78 | 0.4 |

Hog Island, the smallest of the four islands, is an irregularly shaped island and is largely an outcrop of limestone bedrock with a thin mantle of glacial drift that has been reworked by wave action during

higher water levels of Lake Michigan.

The highest part of the island is broken or cut by numerous old beach ridges from five to twenty feet in height. The middle third of the island, dividing the north from the south, is swamp or marsh with some parts having been so recently under water that practically no organic layer has as yet been accumulated on the surface. This area has been cut off from Lake Michigan on the east by a present day beach ridge of sand that has been built up as a rather uniformly leveled band of sand eight to fifteen feet above lake level and 50 to 75 yards wide. On the west it is still exposed to storm wave action and considerable area appears to be intermittently under water.

The northern and southern sections of the island are ringed with beach ridges. The interior is higher and the smoother areas between the older stage beach ridges have a varying thickness of glacial drift with considerable percentage of angular limestone fragments over bedrock. The thickness of this drift material ranges from one to four feet in depth. This part of the island is badly cut up by ridges as well as being stoney and rocky.

The older stage beach ridges are made up of both sand and angular rock fragments with ridges of angular material being dominant. This coarse, angular gravel is but slightly water worn and most of the pieces are the size of one's hand or smaller. Of the present day beaches, there are only two short stretches of sand ridges heaped up, namely along the Bay on the northwest part of the island and the larger bay on the east center shore. The rest of the beach is either rocky or bedrock thinly covered with small fragments with water from one to three feet deep extending 100 yards or more from shore.

The small bay on the northwestern part of the island provides the only moderately good landing spot for small craft. This bay also provides protection from all winds except northwesterly.

The soil fertility is high over much of the island and moisture conditions vary from fair to good under forested conditions but should generally be considered a shallow rocky soil.

The thickness of the organic accumulation over much of the mineral soil in the interior suggests that hot forest fires have been generally lacking and that good forest growth can be expected. The slight depth to bedrock enforces shallow rooting and suggests danger of much windfall.

From one-fourth to one-third of the island is swamp and can be expected to produce swamp conifer vegetation for centuries while cedar is an important tree on the recent beach ridges.

The following indicates the total acreage and percentage of vegetation cover:

| Cover Type | Acres | Percent of Total |
|---|---|---|
| Northern hardwoods | 797.58 | 33.8 |
| Aspen-birch-conifer | 776.36 | 32.9 |
| Beach types | 423.82 | 18.0 |
| Aspen-conifer-hardwood | 295.62 | 12.5 |
| Sedge and marsh | 34.76 | 1.5 |
| Grass-openings | 25.56 | 1.1 |
| Lakes and ponds | 5.34 | 0.2 |

Garden Island, the largest of the small islands of this group, is similar to Hog Island in that it is a bedrock out-crop rising above present lake level with a thin mantle of glacial drift spread over the rock that has in turn been reworked by wave and ice action of higher stages of lake levels during later glacial periods. Glacial boulders are

scattered over the island but they are especially conspicuous in the shoal water around the island. Most of the beach of the island is bedrock swept free of glacial material and covered with layers of angular rock fragments in most places, but there are occasional spots where bare bedrock is exposed. There are but few short stretches of sand beach ridges.

The water recession from the highest stages to the present is well marked by a succession of ridges of coarse angular or but slightly rounded limestone fragments and a slight admixture of sandy material.

The interior of the island has several fairly broad, generally smooth areas not broken by beach ridges and a few smoothed off areas of old sand beach that have developed a hardwood sand soil profile. Some of the larger old clearings are on this latter soil situation.

The other portions of the island not badly cut up with beach ridges have a thin covering of glacial drift over broken bedrock fragments and bedrock. The depth of material varies from one to several feet and the drainage ranges from moderately good to poor. The poorly drained areas in some cases have several feet of peat and muck covering over the mineral material where parts of former Lake Michigan levels have been cut off. Shallow marshy lakes remain in several places in the interior of this island.

There is a good landing for small craft in Indian Harbor on the southwest side of the island, with protection from winds of any direction. There is no first-class sand beach along the entire island shore.

The vegetation, some of it virgin timber, is very dense and resembles that found on Beaver Island. The cover type is as follows:

| Cover Type | Acres | Percent of Total |
|---|---|---|
| Aspen-birch-conifer | 2,279.68 | 48.5 |
| Northern hardwoods | 1,188.98 | 25.3 |
| Beach types | 917.05 | 19.5 |
| Sedge and marsh | 129.38 | 2.8 |
| Grass-openings | 126.48 | 2.7 |
| Lakes and ponds | 59.72 | 1.3 |

## Cultural Activities

The past cultural activity is similar to that discussed in Chapter II. Records indicate that the Ojibway and Ottawa Indians were apparently the first occupants of the Beaver Island group. Records indicate that High, Garden, and Beaver Islands are the only islands of the Beaver group which were at one time inhabited.

The archipelago was first mapped by 1672; however, it was the French in the mid-seventeenth century that first settled on the islands. This settlement did not survive and it was not until the Mormon settlement in 1849 that a permanent settlement was established on Beaver and High Islands. In the interim, however, trappers, traders, and missionaries visited the islands and the American Fur Company had a building at the harbor on Beaver Island about 1830.

The Mormon settlement, under the leadership of the historic James J. Strang, remained from 1849 until 1856 when "King" James J. Strang was assassinated. During Strang's reign: the population built up to 1,300 or, by some estimates, to as much as 2,600; St. James, the harbor community, originated; fields were cleared for farming, roadways were built, and commercial trading and fishing prospered. After Strang's assassination, utter chaos struck the islands as the Irish fishermen, who were previously driven from the islands by Strang, besieged the islands and drove the Mormons from

their lands.

Following the Mormon exile, commercial fishing and lumbering became the main occupations of those who settled on the Beaver group, with one exception. From 1912 to 1928, the House of David, a religious sect with its headquarters at Benton Harbor, Michigan, established a colony of about 500 persons on High Island. The population never again grew to that of the Mormons. As records indicate, the population remained at approximately 900 to 1,000 until the lampery destroyed the commercial fishing industry in 1946.

Relatively little activity has occurred on the other islands of the Beaver Island group with the exception of minor lumbering operations and minor farming conducted on Garden Island and the activity of High Island previously discussed.

The past era of the activities on the Beaver Island group have many unequaled historic events, all of which gain significance in contributing to a recreational feature in the Beaver archipelago.

Today the population of Beaver Island, the only inhabitated island of the Beaver Island group, is approximately two hundred. The only forms of income are from the vacationers and hunters who come to the island on a seasonal schedule.

St. James, the only community on the island, is located adjacent to the harbor facilities on the northern end of the island possessing the following community facilities; restaurants, lodging in cabins, motels, rooms, lodges, and a hotel; general stores, service station, medical clinic, boat docking, public school, museum, post office, Catholic and Episcopal Churches, and a township camping

site. The Coast Guard Station and Michigan Conservation Department Field office are also located adjacent to the harbor. (Figure 9)


Figure 9

Public utilities include telephone service from Petoskey and electricity generated from the Northwest Electricity Plant adjacent to the harbor.

The community's physical layout is similar to that of the past cultures. The major roads parallel the harbor form, while the secondary roads radiate from the harbor forming a web-type circulation pattern.

Access to the island is either by air or boat. Some visitors use privately owned boats or planes while others use the available car and passenger ferry service from Charlevoix (Figure 10) or McPhillips Flying Service located in Harbor Springs.

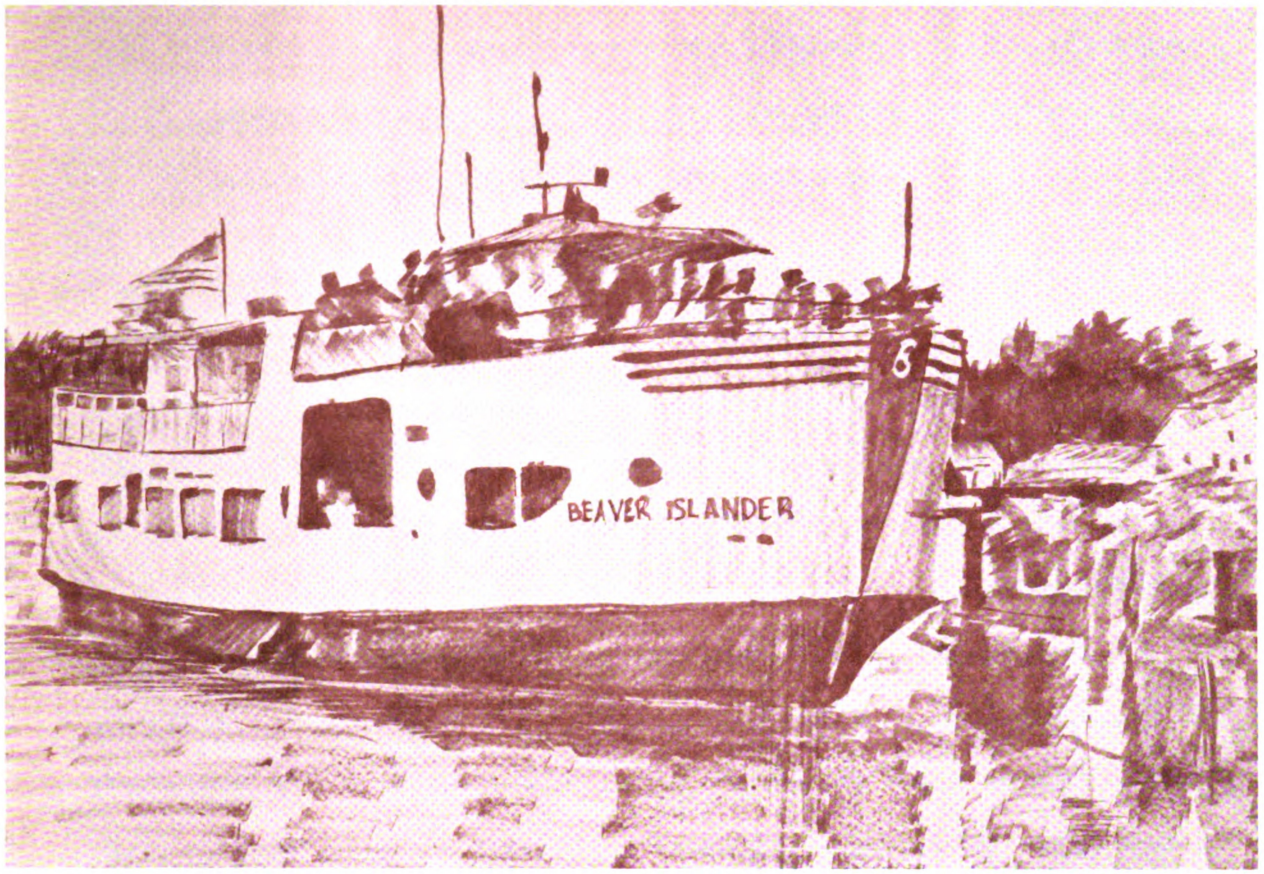



Figure 10

The first impressions upon arrival are similar to those discussed in Chapter III with these exceptions.

By plane:

The awareness of the "heap" of privately owned junk cars that border the airport runway on the north side destroys much of the character as seen from the air.

These cars serve a function, communication to various sections of the island; however, the haphazard location destroys much of what could be a unique transitional experience.

By boat:

The advantages of the natural harbor are soon destroyed by the chaotic building facilities. At a distance the forms

of the lineal massing and irregular roof line of the physical structures are most interesting. However, as the distance is decreased the old and unique become the shabby and the typical, readily apparent on the mainland.

Evidence of the early historic era within the community has all but completely been removed with the exception of the museum structure and the names of some of the community facilities such as the King Strang Hotel. Most of the existing structures are the remains of the fishing village and do possess a limited amount of character, although these structures are in need of maintenance. Some of the structures have a more recent origin and possess absolutely no character. Of those structures spotted throughout the remainder of the island, few are Mormon in origin. Most of the structures have their origin during the past 30 to 75 years. Many of the landscape features, however, date back to the Mormon era, such as stone walls, some existing roads, small overgrown orchards, and cleared fields.

There are numerous old logging trails and approximately 75 miles of narrow gravel roadway. Because of the alignment and condition of the roads, vehicular movement is necessarily slow providing a similar variety of sequential experiences to that experienced on the trails. (Figure 11)

## Design Proposal

The following recommendations and design proposals are based on the preceeding analysis of the natural conditions and cultural heritage of the islands.

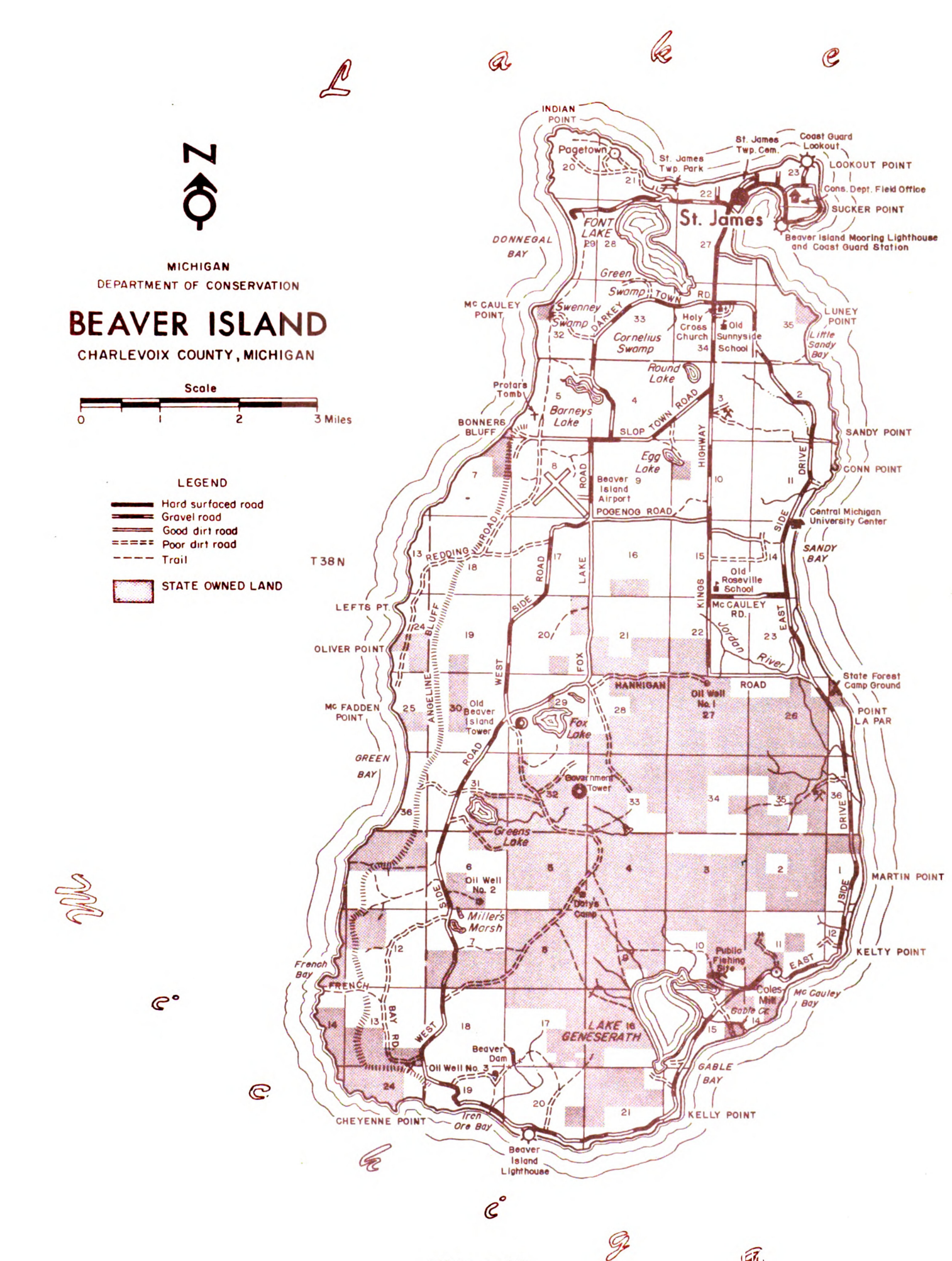

N
MICHIGAN
DEPARTMENT OF CONSERVATION
BEAVER ISLAND
CHARLEVOIX COUNTY, MICHIGAN
Scale
0 1 2 3 Miles
LEGEND
Hard surfaced road
Gravel road
Good dirt road
Poor dirt road
Trail
STATE OWNED LAND
T38N
INDIAN POINT
Pagetown
St. James Twp. Park
St. James Twp. Cem.
Coast Guard Lookout
LOOKOUT POINT
Cons. Dept. Field Office
SUCKER POINT
St. James
Beaver Island Mooring Lighthouse and Coast Guard Station
FONT LAKE
DONNEGAL BAY
Green Swamp
TOWN RD.
MC CAULEY POINT
Swenney Swamp
DARKEY
Cornelius Swamp
Holy Cross Church
Old Sunnyside School
LUNEY POINT
Little Sandy Bay
Round Lake
Protar's Tomb
Barneys Lake
BONNERS BLUFF
SLOP TOWN ROAD
HIGHWAY
SANDY POINT
Egg Lake
Beaver Island Airport
POGENOG ROAD
DRIVE
CONN POINT
Central Michigan University Center
SIDE
SANDY BAY
REDDING ROAD
LAKE
Old Roseville School
KINGS
MC CAULEY RD.
EAST
LEFTS PT.
BLUFF
SIDE
OLIVER POINT
Jordan River
WEST
FOX
HANNIGAN ROAD
Oil Well No. 1
State Forest Camp Ground
MC FADDEN POINT
ANGELINE
Old Beaver Island Tower
Fox Lake
POINT LA PAR
GREEN BAY
Government Tower
Greens Lake
DRIVE
MARTIN POINT
Oil Well No. 2
Dotty's Camp
Miller's Marsh
SIDE
KELTY POINT
French Bay
FRENCH
Public Fishing Site
EAST
Coles Mill
Mc Cauley Bay
Gable Cr.
BAY RD.
WEST
LAKE GENESERATH
Beaver Dam
Oil Well No. 3
GABLE BAY
CHEYENNE POINT
Iron Ore Bay
KELLY POINT
Beaver Island Lighthouse

Figure 11

## Hog, High, and Garden Islands

The soils, vegetation and size of these islands are such that the ruffed grouse research should continue, however, more design consideration is necessary when constructing the open areas and trails needed for research activity. In the design proposal consideration of the aesthetic value of opening forms and the sequential experience from opening to opening, as discussed in Chapters II and III, are necessary. The future need for wilderness camping and educational study will justify this design emphasis.

Those considerations necessary for the ruffed grouse research activity, as adopted from the conservation research program, are as follows.

Grouse range should contain three kinds of cover: 1) shrubs and low growing ground cover for rearing broods and summer and fall food, 2) hardwoods for nesting and for fall, winter and spring foods, 3) conifers or brush tangles for winter cover. All three should occur within an area of forty acres so they will be available in the daily travel limits of the birds. Open areas of one-half to two acres totaling as much as five acres per forty acres of woods are necessary. A good average spacing between open areas is 600 feet as grouse seldom go more than 300 feet in any one cover type.

The combined use of research activity, and wilderness camping and educational study is schematically illustrated in Figure 12.

The islands should remain isolated with access difficult. Their value is for educational research and wilderness recreation purposes.

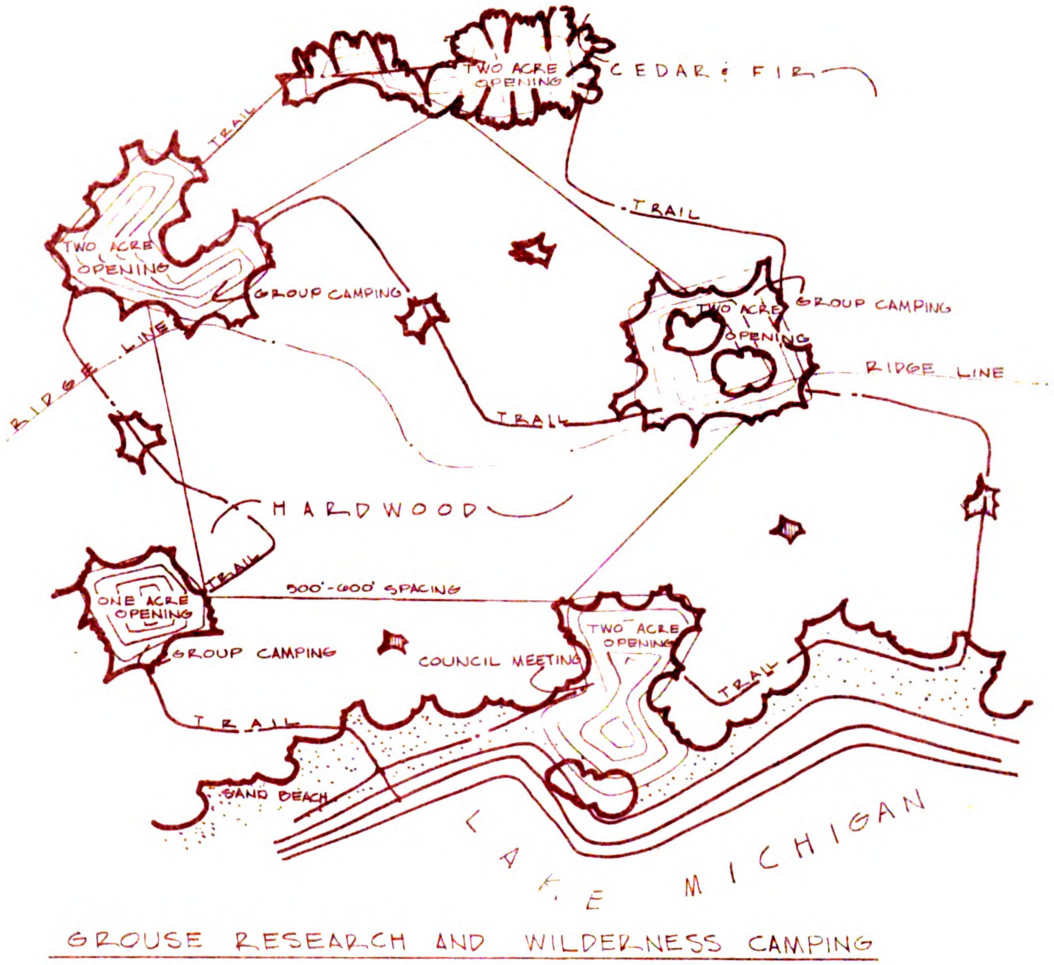



Figure 12

They must be carefully restricted and controlled so that the full value of their wilderness character will be retained and perpetuated for the enjoyment of the future generations.

## Beaver Island

Because much of the land area is privately owned,development is anticipated. This does not, however, imply that little consideration need be given to the natural existing conditions. The ultimate goal should be one of a union between man and nature.

The future demands of the tourist trade must be considered in the design plan and recommendations should be enforced by laws and

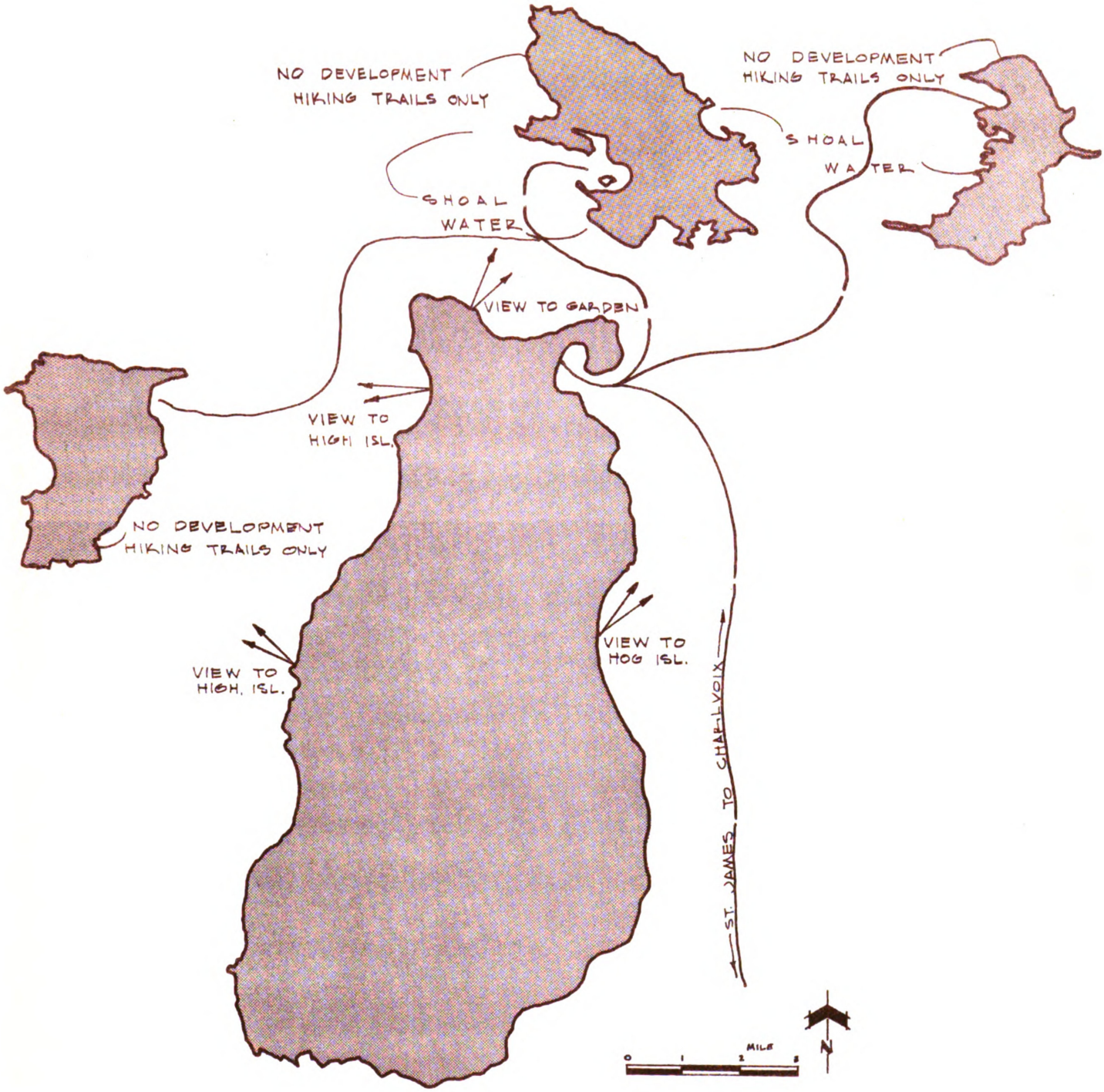
zoning ordinances. Also necessary of consideration is the relation of the smaller islands around Beaver Island.

As has been stated earlier, these islands possess certain physical and psychological features which are invaluable in the development of Beaver Island. Networks of communication and natural vantage points in relation to distances are indicated in Figure 13.

The emphasis in the analysis is placed on visual aesthetics and wilderness experience, both of which necessitate slow movement on the part of the observer. Less emphasis is placed on vehicular movement, while the use of bike paths, hiking trails, and bridle paths are encouraged.

The locations of many of the existing trails have an historical origin as discussed in Chapter II. The location for future trails should further indicate this origin. Most of the trails, existing and proposed, eventually reach outwardly into the waters of Lake Michigan, at which time the surrounding islands gain their psychological importance.

In the process of reaching these natural vantage points, whether by bike paths, hiking trails or bridle trails, many unique natural features are experienced. A typical "trailscape" is almost impossible to define. The succession of ecological relationships, edaphic, climatic and biotic, are ever so apparent. Seasonal changes bring new highlights and ever changing descriptions. The bright colors of the fall, the white and green of the winters, and the feelings of "freshness" in the spring are only a small portion of the visual aesthetics indigenous in a typical




INTER-ISLAND RELATION

Figure 13

island "trailscape".

These aspects of aesthetic splendor circum the heart of a great recreation potential--that of island recreation.

The road system is adequate and currently provides slow movement. The inadequacy will become apparent if, in the future, vehicular movement is not discouraged. The road system should remain narrow, varying in width from 10 to 20 feet. This assures slow movement and provides a pleasing corridor system.

Both the harbor and airfield facilities are of sufficient size and will adequately serve the future growth. There are, however, many aspects of each facility which need to be improved. Each facility is sited in its proper location; however, other than the initial distant island welcome, the island welcome received is very weak and deserves serious design consideration. Previous discussion indicated that the location of cars at the airfield is very chaotic and that the natural outline of the harbor is most welcoming with minor exceptions.

At the airfield, an organization plan for the storage of automobiles is essential. This plan should not reflect the typical mass parking lot--"a sore thumb design"; rather, it should be all encompassing and incorporate the area adjacent to the airfield which lends itself to an organic land form-cluster parking relationship. (Figure 14).

Other aspects necessary of consideration at the airfield in order

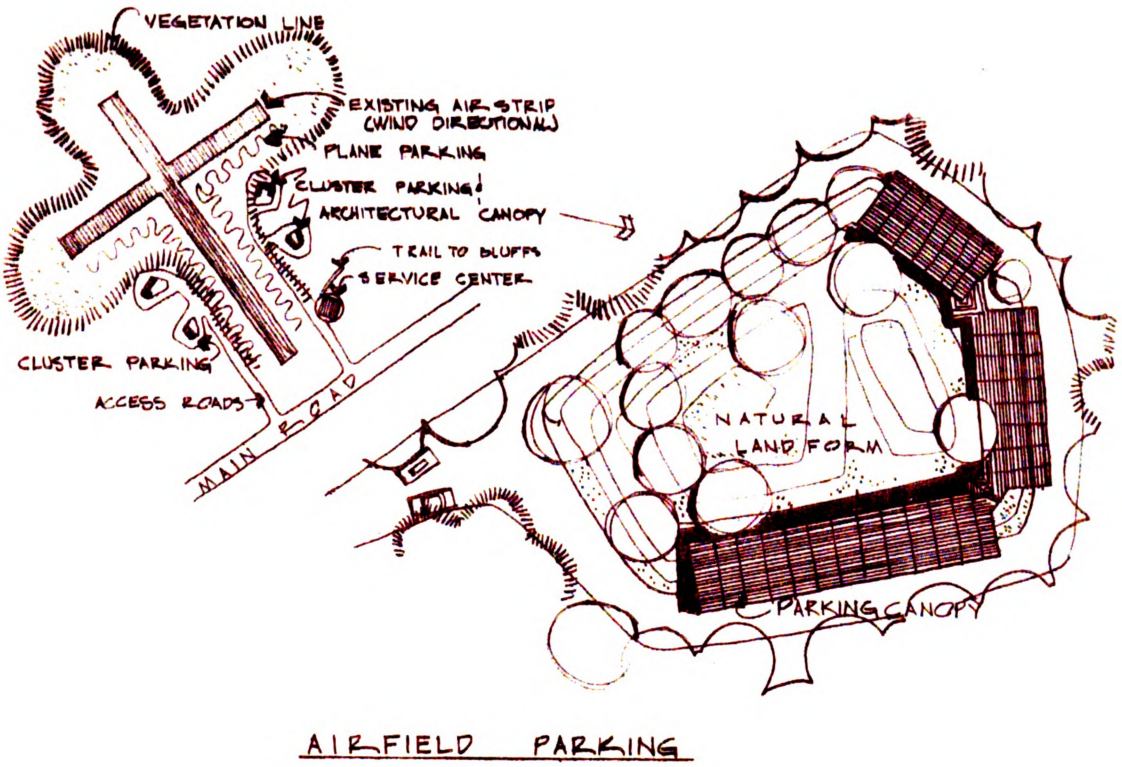



Figure 14

that a proper welcome be extended are: a comfort station to include toilets, drinking water, information and material pertinent to the island's natural and cultural characteristics; plane servicing equipment and storage; and proper signing.

The harbor facilities are of excellent functional quality because of recent construction. There are, however, many aesthetic values which have not received any consideration. The existing relationship between the yacht facilities and the ferry landing is only geographic. Considerations to unify these facilities are necessary. The recently constructed structure at the ferry dock is of suitable size and character; however, the Yacht Club's structure lacks the aesthetic value necessary to unify the

two alike uses. The docking facility is very well oriented and well designed. There is the lack of richness and splendor exhibited in its heritage. Figure 15 illustrates schematically a harmonious design. The intent is to use circulation, similar material, land forms, plant material and structural and vertical elements to perpetuate a more harmonious relation needed for the similar uses and the related environment.

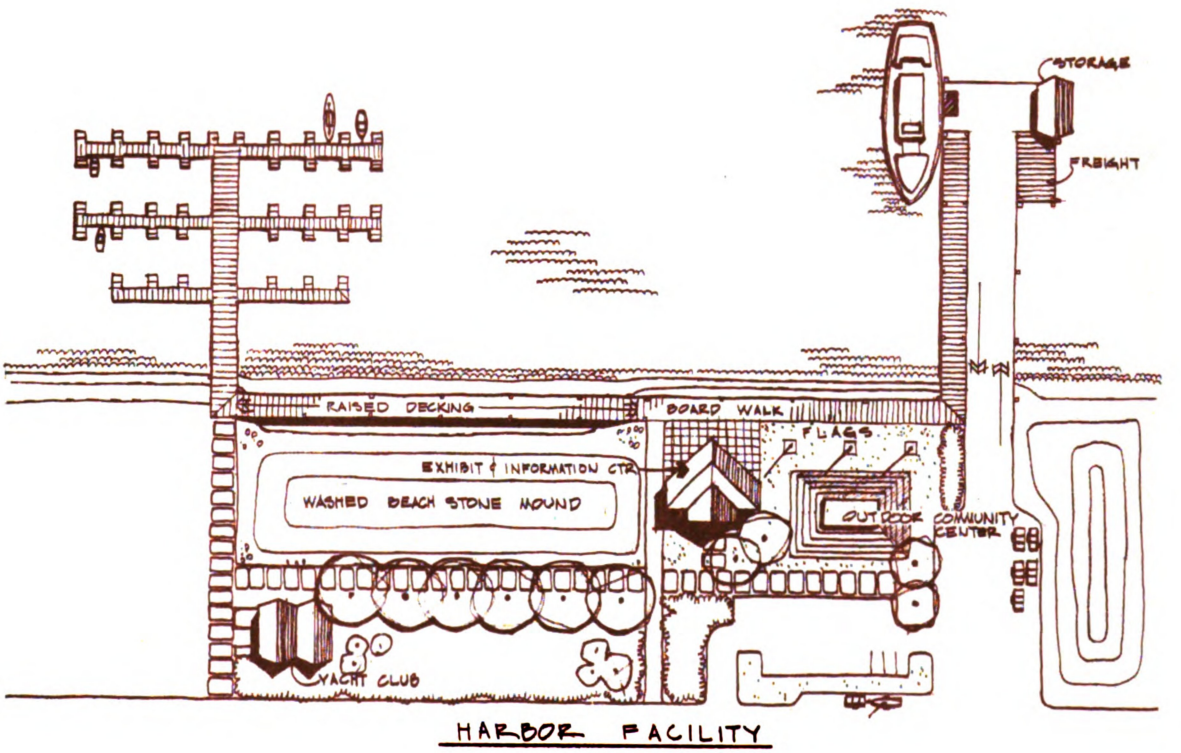
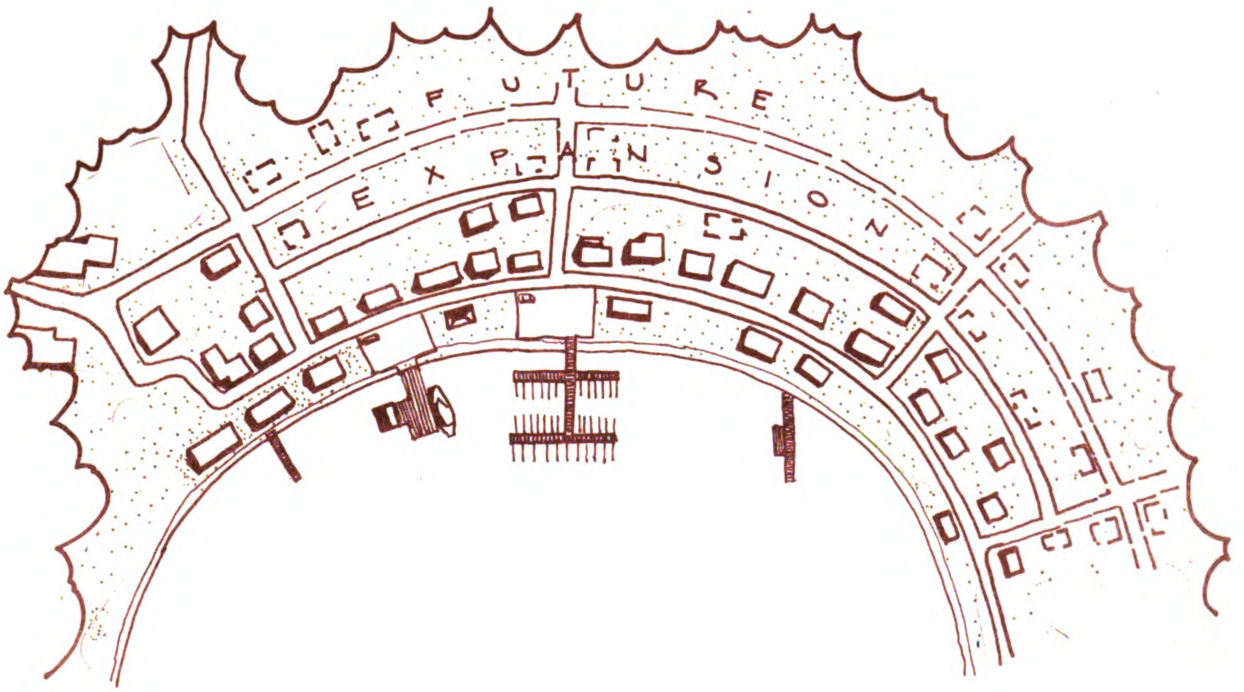



Figure 15

The community facilities are adequate; however, most of the facilities need to be refurbished structurally. The heritage factor far outweighs their removal or "face lifting" design. The existing community layout parallels the harbor shoreline and is enclosed by a backdrop of dense foliage. If the community is to expand, it is recommended that a

high percent of the vacant lots in the current layout continue to be void of structural facilities and future development be on the secondary loop road. The schematic design considerations are illustrated in Figure 16. The




HARBOR COMMUNITY EXPANSION

Figure 16

intent is to illustrate the importance of open and enclosed space, the influence of the historical period, and to further nurture a man-nature oriented environment.

The power plant is currently at peak capacity during the summer months and will need to be expanded to handle future development.

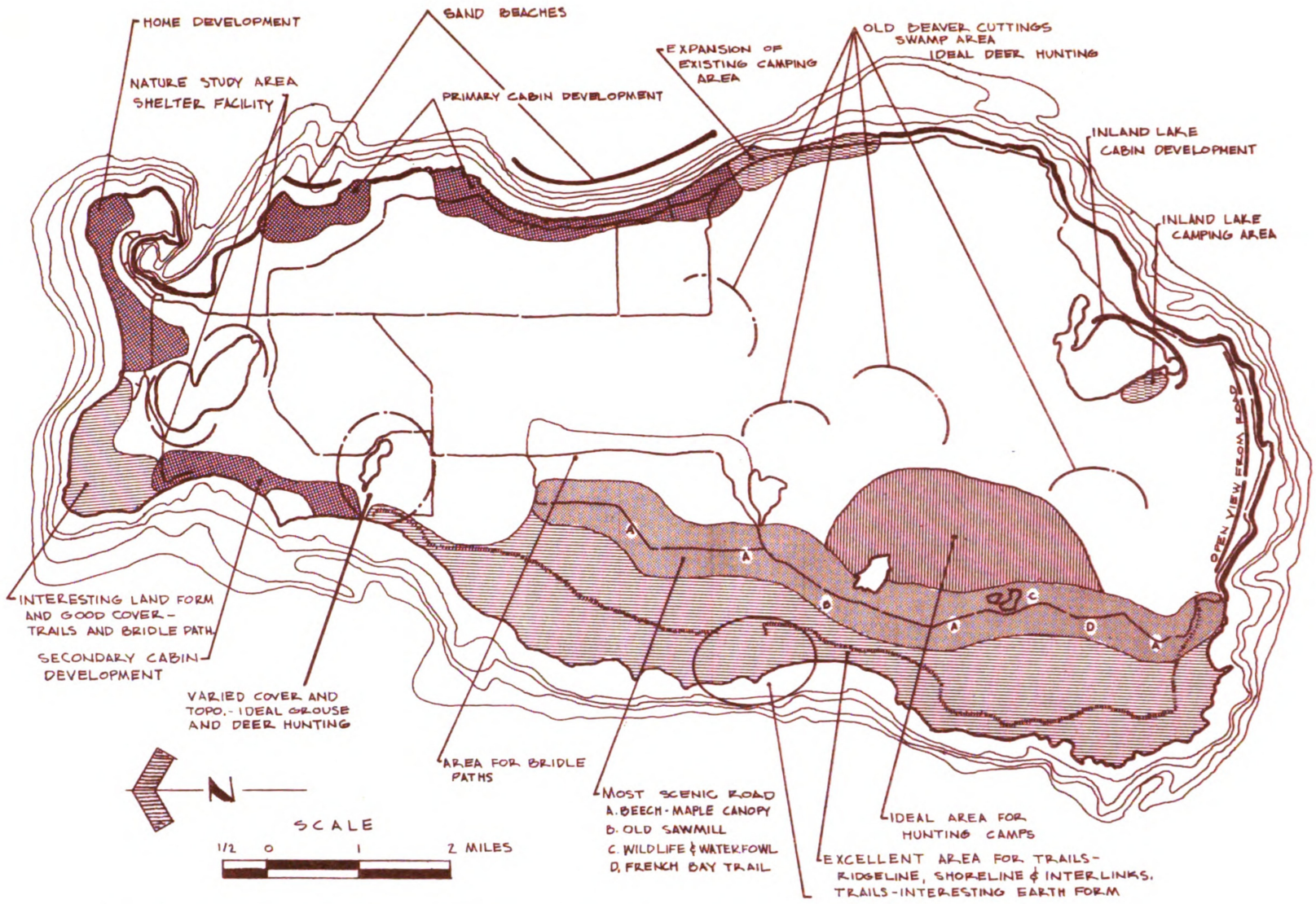
Camping facilities, motels, cabins and lodges are currently adequate; however, more facilities need to be constructed if the tourist trade increases.

The schematic use design (Figure 17) provides a natural and organic plan in harmonious relation to its total environment. Sporatic private development should be curtailed if the natural character of the island is to be maintained. This is important from the visual aspects as well as the projected land use relationships. Large natural areas unobstructed by cabin developments will be needed by sportsmen that seek the game hunting necessary in the deer, grouse and turkey research projects of the Michigan Department of Conservation.

Individual site consideration are equally important if the total environment is to be one of a man-nature relationship. For these reasons, the individual use areas must be wisely applied to an individual receptive site. Figure 18 schematically illustrates some of these considerations. In order to assure this harmonious relation, the following considerations are recommended:

Building materials to be of harmonious material.
Individual site selection to be approved by a qualified board.
Buildings set back from the roads and shoreline.
A scenic easement along all roads and trails.
Control over sign type and location.
Underground utility lines.
Strict enforcement against littering.

In addition to this list of recommendations, there must be the self realization within the islanders and developers that the anticipated tourist trade is interested in the natural conditions and cultural heritage of the island group. The types of recreation offered should be of an indigenous character and those of a non-harmonious nature, such as golf, should be




BEAVER ISLAND USE DESIGN

**Figure 17**

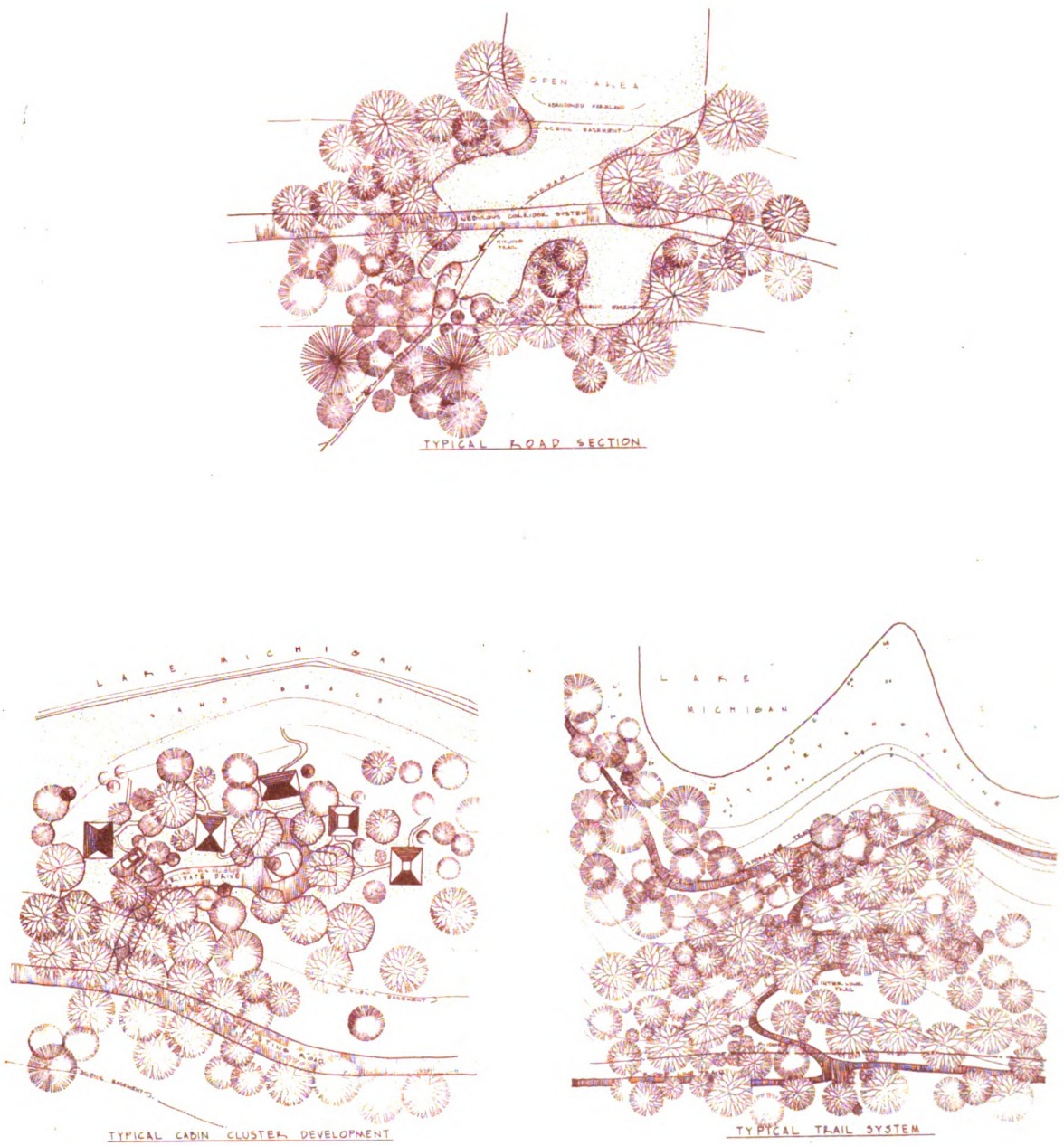



Figure 18

discouraged. The recreation appeal is that of an escape from the ordinary and should express the unique--a man-nature symbiotic relationship.

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* Visitors of Beaver - over 50 in total.