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A LATE PLEISTOCENE GEOGRAPHY
OF SOUTHWESTERN MICHIGAN: A
CULTURAL AND HISTORICAL STUDY

by
David R. Williams

A Thesis
Submitted to the
Faculty of the School of Graduate
Studies in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
August 1969

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in no way divorces me from the sole responsibility for
what is written here.

David Ralph Williams

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CHAPTER I

INTRODUCTION

Pleistocene Geography is a very recent area of study within the discipline of Geography. Although various individuals, such as A. H. Clark,¹ Carl Sauer,² and Wagner and Mikesell,³ among others, have discussed the relationship of Pleistocene studies to geography in nature, the full scope of Pleistocene Geography was not delineated until 1964 when Karl W. Butzer published his book, Environment and Archeology: An Introduction to Pleistocene Geography.⁴ In this work, Butzer defines Pleistocene Geography as "environmental reconstruction

¹A. H. Clark, "Historical Geography," American Geography: Inventory and Prospect, ed. Preston James and C. Jones (Syracuse: Syracuse University Press, 1954), pp. 70-115.

²Carl O. Sauer, "A Geographic Sketch of Early Man in America," Geographic Review, XXXIV (1944), pp. 529-573.

³P. L. Wagner and M. W. Mikesell, Readings in Cultural Geography (Chicago: University of Chicago Press, 1962), p. 589.

⁴Karl W. Butzer, Environment and Archeology: An Introduction to Pleistocene Geography (Chicago: Aldine Publishing Co., 1964), p. 510.

as applied to an understanding of the ecological setting to prehistory."⁵ Thus considered, this subject includes a broad range of factors. Of necessity, environmental reconstruction calls for a knowledge of Physical Geography including the distribution, and the processes affecting the distribution, of weather and climate, soils, vegetation, and landforms over the earth's surface. It also calls for a knowledge of Cultural Geography in relating man's use of the natural landscape. However, first and foremost, the Pleistocene Geographer is a Historical Geographer. A. H. Clark, as quoted by Butzer, states that

To insist that historical geography begins where history, as opposed to prehistory, begins would assume some inherent necessity for written records in studying the past geography of an area. Archeological reconstructions alone have sufficiently demonstrated that no such necessity exists. . . . There is, indeed, no logical date or period in time when such studies may properly be said to begin. If physical geography is something more than a summation of geological, climatological, ecological, and similar evidence, then a physical historical geography must exist, which utilizes the kind of evidence that is also studied, often in arbitrarily restricted categories, by the historical geologist, paleontologists and paleo-climatologists.⁶

Since Pleistocene Geography covers such a wide range of phenomena, it is unlikely that any one geographer will

⁵Ibid., p. 10.

⁶Ibid., p. 8.

have competence in all areas. Therefore, he must draw, from the works of specialists in various areas, such as Paleo-climatology, Paleo-botany, Ecology, Pedology, Geology, and Archeology. His particular contribution to Pleistocene research consists in drawing from all of these other disciplines to determine the relationship of prehistoric man to his environmental and ecological setting.

The Purpose

Butzer's work on Pleistocene Geography is a general introduction to the subject as a whole. Two-thirds of his book is devoted to the various factors in environmental reconstruction while the rest deals with man-land relationships. As most of Butzer's research on prehistoric man has been in Europe, North Africa, and the Middle East, his discussion of man-land relations draws heavily from these areas. Therefore, little was included on North America. This thesis will attempt to apply the principles of environmental reconstruction and the analysis of man-land relationships as set forth by Butzer to the prehistoric cultures existing within southwestern Michigan. These cultures are representative of those existing in the Upper Great Lakes Region and northeastern North America.

The Methods

This thesis can be divided into two parts; one is concerned with environmental reconstruction while the other deals with man-land relationships. Analysis for the first portion relies heavily upon the works of Glacial Geologists and Paleo-ecologists such as Leveratt and Taylor,⁷ and Zumberge and Potzer.⁸ Geological studies provide the means to divide the study area into landform regions and to observe the fluctuation of the glacial and post-glacial lakes within the Lake Michigan Basin. Analysis of fossil pollen gives clues to climate fluctuations and the corresponding change in vegetation types. Faunal remains in bogs, surface finds, and archeological sites provide records of changes in animal ranges. Finally, radio-carbon dating techniques help to establish the chronology used in this thesis.

The analysis of man-land relations in southwestern

⁷ Frank Leverett and F. B. Taylor, Pleistocene of Indiana and Michigan and the History of the Great Lakes ("United States Geologic Survey Monographs," Vol. LIII; Washington, D. C.: Government Printing Office, 1915), p. 520.

⁸ J. Zumberge and J. Potzer, "Late Wisconsin Chronology of the Lake Michigan Basin Correlated with Pollen Studies," Geological Society of America, LXVII (March, 1956), 271-288.

Michigan is done with the aid of maps showing the distribution of sites, by time periods, within the study area. Through the use of the site-card files at the University of Michigan Museum of Anthropology, a ready source of information is available. Subdividing these sites into each of the major cultural periods recognized for the Upper Great Lakes Region (Paleo-Indian, Archaic, and Woodland) has proved a major problem. It was necessary to find some artifact or artifacts which would characterize the period as a whole, but would not overlap into the next period. Finally, it was decided that the Paleo-Indian culture would be distinguished by the presence of fluted points in the site-card description. Since the Archaic Cultural Period was of such a long duration with a great diversity of cultures, the only factor that distinguished the period as a whole was the lack of pottery. The Woodland Cultures were mapped on the basis of pottery being recorded in the site description. Not all sites that were found have been mapped. Only those sites whose provenience data were recorded to within a quarter section were used. The three maps, thus made, were overlain on a landforms map of southwestern Michigan. By observing the changes within the settlement pattern, as revealed by these maps, in light of the cultural characteristics of these people and the environment existing at the time,

it is hoped that a better understanding of the relationship between these people and their environment has been obtained.

There are a number of inherent obstacles to such an analysis. First of all, because of stringent mapping requirements, not all sites within the study area have been mapped. This, coupled with the distinct possibility that many areas within the study region have not been fully investigated for archeologic sites, could, and probably does, mean that some areas do not show a representative distribution of sites. However, it is hoped that the large number of sites which have been plotted will be sufficient for significant analysis.

Furthermore, in dividing the sites into time periods, materials recorded on the site cards may have been misinterpreted. For example, a Woodland site might have had no pottery recorded and therefore been mapped as Archaic. However, it seems likely that the number of such instances may have been insignificant in analyzing the total distribution. Also, when the site can be located with no greater precision than a quarter section, it may be possible that some sites have been located on the wrong landforms. However, as most landforms cover several sections, it would seem that the great majority are correctly located.

Perhaps the greatest difficulty is the great time span covered by each period. One of these, the Archaic, covers approximately 8,000 years. Both the Archaic and Woodland Periods are divided into early, middle, and late subdivisions. Since the majority of the sites mapped had been discovered and recorded by amateurs, most site cards do not contain a specific period identification. Therefore, it has been impossible to map the distribution for each subperiod. As a result, the analysis must be somewhat general and, in places, speculative.

In spite of all these limitations, it is felt that this study will have value as an introductory work and that when the distributional pattern for these subperiods is known, a more detailed study can be undertaken.

The Study Area

Southwestern Michigan, as defined in this study, includes that portion of the state of Michigan which extends northward from the state border to the northern boundary of Kent County and eastward from Lake Michigan to a line from the northeast corner of Kent County to the southeast corner of St. Joseph County. The area includes all of Berrien, Cass, St. Joseph, Van Buren, Allegan, Ottawa, and Kent Counties. Also included is the western half of Barry County and the southern portion

of Muskegon County (see Fig. 1).

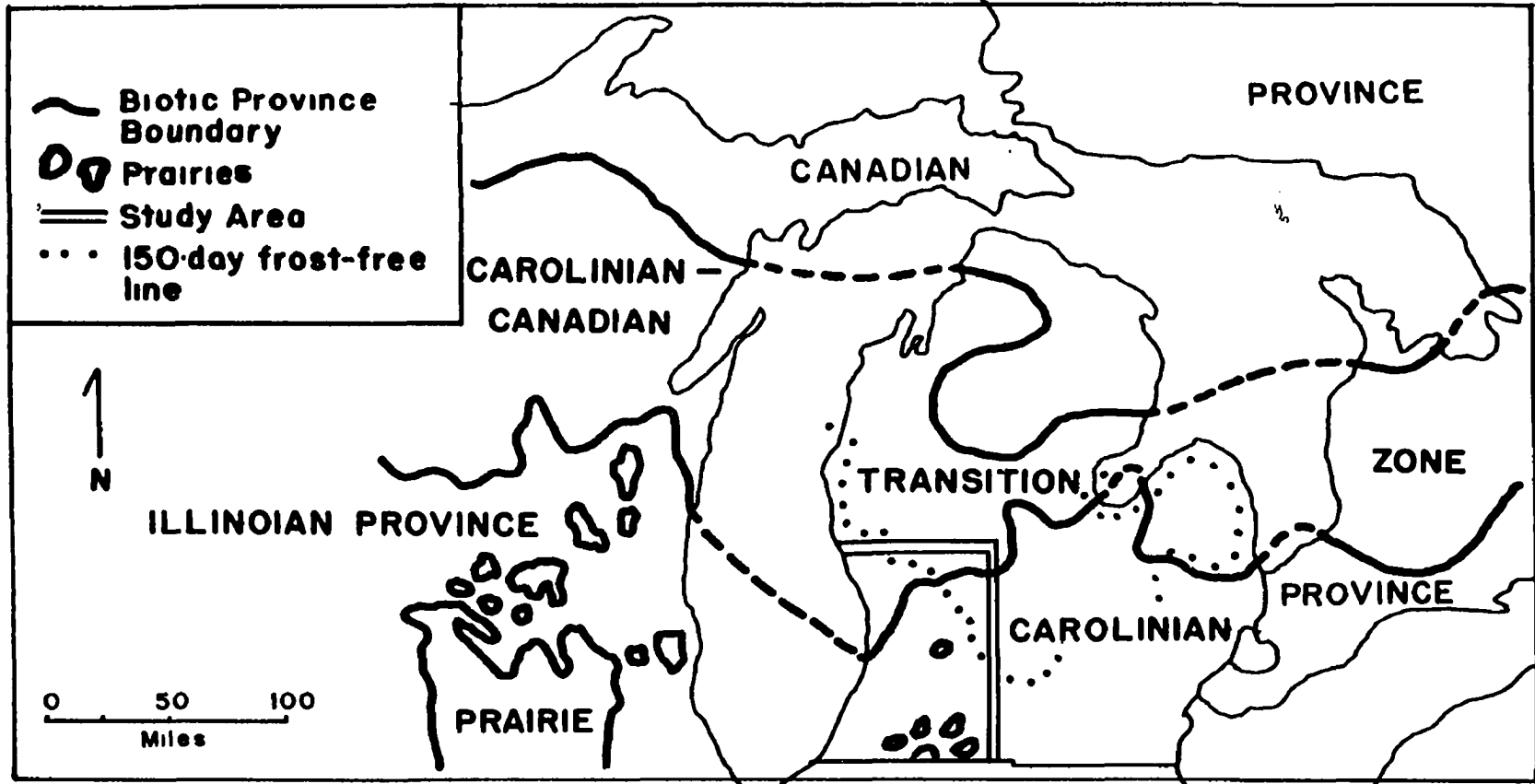
This area was chosen primarily for the availability of site information and the broad range of cultures that had inhabited the area. Also considered was the fact that great environmental change had taken place within this region since the retreat of the continental ice sheet. Since man was in this region while the ice sheet was still in the Upper Great Lakes area, it provides a good setting in which to study his adaption to environmental change.

Chapters II and III will deal with environmental change, but first an understanding of the present environment has to be provided. Ecologists place southwestern Michigan, as defined here, within three biotic provinces: the Carolinian, Illinoian, and the Carolinian-Canadian Transition Zone (see Fig. 2). The term biotic province, as used here, refers to a large, relatively homogenous, ecologic division covering a continuous area on the earth's surface.⁹ Perhaps the term environmental region might be more meaningful to the geographer.

⁹ Charles E. Cleland, The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region ("Anthropological Papers, Museum of Anthropology," No. 29; Ann Arbor: The University of Michigan, 1966), p. 5.

BIOTIC PROVINCES OF THE UPPER GREAT LAKES

Figure 2



The Carolinian Biotic Province

Most of southwestern Michigan lies within the Carolinian biotic province. Although a wide variety of phenomena exist within this region, several factors are characteristic of the region as a whole.

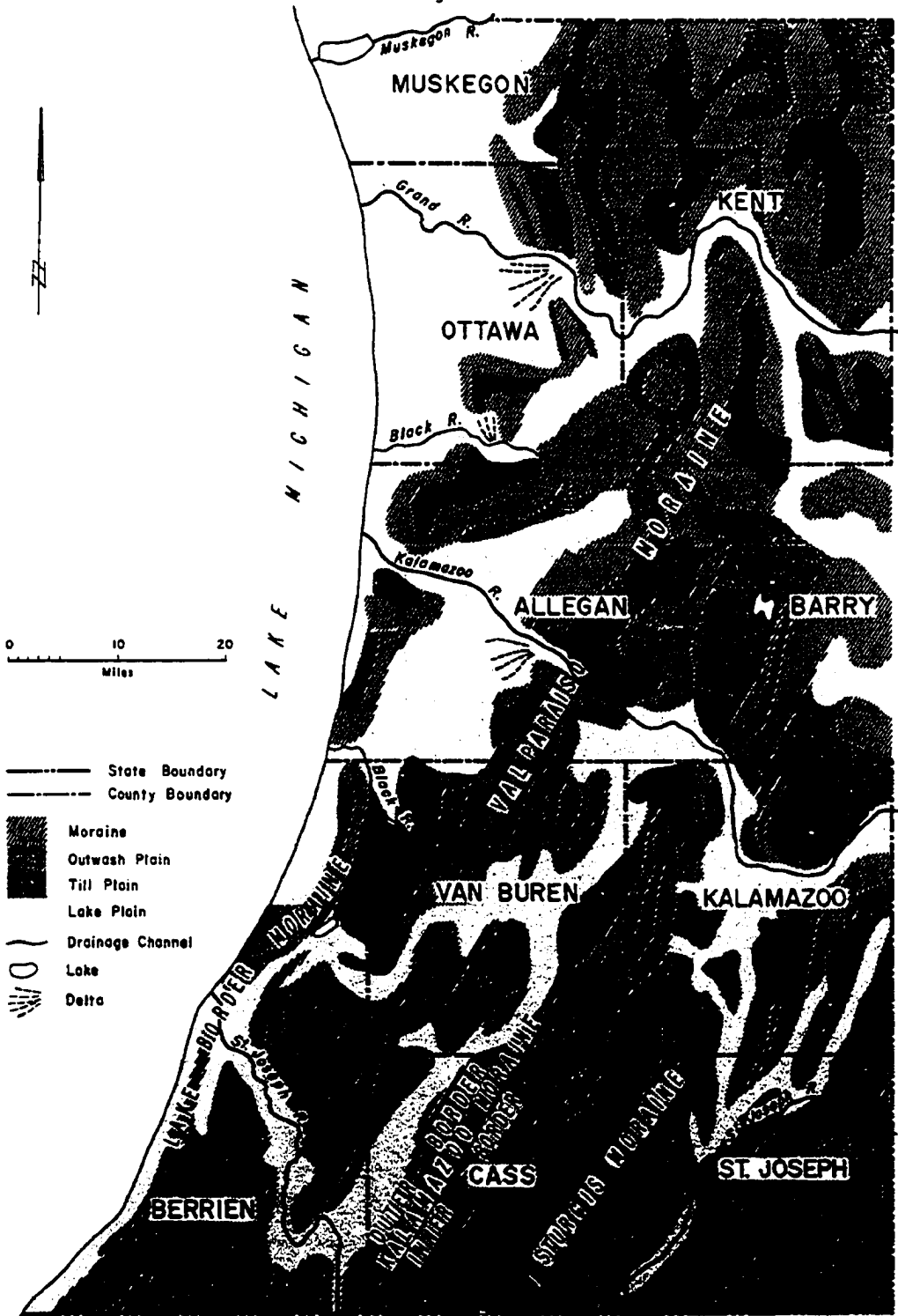
Landforms and Drainage.--The landforms of southwestern Michigan are all glacial in origin, being deposited by the last of the glacial ice sheets, the Wisconsin. The topography is varied, with plains and rolling areas alternating with higher morainic ridges. Drainage is toward Lake Michigan as the land tends to slope to the west except where morainic highlands disrupt this pattern. Several drainage systems can be found, the largest of which are the Grand, Kalamazoo, and the St. Joseph. Other smaller drainage systems include the Black River of Ottawa County, the Black River of Van Buren County, and a portion of the Muskegon River System (see Fig. 3).

Climate.--Present temperatures average from 46° to 50° Fahrenheit.¹⁰ July mean maximum temperatures are in the mid 80° range with slightly cooler conditions existing

¹⁰Ibid., p. 8.

DISTRIBUTION OF SURFACE FEATURES IN SOUTHWESTERN MICHIGAN

Figure 3



near Lake Michigan (see Fig. 4).¹¹ Mean maximum January temperatures range in the low 30°'s with temperatures slightly warmer in the south (see Fig. 5).¹² The growing season varies between 140 and 180 frost-free days.¹³ Precipitation ranges from less than 32 inches in the extreme north to 36 inches in the south (see Fig. 6).¹⁴ In terms of Trewartha's modified version of the Koppen Climatic Classification, the southern portion of the study area has a Humid-Continental Warm-Summer (Dfa) type while the northern portion has a Humid-Continental Cool-Summer (Dfb) type.¹⁵

Vegetation and Soils.--Present vegetation of this area is predominately deciduous forest. Veatch gives this description of presettlement forests.

The Presettlement forests of the Carolinian biotic province are commonly classified as the oak-hickory

¹¹A. H. Eichneier, Climate of Michigan (Ann Arbor: University of Michigan Press, 1964), Fig. 14, p. 43.

¹²Ibid., Fig. 16, p. 45.

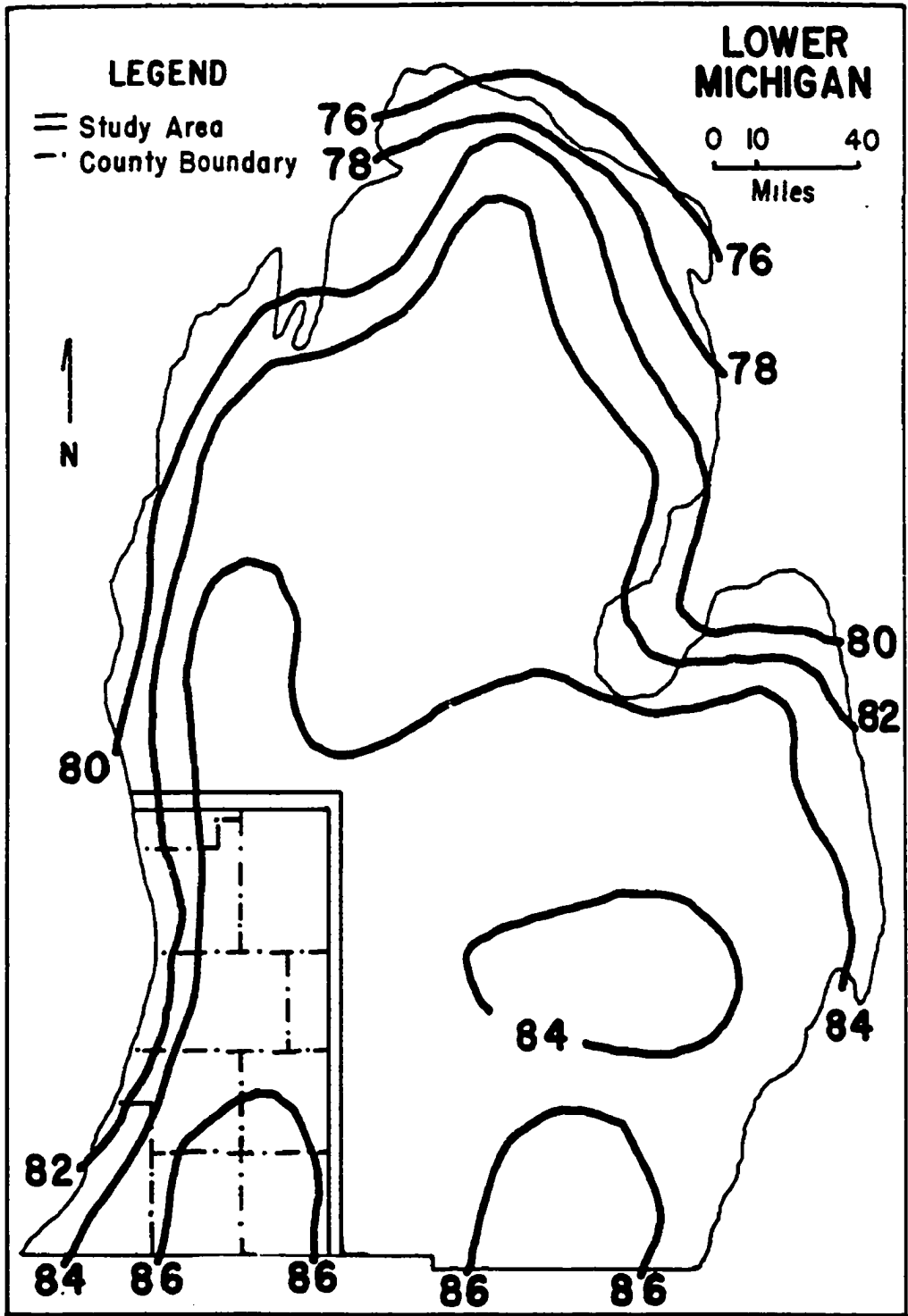
¹³Eichneier, op. cit., Fig. 18, p. 47.

¹⁴Cleland, loc. cit.

¹⁵V. C. Finch, et. al., Elements of Geography (New York: McGraw-Hill, 1957), Plate 2, p. 679.

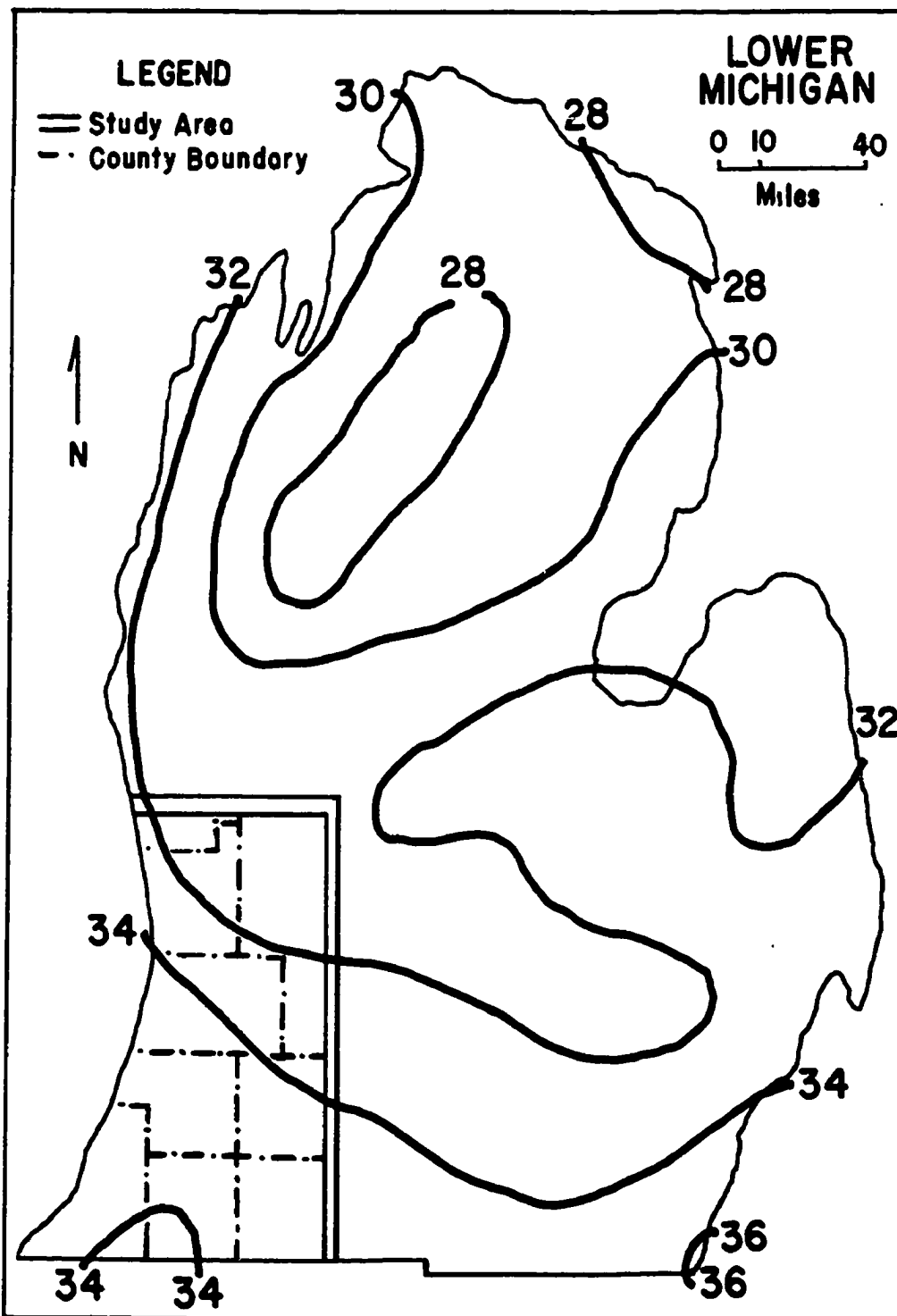
MEAN MAXIMUM TEMPERATURE (°F), JULY

Figure 4



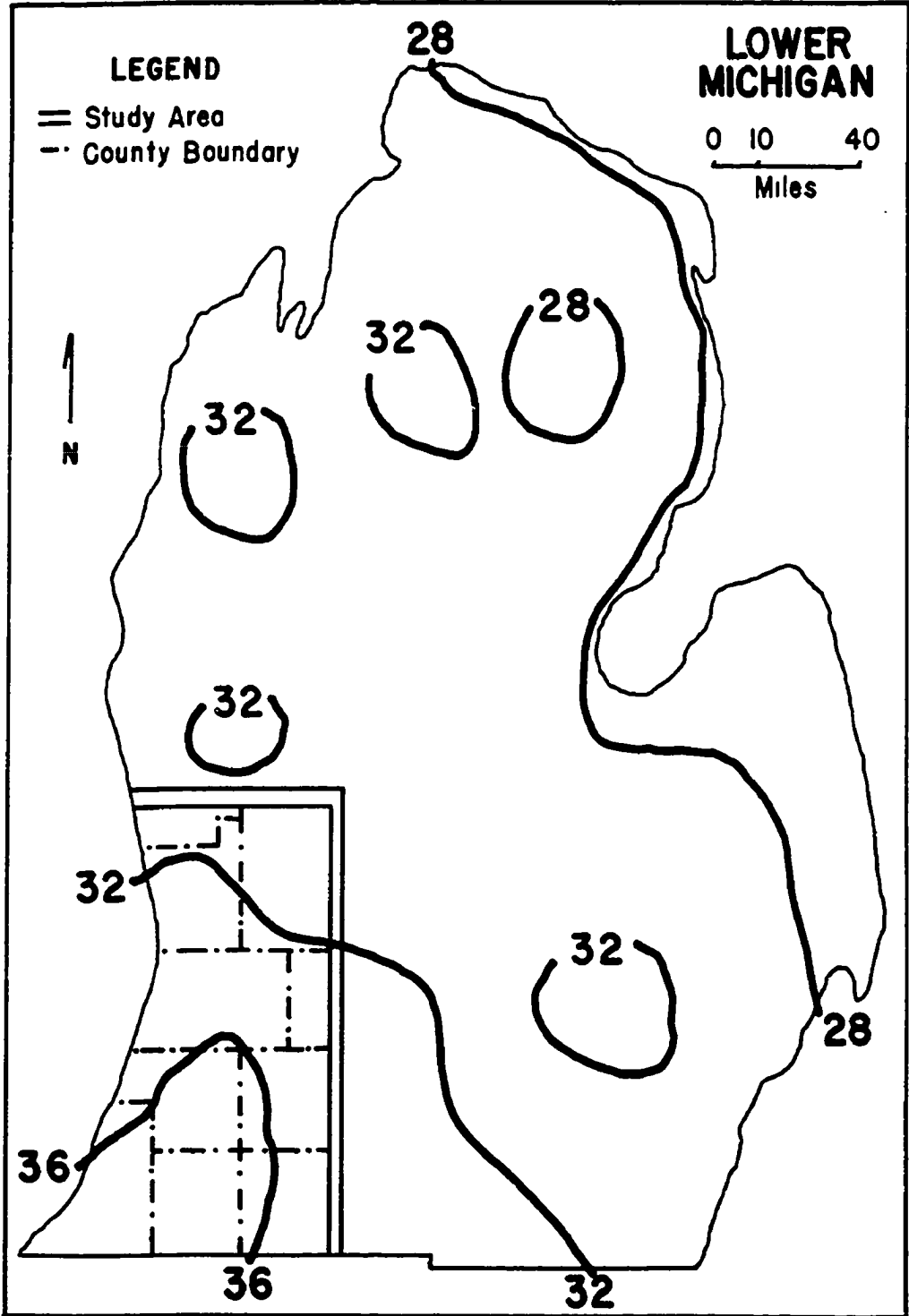
MEAN MAXIMUM TEMPERATURE (°F.), JANUARY

Figure 5



MEAN ANNUAL PRECIPITATION IN INCHES

Figure 6



type. On dry sites forest associations were dominated by black, red, and white oak, and by hickories, sugar maple, beech, walnut, butternut, elm, and tulip. On sites which were not well drained, forests were composed of elm, silver maple, ash, swamp white oak, basswood, shagbark hickory, sycamore, cottonwood, red oak, and burr oak. In swampy situations this assemblage also included cedar and tamarack. On the northern fringe of the Carolinian province elm, red maple, ash, yellow birch, white birch, aspen, and white pine became predominant.¹⁶

The soils of southwestern Michigan belong to the grey-brown podzolic Great Soil Group. The parent material of these soils is glacial drift. Their fertility varies with the type of material deposited by the glacier. Sandy, lake-deposited materials and gravelly outwash laid down by glacial melting are, in general, not well suited to agriculture. Till plains have a higher clay content and are usually more fertile. Morainic soils have a heterogenous mixture of sands, gravels and clays and therefore have a wide range of fertility.

Animal Life.--The animal life associated with deciduous forests was diverse. Cleland states that,

The opossum, raccoon, striped skunk, gray fox, bobcat, gray squirrel, southern flying squirrel, pine mole, cottontail rabbit, whitetail deer, turkey, red-shouldered hawk, barred owl, vulture, bobwhite, red-headed woodpecker, passenger pigeon, woodthrush, and cardinal are all, or probably were, typical of

¹⁶J. O. Veatch, Presettlement Forest in Michigan, Department of Resource Development (East Lansing: Michigan State University, 1959), p. 10.

areas with climax deciduous forest. This list can be lengthened considerably with the inclusion of a large number of reptiles and amphibians which are similarly restricted. In addition to these endemic species, the Carolinian forest is inhabited by a great number of species whose total ranges include other biotic provinces. These are black bear, long-tailed weasel, mink, otter, badger, coyote, wolf, cougar, woodchuck, eastern chipmunk, fox squirrel, beaver, muskrat, elk, and bison.¹⁷

Contact Cultures.--Those peoples who occupied this region at the time of the first European contacts were predominantly agriculturalists. Corn, beans, and squash were the main crops. Hunting, fishing, and gathering were also practiced. Tribes from this portion of the study area include the Pottawattomi and the Miami.

The Carolinian-Canadian Edge

The northern portion of the study area lies within the Carolinian-Canadian Edge (see Fig. 2). This is the transition zone between the Carolinian biotic province and the Canadian biotic province to the north. The climate in this area is cooler than areas to the south. The growing season is somewhat shorter; around 140 days per year. The forests are still largely deciduous, but coniferous trees are found in increasing numbers. The area contains many of the animals already mentioned for the

¹⁷Cleland, loc. cit.

Carolinian province, and in presettlement times probably included porcupine, snowshoe hare, moose, and woodland caribou.¹⁸

The main tribe within this area was the Ottawa. They were hunter-gatherers who also practiced some agriculture, but not to the same extent as the tribes further south.

The Illinoian Biotic Province (Prairies or 'Oak Openings')

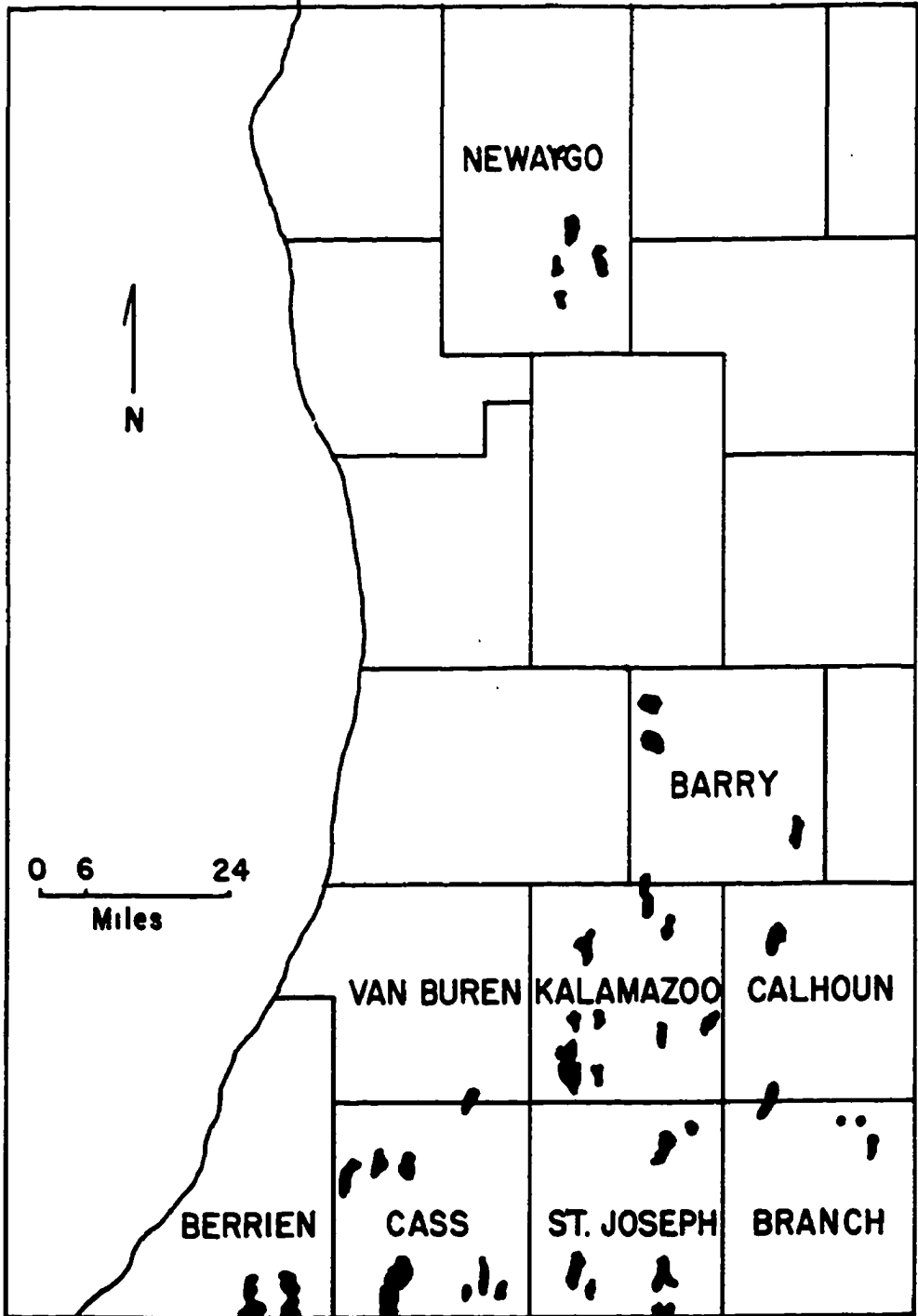
In small scattered areas of southwestern Michigan prairie grasslands existed (see Figures 2 and 7). Early settlers called these prairies 'oak openings'. The fertile soils developed under these grasslands were desired for agriculture. These prairie remnants probably indicate a northeastern expansion of the prairies of the Illinoian biotic province into this area at some time in the past. This province included such animal species as jack rabbit, elk, and bison.¹⁹ Both the Pottawattomi and the Miami Indians lived in areas containing prairies and utilized their resources.

¹⁸Ibid., p. 12.

¹⁹Ibid.

DISTRIBUTION OF PRAIRIES IN MICHIGAN

Figure 7



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CHAPTER II

THE GLACIAL ENVIRONMENT OF SOUTHWESTERN MICHIGAN (12,000 B.C. to 9,000 B.C.)

An understanding of prehistoric man's adaption to his environment in southwestern Michigan can only be obtained by a discussion of the stages in the development of the present environment. These stages must then be correlated with corresponding cultural periods. This chapter will reconstruct the environment of the glacial period of southwestern Michigan. The period begins with the first permanent uncovering of land in the region, sometime before 12,000 B.C., and ends about 9,000 B.C.¹ with the final retreat of the ice sheet from Lower Michigan.

The Landforms of Southwestern Michigan

Southwestern Michigan's landforms owe their formation to continental glaciation during the Pleistocene Era. In particular, it was the fourth and last great ice

¹William J. Wayne and James H. Zumberge, "Pleistocene Geology of Indiana and Michigan," The Quarternary of the United States, ed. H. Wright and D. Frey (Princeton: Princeton University Press, 1965), Fig. 6, p. 76.

advance, the Wisconsin Ice Sheet, which deposited these landforms. Of the major Wisconsin Lobes, the Michigan and Saginaw were the only ones to cover the area. At their farthest point, these lobes covered all of the area and extended south into Indiana and Illinois. Their retreat from this position was not uniform, but included several periods of short advances and recessions known as substages. Table 1 lists these substages and corresponding morainic systems in chronological order.

During the Tazewell and older substages, southwestern Michigan was buried by the ice sheet. It was not until the Cary Substage that the first land was uncovered. The retreat of the Michigan and Saginaw Lobes of the Cary was not uniform, but marked by periods of recession followed by an advance. When the rate of advance equalled the rate of melting, the edge of the ice sheet remained stationary. Glacial drift carried in front of the ice was deposited, forming recessional moraines. When several of these recessional moraines are found in close proximity, they are termed morainic systems. Five major morainic systems are located within southwestern Michigan: the Sturgis, Tekonsha, Kalamazoo, Valparaiso, and Lake Border (see Fig. 3).

TABLE 1
WISCONSIN GLACIAL PERIOD IN
SOUTHWESTERN MICHIGAN

Wisconsin Chronology ^a	Recessional Moraines	Climate ^b	Vegetation ^b
Valders Substage	None	Cold	Black Spruce, Fir, Jack Pine, White Pine
Two Creeks Substage	None	Warming	White Spruce, Black Spruce, Willow, Larch, and Birch
Port Huron (Mankato) Substage	None	Cold	80-90% Spruce-Fir, non-arboreal species still dominant in uplands
Cary Substage	Lake Border Valparaiso Kalamazoo Tekonsha Sturgis	Cold	Spruce-Fir with non-arboreal species in uplands and along edge of ice sheet.
Tazewell Substage	Ice Covered	Cold	None
Iowan Substage	Ice Covered	Cold	None
Farmdale Substage	Ice Covered	Cold	None

^aSubstages after M. M. Leighton, "The Classification of the Wisconsin Glacial Stage of North Central United States," Journal of Geology, 1960, LXVIII (1960), 594-598.

^bVegetation and climatic data taken from Cleland, Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes, pp. 13-20.

Morainic Systems

Chronologically, the first moraine to be formed was the Sturgis--a product of both the Michigan and Saginaw Lobes. The land in front of it was the first part of Michigan to be free of the ice sheet. The moraine extends west to east across St. Joseph County where it dips into Indiana. The average elevation of this moraine is 900 to 1,000 feet with an average width of three to six miles.

The next moraine formed was the Tekonsha Moraine. Again formed by both the Saginaw and Michigan Lobes, this moraine extends from eastern Cass County northeastward into central southern Michigan. In southwestern Michigan, this moraine is a fairly weak feature as it is broken in many places by lines of drainage. The average elevation is 925 to 975 feet with an average width of four to five miles.

The third morainic system in this area is the Kalamazoo. The Kalamazoo Moraine of the Michigan Lobe extends from southwestern Cass County northeastward to southwestern Barry County. Here, it joins with the Kalamazoo Moraine of the Saginaw Lobe and trends southeastward into central Lower Michigan. The Kalamazoo Morainic System of the Michigan Lobe is composed of two

morainic ridges; the inner border to the west and the outer border to the east. These are separated by a high gravel plain. The morainic ridges average about 900 to 1,000 feet in elevation and the gravel plain has been built up almost to their crests. On both ridges, numerous basins and knolls are found and many small lakes, or the marshy remains of what once were lakes, occupy the basins. The gravel plain contains a number of larger lakes, especially in northern Cass and southeastern Van Buren Counties, but most of the lakes found here are only a few acres in extent.

The penultimate and most extensive of the morainic systems of southwestern Michigan was deposited entirely by the Michigan Lobe. This was the Valparaiso System. It enters the area in Berrien County and runs northeastward into southwestern Kent County, where it joins with the Charlotte Moraine of the Saginaw Lobe. Throughout this distance it averages from seven to eight miles in thickness and from 700 to 900 feet in elevation. Lakes and swamps are found throughout its length.

The youngest morainic system in southwestern Michigan is the Lake Border. It is composed of a series of recessional moraines left by the Michigan Lobe. From Muskegon County to the state line, the Lake Border System averages only 700 to 800 feet in elevation. Its continuity is

often broken by till ridges and drainage channels.

Although moraines are the most prominent relief features in southwestern Michigan, they cover only about one-third of the area. The rest is composed of outwash plains, lake plains, and scattered areas of till plain.

Outwash Plains

Outwash plains are fluvial deposits left by meltwaters from the glaciers. These deposits tend to be graded, with the highest elevations along the outer borders of the moraines and gently lowering progressively to the east. As the name outwash plain indicates, these deposits are typically flat. Present drainage is fairly good in these areas, due to the gravelly nature of the soil. However, before the present drainage patterns became well established, swamps and marshy areas would have dominated on these plains. During glacial retreat, ice blocks separated from the edge of the ice sheet and were buried by outwash. When the ice blocks melted, lakes were formed. Most of these lakes are small; however, the two largest lakes in southwestern Michigan, Gun Lake in western Barry County and Gull Lake in northeastern Kalamazoo County, were formed in this manner.

Outwash plains are most common in southeastern portion of the study area, particularly in the area south

and east of the Kalamazoo Moraine (see Fig. 3). These extensive deposits were formed by melt-waters as the ice retreated from the Sturgis Moraine to the Outer Border Kalamazoo.

Once the ice had retreated from the Outer Border Kalamazoo, the melt-waters from the Michigan and part of the Saginaw Lobes were diverted to the southwest through the Glacial Kalamazoo River. This greatly reduced the flow of water in the areas east of the Kalamazoo Moraine and further deposition there was greatly reduced. Of the outwash plains west of the Kalamazoo Moraine, the largest ones lie between the two ridges of the Kalamazoo Morainic System and in front of the outer border of the Valparaiso. These were formed by this shift in drainage to the southwest. To the north the plain along the Gun River was formed by melt-waters from both the Michigan and Saginaw Lobes as they drained south into the Glacial Kalamazoo. The many small north-south running outwash deposits in this area represent shifts in drainage channels as the ice sheet retreated from the area.

Lake Plains

Much of the western portion of the study area is covered by lake plains. This is particularly true of the area north of Van Buren County. The areas indicated as

lake plain on Figure 3 were at one time embayments in early glacial lakes (see Table 2). Waves and currents deposited sediments, creating sandy plains. The most noticeable relief features in this area are in the form of beach ridges and deltas. In southwestern Michigan the first major glacial lake was the 640-foot Glenwood Stage of Lake Chicago (see Fig. 8). As far north as the Allegan County line its beach ridge lies on the inner member of the Lake Border Morainic System. In this area it is located about two miles from the present shoreline. North of Allegan County, the beach lies from six to twenty miles inland. Other Glenwood beaches are found in former bays of Lake Chicago near the mouth of the St. Joseph River, and the large embayment at the head of the Kalamazoo Valley. These beaches are 60 feet above the present lake level.

Where the Glacial Grand River emptied into Glenwood Lake Chicago in eastern Ottawa County, sediments deposited by the sudden reduction in gradient built deltaic deposits (see Fig. 3). In the early stages of Glenwood Lake Chicago, a small delta was built in south-central Ottawa County, but with further ice retreat, a lower course was opened to the north. Here, a more extensive delta was deposited. Another small delta can be found where the Glacial Kalamazoo River entered into the

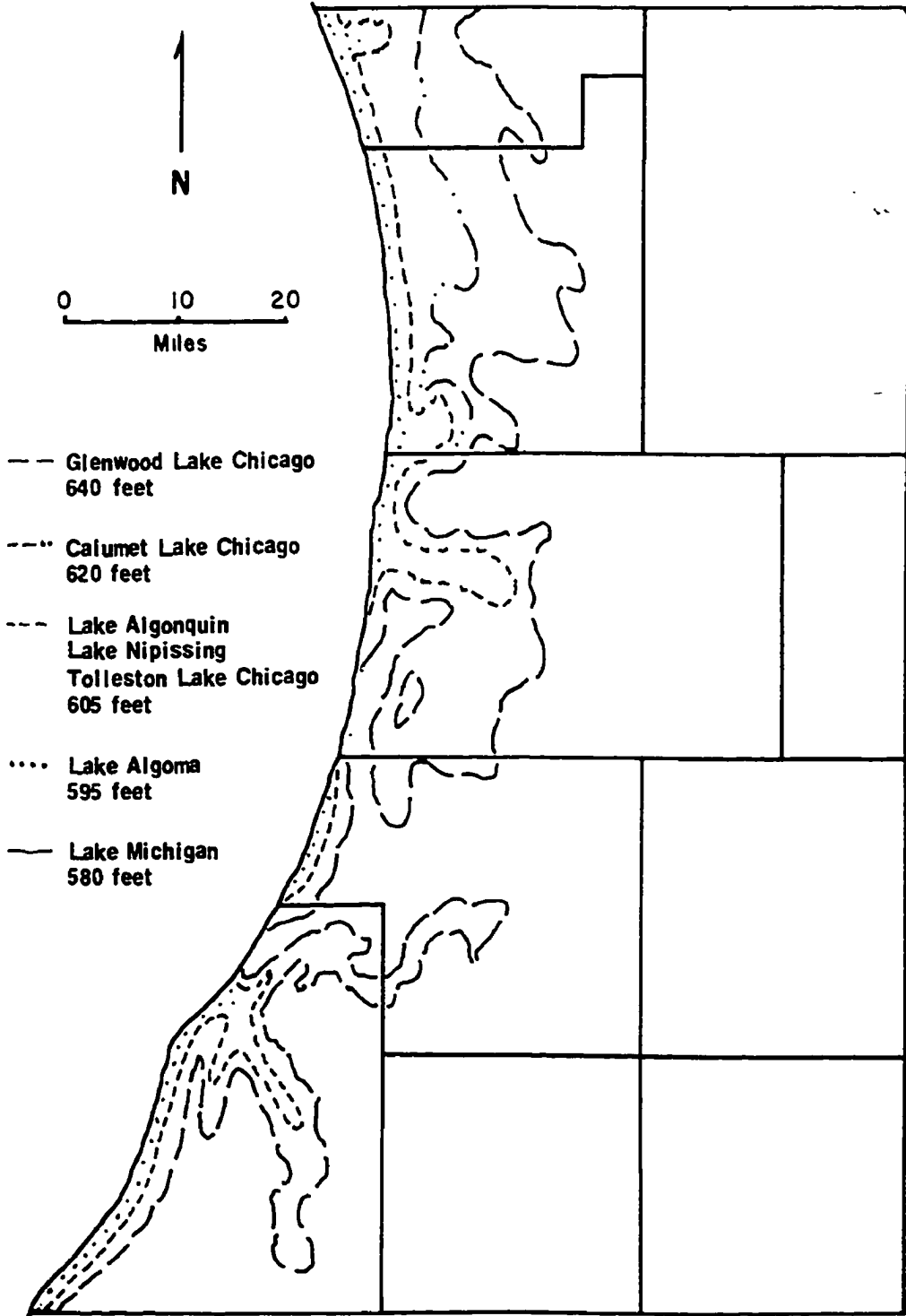
TABLE 2
LAKE STAGES IN MICHIGAN BASIN
DURING THE GLACIAL PERIOD^a

Years B.C.	Glacial Event	Lake Stage
9,000	Valders Retreat	Lowering of lake levels ending in 565' Kirkfield Stage about 8,500 B.C.
	Valders Maximum	Tolleston (605')
		Calumet II (620')
	Two Creeks	Bowmanville
10,000	Port Huron Retreat	Calumet I (620')
11,000	Port Huron Maximum	
	Cary Retreat	Glenwood (640')
12,000		

^aSolid lines indicate reasonably well established correlative events. Table is based on work of Wayne and Zumberge, Pleistocene Geology of Indiana and Michigan, Fig. 6, p. 76.

APPROXIMATE SHORELINES OF GLACIAL AND POST-GLACIAL LAKES IN THE STUDY AREA

Figure 8



embayment of Glenwood Lake Chicago in eastern Allegan County.

Hough (1958)² and Bretz (1959)³ have dated the beginning of Glenwood Lake Chicago at about 14,000 years ago (12,000 B.C.). Bretz concluded that the Glenwood Stage ended with the increased discharge of melt-waters into Lake Chicago from the Huron and Erie Basin by way of the Grand River. This increased the outflow at the Chicago outlet so that a boulder pavement in the drift was eroded and the outlet lowered to the 620-foot level, the Calumet Stage.⁴ Wayne and Zumberge date this lowering with the retreat of the Port Huron Substage about 13,000 B.P. (11,000 B.C.).⁵

In southwestern Michigan, the Calumet Beach can be traced for a short distance near the mouth of the Kalamazoo River in western Allegan County. From here it runs along the south side of Black Lake in southwestern Ottawa County and then north to the Grand River.

²J. L. Hough, Geology of the Upper Great Lakes, (Urbana: University of Illinois Press, 1958), p. 313.

³J. H. Bretz, "The Double Calumet Stage of Lake Chicago," Journal of Geology, LXXII, No. 6 (November, 1959), 675-684.

⁴Ibid., p. 680.

⁵Wayne and Zumberge, loc. cit., Fig. 6, p. 76.

The last beach from this period that can be traced in southwestern Michigan is that left by the 605-foot Tolleston Stage of Lake Chicago. Traces of this beach can be found at the east end of Black Lake in southwestern Allegan County, and in western Ottawa and Muskegon Counties. Wayne and Sumberge date the lowering of the water to this level at about 11,500 B.P. (9,500 B.C.).⁶

Till Plains

Although lake plains, outwash plains and moraines are the most extensive landforms in southwestern Michigan, some scattered areas of till plain can be found (see Fig. 3). These gently undulating deposits were left by the retreating ice sheet. They originally had a greater distribution, here, but now are buried by outwash or lake plain deposits. Those areas presently exposed represent either areas of greatest drainage where the water was too deep and fast moving to deposit outwash, or portions of morainic areas where the ice sheet lacked the drift necessary to build high deposits.

⁶Ibid.

The Paleo-Ecology of Southwestern Michigan

Climate and Vegetation

Plant and animal re-occupation of this recently deglaciated surface was severely limited by glacial cold. Terasmae estimates that the mean annual temperature for southeastern Canada during the period between 11,500 B.C. to 9,000 B.C. was eight to fifteen degrees below present average temperatures.⁷ Because the ice sheet was also the main control of climate in southwestern Michigan at this time, it can be assumed that similar temperatures existed here. Temperatures were not constant throughout the period. The advances of the Port Huron and Valdres Substages brought cold periods (see Table 1). The interval that separated the, called the Two Creeks, was a warm period.

The vegetation of southwestern Michigan at this time reflects the changing climate (see Table 1). While the ice sheet was still in the area, it is probable that a zone of tundra vegetation existed along the edge of the ice sheet. Jelgersma characterizes this tundra in his

⁷J. Terasmae, "Notes on Late Quarternary Climatic Changes in Canada," Annals of the New York Academy of Science (1961), XCV, No. 1, 666.

Minnesota study as small and narrow.⁸ Cleland dates this sub-period in the Upper Great Lakes at 12,000 B.C. to 11,500 B.C.⁹

Both Zumberge and Potzner,¹⁰ and Cleland,¹¹ agree that the earliest stable plant community here was dominated by spruce. Spruce pollen usually comprised 90 per cent to 90 per cent of the arboreal (tree) pollen.¹² The low, swampy areas were the dominant habitat for these arboreal species with non-arboreal ones (grasses) still occupying the higher lands. Thus, in southwestern Michigan at this time most of the land would have been occupied by dense spruce-fir forests with, perhaps, occasional stands of willow, birch, and larch. The higher morainic areas would have been occupied by tundra-like grasses. It is probable that this was not the barren tundra as is present in northern areas today, but rather a wooded tundra with coniferous woodlands interspersed

⁸Saskia Jelgersma, "A Late-Glacial Pollen Diagram from Madelia, South-central Minnesota," American Journal of Science, CCLX, No. 7 (Summer, 1962), 528.

⁹Cleland, op. cit., p. 18.

¹⁰Zumberge and Potzner, loc. cit., p. 283.

¹¹Cleland, op. cit., p. 152.

¹²Ibid.

among the grasslands. Cleland dates this sub-period from 11,500 B.C. to 10,000 B.C.¹³

The period from 10,000 B.C. to 9,000 B.C. represents a transition from spruce to pine along with the entry of a few deciduous species, such as maple. The uplands were rapidly colonized and by the Valdres Maximum little land was occupied by non-arboreal species.¹⁴

Animal Life

It seems probable that animal life also began to enter southwestern Michigan soon after the retreat of the ice sheet from its southern borders. These were open-country grazers such as the mammoth and barren-ground caribou. Their habitat was the higher, morainic areas rather than the dense spruce-fir forests of the lowlands. These forests were the habitat of the woodland musk ox.

With the incursion of coniferous forests into the uplands about 10,000 B.C., the habitat became unfavorable for the grazers. They were replaced by forest browsers. Cleland indicates that by 9,000 B.C. the mastodon, moose,

¹³ Ibid., p. 18.

¹⁴ Ibid.

and woodland caribou had largely replaced the mammoth, barren-ground caribou, and woodland musk ox.¹⁵ He states that, "The date of 6,310±300 B.C. (N-1400) for a Jefferson Mammoth from Berrien County is, therefore, inconsistent with both this theory and the much earlier dates obtained for other mammoths."¹⁶ Noting this, the accuracy of this later date is questionable.

¹⁵Ibid.

¹⁶Ibid.

CHAPTER III

THE POST-GLACIAL ENVIRONMENT OF SOUTHWESTERN MICHIGAN (9,000 B.C. to Present)

The Post-Glacial Era in southwestern Michigan began with the retreat of the ice from the lower peninsula about 9,000 B.C. After this date the glacier's role in affecting the environment of this area was greatly reduced. Temperatures gradually rose and many changes in the range of plant and animal life took place. Cleland, in his study of the prehistoric animal ecology and ethnozoology of the Upper Great Lakes Region, divided this era into several periods. These periods will be applied to post-glacial southwestern Michigan.

The Boreal Forest Period (9,000 B.C. to 7,000 B.C.)

Climate and Vegetation

With the retreat of the Valdres ice sheet, the average annual temperature rose (see Table 3). Terasmae has estimated that temperatures were around six degrees below present norms.¹ The vegetation was largely coniferous at

¹Terasmae, loc. cit., p. 666.

TABLE 3
THE POST-GLACIAL PERIOD IN SOUTHWESTERN MICHIGAN

Years ^a	Glacial Event ^a	Lake Stage ^a	Climate ^b	Vegetation ^b
Present		Lake Michigan (580')		Oak-Pine
1,000 A.D.			Gradual climatic deterioration leading to present norms	
0		----- Lake Algoma (595')		
1,000 B.C.		----- Lake Nipissing (605')		
2,000 B.C.			Warmest and driest since retreat of ice	Expanding Oak-Hemlock broadleaf forest
3,000 B.C.				
4,000 B.C.		Slowly rising lake levels due to uplift		
5,000 B.C.	Slow crustal uplift from glacial unloading		Continued warming	Oak-Pine Pine
6,000 B.C.				
7,000 B.C.	----- North Bay Outlet ice free	----- Lake Chippewa (230')	Moderating climate	Spruce-Pine

TABLE 3: THE POST-GLACIAL PERIOD IN SOUTHWESTERN MICHIGAN (Continued)

Years ^a	Glacial Event ^a	Lake Stage ^a	Climate ^b	Vegetation ^b
8,000 B.C.		Post Algonquin		
9,000 B.C.	Valders Retreat	Main Algonquin (605') Kirkfield (565')	Cool to cold and moist	Spruce-fir

^aSolid horizontal lines indicate generally accepted periods. Data after Wayne and Zumberge, Pleistocene Geology of Indiana and Michigan, Fig. 6, p. 76.

^bData after Cleland, Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes, pp. 14-34, and Zumberge and Potzer, Late Wisconsin Chronology of the Lake Michigan Basin Correlated with Pollen Studies, pp. 271-288.

this time and it has often been compared with the present boreal forest of Canada.² Yet one important difference existed. The boreal forest of southwestern Michigan contained a few deciduous species. Pollen analysis shows that oak, maple, and elm were present at this time.

Animal Life

Along with this increase in deciduous species, it would seem that some of the mammals of deciduous forests should have been present. Cleland notes that, "in addition to mastodon, which have been dated to the Boreal Forest Period, we would expect that these forests were inhabited by black bear, marten, fisher, wolverine, snowshoe hare, beaver, muskrat, porcupine, woodland caribou, and moose."³

Glacial Lake Stages

As the Valdres ice sheet retreated, Telleston Lake Chicago merged with an early Lake Algonquin in the Huron Basin to form the 565-foot Kirkfield Stage. The Chicago and Port Huron outlets were abandoned and drainage was

²Zumberge and Potzer, loc. cit., p. 283.

³Cleland, op. cit., p. 20.

now to the east through the lower Trent Valley. However, either with an uplift of the Trent Valley or a short re-advance of the ice sheet over this area, the waters again rose to the 605-foot Main Algonquin level. Zumberge dates this rise just previous to 8,000 B.C.⁴

Martin, on her 1955 map of the surface formations of the southern peninsula of Michigan, notes only one Algonquin Beach in southwestern Michigan⁵ (see Fig. 8). This runs near the present shore in Berrien County. However, since the Tolleston beaches previously mentioned were also at 605 feet, it would seem that these would have also been beaches of Lake Algonquin.

The Pine Forest Period (7,000 B.C. to 3,500 B.C.)

Climate and Vegetation

This period represents a time of slow change. With the retreat of the ice sheet from the Upper Great Lakes Area, the climate became milder. The average annual

⁴Wayne and Zumberge, loc. cit., Fig. 6, p. 76.

⁵Helen M. Martin, "Map of the Surface Formations of the Southern Peninsula of Michigan," Scale 1:500,000, Michigan Department of Conservation, Geologic Survey Division Publication 49 (Lansing: 1955).

temperature was about five degrees above present norms.⁶ This climatic optimum has been referred to as the Xerothermic Period by paleoclimatologists.

Along with this change in climate, vegetative changes took place. The forest graded from spruce-pine to pine, and finally to oak-pine.⁷ If the Xerothermic Period was dry as well as warm, one might expect that the prairie lands now found from Illinois westward would encroach northward. Some botanists feel that the "oak openings" of southern Michigan, as seen by early settlers, may be remnants of this encroachment. At Kirchner Marsh in south-central Minnesota, Winter reports large amounts of non-arboreal pollen, mainly grasses, from about 7,000 B.P. (5,000 B.C.) to 5,500 B.P. (3,500 B.C.).⁸ Cleland implies that this may also indicate prairie expansion into southern Michigan during the same period.⁹ However, prairie expansion is not the only method that would account for the formation of these "oak openings."

⁶Terasmae, loc. cit., p. 666.

⁷Zumberge and Potzer, loc. cit., Table IV, p. 286.

⁸T. C. Winter, "Pollen Sequence at Kirchner Marsh, Minnesota," Science, CXXXVIII, No. 3539 (Oct. 26, 1962), 527.

⁹Cleland, op. cit., p. 21.

Curtis (1959) stated that only two reasons could account for the origin of true prairie in the prairie-forest border region. These were that (1) the catastrophic destruction of the forest by fire, presumably during the Xerothermic Period, or (2) the areas had never been occupied by trees in post-glacial times. Curtis also noted that fossil pollen argued against the latter of these two hypotheses.¹⁰

Brewer (1965) suggests another possibility; that these prairies were formed by the drying up of marsh lands during the Xerothermic Period.¹¹ Kenoyer (1930) wrote that Michigan prairies "are all on glacial outwash, level in contour, and on soil of high organic matter. It is believed that they began as marshes. Even now around the borders of lakes are wet meadows that show the transition from marsh to prairie."¹²

¹⁰J. T. Curtis, The Vegetation of Wisconsin, 1959, quoted in Richard Brewer, Vegetational Features of a Wet Prairie in Southwestern Michigan ("Occasional Papers of the C. C. Adams Center for Ecological Studies," Kalamazoo: School of Graduate Studies of Western Michigan University, 1965), p. 14.

¹¹Richard Brewer, Vegetational Features of a Wet Prairie in Southwestern Michigan ("Occasional Papers of the C. C. Adams Center for Ecological Studies," Kalamazoo: School of Graduate Studies of Western Michigan University, 1965), p. 14.

¹²L. A. Kenoyer, "Ecological Notes on Kalamazoo County, Michigan, based on the original land survey," Paper of the Michigan Academy, (1930), p. 212.

Brewer states that,

If fairly extensive marshes existed in southwestern Michigan during the Xerothermic Period, it seems reasonable that as these tended toward dry land through the various processes of silting, deposition of organic matter, decreased rainfall, and increased evaporation, then wet and eventually more mesic prairie might be the expected vegetation to develop . . . even though in cooler or moister periods before or afterwards, seres leading more or less rapidly to forest vegetation might have been more general.¹³

This hypothesis of a wet prairie existing only on glacial outwash, would seem to support a previous contention that outwash plains, where nearly level in gradient, were wet, marshy areas interspersed with hydrophytic trees at some time before the Xerothermic Period. During this time of high temperatures and presumably less humid conditions, these areas dried out, forming prairies. The gravelly nature of these outwash plains retarded the development of mesophytic trees during the climatic deterioration following the Xerothermic Period, thus, leaving the "oak openings" as found by early settlers.

This period also found the Canadian and Carolinian biotic provinces reaching their present positions. These positions did fluctuate slightly, but the present boundaries were generally maintained after this time.¹⁴

¹³Brewer, loc. cit.

¹⁴Cleland, op. cit., p. 22.

Animal Life

As the deciduous forest gradually replaced the conifers, the animal life also changed. The mastodon became extinct about 4,000 B.C. and animal species associated with deciduous forest began to dominate over those of the boreal forests.¹⁵

Glacial Lake Stages

Lake levels in the Michigan Basin, during this period, fell to an all-time low of 230 feet. This low water stage was initiated by the uncovering of the North Bay Outlet in western Ontario as the ice sheet retreated. According to Terasmae and Hughes, this outlet was uncovered prior to 7,559 B.C.¹⁶ Therefore, the lowest stage, the 230-foot Lake Chippewa, should have been reached at least by 7,000 B.C. (see Table 3). This lake was 350 feet below present lake levels and much of the land, now under water, was then available for plant and animal colonization.

¹⁵Ibid., p. 23.

¹⁶J. Terasmae and O. L. Hughes, "Glacial Retreat in the North Bay Area, Ontario," Science, CXXXI, No. 3411 (May 13, 1960).

The Oak-Pine Period (3,500 B.C. to Present)

Climate and Vegetation

The Xerothermic Period continued into this period and reached its maximum about 2,000 B.C.¹⁷ With this steady warming, the vegetation changed from an oak-pine to an oak-hemlock, broadleaf forest about 2,000 B.C.¹⁸ After this date a general climatic deterioration took place (see Table 3). The average annual temperature fell to present norms and Potzer and Zumberge note that the vegetation reverted back to oak-pine.¹⁹ This deterioration was not steady, but included several periods of cooling and warming. Warm temperatures continued to dominate until about 1,800 B.C. From 1,800 B.C. to 1,300 B.C. an increase in pine pollen indicates that a decline in temperatures took place. The period from 1,300 B.C. to 800 B.C. probably found temperatures rising somewhat. The evidence is scanty, but the presence of raccoon as far north as Saginaw County, Michigan may indicate warming.

¹⁷ Wayne and Zumberge, loc. cit., Fig. 6, p. 76.

¹⁸ Zumberge and Potzer, loc. cit., Table 4, p. 286.

¹⁹ Ibid.

This warming trend probably continued until about A.D. 300. From A.D. 300 to A.D. 800, temperatures again fell. Moose were found as far south as Kent County. This period was followed by still another warm period from A.D. 800 to A.D. 1200. Animal species characteristic of the southeastern states were found in the Upper Great Lakes Region. From A.D. 1200 to about 1880 the climate generally deteriorated. The early part found cool and dry conditions existing in which the prairie peninsula may have again extended into southwestern Michigan.²⁰ After 1880 records indicate rising temperatures up to the present.²¹

Animal Life

During this period, deciduous forest species such as deer, elk, raccoon, gray squirrel, passenger pigeon, turkey, and box turtle became dominant. The red squirrels, red fox, snowshoe hare, woodland caribou, and moose formerly associated with the earlier coniferous forests of this area had moved north.²²

²⁰ David Barreis and Reid Bryson, "Climatic Episodes and the Dating of Mississippian Cultures," Wisconsin Archeologist, XLVI, No. 4 (Dec. 1965), 203-220.

²¹ Climatic data for Oak-Pine Period taken from Cleland, op. cit., pp. 25-36.

²² Ibid., p. 24.

Post-Glacial Lake Stages

Lake levels in the Michigan Basin were rising during this period. In the areas north of southwestern Michigan, where the ice had been the thickest, the land had been greatly depressed. With the retreat of the ice sheet, this land began to rebound. The North Bay Outlet was raised and lake levels began to rise. By 2,000 B.C., these post-glacial lakes had again risen to the 605-foot level in the Lake Nipissing Stage²³ (see Fig. 8). Both the Chicago and St. Clair outlets again came into use. Hough (1953) recognized that the Nipissing water level in the southern Michigan Basin was coincident with the main Algonquin Stage which was also at 605 feet.²⁴ Thus, the Algonquin Beach as shown on Figure 8 was also the boundary of Lake Nipissing. Further, as the Tolleston Beach on the map was also 605 feet, this beach also should have marked the limits of this lake in southwestern Michigan.

Lake Nipissing occupied the Michigan Basin, as well as the Superior and Huron Basins for about 1,000 years

²³Wayne and Zumberge, loc. cit., p. 80.

²⁴Ibid.

until deepening of the St. Clair Outlet lowered the lakes ten feet to the 595-foot level of Lake Algoma²⁵ (see Fig. 8). Lake Algoma lasted until about the time of the Birth of Christ, when continued erosion of the St. Clair Outlet lowered the lakes to their present level.²⁶ Lake Michigan presently stands at the 580-foot level.

²⁵Ibid., Fig. 6, p. 76.

²⁶Ibid.

CHAPTER IV

THE PALEO-INDIAN CULTURES OF SOUTHWESTERN MICHIGAN (12,000 B.C. to 9,000 B.C.)¹

In comparison with the Old World, man has been in the New World for only a short period of time. Griffin places the date of entry at between 20,000 and 16,000 years ago, although much later dates have been suggested.² It is generally accepted that man crossed the Bering Coastal Shelf and migrated south. The route or routes that he followed from there remain in doubt. Griffin hypothesizes that he moved southeastward following an ice free corridor to Montana. He feels that these Paleo-Indians were well adapted to the arctic or sub-arctic environment of such a route.³ Griffin gives no name to this, as yet poorly documented, early cultural complex which consisted of crude choppers, scrapers and bone pounders. He does state that there is sound evidence of a fluted point (Paleo-Indian) hunting complex existing

¹The date for this and all following cultures after Cleland, op. cit., pp. 91-97.

²James B. Griffin, "Eastern North American Archaeology: A Summary," Science, CLVI, No. 3772 (April 14, 1967), 176.

³Ibid.

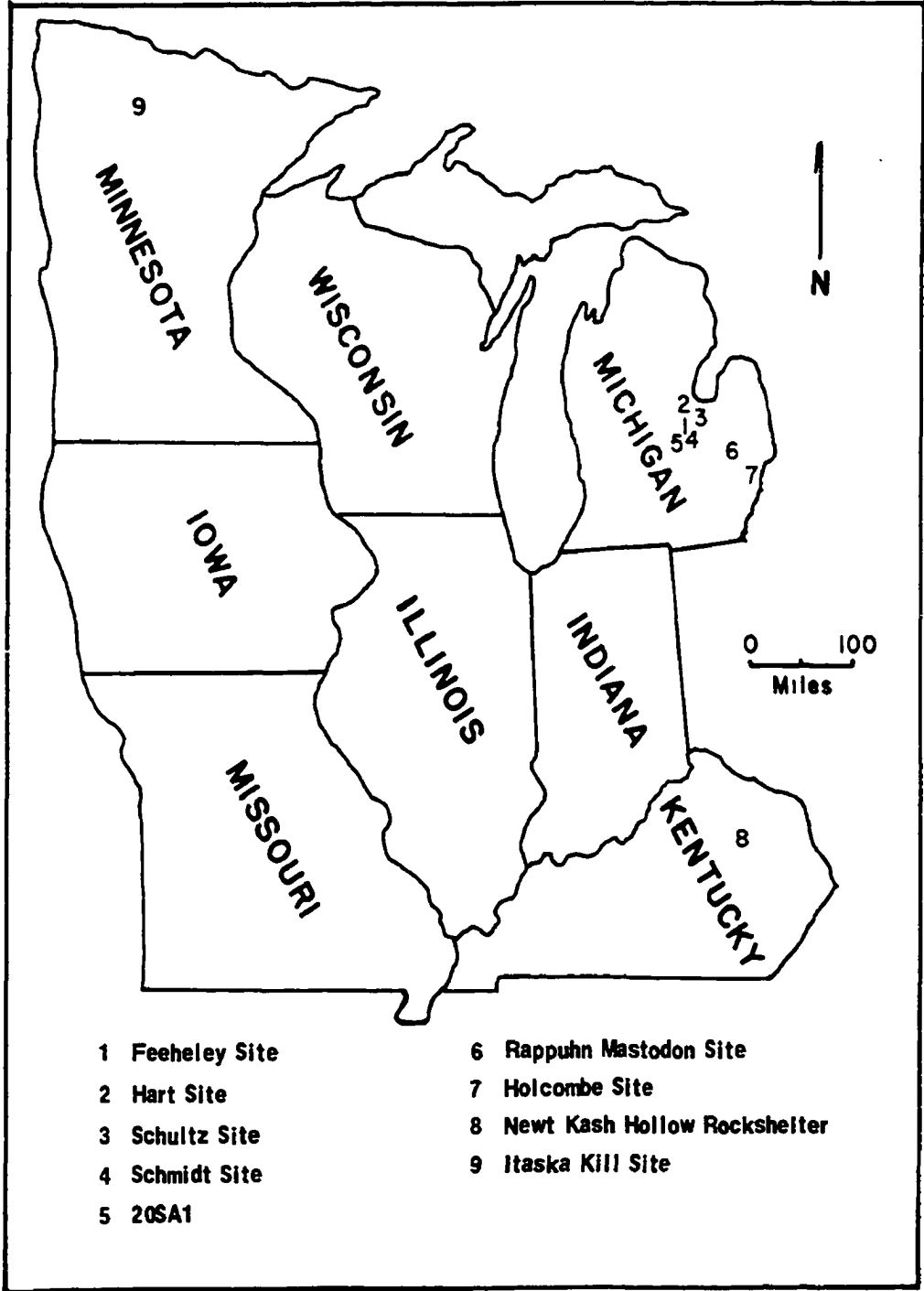
in the western Plains between 9,500 B.C. and 8,000 B.C. Their bifacially-flaked knives and points have a distinctive groove or "flute" running from the base toward the tip on both faces of the implement.⁴ Because most of the Paleo-Indian Groups lived on small, temporary and widely scattered sites, and made tools for hunting and skin working, it has been presumed that these people were primarily hunters. The additional fact that these tools have been found in association with the remains of extinct Pleistocene animals on the Great Plains in the Southwest, have led many archeologists to believe that this was strictly a big-game hunting culture based on such mammals as the mammoth, extinct forms of bison, and perhaps mastodon and woodland musk ox. However, in the eastern United States, there has been only one site, the Rappuhn Mastodon Site from Lapeer County, Michigan (see Fig. 9), that has shown any possible connection between man and extinct Pleistocene species, and no Paleo-Indian tools were found here.⁵ Recently, a second field examination was conducted and it, too, failed to find any

⁴ Ibid.

⁵ Warren Wittry, "The Institute Digs a Mastodon," Cranbrook Institute of Science Newsletter, XXXV, No. 2, (April, 1965), Pl. 9.

IMPORTANT SITES OUTSIDE OF THE STUDY AREA

Figure 9



artifacts.⁶ In fact, the only direct association between this culture and any animal in the eastern United States is a barren-ground caribou from the Holcombe Site (9,000 B.C.) in Macomb County, Michigan (see Fig. 9), a medium-sized game animal.⁷ Griffin says that "There is no compelling reason to believe that early man was solely a carnivore, or that his primary protein source was 'big game.' Most historically documented groups obtained a sizable proportion of their food from vegetation."⁸ Griffin has stated elsewhere that "The restriction of the diet of these early hunters to 'big game' has been by certain archeologists, not by the people of 10,000 B.C."⁹

No one knows where this fluted-point tradition originated. Griffin notes that

For years it has been assumed that it began in the southern Great Plains and the adjacent areas of the

⁶ Personal communication with Dr. Elizabeth Baldwin, Department of Anthropology, Western Michigan University, Kalamazoo, Michigan.

⁷ Cleland, op. cit., p. 46.

⁸ Griffin, loc. cit., p. 156.

⁹ James B. Griffin, "The Northeast Woodland Area," in Prehistoric Man in the New World, ed. J. Jennings and E. Norbeck (Chicago: University of Chicago Press, 1964), p. 224.

Southwest. However, the greater variety and large number of fluted point forms in the Southeast and the sharply restricted time period for Clovis points in the West, from 9,500 B.C. to 9,000 B.C., now suggest that the development of the complex may have taken place in the Southeast.¹⁰

If this was so, Paleo-Indian Culture spread west and, with the retreat of the ice sheet, north out of the Southeast. With the retreat of the Cary Lobes from the southern boundary of lower Michigan, sometime prior to 13,000 B.C., man would have been able to enter the area.¹¹ Mason's Map of the Paleo-Indian penetration into lower Michigan¹² shows two distinct lines of entry, one through southeastern Michigan and the other in southwestern Michigan along Lake Michigan (see Fig. 10).¹³

¹⁰Griffin, "Eastern North American Archaeology . . .," p. 156.

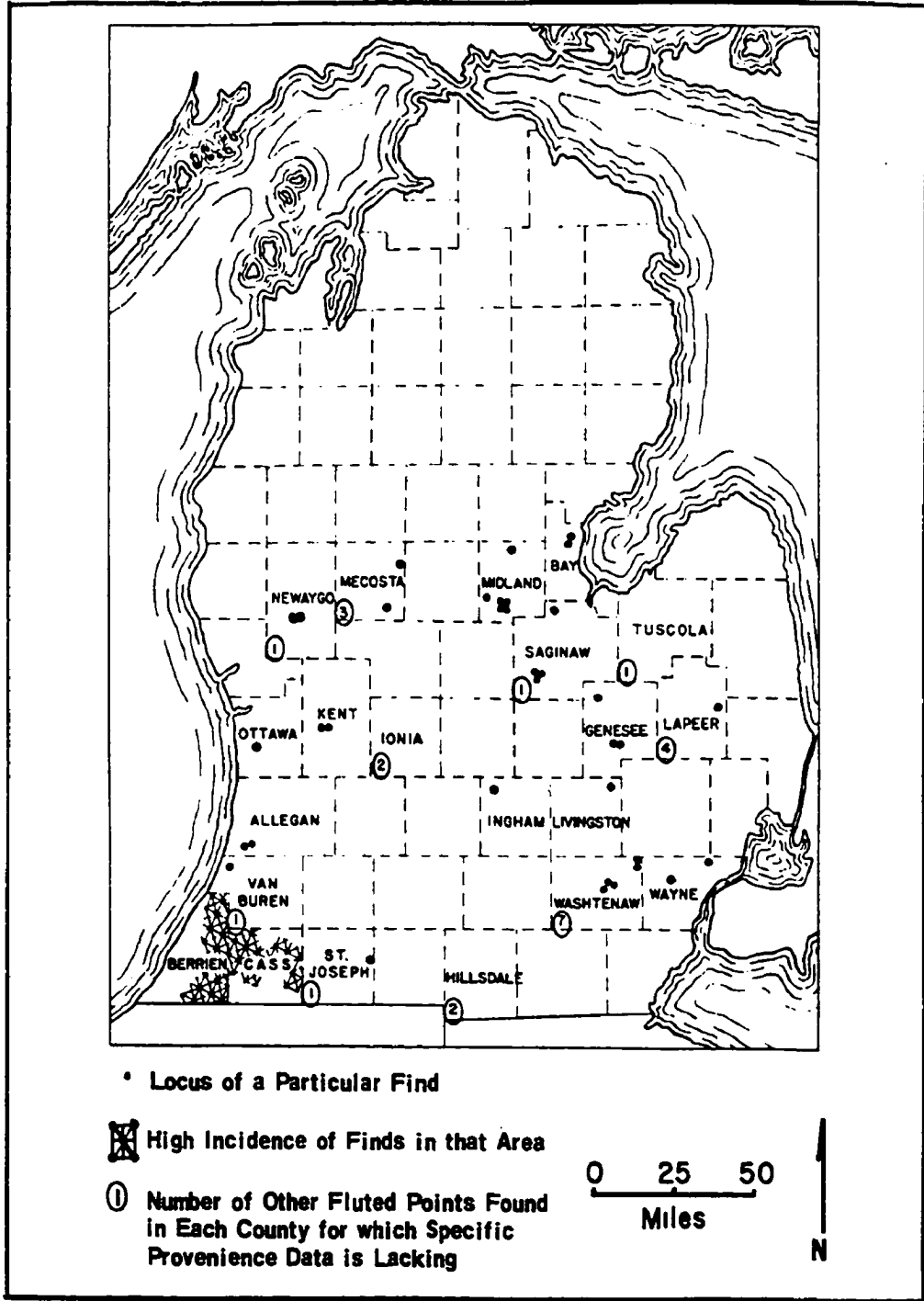
¹¹Ronald J. Mason, Late Pleistocene Geochronology and the Paleo-Indian Penetration into the Lower Peninsula ("University of Michigan Museum of Anthropology, Anthropological Papers," No. 11; Ann Arbor: University of Michigan, 1958), p. 4.

¹²Ibid.

¹³It is interesting to note on Mason's Map the large area in south-central Michigan where no fluted points have been found. The major landform in this area is a level outwash plain. This probably was an extensive swamp during the Glacial Period and could well account for the distribution of Mason's Map (see Fig. 10).

DISTRIBUTION OF FLUTED BLADES IN MICHIGAN

Figure 10



-The Subsistence Economy

Paleo-Indian life in southwestern Michigan is difficult to reconstruct as no true sites, only surface finds consisting largely of isolated fluted points, have been found. However, Dr. James Fitting, and others from the University of Michigan, have extensively excavated the Holcombe Site. This site is within the same latitude as the study area (see Fig. 9). On the basis of these excavations, and from ethnographic analogies, Fitting suggests that a Paleo-Indian Group may have been "a band of thirty to sixty individuals led by six to twelve adult males, following a regular pattern of seasonal wanderings, within a restricted territory."¹⁴ He believes that these people had a focal hunting economy which was supplemented by foraging.¹⁵ As the remains of a barren-ground caribou

¹⁴James B. Fitting, "Observations on Paleo-Indian Adaptive and Settlement Patterns," The Michigan Archaeologist, XI, Nos. 3-4 (Sept. to Dec. 1965), p. 104.

¹⁵Cleland defines a focal subsistence economy as one that is directed toward the procurement of one or a few similar kinds of foods. Those societies which practice focal economies are specialized ones, depending upon specific methods and techniques for the exploitation of an abundant resource. . . . Specialized hunters, fishermen, as well as agriculturalists, have focal economies. He terms less specialized subsistence as diffuse economies. Such an economy is based not on the reliability of one resource, but on an ability to exploit a variety of resources. Societies with diffuse adaptations are not

(Rangifer articus)¹⁶ were found in the central hearth area. Fitting views this site as a temporary camp centered around a successful kill. The band would remain here long enough to repair equipment and furnish the meat, and then move on again in search of food.¹⁷

As the barren-ground caribou was the only animal found at the Holcombe Site, it would seem that this animal was the main meat source, not the larger game animals of the Pleistocene. Certainly such species as the mastodon, mammoth, and woodland musk ox were contemporary with Paleo-Indian Man in the area.¹⁸ Quimby notes that of the counties of southwestern Michigan, all but Kalamazoo, Cass, and Barry Counties had both fluted point and mastodon finds.¹⁹ In addition to this, the finding of two

specialized ones in the strict sense of the word, since they depend upon many specialized skills and techniques to exploit a number of different kinds of resources. These terms will be used throughout this study to indicate the type of subsistence economy being practiced. Cleland, op. cit., pp. 43-44.

¹⁶ Charles E. Cleland, "Barren-Ground Caribou Rangifer Articus from an Early Man Site in Southeastern Michigan," American Antiquity, XXX, 3 (Jan., 1965), pp. 350-51.

¹⁷ Fitting, loc. cit.

¹⁸ George Quimby, Indian Life in the Upper Great Lakes, 11,000 B.C. to A.D. 1800 (Chicago: University of Chicago Press, 1960), Fig. 12, p. 31.

¹⁹ Ibid., p. 31.

Paleo-Indian points from Kalamazoo County by Dr. Elizabeth Baldwin, in the summer of 1967, leaves only Cass and Barry Counties without both finds.²⁰ In addition to this, Green has shown an association between Paleo-Indian man and the Prillwitz Mammoth in Berrien County.²¹

Yet even with this close association, it must be noted that these big game animals would have been difficult to kill by men with primitive techniques. Although mammoths were hunted and killed in the Southwest, the lack of direct association between man and mammoth east of the Mississippi River indicates that man had adjusted his economy to smaller game animals, such as the barren-ground caribou, in this area. Since caribou are gregarious, a band such as Fitting hypothesized for southeastern Michigan could have killed them with relative ease, particularly if group co-operation was used. Dead, disabled or trapped 'big game' animals probably provided some food. The Rappuhn Mastodon may represent such a case. However, this was probably not done on a regular

²⁰ Personal communication with Dr. Elizabeth Baldwin, Department of Anthropology, Western Michigan University, Kalamazoo, Michigan.

²¹ Amos R. Green, "Paleo-Indian and Mammoth were Contemporaneous in Berrien County, Michigan," The Michigan Archaeologist, XIII, No. 1 (March, 1967), 1-10.

basis. In light of the relatively large number of mastodon and mammoth finds in Michigan (156),²² and the absence of conclusive associations between man and these animals, it would seem that only a small proportion of his meat was obtained in this manner. Yet it certainly cannot be said that barren-ground caribou comprised 100 per cent of the food resources, based on a single identification of the species at the Holcombe Site. Smaller game, such as squirrels and rabbits, in all probability, were hunted or trapped to supplement the food supply. Possibly their remains would less likely be preserved than the larger caribou bones. Evidence for the use of plant food by these people is scarce, as vegetation is less likely to be preserved than bone. Yarnell has identified chestnut at the Holcombe Site as a likely food source, and pine, maple, beach, and oak charcoal were found. All of these have been recorded as having food value to later cultures.²³ The sap from maple trees was

²²M. A. Skeels, "The Mastodons and Mammoths of Michigan," Papers of the Michigan Academy of Science, Arts and Letters, XLVII, Part 1 (1962), 110 and 121.

²³Richard A. Yarnell, Aboriginal Relationships Between Culture and Plant Life in the Upper Great Lakes Region ("Anthropological Papers: Museum of Anthropology, University of Michigan," No. 23, Ann Arbor: University of Michigan Press, 1964), p. 142.

collected for sugar and the nuts from beech and oak as well as pine cones were used for food. In addition, roots and berries were probably utilized.

The Distribution of Fluted Point Finds

Figure 11 shows the distribution of fluted point finds in southwestern Michigan in relation to the various landforms on which they are located. This map does not represent the total number of Paleo-Indian finds in southwestern Michigan. Minimum mapping requirements necessitated that the provenience be established within a quarter section. Location data was obtained from the site-card file of the University of Michigan, and from articles by Amos Green (1967),²⁴ and Donald Peru (1965)²⁵ and (1967).²⁶ All fluted points and other artifacts specifically identified as Paleo-Indian that had provenience data within a quarter section were mapped. Under many circumstances a location within a quarter section would be too general for

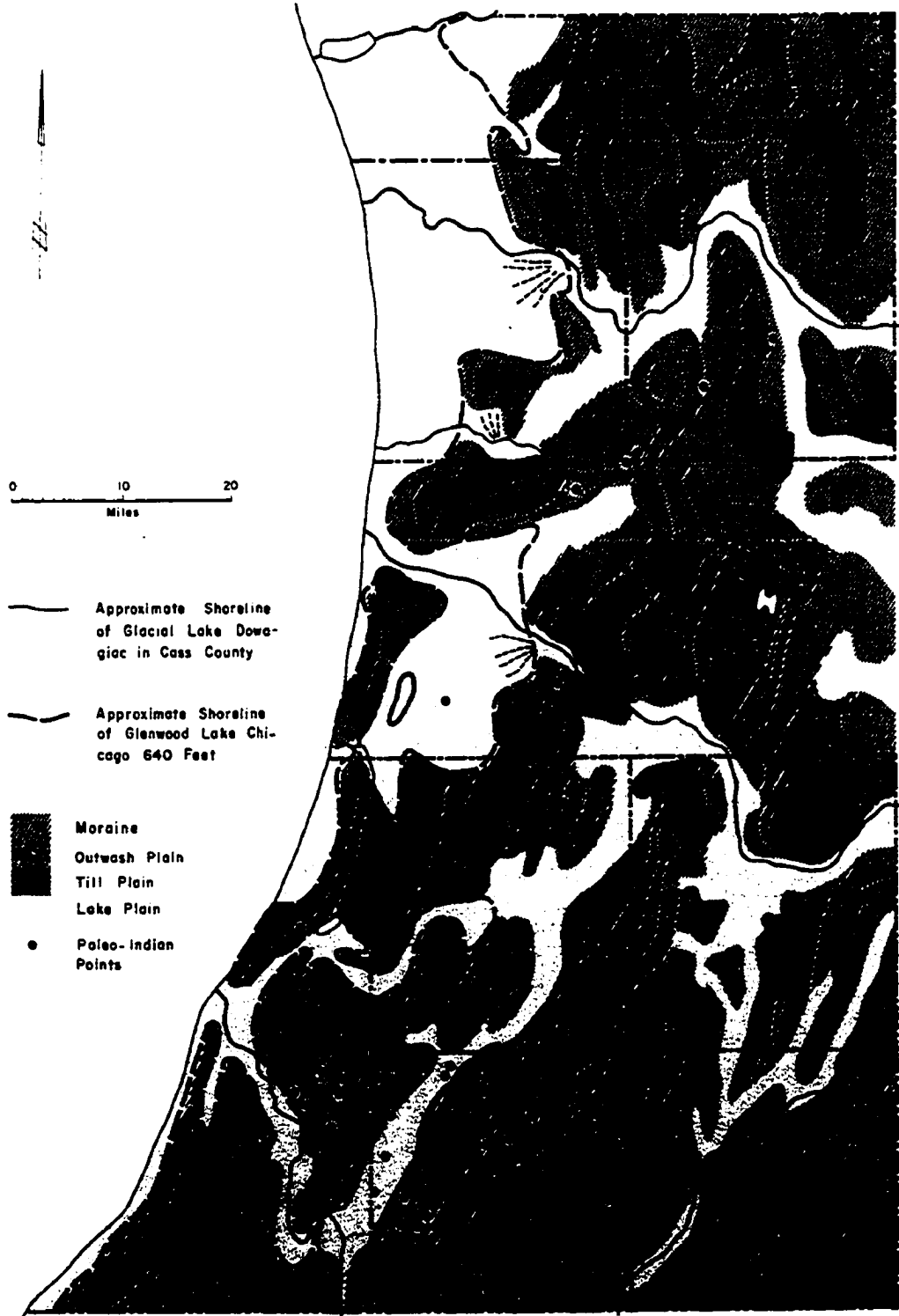
²⁴Green, loc. cit.

²⁵Donald V. Peru, "The Distribution of Fluted Points in the Counties of Kent and Allegan, Michigan," The Michigan Archaeologist, XI, No. 1 (January, 1965), 1-8.

²⁶Donald V. Peru, "The Distribution of Fluted Points in Cass County, Michigan," The Michigan Archaeologist XIII, No. 3 (September, 1967), 137-146.

DISTRIBUTION OF PALEO-INDIAN FLUTED POINTS IN SOUTHWESTERN MICHIGAN

Figure II



research purposes. However, as landforms usually cover several sections, mapping at this level of accuracy may be considered significant. An examination of this map shows several interesting factors: (1) the dominance of fluted point finds on morainic areas, (2) the large concentration of fluted points located on the Valparaiso Moraine, and (3) the high concentration of sites in Berrien and Cass Counties.

Certainly, in analyzing a distribution such as shown here, one must take into consideration that some areas have been studied more than others. Such a distribution as presented here could, and probably does, to some extent, reflect this differential investigation. Yet, when the environmental situation at the time these cultures were in existence is analyzed, a distributional pattern as it is known does seem to have cultural validity.

Fluted Point Finds Located on Morainic Highlands

According to Cleland, the Paleo-Indian Cultures were contemporaneous with the Boreal Woodland Period (12,000 B.C. to 9,000 B.C.) for the Upper Great Lakes.²⁷ These dates roughly correspond with the Glacial Period for

²⁷ Cleland, The Prehistoric Animal Ecology . . ., pp. 91-92.

southwestern Michigan, as discussed in Chapter II (see Table 4). The vegetation graded from barren tundra near the ice sheet to open woodland in the upland areas. The lowlands were dominated by dense spruce-fir forests and marshy wetlands. Cleland suggests that from 10,000 B.C. to 9,000 B.C. was a period of colonization of the better-drained uplands by coniferous and a few deciduous species. Such a situation, he believes, is very similar to today's forests of the Canadian subarctic. On this basis, and the remains of the barren-ground caribou found at the Holcombe Site, Cleland draws ethnographic parallels between Paleo-Indian Man in the Upper Great Lakes Region and the present Athabaskan Cultures of the Canadian subarctic. He observes that

The Athabaskans are not free wandering hunters, but hold territories along the seasonal migration routes of the caribou. Caribou are killed in large numbers during the migration period when members of the band cooperate to direct the flow of animals to positions where they are vulnerable to spear-men.²⁸

Such a settlement pattern as suggested by Cleland could explain the distribution of Paleo-Indian points in southwestern Michigan. The barren-ground caribou, today, is found in the open tundra areas in the summer, but, in the winter, it migrates into the boreal forests. Cleland

²⁸ Ibid., pp. 47-48.

TABLE 4
PALEO-INDIAN--ENVIRONMENTAL CORRELATION

Date B.C.	Lake Levels ^a	Morainic Systems ^b	No. of Finds ^c	Northern-most Location of Fluted Point Finds by Moraine ^c	Vegetation ^d	Economically Important Animal Life ^d
?	Lake LaGrange (850')?	Sturgis	3	Southern Cass County	Tundra-like vegetation near edge of ice sheet, and in upland areas, spruce- fir forests dominate low- lands	Barren- ground caribou, probably smaller secondary species, and
?	Lake Dowagiac (750')?	Kalamazoo	11	Central Kala- mazoo County		
14,000	Early Lake Chicago (660')?	Valparaiso	18	Central Kent County		
12,000	Glenwood Lk. Chicago (640')	Lake Border	1	Northern Berrien County		
11,000	Calumet I (620')				non-arboreal species in uplands, spruce-fir forests in	possibly mammoth and other
10,000	Bowmanville low water stage (?)				forests in lowlands	big game species

TABLE 4: PALEO-INDIAN--ENVIRONMENTAL CORRELATION (continued)

Date B.C.	Lake Levels ^a	Morainic Systems ^b	No. of Finds ^c	Northern-most Location of Fluted Point Finds by Moraine ^c	Vegetation ^d	Economically Important Animal Life ^d
10,000	Bowmanville low water stage (?) Calumet II (620') Tolleston (605')	Southwestern Michigan permanently uncovered by glacial retreat			Rapid in- crease in the number of pine and deci- duous species	Possible entry of a few species associated with deci- duous forests such as wood- land caribou and elk
9,000	Early Lake Algonquin					

^aAfter Wayne and Zumberge, "Pleistocene Geology of Indiana and Michigan," Figure 6, p. 76.

^bAfter Robert Kelly, The Glacial Lakes Around Michigan, Geological Survey Bulletin No. 4 (Lansing: Michigan Department of Conservation), Table 1, frontface.

^cAfter Peru, "Distribution of Paleo-Indian Sites in Cass County, Michigan," p. 145.

^dAfter Cleland, Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes, p. 294.

states that, "Unless its habitat has changed since the retreat of glacial ice from the Great Lakes Region, which seems unlikely, we can hypothesize a similar type of environment for southern Michigan at the time it was occupied by Paleo-Indians."²⁹ In the summer the caribou probably fed along the narrow band of barren tundra which was found along the edge of the ice sheet. In the winter these animals migrated southward. The winter habitat was not the dense spruce and fir forests then occupying the lowlands, but the more open boreal woodlands of the higher morainic areas.

Thus, if the Paleo-Indians of this area were caribou hunters, as suggested by Cleland and Fitting, one would expect to find most of their settlements on morainic areas also. In summer, these highland sites would also be preferable as places of settlement over the swampy and, probably, insect-infested lowlands.

Fluted Point Finds Located Near Glacial Shorelines

In addition, it would seem that Paleo-Indian Man preferred to live near large bodies of water adjoining these highland areas. Green has stated that no fluted points have been found below the level of the 660 feet

²⁹ Ibid., p. 46.

in Berrien County.³⁰ Glenwood Lake Chicago existed in this area at an elevation of 640 feet (see Table 4). Peru's distributional study of fluted points from Kent and Allegan County notes several fluted point finds that would have been located along embayments of Glenwood Lake Chicago or channels leading into the lake in these areas.³¹ All but one point was found above 640 feet. Another fluted point distributional study by Peru, this time in Cass County, points out a hypothetical relationship between Paleo-Indian Man and the shoreline of Glacial Lake Dowagiac.³² This lake, actually a river pool receiving melt-waters from the west and north, was ponded between the ice sheet and the inner border of the Kalamazoo Moraine. Projecting a maximum elevation of 760 feet for this lake, Peru notes nine finds that would have been located along this shoreline. Two more finds would have been above water at the 740-foot level, and only two were definitely considered lake bottom sites. This is in direct opposition to Mason's (1958) data for Cass County,

³⁰Green, loc. cit., p. 3.

³¹Peru, "The Distribution of Fluted Points in the Counties of Kent and Allegan, Michigan," p. 3.

³²Peru, "The Distribution of Paleo-Indian Sites in Cass County," p. 140.

which indicated that most of the finds came from the floor of Lake Dowagiac.³³ Figure 11 supports Peru on this point. Peru also suggests that a similar pattern existed around Lake LaGrange (850'), a small lake that existed for a short time between the Outer Border of the Kalamazoo Moraine and the ice sheet in Cass County.³⁴ Once the Inner Border of the Kalamazoo Moraine had been built, this drainage route was abandoned. Considering the short existence of this lake and that only two points have been found near the projected shoreline, Peru's inference for association of man with this lake must be regarded as highly conjectural.

It should not be surprising that Paleo-Indian Man showed a preference for lake sites, particularly around large lakes. The warmer temperatures of the lake would have modified the lakeshore environment, thus making a more favorable camp-site. In addition, it would have provided water for both man and animals, and, therefore, would have been a good hunting area.

Fluted Point Finds Located on the Valparaiso Moraine

The dominance of sites along the Valparaiso Moraine

³³Ibid., p. 143.

³⁴Ibid.

indicates a main migration route of the caribou as they moved south. The Valparaiso Moraine is the best developed of the morainic systems of southwestern Michigan. Except where cut by rivers, it runs continuously from near Grand Rapids to the state border in Berrien County. This upland area would certainly provide a suitable habitat for the north-south movement of the barren-ground caribou. To the east of the Valparaiso Moraine lies an extensive area of outwash and lake plain which in the Glacial Period would have been dense spruce forests mixed with marshy bogs. Such an environment would have made migration along this route unlikely. To the west, the Lake-Border Moraine could have provided a route of migration and several fluted points have been found along it. However, the Lake-Border Moraine is not as extensive as the Valparaiso and it is interrupted in many areas by lake plains which, when not covered by water, were probably swamps at this time.

Some fluted points have been found along the Kalamazoo Moraine, mostly in Cass County. Its usefulness as a migration route would have been limited by its narrow width and the fact that the position of the ice sheet at the time of its formation would have prevented penetration north of the Kalamazoo area (see Fig. 3). As the ice retreated west to the position of the Valparaiso

Moraine, the ice sheet remained stationary in the north.³⁵

The barren-ground caribou would have migrated from the Kalamazoo Moraine to the Valparaiso Moraine; possibly Paleo-Indian Man followed. Ice retreat after this time was rapid in both the west and north. A short advance of the ice sheet built the portion of the Valparaiso Moraine extending north to Kent County. If Paleo-Indian Man were already established in the south, it would be only natural for this to be the route of northward penetration.

Concentration of Fluted Point Finds in Berrien and Cass Counties

The largest concentration of fluted point finds is located within Berrien and Cass Counties. Eighty per cent of the finds on Figure 7 are located here. Such a concentration might seem easily answered by the fact that they are located in the southernmost tier of counties in southwestern Michigan and, therefore, probably had a somewhat milder climate than those further north. However, with a continental glacier still affecting the climate of this area, the temperature can be considered uniform enough so that no major difference in temperature

³⁵Leverett and Taylor, op. cit., p. 184.

existed which would influence settlement. Unlike the agriculturalists of later periods, temperature was not as important a factor in determining settlement as was the movement of the food supply.

One probable factor in explaining this concentration is that man has been in Berrien and Cass Counties longer than anywhere else in southwestern Michigan. Since the caribou fed along the edge of the ice sheet in the summer, it is probable that man also was in this area before some of the more northern counties were uncovered.

Yet, it seems unlikely that this accounts totally for the concentration of sites in this area. If Cleland's dating of around 12,000 B.C.³⁶ for the maximum age of Paleo-Indian Man in Michigan is accepted, this would indicate that the glacier had retreated at least to the Lake-Border Moraine and the retreat of the ice from here was fairly rapid.

Still another reason can be hypothesized. The summer season available for grazing in the open tundra to the north at this time would have been relatively short. Judging from the present areas of tundra, only one to

³⁶Cleland, The Prehistoric Animal Ecology . . ., p. 91.

three months of the year would be available for grazing in these areas. Thus, the time man spent hunting in the north would be correspondingly low and one would expect fewer finds. In addition, Cleland has stated that by 10,000 B.C. deciduous forests were becoming established in the well-drained uplands.³⁷ The percentage of these deciduous trees in this area would have been greatest in the south; although archeologists have little evidence as to the plant use of Paleo-Indian Man, deciduous forests are known to provide much more useable food than coniferous ones. Yarnell indicates that a chestnut was found in the lowest layer of the Holcombe Site. He says that,

If the chestnut was established in southeastern Michigan at this early date, it is likely that the flora of southeastern Michigan existed much as it was during the Woodland Period [1,000 B.C. to 1650 A.D.] and most of the economic plants were the same; although some of them may not have arrived in the area and some may not have been utilized.³⁸

This is well supported by the fact that pine, maple, beech and oak charcoal were also found at the Holcombe Site.³⁹

If these species also existed in Berrien and Cass Counties at the same time, they would add greatly to the food

³⁷Ibid., p. 18.

³⁸Yarnell, op. cit., p. 143.

³⁹Ibid.

supply here. The gathering time for most of these plant foods would be in the fall and coincide with the southern migration of the caribou. This indicates that the resource base in this area would have been greatly increased and could support a larger population. In the summer the same number of people would have to scatter over a much larger area to find food.

Age Structure of Fluted Point Finds in Southwestern Michigan

One factor, not explicit on Figure 11 but that can be implied, is the age structure of the various finds. If Paleo-Indian Man in southwestern Michigan was a migratory hunter following herds of barren-ground caribou, and if this species moved from moraine to moraine as the ice sheet retreated, then it would be expected that the oldest sites in southwestern Michigan would be found on the Sturgis Moraine. This was the first morainic system to be formed. Finds on the more western moraines would be progressively younger. Is there any solid evidence for these "ifs"? Here, again, the distribution of sites must be examined.

As has been previously mentioned, Paleo-Indian finds were largely located along old shorelines of glacial lakes (see Table 4). Because of the direct association between these artifacts and the 640-foot Glenwood Stage

of Lake Chicago, most archeologists date the entry of man into southwestern Michigan at least about 9,000 B.C. Since fluted points were found on the bed of this lake, this culture is at least this old. However, Paleo-Indian artifacts are not confined to this shoreline. This is especially true of Cass County where 30 fluted points from 22 finds have been recorded by Peru.⁴⁰ Only nine map-pable points have been recorded from Berrien County in this study. This does not necessarily mean that Berrien County has less Paleo-Indian material, only that exact provenience data is lacking. It does show that a high percentage of finds cannot be directly correlated with the 640-foot stage of Lake Chicago. Table 5 shows the elevation of Paleo-Indian Sites in Berrien and Cass Counties. Peru notes the interesting fact that in Cass County, in general, the points on each moraine lie at successively lower elevations west of the Sturgis Moraine. Lake levels, even if there were no reduction in the amount of water passing through them, would lower from east to west as the melting ice sheet retreated toward the center of the Lake Michigan Basin. This has chronological implications, as the higher the lake level the

⁴⁰Peru, "The Distribution of Paleo-Indian Sites in Cass County," p. 145.

TABLE 5
 FLUTED POINT DISTRIBUTION IN BERRIEN^a AND CASS^b COUNTIES

Site Location	Morainic System	Elevation	Average Elevation
SW 1/4 5 Newberg	Sturgis Moraine	930 feet	917 feet
NE 1/4 13 Newberg		900	
S 1/2 3 Porter		920	
NE 1/4 25 Volinia		920	
N 1/2 39 Volinia	Outer Kalamazoo Moraine	900 feet	844 feet
NE 1/4 31 Volinia		840	
NW 1/4 13 LaGrange		800	
SW 1/4 15 LaGrange		840	
SW 1/4 29 Jefferson		840	
NW 1/4 23 Wayne	Inner Kalamazoo Moraine	880 feet	786 feet
NE 1/4 29 LaGrange		800	
S 1/2 3 Howard		760	
NW 1/4 14 Howard		750	
NE 1/4 15 Howard		750	
NE 1/4 21 Howard		770	
NW 1/4 6 Wayne	Inner Border Kalamazoo Moraine	760 feet	741 feet
NW 1/4 10 Wayne		740	
NE 1/4 10 Silver Creek		780	
NW 1/4 33 Silver Creek		740	
NW 1/4 6 Howard		710	
NE 1/4 20 Pokagon		720	

TABLE 5: FLUTED POINT DISTRIBUTION IN BERRIEN^a AND CASS^b COUNTIES (Continued)

Site Location	Morainic System	Elevation	Average Elevation
SW 1/4 18 Silver Creek	Valparaiso Moraine	835 feet	722 feet
SW 1/4 30 Silver Creek		680	
NE 1/4 25 Silver Creek		700	
SE 1/4 18 Silver Creek		700	
NW 1/4 20 Silver Creek		?	
SW 1/4 5 Silver Creek		680	
NE 1/4 17 Silver Creek		740	

^aAfter Amos R. Green, "Paleo-Indian and Mammoth were Contemporaneous in Berrien County, Michigan," The Michigan Archaeologist, March, 1967, 13, 1, p. 6.

^bAfter Donald V. Peru, "The Distribution of Fluted Points in Cass County, Michigan," The Michigan Archaeologist, September, 1967, 13, 3, p. 145.

younger the lake must have been. If Paleo-Indian Man indeed lived along the shores of these early lakes, it can generally be said that the lower the elevation of the site the younger it is.

Thus, if the points located on the Sturgis Moraine correspond to the level of Glacial Lake LaGrange as suggested by Peru, and admittedly this is very conjectural, one would expect that these would be the earliest areas of settlement in the area. These would have been followed by occupation of the Outer Border of the Kalamazoo Moraine, where point distribution seems to correlate with Glacial Lake Dowagiac, (see Fig. 11). The distribution of occupations in these areas would have been limited by the closeness of the ice sheet. Only in a few summer months could man have entered the area. Once the ice had formed the Inner Border of the Kalamazoo Moraine, the separation between the Cary Lobes was greatly increased and summer temperatures increased somewhat. Lake Dowagiac now extended between the ice sheet and the Kalamazoo Inner Border from Kalamazoo County to northern Indiana. The moderating temperatures provided this drainage area with much more melt-water than previous drainage areas. Thus, with drainage flowing in from both north and west, Lake Dowagiac lasted for a much longer time. This factor may be represented by the higher percentage of finds along its

shoreline than on the Sturgis Moraine.

Once the ice sheet had retreated from the Valparaiso Moraine, drainage shifted southwest following a drainage channel through this moraine and Lake Dowagiac was abandoned. Man and barren-ground caribou may have crossed over to the Valparaiso Moraine. Here, an early 660-foot stage of Lake Chicago would have existed in front of the Valparaiso Moraine and as embayments in river valleys, up to the 660-foot contour line. As Green and Peru have noted, a large number of fluted points have been found above this elevation. This 660-foot stage was destroyed by the ice advance that built the Lake-Border Moraine about 13,000 B.C.⁴¹ Ice retreat from here was rapid. The water levels stabilized at 640 feet (Glenwood Lake Chicago). Again, Green's statement that no fluted points have been found below 640 feet in Berrien County should be noted. Ice retreat from here was northward as well as westward. Both the barren-ground caribou and man could now have moved north. As the broken character of the Lake-Border Moraine made this route unfavorable, the Valparaiso Moraine became the major route of migration. The Paleo-Indian points found along the Glenwood Beach

⁴¹Davis, op. cit., p. 37.

and channels entering into this lake would be among the youngest in southwestern Michigan. Man now could live year-round in the southern portions of the area. In the summer he might move north into Kent and Allegan Counties following the caribou. As man could not have entered these counties before the retreat of the ice north of the southern boundary of Allegan County, this must have been a Middle Cary event.

Archeologists generally agree that Paleo-Indian Cultures in southwestern Michigan ended about 9,000 B.C. with the retreat of the Valdres Ice Sheet. The barren-ground caribou moved north following the receding ice sheet. Man either had to follow, or else he had to adjust his culture to the forest conditions becoming established in the area at this time. While this terminal date for the Paleo-Indian Period is fairly well agreed upon, the entry of Paleo-Indian Man into this area is not. From the evidence presented here, it is possible that entry could have been made by the time the Kalamazoo Moraine was formed, if not earlier. However, it must be noted that this conclusion is reached on very circumstantial evidence and must remain a tentative hypothesis until more Paleo-Indian Sites have been found and investigated. However, the fact that barren-ground caribou were hunted by these early men; that their artifacts have

been found almost totally on morainic highlands, the habitat of the barren-ground caribou; that fluted point finds seem to be associated with the shorelines of temporary glacial lakes lying in front of the retreating ice sheet; and the distinct possibility that the caribou migrated from morainic system to morainic system following the retreating ice, could indicate a much earlier date than presently accepted. Perhaps the strongest argument against this early date is that it fails to fit into the present dating for Paleo-Indian Cultures in North America. These dates, from the southwestern United States, have been established at about 9,000 B.C. through the use of radio-carbon dating and association with various pluvial lake levels. However, as quoted above (page 54), Griffin indicates that Paleo-Indian Cultures in the Southeast may be even older. No conclusive proof can be established until sites, rather than surface finds, can be found and dated in the Southeast, and the date of entry of Paleo-Indian Man into North America is firmly established.

CHAPTER V

THE ARCHAIC CULTURES OF SOUTHWESTERN MICHIGAN (9,000 B.C. to 1,000 B.C.)

By 9,000 B.C. man was well established in southwestern Michigan. He had been here for at least 1,000 to perhaps 3,000 years or more. His culture had changed little over this period of time, and so had the resources of the environment which he utilized. This cultural stability is evident in the specialized fluted points found in many parts of the Great Lakes Region. These include Folsom, Bullbrook, Barnes, Enterline, and Ross County points.¹ Only the first of these has not been found in southern Michigan.² The presence of several distinctive fluted point styles within this cultural area probably indicates several well established bands, each having a slightly different culture. However, soon after 9,000 B.C., this fluted point tradition seems to have declined. One point, the Hi-Low, retains many of the stylistic similarities to fluted point. It exhibits

¹William B. Roosa, "Some Great Lakes Fluted Point Types," Michigan Archaeologist, II, No. 3 & 4 (September-December, 1965), 95.

²Ibid.

extensive basal thinning, and may have lateral grinding, a characteristic of fluted points, but is unfluted.³ Some archeologists have felt that this indicated an extension of the Paleo-Indian Period as late as 6,000 B.C.⁴ However, this study, following Griffin, will consider the change from fluted to unfluted point forms as the dividing point between Paleo-Indian and Archaic Cultures.⁵ It is possible that some group, or groups, retained a life-way similar to that of Paleo-Indian Man as late as 6,000 B.C., but certainly unfluted points that were stemmed and notched were dominant after 9,000 B.C.

In this study, the term Archaic will be used to denote pre-ceramic groups who had adapted to a forest environment in southwestern Michigan. The cultural stage represented by these Archaic people is one of spear and possibly bow and arrow hunting, as well as trapping and netting, with an increasingly developed seasonal round of food-gathering activities within this region.⁶ This is

³James E. Fitting, "The Hi-Lo Site: A Late Paleo-Indian Site in Western Michigan," Wisconsin Archaeologist, XLIV, No. 2 (April, 1963), 87.

⁴Griffin, loc. cit., p. 178.

⁵Ibid.

⁶Personal communication with Dr. Elizabeth Baldwin, Department of Anthropology, Western Michigan University, Kalamazoo, Michigan.

opposed to the focal hunting economies of the Paleo-Indian Cultures and the ceramic, agricultural Woodland Cultures.

As few direct studies of the Archaic stage in southwestern Michigan have been done, and even fewer of these deal with man's relationship to his environment within this area, it will be necessary to discuss Archaic Man in the Upper Great Lakes and then fit the study area back into this picture. This portion will rely heavily on the works of Cleland (1966)⁷ and Griffin (1967).⁸

It is impossible not to note the parallel between this cultural change and the change from coniferous to deciduous forests (see Table 6). As previously discussed in Chapter II, deciduous forests were becoming established in the well drained uplands at about 9,000 B.C. This was primarily the result of the moderation of climate with the retreat of the Valdres Ice Sheet. As the ice sheet retreated, the natural resources of southern Michigan were greatly altered. The barren-ground caribou moved north following the ice sheet. In southern Michigan it was replaced first by boreal forest animals such as

⁷Cleland, The Prehistoric Animal Ecology . . ., p. 294.

⁸Griffin, loc. cit., pp. 175-191.

TABLE 6
 ARCHAIC--ENVIRONMENTAL CORRELATION

Date B.C.	Lake Levels ^a	Cultural Period ^b	Climate ^b	Vegetation ^b	Subsistence Economy ^b
9,000	Early Algonquin (605')		Warming	Spruce-fir	Focal hunting
			but still	pine forest	economy prob-
8,500	Kirkfield low water (565')		cool	with an	ably based on
				important	moose, wood-
	Main Algonquin (605')			deciduous	land caribou,
8,000	Post Algonquin lowering	Early Archaic Cultures		element	beaver, and
					hare, with
					some gathering
7,500	Lake Chippewa (230')				

TABLE 6: ARCHAIC--ENVIRONMENTAL CORRELATION (Continued)

Date B.C.	Lake Levels ^a	Cultural Period ^b	Climate ^b	Vegetation ^b	Subsistence Economy ^b
7,000	Slowly rising lake levels due to crustal rebounding	Middle Archaic Cultures	Continued warming	Pine forest with oak	A more diffuse economy based on deer hunting and gathering
3,000					
2,000	Lake Nipissing (605')	Late Archaic Cultures	Xerothermic Maximum temperatures warmer than present	Oak-pine forest	Diffuse economies winter for deer hunting
1,000					

^aAfter Wayne and Zumberge, "The Pleistocene Geology of Indiana and Michigan," Figure 6, p. 76.

^bAfter Cleland, The Prehistoric Animal Ecology . . ., p. 294.

woodland caribou, moose, and later by deer and other smaller species of deciduous forests. Paleo-Indian Man had only a limited number of choices in the face of these dynamic environmental changes. He could migrate north with the barren-ground caribou or adapt to this new environment. It would seem likely that the Paleo-Indian groups which lived nearest to the ice sheet, and therefore were most adapted to an arctic environment, migrated north. However, those groups represented by the concentration of fluted points in the southwestern portion of the study area had, at least to some extent, become adapted to a forest way of life by this time. This environmental change would have taken place earlier in this area. Such groups, with a probable later influx of people coming from the south who were already adapted to the forest environment, were the forebearers of the Archaic Cultures.

The Early Archaic Cultures (9,000 B.C. to 7,000 B.C.)

In this study the term Early Archaic will refer to the period of initial cultural change and adaptations to the food and industrial resources of Post-Glacial southwestern Michigan--a part of the Upper Great Lakes Region.⁹

⁹Ibid., p. 178.

This was a dynamic period. The habitat changed from spruce, fir, and pine to a dominance of pine and increasing numbers of deciduous species with continued climatic moderation towards 7,000 B.C. The food resources of the habitat changed likewise. The barren-ground caribou migrated north and was replaced by the moose, woodland caribou, and other smaller species associated with northern coniferous forests. The small deciduous element of these forests, particularly in the southern Great Lakes, provided much more usable plant food, notably in the form of nuts and tubers, than had existed during the previous cultural period. Archeological evidence indicates that man's technology was also changing. Fluted points decrease and eventually disappear. The only points suggestive of Paleo-Indian Culture which have been dated to this period are the Hi-Lo points which fitting dates from 8,000 B.C. to 6,000 B.C.¹⁰ However, these points were in the minority. Large stemmed and lanceolate projectile points of argillite and quartzite were being used in increasing numbers.

¹⁰Fitting, The Hi-Lo Site, p. 87.

Subsistence Economy

Animal remains from Early Archaic sites in the Upper Great Lakes are rare. The excavations at the Itaska Kill Sites in Clearwater County, north-central Minnesota (7,000 B.C.) have produced deer, muskrat, wolf, black bear, turtle, bird and fish bone.¹¹ Cleland states that,

At least in the Great Lakes Region, the admittedly scanty evidence indicates an adjustment to forested conditions. Food remains such as beaver, black bear, muskrat, turtle, and fish do not indicate 'prairie or savannah-type adaption' nor are these remains one of the numerous discoveries which have related this (Paleo-Indian--Eden-Scottsbluff) highly specialized stone working tradition with the specific life-way of big game hunting. While the Early Archaic peoples of the Great Lakes were most certainly hunters, they were just as certainly hunters of the forest and must have been adapted to a forest way of life. This being the case, we can predict the acquisition of new techniques and devices applicable to life in forested areas. The Itaska faunal assemblage indicates that Early Archaic hunters were utilizing forest game species. Traps, snares, harpoons, canoes, and snowshoes may well have been used by Early Archaic people. If the Paleo-Indian of the Upper Great Lakes were exploiting large herding animals, then the disappearance of these species, with the warming climate and resultant encroachment of pine forest, must have brought about a change in hunting techniques more suitable to the capture of the non-gregarious animals and smaller game species of these forests.¹²

¹¹ Cleland, Prehistoric Animal Ecology. . ., pp. 49-50.

¹² Ibid., pp. 49-50.

Cleland goes on to draw ethnographic parallels between Early Archaic peoples and the Algonquin Moose Hunters of Canada. He states that,

At the time Early Archaic Cultures occupied the Upper Great Lakes Region, its forests were probably composed of spruce, fir, and pine; suitable habitat for moose and woodland caribou. If these species were the major sources of food in this area, then ethnographic parallels can be sought with the Algonquin Moose Hunters of the Canadian boreal forest. Here, people such as Cree, Naskapi, and Montagnais live in small, scattered bands hunting moose, woodland caribou, beaver, and occasionally fishing during the warm season. Larger animals are stalked during the winter, and during the summer are driven into the water where they are speared.

Without evidence of many cultural traits, but based on a fair knowledge of Early Archaic technology and the kind of environment these people had to deal with, it is not unreasonable to suppose a band level culture, similar to the Algonquin cultures of the North American subarctic forests.¹³

Cultural Change

This cultural change, along with environmental change, seems more than a coincidence, but rather a direct adjustment to the changing environment. Griffin states that,

In the Early Archaic, the fluted point style of shaping points and knives is abandoned gradually and unfluted forms become predominant. The other tools remain the same, and the inference is that in no area of the East does the shift in projectile-point styles result from the movement of new cultural groups into the area.¹⁴

¹³ Ibid.

¹⁴ Griffin, loc. cit., p. 178.

The Middle Archaic Cultures (7,000 B.C. to 3,000 B.C.)

Cultures recognized as Middle Archaic are identified on the basis of the development of new tools for the utilization of both plant and animal resources of the forest. In the Upper Great Lakes these include projectile points, knives, scrapers, and drills of flint as well as ground-stone tools such as the grooved ax, adz, gouge, bannerstones, and probably milling stones. In addition, a variety of bone tools, including awls, antler points, and needles were probably used.¹⁵

Subsistence Economy

Middle Archaic people living in the southern Great Lakes region at this time seem to have been the first in this area to have a balanced utilization of both plant and animal resources. The only excavated Middle Archaic site in the Great Lakes area with enough evidence preserved to permit the reconstruction of subsistence patterns is the Raddatz Rockshelter in southcentral Wisconsin.¹⁶

¹⁵Ibid., p. 51.

¹⁶Warren Wittry, "The Raddatz Rockshelter, SKr, Wisconsin," Wisconsin Archaeologist, XL, No. 2 (April, 1959), 33-69.

Cleland indicates that,

Deer provided over 80% of the meat represented in all levels of the site while deer and elk made up over 90% of the total meat. It has been noted, however, that many other smaller animals were represented, and represented consistently. This indicates that smaller animals were important as a secondary or 'stop gap' resource The small species are also indicative of a diffuse economy. . . . Since it has been suggested that the Raddatz site was occupied much more frequently during the winter than the summer, we must remember that only part of the yearly subsistence cycle was presented. Wittry records the presence of a grinding stone which was probably used to prepare plant foods during one of the brief summer occupations. It is also possible, however, that grinding implements were used to pulverize dried meat and that this activity could have taken place at any season.¹⁷

Cleland goes on to say that,

The small and dispersed nature of Middle Archaic sites suggests that there was a continuation of band type level of socio-political integration. The economics of these Middle Archaic societies was importantly different from previous patterns in the Upper Lakes area in that it was based upon the exploitation of a great variety of resources. In short, diffuse economies were developed during this period. This type of adaptation was not possible during the Paleo-Indian or Early Archaic Periods simply because the area was covered with a boreal forest and boreal forests did not support a variety of resources It should be noted, however, that Early Archaic peoples farther south did develop diffuse exploitations much earlier than contemporary people of the Great Lakes.¹⁸

¹⁷ Cleland, Prehistoric Animal Ecology. . . , p. 51.

¹⁸ Ibid., pp. 51-52.

Cultural Change

These Early Archaic people, south of the Great Lakes, lived in the Carolinian biotic province--a deciduous forest area containing a wide variety of food resources. With the moderation of climate which continued throughout the Middle Archaic Period, the Carolinian biotic province shifted north. By 5,000 B.C. it had reached its present position¹⁹ (see Fig. 2). Some fluctuation of the northern boundary would take place, but, in general, it has maintained this position up to the present. With the movement of this biotic province into southwestern Michigan, particularly along the edge of the Prairie Provinces, diffuse economic patterns became possible. Cleland notes that diffuse adaptations develop best in areas of ecologic diversity.

Since an adaptation of this type requires movement of the group of parts of the group from one seasonally available resource to another, the ease and efficiency with which these resources can be exploited varies directly with the geographic proximity of the resource. . . . Expansive natural communities would require such long distance movements from one resource to another that these movements could not be correlated with the availability peaks of more than a few resources.²⁰

¹⁹Ibid., p. 21.

²⁰Ibid., p. 52.

However, Cleland also states that,

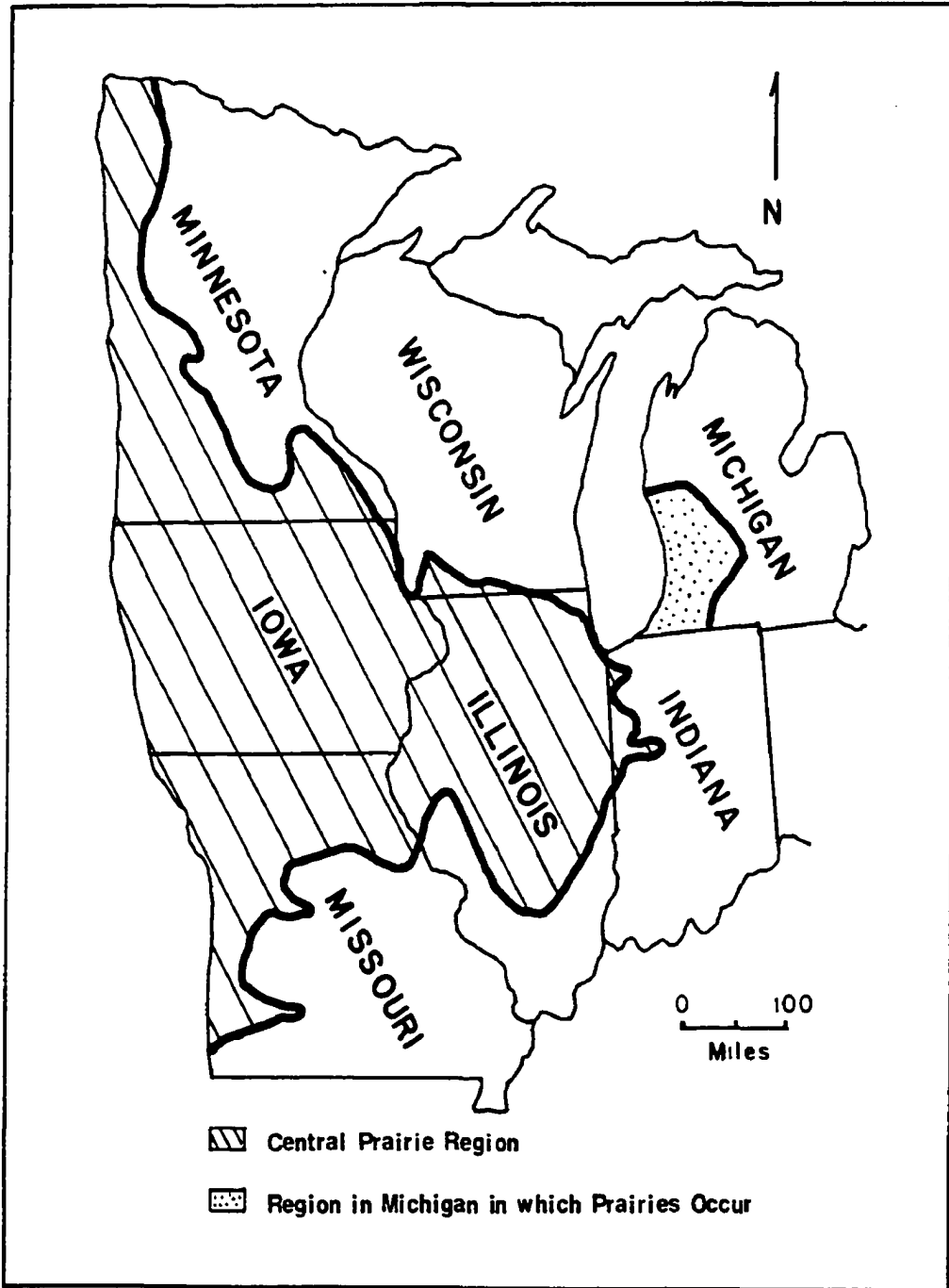
Although the southern Great Lakes area is also a region of ecological diversity (the northern margin of the Prairie Peninsula), diffuse adaptations did not flourish here as they did farther south. This can be attributed, in part, to the fact that there were fewer resources available at this more northern latitude, . . . cultural stability or a combination of both. . . . Since the type of adaption practiced by a given society is culturally determined, ecological diversity does not require, but simply permits, the development of smaller, more highly populated and culturally diverse societies within a given geographic area.²¹

No excavated Middle Archaic sites have been recorded from southwestern Michigan which would indicate the subsistence pattern here. However, as it is situated near the eastern extension of the Prairie Peninsula and lies within the Carolinian biotic province, diffuse economies as described by Cleland certainly would be inferred, after the Carolinian biotic province became established in the area. In addition, it seems that the Prairie Peninsula spread into parts of southern Michigan as is evidenced by the Oak Openings found by early settlers in this area (see Fig. 12). Whether this was a true prairie expansion or, as Brewer suggests, the desiccation of wetlands during the Xerothermic Maximum is of little importance here. The important fact is that large areas of grassland were present

²¹Ibid., pp. 52-53.

LOCATION OF THE PRAIRIES OF MICHIGAN WITH REFERENCE TO THE CENTRAL PRAIRIE REGION OF THE UNITED STATES

Figure 12



in southwestern Michigan which could have provided the resources for diffuse economics. Cleland dates this prairie expansion into southern Michigan at between 5,000 and 3,500 B.C., which corresponds with the establishment of the Carolinian biotic province elsewhere in southern Michigan.²² This study will assume that diffuse economic adaptations did take place during the Middle Archaic Period in the area and, on the basis of the above information, that this gradual change from earlier, predominantly hunting cultures was established by at least 5,000 B.C.

The Late Archaic Cultures (3,000 B.C. to 1,000 B.C.)

Late Archaic Cultures were characterized by warming temperatures, an increasing number of food resources, and a less specialized adaptation by man to these resources.

Temperatures during this period were probably warmer than present temperatures, and perhaps drier. Deciduous forests, especially oak, became dominant, increasing the availability of plant foods. Throughout the Upper Great Lakes man made a series of adaptations to this changing environment.

²²Ibid., p. 21.

Subsistence Economy

In the northernmost areas of the Upper Great Lakes were found the Old Copper cultures. Their economy was largely based on hunting and fishing. At this latitude the environment (Canadian biotic province, see Fig. 3) lacked the diversity of resources necessary to develop diffuse economies.²³

The Glacial Kame Culture of Indiana, Ohio, and south-central Michigan, and the Red Ocher Culture in the Illinois River Valley, eastern Wisconsin, and southwestern Michigan were located within the Carolinian biotic province at this time. In this province a much greater variety of food resources was available. These people continued to develop diffuse economies which had begun in the Middle Archaic Period. Cleland warns of misunderstanding the nature of this diffuse economy.

Archaic people of the Carolinian Province did not become more specialized, but less specialized, not better adapted but more adaptable--they did become more efficient, but only at exploiting most kinds of resources rather than developing more efficient methods to exploit a few food sources. The secret of successful hunting and gathering is the ability to move between available resources in collecting food. Such a diffuse adaptive pattern is possible only in areas where a large number of different kinds of resources are available within the temporal and spatial restriction of the efficient movement of people.²⁴

²³Ibid., pp. 54 & 55.

²⁴Ibid., p. 57.

Very little is known about the subsistence activities of the Late Archaic people of southwestern Michigan. These were dominately of Red Ocher Culture, although some evidence of Glacial Kame has been found. Both the names and what is known about these cultures have come from burial sites, and the full extent of their adaptation to the environment of this time is not known. Cleland projects a picture of a diffuse economy based upon winter deer hunting, spring and summer fishing, and the collection of substantial quantities of wild plant foods including nuts, berries, and probably most important, the seeds of wild plants.²⁵

Cultural Change

With the continued development of these diffuse economies, a great dependence was placed upon the seasonal availability of various food resources, such as projected by Cleland, above. Familiarity with local resources and regularity of movement among these resources may have helped to bring about the development of tribal regions, although they were probably not well defined.²⁶ The Red Ocher and Glacial Kame Cultures probably represent such an

²⁵Ibid., p. 93.

²⁶Ibid.

adaptation. Cleland indicates that,

The extent of such territories were defined by the loci of resources that were exploited on a regular basis by a particular society. Differentials in the distribution of some resources was one of the factors which led to the widespread intergroup and intra-group exchange of the Late Archaic Period.²⁷

The Distribution of Archaic Sites

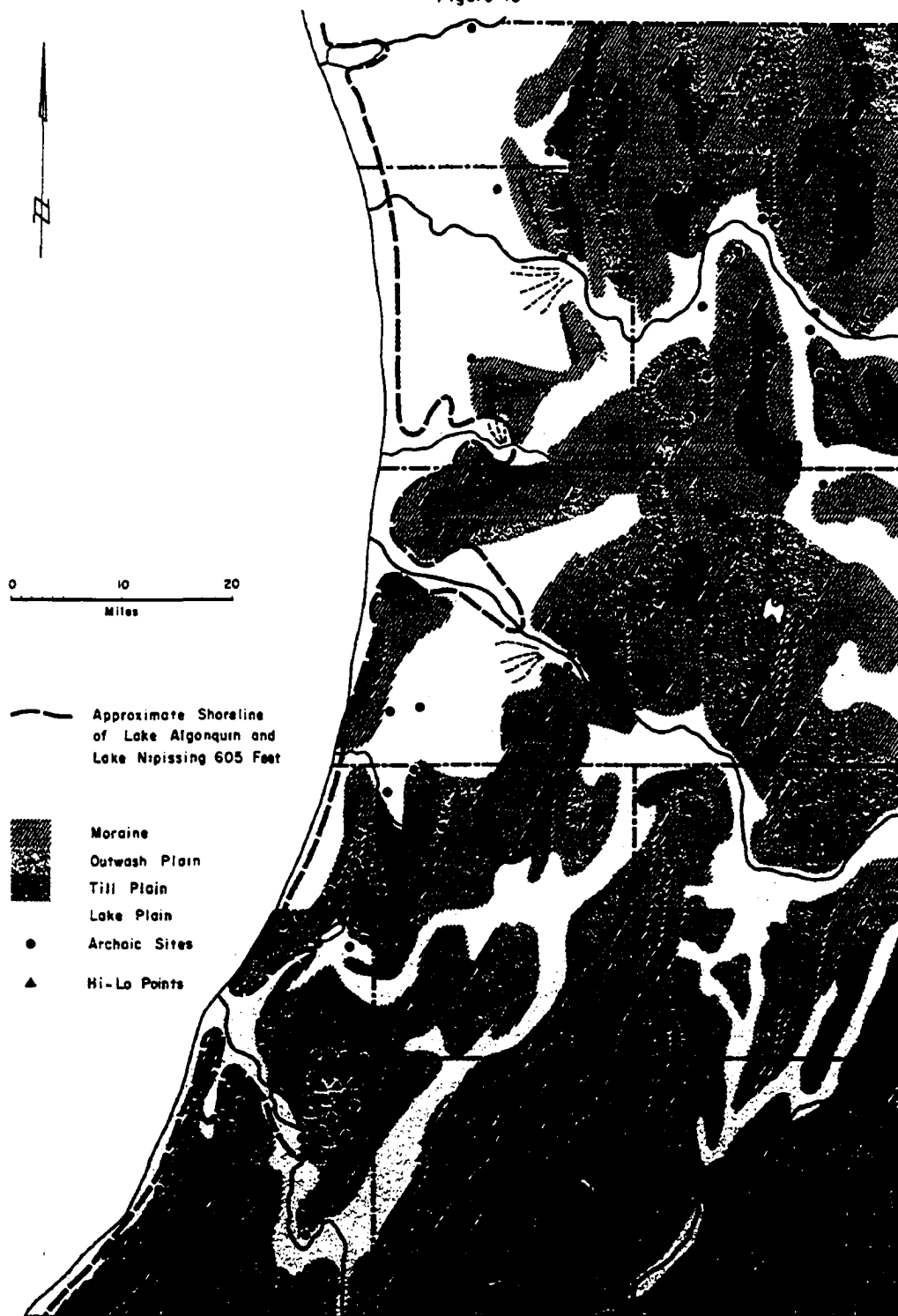
Figure 13 shows the distribution of Archaic Sites in southwestern Michigan. The location of these sites were again obtained from the University of Michigan Site-Card File and an article by Amos Green.²⁸ Although many of these sites were not specifically identified as Archaic, all non-pottery sites not containing fluted points were mapped as belonging to the Archaic. This was done so in keeping with the definition of Archaic Cultures as pre-ceramic, but post-fluted point. It should be pointed out that some of the sites mapped here could be Woodland Sites on which no pottery was found, or recognized as such, in the sometimes scanty data recorded. However, it is believed that the majority of the sites shown on this map are in fact Archaic, and hence a meaningful analysis can be made from their distribution.

²⁷ Ibid.

²⁸ Amos Green, loc. cit., pp. 1-10.

DISTRIBUTION OF ARCHAIC (NON-POTTERY) SITES IN SOUTHWESTERN MICHIGAN

Figure 13



The greatest problem which confronts one in analyzing this distribution is the great time period covered (9,000 B.C. to 1,000 B.C.). In most cases, the site-card data was insufficient to divide this period into Early, Middle, and Late Archaic. Because of this it will be necessary to analyze this map as a whole, drawing on the early discussion of the Archaic in the Upper Great Lakes to interpret this distribution (see Table 6).

Sites in Upland Areas

Certainly, one factor readily noticeable upon examining this map is that the great majority of sites plotted here are still located on upland areas. The lake plains and outwash plains contain few sites, although more are present than in the Paleo-Indian Period. It should be noted that the Valparaiso and Lake-Border Moraines contain most of the sites plotted here. In the eastern portion of the study area, only four mappable sites were found. This does not necessarily mean that these are the only Archaic Sites which exist in this area. Differential investigation and lack of exactness in recording sites doubtless contributed to the distribution as recorded here. Yet, the striking contrast between the distribution of sites east and west of the Valparaiso cannot be ignored. It would seem safe to say that the majority of the

non-pottery sites were west of the Valparaiso Moraine. Perhaps a functional reason can be found for such a distribution.

One factor certainly was that the majority of Paleo-Indian finds can be correlated with the Valparaiso Moraine and this was the last area of southwestern Michigan to be occupied by these people. This area was the center of population as the modifying climate brought about a gradual change from spruce-pine to deciduous forest. Such a distribution should not be surprising if, as already discussed, the Archaic Cultures represent Paleo-Indian Man gradually modifying his life-way to fit this changing environment, and if no new major migration of people into the area occurred.

Distribution of Early Archaic Cultures

As it was in the better drained uplands where this environmental change first took place, it is here we should expect to find the first cultures which adapted to it. This is particularly true of the Early Archaic Cultures. Green notes that only one Hi-lo point (8,000 to 6,000 B.C.) out of thirty studied in Berrien and Van Buren Counties was below 640 feet in elevation.²⁹

²⁹ Ibid., p. 3.

With the moving of gregarious animals such as the barren-ground caribou out of the region, man had to use a greater variety of food resources. The lack of large herds of animals made hunting more difficult. Increased reliance upon plant foods and possibly fishing began.

Distribution of Middle Archaic Cultures

The population of the area during the Middle Archaic was still small as the resources of the pine forest existing for most of this time could not have supported large populations. The complete distribution of Middle Archaic Sites in this area will probably never be known. This is because the majority of these sites probably lie beneath the waters of Lake Michigan. With the opening of the North Bay Outlet, about 7,500 B.C., the waters in the Michigan Basin fell from the 605-foot Algonquin Stage to the 230-foot Chippewa Stage.³⁰ This left a much greater area open to settlement. Since the lake had been important to Paleo-Indian Man, and presumably also to the Early Archaic Cultures, there is no reason to believe that man did not occupy this newly opened area.

³⁰Wayne & Zumberge, loc. cit., Figure 6, p. 76.

Distribution of Late Archaic Cultures

The majority of the sites shown on Figure 13 are probably Late Archaic. With warming temperatures and an increase in plant and animal food resources associated with deciduous forests, the environment of this period was capable of supporting larger populations. Along with this rebounding the water level raised in the Lake Michigan Basin to the 605-foot Nipissing Level (2,000 B.C.).³¹ Most of the sites are found in upland areas, however, a significant number of sites are also found along the 600-foot contour line, which would correspond closely to the 605-foot shoreline of Lake Nipissing. This would support the idea of a seasonal movement of all, or part, of the family group. Summers were spent hunting and fishing along the shore of the lake and in the winter they would move back into the forested uplands for protection. In such a movement man took advantage of all available food resources as he went. A knowledge of when and where these resources were available was indispensable. Yarnell hypothesizes this pattern of Indian plant use in the Upper Great Lakes: "The most important plant foods by season of exploitation appear to be as follows: maple sap in

³¹ Ibid.

early spring, tubers in spring, greens in late spring, berries in summer, nuts in fall, tubers in late fall, and lichens in winter."³² Such a seasonal usage could well be applied to Late Archaic Cultures of southwestern Michigan.

Why such a seasonal migration? Certainly the need to make use of more and varied food resources was one factor. Also, the increasingly warmer temperatures and the decreased moderating effect of the lake during the Early and Middle part of the Archaic Period would have made the forested uplands less desirable places to live during the summer. Humidity is increased in forested areas and insect numbers would have been high. The lake-shore would have been a preferred site for both man and larger animals, such as deer, to live. In the winter, cold temperatures, made more severe by reduced water area, would have made the protected woodlands the more favorable area for settlement. The knowledge of the food resources gained during such a movement lead to the development of diffuse economics and inferred tribal development characteristic of the Late Archaic in the Upper Great Lakes.

It is interesting to note that many of the sites on

³²Yarnell, op. cit., p. 144.

Figure 13 which correspond to the 600-foot contour line are grouped around what would have been embayments in Lake Nipissing. A situation similar to that described at the Feeheley, Hart, and Schmidt Sites from Saginaw County, Michigan, as seen on Figure 9.³³ Although these sites are not in southwestern Michigan, the fact that they are located on the northern edge of the Carolinian biotic province and were also located along embayments in Lake Nipissing should allow some general comparisons to be made with the Nipissing Embayment Sites in the study area.

The Feeheley and Hart Sites are similar in that fish and other aquatic animals compose most of the faunal remains. The Schmidt Site, located in a similar position along a shallow embayment of Lake Nipissing, differs from the other two in that mammals, especially deer, made up 83.1 per cent of the available food resources.³⁴ Cleland states that,

While all three of these Late Archaic Sites were located near the shallow Post-Nipissing Saginaw Embayment and the people of all three sites were exploiting the resources of this embayment, the Schmidt Site is divergent both in the variety of species utilized and the high frequency of bird and

³³Cleland, Prehistoric Animal Ecology. . ., pp. 109-116.

³⁴Ibid., Table 13, p. 115.

mammal remains. It is important to note that Late Archaic people of the Saginaw Valley had developed a subsistence pattern which included both specialized fishing sites and hunting camps. It seems likely that fishing and gathering was a summer activity, while deer hunting and fowling provided food during the winter months. The Schmidt Site is thought to represent a fall and perhaps early winter camp, while the Feeheley and Hart Sites are summer fishing stations.³⁵

Although the subsistence pattern of the Late Archaic people living along the Nipissing and Post-Nipissing Embayments in southwestern Michigan will not be known until these sites are investigated and the plant and animal resources of these people are revealed, it seems reasonable to assume that a subsistence pattern similar to the above sites may be applicable here.

³⁵Ibid., p. 116.

CHAPTER VI

THE WOODLAND CULTURES OF SOUTHWESTERN MICHIGAN (1,000 B.C. to A.D. 1,650)

The Woodland Period was marked by a series of new cultural developments which began about 1,000 B.C. The most significant of these were the introduction of pottery, mound-building, and agriculture.

Griffin describes Early Woodland pottery as a "thick, grit-tempered vessel, coiled and low-fired, with wide-mouth and flat-to-round base, which was paddled on both the outer and inner surfaces with a cord-wrapped paddle."¹ This pottery bears a marked resemblance to Asiatic Styles, which had been introduced into Alaska about 1,000 B.C. However, there is little evidence to support an eastward diffusion of this technique into the Upper Great Lakes Region.² The origin of Great Lakes pottery styles is still uncertain.

Another practice unique to this period was the burying of the dead in earthen mounds. The dead were arranged in a flexed position, often in a circle.

¹Griffin, loc. cit., p. 180.

²Ibid.

Baskets of dirt were then used to gradually build up a conical-shaped mound. It seems that not all people received mound burial, but only those people of high social standing.

Just where mound-building began is uncertain. Quimby thinks that mound-building may have antecedents in the northern forest zone of Eastern Asia or that it might have had an independent development as a transition from Late Archaic practice of burying the dead on raised places such as sand ridges, kames, or gravelly knobs.³ Others have thought mound-building diffused in from the south, from the Vera Cruz area of Mexico. However, Griffin thinks the techniques of mound construction and burial practices are markedly different in these two areas.⁴

Regardless of the uncertain origin of pottery and mound-building techniques, maize agriculture, it seems, spread northward from Mexico, although some independent development of other cultigens may have taken place.⁵ Cultivation in the Upper Great Lakes probably began about

³Quimby, op. cit., p. 64.

⁴Griffin, loc. cit.

⁵Ibid.

500 B.C.⁶

The introduction of agriculture in the diffuse economic pattern of the Late Archaic Period had an important impact on cultures of this time in some parts of Eastern North America. In discussing these changes, the Woodland Period can be divided into three distinct subdivisions: Early, Middle, and Late Woodland. The cultural changes taking place in each will be discussed for the Upper Great Lakes, and then related to southwestern Michigan.

The Early Woodland Cultures (1,000 B.C. to 300 B.C.)

The Early Woodland Period is distinguished by the introduction of pottery and the beginnings of plant cultivation. Temperatures at the time had fallen somewhat from that of the Late Archaic Period. The total environmental complex in southwestern Michigan was not greatly different from that of the present (see Table 7).

Subsistence Economy

This slight decline in temperature did not seem to hinder the development of plant cultivation, especially in southwestern Michigan where the modifying effects of

⁶Ibid.

TABLE 7
WOODLAND--ENVIRONMENTAL CORRELATION

Date	Lake Levels ^a	Cultural Period ^b	Climate ^a	Vegetation ^a	Subsistence Economy ^b
1,000 B.C.	Lake Algoma (595')	Early Woodland	Cool	Oak-Pine Forest	Hunting and fishing supplemented by agriculture
300 B.C.			_____		
0			_____		
200 B.C.	Lake Michigan (580')	Middle Woodland	Cool?	Oak-Pine Forest	Focal agricultural economy based on corn, supplemented by hunting and fishing
800 A.D.		Late Woodland	Warming		
1,650 A.D.					

^aAfter Wayne and Zumberge, "Pleistocene Geology of Indiana and Michigan," Figure 6, p. 76.

^bAfter Cleland, Prehistoric Animal Ecology. . ., pp. 294.

Lake Michigan lengthened the growing season. However, the Upper Great Lakes at this time were on the northern margin of this cultural development. The primary centers of this culture were to be found south of this region, where focal agricultural economies were developing. Although squash seeds, dating from 500 B.C., have been found as far north as Saginaw County, Michigan, most of the available archeological information concerning Early Woodland economic patterns indicate a closer relationship to the diffuse economies of the Late Archaic Cultures than to the focal agricultural patterns of the Middle or Late Woodland.⁷

Cleland discusses two Early Woodland Sites from the Saginaw Valley of Michigan (see Fig. 9). An unnamed site (20SA1) yielded the food remains of mollusc shells, bird, fish, turtle, beaver, and muskrat. Plant food remains included acorns, grape seeds, cherry or blueberry seeds, and two seeds of the squash family Cucurbita. This site has been dated 530 ± 120 B.C. Cleland thinks that the occupation of this site most certainly was during the summer and fall months.⁸

⁷Cleland, The Prehistoric Animal Ecology. . ., p. 60.

⁸Ibid., p. 59.

The Schultz Site (see Fig. 9), nearby, is very different. Mammals were hunted to the exclusion of other species. Fishing was of little importance and only the larger species, such as sturgeon, were taken. From the evidence revealed by these two sites, Cleland draws the conclusion that,

These people were practicing a diffuse economy in the true sense of the word. Shellfish, fish, turtles, small mammals, nuts, berries, and some domestic plants supplied their summer and fall foods. The use of these foods required a variety of methods and techniques in order to prepare it for consumption. Winter was the season for hunting and, unlike the hunting practiced by strongly agricultural people, these hunters did not place high selective pressure on a few species. The total picture of the Early Woodland adaptation of the Saginaw Valley of Michigan is based upon a diffuse adaptation. In this respect, it is very similar to the economic adaptation hypothesized for the Late Archaic Period. In fact, the introduction of the domestic squash and possibly the use of other domestic and wild plant seeds at that time only increased the margin of as-
surance within the diffuse economy. Early Woodland economies are, therefore, seen as an elaboration of those of the Late Archaic Period and thus are more closely related to the diffuse Archaic pattern than to the focal agricultural adaptations of the Late Woodland Period.⁹

Although the preceding discussion has not dealt directly with southwestern Michigan, this area and the Saginaw Valley were probably climatically similar. Climate, of course, must be regarded as one probable reason

⁹Ibid., p. 60.

for the lack of dependence upon agricultural production in the Upper Great Lakes. The presence of animals characteristic of the Canadian biotic province further north, such as fisher and martin, in the Saginaw Valley at this time may indicate that the climate was cooler than at present and, therefore, unfavorable for many agricultural crops, such as corn.¹⁰ Squash, which could mature with a much shorter growing season, was, however, cultivated.¹¹

Cultural Change

Even though Early Woodland subsistence patterns were more closely related to those of Late Archaic Cultures, the beginnings of plant cultivation established the means for the development of focal agricultural economies. This development would not come about until a longer, more reliable, growing season was established. Since the climate of southwestern Michigan is moderated somewhat by Lake Michigan, this development may have come somewhat earlier here than in the Saginaw Valley. As Cleland states,

The adaptation of the Early Woodland Period was extremely important in the development of later agricultural subsistence patterns. It was at this point,

¹⁰Ibid., p. 28.

¹¹Ibid., p. 59.

and in fact even earlier, that the social milieu and technology of agriculture was developed. Although seeds of wild and domesticated plants were not yet of great importance, in the sense that people depended on them, such a dependency was only a matter of a shift in emphasis. The introduction of a more dependable and efficient inventory of domestic plants, notably corn and later beans, provide the reliability necessary to allow the gradual decline in the use of other food resources and the cultural implementation which made the exploitation of these resources possible.¹²

The Middle Woodland Cultures
(300 B.C. to A.D. 400)

Middle Woodland refers to the period between 300 B.C. and A.D. 400 when the Hopewellian Culture was dominant over many areas of the Eastern United States. This culture was characterized by the building of mounds and rectangular earthworks. The most spectacular of these works were produced by the Ohio Hopewell where earthworks often covered from ten to one hundred acres. Later, the Illinois Valley and the adjacent Mississippi Valley became another important center for the Hopewellian Culture.¹³

There were many similarities between the Ohio and Illinois Hopewell. Mound-building, erection of earthworks and, presumably, agriculture, just to name a few.

¹²Ibid.

¹³Griffin, loc. cit., p. 183.

There was also trade and a diffusion of ideas and practices between these groups. Together, they created what Griffin terms and "interaction sphere" and formed the center of the Hopewellian Culture.¹⁴ The spread of this culture took place in all directions from the regional center. The Ohio Hopewell spread their influence into the Allegheny Valley, New York, Ontario, Northern Alabama, Tennessee, Western North Carolina, Georgia, and Florida. On the other hand, the Illinois Hopewell expanded into northwestern Indiana, southern Wisconsin, southeastern Minnesota, and southwestern Michigan.¹⁵

Quimby places the date of entry into southwestern Michigan at about 100 B.C. As the Hopewellians were a riverine people, he traces their route up the Kankakee River Valley and then over to the valley of the St. Joseph River. Proceeding northward, the Kalamazoo and Grand River Valleys were occupied. This was followed by a somewhat later group who settled in the Muskegon Valley and then spread eastward into the Saginaw Valley.¹⁶

Hopewellian settlement in Michigan during this

¹⁴Ibid., p. 184.

¹⁵Ibid., p. 186.

¹⁶Quimby, op. cit., p. 72.

period was limited to the Carolinian biotic province. The northern boundary of this province roughly corresponds with the northernmost spread of Hopewellian settlement. No major Hopewellian settlement has been found north of the present 150-day frost-free line¹⁷ (see Fig. 2). This is the southern boundary of the Humid Continental Warm Summer (Dfb) climatic type.

Subsistence Economy

This climatic limitation must have been a controlling factor on the agriculture carried out by these people. They grew corn, squash, perhaps beans, and probably tobacco.¹⁸ Of these, corn is most affected by climate as it needs a relatively long growing season. In addition, the variety of corn grown was probably much different from that of today, which matures in approximately 100 days. It was a longer-maturing variety of corn called 'Dent corn.' Western lower Michigan lies completely within this 140-day frost-free area. The moderating effect of Lake Michigan prolongs the growing season here as compared to the interior of the state.

¹⁷Ibid., p. 73. . .

¹⁸Ibid.

This agricultural dependence did not characterize the period as a whole. Early in the Middle Woodland Period, Cleland indicates the continuance of a diffuse economy in the Carolinian province similar to the patterns developed in the Late Archaic and Early Woodland Periods. Cleland states that, "The location of early Middle Woodland sites on alluvial bottoms, their relatively large size, and the kinds and quantities of secondary resources being exploited indicated that the use of plant seeds, both wild and domestic, had become the principle subsistence activity."¹⁹

The presence of an abundance of readily available plant foods permitted the development of the technology, necessary for what Cleland terms a new "focal adaptation" based on agriculture. He indicates that, "Presumably the arrival of corn, sometime late in the Middle Woodland Period, provided the catalyst for this new adaptation."²⁰

The Illinois River Valley was one of the centers for this focal agricultural economy. Struever indicates that the main factors in the development of plant manipulation in this area are as follows:

¹⁹ Cleland, Prehistoric Animal Ecology. . ., p. 94.

²⁰ Ibid.

1. Increased security and residential stability.
2. An increasing reliance on natural plant foods.
3. A shift in division of labor which brought women into food production on a large scale for the first time.²¹

Increased dependence upon plant cultivation along with hunting and fishing brought about a larger, more dependable food supply than ever before. Such a subsistence economy as this would have been able to support higher population densities than any previous period. Flanders states that, "Early Hopewellian expansion may have been the result of a search for more living room for an expanding population."²²

Cultural Change

The advance and decline of the Hopewellian Cultures in southwestern Michigan and throughout the Upper Great Lakes seems to have been influenced by the climate of the

²¹Stewart Struever, "The Hopewell Interaction Sphere in Riverine-Western Great Lakes Culture History," Hopewellian Studies, ed. Caldwell & Hall (Springfield: Illinois State Museum Scientific Papers, 1964), XII, No. 3, 98.

²²Richard C. Flanders, "A Comparison of Some Middle Woodland Materials from Michigan and Illinois," Ph.D. dissertation (Ann Arbor: University Microfilms, 1965), p. 371.

time. Several hypotheses have been advanced along these lines. Griffin has said that, "The Hopewellian Cultural height of 200 B.C. to A.D. 200 corresponds neatly to a warm period."²³ This warm climate would have increased the growing season and allowed a greater dependence upon plant foods, obtained either by foraging or by agriculture. Griffin adds that, "The gradual decline and demise of the Hopewell Culture in the Ohio and northern Mississippi Valley appears to correlate well with the cold period from around A.D. 200 to A.D. 700."²⁴ This climatic deterioration supposedly reduced the reliability of agriculture and, therefore, the Hopewellian decline.

Barreis and Bryson, in their study of climate and Mississippian Cultures, suggest that the period from 600-500 B.C. to A.D. 300-400 was not warm, but cool.²⁵ They do indicate that this cool period may not have universal application.

²³James B. Griffin, "Climatic Change: A Contributory Cause of Growth and Decline of Northern Hopewellian Culture," Wisconsin Archaeologist (January, 1960), XLI, No. 1, 28.

²⁴Ibid.

²⁵David Barreis & Reed Bryson, "Climatic Changes and the Dating of Mississippian Cultures," Wisconsin Archaeologist (December, 1965), XLVI, No. 4, 203-220.

Cleland lists several factors which support the latter of these hypotheses.

1. It has not been demonstrated that Hopewellian Culture was reliant on maize agriculture.
2. Most corn that has been reported from Middle Woodland Sites dates from the later part of the period.
3. Struever indicates that Hopewellian communities in Illinois were dependent upon the exploitation of natural plant resources and hunting. This may be partially supported by data from the Schultz Site in Saginaw County.
4. The distribution of the Havanna tradition of the Hopewellian Culture is entirely south of the present northern boundary of the Carolinian biotic province. If the climate of this period was one of warmth, they would have established sites further north. However, if the weather was cooler than it is at present, they would have had the distribution as now known.²⁶

In summary, Cleland states,

The hypothesis favored here is that Hopewellian peoples were not dependent upon food production until almost the second century after Christ, and that the climate, at least in the Upper Great Lakes, was not deteriorating but becoming increasingly warm during the late Middle Woodland Period. . . . In short, the above data is inconsistent with Griffin's theory of decreasing agricultural potential during the late Middle Woodland Period. It appears, instead, that the people of the southern Upper Great Lakes were becoming more strongly agricultural up to and beyond Griffin's A.D. 300 cut-off date for the Hopewellian Warm Phase. If, as Griffin implies, Hopewellian peoples were agriculturists who expanded northward during the Hopewellian Warm Phase and were later thwarted in their effort to produce corn in

²⁶Cleland, Prehistoric Animal Ecology. . . , pp. 28-9.

the face of cooler weather, we would expect to find both a southward retraction and a decrease in the density of Middle Woodland Sites within this period. If, as it has been suggested, the reverse situation is true, then we must follow the suggestion of Barreis and Bryson that the climate of the late Hopewell Period was becoming warmer and therefore more favorable to the production of food.²⁷

Much more evidence is needed from within the study area before any definite conclusion can be drawn. However, on the basis of the evidence presented above, Cleland's hypothesis is the one favored in this study. It could be argued that, in southwestern Michigan, the modifying influence of Lake Michigan negated any effects of a cooling climate on agriculture in the Upper Great Lakes. However, Griffin's argument is based on the supposed dominance of maize agriculture during the Middle Woodland Period and it seems that corn was not a dominant crop until about A.D. 200.²⁸

If climatic deterioration was not the cause of the Hopewellian decline, what else could be held responsible for the downfall of a large, relatively advanced, agricultural society? As was stated before, early Middle Woodland Cultures had a subsistence pattern similar to those of the Late Archaic and Early Woodland Periods and,

²⁷Ibid., pp. 29-30.

²⁸Ibid.

doubtlessly, the territorial pattern which had developed during these periods continued. The holding of large territories brought the Hopewellian peoples into contact with many cultures from whom new ideas could be learned and with whom trade developed. Collectively, these new ideas enabled the Hopewellians to develop a culture dominant over those peoples which bordered them. As agriculture became the primary subsistence activity, many cultural changes took place. Cleland argues that,

Concentration on one subsistence activity (corn) negated the necessity of social control over widely scattered resources and, as a result, intra-group contacts were reduced to a minimum. Neutral or even competitive relationships replaced the once thriving reciprocal trade networks of earlier times. No doubt the so-called 'Hopewellian decline' which was characterized by such features as a cessation in the flow of exotic burial goods and raw material and a breakdown in the communication of stylistic design motifs was the result of newly established focal agricultural economies.²⁹

The Late Woodland and Upper Mississippian Cultures
(A.D. 400 to A.D. 1,650)

If Cleland's explanation of the Hopewellian decline is accepted, then it should be suspected that this period would be one of relative cultural diversity within the Upper Great Lakes. No one group dominated the period as the Hopewellian Culture had during the Middle Woodland.

²⁹ Ibid., p. 95.

Rather, different subsistence economies existed in the various environmental regions.

Subsistence Economy

In the Canadian biotic zone, diffuse adaptations continued as they had in earlier periods. Climatic limitations of under 140 frost-free days prevented focal agricultural development. Maize crops were not dependable enough for the dominant food supply.

The Carolinian-Canadian Edge transition zone found cultures developing which were partially dependent on agriculture, but hunting was the mainstay of the economy. Agriculture was a welcome supplement, but the growing season was not dependable enough for a complete change from a diffuse to a focal agricultural economy.

In the Carolinian biotic province agricultural economies predominated. Here a stable growing season of 140 to 160 days would be expected. This is especially true of south western Michigan where the modifying effects of Lake Michigan extended the growing season. The economic pattern here is largely an intensification of those existing at the end of the Middle Woodland Period.³⁰ Corn was the dominant crop, with the bean being added

³⁰Ibid., p. 97.

later. This focal agricultural economy led the way to higher population levels, and greater residential stability. However, it should be noted that this level of specialization was far below developments taking place in more southerly areas of the Midwest and Southeastern United States.³¹

The hunting of game was reduced in importance in these agricultural economies. Only larger animals, which would supply a large amount of meat in return for the energy expended, were hunted. For the most part, these were deer, elk, and bison. These hunts usually took place in a season which would not interfere with agricultural activities.

The cultures found in southwestern Michigan, at this time, were similar to those existing in the Illinoian biotic province of Wisconsin and around the southern end of Lake Michigan. These cultures were agricultural and tended to settle along lakes or streams. They do not seem to be closely related to the cultures in southeastern Michigan, which were more closely related to those existing in southeastern Ontario at this time.³² One major

³¹Ibid.

³²Ibid., p. 68.

difference is that the cultures of southeastern Ontario settled inland away from navigable water.³³

As the Late Woodland Cultures were in existence at the time of the first European contact, more is known about their way of life than any other period. From north to south in southwestern Michigan we find cultures which become increasingly more dependent on agriculture. In the valleys of the Muskegon and Grand Rivers the Ottawa Indians were found. These people were semi-sedentary. In summer they lived in villages and were agricultural, but in autumn they separated into family groups and went to winter hunting grounds. Dwight Goss, writing of the Ottawa, states that, "In autumn an entire family, and sometimes two or three families together, would leave the villages and wander up the smaller streams into the forests of the interior for their winter's hunt, and they would generally camp in or near a bunch of maple trees in order to make sugar in the spring."³⁴ The area held by the Ottawa was in or very near the southern boundary of the Carolinian-Canadian edge zone. Their

³³Quimby, op. cit., p. 98.

³⁴Dwight Goss, "The Indians of the Grand River Valley," Michigan Pioneer and Historical Collections (Lansing: 1905), XXX, 298.

culture is more closely related to the agricultural-hunting economy of the edge area than to the more focal agricultural economies farther south.

Continuing south, the next group was the Pottawattomi. George Willard places the dividing line between the Pottawattomi and the Ottawa at the Kalamazoo River.³⁵ The Pottawattomi were culturally similar to the Ottawa, but were more sedentary. Cleland, quoting Edward Foote, gives this description of Pottawattomi life--

The oak opening land in the south part of the county (Eaton) seemed better adapted to the Indian . . . mode of living than the dark, and heavily timbered forests north of here. . . . During the sugar-making season, they would move into the heavy timber and camp among the great sugar maples. After this they would come out and remain among the oak openings in the south part of the county, cultivating corn, pumpkins, and gathering berries.³⁶

The Miami probably lived in the extreme southwestern portion of the study area and in adjacent Indiana and Illinois. The area was open forest interspersed with a few areas of open grassland. These were called barrens or oak openings by the early settlers. The Miami were even more intensely agricultural than the Pottawattomi.

³⁵George Willard, "The Maturing of Michigan," Michigan Pioneer and Historical Collections (Lansing: 1890), XVII, 298.

³⁶Cleland, Prehistoric Animal Ecology . . ., p. 75.

They lived in large, permanent villages in which at least some of the people lived all year. Hunting was selective and usually took place in the fall when large, communal bison hunts were undertaken by some of the Miami. Elk, deer, bear, and beaver were also hunted. Corn was the main crop. It was stored in underground pits which were lined with bark.³⁷ As this preserved the corn well, enough could be grown and stored to provide a dependable food supply throughout the winter.

Generally grouped, the Ottawa and Pottawattomi probable belong to what Quimby has termed the Peninsular Woodland Culture, but were more dependent on agriculture than more northern members of this group.³⁸ The Miami were probably part of Quimby's Fisher Culture. This culture had developed in the Illinois River Valley about A.D. 1,000 and spread into southwestern Michigan about A.D. 1,300.³⁹

Also about A.D. 1,000, people stemming from the Mississippian cultural tradition moved into southern Wisconsin. Here they stimulated the development of

³⁷ Ibid., p. 75.

³⁸ Quimby, op. cit., p. 88.

³⁹ Ibid., p. 99.

several Mississippian variants called "Upper Mississippian." These cultures spread through northern Illinois, northern Indiana, and extreme southwestern Michigan.⁴⁰ This Upper Mississippian Culture is represented in southwestern Michigan by the Moccasin Bluff Site, T 7 S, R 18 W, Section 22, Buchanan Township, Berrien County (see Figure 14). Cleland describes the site as "strongly Upper Mississippian on a basic Woodland pattern."⁴¹ The people living here were intensely agricultural with some selective hunting, mainly for deer. These occupations have been attributed to either the Pottawattomi or Miami by Quimby since both were in the area at contact times.⁴² Perhaps the material from the latest occupations of Moccasin Bluff can be most closely equated with the late Fisher Focus material from northeastern Illinois.⁴³

⁴⁰ Cleland, Prehistoric Animal Ecology. . ., p. 69.

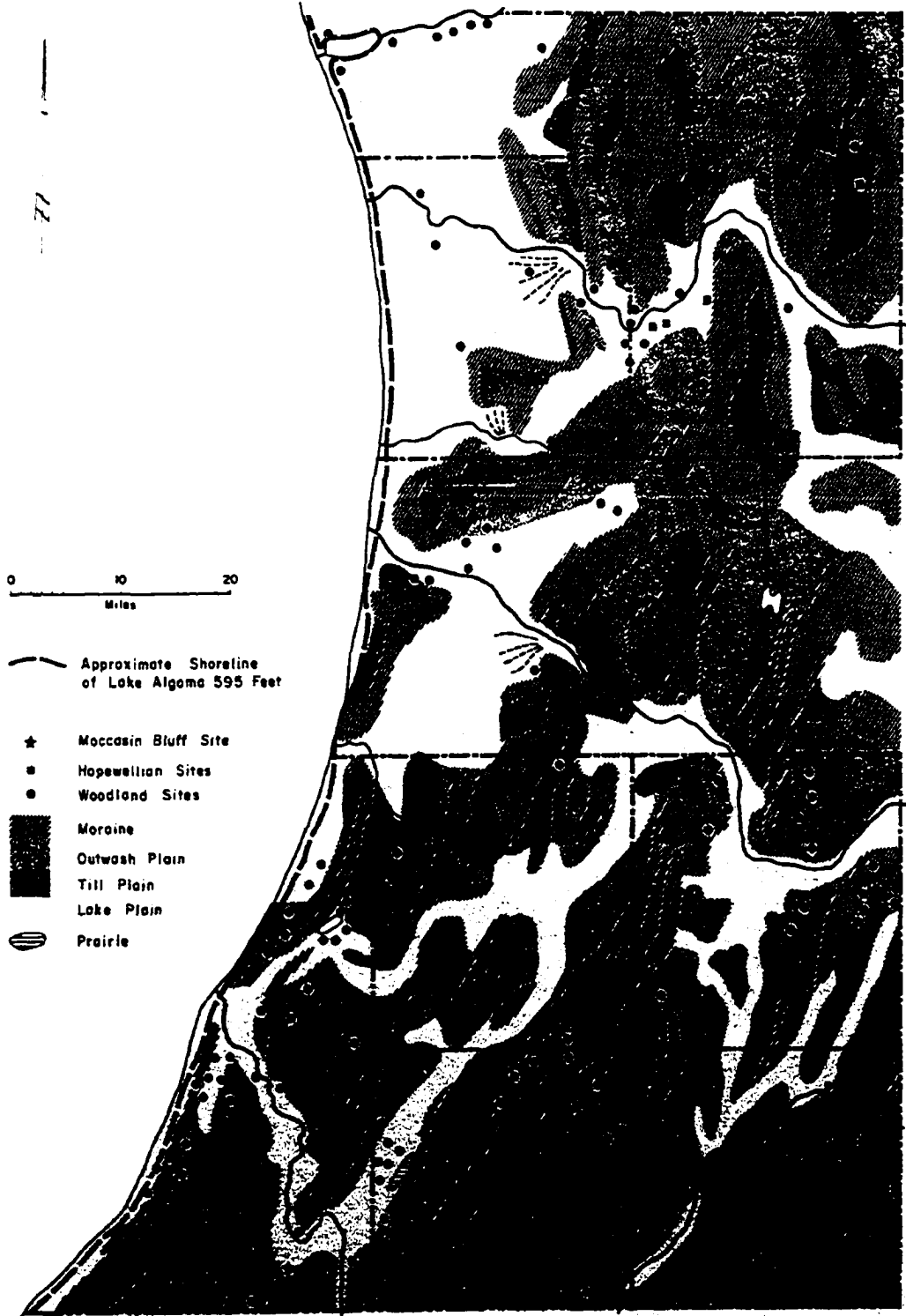
⁴¹ Cleland, Prehistoric Animal Ecology. . ., p. 211.

⁴² George I. Quimby, "The Archaeology of the Upper Great Lakes Area," in Archaeology of the Eastern United States, ed. J. B. Griffin (Chicago: University of Chicago Press, 1952), p. 70.

⁴³ Ibid., p. 97.

DISTRIBUTION OF WOODLAND (POTTERY) SITES IN SOUTHWESTERN MICHIGAN

Figure 14



Cultural Change

As can be seen in the preceding discussion, Late Woodland Cultures in southwestern Michigan were developing a specialized economy based on agriculture. This type of economy was not new, but rather an intensification of those existing in late Middle Woodland times.⁴⁴ With this intensification, each group became more dependent on the local environment. Larger, more stable residential units began to develop throughout the Carolinian biotic province.⁴⁵ With the reduction of mobility and intra-group contacts, we find the tribal pattern developing which was discovered by the first Europeans to enter the area.

The Distribution of Woodland Sites

Since pottery and mound-building were cultural innovations of the Woodland Period, all sites which had either or both of these characteristics and could be located within a quarter section were mapped.

The distribution revealed by this map shows a broader dispersal of sites than any of the previous

⁴⁴ Ibid.

⁴⁵ Ibid.

periods (see Fig. 14). More sites can be noted on lake plain deposits and sites are recorded on outwash plains for the first time. This probably reflects a changing land use with an increasing dependence upon agriculture by these people and a corresponding increase in population.

Sites on Upland Areas

As in previous periods, a concentration of sites can be noted on morainic areas. These were probably fall, winter, and early spring habitations. As these upland areas were covered by deciduous forests, they provided many usable food resources. In the fall, nuts from such trees as the oak, beech, and hickory provided a storable food supply. In winter, the trees helped to brake the force of the wind and modify the forest environment. Also game, particularly deer, and firewood were readily available.

Sites on Flood Plains

However, in the late spring and summer, the people of this period migrated from the forested uplands to the lakeshore and into the larger alluvial valleys for gathering and some plant cultivation along with hunting and fishing. Writing of the Hopewellian Cultures, Struever

states that:

Localities manifesting Hopewellian forms can be correlated with a series of ecological zones ranging in increasing specificity from the entire region lying south of the 140-day frost-line to the flood plains of the major river valleys to (in the case of habitation sites) the immediate environs of shallow back-waters and stream banks in and immediately proximal to the alluvium.⁴⁶

Figure 14 shows a much heavier concentration of sites in these areas than ever before. Some settlement in flood plain areas had been indicated for Late Archaic Cultures. These people used this environment for gathering plant foods. The types of plant foods gathered here are difficult to name, as plant remains are not usually preserved in archeological sites. Struever indicates that Marsh Elder Iva and Lamb's Quarter Chenopodium were recovered in human feces in the Newt Kash Hollow Rockshelter in Kentucky (640 B.C.).⁴⁷ This site is believed to be of Early Woodland age.⁴⁸ Struever states that:

These species colonize natural scars in the vegetation cover. Their niche is a habitat disrupted either by man or by natural agencies Such disturbed places were created by annual spring floods which, by cutting and filling, constantly

⁴⁶ Struever, loc. cit., p. 99.

⁴⁷ Ibid., p. 100.

⁴⁸ H. R. Crane, "University of Michigan Radiocarbon Dates I," Science, CXXIV, No. 3224 (1956), 665.

opened new areas. The most extensive of such scars would be the flats of shallow backwaters covering large section of flood plain. It is difficult to imagine another situation in which a disturbed habitat is created with a regularity and geographic context comparable to that of broad alluvial bottomlands. It is here one might expect the early manipulation of commensal plants to have played an important role prehistorically in the development of higher levels of economic productivity.⁴⁹

Gathering of plant foods such as Marsh Elder and Lamb's Quarter from the flood plain, and nuts and other plant food resources from the upland areas, played an increasingly important role in the subsistence economy of Late Archaic and Early Woodland peoples. Perhaps at some indefinite point in time a group of people returned from wintering in the highlands to a previously occupied summer campsite and found plants they had gathered the year before growing in the campsite. After a number of years of observing associations such as this, the idea of deliberate plant cultivation may have come about, or perhaps it was a diffusion of ideas into the area from areas where agriculture was already established. In any case, with the beginning of plant cultivation during the Woodland Period, the food supply became more dependable and could support a greater number of people. This explains the increase in the density of sites along flood plains.

⁴⁹Struever, loc. cit., pp. 102-3.

Sites Along Water

Water was also of great importance to Woodland Peoples. Most of the sites on Figure 14 are located near some water source. Besides the agricultural use of the flood plain of the river, fishing was an important secondary form of subsistence as was hunting, particularly for deer. The rivers became important transportation routes and, of course, the larger agricultural villages would need plentiful supplies of fresh water.

Sites on Outwash Plains

The concentration of sites on the outwash plain east of the Kalamazoo Moraine is probably also related to agriculture, particularly to the agricultural use of the scattered areas of open grasslands known variously as barrens, oak openings, or prairies. These were limited in their distribution to areas of glacial outwash or coarse valley filling in old glacial drainage ways.⁵⁰ As these deposits were covered by grasslands, the soils developed were generally of a much higher fertility than those of surrounding areas. Early settlers in southwestern

⁵⁰J. O. Veatch, "The Dry Prairies of Michigan," Papers of the Michigan Academy of Science, Arts and Letters, VII (1927), 271.

Michigan discovered that the rich soils of the prairies were excellent farm land.

Chapter III speculated on the origins of these grasslands. Their origin is far from clear, but they seem to have spread in from the West and probably were, at some time in the past, much more extensive than the distribution known at the time of first settlement.

Edward Foote, as quoted above (page 126), places the Indians in these areas during historic times and describes something of their agricultural use of the land. The animal life of these prairies, such as buffalo, would have been characteristic of the Illinoian biotic province. The close proximity of animal life of both the Carolinian and Illinoian biotic provinces would have made the area a valuable hunting ground as well as a good agricultural area.

Figure 14 shows the distribution of dry prairies in Michigan, as recorded by Veatch, in relationship to the distribution of Woodland Sites. There are a number of very close associations, particularly in Kalamazoo County. The rest of the sites east of the Kalamazoo Moraine do not seem directly associated with these grasslands. However, these grasslands should not be confused with the terms, barrens or oak openings. The dry prairies were treeless except for some burr oaks. Other areas of

outwash were occupied by oaks interspersed with grasslands. Writing of the Upper Great Lakes, Yarnell indicates that, "Prairie plant species cannot compete with forest species in this region under natural conditions."⁵¹ However, if climatic conditions were drier at some time in the past, these prairies may have been more extensive and included those sites not directly in association with grasslands on Figure 14. Some support for this contention can be found in Cleland's statement that a prairie expansion took place between A.D. 1,300 and A.D. 1,450.⁵² This would have been during the latter part of the Late Woodland Period. In either case, Woodland Peoples probably drew from the resources of both biotic provinces.

It has also been suggested that the Indians created these prairies, or helped to prevent reforestation of them by using fire. According to Greenman, the name Pottawattomi literally means "people of the place of the fire." Prairie Ronde, a small grassland in Kalamazoo County, was called by the Indians "round fire plain."⁵³

⁵¹Yarnell, op. cit., p. 97.

⁵²Cleland, Prehistoric Animal Ecology. . ., p. 34.

⁵³Emerson F. Greenman, The Indians of Michigan (John M. Munson Michigan History Fund Publication, Pamphlet No. 5; Lansing: Michigan Historical Commission, 1961) pp. 14-17.

Greenman indicates that the so-called garden beds of Michigan were often found in association with these prairies.⁵⁴ These were originally believed to have been used for agriculture, but Greenman believes differently. He describes them as follows:

The garden beds consisted of parallel ridges of earth up to two feet high, and three or four feet apart, in patches of as much as five acres. The ridges were almost always in small sections at a high angle to one another. They may have been built for killing buffalo by driving the herd across them. The effect would be for those animals in front to fall or be trampled by those coming on behind, and, in any case, the speed of the running animals would be slowed down to they could easily be shot with arrows by hunters hidden in the grass.⁵⁵

Although it would seem doubtful that the Indians created these grasslands by the use of fire, repeated burnings to drive buffalo into traps might have prevented reforestation in certain areas. If this was so, the sites on outwash not corresponding to prairies, as indicated on Figure 14, may have been located on grasslands kept open by repeated burnings during prehistoric times and rapidly colonized by deciduous forest during historic times.

Driving of buffalo into traps may not be the only reason for burning. Bromley reports that Indians of southern New England deliberately altered their habitat

⁵⁴ Ibid.

⁵⁵ Ibid.

by use of fire. This burning favored nut trees over other timber and perpetuated blueberry heaths which furnished food for large numbers of game animals as well as for the Indians.⁵⁶ Perhaps similar factors, such as preserving habitat for buffalo, motivated the peoples of the outwash plains of southwestern Michigan.

The above discussion has primarily dealt with the agricultural portion of the Woodland period. However, only the middle and latter portion of this period were agricultural. Since no maps were able to be constructed for the distribution of sites during the subdivisions of the Woodland Period, great difficulty is encountered in making a more detailed analysis. However, some general statements can be made.

Distribution of Early Woodland Sites

Since the peoples of this period were economically more closely related to Late Archaic Cultures than later Woodland groups, we can expect their settlement pattern would have been similar to the Late Archaic as well. Diffuse economies were still being practiced, so it would be expected that these people would move over a wide territory seeking new food resources as they became seasonably

⁵⁶Yarnell, op. cit., p. 90.

available. Winter sites would be located in forested uplands which offer protection from the weather and good hunting. Summer sites would be located close to the lake then existing in the Lake Michigan Basin (Lake Algoma, 595'), as fishing and gathering made up a large part of the summer subsistence.

Distribution of Middle Woodland Sites

The location of early Middle Woodland Sites probably were little different from Late Archaic and Early Woodland Sites, as the subsistence pattern had not greatly changed. However, with the arrival of the Hopewellian Cultures and maize agriculture sometime after A.D. 200 the number of sites along flood plains of major rivers would have increased significantly. Flanders indicates that the site location ordinarily comes from the second terrace above the flood plain and that each site is located in an area that contains at least one soil type that is poorly drained.⁵⁷ Some Hopewellian Sites, such as those in St. Joseph County, are located in old glacial drainage channels on muck soil surrounded by sandy loam.⁵⁸

⁵⁷Flanders, op. cit., p. 365.

⁵⁸Ibid., p. 366.

As to their agricultural suitability, Flanders found that muck soils produce as much corn as sandy loams in the vicinity of these sites. The major drawback is reported to be a tendency for muck soil crops to sustain more frost damage than crops grown on loams.⁵⁹

This it seems that Hopewell expansion into the study area was associated with the exploitation of marsh or mud-flat environments. Flanders states that:

This is certainly a flood plain situation and not one depending upon an extension of the Prairie Peninsula (Brown, 1964, p. 120) although it is clear that the upland areas were also exploited in each case, whatever their constitution It is the nature of the flood plain that is important here, not the resources of the upland areas. Although there is quite a bit of 'river gathering' in most of these situations, it has been stated that the labor and population size evidence by burial activities is difficult to explain on any other basis than a subsistence agriculture.⁶⁰

Some of the Woodland Sites on Figure 14 probably represent Hopewellian camp sites. Quimby notes that these sites were "always located in sheltered hollows among sand dunes, usually in areas of land between Lake Michigan and an inland lake or river estuary."⁶¹

⁵⁹ Ibid.

⁶⁰ Ibid., p. 367.

⁶¹ Quimby, Indian Life in the Upper Great Lakes, p. 75.

During the summer, some Hopewellian Groups or part of the group occupied these camps for hunting and fishing.

Distribution of Late Woodland Sites

With temperature becoming increasingly warmer, agriculture became more and more reliable. In the southern portion of the study area, this dependence upon agriculture may have produced a greater stability of settlement than ever before and probably a higher population density. Settlement spread out along the river valleys. Some groups still wintered in the upland areas.

To the north, in the portion of the study area in the Carolinian-Canadian edge, agriculture was less reliable and agricultural-hunting economies developed. These people were more mobile than those to the south. Summer sites would still be found in the river valleys, but the winter camp sites were in the forested uplands, as in earlier periods.

To the east, many of the sites found on or near outwash plains were probably from this period. There is no direct evidence for this conclusion, however, the Pottawattomi were in the area in the later part of the period and they used the area for agriculture. In light of the best available data, Early and Middle Woodland agricultural practices were almost exclusively confined to flood

plains of rivers or low lying areas along lakeshores, not
on outwash plains.

CHAPTER VII

CONCLUSION

The major factor in the prehistoric geography of southwestern Michigan is change; a change which took place with great rapidity. Within approximately 15,000 years, the environment changed from subarctic to present conditions. Many animal species once found in the area are now extinct; others are presently found far to the north. The vegetation also has changed. Tundra-like vegetation and coniferous forests, similar to those that presently exist hundreds of miles to the north, once cominated the area.

Only the advance of the continental ice sheets could have brought temperature conditions into the area necessary for these environmental changes. The lack of east-west terrain barriers enabled entire biotic provinces to gradually shift latitudinal position before the advance of the ice. With its retreat, these biotic provinces shifted back to their present positions.

Man living within southwestern Michigan during the last 13,000 years, or perhaps earlier, underwent a series of distinct adaptations to this changing environment. These adaptations can be summarized according to the

following time periods (see Table 8).

The Paleo-Indian Period (12,000 B.C. to 9,000 B.C.)

The climate of this period was severe, with conditions similar to those existing in subarctic areas today. A distinct difference was that perma-frost was apparently absent except near the edge of the ice sheet. Low growing, tundra-like vegetation existed only near the ice margins and in the upland areas just to the south. These were not the true tundra, but rather grasslands interspaced with woodlands. These areas were the preferred habitat for large Pleistocene mammals, such as mammoth, mastodon, and barren-ground caribou, which were adapted to a subarctic environment and followed the movements of the ice sheet. The moraines left after each successive retreat of the Michigan Ice Lobe provided these animals with a well drained, upland route for north-south movement. Lowland areas were not used as they were poorly drained and contained dense spruce-fir forests.

In the preceeding discussion on Paleo-Indian Cultures, it was felt that, after Griffin, Paleo-Indian Man was already adapted to a subarctic environment when he crossed into North America over the Bering Straits. On the basis of the slight evidence available, he probably was a hunter following herds of gregarious animals such

TABLE 8
 CULTURAL CHANGE IN SOUTHWESTERN MICHIGAN
 CORRELATED WITH ENVIRONMENTAL CHANGE
 15,000 B.C. to A.D. 1650

Date	Culture	Climate	Vegetation	Economically Important Animal Life	Cultural Adaptation to Environment
15,000 B.C.	No Direct Evidence		Spruce-fir forest with non-aboreal species in highlands and along the ice edge		
12,000 B.C.	Paleo-Indian Cultures	Severe Glacial Climate		Barren-Ground Caribou	Fluted points for hunting large game animals in the open woodlands along moraines and near the ice edge
9,000 B.C.	Early Archaic Cultures	Cool to cold and moist	Spruce-fir, pine forest with a small deciduous element	Moose, Woodland Caribou, smaller species of the boreal forest	Fluted points disappear, tools become better adapted to forest environments
7,000 B.C.		Moderating Climate	Spruce-fir, with a growing deciduous element		

TABLE 8: CULTURAL CHANGE IN SOUTHWESTERN MICHIGAN CORRELATED WITH ENVIRONMENTAL CHANGE 15,000 B.C. to A.D. 1650 (Continued)

Date	Culture	Climate	Vegetation	Economically Important Animal Life	Cultural Adaptation to Environment
	Middle Archaic	Continued warming	Pine forest	Deer and elk	Development of new tools, especially ground stone tools for making better use of plant and animal resources of the forest
3,000 B.C.	_____	Warmest and driest since the retreat of ice sheet	Oak-pine forest		
	Late Archaic		Expanding oak-hemlock, broadleaf forest	Deer and fish	Diffuse economic adaptations to plant and animal resources of deciduous forests
1,000 B.C.	_____	Climatic cooling			
	Early Woodland			Deer, fish, shellfish, small mammals	Diffuse economic adaptations with some agriculture
300 B.C.	_____	Period of warming			

TABLE 8: CULTURAL CHANGE IN SOUTHWESTERN MICHIGAN CORRELATED WITH ENVIRONMENTAL CHANGE 15,000 B.C. to A.D. 1650 (Continued)

Date	Culture	Climate	Vegetation	Economically Important Animal Life	Cultural Adaptation to Environment
A.D. 400	Middle Woodland	Continued warming cooling	Oak-pine	Deer most important, also elk, and turkey	Introduction of corn
A.D. 800	Late Woodland	warming cooling		Deer most important, also elk, and turkey	Focal agricultural economies with some hunting and gathering
A.D. 1,200					
A.D. 1,650		warming	Oak-hickory climax forest		

After Cleland, The Prehistoric Animal Ecology . . ., pp. 294.

as the barren-ground caribou. Plant foods and smaller game certainly proved important secondary forms of subsistence. From here, he could have moved eastward as well as southward along the edge of the ice. Before the ice retreated from the southern border of Michigan, Paleo-Indian Man was probably in the Ohio Valley and perhaps had reached the east coast. As the ice sheet withdrew northward, Paleo-Indian Man migrated into the study area along the same morainic uplands used by the Caribou.

The Archaic Period (9,000 B.C. to 1,000 B.C.)

The environment of this time was rapidly changing. With the retreat of the Valdres ice sheet, average temperatures rose. During the first 5,000 years or so, the vegetation was mostly coniferous with spruce-fir forests gradually grading to pine. Later, about 4,000 B.C., deciduous species, largely oak, increased rapidly. By 2,000 B.C. the climate had become the warmest and driest since the retreat of the ice sheet. Average temperatures rose above present norms and with this rise oak became the dominant vegetative type.

As with the vegetative types, great changes took place in the animal species. The barren-ground caribou moved north following the retreating ice sheet. The

mammoth was apparently not able to adapt to the changing environment and became extinct early in the period. The mastodon was present until about the middle of the period, but it too eventually died out. These animals were replaced, at first, by mammals similar to those presently existing in the boreal forest of Canada. Woodland caribou, moose, black bear, among others, were represented. Later, as deciduous forest species increased, so did mammals associated with this forest, including deer, elk, and turkey.

The subsistence methods so effectively used in the Paleo-Indian Period underwent a distinct change. With the passing of the great herds of barren-ground caribou, the reliability of hunting was reduced. Subsistence techniques had to be developed which would fill in this gap in the economy of these cultures. Fluted points were replaced by non-fluted ones which were notched and stemmed. These points were better adapted to hunting forest animals. Fishing and gathering also increased in importance. These were the beginning of diffuse cultures. A wide variety of food resources gradually came into use, and numerous techniques were developed for obtaining them. Such developments were gradual ones covering about 8,000 years. Within this time period, several distinct subperiods can be recognized.

Early Archaic Period (9,000 B.C. to 7,000 B.C.)

The Early Archaic Period reflects an initial adaptation to the changing environment along with the retreat of the ice sheet. The focal hunting economies of the Paleo-Indian Cultures were replaced by a more diffuse culture based on a variety of resources existing within the boreal forest which dominated at this time. This change is reflected in the technology of these people. The fluted point was replaced by points better adapted to killing smaller game. Gathering became increasingly more important and possibly some fishing took place.

In their settlement pattern, these people were similar to the Paleo-Indian Cultures, preferring the morainic uplands to the more poorly drained lowland areas. As with the previous period, population density was small as the resources of the boreal forest of this time could not have supported large populations. Most of this population seems to have been concentrated in the southeastern portion of the study area along the west of the Valparaiso Morainic System. Again, this is a situation not unlike that of the later portion of the Paleo-Indian Period. From this evidence, and the limited knowledge of Early Archaic traits, this culture is viewed as a gradual transition from the focal hunting economies of the Paleo-Indian

Cultures to the true diffuse cultures that developed later in the Archaic Period. It is thought that no major migration of new cultures came into the area during this time.

Middle Archaic Period (7,000 B.C. to 3,000 B.C.)

The cultures of the Middle Archaic Period are recognized by the development of new tools for the utilization of the plant and animal resources of the forest. These cultures seem to have been the first to have developed balanced utilization of both of these resources. With the continued moderation of climate into this period, the Carolinian biotic province reached its present position about the middle of the period. In addition, the Illinoian biotic province spread into Michigan at about the same time, or slightly later. The presence of two different biotic environments in very close proximity provided these people with a wide variety of food resources. Such a setting contributed to the development of diffuse economic adaptations. The hunting of medium-sized game animals, such as deer and elk, supplied a large percentage of the meat foods, but smaller animals seem to have been a secondary resource. Plant foods assumed a greater importance, especially with the increase in number of deciduous species.

The actual distribution of Middle Archaic Sites in southwestern Michigan probably cannot be determined with any accuracy. For several thousand years after the start of this period, the water level in the Michigan Basin fell as the retreating ice sheet uncovered successively lower outlets; this ended in the 230-foot Chippewa Stage. At this level, a much greater area was left open to settlement than at present. Since the lake had been important to Paleo-Indian Man, and presumably also to Early Archaic Cultures, there is little reason to feel that man did not occupy this area as well.

Late Archaic Period (3,000 B.C. to 1,000 B.C.)

The cultures of the Late Archaic Period were less specialized than any of their predecessors in that an increasing variety of food resources, both plant and animal, were used and more sophisticated techniques were developed to obtain them. A regular pattern of movement took place, geared to the seasonal availability of various food resources of the forest. This distribution of Late Archaic Sites largely reveals this seasonal migration. Two main concentrations of sites can be noticed; one in the higher morainic and till plain areas which would have supported large stands of deciduous forest, and the other along the 605-foot Lake Nipissing Level in the Michigan Basin.

Spring found these people in the upland forests where they hunted and collected maple sap. Before the forest canopy developed, tubers and greens could have been collected. In the summer, as the full-leaf canopy hindered growth on the forest floor and increased the heat and humidity of the forest itself, a migration was made to the shores of Lake Nipissing. Their camps were often made around inlets where streams entered the lake. Here berries and other wild plant foods could be found to supplement fishing. In the fall, cooling temperatures, and nuts from deciduous forest species such as oak and beech, provided an incentive to return to the forested uplands. In the winter, the forest provided protection from the elements but little food. Only tubers in late fall and lichens in winter could have been used. Then, hunting, particularly of deer, provided most of the winter subsistence.

This pattern of seasonal migration helped establish tribal regions, defined, in general, by the distance a group could move and still make use of the most possible food resources. Two distinct cultural groups have been recognized in the study area at this time; the Glacial Kame in the extreme eastern portion of the region and, west of this group, the Red Ocher Culture. Although these cultures are known almost entirely from burials,

evidence from other Late Archaic Sites having a similar environment indicates that these cultures probably had a diffuse economic adaptation.

The Woodland Period (1,000 B.C. to A.D. 1,650)

Climatically, the Woodland Period was influenced by a decline in temperatures from the Xerothermic Maximum, about 2,000 B.C. to present norms. It was not a continuous decline, but rather an initial drop followed by a gradual rise to present temperatures. Deciduous vegetation continued to dominate the region and the present oak-hickory climax forest was established.

Culturally, this period was marked by the introduction of several innovations, notably mound-building, pottery-making, and agriculture. These techniques came into the area either by cultural diffusion or by the immigration of new cultural groups.

The reliance upon agriculture differentiated the economy of these cultures from those of the Paleo-Indian or Archaic Periods. These focal agricultural adaptations did not come about suddenly with the end of the Late Archaic Period, but as a gradual process. Each of the major subdivisions of this culture represents a stage in this transition.

Early Woodland Period (1,000 B.C. to 300 B.C.)

Except for the introduction of pottery and the beginnings of agriculture, these cultures were very similar to those of the Late Archaic Period. The type of economy practiced was essentially diffuse. Any plant cultivation was only supplemental to hunting and gathering. The cooler climate of this time made agriculture too unreliable to be a dependable mainstay of the economy. However, this period was very important in developing focal agricultural economies, as it was during this time that the techniques of agriculture were developed. Even though agricultural products did not have a great dependence placed upon them during this period, this development only awaited a moderation in climate and the introduction of new, more dependable crops, such as corn.

Just as the economic pattern was similar to those in the Late Archaic, so can it be assumed that the settlement pattern for this period would be similar as well. Seasonal migrations still took place. Fall, winter, and spring still found the inhabitants in the forested uplands, but in summer they migrated into the flood plains along major rivers and to sheltered areas around Lake Algoma. It would have been in these areas that plant cultivation first developed in the region, probably after

wild seeds, which had been gathered for food, were dropped and later the plants were found growing in the camp area. Eventually this association would have been noticed and a limited inventory of domesticated plants begin to be developed.

Middle Woodland Cultures (300 B.C. to A.D. 400)

This time period found the Hopewellian Cultural Group dominant in southwestern Michigan. It was related to the more highly developed Hopewellian Cultures in Illinois. From here they had migrated into the study area passing northward from river valley to river valley until they reached the Muskegon River. This was the approximate northern limit of the group. In addition to the pottery and agriculture of the Early Woodland Period, the Hopewellians brought mound-building and the erection of rectangular earthworks. Trade and the exchange of ideas with other Hopewellian areas helped to make these people the most advanced of the prehistoric cultures of southwestern Michigan.

These people may have been the first in the region to have a focal agricultural economy. Warming temperatures during Middle Woodland times enabled crops to be grown further north than ever before. This focal economic adaptation based on agriculture did not dominate the

whole of the period. Early Middle Woodland Cultures were probably similar to Early Woodland Cultures. However, the introduction of corn, presumably in the latter portion of the Middle Woodland Period, provided a crop which was sufficiently dependable to permit the economy gradually to shift from hunting and gathering, supplemented by agriculture, to agriculture, supplemented by hunting and gathering. This agricultural emphasis probably accounts for the presence of so many Middle Woodland Sites being located along or near the flood plains of streams or rivers.

Late Woodland Cultures (A.D. 400 to A.D. 1,650)

Cultural diversity characterized the Late Woodland Period in southwestern Michigan. No one group dominated the period as the Hopewellian Culture had. While archeological evidence indicates that the Hopewellians at one time had a trading network which included goods from the Rocky Mountains and the Gulf-Atlantic Region of the southeast, this trading network gradually broke down. The use of exotic burial goods and the transfer of certain pottery styles occurred less frequently. While the causes for this decline remain in doubt, it is felt that the Hopewellian decline and the development of Late Woodland Cultures were closely related to the initiation of focal

agricultural economies. As agriculture increased the reliability of food resources, mobility of the group was reduced. Contacts with surrounding groups decreased.

Thus, Late Woodland Cultures became more or less isolated in a given area, usually bounded by river valleys. In the area from the Muskegon to the Kalamazoo River were the Ottawa. They were not the focal agriculturalists, but rather had an agricultural-hunting economy. This was largely due to the fact that the cooler climate of this more northern area made agriculture, while still possible, unreliable. In summer, some crops were grown along the river bottoms. However, in fall and winter, the Ottawa would migrate into the forested uplands for hunting.

South of the Kalamazoo River, the Pottawattomi were found. These people were semi-sedentary and strongly agricultural. In summer, they planted crops along the river bottoms but in winter and spring migrated into the upland forest for hunting and sugar making. It would also seem that many of their sites were located on outwash east of the Kalamazoo Moraine. These sites were often found in association with 'oak openings' which these people found favorable to agriculture.

The Miami probably represent the most intensely agricultural group in the area. Located in the extreme southern portion of the study area, they maintained

permanent villages along streams and rivers. Corn was the main crop and enough was grown and stored to provide a permanent food supply throughout the winter. Hunting was undertaken when it did not interfere with the crops.

The Upper Mississippian Cultures (A.D. 1,000)

The Moccasin Bluff Site in the extreme southwestern portion of the study area contains cultural material different from the Late Woodland Sites surrounding it. Although it seems to have had an economic pattern similar to Late Woodland Cultures, the artifacts found seem more closely related to the Upper Mississippian Cultures of Wisconsin and Illinois. Thus, this site probably represents a migration of these people into the area, rather than a gradual transition from Middle Woodland Cultures already existing within the area.

The Historic Period (A.D. 1,650 to Present)

After A.D. 1,650, cultural change cannot be correlated with environmental change. As soon as the French and British trappers and traders had entered the region, European Culture began to intermingle with Indian Cultures. Iron knives and arrowheads replaced stone tools. Guns were introduced. Even some European domestic animals were imported. The settlement pattern also changed. Indian

trails now focused on trading posts and early Christian missionaries encouraged the Indian to settle around the mission and adopt European civilization. While the latter portion of the prehistoric period found the Indians living in well defined tribal regions, the westward displacement of eastern tribes by European settlers brought about land competition. This led to intertribal warfare. Many tribes, particularly those who had not adopted European weapons, were practically annihilated. With the influx of the European settler the demise of the Indians' culture was complete. Most tribes were forced to move west or to settle on reservations. Others adopted European ways. The Indian, who for so long had adjusted to his changing environment, could not adjust to European culture and was overwhelmed.

APPENDIX

MAP REFERENCES

Although some of the maps used in this study have been discussed in the text, it is felt that a more complete treatment of the subject would be useful for the reader desiring specific details on these maps. Where a map has been discussed in detail in the text, the reader will be referred to the appropriate chapter and page, and only a short summary will be given here.

Figure 1: The Study Area

The base map for this figure was taken from one done by the East Michigan Development Association. The original data, showing the locations of community and junior colleges in Michigan, were removed, leaving a blank base map. The reason for doing this was that the larger lettering of the county names was more readable than in any other base map found. The Upper Peninsula of Michigan was omitted, as this had little bearing on southwestern Michigan and it made the map too large for the margin specifications.

The reasons for choosing the study area, as delineated on this map, are discussed in detail in Chapter I.

These reasons can be summarized as follows:

1. Familiarity with the study area.
2. Uniformity of landform features.
3. The region contains archeologic finds or sites from all three of the cultural periods recognized for the Upper Great Lakes area: the Paleo-Indian, the Archaic, and the Woodland.

With these considerations in mind, the boundary lines were arbitrarily drawn to include what was felt to be a manageable area for distributional analysis.

Figure 2: The Biotic Provinces
of the Upper Great Lakes

This map was modified from one in Charles E. Cleland's, The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes, University of Michigan, Museum of Anthropology, Anthropological Papers, No. 29, Ann Arbor, 1966, page 6. The map was masked and enlarged to its present size, and the position of the study area was added. It was important to include more provinces than just those that are found within the study area today, as all of these provinces at one time occupied southwestern Michigan during the glacial retreat. This map shows the present distribution of these provinces and gives the reader a chance to compare their latitudinal shifts, as discussed in Chapters II and III. Also, the 150-day frost-free line was added to this map as an indication of

the agricultural potential of the area. This line is the northernmost limit at which cultivation of prehistoric crops, such as corn, squash, and beans, could have taken place with reliability, according to present-day conditions. It would have changed positions during the glacial advance and retreat.

Figure 3: Distribution of Surface Features
in Southwestern Michigan

This map is based on Helen Martin's map of the Surface Formations of the Southern Peninsula of Michigan at a scale of 1:500,000, Michigan Department of Conservation Geologic Survey Division, 1955. The use of this map presented some difficult problems. First of all, in its original form, the portion of Martin's map dealing with the study area was too large to fit on an 8-1/2 x 11 inch page. Reduction was done by use of the Mapograph in the Geography Department, Western Michigan University. Since color could not be used for this map, finding patterns that would "stand out" was a problem. This was further complicated by the fact that, on later maps, archeological sites would be plotted on the map and the pattern would have to be light enough not to obscure them. Zip-a-tone patterns were found to be unsuitable for this work, as they did not provide enough textural variation in the dark and light greys. The problem was solved by scraping

off the desired landform patterns on several negatives of different shades. These were overlain on each other and photographed. An Osalid was used to make prints.

Although the map is basically the same as Helen Martin's, some of the fine detail was lost in reducing its size. The credit for the excellent cartography on this map, and also Figures 11, 13, and 14, goes to Mr. Hans Stolle, a graduate student at Western Michigan University, and a professional cartographer.

Figure 4: Mean Maximum Temperature ($^{\circ}$ F), July
and Figure 5: Mean Maximum Temperature ($^{\circ}$ F), January

These maps are modified after similar maps in A. H. Eichmeier, "Climate of Michigan," in Climates of the States, Climatography of the United States, No. 60-20, Washington, D. C., 1959, as reproduced in Readings in the Geography of Michigan, edited by Charles M. Davis, Ann Arbor, 1959, Figures 16 and 18, pages 45 and 47. Isotherms were drawn through points having approximately equal temperatures. The Upper Peninsula of Michigan and the locations of reporting stations were omitted and the map size was enlarged.

The mean maximum temperatures were selected for these maps, as it was felt that they gave the best indication of temperature differences within the study area. This is particularly well shown by Figure 4, where the

moderating effect of Lake Michigan on the west coast of the study area is easily observable. This factor may well have induced cultural groups to migrate into this area in summer and then to return to the protection of the interior forests during the winter. However, when using these maps, it should be remembered that these are present-day temperatures and the actual temperature varied greatly in glacial and post-glacial times. Still, the presence of a lake in the Lake Michigan Basin would have modified the lake shore environment during any period.

Figure 6: Mean Annual Precipitation in Inches

Figure 6 is again based on Eichmeier, "Climate of Michigan," as reproduced in Davis, Figure 14, page 43. Isohyets were drawn through points having approximately equal precipitation totals. Only the Lower Peninsula portion of this map was used, individual recording stations were omitted, and the map was enlarged.

This map readily shows the higher annual precipitation totals in the southwestern portion of the study area where higher temperatures and more moist conditions combine to increase precipitation.

Figure 7: Distribution of Prairies in Michigan

This map is after J. O. Veatch, "The Dry Prairies of Michigan," Papers of the Michigan Academy of Science, Arts and Letters, volume 8, 1927, Figure 2, page 271. This map was masked and enlarged to its present size.

This map gives a basic idea of the areas in which prairies were located. However, Veatch's map has been criticized by Bernard C. Peters, personal conversation, March 28, 1969, on the grounds that Veatch felt that prairies existed only on the Warsaw-Silt-Loam soil series. Peters, on the basis of the impressions and evaluations recorded by early settlers in Southern Michigan, suspects that they had a wider distribution than this. He also warns that prairies should not be confused with the term "Oak Openings" or "Oak Barrens" which were small grassland areas interspersed among Oak forests. These had a much wider distribution in southern Lower Michigan than did the prairies which were larger and contained only a few burr oak trees.

Figure 8: Approximate Shorelines of Glacial and Post-Glacial Lakes in the Study Area

This map is again after Martin's map of the Surface Formations of the Lower Peninsula of Michigan (see Fig. 3). Like Figure 3, this map has also been reduced from its

original size. The shorelines drawn are approximate, as Martin's map shows only where beaches have been specifically identified. Due to fluctuation of water levels, glacial and post-glacial lakes were often at the same elevation, and one line may indicate the position of several shorelines.

Figure 9: Important Sites Outside of the Study Area

Throughout the text, reference is made to sites outside the study area for comparative purposes. The major ones are located on this map. Due to the scale of this map, it should be considered that the locations are only approximate. The sources of this information are so varied that specific publication data will not be given. The text includes this data.

The base map used here is essentially the same as the state boundaries on Veatch's map of the Central Prairie Region (see Fig. 12). However, the state of Kentucky was added.

Figure 10: Distribution of Fluted Blades in Michigan

This map is a reproduction of one done by Ronald J. Mason in his Late Pleistocene Geochronology and the Paleo-Indian Penetration in Michigan, University of Michigan, Museum of Anthropology, Anthropological Papers, Ann Arbor,

1958, page 8. No change in size or subject matter was done. Although several additional fluted points have been found since this map was drawn, the basic pattern is still the same.

Figure 11: Distribution of Paleo-Indian Fluted Points,
Figure 13: Distribution of Archaic (Non-Pottery) Sites,
and
Figure 14: Distribution of Woodland (Pottery) Sites

Each of these maps has been discussed in detail in earlier chapters: Figure 11 in Chapter IV, Figure 13 in Chapter V, and Figure 14 in Chapter VI.

The distribution of sites and finds shown on these maps was obtained, for the most part, from the site-card file at the Great Lakes Division, Museum of Anthropology, University of Michigan, Ann Arbor. Each card contained places for the location of the site, elevation, site description, and a description of the artifacts found. Sometimes photographs of these artifacts were included. However, much of this data has been recorded by amateur archeologists working individually, or out of the various chapters of the Michigan Archaeological Society. As such, the completeness and detail of the cards varies with the competence of the recorder. There is a wealth of information here that has not been greatly used. Both geographers and archeologists would find this information useful.

Each site-card was first examined for information on the artifacts found at each site. Since most cards contained no specific period identification, several key artifacts or lack of these artifacts were used to group the sites into time periods. These criteria were fluted points for the Paleo-Indian Period, the lack of pottery and no fluted points for the Archaic Period, and Pottery for the Woodland Period.

After this, the sites and finds in each time period were located on Figure 3, the surface features map of southwestern Michigan. These maps do not show all of the sites or finds in the study area, as a comparison of Figure 11, with Mason's map, Figure 10, will show. Strict mapping requirements prevented the use of any site or find located more generally than within a 1/4 section. Caution should be used in attempting to locate the exact position of a particular site or find. The original mapping of these sites was done at the 1:500,000 scale of Helen Martin's landforms map (see Fig. 3). This in itself was general mapping, with the attempt being to locate the site on the correct landform as closely as possible to the correct location. Where there was any doubt as to the correct positioning of the site, United States Geologic Survey Quadrangle maps were consulted. Reduction of the size of these three maps to a scale of about

1:875,000 further increased their generality. However, the major purpose of these maps is still achieved--that of locating the site on the correct landform.

Several other sources were used for obtaining site locations. Donald V. Peru's articles entitled, "The Distribution of Fluted Points in the Counties of Kent and Allegan," Michigan Archaeologist, Volume 11, No. 1, 1965; and, "The Distribution of Fluted Points in Cass County, Michigan," Michigan Archaeologist, Volume 13, No. 3, September, 1967, pages 140 and 145, provided several additional find locations and the boundary line of Lake Dowagiac for the Paleo-Indian Map (Figure 11). Amos Green's article entitled, "Paleo-Indian Man and Mammoth were Contemporaneous in Berrien County, Michigan," Michigan Archaeologist, Volume 13, No. 1, March, 1967, page 6, provided a number of finds for the Paleo-Indian Period and the distribution of Hi-Lo points as shown on the map for the Archaic Period (Figure 13). The Hopewellian Sites, specially marked on the Woodland Period map, were obtained from Quimby's, The Goodall Focus: An Analysis of Ten Hopewellian Components in Michigan and Indiana, Indiana Historical Society Prehistory Research Series, Volume 2, No. 2, pages 63-161.

Figure 12: Location of the Prairies of Michigan

This figure is a reproduction, slightly enlarged, of a map in Veatch's "The Dry Prairies of Michigan," Michigan Academy of Science, Arts and Letters, Volume 8, 1927, Figure 1, page 270. It does not show the actual location of prairies in the study area, only a comparison of the general area in which they occur in relationship to the extension of the prairie province east of the Mississippi River.

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