AN ARCHAEOLOGICAL INVENTORY AND EVALUATION OF THE SLEEPING BEAR DUNES NATIONAL LAKESHORE, LEELANAU AND BENZIE COUNTIES, MICHIGAN

In an effort to preserve sensitive cultural resources,
figures showing locations of archaeological sites
have been removed from this electronic edition.

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INTRODUCTION

This final survey report describes an inventory and evaluation project conducted in 1974 and 1975 within the proposed Sleeping Bear Dunes National Lakeshore, Benzie and Leelanau Counties, Michigan. The project, and the funds that supported it, was sponsored by the National Park Service, Midwest Archaeological Center, and was conducted by the Michigan State University Museum (Contract No. CX-6000-4-0150). The terms of the agreement designated William A. Lovis as Principal Investigator and responsible party for this work. Contractual provisions stipulated that the Michigan State University Museum "provide the necessary personnel, facilities, supplies, and materials to perform an inventory and evaluation of the cultural resources within Sleeping Bear Dunes National Lakeshore, Michigan." Field work was to be completed by August 31, 1975, and a final report submitted by June 30, 1976, unless written approval for an extension was forwarded by the Park Service.

This report will summarize several facets of the overall project: the natural environment of the area vis a vis potential site location; documentary searches and prior archaeological data for the area; the field survey tactics; description of the sites located by the survey; and a description and analysis of cultural materials recovered through surface collections and evaluative test excavation.

The Survey Area and Field Work

The survey area designated in the cooperative agreement included parts of 106 sections in Leelanau and Benzie Counties, Michigan, all of which will compose Sleeping Bear Dune National Lakeshore. Of the approximately 71 square miles investigated, parts were owned by the state (Benzie State Park,

D. H. Day State Park), major parts had been acquired by the National Park Service (South Manitou Island), and large parcels were still privately owned. The survey properties may be grouped into four essentially discrete parcels: South Manitou Island (Figure 1), eastern and western "upper" mainland areas located north of the town of Empire (Figures 2 and 3), and a "lower" or southern mainland block to the south of Empire in Leelanau and northern Benzie Counties (Figures 4). Many areas of high site potential (see "Zones of High Potential") were not included in the bounded lakeshore area; these include specifically (Figures 1-4) the present shorelines of Little Traverse Lake, the east and west arms of Glen Lake, and the Platte Lakes. North Manitou Island, although owned by The National Park Service and included in the National Lakeshore, has been surveyed previously (Cleland 1967) and was not included in the agreement.

Between September 1 and September 7, 1974, planning and pre-field research was completed for the South Manitou Island survey. This included archival research in site files, geological reconstruction, and topographic evaluation. From September 14 through September 27, 1974, on-site reconnaissance of South Manitou Island was performed by a seven-person field crew directed by Charles Cleland, Curator of Anthropology, Michigan State University Museum, and Susan Martin, graduate student in the Department of Anthropology, Michigan State University. In addition Patrick Martin, an historic sites archaeologist, was present to aid in the identification of European colonial period sites. Archaeological materials recovered were catalogued and described during the winter of 1974-1975.

Pre-field research and planning for survey of the mainland parcels was accomplished on an intermittent basis throughout the spring of 1975. Again, this involved archival research on the presence of reported or recorded

Figure 1. The South Manitou Island survey area.

Figure 2. Eastern "upper" mainland survey area.

Figure 3. Western "upper" mainland survey area.

Figure 4. "Lower," or southern, mainland survey area.

sites in the survey area and the isolation of high potential areas based on topographic and other natural features. From June 15 through August 30, 1975, Robert Mainfort, of the Michigan State University Museum, directed a six-person field crew in on-site survey of the mainland areas. Materials collected through survey and excavation from this phase of the investigation were processed during September, 1975, and were catalogued into The Museum collections under Accession Number 4317. All survey notes are now housed at the MSU Museum.

Several problems arose during the course of fieldwork on the mainland properties. Continued intensive commercial and/or private development had greatly disturbed parts of the study area. In some instances, this development had taken place in areas of recorded prehistoric sites, which had been obliterated and could not be relocated by the survey parties. Because much of the designated lakeshore areas is still privately owned, field parties were obligated to obtain permission before entering some areas. Such permission was flatly refused in some cases, while, in at least one instance, permission was granted for surface survey but not for evaluative test excavation.

Some parts of the survey area have undergone little modern development and were covered by thick undergrowth and other vegetation. These areas also had few roads, houses, or other landmarks by which the field crew could orient themselves during on-site survey. Although field tactics could partially overcome these problems, these areas could not be surveyed as precisely as could the remainder of the survey area (<u>see</u> "The Survey").

NATURAL ENVIRONMENT

Glacial Geology and Topography

The bedrock stratigraphy underlying the study area is composed primarily of two types of sedimentary rock: an undifferentiated blue-gray limestone (Traverse series) deposited during the Devonian and an overlying stratum of black shales (Antrim) formed during very late Devonian and early Mississippian times. The Antrim shales, however, encroach on the study area only on its eastern margins in Benzie County, while the remainder of the study area, including South Manitou Island, is underlain by Traverse limestones.

Contemporary topography and soil of the Benzie-Leelanau County area resulted from the last Wisconsinan glaciation and by several post-glacial lake-level fluctuations. The Wisconsinan glacial stage may be subdivided into three substages: Cary, Port Huron, and Valders. These began ca. 17,000 years ago and terminated ca. 9500 years ago with retreat of the Valders ice (Hough 1963). Although each glacial re-advance had widespread effects, discussion will be confined to movement of the Lake Michigan lobe.

Topographically, the glacial periods of greatest importance began ca. 14,000 years ago with the retreat of the last oscillation of the Cary substage. This retreat halted in the Grand Traverse region, where it produced a ground moraine that subsequently developed into a major topographic feature east and south of Grand Traverse Bay, called the Lake Border morainic system. Drainage from the ice front was concentrated east of this moraine, draining south through the present Upper Manistee River and into glacial Lake Glenwood. Continued retreat of the ice front, which eventually freed most of the Michigan basin by ca. 13,300 years ago, produced the Cary-Port Huron Interval,

a low-water lake stage that drained eastward via the Lake Huron Basin.

Continued oscillation of the ice front, however, initiated the last major re-advance of the ice sheet ca. 12,500-13,000 years ago during the Port Huron substage, which formed the Port Huron moraine. Rapid melting of the Port Huron ice sheet caused a major outwash along the glacial front between the Port Huron and Lake Border moraines, forming the Little Manistee River valley (Martin 1957). This outwash flowed south into proglacial Lake Glenwood II, then to the Mississippi River drainage system. With retreat of the Port Huron ice sheet, the Lake Michigan basin was free once again, and a second low-water stage occurred, the Two Creeks Interval. In the Michigan basin, proglacial Lake Kirkfield, dated to ca. 11,850 years ago, stood at an elevation more than 20 feet below that of present Lake Michigan (Hough 1958).

The last advance of the Wisconsinan, which occurred ca. 11,300 years ago during the Valders substage, did not move as far south as either the Cary or Port Huron lobes. The moraine formed by the Valders loops around the southern end of Grand Traverse Bay through Leelanau County and along the present Lake Michigan shoreline of Benzie and Manistee Counties, comprising one of the major geographic features of the study area, the Manistee moraine. Once again, drainage off the ice front formed a major meltwater channel between the moraines, the Boardman River. Decreasing amounts of meltwater from the glacier caused a lessening of the flow, however, reducing the size of the river, which cut through its earlier broad channel. The Valders stabilized at this point for awhile, and during this period of immobility, the extensive ground moraines of Leelanau County were deposited (Martin 1957). These are gravelly boulder-strewn deposits of till dposited under the ice front. Likewise, these ground moraines contain the extensive drumlin

fields of Leelanau County. Drumlins are streamlined hills of till, resembling the inverted bowl of a spoon, with their longitudinal axis aligned in the direction of ice flow.

As the Valders began its continued northward retreat, it halted at several places, depositing further morainic features. The Manitou, Fox, and Beaver Island chains are recessional moraines of the Valders ice sheet.

Although glacial activity contributed strongly to the current topography of the study area, post-glacial lake activities and the effects of other natural phenomena continued to modify the glacial features. Essentially, three factors account for post-glacial modification of the Grand Traverse region: crustal rebound, wind action, and fluctuating lake levels.

Continued oscillation of the Valders ice sheet occurred during its recession. By 11,000 years ago the Straits of Mackinac, joining the Michigan and Huron Basins, were freed. A local re-advance in the Trent Lowlands of Ontario, however, blocked the Trent outlet. Thus, drainage of post-glacial Lake Algonquian was to the southern outlets at Chicago (Des Plaines River) and Port Huron both of which stood at an elevation of 605' a.s.l. (Dorr and Eschman 1970). Lake Algonquian, with its high elevation, occupied much of the lowlands in the Grand Traverse area, forming an archipelago. In the study area, Glen, Platte, and Crystal Lakes were broad, shallow bays, as was the Bass-Lime-Traverse Lake area. Lake Leelanau was a channel separating the Leelanau Peninsula from the mainland (Martin 1957). The shoreline effects of glacial Lake Algonquian cut beaches into the moraines at, or slightly above, the 605' a.s.l. elevation.

The weight of the glacial ice mass, however, had depressed the crust of the earth. As soon as the ice retreated, the crust began to bounce back from this compression. The point at which no uplift occurs is the hinge

line for a particular stage. South of Manistee, the Algonquian beach underwent no uplift, while at Traverse City, the Algonquian beach has an elevation of 619 a.s.l. (Dorr and Eschman 1970). This beach can be traced at varying elevations in the Glen, Platte, and Crystal Lake embayments, and in the Bass-Lime-Crystal Lake Embayment.

As the ice sheet re-opened the Trent Valley outlet and, subsequently, the very low North Bay outlet, the post-glacial lakes began to drop until, by 9500 B.P., the Michigan basin held Lake Chippewa at 230' a.s.l. (Hough 1958, 1963; Dorr and Eschman 1970). Due to the low elevation of both Lake Chippewa and the several lakes that preceded it in this drop, none of the beaches are easily, if at all, recognizable in the study area.

Subsequent changes in the lake level may be directly attributed to the effects of isostatic rebound or uplift. Slow uplifting of the North Bay outlet gradually raised the water levels in the Huron and Michigan basins, once again causing drainage to flow south via the Chicago River. By 4500 years ago, the waters of the Michigan basin had stabilized at 605' a.s.l.; the level of the outlets and the same level as glacial Lake Algonquian (Hough 1963; Dorr and Eschman 1970). This, the Lake Nipissing stage, lasted until ca. 3500 B.P., and, again, prominent shoreline features were carved during its ca. 1000 year duration. Due to uplift of the Algonquian beaches, Nipissing features occur at a lower elevation in the study area, although they may be traced in approximately the same areas as the Algonquian features. A prominent Nipissing strandline, which may also be traced along the south and east shore of South Manitou Island, is aligned in a crescent parallel to the bay.

Other prominent features were formed during the Nipissing stage, specifically Sleeping Bear Dune and other similar dune areas, including

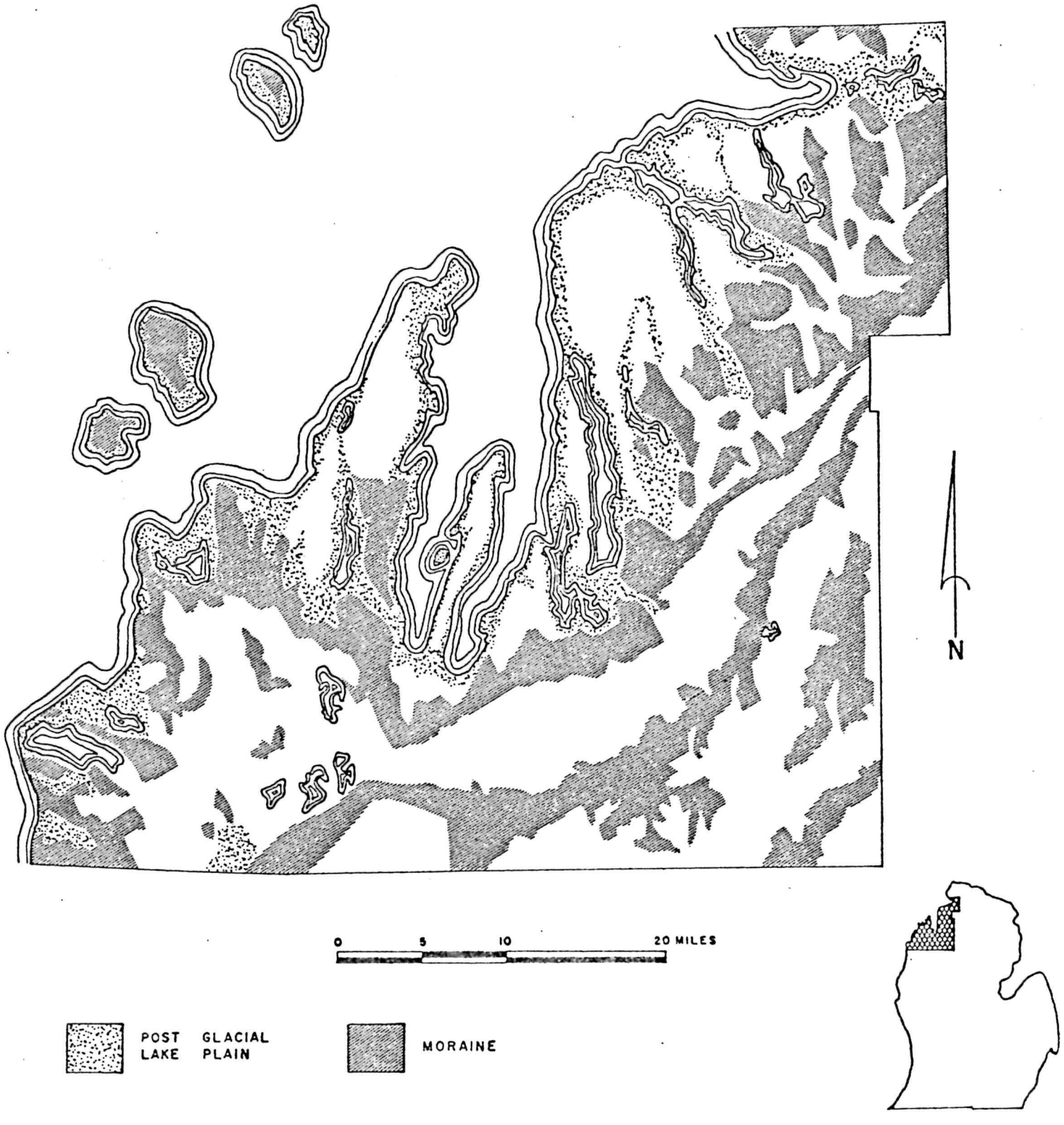
those in Benzie State Park. Although Sleeping Bear Dune is primarily composed of outwash and morainic soils, it was close to lake elevation during both the Algonquian and Nipissing stages. Windblown sand was deposited onshore in a relatively thin veneer, perched atop the glacial deposits (Dorr and Eschman 1970).

Both Lake Algonquian and Lake Nipissing were rich in suspended sediments, which were deposited in the shallow, calm shoreline embayments. This process of sand-bar deposition, uplift, and eventual wind action on exposed sediments modified the shoreline considerably, impounding the waters of Platte, Glen, Crystal, and other shoreline embayments into lakes (Martin 1957).

Continued uplift of the outlet at North Bay raised it above lake level, causing increased southern drainage via the Chicago and St. Clair Rivers. The increased rate of flow rapidly cut through the glacial deposits in the St. Clair River until bedrock was reached, causing stabilization of lake levels at 595' a.s.l. by 3000 years ago (Hough 1963; Dorr and Eschman 1970). This was glacial Lake Algoma, which by 2000 years ago had dropped to the present Lake Michigan elevation of 580' a.s.l. The Algoma beach in the study area is a poorly developed feature on the mainland, only sometimes visible slightly above the present shoreline. On South Manitou Island, however, the Algoma strandline and several recessional features are visible along the bay on the southeastern margin of the island.

In summary, the modern topography of the region (Figure 5) illustrates many of the events that formed them, with elevations approaching 1100' a.s.l. in the Manistee moraines to the east, west, and north of Glen Lake. South of these moraines in southern Leelanau and northern Benzie Counties are broad outwash plains with low, almost level, relief. The small lakes

Figure 5. Moraines and post-glacial lake plains in the Sleeping Bear Dunes area.


N
0
5
10
20 MILES
POST GLACIAL LAKE PLAIN
MORAINE

dotting western Benzie County are meltwater ponds left by the receding glacial front (Martin 1957). As a unit, they form the headwaters of the Platte River, which drains west through Benzie County to Platte Lake. Former large bays of post-glacial high-water lakes have slowly become landlocked through isostatic rebound, sedimentation, and wind actions, forming Glen Lake, Platte Lake, and several smaller coastal lakes (see Scott and Dow 1937, for a discussion of this phenomena at the Herring Lakes, Benzie County, Michigan). The effects of post-glacial lake transgressions are visible in the broad, level areas surrounding these lakes and the wave-cut terraces above them. Massive dunes dot the coastline of Lake Michigan where wind action either deposited sands on extant morainic features or acted upon newly exposed bottom sediments. South Manitou Island itself is a moraine with both perched dune deposits on its western margin and wave-cut terraces on its eastern shore.

Soils

The soils of the Sleeping Bear Dune survey area display low variability and may be correlated with the glacial and post-glacial phenomena reviewed in the preceding section. Detailed soil survey data are available for the Leelanau County area from the USDA Soils Conservation Service (Weber 1973). Such data, however, are not yet available for Benzie County. Discussion of soils in the Benzie County area are based on early field maps (Veatch 1935) made available through the courtesy of Dr. E. Whiteside, Department of Crop and Soil Sciences, Michigan State University.

Broadly speaking, the study area is encompassed within Michigan's podzol region (Whiteside, et al. 1968), which as Fitting notes (1970: 25, citing Butzer 1964: 85) displays a profile consisting of a thin humic horizon at the surface, underlain by bleached sands, resting on a horizon of

light-brown-colored redeposited aluminum and iron sesquioxides. Within the study area, this general surface stratigraphy is maintained except in poorly drained areas, where organic peats and mucks have developed, and in unstable dune areas, where the soil profile has been unaffected by recent vegetation and/or capped existing morainic deposits.

Three types of soils occur on South Manitou Island. Both the northern and western portions of the island feature a Deer Park-Dune Land association confined to dune deposits of very sharp relief; these cap and overlay recessional Valders morainic deposits. These morainic soils, an Emmet-Leelanau association, surface along the southern shore and in the center of the island. Along the southeastern and eastern shore of the island are East Lake-Eastport-Lupton soil associations. For the most part, the latter are sediments deposited by post-glacial lake transgressions and cutting action, resulting in low to moderate relief.

A similar distribution pattern holds for the mainland portions of the study area. Dune deposits with high relief, consisting of Deer Park-Dune Land soils, are found perched on top of morainic features and in zones of post-glacial lake sediment deposition. These are confined to the present Lake Michigan shoreline west of Good Harbor Bay on Sleeping Bear Point, to the north and south of Empire, and in the Benzie State Park area.

Morainic soils, such as the Kalkaska-East Lake associations, are confined to areas where: (1) post-glacial lake activity did not erode or blanket the deposits with lake sediments; (2) aeolian deposition and deflation did not cover the deposits; and (3) where inter-morainic meltwater channels did not cut through the deposits and/or deposit outwash sediments. Thus, sandy lacustrine soils, such as the East Lake-Eastport-Lupton association, are coterminous with the maximum extent of post-glacial

Lake Algonquian, being located in the vicinity of most of the coastal lakes such as Crystal Lake, Platte Lake, Glen Lake, Lime Lake, Little Traverse Lake, and Bass Lake. Likewise, the Kalkaska-Mancelona and Kiva-Mancelona outwash soils are deposited in the ancestral channels of the Boardman, Manistee, and Platte Rivers.

Both the lacustrine deposits and the outwash deposits present little topographic variability. Likewise, these areas contain the highest proportion of drainage features in the study area, with the small interior lakes of the outwash plain drained by the only major stream in the study area, the Platte River.

Vegetation

The study area falls within an edge area or transition zone (Fitting 1966; Cleland 1966) between the northern Canadian and southern Carolinian Biotic Provinces (Dice, 1943). Thus, the Sleeping Bear Dunes vicinity exhibits an "edge effect" (Odum 1965:278), that is, a tendency toward increased variety and diversity in plant and animal communities. Natural vegetation of the Leelanau-Benzie County vicinity has been described by Potzger (1946), Cushing (1965), and others as within the "Lake Forest Formation," which is a mixed conifer-deciduous association. Recently, several investigators have refined this characterization to a tightly defined man-land relationship in the prehistoric Great Lakes (Mason 1967, Brose 1970, Fitting 1970).

Rather than rely on soil and vegetation associations in this discussion, the vegetation will be presented in terms of presettlement distributions. Presettlement vegetation for the Leelanau-Benzie County vicinity has been reconstructed by Isleib (1969) from field notes of the original 1839 survey

(Figure 6). Isleib's distribution map demonstrates low overall variability for this area, even though she recognizes seven distinct communities. With the exclusion of lake basins, river basins, and dune areas, a sugar maple-beech-hemlock association predominates. Next in frequency is the cedar-tamarack-hemlock association in rivero-lacustrine settings, while white pine is found in several remaining associations. Importantly, this conforms closely to Kuchler's (1964) estimate of natural distributions based on remnant communities. As Brose (1975: 72 citing Yarnell 1964) notes, undergrowth in this situation would have consisted of blueberry, raspberry, several annuals, and (citing R. Ford, personal communication) wild rice in the vicinity of Glen Lake, Sleeping Bear Bay, and Good Harbor Bay.

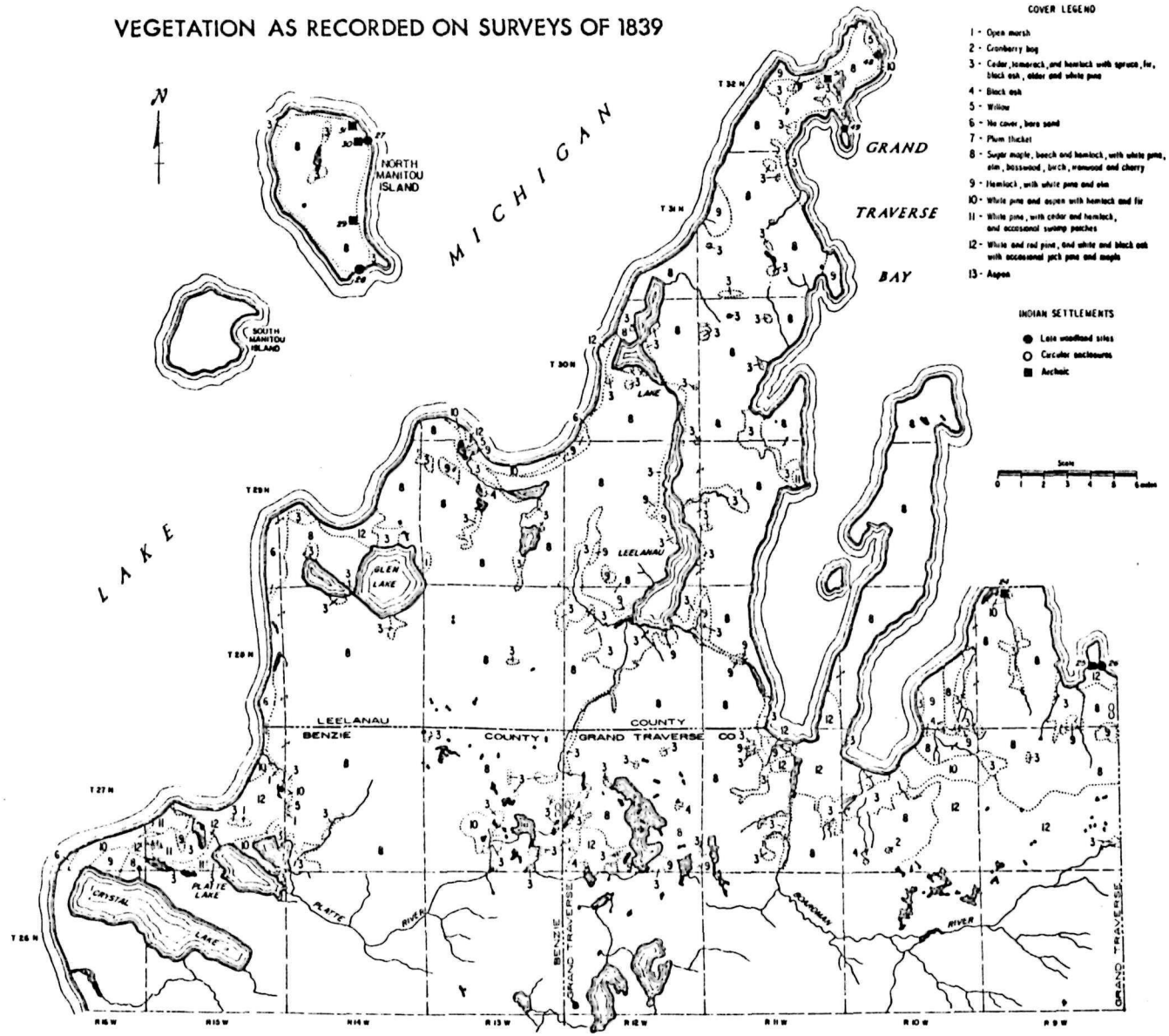
Although Hinsdale (1932) notes that deciduous forest situations were favored by native populations, recent investigations in northern lower Michigan suggest that vegetation variability may have been a determining factor in site location. Nowak (n.d.) has demonstrated that vegetation interfaces where several microenvironments converge are zones of high potential for prehistoric occupation sites. Thus, based on these vegetational criteria, the study area would possess few areas of high prehistoric site potential, with these areas confined to rivero-lacustrine features with high floral community variability.

Fauna

The transitional types of plant communities found in the study area provide a variety of microhabitats in which terrestrial mammals may occur. The fauna of the transition zone have been described elsewhere (Cleland 1966; Burt 1957). However, Burt (1957: 3) mentions that 16 northern species occur which have their southern limits in the ecotone, while 17

Figure 6. Presettlement vegetation of Sleeping Bear Dunes National Lakeshore and vicinity.

VEGETATION AS RECORDED ON SURVEYS OF 1839



southern species range northwards into the edge area. Potential for avian food resources is considerably enhanced, at least in modern communities, by the location of the study area along a tributary of the Mississippi Flyway (Hawkins 1964: 185, 187). Marsh and coastal areas in the vicinity of Platte and Little Traverse Lakes are apparent nesting areas.

Non-avian aquatic fauna have few environments available that would allow aggregation in large enough quantities for mass extraction. Since most of the survey area coastline is unprotected, surface currents attain relatively high velocity (Ayers 1959). Additionally, the lake bottom drops sharply short distances from the beach. Shoals, which potentially might serve as spawning areas for lake species, occur offshore Pyramid Point west of Good Harbor Bay, west of Platte Bay, and off the south shore of South Manitou Island. Riverine features with potential for fish extraction include Otter Creek and the Platte River.

Climate

Climatic conditions of the Sleeping Bear Dunes study area are strongly affected by the moderating influences of Lake Michigan. No long-term climatic records are available for stations within the study area. However, data for the Frankfort station in Benzie County should provide representative examples of means and ranges of climate (USDA 1941: 914-924). Mean January and July temperature varies from 22.6 F to 66.1 F, with maximum temperature extremes of 99 F and -32 F. Importantly, this places Frankfort (as well as Traverse City and most of the Leelanau Peninsula) within a 140 day frost-free thermocline, which is well within the effective limits of viable corn agriculture (Yarnell 1964). This, in combination with an average warm-season precipitation of about 16 inches (28 inches annual average), indicates

that during late prehistoric periods, the area could have supported groups partially dependent upon domestic food products.

Zones of High Site Potential

Although field survey methods required total coverage of the survey area (see "Survey Method and Technique"), local configurations of topography and environment allowed the isolation of areas considered to be of high site potential. As noted in succeeding sections, these areas received different survey treatment than did the remainder of the study area. The following features were considered zones of high potential, either singly or in combination.

1. Hydrologic Features. Information from the documents search demonstrated that known recorded sites in the survey area were located adjacent to water. This phenomena was subjected to survey testing in a comparable area of northern Lower Michigan, where prehistoric sites were demonstrated as occurring adjacent to prehistoric or modern water bodies (Lovis 1976). Thus, areas adjacent to lakes and rivers and to the confluence of riverine and lacustrine features were given high priority. Due to the potential for prehistoric utilization of the area as early as Lake Algonquian times (ca. 11,000 B.P.), fossil beach ridges were also given high priority. The Algonquian terrace in the survey area varies in elevation due to the effects of isostatic rebound and is higher to the north. Around Platte Lake, just north of the zero isobase at Manistee, the beach occurs at elevations of approximately 608' a.s.l., whereas on the margins of Lime Lake and Little Traverse Lake, it is ca. 620' a.s.l. Given that the zero isobase for Lake Nipissing beaches is to the north of Traverse City, the terrace for this lake may be traced at approximately 605' a.s.l. throughout the survey area,

including South Manitou Island.

2. Diverse vegetational associations. Extending Fitting's (1966: 144) hypothesis regarding higher prehistoric population density in the ecotone a step further, Lovis (1973) proposed that maximum site density for this region is contingent upon environmental diversity. Nowak's (n.d.) analysis of settlement locations in the area between Traverse City and Mackinac City supports this; sites are located with respect to their distance from two or more microenvironments. Areas within the survey region given survey priority on this basis were those illustrating the most presettlement vegetation diversity according to Isleib's (1969) distribution analysis.

3. Sandy, well-drained soils. Prior information indicated that all known, recorded sites in the Leelanau-Benzie County area occur on well-drained sands. Survey priority, therefore, was given to such areas based on the distribution of sands mapped by Veatch (1935) for Benzie County and Weber (1973) for Leelanau County. In the study area, such sands are coterminous with the maximum transgression of post-glacial Lake Algonquian.

4. Coastal features adjacent to offshore shoals. Since fishing was of documented importance to prehistoric Great Lakes populations (Cleland 1966), areas of present high potential for seasonal fish aggregation were given priority (see "Fauna").

Within the Sleeping Bear Dunes survey area, these features generally occur in combination, although only the presence of one high priority feature was necessary to list it as high potential and deserving of different treatment. (As an example, however, the Platte Lake vicinity has all of the features listed above.) In summary, pre-survey research indicated that the study area had few areas possessing criteria favorable to prehistoric site location and/or high prehistoric population density.

SUMMARY OF MICHIGAN PREHISTORY

Although there has been little systematic regional study of the archaeology of Michigan, thus prohibiting in-depth discussion of spatial and temporal problems, enough work has been performed that broad chronological and areal trends have been formulated and widely accepted. The temporal sequence may be divided into four time segments that are, for the most part, common to the Great Lakes area; the Paleo-Indian, Archaic, Woodland, and Euro-American Contact periods.

Although recent archaeological research indicates the possibility that prehistoric populations may have entered the New World as early as 30,000 years ago, the data currently reveal a major migration about 14,000 years ago. Due to the presence of glacial activity in Michigan, however, human occupation of the state initiates ca. 10,000 B.C., when Paleo-Indian groups entered the area hunting mammoth, mastodon, bison, and caribou while following the retreating ice front northward. The environment in these newly opened areas has been variously characterized as tundra, open boreal forest, or a complex ecotonal mosaic. Whatever the case, this successful focal economy began to undergo considerable change by ca. 8000 B.C.--the beginning of the Archaic period.

Several related factors apparently combined to trigger this shift: fluctuating temperatures and changing floral and faunal resources. With the introduction of mixed deciduous and dense conifer forests with contemporary woodland animal species, both technological and subsistence changes took place. During the continued warming trend of the Archaic, new food sources were experimented with, discarded, or adopted into the subsistence

base. Two important changes may be noted: the formalized patterning of the year into seasonal units which yielded specific resources and the increasing emphasis on plant foods. The Archaic hunters and gatherers are the first peoples in Michigan who manufactured tools such as mortars, pestles, and axes for the processing of wood and seeds.

By 5000 years ago, it is possible to recognize distinct, regional Archaic subsistence patterns in Michigan. To the north, a hunting-gathering adaptation attuned primarily to large mammals and seasonal fishing occurs, while in the sourthern parts of the state, the intensive collection of wild plant foods becomes an integral part of the economy. The Late Archaic may be further characterized by its participation in an extensive trade network extending from Lake Superior to the Gulf of Mexico. Apparently Lake Superior copper was an important commodity that was mined and traded for exotic southern items. Local use of certain exotic items in association with elaborate burial ceremonialism gave rise to regional Archaic complexes such as Red Ocher, Old Copper, and Glacial Kame.

Despite the fact that trade patterns and basic subsistence patterns continue, two innovations herald the arrival of the Woodland period by 1000 B.C.: ceramic manufacture and plant domestication. The latter was dependent on local growing conditions, and we find that, in the southern areas of Michigan, squash and sunflowers begin to supplement the hunting and food collecting economy. In the north, however, climatic conditions prohibited intensive dependence on such food products. The Archaic subsistence pattern, with a veneer of ceramic manufacture, appears to continue with an ever-increasing emphasis on fishing.

Through time, the populations of southern Michigan become increasingly involved with the "Hopewell Interaction Sphere;" a widespread network of

trade and burial ceremony. This included the construction of burial mounds, the manufacture of specific ceremonial pottery, and the importing of exotic trade items such as obsidian from Wyoming, shell ornaments from the Gulf of Mexico, mica from the Appalachians, and grizzly bear claws and canines from the Missouri River. This participation was supported by an increasing emphasis on plant food production. In addition to sunflowers and squash, corn begins to appear in the archaeological record.

As food production in the south and fishing in the north become primary subsistence items in their respective areas, it is possible to define some important regional differences in the Woodland cultures of Michigan. In those areas where corn, squash, and, by 1300 A.D., beans, were viable food items, the seasonal subsistence pattern involved a semi-sedentary round. Large villages were located near crop fields for the majority of the warm season. Hunting and wild plant gathering, however, remain an integral part of the overall economy. In the agriculturally unreliable northern areas, the resource emphasis is fish. New, efficient techniques for fishing are refined, such as the use of nets and weirs. This nonfood producing economy continued its seasonal round of food extraction. Rice and other food items such as maple sugar, goosefoot, and mustard were gathered seasonally, and hunting is more or less important throughout the year.

With the arrival of Europeans in the early 1600's, indigenous economies and lifeways underwent tremendous changes. Native American sites of this Contact period, belonging to Algonquian-speaking Indians, reflect the impact of a market economy. The aboriginal technology is replaced by goods of European or American manufacture, and changes in economy due to participation in the fur trade may be documented. European and American sites of the

seventeenth, eighteenth, and early nineteenth centuries tend to be fortified trading settlements originally founded as regional market and distribution centers, slowly evolving into major villages and towns. Importantly, those areas which were heavily occupied prehistorically remain so during the Contact period. Chronological positioning of historic European sites and Native American sites is aided by the kinds and amounts of trade items recovered, and rather precise dating is possible using artifact inventories in conjunction with historic documents.

In summary, the following chronology may be employed in Michigan.

Paleo-Indian	10,000 B.C. to 8,000 B.C.
Archaic	8,000 B.C. to 1,000 B.C.
Woodland	1,000 B.C. to A.D. 1620
Contact	A.D. 1620 to A.D. 1830

SUMMARY OF PRIOR ARCHAEOLOGICAL INFORMATION

Prior archaeological data on the Sleeping Bear Dunes study area were extremely limited. The available information proved to be of little value in the on-site reconnaissance phase of the investigations. No prior systematic archaeological surveys had taken place within the bounded study area, although several had been performed around its margins.

One of the earliest published references to prehistoric archaeological sites of the Grand Traverse Bay area is found in Leach's (1903:17) History of the Grand Traverse Region, the data for which were compiled in 1883. Leach mentions mounds in Manistee County, as well as mounds on the Boardman River near Traverse City. Apparently, several burial mounds were destroyed by "relic hunters" and others were "opened."

Hinsdale's (1931) Archaeological Atlas of Michigan directly refers to the archaeological resources of the study area and its general vicinity. He reports that the shifting dune area of Sleeping Bear Point was a good area to uncover "relics" and human bone. Hinsdale states that Honor (Section 8, T26N, R14W) was the site of a village, mounds, and a cemetary. Likewise, he documents another village on Crystal Lake, just outside the Sleeping Bear Dunes survey area. Map references and the University of Michigan, Museum of Anthropology, site files place this village on the northwest corner of Crystal Lake, in the southern portions of Sections 1 and 2, T26N, R16W. Within the survey area, the town of Good Harbor, on Good Harbor Creek (Section 6, T29N, R12W), is noted by Hinsdale as being in the vicinity of a cemetery. He does not mention any known or reported sites on South Manitou Island, despite its broad, protected harbor. Importantly, Hinsdale performed one of the first systematic

archaeological surveys of the Leelanau area, walking the shores of Lake Leelanau where he found a site on "almost every high point" overlooking the lake.

A search of the University of Michigan--Michigan Archaeological Society State Site Files revealed the location of several reported sites either in or adjacent to the survey area. Some are duplicates of those noted by Hinsdale (1931). These sites are:

20 LU 1. Empire Township, NE 1/4 of Section 10, T28N, R14W. This is the reported location of a village site occupied from the Archaic through the Late Woodland. The University of Michigan Museum of Anthropology houses some artifacts collected from the site.

20 LU 2. Glen Arbor Township, Section 21, T29N, R14W along the Sleeping Bear shore. Pottery has been recovered from this site, indicating occupation at least from the Woodland period.

20 LU 3. Centerville Township, NW 1/4 of Section 6, T29N, R12W, along the Lake Michigan shore south of Good Harbor. This is the burial site reported by Hinsdale from this area.

20 LU 6. Empire Township, Sections 3 and 10, T28N, R14W. This is apparently a village site.

20 LU 19. Cleveland Township, Section 31, T30N, R13W. Reported as being located 1/2-mile south of Lake Michigan from Pyramid Point. No other information is available about age, cultural affiliations, or collections.

20 LU 22. Glen Arbor Township, NE 1/4 and SW 1/2 of Section 31, T29N, R14W. Ford and Brose (1975) state that this is a Late Archaic-Early Woodland cremation burial site containing wild rice. This site lies outside of, but adjacent to, the survey area.

Figure 7. Location of previously reported sites in the survey area.

20 LU 21. Glen Arbor Township, SE 1/4 of Section 24, T29N, R14W, on the north bank of the Crystal River where it empties out of Fisher Lake. A brief report on this site (Brose 1975) based on limited test excavation indicates a Middle and Late Woodland occupancy. This site was subsequently destroyed by expansion of the Crystal Harbor Marina.

Although not part of the present survey area, North Manitou Island, which will eventually be included in the Sleeping Bear Dunes National Lakeshore, can provide us with some indication of the archaeological potential of South Manitou Island. An archaeological survey of North Manitou Island was performed by a Michigan State University field crew in 1967 under the direction of Charles E. Cleland. The William R. Angell Foundation funded the project, and a preliminary report was prepared (Cleland 1967). The survey recorded the location of seven prehistoric sites (Appendix C), ranging in age from Late Archaic through Late Woodland. Importantly, all sites are located on either modern or fossil beach ridges along the Lake Michigan shoreline (Figure 8). No sites were found adjacent to inland Lake Manitou.

Other sites have been reported west and east of the survey area on the Manistee River. Fitting (1968) discusses collections from the Bear Creek Site (20 MT 1) and the Riverview Cemetery Site (20 MT 2). Both sites are located on high bluffs above the river (Fitting 1968: 123-124). Likewise, Brunett's (1966) survey of the Manistee River basin in Wexford, Grand Traverse, Kalkaska, and Missaukee Counties located 17 sites. All are situated in well-drained areas overlooking or near waterbodies.

In 1972, Michigan State University performed a brief survey of parts of Leelanau County. Aside from the primary objective of systematically surveying areas that had not been visited by Hinsdale or prior Michigan State University field parties, it was further decided to verify or reject the presence of

Figure 8. Location of sites on North Manitou Island.

previously reported sites. The south side of the juncture of the east and west arms of Glen Lake was subject to intensive survey. Repeated attempts to locate sites reported for this vicinity (20 LU 1-20 LU 6) led to the conclusion that the sites had been destroyed by intensive twentieth-century development (MSU Survey Notes, 1972).

Correspondence with the Historic Preservation Coordinator, Office of the State Historic Preservation Officer, Michigan Department of State, was initiated to document archaeological sites of national, state, or local significance within the survey area. No archaeological sites are listed for this area.

Several conclusions were drawn from the preceding overview of the archaeological literature.

1. Certain aspects of the natural environment apparently are correlated highly with site location. Specifically, all known or reported sites are located adjacent to either contemporary or prehistoric waterbodies. This information is entirely consistent with data obtained from numerous other site surveys in northern Lower Michigan (Lovis 1976).

2. The prehistory of the area as documented from prior records initiates during the Late Archaic (ca. 3000 B.C. to 1000 B.C.) and continues through the Woodland period, terminating ca. A.D. 1620. Although earlier sites might be expected to occur in the area, priority, therefore, must be given to those features optimal for habitation from the Late Archaic period onward; from the post-glacial Lake Nipissing stage (see "Natural Environment") to the present.

3. Reported site densities for the area are low; therefore, expected survey area site densities are predictable as low.

4. Reported archaeological sites in the area have been destroyed in two cases. Priority should be given to on-site verification or rejection of the presence of these sites and determination of whether they have been destroyed by modern activity. The reported locations of these sites are illustrated in Figure 8.

5. No reported survey of South Manitou Island is available. Priority should be given to rather complete coverage of the island based upon data compiled about prehistoric site location for North Manitou Island.

6. Since the Sleeping Bear Dunes area has never been systematically surveyed, priority should be given to complete systematic archaeological reconnaissance in addition to intensive survey of high potential areas.

THE SURVEY

Problem Orientation

Although archaeological site survey can be approached from the basis of complete inventory and description, it has become increasingly apparent that, even within the constraints posed by survey projects, an overall problem orientation greatly increases the information return of such field research. This is true whether the problem to be solved is explanatory or descriptive. Such a problem-oriented stance directed the field research and interpretation of the Sleeping Bear Dunes Inventory and Evaluation project.

Several potential problem areas suggested by the data collected in the documentary research on prior archaeological information and environmental setting of the study area. On the basis of time and personnel considerations, some were eliminated as beyond the scope of the survey. The problems that it was decided to address are linked in that they all attempt to clarify the kind and location of prehistoric settlement in the Sleeping Bear Dunes area as relate to natural and cultural considerations. Thus, the confirmation or rejection of the hypotheses posed should allow more efficient survey of other Upper Great Lakes areas and more accurate predictions of expected settlement types and locations.

Among the more noticeable results of the archival research was the fact that all known, reported sites in the survey area occurred adjacent to either modern or prehistoric waterbodies. Although this same phenomena had been previously tested and confirmed by a regional sample

in the northern Lower Peninsula of Michigan (Lovis 1976), Lovis' study involved a 20% sample rather than a complete survey. Further, Lovis, Martin, and Noble (1975:29-30) observed that the apparent correlation between sites and waterbodies may well be the result of survey bias, in that only such features have been intensively and adequately surveyed since they are the highest return areas. An associated phenomenon is the correlation of sites with more than one vegetational association. Vegetational and soil diversity, however, is most often located in the presence of rivers and lakes. Thus, both of these observations may well result from limited survey strategies. The Sleeping Bear Dunes National Lakeshore survey allowed the testing of these hypotheses through the systematic investigation of a large area including Great Lakes coastline, river systems, and interior lakes. The hypothesis formulated was that:

> Sites would not occur in areas where only a single vegetational association was present. Since diversity of plant communities varies with drainage features, sites will not occur in proximity to water.

If, in fact, this hypothesis is rejected, and it is confirmed that sites occur only in areas of vegetational diversity, several other associated hypotheses are available for test. Previous sections (see "Natural Environment") document that the survey area does not possess much vegetational variability, that drainage features are few, and that the area may be characterized as an ecotone. To reject the hypothesis would mean that the Sleeping Bear Dunes study area is not highly favorable for prehistoric habitation, that is, it does not possess features that are apparently conducive to site location. If the above hypothesis is rejected, the following observations should be confirmed for the sites located by the survey:

Overall site density for the study area should be low. Those sites located by the survey should be small sites. Intra-site artifact densities should be low, not reflective of large groups, nor of long-term occupation.

If the above three observations are confirmed, the primary implication has been proposed by Fitting (1966:144), who has characterized the transition zone as a cultural tension zone. The fact that the area may not have been conducive to intensive prehistoric occupation and exploitation raises questions about prehistoric boundary maintenance and its relationship to the edge area. If, in fact, the area functioned as a loose and rather flexible boundary prehistorically, then this should be reflected in the artifact assemblages and settlement types of the sites recovered. One would not, for instance, expect permanent or long-term seasonal settlement in such an area. Further, either raw materials or ceramic types from the interfacing cultural areas should be manifested in the artifact assemblages of sites in the area. The frequency of such intermixing should vary directly with distance from the source of the populations utilizing the boundary or buffer zone. That is, given the proximity of the Sleeping Bear Dunes survey area to the Straits of Mackinac, one would hypothesize that the frequency of materials associated with prehistoric populations from the area would be higher than the frequency of materials from southwestern Michigan or the Saginaw Valley.

On the other hand, several important implications would arise from confirmation of the first hypothesis, indicating no association of sites with vegetational diversity, and drainage features. If it is found that sites do not associate with these features of the environment, then it becomes apparent that it may in fact be variables such as vegetation type that are behaving regularly with site location. Diversity may not then

be used as a measure of potential prehistoric settlement density. Futhermore, the lack of an association between water features and site location would nullify the validity of surveys that only explored areas adjacent to waterbodies, since the potential for sites to be located away from these features has been established. It would, therefore, be necessary to reappraise our concepts of prehistoric settlement systems in this area, and perhaps design further surveys to test for other settlement in more variable environmental situations.

The survey strategy presented in the following section is designed to test these hypotheses as efficiently as possible. However, it was also designed to intensively survey areas of known high potential and high return as well. Thus, each and every part of the survey area received a minimum of uniform, systematic coverage, while certain areas received special attention, especially in situations where reported sites were being relocated, where local surface vegetational and soil features posed survey difficulties, and in areas of high potential based on prior archival research.

Methods and Techniques

On the basis of pre-field research and given the paucity of archaeological documentation, priority was given to isolating localities that exhibited high archaeological potential based on local topography and other natural features. The pertinent glacial geology within the lakeshore was reconstructed prior to on-site survey, and the location of these features was field-checked by the survey crew. This, in conjunction with observed drainage patterns, soil associations, and topography, allowed the isolation of zones having high archaeological potential within the survey area. For example, raised fossil beach ridges were

assigned higher priority than submerged, poorly drained bog or swamp situations. Some potentially valuable information concerning the natural environment was not available to the researchers. Several long-time residents of the area noted that prior to the cutting of virgin timber, many springs were present in areas of high relief. The removal of the virgin timber lowered the water table, which caused many springs to dry up. Undoubtedly, these springs were considerably important to the aboriginal occupants of the area as they were to the early white settlers. Unfortunately, locating these now-dry water sources is virtually impossible.

The following areas within the survey area were designated as having high site potential.

Benzie County. Northwest shore of Platte Lake, including the mouth and banks of the Platte River in SW 1/4 of Section 27 and E 1/2 of Section 28, T27N, R15W; the mouth and banks of the Platte River in N 1/2 of Section 20, T27N, R15W; high bluff in Sections 7, 12, and 18, T27N, R15W; mouth of Otter Creek in NW 1/4 of NW 1/4 of Section 12, N27N, R15W,

Leelanau County. Ridge north and east of North Bar Lake in W 1/2 of Section 7 and S 1/2 of Section 12, T28N, R15W; ridge below and to the north of Sections 28 and 29 and extreme south of Section 20, T29N, R14W; banks of the Crystal River in E 1/2 of Section 23 and SW 1/4 of Section 24, T29N, R14W; mouth and banks of Shalda Creek in NW 1/4 of Section 4, T29N, R13W; ridge above north side of Little Traverse Lake in Sections 10 and 11, T29N, R13W; shoreline of Florence Lake in the SE 1/4 of Section 4 and the N 1/2 of Section 9, T30N, R15W; the 600' a.s.l. ridge in Sections 3, 10, and 34, T30N, R15W (Figure 9).

Additionally, all portions of the Lake Michigan shoreline not covered by high sand dunes were deemed as having high potential,

Figure 9. Intensive survey areas
of South Manitou Island

although the unstable soil conditions could make site location difficult.

The procedures employed in the on-site survey phase were generally consistent with those discussed by Lovis (1976), Claasen and Spears (1975), and others, with specific modifications implemented in light of conditions peculiar to subareas of the lakeshore. For example, most areas of high surface visibility were also characterized by unstable soil conditions, such as wind-deflated sand.

A second problem occurred in the use of shovel testing. In particular, some owners of fields in pasture had strong negative feelings about 1' square holes being dug on their land. This was quite understandable in instances where animals were being grazed in these fields. Some fields, therefore, were only surface surveyed, others received small trowel tests, and the remainder shovel tests.

The on-site procedures employed during reconnaissance were:

1. Transects spaced at approximately 50-yard intervals across each section or partial section (or tract) within the survey area in a ground surface search for materials.

2. Systematic shovel tests, about 1' square, at 50-yard intervals along each transect in search of cultural remains (Lovis 1976; Baker 1975). Small trowel tests occasionally were employed instead of shovel testing.

3. Intensive survey (Ruppe 1966), employing both surface examination and extensive shovel-testing. In those areas defined as having high archaeological potential.

4. Intensive survey to relocate documented sites within the National Lakeshore boundaries.

5. Intensive survey of all areas having high surface visibility (such as blowouts and unimproved roads) for prehistoric remains.

6. Interviews with local informants, including park rangers, local historians, and other individuals, to ascertain what they might know of archaeological or historical sites in the survey area.

7. A daily log of all activities were kept by each member of the survey crew and maps were kept up-to-date on areas covered, how they were covered, interviews, and results. All field records are filed

at the Museum, Michigan State University, East Lansing, Michigan, 48824.

Results of the Survey

On-site survey results were generally disappointing. However, four prehistoric archaeological sites and several isolated artifacts were found along what is apparently a Nipissing beach in Sections 20, 28, and 29, T29N, R14W. A fifth site in the vicinity of Narada Lake was located on what probably is a prehistoric beach. This latter site, which has been designated as the Stebner Site (20 LU 30), was the most productive of all archaeological localities. Limited test excavations were performed at each site. In general, these mainland sites yielded lithic materials but, significantly, no pottery. Interestingly, all prehistoric sites occurred in areas that were suggested by local informants as being archaeological localities. Ceramics were, however, recovered from one of the two sites located on South Manitou Island (Section 10, T30N, R15W). A single historic site was also located during the survey. This is the remains of the late nineteenth-century logging town of Aral, which is located along Otter Creek in Section 12, T27N, R15W.

Survey crews could not relocate any sites previously documented as being in the survey area. Site 20 LU 1 was probably destroyed by intensive development of the area; 20 LU 2 may well be deeply buried by shifting dune sand. Additionally, intensive survey of several localities suggested by local informants failed to reveal traces of cultural activity. Owner permission could not be obtained for the investigation of one alleged site located in S 1/2 of the NE 1/4 of Section 36, T27N, R16W, on the banks of Crystal River. Artifacts have been found there in the past, and the area has been extensively modified by dredging and filling.

The uniform insistence by local residents that prehistoric artifacts were extremely rare within the lakeshore was very impressive. Additionally, no one interviewed possessed more than one or two artifacts found within the survey area. These interviews compliment the results of on-site survey, which indicate that at least the contemporary remains of prehistoric occupation within the lakeshore are extremely sparse.

Other factors that may have contributed to low site recovery are related to the field survey tactics employed, although the overall effect cannot be estimated. Specifically shovel testing or any limited subsurface testing procedures do not have the ability to locate deeply buried occupation strata, only those that occur at or near the surface. Areas occupied prehistorically that were subsequently buried by unstable soil conditions may not have been located. As mentioned previously, this is particularly true in coastal dune locations. However, the forested interior of the survey area should not have posed such tactical problems. These are stable, wooded situations with relatively low rates of soil development. Such stability would indicate that cultural materials should occur at or near the soil surface. Thus reducing the probability that shallow test locational techniques would miss buried cultural materials. It is suggested that for these interior areas site recovery was complete within the limits (such as 50-yard transect intervals) of our survey techniques.

THE SITES

In the course of these investigations, seven prehistoric sites and one late nineteenth-century historic site were recorded. Of the prehistoric sites, two were located on South Manitou Island. The remaining five, and the one historic site, were within the boundaries of the Sleeping Bear Dunes Wilderness area on the mainland. Except for the Aral Site, all site locations have been entered into the State Site Files housed at the University of Michigan Museum of Anthropology, Ann Arbor, and have been assigned site numbers.

South Manitou Site 1 (20 LU 24) — S½, NE¼, Sec. 10, T30N R15W Leelanau County

Situated 50 yards from the present shore of Lake Michigan and approximately 100 yards southwest of the Old South Manitou Light (Figure 10), this site is associated with an undisturbed relic sod zone about 35 feet beneath the top of an active dune. Deflation and wind erosion has recently exposed this sod zone, which lies below the 600 foot a.s.l. contour. Surface collection of the area determined that overall site limits are approximately 10 yards by 50 yards; two 5' by 5' test units also were excavated.

The stratigraphy of Test Pit 1 consisted of a heterogeneous upper sod stratum followed by a zone of white and mottled gray sands. These, in turn, overlaid a zone of mixed black, yellow, and gray sand underlain by a sterile stratum of yellow sand. The unit contained two firecracked rocks, two cordmarked ceramic sherds, three flint chips, and one shell fragment.

Test Pit 2, which was devoid of cultural material, showed a black sod layer above a mottled grey sand, all overlying the basal yellow sands.

The total material retrieved from surface and subsurface testing of the blowout included: 4 firecracked rocks, 2 shell fragments, 1 unidentifiable bone fragment, 1 flint projectile point tip, 13 flint chips, 2 cordmarked body sherds (Figure 11G), and 1 body sherd that lacked the exterior surface. All flint was the Norwood variety, and all ceramics were coarse grit tempered.

The site has been temporally classified as dating from the Late Woodland period (A.D. 600-A.D. 1620) on the basis of the cordmarked ceramics found. Furthermore, its low elevation precludes occupation earlier than the Algoma lake stage.

South Manitou Site 2 (20 LU 25)

N½, NE¼, Sec. 10, T30N R15W
Leelanau County

This site is located ¼-mile southwest of the Sandy Point settlement, approximately 500 yards north-northwest of 20 LU 24. Situated in an area of cleared flat ground and bisected by a two-track road, the site's elevation is slightly under 600 feet a.s.l. This area is just north of a high ridge that separates the site from 20 LU 24. Ground scatter indicates that the site covers about 100 square yards.

A single 5' by 5' test unit was excavated north of the roadway, at what was thought to be the midpoint of the site. The soil stratigraphy of this unit consisted of a shallow layer of light and dark gray mottled sand overlying a zone of white and yellow beach sand. The excavation yielded only five flint chips, a fragment of a flint core, and some charcoal.

This assemblage, as well as the material collected on the surface, resulted in a total of 4 firecracked rocks, 20 flint chips, 2 utilized flakes, 1 bipolar core fragment (Figure 11F), 4 unidentifiable bone fragments, and some charcoal. All flint was from the Norwood outcrop on the

Figure 10. The location of sites 20 LU 24 and 20 LU 25.

Figure 11. Artifacts from the Sleeping Bear Dunes Survey.

A. Projectile point tip, Stebner Site
B. Bipolar core, Stebner Site
C. Projectile point tip, Stebner Site
D. Modified flake, Stebner Site
E. Bipolar core, Stebner Site
F. Bipolar core, South Manitou 2
G. Cordimpressed body sherd, South Manitou 1



A



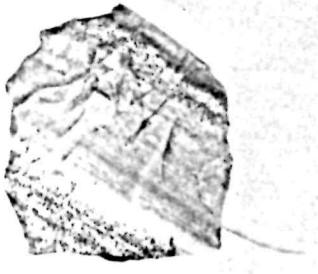
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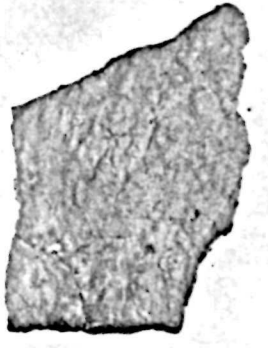
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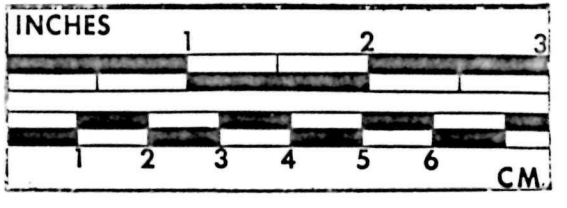
E



F



G



mainland.

This site has also been assigned to the Late Woodland period (A.D. 600-A.D. 1620) on the basis of its elevation.

The Stanz Site
(20 LU 26)

NE¼, SW¼, Sec. 19, T29N·R14W
Leelanau County

The Stanz Site (Figure 12) is exposed in several blowouts along the southwest perimeter of a small gravel pit. This area, located to the east of a large dune ridge at an elevation of 620 feet a.s.l., is apparently a Lake Nipissing beach terrace (Figure 13). Two extensive surface collections, indicating a site size of at least 200 square yards, yielded 75 flint chips and 2 utilized flakes. Two test units were later excavated by the field crew.

The first, a 10'-by-10' immediately east of the quarry, contained no prehistoric materials. The only items recovered were modern debris, consisting of 11 fragments of linoleum tile and a wire nail.

The second pit, 5'-by-5', was excavated 50 feet south and 50 feet west of Test Unit 1 and yielded a mixture of modern and aboriginal debris. The first 3-inch level produced eight flint chips, one piece of slate , a fragment of wire, and some bottle and window-glass sherds. Two flint chips were found in Level 2, and all subsequent levels were sterile.

Stratigraphy at the site (Figure 14) typically exhibits a layer of humus and brown sand over sterile yellow sand. A lens of white aeolian sand, at times intruding between the brown and yellow sand zones, varies in thickness across the site.

Due to the lack of diagnostic artifacts from the Stanz Site, estimates of age or cultural affiliation cannot be assigned.

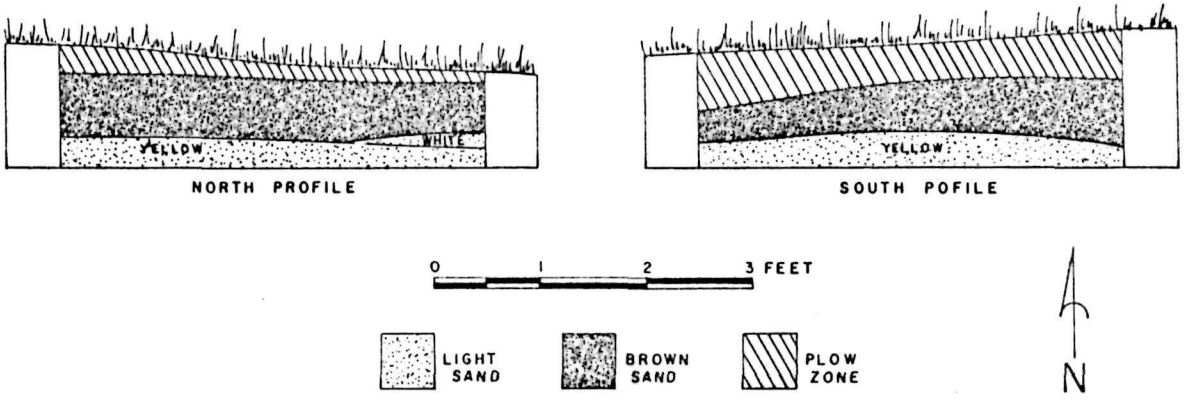
Figure 12. The Stanz Site.



Figure 13. Location of 20 LU 26.

Figure 14. Soil profiles of 20 LU 26.

STANZ SITE 20LU26



The Faubel Site
(20 LU 27)

SW¼, SE¼, Sec. 20, T29N R14W
Leelanau County

Located at the base of and about 1½ miles west of the same moraine as 20 LU 29, this site was found in a blowout along the 600-foot contour (Figure 15). Eighteen flint chips and one utilized flake, all of Norwood flint, were retrieved during surface collection. In addition, local residents have collected a number of points from this general area, several of which are owned by the present tenant of the property on which the Faubel Site is located. Minimum site size is approximately 25 square yards. The Faubel Site's elevation suggests that it could not predate the Woodland period (1000 B.C.-A.D. 1620). Since the property owner would not permit excavation in the site area, no stratigraphic information is available.

The Faubel Driveway Site
(20 LU 28)

SW¼, SE¼, Sec. 20, T29N R14W
Leelanau County

Surface inspection revealed another site in the immediate vicinity of the Faubel Site and at the same elevation, suggesting that both are from the same period. This site (Figure 16), situated in a second blowout below the moraine (Figure 15), has a minimum area of 2 square yards. Cultural debris recovered from the ground surface included two retouched flakes, one utilized flake, and nine flint chips.

The tenant of the property allowed no excavation of his land. Therefore, no subsurface testing was initiated at either of these sites. The Faubel and Faubel Driveway Sites, although they are reported as two distinct sites, may be only different areas of a single occupation.

The Day Forest Road Site
(20 LU 29)

NE¼, NE¼, Sec. 29, T29N R14W
Leelanau County

The site (Figure 17), situated at an elevation of 600 feet a.s.l. in a blowout at the base of a steep morainal ridge (Figure 15), has a minimum site

Figure 15. The location of 20 LU 27, 20 LU 28, and 20 LU 29.

Figure 16. The Faubel Driveway Site.



Figure 17. The Day Forest Road Site.



size (based on the area of ground scatter) of 5 square yards. Four flint flakes and one firecracked rock were found on the surface, while one 5'-by-5' test pit, dug on a small ridge to the east of the surface finds, was sterile. The low frequency of cultural material and the fact that the locality has been heavily disturbed by bulldozing and planting suggests that further investigation would not be profitable.

This area was not exposed by the lowering of post-glacial lake levels until the Algoma state (1000 B.C.). Therefore, the site must represent a Woodland occupation (1000 B.C.-A.D. 1620).

The Stebner Site
(20 LU 30)

SW¼, SW¼, Sec. 5, T29N R13W
Leelanau County

The Stebner Site (Figures 18 and 19) lies on a level terrace to the northeast of Narada Lake at an elevation of 620 feet a.s.l. Based on its elevation, this terrace is apparently an uplifted fossil beach of glacial Lake Nipissing. Surface distribution of cultural materials indicates a minimum site size of 40 square yards, although site size may, in fact, be more extensive. Due to the stable ground cover, surface collection was possible only in areas where the vegetation permitted. Two undiagnostic projectile point tip fragments, 29 unmodified flakes (total weight=22.5 g), and 7 modified flakes (either retouched or utilized) were recovered from the surface on two occasions.

Further site investigation (Figure 20) consisted of locating and excavating three test pits, one 10'-by-10' (Test Pit 1), and two 5'-by-5' squares (Test Pits 2 and 3). The stratigraphic sequence for all test units was similar (Figure 21). Although the surface was stabilized by grass, this apparently is a recent situation, since only a thin A zone (about 1") had developed. This zone was removed as a provenience unit in

Figure 18. Location of 20 LU 30.

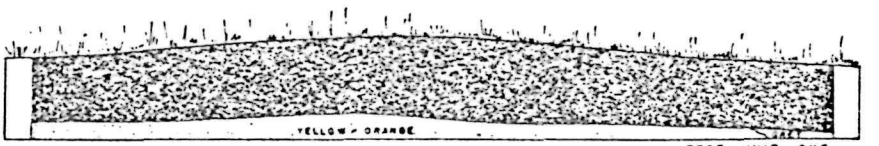
Figure 19. The Stebner Site.



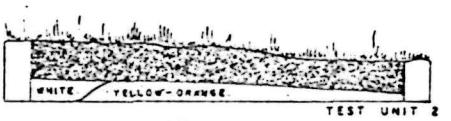
Figure 20. Location of excavation units at 20 LU 30.

Figure 21. Soil profiles of 20 LU 30.

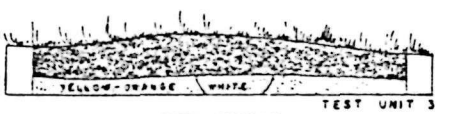
STEBNER SITE 20LU30



NORTH PROFILE

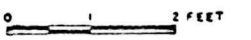


NORTH PROFILE



NORTH PROFILE







SHIMMIN

all excavations. The A_1 zone consisted of a loose brown sand horizon, averaging 8 inches in thickness, that overlaid a podzolic B zone. Cultural materials were not encountered in the B zone, which may be considered sterile. No hearths, storage pits, or structural evidence such as postmolds were observed in any excavation unit. No charcoal was recovered, and the soil pH was not conducive to bone preservation. All test units were excavated in arbitrary 3-inch levels until the podzol zone was encountered. That level was then terminated and a new level begun, thus maintaining stratigraphic integrity. Soil from each level was sifted through ¼-inch hardware cloth.

Cultural materials recovered from the Stebner Site are described below (for a compilation by provenience unit see Appendix B).

Chippage. A total of 564 flint chips weighing 393 grams was recovered from the Stebner Site. Of these, 305 were flat flakes, 15 were blocky flakes possibly resulting from core preparation (White 1963), and 244 were broken flat flakes. The majority (N=452) of this debitage, which is gray and white, tabular, banded chert, originated in the bedrock outcrops of the Pi-wan-go-ning Quarry at Norwood, the primary source (Cleland 1973). This primary quarry was exploited from the Early Archaic period until The Contact period, although its periods of greatest use were the Late Archaic and the Late Woodland.

Two other chert types were encountered in the chippage and were labelled Types A and B. The 109 Type A flakes are a lustrous, fine-grained chert containing small crystalline inclusions; color ranges from mottled white and light gray to a dark gray and brown. Type B chert is represented by only three flakes. This is a dull, gray-brown, coarse-grained chert with white inclusions that are uniformly distributed throughout. Both chert types are found in the local glacial deposits of the Sleeping Bear

Dune area (field observation).

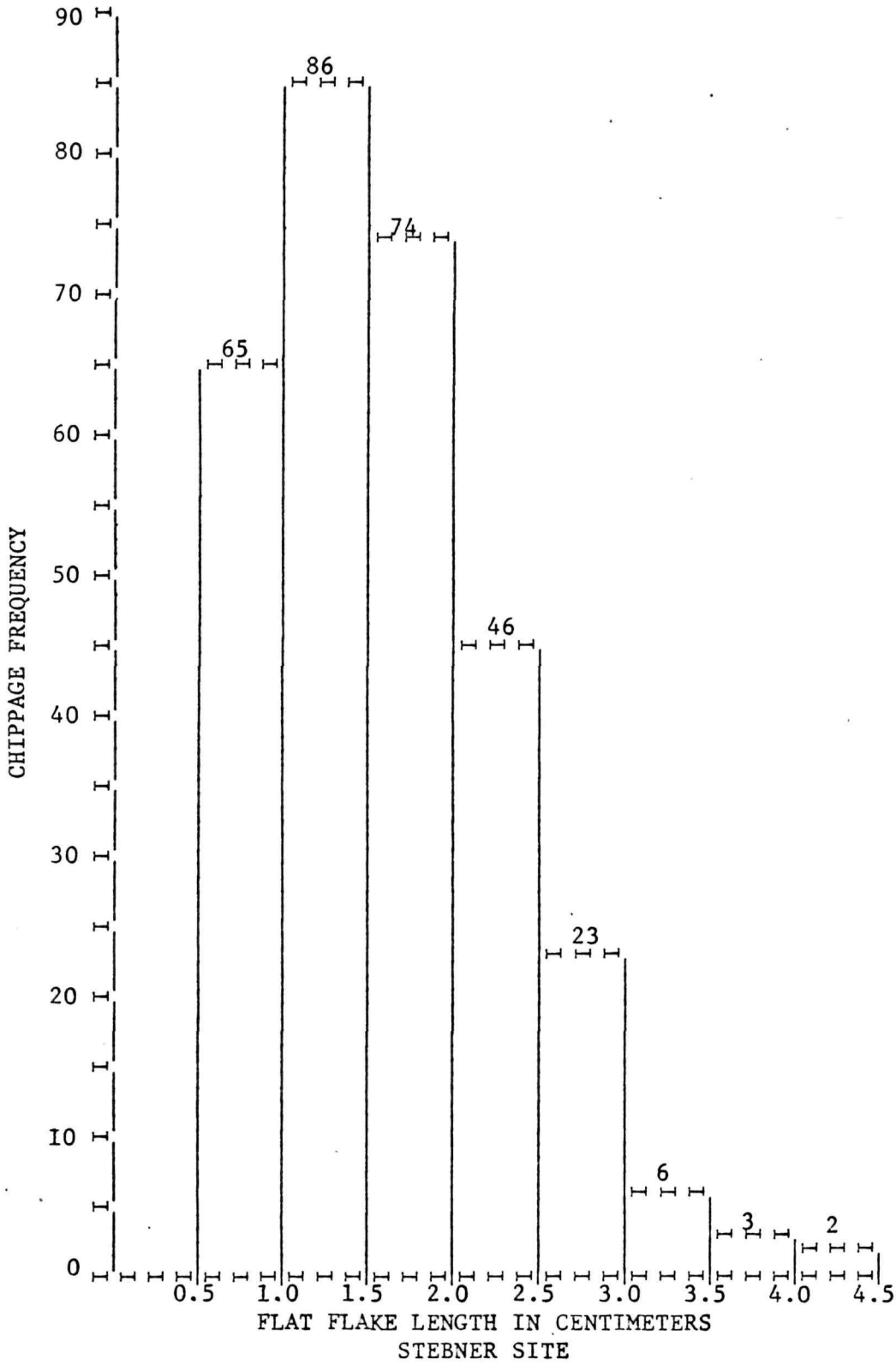
Of the 564 flakes from the Stebner Site, 305 were unbroken flat flakes that could be measured for length. These flakes are neither decortication flakes or primary flakes but result from regular flake removal from a prepared core or artifact. The frequency distribution of flat flakes by length from the Stebner Site is illustrated in class intervals of 0.5 cm (Figure 22). The absence of any flakes in the 0.0-0.49 cm class interval is undoubtedly a result of sampling error: these would have passed through our ¼-inch hardware cloth. The mode is between 1.0 and 1.49 cm, and over two-thirds of the chippage ranges from 0.5 to 1.99 cm in length. Such a profile has been hypothesized as indicating regular flake removal from either prepared cores or artifact preforms (Lovis 1973). This hypothesis is in part supported by the lack of chippage characteristic of early stages of core preparation and the lack of any unmodified raw material from the test excavations.

Modified Flakes (Figure 11D). Sixteen modified flakes were recovered from the Stebner Site test excavations. These flakes are characterized by unifacial retouch along one straight edge. The retouch may be patterned or unpatterned, and it is impossible to determine whether the retouch is intentional or the result of use modification.

Projectile Point Fragments (Figure 11A, C). Two projectile point tips were recovered from the surface collection. Neither may be considered diagnostic for temporal or cultural purposes.

Block Core Fragments. The seven block core (Binford and Papworth 1963; Lovis 1973) fragments recovered from the Stebner Site are all Norwood chert. These fragments suffered from planar cleavage, most likely from frost action after deposition, although a similar cleavage may result from

Figure 22. Frequency distribution of flat flakes by length from 20 LU 30.


CHIPPAGE FREQUENCY
90
80
70
60
50
40
30
20
10
0
65
86
74
46
23
6
3
2
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
FLAT FLAKE LENGTH IN CENTIMETERS
STEBNER SITE

controlled fracture of previously frozen material.

Bipolar Cores (Figure 11B, E). Extensive descriptions and classifications of bipolar cores from northern Lake Michigan are available (Binford and Quimby 1973; Lovis 1973; Brose 1970; McPherron 1967). Although a controversy exists as to whether these artifacts are in fact cores resulting from the use of small raw materials, or whether they are wedges for splitting wood and bone, the fact remains that documented bipolar cores have not been recovered from Late Archaic sites in this region. Rather, they occur primarily in Middle and Late Woodland contexts.

In addition to the chipped-stone artifacts, two kinds of coarse stone were found. These include 12 fragments of reddened and charred hearthstones broken by extremely high temperatures. Although no hearths were recorded during excavation, some probably occur at the site. Six degraded granite cobbles represent the second category. This material, which is most commonly used as temper in Woodland ceramics, commonly occurs at Late Woodland Sites between Traverse and Mackinaw Cities.

This summary suggests that the Stebner Site is a short-term Woodland occupation, similar to the chipping station described by Fitting (1967) at Hamlin Lake. Although only one of the test pits yielded significant amounts of cultural material, several such intensively utilized areas probably are present at the Stebner Site.

The Aral Site

NW¼, NW¼, Sec. 12, T27N R15W
and SW¼, SW¼, Sec. 1,
T27N R15W
Benzie County

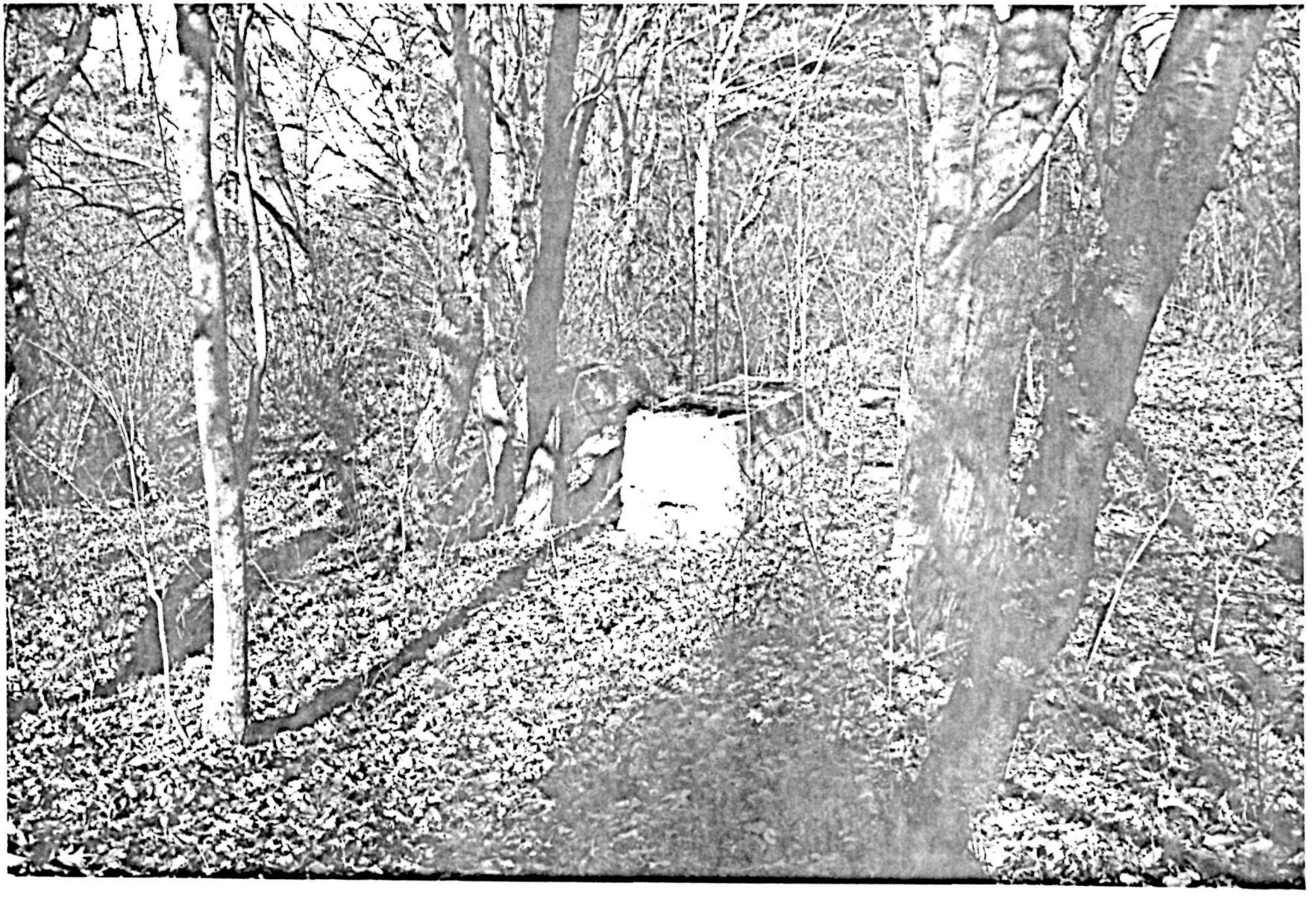
The Aral Site is a late nineteenth-century logging complex located near the mouth of Otter Creek (Figures 23 and 24). Along the south bank of the creek are the remains of what may have been the saw mill. Further

evidence indicates that several other buildings stood on either side of the watercourse. The field crew noted a number of brick fragments and metal objects on the surface. The total area of the site is estimated at 40 acres.

Amateurs connected with the local history group in Empire have conducted excavations at the site. A short book (Dig, by Bolton and Dickenson) has been published on their activities and findings. Repeated, unsuccessful attempts were made to obtain copies of this monograph, both locally and at several major libraries. Due to the size, age, and complexity of the Aral Site, it was decided that no excavation should be performed by the Michigan State University field crew.

Figure 23. The location of the Aral Site.

Figure 24. The Aral Site.



THE PREHISTORY OF SLEEPING BEAR DUNES NATIONAL LAKESHORE

Reconstruction of the prehistory of Sleeping Bear Dunes National Lakeshore must begin with the natural context within which occupation occurred. As previously noted, the natural environment of the study area may not, on the whole, be considered conducive to intensive prehistoric settlement. This is due primarily to its ecotonal vegetation pattern and paucity of major riverine or lacustrine features. Based upon the pre-field documentary research, it was hypothesized that sites would not occur in areas of vegetation diversity or water features. This hypothesis was rejected. Total coverage of the survey area resulting in the location of seven prehistoric sites, when combined with information from the North Manitou Island Survey (Cleland 1967), the Dunn Farm Site (Ford and Brose 1975), and the Fisher Lake Site (Brose 1975), unequivocally demonstrates that sites occur at or near the interface of two or more vegetation zones and that they are located adjacent to either modern or prehistoric water features. Within the constraints of the survey strategy, therefore, sites do not occur within one vegetation zone without nearby water access.

It was further hypothesized that, with rejection of the first hypothesis, the following should be observed: low over-all site density, small site size, and low intra-site artifact density reflecting short-term use by small groups. Including Fisher Lake (20 LU 21) and Dunn Farm (20 LU 22), seven prehistoric sites occurred on the mainland, while nine prehistoric sites were located on North and South Manitou Islands. The former illustrates the expected low site density for this area, while in the latter case, this relatively more intensive use of island habitats was unexpected, a result which must remain

unexplained.

All sites located, with the exception of 20 LU 35 and 20 LU 38 on North Manitou Island, were small occupations, while mean site area for the entire sample was 177 square yards. This compares with the following site size estimates compiled by Cleland for the area between Traverse City and Mackinaw City:

	Archaic		Woodland	
Site Location	N	X Area in Yards	N	X Area in Yards
Coastal	15	2006	22	4087
Interior River	18	3968	14	1639
Interior Lake	5	7623	7	2719
TOTAL	38		43	

Clearly, sites from the Sleeping Bear Dunes area are considerably smaller in area than the mean area of any of the above groups, thus partially verifying the conception that these sites are short-term, small-group encampments. 20 LU 35 and 20 LU 38 may well be accretional occupations of smaller groups utilizing the area repeatedly for short intervals. Unfortunately, the techniques necessary to differentiate between sporadic small-group accretional occupations and intensive long-term occupations are lacking for this area.

Artifact densities have not been reported for many sites in this area. Of the sites located during the survey, 20 LU 30 was the densest occupation, with four artifacts per square foot of area. This compares with the very high density of 20 LU 21 (Brose 1975) of about 20 artifacts per square foot of excavated area. The mean artifact density for the Ponshewaing Point, Wycamp Creek, and O'Neill Sites, in the Little Traverse Bay area, is about 12 artifacts per square foot of excavation. Although this is not a precise

comparison of artifact densities, it would indicate that, generally, prehistoric settlements in the Sleeping Bear Dunes area are low-density occupations, although sites such as multicomponent 20 LU 21 illustrate that the possibility of denser settlements is present.

These data strongly suggest that prehistoric populations in northern Michigan were not specifically adapted to the edge area; rather it was occupied and exploited on an infrequent basis by small groups. Faunal remains from 20 LU 21 (Brose 1975) and flora from 20 LU 22 (Ford and Brose 1975) indicate that these extractive tasks would include hunting, fishing, and perhaps wild-rice collection. With the possible exception of hunting, the remaining activities would indicate primary utilization from early spring through late fall. If we accept Fitting's (1969) model of group sexual composition and general subsistence activity based on assemblage composition, several inferences may be proposed. First, that group sexual composition was almost entirely male at all sites except 20 LU 21 and, that given the low ratio of bifaces to unifaces, the primary subsistence activity reflected by the assemblages would be fishing. Given the poor faunal preservation at the sites located and test excavated, this can neither be confirmed nor rejected. Because the survey did not include the shorelines of many of the interior lakes, the larger more densely occupied village sites, such as 20 LU 21, may not have been found by the survey crews, thus biasing our interpretation of local settlement patterning towards temporary occupations.

Chronologically, the earliest occupation in the study area is represented by sites 20 LU 22 (Dunn Farm) and 20 LU 38 (North Manitou 3). The Dunn Farm Site is a pit cremation of "very Late Archaic or Early Woodland temporal placement" and Ford and Brose (1975:11) expect that a date of 400-600 B.C. will be obtained on charcoal recovered from the burial pit,

which contained wild rice (Zizania Aquatica L.). Artifact relationships are apparently closest to the Killarney Bay I Site at Georgian Bay (Greenman 1966). Of the habitation sites located in the study area, only 20 LU 38 (North Manitou 3) is of confirmed Late Archaic provenience, dating to perhaps ca. 1000 B.C. The affinities of this site are most closely related to the Eastport Site (Binford and Papworth 1963), located south of the Norwood chert outcrops. However, the heavy chert processing activities characteristic of the Eastport Site are not apparent at North Manitou 3. Importantly, artifacts from South Manitou 3 are manufactured primarily on Norwood chert. Both sites are most closely related to northern Lake Michigan Late Archiac groups, rather than those to the south or in the Saginaw Valley.

Following the Late Archaic exploitation and utilization of the Sleeping Bear Dunes area, there is an apparent occupational hiatus until the late Middle Woodland (ca. A.D. 200-A.D. 600). A similar hiatus, on the basis of artifactual remains, apparently occurs for the area between Traverse City and Mackinaw City on Lake Michigan (Lovis and Holman 1976:270). Whether this phenomenon is related to actual population declines in the northwestern Lower Peninsula during the Early Woodland and early Middle Woodland is conjectural at this stage. An alternative explanation is that populations did not decline, remained in the area, and retained an essentially Late Archaic material inventory without ceramics. Ceramics, the classic Woodland horizon marker, may not have been introduced into this area until the latter parts of the Middle Woodland, thus making the distinction difficult on a comparative assemblage basis. In the future, it may be necessary to speak in terms of a non-ceramic Early Woodland complex in northern Lake Michigan, one with an essentially Archaic technology. On

the other hand, the introduction of ceramics may well have resulted from population diffusion into an area of low or no population density (Lovis and Holman 1976). At present, there is limited supporting evidence for either of the above alternatives.

The chronology of the study area is next represented by 20 LU 21 (Fisher Lake). According to Brose (1975:80), the early occupation component at Fisher Lake occurred ca. A.D. 200-A.D. 600 and was represented by ceramics such as North Bay types from the Door Peninsula, Wisconsin (Mason 1966, 1967), and Iosco and Goodwin-Gresham wares from Lake Huron (Fitting, et al. 1969). The chipped-stone assemblage is typical of the late Middle Woodland, with bipolar cores, and corner-removed projectile points. Of the 74 flakes from this component, representing all stages of core preparation, 51 derived from the Bayport Quarry on Saginaw Bay, suggesting an eastern Michigan derivation, if not for the sites' occupants, then at least for their raw material. It is suggested that one need not look to Wisconsin to identify the ceramic types. Brose (1975:80) has interpreted the Fisher Lake Site early component as a short-term fishing station.

The Late Woodland (A.D. 600-A.D. 1620) utilization of the Sleeping Bear Dunes area is represented by a number of sites; the late component at 20 LU 21 (Fisher Lake), 20 LU 24 (South Manitou 1), 20 LU 25 (South Manitou 2), 20 LU 27 (Faubel), 20 LU 28 (Faubel Driveway), 20 LU 29 (Day Forest Road), 20 LU 30 (Stebner), 20 LU 35 (North Manitou 7), 20 LU 40 (North Manitou 4), 20 LU 41 (North Manitou 1), and 20 LU 42 (North Manitou 2).

Unfortunately, the artifacts capable of cross-dating from these sites are few. Ceramics were recovered only from South Manitou 1, North Manitou 7, and the Fisher Lake Site. The first two sites produced some grit-tempered, cordimpressed body sherds that could date anywhere within

the Late Woodland chronology (A.D. 600-A.D. 1620). The ceramics identified by Brose (1975) from the Fisher Lake Site are similar to several Late Woodland types common to the northern Lake Michigan area between ca. A.D. 700-A.D. 1100 (1975:81-83). These include Bois Blanc Ware (McPherron 1967), Heins Creek Ware (Mason 1966), Madison Ware (Hurley 1975), and Spring Creek Ware (Fitting 1968). No lithic artifacts from this site are temporally sensitive. The triangular projectile points from this site were manufactured on Norwood Chert, whereas over 70% of the lithic debitage was Bayport chert, once again pointing out the spatially diffuse origins or contacts of the sites' occupants.

The remaining sites assigned to the Late Woodland are non-ceramic sites, and aside from the Stebner Site, were dated on geochronological bases; they could not have been occupied prior to the Algoma stage. All are small sites characterized by one or more high density locii. With the exception of some locally available glacially derived cherts, the only other raw material present was Norwood chert. It is suggested, therefore, that the cultural relationships of the sites' inhabitants lie along the Lake Michigan shoreline north of Traverse City. These are small, short-term occupations, and as mentioned previously, are probably specialized hunting, fishing, ricing, or, possibly, fowling sites. Hunting and fishing activities are reflected in the faunal remains from the Fisher Lake Site's late component (Brose 1975:77, Table 2).

The remaining three prehistoric sites located by the survey cannot be adequately dated on either artifactual or geochronological grounds: these include 20 LU 26 (Stanz), 20 LU 36 (North Manitou 5), and 20 LU 37 (North Manitou 6). Since each of these sites occurs at an elevation at or above ca. 620' a.s.l., on the Nipissing stage beach, it would be expedient to

classify them as Late Archaic. However, as the Stebner Site demonstrates, occupations with Woodland artifacts do occur at this elevation. Due to the lack of diagnostic artifacts from these three sites, then, they will not be dated.

In summary, the Sleeping Bear Dunes survey has defined a small part of the prehistoric settlement systems in northern Lake Michigan. No evidence of long-term occupation by indigenous groups was generated; the sites are small (with a mean area of 177 square yards), short-term, probably warm-season occupations by small groups. Aboriginal utilization of the survey area initiated during the Late Archaic but was most pronounced during the Late Woodland. On the basis of raw materials recovered from the 16 prehistoric sites in the Lakeshore, the populations using the area were primarily from the northwestern Lower Peninsula of Michigan, although there is evidence of either people from, or exchange with, the Saginaw Valley area of eastern Michigan. This pattern is not surprising. It suggests that Woodland adaptations were not specific to the ecotone, but to either the Canadian or Carolinian biotic provinces themselves. Apparently, the Canadian-Carolinian edge area was exploited to some extent by populations with both adaptations, although in the survey area, the intensity of exploitation varies with distance. This type of mutual-use, or buffer, situation, has been ethnohistorically documented for other areas of the Upper Great Lakes (c.f. Hickerson 1962, 1965 for a discussion of this concept in Wisconsin). Fitting (1966:144) characterizes the Michigan manifestation as both a cultural and an ecological tension zone. Thus, the settlement types located in the Sleeping Bear Dunes National Lakeshore are to be expected in such a buffer-zone mutual-use area.

RECOMMENDATIONS

It can and has been argued that each and every archaeological site is a unique data set that can yield important information about past adaptations. Although this cannot in most instances be refuted, it should be recognized that the information potential of archaeological sites varies considerably with regard to both context and problem orientation. In formal terms, such as site size, density of cultural material, or the presence of cultural features such as house patterns, few sites located by the Sleeping Bear Dune Survey possess high information value. However, in the context of Woodland settlement variability, it is apparent that several of the prehistoric sites differ radically from the common Late Woodland village sites of the area and may perhaps be seasonally or functionally specific site types. Added information about such sites should help to more adequately define Woodland settlement-system variability in the northern Lake Michigan area and help to offset the apparent research skew towards large semipermanent summer villages. Based on the Sleeping Bear Dunes National Lakeshore Survey and the North Manitou Island Survey (Cleland 1967), it is therefore recommended that:

1. A small-scale site sampling strategy be instituted at 20 LU 24 (South Manitou 1) and 20 LU 25 (South Manitou 2). These are both Late Woodland occupations in stable, undisturbed soil situations. Although site artifact densities are not high, they will produce information on island-located settlement types that may be compared both functionally and formally with sites on the mainland and other islands.

2. A more intensive sampling strategy be designed and implemented at 20 LU 30 (Stebner Site). This is apparently a special function short-term occupation from the Woodland period, with the probability of several occupational locii. Information from this site will be useful for comparison of knapping techniques with sites closer to the primary raw material source at Norwood and with more permanent Woodland village settlements.

3. Site 20 LU 38 (North Manitou 3) should undergo intensive excavation. The extensive Late Archaic occupation at 20 LU 38 is the only one present in the Sleeping Bear Dunes National Lakeshore and is one of the most extensive occupations of this period in the northwestern Lower Peninsula of Michigan.

4. Either site 20 LU 36 (North Manitou 5) or 20 LU 37 (North Manitou 6) should undergo limited test excavation to determine the age and type of occupation. As noted previously, these sites could not be dated on either artifactual or geochronological grounds. They may be Archaic or Woodland functionally specific occupations.

5. No excavation was performed at the Aral Site by the Michigan State University survey crew due to the size, age, and complexity of the site. This late nineteenth-century industrial complex may or may not warrant further investigation. If it is determined that archaeological research at this site is necessary, then accurate mapping of surface features in the approximately 40 acres of site area must be performed prior to excavation. Further, extensive archival research would be a natural starting point for the development of a research design for excavation. However, it is recommended that excavation at this site is not necessary. A program of mapping, photography, and archival research should provide adequate information for interpretation.

6. The remaining sites in the study area either represent such light occupations that their information value is exceedingly low, or they have been disturbed by either natural or human phenomena to such an extent that artifact context is lost. No further work is recommended for sites 20 LU 26 (Stanz), 20 LU 27 (Faubel), 20 LU 28 (Faubel Driveway), 20 LU 29 (Day Forest Road), 20 LU 35 (North Manitou 7), 20 LU 40 (North Manitou 4), 20 LU 41 (North Manitou 1), or 20 LU 42 (North Manitou 2).

Implementation of the management program outlined above will result in a significant amount of archaeological information from the Sleeping Bear Dunes National Lakeshore while, at the same time, maximizing the financial constraints of such a program. Any work beyond these recommendations will result in diminishing returns for the cost expended.

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A P P E N D I C E S

APPENDIX A

Artifact Measurements in Centimeters from Sleeping Bear Dunes Survey

STEBNER SITE (20 LU 30)

Surface 8/14/75	Length	Width	Thickness	Modified Edge	Flake Shape
Point Tip	3.6	2.8	0.7		
Point Tip	3.0	2.4	0.6		
Modified Flake	3.5	4.3	0.6	Lateral	Expanding
Modified Flake	2.4	2.2	0.4	Lateral	Parallel
Modified Flake	2.0	1.5	0.4	Lateral	Expanding
Modified Flake	2.4	1.9	0.4	Lateral/ Distal	Expanding
Surface 7/29/75					
Modified Flake	3.4	2.8	0.5	Distal	
Modified Flake	2.9	1.9	0.6	Distal	
Modified Flake	2.9	3.2	0.6	Lateral/ Distal	
Test Unit 1, Level 1A					
Block Core Fragment	5.9	5.0	1.7	(50g)	
Block Core Fragment	3.5	1.9	0.9	(6g)	
Block Core Fragment	2.7	1.2	0.6	(2g)	
Modified Flake	3.4	2.2	0.6	Lateral	Contracting
Modified Flake	2.3	1.6	0.4	Lateral	Contracting
Modified Flake	2.2	2.9	1.2	Distal	Parallel
Blade	4.7	2.5	0.8		Parallel
Test Unit 1, Level 1					
Block Core Fragment	3.7	2.0	1.7	(7g)	
Block Core Fragment	1.9	3.3	1.6	(5g)	
Bipolar Core	3.5	3.0	1.0	Point/Area	
Bipolar Core	3.5	3.3	1.1	Area/Area	Expanding
Modified Flake	2.0	2.9	0.7	Distal	Expanding
Modified Flake	2.3	2.4	0.4	Lateral	Expanding
Modified Flake	3.6	3.7	0.7	Lateral/ Distal	Expanding
Modified Flake	3.0	2.0	0.3	Lateral	Parallel

Test Unit 1, Level 2

Block Core Fragment	5.9	4.2	2.3	(58g)	
Core Fragment	1.3	3.5	2.6	(10g)	
Modified Flake	2.7	2.0	0.5	Distal	Expanding
Modified Flake	2.3	1.5	0.3	Lateral	Contracting

SOUTH MANITOU 1 (20 LU 24)

Point Tip	2.1	1.8	0.6		

SOUTH MANITOU 2 (20 LU 25)

Modified Flake	3.7	3.3	0.6	Distal	Expanding
Modified Flake	3.0	3.3	0.7	Distal	Expanding

Test Pit 1, Level 3

Bipolar Core Fragment	4.9	3.4	1.6	Point/Ridge	

STANZ SITE (20 LU 26)

Eastern Surface

Modified Flake	2.1	2.6	0.4	Lateral/ Distal	Expanding
Modified Flake	2.7	2.0	0.6	Lateral	Contracting

FAUBEL SITE (20 LU 27)

Modified Flake	1.6	2.9	0.5	Distal	Parallel

FAUBEL DRIVE (20 LU 28)

Modified Flake	4.5	1.4	0.5	Lateral	Contracting
Modified Flake	3.0	4.2	0.5	Lateral/ Distal	Expanding
Modified Flake	4.0	4.1	0.6	Bilateral/ Distal	Expanding

APPENDIX B

Artifacts from the Stebner Site, 20 LU 30, by Excavation Unit and Level

Surface Collection (8-14-75 and 7-29-75)

29 flint chips (32.5 grams)
7 modified flakes
2 undiagnostic projectile point tips

Test Unit 1

Level 1A - 71 flint chips (42.5 grams)
3 modified flakes
1 blade
3 block core fragments
3 firecracked rocks
2 degraded granite cobbles

Level 1 - 277 flint chips (176.5 grams)
4 modified flakes
2 block core fragments
2 bipolar core fragments
8 firecracked rocks

Level 2 - 187 flint chips (153 grams)
2 modified flakes
2 block core fragments
1 firecracked rock
3 degraded granite cobbles

Level 3 - 1 flint chip (1.5 grams)

Test Unit 2

Level 1 - 1 piece of unidentifiable scrap iron
Level 2 - 1 flint chip (0.5 grams)
Level 3 - sterile

Test Unit 3

Level 1 - 2 flint chips (4 grams)
Level 2 - 1 flint chip (0.5 grams)
Level 3 - sterile

APPENDIX C

Site Record Forms for North Manitou Island Survey

Date August 18, 1967

ARCHAEOLOGICAL SURVEY RECORD

Site North Manitou 7 20 LU 35 Map North Manitou County Leelanau
Other Designations for site

Twp. T 31 N R 14 W Section 22 $\frac{1}{4}$ Section SE Elev. 600'a.s.l.

Present tenant National Park Service Address

Owner National Park Service Address

Previous owners, dates Detroit Bank and Trust, William R. Angell Foundation

Attitude toward excavation

Description of Site Located in mouth of a draw at the south end of the island. The area is currently wind eroded, artifacts are on a stable gravel pavement.

Vegetation poplar, birck, sedges Depth surface Cultivation none

Soil of site (surface/base, type) deflated wind blown sand

Nearest surrounding water Lake MIchigan

Previous excavation None

Buildings, roads, etc. none

Possibility of destruction unknown

Surface features none

Burials Unknown

Artifacts chippage, one scraper, one projectile point

Other collections from site None

Remarks Surface geography is lkely to change with shifting dune formations

Recorder Valetta Canouts Date recorded August 21, 1967 Date visited August 15, 1967

Aerial photo No Sketch map made? Yes

Date August 21 1967

ARCHAEOLOGICAL SURVEY RECORD

Site North Manitou 5 20 LU 36 Map _____ County _____
Other Designations for site _____

Twp. T 31 N R 14 W Section 16 ¼ Section SE¼ of NE¼ Elev. 620' +

Present tenant National Park Service Address _____

Owner National Park Service Address _____

Previous owners, dates Detroit Bank and Trust, William R. Angell Foundation

Attitude toward excavation _____

Description of Site Forested area just to the northeast of The Spring; the site covers an area of approximately 200 by 50 feet.

Vegetation Deciduous forest Depth Unknown Cultivation None

Soil of site (surface/base, type) Surface: Podzol sands Base: Gravel

Nearest surrounding water Lake Michigan

Previous excavation None

Buildings, roads, etc. None

Possibility of destruction Unknown

Surface features Tree-fall hummocks, no cultural features visible

Burials None

Artifacts Chippage only, no diagnostic artifacts

Other collections from site None

Remarks Surface collection is small but may not reflect actual site size and density. Also, time spent in surface collection was brief.

Recorder Marla Buckmaster Date recorded August 21, 1967 Date visited August 15, 1967

Aerial photo None Sketch map made? Yes

Date August 21 , 1967

ARCHAEOLOGICAL SURVEY RECORD

Site North Manitou 6 20 LU 37 Map North Manitou County Leelanau
Other Designations for site

Twp. T 31 N R 14 W Section 15 ¼ Section S½ of Nw Elev. ca. 620

Present tenant National Park Service Address

Owner National Park Service Address

Previous owners, dates Detroit Bank and Trust, William R. Angell Foundation

Attitude toward excavation

Description of Site Site lies to the east of the Main road between the spring and the Old Strormer Dock Road. Site is covered with hemlock, juniper, and hydropphytic hardwood. Road has destroyed some parts of the site.

Vegetation see above Depth ca. 1 foot Cultivation none

Soil of site (surface/base, type) humus and podzol soils

Nearest surrounding water Lake Michigan

Previous excavation None

Buildings, roads, etc. Road cuts through the site area

Possibility of destruction Unknown

Surface features None

Burials Unknown

Artifacts Chippage, no diagnostics

Other collections from site None

Remarks None

Recorder Marla Buckmaster Date recorded August 21, 1967 Date visited August 16, 1967

Aerial photo No Sketch map made? Yes

Date August 21, 1967

ARCHAEOLOGICAL SURVEY RECORD

Site North Manitou 3 20 LU 38 Map North Manitou County Leelanau

Other Designations for site

Twp. T 32 N R 14 W Section 27 ¼ Section SE¼ of NW¼ NE¼ of SW¼ NW¼ of SE¼ Elev. 600'-610'

Present tenant National Park Service Address

Owner National Park Service Address

Previous owners, dates Detroit Bank and Trust, William R. Angell Foundation

Attitude toward excavation

Description of Site Occupies both sides of the north shore road from the Ten Commandment Tree to one quarter mile northwest of same. Site area encompasses from the edge of 600' terrace to the bluffs 50 yards west.

Vegetation beech and maple Depth ca. 1 foot Cultivation None

Soil of site (surface/base, type) Surface: Thin podzols Base: Gravel

Nearest surrounding water Lake Michigan

Previous excavation None. Michigan State University excavated five test pits.

Buildings, roads, etc. North Shore Road cuts through site.

Possibility of destruction Unknown

Surface features Tree-fall hummocks, no cultural features.

Burials None encountered during excavation.

Artifacts See Michigan State University Catalog File; artifacts include Late Archaic Pomranky Cache Blades, stemmed and side notched points, large side scrapers.

Other collections from site None

Remarks Definitely worth further excavation.

Recorder Marla Buckmaster Date recorded August 16, 1967 Date visited August 16, 1967

Aerial photo None Sketch map made? Yes

Date August 21, 1967

ARCHAEOLOGICAL SURVEY RECORD

Site North Manitou 4 20 LU 40 Map North Manitou County Leelanau
Other Designations for site

Twp. T 31 N R 14 W Section 34 $\frac{1}{4}$ Section NE Elev. 600'

Present tenant National Park Service Address

Owner National Park Service Address

Previous owners, dates Detroit Bank and Trust, William R. Angell Foundation

Attitude toward excavation

Description of Site Located just north of cherry picker shacks near the north end of North Cherry Road. Site area is generally clear with little vegetation.

Vegetation Cherry trees Depth Unknown Cultivation Cherry Orchard

Soil of site (surface/base, type) Surface: Sand Base: Gravel

Nearest surrounding water Lake Michigan

Previous excavation None

Buildings, roads, etc. Note description of site above.

Possibility of destruction Unknown

Surface features None

Burials None

Artifacts Chippage only, no diagnostics

Other collections from site None

Remarks None

Recorder Marla Buckmaster Date recorded August 17, 1967 Date visited August 17, 1967

Aerial photo None Sketch map made? Yes

Date August 16, 1967

ARCHAEOLOGICAL SURVEY RECORD

Site North Manitou 1 and North Manitou 2 Map North Manitou County Leelanau
Other Designations for site 20 LL 41 and 20LL 42

Twp. T 32 N R 14 W Section 27 $\frac{1}{4}$ Section NW Elev. 600'

Present tenant National Park Service Address

Owner National Park Service Address

Previous owners, dates Detroit Bank and Trust, William R. Angell Foundation

Attitude toward excavation

Description of Site Cultural material along the road that runs along the 620' terrace inland from the north shore. Site is covered with deciduous vegetation.

Vegetation Deciduous Forest Depth Cultivation None

Soil of site (surface/base, type) Surface: podzolic sands Base: Gravel

Nearest surrounding water Lake Michigan

Previous excavation None

Buildings, roads, etc. Unmodified two track dirt road cuts through the site area.

Possibility of destruction Unknown

Surface features None

Burials Unknown

Artifacts Chippage, no diagnostics

Other collections from site None

Remarks None

Recorder Valetta Canouts Date recorded August 21, 1967 Date visited August 16, 1967

Aerial photo NO Sketch map made? Yes