A survey of Willow Metropark, Wayne County, Michigan

Ashlee Ann Jed

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A survey of Willow Metropark, Wayne County, Michigan

Abstract
There has been little archaeological research on prehistoric settlement patterns for Southeast Michigan with which to understand how humans interacted with their environments and landscapes. Based on James Krakker's hypotheses on agricultural settlements and limited-use prehistoric components (PCs) in Southeast Michigan, agricultural settlements should be associated with well-drained soil adjacent to arable soil suitable for cultivation, and they should be located within 1 km of a river while limited use PCs should be located further inland. This thesis uses survey data from the 2009-2012 Eastern Michigan University Archaeology Field School seasons to test Krakker's hypotheses in the Willow Metropark, Wayne County, Michigan. The results of this study indicate that agricultural settlements were associated with well-drained soils adjacent to arable soils and they were located within 1 km of a river. However, limited-use PCs were not always located further inland. These results support Krakker's hypotheses on Late Woodland period settlements or camps but may suggest limited-use PCs were less influenced by landform and distance from the river.

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First Advisor
Bradley Ensor

Second Advisor
E.L. Cerroni-Long

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A SURVEY OF WILLOW METROPARK, WAYNE COUNTY, MICHIGAN

By

Ashlee Ann Jed

A Senior Thesis Submitted to the

Eastern Michigan University

Honors College

in Partial Fulfillment of the Requirements for Graduation

with Honors in Sociology, Anthropology, and Criminology

Approved at Ypsilanti, Michigan, on this date Dec. 12, 2014
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ABSTRACT

There has been little archaeological research on prehistoric settlement patterns for Southeast Michigan with which to understand how humans interacted with their environments and landscapes. Based on James Krakker’s hypotheses on agricultural settlements and limited-use prehistoric components (PCs) in Southeast Michigan, agricultural settlements should be associated with well-drained soil adjacent to arable soil suitable for cultivation, and they should be located within 1 km of a river while limited-use PCs should be located further inland. This thesis uses survey data from the 2009-2012 Eastern Michigan University Archaeology Field School seasons to test Krakker’s hypotheses in the Willow Metropark, Wayne County, Michigan. The results of this study indicate that agricultural settlements were associated with well-drained soils adjacent to arable soils and they were located within 1 km of a river. However, limited-use PCs were not always located further inland. These results support Krakker’s hypotheses on Late Woodland period settlements or camps but may suggest limited-use PCs were less influenced by landform and distance from the river.
CHAPTER 1:
INTRODUCTION

This thesis examines prehistoric archaeological sites identified from a survey at Willow Metropark, Wayne County, Michigan. The fieldwork took place during the 2009-2012 seasons of the Eastern Michigan University Archaeology Field School under Dr. Bradley Ensor's direction. The project had three objectives: to provide students with survey training for Cultural Resource Management, to refine and expand archaeological data in a sample area of the Lower Huron River Valley in Southeast Michigan, and to contribute to the cultural resources inventory for the park's balancing of preservation and development needs.

Some prehistoric sites were previously recorded in and nearby Willow Metropark. Among these sites, an early Late Woodland Period archaeological site, 20WN14, was identified by James Krakker (1983) during a surface survey for his PhD dissertation. This site is located next to the Lower Huron River in the Willow Metropark. However, most of the prehistoric components required locational verification as well as more information on their site type and the range of activities that took place at each one. Sixty sites with prehistoric components were identified in the Eastern Michigan University survey.

Archaeological sites in the Great Lakes usually do not yield a large amount of well-preserved artifacts or features such as structures, trash deposits, pottery, stone tools, and hearths. This makes interpreting prehistoric activities difficult. Archaeological investigation in the Great Lakes Region generally requires the analysis of artifact attributes, densities, and dispersions in order to define the function of a site (Fitting 1969:
Unfortunately, the lack of archaeological investigation conducted in Southeast Michigan has led to poor understanding of prehistoric activities during the Late Woodland Period.

The complexity of the Late Woodland Period can be broken up into three settlement pattern models: the Chippewa, Ottawa, and the Potawatomi (Fitting and Cleland 1969). The Chippewa peoples’ main villages were comprised of summer camps that existed for the exploitation of fish. In comparison to the summer sites, the winter sites were smaller and had multiple locations inland from the lakes. The Ottawa peoples were dependent on hunting and fishing, agriculture, and trading. They were considered semi-sedentary because their agricultural villages were moved occasionally. Their main village site was a large camp occupied for several seasons. Some winter sites were very small and served as specialized hunting sites (Fitting and Cleland 1969: 293-296). The Potawatomi peoples lived in large, temporary hunting camps during winter and lived in large permanent villages during summer. Winter sites were large, but did not have any permanent structures (Fitting and Cleland 1969: 297).

Krakker conducted a surface regional survey of the Lower Huron River Valley in the 1980s. The 2009-2012 Eastern Michigan University Archaeology Field School seasons resurveyed Willow Metropark with standard shovel tests. Krakker (1983) suggested that agricultural settlements must be located on well-drained soils. In addition, he hypothesized that agricultural settlements must be adjacent to arable soils suitable for cultivation and they should be in close proximity (within 1 km) to a river. Smaller limited-use sites should be located further away from the river (Krakker 1983). These hypotheses can be tested with the survey data from the field school. If Krakker’s
hypotheses are accurate, then every settlement/camp found in Willow Metropark must be located on well-drained soil adjacent to arable soil for cultivation, and they must be within 1 km of a river. Limited-use sites must be located further inland.

Chapter 2 will examine past research on settlement patterns in southeastern Michigan, the Late Woodland Period in southeastern Michigan, soil types of Willow Metropark, and the models of social organization first proposed by James Krakker. Chapter 3 will describe the methods used by the Eastern Michigan University Archaeology Field School and how the results of the survey can be used to test Krakker’s hypotheses on agricultural settlement location in relation to soil types and distance from a river, as well as his hypothesis on limited-use site location. Chapter 4 will focus on the results of the analysis. Chapter 5 will compare those results with Krakker’s models of settlement and limited-use location described in Chapter 2 to form the conclusions.
CHAPTER 2:
SITE TYPES, THE LATE WOODLAND PERIOD, AND SOIL TYPES AND SETTLEMENT PATTERNS IN SOUTHEAST MICHIGAN

This chapter examines past research on settlement patterns in southeastern Michigan. The first section describes previous understandings of site types and site activity classifications in the Great Lakes Region. The second section discusses the Late Woodland period in southeastern Michigan. The third section describes the types and characteristics of the soils found in Willow Metropark and how they relate to specific settlement patterns. The fourth section presents my expectations and hypotheses based on the soil type characteristics present in Willow Metropark as well as the two models of social organization first proposed by James Krakker in his PhD dissertation (Krakker 1983). The final section summarizes the topics discussed throughout the chapter.

Site Types in Southeastern Michigan

Prehistoric archaeological sites in Michigan have a range of material culture: earthworks, mounds, and a small amount of artifacts (remnants of sites that were very lightly occupied). In order to study Michigan's settlement patterns, new parameters of site identification and classification had to be created to accommodate the state's lack of easily surveyable areas (Fitting 1969: 361-362).

Early settlement studies used site size and occupation intensity, season of occupation, and stability variables. Griffin (1956) suggested projecting normative settlement and chronological models against changes in the background of environments in the Midwest. Sites of a certain time period represented the sole settlement type for that
period. Camps were thought to have been occupied by Paleo-Indian and Archaic peoples while villages were thought to have been occupied by Middle and Late Woodland peoples. Over time, this model proved inadequate for the complex data and it brought about distortions (Fitting 1969: 362). It became clear that camp and village settlement types were not restricted to one group or another. The peoples from each time period had a unique mix of camp and village settlements depending on other variables. Models were created in terms of more intra-horizon types within a larger system in order to make the models accurate and complex. The variables now used in settlement studies include season of occupation and site specialization, site size and intensity, and the stability of the society (Fitting 1969: 362).

**Floral and Faunal Remains**

Food remnants and site location determine season of occupation (Fitting and Cleland 1969: 292). One must be cautious when determining season of occupation with floral remains because season of harvest doesn’t always match up with season of occupation. Crop foods may all be storable, but they may offer some help with season of occupation determination. It is unlikely that inhabitants would plant crops and then leave them untended for extended time periods. In order to figure out how long the crops would have kept inhabitants in one location, the length of time crops were in a field must be determined (Keene 2004: 677-678). For sites located near rivers or bodies of water, the seasonal availability of fish may be determined with data compiled from an intensive biological survey. Birds are a great source of data on season of occupation because many species migrate. However, invertebrates, such as bivalves and gastropods, offer little help with season of occupation. Mammals may provide additional data depending on what
types of bones were found. For instance, deer antlers and juvenile tooth eruption may be used along with breeding seasons (Keene 2004: 682).

Site specialization may also be demonstrated by floral and faunal remains, and soil and sediments which may determine season of occupation. For example, animal and plant exploitation found associated with chipped stone tools may indicate fishing stations or hunting camps (Fitting and Cleland 1969: 292).

**Gender and Site Type**

Site specialization may be related to the division of labor according to gender. It was once thought that feminine ratios of a settlement may have been determined by the ratio of the artifacts associated with the specific activities of either gender. Generally, the amount of chipped stone compared to the amount of ceramics can be used as a rough indicator of masculine and feminine activities. If sherds, small remnants of pottery, rather than chipped stone make up most of the artifacts, then the site was probably predominantly occupied by the feminine gender (Fitting and Cleland 1969: 293).

However, recent research suggests otherwise. While some tasks, such as hunting, were almost exclusively believed to be men’s activities, many tasks aren’t consistently assigned to one gender (Baker and Jacobson 2007: 768). There are five logical possibilities for the distribution of tasks across a production sequence according to Burton et. al. (2007). In the first, all tasks in the sequence are completely done by men while in the second, all tasks are done completely by women. All tasks can possibly be shared by the two genders as well. On the other hand, the sequence can be begun by men and completed by women with an intermediate stage where both genders participate.
equally. In the last, an activity is begun by men without the intermediate stage where both genders participate equally (Burton et. al. 1977: 230).

Site Size

Site size can be defined by the distribution and amount of cultural material found within a site and it can also be categorized into small and large settlements. Sites are considered small if they are only 1-2 hectares and have a low density of artifacts. Sites are considered large if they encompass a larger area and have a high density of artifacts. Two methods have traditionally been used to determine site size: surface collection of artifacts in plowed fields or altered environments and shovel testing where buried archaeological remains and their distributions are recovered (Cook and Burks 2011: 145).

Artifact Diversity and Density

The density of cultural material, also referred to as intensity, is measured by the amount of artifacts retrieved in relation to the volume of any distinct component or the excavated surface area of the site (Fitting 1969: 362-363). In the Great Lakes area, stable occupations are those that lasted for at least one season. These sites generally appear as intensive occupations if the stable occupation of the site was repeated for several seasons. If a stable site occupied for one season had a low artifact density, it would be classified as extensive (Fitting 1969: 362-363).

Sites containing at least two material artifact combinations are considered high diversity while sites containing one artifact category are considered low diversity. Pre-ceramic site ratios include counts of chipped stone artifacts and fire cracked rock found per square foot (Fitting 1969: 362-363). High diversity sites are generally characterized
as settlements or camps while low diversity sites are generally characterized as limited-use prehistoric components.

The light occupation of a site results in a low density of artifacts. Portions of Willow Metropark were plowed in the past but now have grass cover or dense regrowth of vegetation. Fields that have been plowed make surface collecting quite difficult because the top layers of soil were disturbed in the plowing process and in turn earlier and later artifact deposits are mixed (Fitting 1969: 361). Agricultural manipulation such as plowing may bring buried material to notice, but it also impairs interpretation of the record by altering artifact form, size, and location. In spite of this, plowed materials are still important components of archaeological field research. They reveal important information about the formation of plow zone assemblage and even data about the presence, character, and distribution of deposits of artifacts under the plow zone (Dunnell and Simek 1995: 305, 317). However, the dense growth of vegetation creates a larger problem for the collecting of artifacts.

**The Late Woodland Period in Southeastern Michigan**

The peoples of the Late Woodland period were horticulturists. Long term survival of horticulturists in an uncertain environment requires a hierarchy of regulatory mechanisms operating above the subsistence level. In other words, regulators that occur above the subsistence level, such as population fluctuation, must be present for the survival of horticulturalists. Environmental uncertainty is a fundamental problem for dwellers in the temperate deciduous forest of the Great Lakes Region (Krakker 1983: 228). After A.D. 1000, horticultural settlements became a recognizable part of the settlement pattern. In addition to horticulture settlements, seasonally occupied special
purpose camps were a large part of the settlement patterns. This is expected because Late Woodland peoples practiced long cycle shifting cultivation. (Krakker 1984: 223).

Shifting cultivation, also known as slash and burn agriculture, is the act of clearing a patch of forest by burning and felling trees and then cultivating the patch for at least one year before abandoning it to create more patches (Seavoy 1973: 527). Long cycle shifting cultivation uses long fallow periods between each patch shift (Lawrence 2005: 26). These seasonally occupied special purpose camps had a definite seasonal round of subsistence activities. It wasn’t efficient to exploit variable resources from one main settlement, so horticultural settlements might have been seasonally abandoned or a small group from the community might always reside there while work groups occupied seasonal satellite camps for specialized tasks (Krakker 1984: 223).

Archaeological evidence suggests that before A.D. 1000, settlement and subsistence patterns were characterized by seasonal movements. As cultivation became more important, settlement locations shifted to provide access to increasingly large areas of arable land. Locations of probable horticultural settlements in Southeastern Michigan suggest the latest sites are close to the most extensive areas of easily tilled soils. The later occupations seem to be clustered in limited areas of major stream valleys and close to Lake St. Clair and Lake Erie. This may be a response to restriction of location choices by larger community size (Krakker 1984: 230). The density of agricultural settlements are expected to be related to the distribution of arable soil. The nature and drainage of the soils of the lake plain of southern and western Wayne County place limitations on shifting cultivation (Krakker 1983: 431).
Soil Types of Willow Metro Park and Settlement Patterns

Soil Types

As a product of the retreat of the Late Wisconsin ice sheet, a series of glacial lakes were created. The actions of this series of post glacial lakes created two physiographic provinces in the Southeastern Michigan Region: the upland moraine and the lake plain. The glacial origins of these two zones influenced the major soil and vegetation characteristics of the region (Branstner and Prahl 1984: 17). Willow Metropark is located on the lake plain. The lake plain is made up of remnant glacial beach and dune lines which are mostly composed of well-drained fine sands and sandy loams (Branstner and Prahl 1984: 17). The well-drained sands and sandy loams create a complex pattern of ridges and lowland resulting in a unique mosaic of vegetation (Krakker 1983: 401).

Willow Metropark’s soils include Blount, Metamora, Metea, Morley, Oakville, Pewamo, Selfridge, Tedrow, Wasepi, Gilford, Boyer, Shoals, Belleville, Corunna, and cut and fill land. Table 1 summarizes the soil characteristics and their suitability to crops, flora, and fauna. Of these fifteen soil types, only Oakville soils are poorly suited to crops commonly grown in the county. Oakville soils are well drained or moderately well drained soils formed with sandy material (Larson 1977: 27). Since these soils are well drained, they are not arable. Therefore, Oakville soils are perfect for settlement locations because they are dry and vegetation is often thin on well-drained sandy soils (Krakker 1983: 401). Smaller groups like hunter and gatherers or foragers may have occupied areas that contain Oakville soils. This type of soil provides land that would also most likely be used by seasonal camps.
However, Metea, Pewamo, Selfridge, Tedrow, and Boyer soils are moderately well suited to crops commonly grown in the county. Metea soils are well drained soils formed in sandy material and underlying loamy glacial till (Larson 1977: 24-25). Pewamo, Selfridge, and Tedrow soils are poorly drained or very poorly drained soils. Pewamo soils formed in loamy and clayey glacial till, Selfridge soil formed in sandy and loamy material, and Tedrow soil formed in water lain sandy material (Larson 1977: 29-36). Boyer soils are well drained soils formed in sandy and gravelly glaciofluvial deposits (Larson 1977: 16). Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils are the best suited soils out of all of Willow’s soils for growing crops. Blount and Metamora soils are poorly drained where Blount soils formed in loamy glacial till and Metamora soils formed in sandy and loamy material (Larson 1977: 15, 23-24). Morley soil is well drained or moderately well drained soil that formed in loamy and clayey glacial till (Larson 1977: 25). Wasepi soils are poorly grained and formed in sandy and gravelly glaciofluvial deposits. Gilford soils are poorly drained sandy, loamy, and gravelly glaciofluvial deposits. Shoals, Belleville, and Corunna soils are all poorly drained as well. Shoals soil forms in loamy alluvium, Belleville in sandy glacioluvium and loamy lacustrine or till, and Corunna in sandy and loamy material underlain by loamy material (Larson 1977: 16-38). Therefore, Metea, Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils are all suitable for growing crops. Areas containing these soils are well suited for cultivation but not settlements.
<table>
<thead>
<tr>
<th>Soil</th>
<th>Characteristics</th>
<th>Crops</th>
<th>Flora</th>
<th>Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oakville</td>
<td>well drained or moderately well drained sandy material</td>
<td>poorly suited</td>
<td>woody plant group 3</td>
<td>N/A</td>
</tr>
<tr>
<td>Metea</td>
<td>well drained sandy and loamy glacial till material</td>
<td>moderately well suited</td>
<td>woody plant group 3</td>
<td>woodland wildlife</td>
</tr>
<tr>
<td>Pewamo</td>
<td>poorly drained or very poorly drained loamy and clayey glacial till material</td>
<td>moderately well suited</td>
<td>woody plant group 5</td>
<td>wetland wildlife</td>
</tr>
<tr>
<td>Selfridge</td>
<td>poorly drained or very poorly drained sandy and loamy material</td>
<td>moderately well suited</td>
<td>woody plant group 2</td>
<td>woodland wildlife</td>
</tr>
<tr>
<td>Tedrow</td>
<td>poorly drained or very poorly drained waterlain sandy material</td>
<td>moderately well suited</td>
<td>woody plant group 2</td>
<td>N/A</td>
</tr>
<tr>
<td>Blount</td>
<td>poorly drained loamy glacial till material</td>
<td>well suited</td>
<td>woody plant group 2</td>
<td>openland and woodland wildlife</td>
</tr>
<tr>
<td>Metamora</td>
<td>Poorly drained sandy and loamy material</td>
<td>well suited</td>
<td>woody plant group 2</td>
<td>openland and woodland wildlife</td>
</tr>
<tr>
<td>Morley</td>
<td>well drained or moderately well drained loamy and clayey glacial till material</td>
<td>well suited</td>
<td>woody plant group 4</td>
<td>openland and woodland wildlife</td>
</tr>
<tr>
<td>Wasepi</td>
<td>poorly drained sandy and gravelly glaciofluvial deposits</td>
<td>suited</td>
<td>woody plant group 2</td>
<td>openland and woodland wildlife</td>
</tr>
</tbody>
</table>
Table 1. Willow Metropark Soil Types (Compiled from Larson 1977).

<table>
<thead>
<tr>
<th>Soil</th>
<th>Characteristics</th>
<th>Crops</th>
<th>Flora</th>
<th>Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gilford</td>
<td>poorly drained sandy, loamy, and gravelly glaciofluvial deposits</td>
<td>suited</td>
<td></td>
<td>wetland wildlife 5</td>
</tr>
<tr>
<td>Cut and Fill Land</td>
<td>original soils are impossible to identify because of mechanical mixing</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Boyer</td>
<td>well drained sandy and gravelly glaciofluvial deposits</td>
<td>moderately well suited</td>
<td>woody plant group 3</td>
<td>woodland wildlife</td>
</tr>
<tr>
<td>Shoals</td>
<td>poorly drained loamy alluvium</td>
<td>suited</td>
<td>woody plant group 2</td>
<td>woodland wildlife</td>
</tr>
<tr>
<td>Belleville</td>
<td>poorly drained and very poorly drained sandy glacioluvium, loamy lacustrine or till</td>
<td>suited</td>
<td>woody plant group 2</td>
<td>N/A</td>
</tr>
<tr>
<td>Corunna</td>
<td>poorly drained sandy and loamy material and underlain by loamy material</td>
<td>suited</td>
<td></td>
<td>wetland wildlife 5</td>
</tr>
</tbody>
</table>

Soils and Settlement Patterns

Camps and settlements associated with cultivation should occur on areas that contain Oakville soils. However, access to arable soil sufficient enough to support a community must be a factor in the selection of a location for an agricultural settlement (Krakker 1983: 424). Settlements must be adjacent to soils suitable for cultivation such as
Metea, Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils. Agricultural settlement locations, along with being located in proximity to arable soil, are also expected to be concentrated within 1 km from major streams (Krakker 1983: 399, 405). This provides access to fish, other riverine resources, and the ability to use major streams and rivers for transportation. The Huron River is the major water stream for Willow Metropark; it snakes through the middle of the park. The distribution of ceramics and projectile points in the Lower Huron and Silver Creek areas, collected by Krakker during the surface survey for his PhD dissertation, supports his proposal that Late Prehistoric agricultural settlements are most intensive within 1 km of the Huron River (Krakker 1983: 406).

The Metea, Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soil types found in Willow Metro Park are well suited for growing crops (Larson 1977). Late Woodland peoples may have used these soils for cultivation. However, Oakville soil is not suitable for growing crops because it is well drained and dry. Therefore, Late Woodland peoples may have used lands with this non-arable soil type for their settlements (Krakker 1983: 424). Krakker (1983) also hypothesized that agricultural settlement locations, along with being located in proximity to arable soil, are also expected to be concentrated within 1 km from major streams. This ensures access to fish and other riverine resources as well as the use of the major stream as a means of transportation (Krakker 1983: 399, 405-406). With this in mind, Late Woodland settlements should be located on Oakville soil which should be adjacent to arable soils such as Metea, Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils used for cultivation. In addition,
the settlements should be located within 1 km of the major stream source, the Huron River. Settlements and camps should not be located on arable soils because areas containing these soils are generally moderately or poorly well drained and therefore are susceptible to flooding. These expectations will be tested using the more comprehensive Eastern Michigan University survey data collected from Willow Metropark.

Summary

Generally, deciphering settlement patterns throughout southeastern Michigan depends on the presence of a small amount of artifacts along with earthworks and mounds rather than classifying sites as a city, ceremonial center, town or village. Sites were too lightly occupied to produce enough artifacts and structural remnants necessary to be considered any of these units. Instead, settlement studies now use variables such as site size and intensity, season of occupation, and stability to characterize sites (Fitting 1969: 362). Site specialization can be related to the division of labor based on gender and it can also be demonstrated by non-artifactual material such as floral and faunal remains (Fitting and Cleland 1969: 293).

The site variables of Late Woodland locations were influenced by the unpredictable weather and environmental patterns of the Great Lakes Region. Settlement and subsistence patterns were characterized by seasonal movements, but as cultivation became increasingly important to the Late Woodland peoples, their settlement location choices relied heavily on the presence of arable land. Since Late Woodland peoples practiced long cycle shifting cultivation, a slash and burn method with long fallow periods, a large part of the settlement pattern consisted of seasonally occupied special
purpose camps; they had a definite seasonal round of subsistence activities (Seavoy 1973: 522; Lawrence 2005: 26; Krakker 1984: 231).

Based on Krakker’s hypothesis on agricultural settlements and camps, they should be located on well-drained soils such as Oakville or Metea and they should be adjacent to arable soils well suited for cultivation such as Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils. In addition, agricultural settlements/camps should be no more than 1 km away from the Huron River. However, limited-use prehistoric components should be located further inland.
CHAPTER 3:
METHODS

This chapter describes the field and lab methods used during Eastern Michigan University Field School's survey of Willow Metropark in the 2009-2012 seasons. Site size and the artifact quantity and combinations with the presence of specific chipped stone attributes are used to provide a definition of camps and settlements versus limited-use sites. As described in Chapter 2, Krakker (1983) suggested agricultural sites are located on well-drained soils adjacent to arable soil for the purpose of cultivation. In addition, Krakker offered that these agricultural settlements must be in close proximity (within at least 1 km) of a major stream such as the Huron River. This would provide possible transportation and access to an abundance of riverine sources (Krakker 1983: 405). Further archaeological investigation of Willow Metropark was conducted by the Eastern Michigan Archaeology Field School. The survey data uncovered during the 2009-2012 seasons can be used to test Krakker's model for agricultural settlements.

Survey Methods

For the survey in Willow Metropark, a total of 954 shovel tests were dug in 50 m intervals on a cardinal grid pattern (Figure 1). Natural obstacles such as dense vegetation, buildings, and disturbed areas occasionally prevented exact 50 m intervals.

The shovel tests were each about 30 cm in diameter. Each shovel test was excavated to a maximum of 1.00 m except when the water table, dense roots, or clays
were encountered. The sediment was sifted in increments of 20-30 cm at a time. In order to find artifacts, all sediment excavated was screened through 6 mm (1/4") wire mesh.

Figure 1. Shovel Test survey of Willow Metropark (Eastern Michigan University Archaeological Field School).

A field journal describing each shovel test was kept that included the shovel test number, the approximate depth of each strata along with their sediment characteristics,
and encountered artifacts and their location and depth. Each artifact category was collected in a bag labeled with its provenience information.

The strata characteristics recorded include texture, compaction, and color. Texture was described as sand, silt, or clay with sand being the coarsest and clay being the most fine. Compaction categories include loose, lightly compact, compact, and very compact. Strata color was defined based on the Munsell soil color charts.

A minimum of one artifact needs to be present for the area to be classified a site. Sites are also distinguished by a distance of 100 m between artifacts. Settlements should have a high density of at least two material category combinations. Camps should have the same range of material category combinations, but with less quantity and smaller site size. However, these definitions are subject to change: sometimes multiple components with different dates in close proximity with one another can seem like one large settlement. Limited use sites should have one artifact category in lower density with a small site size.

Each season after fieldwork was completed, lab work comprised several phases. The collected artifacts were sorted into categories and were bagged for cataloging. Artifact categories included fire-cracked rock, lithic, ceramic, historic ceramic, historic metal, historic glass, fauna and miscellaneous. The miscellaneous category included artifacts such as clinkers, brick, Bakelite, coal, and so on. Although historic artifacts were collected, the analysis of historic artifacts doesn’t fall within the extent or range of this survey. Therefore, historic artifacts will not be discussed past this point.

Since historic artifacts are not included in this thesis, the found areas that contain artifacts will be referred to as prehistoric components (PCs). Both the historic artifact and
prehistoric artifact distributions would result in site definitions. PCs are defined only by the presence of prehistoric artifacts. The distance between shovel tests defines a PC and, along with artifact diversity and density, they define the type of PC. In this study, PCs can be categorized as small or medium limited-use areas or large settlements/camps. A distance of about 100 m (two shovel tests) distinguishes a PC from another.

**Artifact Analysis**

Fire-cracked rock, lithics, and ceramic are all considered indigenous Prehistoric artifacts. These material categories and their attributes were analyzed. Fire-cracked rock density and weight were recorded. Lithics were categorized into categories, then their attributes or condition, size and technology, and the degree of reduction were noted. Pottery density and size were recorded. The data collected from the artifact types can be used to interpret site size.

*Fire-cracked Rock*

Fire-cracked rock is characterized by sharp and angular fractures which indicate exposure to intense heat. These remains were only counted and weighed because the stone material couldn't be identified due to the burned surfaces and alterations in heat temperature. The presence of fire-cracked rock suggests an area was used for heating or for the cooking of foods usually for large groups. Therefore, the presence of fire-cracked rock indicates the area was either a camp site or a settlement.

*Chipped Stone*

All of the collected lithics were chipped stone artifacts. They were classified by stone material and were then separated into three categories: debitage, cores, and formal tools. Debitage is the byproduct or waste of chipped stone manufacturing. Analysis of
debitage included recording attributes or condition, size and technology, and the degree of reduction. Condition categories include complete flake, broken flake, split flake, flake fragment, shatter, and indeterminate. Complete flakes have both their platform and termination present. Broken flakes have platforms present, but they lack termination. Split flakes are broken along the long axis and flake fragments have terminations present, but lack platforms. Shatter are angular lithics that lack flake morphology. Large primary flakes are created by initial reduction while small tertiary flakes are created during tool finishing and retouching. A location containing a high percentage of complete flakes and shatter suggests the area was used for core reduction and expedient tool production. In contrast, an area was most likely used for formal tool manufacturing when a high percentage of broken flakes and fragments and a low percentage of complete flakes and shatter are all present.

Individual pieces of debitage were placed within a series of squares in order to record their size. The sizes of the squares are as follows: <0.5 cm, 0.5-1.0 cm, 1.0-1.5 cm, 1.5-2.0 cm, 2.0-3.0 cm, 3.0-3.5 cm, 3.5-4.0 cm, and >4.0 cm. Functional activities can be determined by the size categories. In turn, the functional activities can often be correlated with technology and reduction.

The technological categories include hard hammer percussion, soft hammer percussion, soft pressure, bipolar percussion, and indeterminate. Hard hammer percussion attributes are produced by hammerstones of rock harder than the core material. A pronounced bulb, fissures, and compression rings are products of hard hammer percussion. Soft hammer percussion attributes are produced by a hammer of lesser hardness than the core material. A diffused bulb and little to no fissures and compression
rings are produced by soft hammer percussion. Soft pressure attributes are produced by the application of pressure flaking with a pointed applicator. Feathered terminations and a small bulb are produced by soft pressure. Bipolar percussion attributes are produced by placing a core on an anvil and striking it with a hammerstone. As a result, sheared or split bulbs and the presence of crushing on proximal and distal ends are produced.

A core is the nucleus or the original material from which flakes were removed for the manufacturing of formal tools. Therefore, a core has negative flake scars. These were categorized based on condition, method of manufacture, and weight. Condition of a core was described as either a whole core or a core fragment. The method of manufacture categories, or technology categories, include tested cobble, conical core, bifacial core, multidirectional core, and indeterminate. Tested cobble cores have a few flake scars which indicate the core was abandoned. Conical cores have flake scars that are usually in the same direction around the entire platform. This suggests flake production was efficient. Bifacial cores only have two sides that were reduced and this indicates the conservation of materials. Multidirectional cores were created by the use of percussion techniques from multiple directions, indicating expediency. These categories are important because they indicate what kind of formal tools were being created.

Debitage reduction stages are based on the percentages of cortex on the dorsal surface. These reduction stages include primary, secondary, and tertiary. Primary debitage has more than ninety percent cortex which indicates the early reduction and testing activities. Secondary debitage has one to ninety percent cortex which indicates intermediate reduction activities. Tertiary debitage has no cortex, suggesting reduction activities from the manufacturing of a formal tool or with a heavily used core.
High rates of formal tool production is associated with semi-sedentary and sedentary settlements (Ensor 2009). Therefore, a site containing a low percentage of complete flakes and a high percentage of shatter and broken flakes indicates that the site was a settlement or camp rather than a limited-use site. High rates of expedient tool production are associated with short-term or limited-use sites (Ensor 2009). Considering this, a site containing a high percentage of one type of debitage indicates that the site was a short-term or limited-use site. The type of debitage found depends on the main activity represented by the site. Larger sites are either settlements or camps while smaller sites are limited-use sites. Settlements and camps should contain shatter and broken flakes while a limited-use camp should contain complete flakes.

Ceramic

Pottery sherds were counted and measured for size. The individual sherds were placed within a series of squares in order to record their size. The sizes of the squares are as follows: <0.5 cm, 0.5-1.0 cm, 1.0-1.5 cm, 1.5-2.0 cm, 2.0-3.0 cm, 3.0-3.5 cm, 3.5-4.0 cm, and >4.0 cm. Anything larger than 4.0 cm was measured with a caliper. All of the sherds were too small to classify as either body fragments or lip fragments. Therefore, the diameter, form, and function could not be determined. The small sherds are only used for presence or absence to identify limited-use site versus settlements and camps.

Artifacts and Their Relation to Site Type

Sites with pottery suggest storing and cooking. The presence of fire-cracked rock indicates the cooking of foods and heating. If all or a combination of these artifacts are found together, one can conclude the area was used for cooking. An area was used for chipped stone tool manufacturing if a variety of lithics are found closely associated with
each other. When ceramics, fire-cracked rock, and multiple tools and debitage types are present, the location can be interpreted as a settlement. A limited-use PC might contain a small amount of lithics, fire-cracked rock, or a combination of these.

Camps and settlements have a higher density of material categories than limited-use sites do. Limited-use sites are also smaller than camps and settlements. Limited-use PC usually only have a low density in one artifact category while camps and settlements have a high density in at least two material category combinations.

In sum, camps and settlements are associated with the high density combination of ceramic, fire-cracked rock, tertiary flakes, and a high percentages of shatter and broken flakes. For example, a heavily occupied camp is associated with the presence of chipped stone, fire-cracked rock, and possibly fauna (animal bones). Limited-use PCs are associated with one type of artifact. Limited-use site are also associated with the presence of expedient chipped stone and low density.

**Settlement Pattern Analysis**

Using Figure 1, the artifact materials and their quantities from the shovel tests were plotted. Then, site boundaries were defined and each were classified into a functional site type (settlements or limited-use sites). The site types were compared to the soil types and the distance from the Huron River.

**Summary**

Fire-cracked rock, chipped stone, and pottery from each PC were examined. Fire-cracked rock was only counted and weighed because the stone material couldn't be identified due to the burned surfaces and alterations in heat temperature. Chipped stone were classified by stone material and were then separated into three categories: debitage,
cores, and formal tools. Chipped stone attributes including condition, size and technology, and the degree of reduction were then noted. Sherds were counted and measured. Since all of the sherds were too small to classify as either body fragments or lip fragments, their diameter, form, and function could not be determined.

Settlements/camps are associated with the high density combination of ceramic, fire-cracked rock, tertiary flakes, and a high percentages of shatter and broken flakes while limited-use PCs are associated with one type of artifact, the presence of expedient chipped stone, and low density.

To analyze settlement patterns, the artifact materials and their quantities from the shovel tests were plotted on Figure 1. Site boundaries were defined and each were classified as settlements/camps or limited-use PCs. The site types were then compared to the soil types and the distance from the Huron River.
CHAPTER 4

RESULTS

There were a total of 60 prehistoric components identified using the criteria outlined in Chapter 3. The prehistoric component's location and a summary of their information are presented in Figure 2 and Table 2. Prehistoric components were categorized as small, medium, or large. The number of interpreted limited-use prehistoric components were based on component size, the amount of artifacts, and artifact diversity. The number of interpreted settlements and camps were also based on component size, the amount of artifacts, and artifact diversity. The following sections describe the prehistoric component categories, their interpretations, their soil associations, and their distances from the river with which to evaluate the hypothesis in Chapter 2.

Prehistoric Components

This section describes the different prehistoric components (PCs) found within Willow Metropark. The size, the total and mean artifact numbers, artifact categories, and generalizations on chipped stone reduction stage, size, type, condition, and technology of all PCs are discussed. An interpretation of what limited activities took place at the different PCs is given. Specific assemblage and activities are further described for the PCs identified as settlements or camps. An interpretation of the entire range of activities that took place at these PCs is offered.
A total of 56 PCs were identified as limited-use. These limited-use PCs were either categorized as small or medium. A PC consisting of 1 or 2 shovel tests is considered small while a PC consisting of between three and nine shovel tests is considered medium. Small and medium PCs had to have at least 1 artifact and a low density of artifacts in comparison to settlements or camps. Artifact categories found in these limited-use PCs include chipped stone, fire-cracked rock, and ceramic. A total of 47 PCs only had chipped stone while 3 had both chipped stone and fire-cracked rock, 1 had chipped stone and ceramic, and 5 had only fire-cracked rock. As seen in Table 2, the chipped stone reduction stages, size, type, condition, and technology of these limited-use PCs indicate either 1 or 2 late stage core reduction, early stage core reduction, or late stage core reduction.
Figure 2. Prehistoric Components and well-drained soils.
<table>
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<tr>
<th>PC#</th>
<th>Area</th>
<th>Artifacts Total</th>
<th>ST mean (n)</th>
<th>L (n)</th>
<th>FCR (n)</th>
<th>C (n)</th>
<th>L Description</th>
<th>PC Classification</th>
<th>Soil Association (Oakville / Metea)</th>
<th>Distance from River (km)</th>
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very little evidence for formal tool manufacturing at the limited-use PCs. Only two had projectile points indicating hunting: PC 31 with a whole Adena point (with a date range of Archaic to Middle Woodland periods) and PC 60, which had a Late Woodland period Levanna base fragment. All limited-use PCs correlate with the same Oakville soil formations.

A total of 4 PCs were identified as settlements or camps. These settlements/camps were large. A PC consisting of more than 9 shovel tests is considered large. Settlements/camps have a high density of artifacts in comparison to small and medium PCs. Artifact categories found in these settlements/camps include chipped stone, fire-cracked rock, and ceramic. A total of 3 PCs had chipped stone, fire-cracked rock, and ceramic while one, PC 54, had only chipped stone and fire-cracked rock. As seen in Table 2, the chipped stone reduction stages, size, type, condition, and technology of these settlement/camp PCs indicate one or two late stage core reduction.

In addition to one core and one core fragment, PC 42 has a very high percentage of tertiary debitage indicating late stage core reduction. Table 3 summarizes PC 42s debitage attributes. The medium sizes and the high percentage of whole flakes and shatter indicate an emphasis on informal expedient tool production. The low percentages of pressure flaking and flake fragments indicate a limited amount of formal tool manufacturing also took place. This PC is represented primarily by lithic artifacts representing core reduction for expedient tools. Only seven had fire-cracked rock suggesting limited cooking or heating took place. There was very little evidence for formal tool manufacturing at PC 42.
In addition to one core fragment, PC 45 has a high percentage of tertiary debitage indicating late stage core reduction. Table 4 summarizes PC 45's debitage attributes. The high percentage of whole flakes indicate an emphasis on informal expedient tool production. The low percentages of pressure flaking and flake fragments indicate a limited amount of formal tool production.

PC 50 has a high percentage of tertiary debitage suggesting secondary and late stage core reduction. Table 5 summarizes PC 50's debitage attributes. The high percentage of whole flakes and shatter indicate an emphasis on informal expedient tool production. The low percentages of pressure flaking and flake fragments indicate a limited amount of
formal tool manufacturing also took place. PC 45 and 50 are very similar to each other, but differ from PC 42. Even so, PC 42, 45, and 50 are all associated with Oakville soils.

<table>
<thead>
<tr>
<th>Reduction Stage</th>
<th>Size (cm)</th>
<th>Technology (%)</th>
<th>Condition (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>Median Range</td>
</tr>
<tr>
<td>Primary</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Secondary</td>
<td>11</td>
<td>37.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Tertiary</td>
<td>18</td>
<td>62.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100</td>
<td>---</td>
</tr>
</tbody>
</table>

Technology: H = hard percussion, S = soft percussion, P = pressure, I = indeterminate
Condition: F = whole flake, S = shatter, FB = broken flake, FF = flake fragment, FS = split flake, I = indeterminate

There are a wide range of activities that took place at these PCs. The small and medium PCs interpreted as limited-use areas were used primarily used for expedient tool manufacturing. Some limited-use PCs had debitage that suggests most were for late stage core reduction for expedient tools while some limited-use PCs had debitage that indicates secondary stage core reduction for expedient tools. Other PCs were used for heating and expedient tool manufacturing, formal tool manufacturing, or just heating. The large PCs interpreted as settlements or camps were primarily used for informal expedient tool manufacturing, heating and cooking, and storage. The high percentage of tertiary debitage found in some large PCs indicates a limited amount of formal tool manufacturing.

A total of 56 PCs were identified as limited-use while 4 PCs were identified as settlements or camps. Limited-use PCs are small or medium, but settlements/camps are large. The limited-use PCs are represented primarily by lithic artifacts representing core reduction for expedient tools. The chipped stone details of settlement/camp PCs indicate one or two late stage core reduction with a limited amount of formal tool manufacturing.

The activities that took place at limited-use PCs include the manufacturing of just
expedient tools, formal tool manufacturing, heating, or heating and expedient tool production. The large PCs were used for expedient tool production, limited formal tool manufacturing, heating, cooking, and storing.

Soil Associations and Distance from River

This section describes the soil associations and distances from the Huron River. Krakker (1983) suggested agricultural sites are located on well-drained soils adjacent to arable soil for the purpose of cultivation. In addition, Krakker offered that these agricultural settlements must be in close proximity (within at least 1 km) of a major stream such as the Huron River. This would provide possible transportation and access to an abundance of riverine sources (Krakker 1983: 405). Considering this, settlements/camps should be located on well-drained soils such as Oakville or Metea, and they should be adjacent to soils suitable for cultivation. These soils include Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils. The well-drained soils must be adjacent to arable soils and must also be within 1 km of the Huron River. However, small and medium limited-use PCs interpreted as limited-use are going to be located further from the river.

The hypothesis were partially supported. Settlements/camps are associated with Oakville or Metea soil types. PC 42, 45, and 50 are located on Oakville soil while PC 54 is located on Metea soil. These PCs are located in close proximity to Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils, which are suitable for cultivation. These PCs are also located within 1 km of the Huron River. However, small and medium limited-use PCs were not always located further from the Huron River. Of these limited-use PCs, a total of 19 were located in
close proximity to the Huron River. On the other hand, a total of 37 limited-use PCs were located further from the Huron River.

**Summary**

In this chapter, the hypotheses on soil types and their association with settlement/camp location and limited-use location, cultivation suitability, and distance from the Huron River were tested with the Willow Metropark survey data. The hypotheses were partially supported. Large PCs interpreted as settlements or camps were associated with Oakville and Metea soils. These soil types are well-drained and therefore are suitable for permanent and semi-permanent residency. These settlements/camps were also located near soil types including Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils. These soil types are suitable for cultivation. In contrast, small and medium PCs interpreted as limited-use areas were scattered all over Willow Metropark rather than all being located further from the Huron River; some were located near the river while others were located further from the river. Limited-use PCs are all associated with the Oakville soil type.
CHAPTER 5:
CONCLUSIONS

The shovel test survey identified a total of 60 prehistoric components. Among these, 56 were identified as limited-use prehistoric components and four were identified as settlements or camps. The chipped stone assemblage, from all prehistoric components combined, reflect one or two late stage core reduction activities. However, there was an emphasis on expedient tool production with a limited amount of formal tool manufacturing. The limited-use PCs are represented primarily by lithic artifacts representing core reduction for expedient tools. There was very little evidence for formal tool manufacturing at the limited-use PCs. Two had projectile points indicating hunting. PC 31 had a whole Adena point and PC 60 had a Levanna base fragment. The settlement/camp PCs had a high percent of tertiary debitage indicating late stage core reduction. Some limited formal tool manufacturing also took place. Activities that took place at limited-use PCs include expedient tool manufacturing, formal tool manufacturing, and heating. Large PCs were used for manufacturing of expedient tools, some formal tool manufacturing, heating, cooking, and storing.

In Chapter 2, models for agricultural and limited-use sites were described. Agricultural settlements/camps are large and are expected to be located on well-drained soils such as Oakville and Metea. These soils are well-drained, not arable, and are dry, therefore, vegetation is often thin. These settlements/camps must also be adjacent to arable soil and in close proximity to a river. Arable soil types suitable for cultivation
include Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils. Agricultural settlements/camps are expected to be within 1 km of the nearest river. This provides access to riverine resources and transportation.

These hypotheses were partially supported. Large PCs interpreted as settlements or camps were associated with Oakville or Metea soil types. These PCs are adjacent to arable soil types including Pewamo, Selfridge, Tedrow, Blount, Metamora, Morley, Wasepi, Gilford, Shoals, Belleville, and Corunna soils. The four identified settlement/camps were also located within 1 km of the Huron River. On the other hand, small and medium PCs interpreted as limited-use areas were not all located further away from the Huron River. Thirty-seven of the limited-use PCs were located further from the Huron River while 19 were located near the river.

The findings discussed in this thesis give insight to the general understanding of the Late Woodland Period in southeastern Michigan and the Great Lakes region. The survey of Willow Metropark indicates that all settlements or camps are associated with well-drained soil, are adjacent to arable soils, and are located within 1 km of the Huron River. The survey also indicates that not all limited-use PCs will be located further away from the Huron River. This may indicate that limited-use PCs do not need to be described as being located further away from a river.
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