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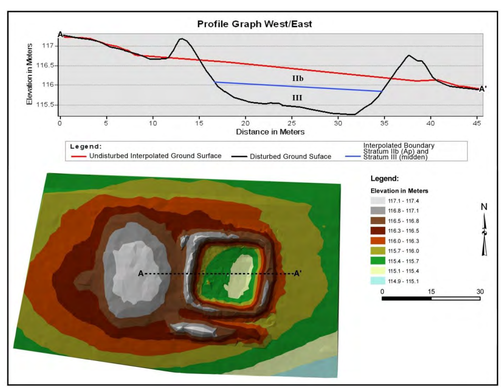

Indiana Department of Natural Resources
Division of Historic Preservation
and Archaeology (DHPA)

DNR
Indiana Department of Natural Resources

INDIANA DIVISION OF HISTORIC PRESERVATION AND ARCHAEOLOGY

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Notes: The projects discussed in several of the articles, noted below with –**HPF**," received federal financial assistance from the Historic Preservation Fund Program for the identification, protection, and/or rehabilitation of historic properties and cultural resources in the State of Indiana.

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Reports / Features

INTRODUCTION

The Division of Historic Preservation and Archaeology (DHPA) is proud to present the 10th anniversary volume of the journal *Indiana Archaeology*. Through the previous years, this journal has shared 60 articles and 9 features/reports on a wide variety of archaeology topics and sites. Per state statute (Indiana Code 14-21-1-12), one of the duties of the DHPA is to develop a program of archaeological research and development, including the publication of information regarding archaeological resources in the state. This journal is one of the ways the DHPA continues to address that mandate. Also, Indiana Code 14-21-1-13 states that the Division may conduct a program of education in archaeology. Indiana‘s cultural resources management plans have also listed educating the public about Indiana‘s prehistoric and historic Native American cultures and identifying, and studying Native American, African-American, and other ethnic and cultural heritage resources, as ways to accomplish several preservation goals. The variety of archaeological sites in Indiana is wide-ranging and impressive. Virtually all of the cultural groups prehistorically and historically in Indiana are represented archaeologically in one way or another. Editing and structuring *Indiana Archaeology* has been an enriching and rewarding journey, and we have learned a lot about our heritage and selves along the way.

We are pleased to offer this digital document containing articles on a broad range of archaeological and anthropological topics. Archaeology is happening regularly in Indiana, and all of these articles provide the reader with various insights into many important sites, past cultures, theories, and projects. To view previous volumes of *Indiana Archaeology*, go to http://www.in.gov/dnr/historic/3676.htm.

For those who may not be familiar with some archaeological terms, a helpful glossary of some of these general terms is included in the back of this journal. To also aid the non-archaeologist reader, a general overview of prehistoric time periods may be found at the end of this volume. Additional archaeological outreach documents, including *Early Peoples of Indiana*, may be accessed at www.IN.gov/dnr/historic. For those readers who may not be familiar with the authors and editors of the volume, biographical information is provided. Feel free to access our Indiana archaeological travel itinerary (http://www.in.gov/dnr/historic/files/travelsarchaeo.pdf) if you would wish to visit an archaeological site. The DHPA also urges you to participate in the annual Indiana Archaeology Month in September. If you have an interest in providing a voluntary financial donation to contribute to archaeology in our state, please consider the Archeology Preservation Trust Fund (http://www.in.gov/dnr/historic/5897.htm).

Our thanks to those who contributed peer reviews for the journal.

-- JRJ, ALJ

10th
Anniversary
Volume

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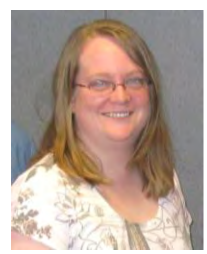

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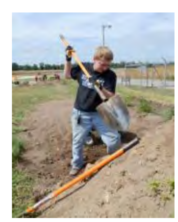

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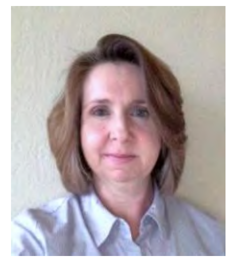

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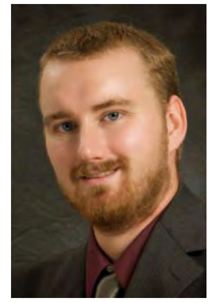

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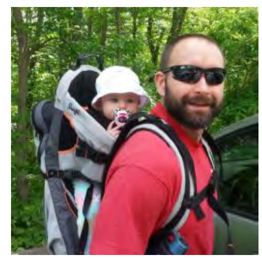

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(photo credit: J. Intintoli, Middle Tennessee State University)

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SCIENTIFIC RECOVERY INVESTIGATIONS AT THE KRAMER MOUND (12Sp7): PREHISTORIC ARTIFACT ASSEMBLAGES, FAUNAL AND FLORAL REMAINS, AND HUMAN OSTEOLOGY

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―*Nothing disappears without a trace*." Floyd Red Crow Westerman in the *X Files*

[Editors' note: Please be advised that this article contains descriptions of Native American human remains.]

Introduction

In fulfillment of the terms of an approved plan for scientific recovery #2010006 granted by the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology (DHPA), Christopher Bergman implemented scientific recovery investigations at the Kramer Mound (12Sp7), Spencer County, Indiana (Figure 1). The 2010 field investigations were precipitated by an inadvertent disturbance to the site consisting of soils excavated from a shallow basin which were incorporated into a retaining berm, as well as into a plowzone segregation backdirt pile (Bergman 2011). Based on calculations derived from the interior of the basin, it is suggested the ground disturbance involved approximately 213 m^3 within a 16.5 meter x 17 meter x 0.76 meter area (Figure 2).

This article describes the prehistoric artifact assemblage, faunal and floral remains, and human osteology. The scientific recovery of 12Sp7 collected 1,782 nineteenth-twentieth century historic artifacts (not discussed below), 12,065 flaked stone artifacts, 163 groundstone and ―other" artifacts, 349 specimens of worked bone and antler, 1,854 pieces of fire-cracked rock (FCR), eight prehistoric ceramic sherds, 23,747 remains of terrestrial and aquatic animals, an unspecified number of paleobotanical remains, and the remains representing 41 individuals. These materials span the Early Archaic to the early nineteenth century and into the twentieth century.

[Editors' note: The Division of Historic Preservation and Archaeology (DHPA) has removed this image from the public version of this electronic document because it contains site location information. If you need access to this information for professional research purposes, please contact the DHPA.]

Figure 1.

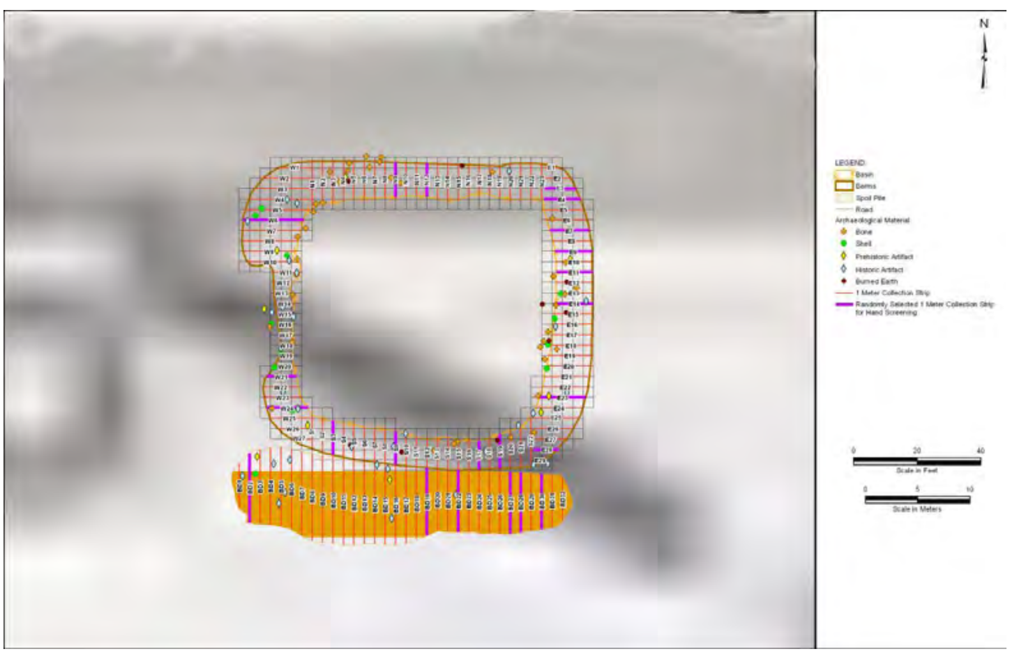


Figure 2. Map of the area of disturbance and collection grid showing the surrounding berms and backdirt pile to the south.

Prehistoric Lithic Assemblage

The lithic assemblage represents 31 percent of the artifacts recovered (total sample size = 39,968). The lithic assemblage can be divided into two main categories: flaked stone and groundstone. This section begins with a discussion of the flaked stone artifacts which include cores, flakes, Projectile Points/Knives (PPKs), bifaces, and unifacial tools.

General Overview of the Flaked Stone Assemblage

The following Table 1 presents the entire flaked stone artifact collection recovered from 12Sp7. The vast majority of the flaked stone assemblage, numbering 11,358 specimens, consists of debitage accounting for 94.1 percent, while the 707 PPKs, bifacial tools and unifacial tools account for 5.9 percent. Of the 11,358 pieces of debitage, 11,228 specimens or 98.9 percent are flakes, flake fragments, and angular shatter derived from a variety of manufacturing trajectories as outlined in further detail below. Cores and bipolarized pieces account for 130 specimens (1.1 percent).

The discussion of the lithic assemblage begins with some brief overview statements, mainly concerned with the broken debitage specimens and temporal affiliations of the classifiable tools. This is followed by an in-depth technological review, based on a sample of 1,509 flakes (or 19.3 percent of the flakes, exclusive of angular shatter) and 130 cores, that were complete and measured, along with all of the PPKs, bifacial tools and unifacial tools (n=707 specimens or 5.9 percent of the assemblage). This section then concludes with a discussion of lithic operating or manufacturing chains present at 12Sp7.

The debitage assemblage from 12Sp7 is characterized by elevated frequencies of later stage flakes derived from a number of manufacturing sequences involving cores, bifaces, PPKs, and bipolarized pieces. Specifically, of the 11,358 debitage specimens, flakes classified as being derived from unspecified reduction sequences (exclusive of initial reduction) account for 11.4 percent of the assemblage, while later stage biface manufacturing flakes account for close to 29 percent. The other two major classes include badly broken or burned, and hence unclassifiable flakes, at 18.2 percent, and angular shatter fragments at 30.2 percent.

Table 1 Artifact Type by Location of Recovery at 12Sp7.

Artifact Type/Unit	Backdirt Pile		North Berm		West Berm		South Berm		East Berm		Flotation		Surface		Total	
Core/Bipolarized Piece	15	1.3%	28	1.3%	18	1.2%	25	1.2%	44	1.1%	0	0.0%	0		130	1.1%
IRF	77	6.6%	138	6.2%	95	6.6%	109	5.2%	213	5.5%	4	0.9%	5		641	5.6%
URS	179	15.4%	254	11.3%	184	12.7%	252	11.9%	410	10.5%	8	1.8%	9		1296	11.4%
BIRF	9	0.8%	8	0.4%	9	0.6%	9	0.4%	19	0.5%	1	0.2%	1		56	0.5%
BTF	173	14.9%	577	25.7%	251	17.3%	415	19.7%	838	21.5%	12	2.6%	10		2276	20.0%
BFF	75	6.5%	181	8.1%	116	8.0%	161	7.6%	405	10.4%	43	9.4%	0		981	8.6%
Chip	18	1.5%	10	0.5%	15	1.0%	17	0.8%	39	1.0%	6	1.3%	0		105	0.9%
FLS	329	28.3%	339	15.1%	271	18.7%	318	15.1%	758	19.4%	46	10.1%	2		2063	18.2%
ANS	272	23.4%	680	30.3%	474	32.7%	787	37.3%	1118	28.7%	86	18.9%	8		3425	30.2%
Microdebitage	0	0.0%	3	0.1%	1	0.07%	1	0.05%	2	0.05%	250	54.8%	0		257	2.3%
Notch Flake	2	0.2%	2	0.09%	0	0.0%	2	0.1%	1	0.03%	0	0.0%	0		7	0.06%
Flake from Bipolar Core	2	0.2%	6	0.3%	10	0.7%	6	0.3%	16	0.4%	0	0.0%	1		41	0.4%
Janus Flake	12	1.0	16	0.7%	6	0.4%	10	0.5%	36	0.9%	0	0.0%	0		80	0.7%
Debitage Subtotals	1163	100.1%	2242	100.1%	1450	100.0%	2112	100.2%	3899	100.0%	456	100.0%	36	100.0%	11,358	100.0%
Debitage Totals by Provenience	1163	10.3%	2242	19.7%	1450	12.8%	2112	18.6%	3899	34.3%	456	4.0%	36	0.3%	11,358	100.0%
Projectile Point	18		46	35.9%	36	30.3%	54	40.6%	96	43.0%	3		18		271	38.3
Biface (including drills and other bifacial tools)	29		68	53.1%	60	50.4%	60	45.1%	94	42.2%	4		13		328	46.4
Unifacial Tool	17		14	10.9%	23	19.3%	19	14.3%	33	14.8%	0		2		108	15.3
Tool Totals	64		128	99.9%	119	100.0%	133	100.0%	223	100.0%	7		33		707	100.0%
Total															12,065	
Total Debitage															11,358	94.1%
Tool Retouched Tools															707	5.9%

IRF = Initial Reduction Flake; URS = Secondary Unspecified Reduction Flake; BIRF = Biface Initial Reduction Flake; BTF = Biface Thinning Flake; BFF = Biface Finishing Flake; FSH = Flake Shatter; ASH = Angular Shatter

Table 2 PPKs by Location of Recovery at 12Sp7.

Projectile Point Type	Backdirt Pile	North Berm	West Berm	South Berm	East Berm	Flotation	Surface	Total		Percentage without Unidentified
Early Archaic										
Charleston Corner Notched	0	0	1	1	0	0	0	2	0.7%	1.3%
MacCorkle Stemmed	0	0	0	0	1	0	0	1	0.4%	0.7%
Total	0	0	1	1	1	0	0	3	1.1%	2.0%
Middle Archaic										
Big Sandy II	0	3	2	2	2	0	1	10	3.7%	6.6%
Eva I	0	0	0	0	1	0	0	1	0.4%	0.7%
Total	0	3	2	2	3	0	1	11	4.1%	7.2%
Middle Archaic-Late Archaic										
Elk River Stemmed	0	1	1	0	1	0	0	3	1.1%	2.0%
Late Archaic										
Bottleneck Stemmed	0	0	0	1	0	0	0	1	0.4%	0.7%
Brewerton Side Notched	0	0	0	1	0	0	0	1	0.4%	0.7%
Brewerton Corner Notched	0	0	0	1	0	0	0	1	0.4%	0.7%
Brewerton Eared Notched	1	9	0	7	15	2	3	37	13.7 %	24.3%
Brewerton Eared Triangle	0	2	0	0	0	0	2	4	1.5%	2.6%
Karnak Stemmed	0	0	2	1	2	0	0	5	1.8%	3.3%
Lamoka	0	0	2	2	0	0	0	4	1.5%	2.6%
Ledbetter Stemmed	0	1	1	0	1	0	0	3	1.1%	2.0%
Matanzas Side Notched	0	1	3	2	7	0	3	16	5.9%	10.5%
McWhinney	1	2	4	5	5	0	1	18	6.6%	11.8%

Projectile Point Type	Backdirt Pile	North Berm	West Berm	South Berm	East Berm	Flotation	Surface	Total		Percentage without Unidentified
Heavy Stemmed										
Normanskill	0	0	0	0	1	0	0	1	0.4%	0.7%
Table Rock Stemmed	0	0	1	0	0	0	0	1	0.4%	0.7%
Total	2	15	13	20	31	2	9	92	34.0 %	60.5%
Terminal Archaic										
Merom Expanding Stemmed	1	2	0	1	4	0	1	9	3.3%	5.9%
Trimble Side Notched	0	0	0	0	0	0	1	1	0.4%	0.7%
Total	1	2	0	1	4	0	2	10	3.7%	6.6%
Late Archaic-Early Woodland										
Delhi	0	1	0	0	0	0	0	1	0.4%	0.7%
Gary Contracting Stemmed	0	0	0	1	1	0	0	2	0.7	1.3%
Motley	0	1	0	0	0	0	0	1	0.4%	0.7%
Saratoga Expanding Stem	0	4	1	1	10	1	0	17	6.3%	11.2%
Saratoga Parallel Stemmed	0	0	0	3	2	0	0	5	1.8%	3.3%
Turkey-tail	0	0	1	0	0	0	0	1	0.4%	0.7%
Wade	0	1	0	1	0	0	0	2	0.7%	1.3%
Total	0	7	2	6	13	1	0	29	10.7 %	19.1%
Early Woodland										
Robbins	1	0	0	0	0	0	0	1	0.4%	0.7%
Middle Woodland										
Lowe Flared Base	1	0	0	0	0	0	0	1	0.4%	0.7%

Projectile Point Type	Backdirt Pile	North Berm	West Berm	South Berm	East Berm	Flotation	Surface	Total		Percentage without Unidentified
Snyders	1	0	0	0	0	0	0	1	0.4%	0.7%
Total	2	0	0	0	0	0	0	2	0.8%	1.4%
Late Woodland										
Jacks Reef Corner Notched	0	0	0	1	0	0	0	1	0.4%	0.7%
Unassigned										
Unidentified	12	18	17	23	43	0	6	119	43.9 %	N/A
Total	18	46	36	54	96	3	18	271		

The data presented in Table 2, indicate that the majority of the PPK specimens were not assigned temporal affiliations, comprising 43.9 percent of the 271 total. Some of these were complete specimens that could not be identified, but most are fragmentary. The most commonly classified types, when treated in combination, are the Brewerton Eared varieties that account for 26.9 percent of the 152 identified PPKs. When the Brewerton Eared Notched and Eared Triangles are considered with the related Matanzas Side Notched PPKs, they have a combined total of 37.4 percent. Other commonly identified PPKs include the Saratoga Cluster types (Expanding Stemmed and Parallel Stemmed) at 14.5 percent of the total of 152 identifiable specimens, as well as McWhinney Heavy Stemmed (11.8 percent), Big Sandy II (6.6 percent), and Merom Expanding Stemmed (5.9 percent) types.

An examination of the identified projectile points by temporal assignation suggests PPKs that span the Late Archaic through Late Archaic-Early Woodland periods predominate in the collection at 86.2 percent of the total. If the Middle Archaic and Middle-Late Archaic PPKs are also considered, then approximately 90 percent span the time period from the Middle Archaic to the transition into the earliest part of the Woodland Period.

Raw Material Procurement for Flaked Stone Artifacts

A variety of raw materials were selected for use as stone for tools at 12Sp7 (Table 3). The raw materials, predominantly cherts, recovered from the site are quite variegated, similar to other Late Archaic occupations in the region as reported by Stafford and Cantin (2009). However, examination of the outer surfaces of many of the flakes indicates they display natural surfaces that are smooth and worn, due to weathering and transport. It is highly likely that many of the cherts collected have been obtained from enriched ―secondary source" deposits like creek and river channels or even *felsenmeer* or a concentration of angular rocks or cobbles (Bergman and Comiskey 2006).

Table 3 Raw Materials and Major Artifact Types.

Chert Type	Debitage Number	Debitage %	PPK Number	PPK %	Biface Number	Biface %	Uniface Number	Uniface %
Allens Creek	8	**0.5**	5	**1.8**	5	**1.5**	1	**0.9**
Bryantsville	4	**0.3**	3	**1.1**	2	**0.6**	0	**0.0**
Burlington	2	**0.1**	1	**0.4**	0	**0.0**	0	**0.0**
Chalcedony	3	**0.2**	0	**0.0**	0	**0.0**	0	**0.0**
Derby	2	**0.1**	1	**0.4**	0	**0.0**	0	**0.0**
Ditney	1	**0.07**	0	**0.0**	0	**0.0**	0	**0.0**
Haney	96	**6.4**	7	**2.6**	15	**4.6**	1	**0.9**
Harrodsburg	15	**1.0**	1	**0.4**	0	**0.0**	2	**1.9**

Chert Type	Debitage Number	Debitage %	PPK Number	PPK %	Biface Number	Biface %	Uniface Number	Uniface %
Hematite	4	**0.3**	0	**0.0**	0	**0.0**	0	**0.0**
Holland	223	**14.8**	54	**19.9**	52	**15.9**	20	**18.5**
Hornfels	1	**0.07**	0	**0.0**	0	**0.0**	0	**0.0**
Indian Creek	84	**5.6**	10	**3.7**	10	**3.0**	6	**5.6**
Jeffersonville	40	**2.7**	8	**3.0**	8	**2.4**	4	**3.7**
Kaolin	1	**0.07**	0	**0.0**	0	**0.0**	0	**0.0**
Laurel	179	**11.9**	28	**10.3**	24	**7.3**	9	**8.3**
Lead Creek	66	**4.4**	5	**1.8**	11	**3.4**	3	**2.8**
Limestone	14	**0.9**	0	**0.0**	0	**0.0**	0	**0.0**
Muldraugh	305	**20.2**	37	**13.7**	28	**8.5**	12	**11.1**
Perth	2	**0.1**	0	**0.0**	0	**0.0**	0	**0.0**
Quartz	1	**0.07**	0	**0.0**	0	**0.0**	0	**0.0**
Quartzite	1	**0.07**	0	**0.0**	0	**0.0**	0	**0.0**
Silicified Limestone	1	**0.07**	0	**0.0**	0	**0.0**	0	**0.0**
Upper St. Louis	5	**0.3**	1	**0.4**	4	**1.2**	2	**1.9**
Stanford	54	**3.6**	23	**8.5**	32	**9.8**	8	**7.4**
Wyandotte	201	**13.3**	26	**9.6**	36	**11.0**	22	**20.4**
Unidentified	196	**13.0**	58	**21.4**	63	**19.2**	12	**11.1**
Missing Data	0	**0.0**	3	**1.1**	38	**11.6**	6	**5.6**
Total	**1,509**	**100.1**	**271**	**100.1**	**328**	**100.0**	**108**	**100.1**

The most common raw materials among the 1,509 specimen sample of complete flakes include Haney (6.4 percent), Holland (14.8 percent), Indian Creek (5.6 percent), Laurel (11.9 percent), Lead Creek (4.4 percent) and Wyandotte (13.3 percent). Muldraugh chert was the single most commonly identified at 20.2 percent. Many of these cherts could be classified as ―gravel cherts" and, thus, the exact location of procurement may not coincide with bedrock outcrops. Further, since chert identification was based on visual inspection of hand samples, there is certainly a possibility of analytical error.

Due to the manner in which the artifacts were collected from disturbed contexts (see discussion on Spatial Distribution, below), as well as the fact that only complete flakes were analyzed, it is difficult to comment on raw material use in detail. However, some trends are worth noting. For example, relatively few examples of Allens Creek debitage were identified in the 1,509 flake sample. Although tools made from this chert are also few in number, they occur in greater frequency than the flake sample, suggesting bifaces or finished PPKs and other tools were transported to 12Sp7. A similar pattern was identified for the sample of Stanford cherts, which display a relatively low frequency of debitage with higher frequencies of tools, ranging between 7.4 percent for unifacial tools and 9.8 percent for bifaces. Most of the Stanford debitage (n = 54) represents later stage reduction including 21 biface thinning and finishing flakes. Stanford bifaces and PPKS were most likely transported to the site and later finished, sharpened, or repaired.

Holland chert, local to Spencer County, displays roughly similar percentages of debitage and tools, but the numbers of debitage analyzed are much lower than the expected amount of flakes generated from 126 tools. Obviously, this is a product of sampling only the complete debitage, as indicated above, but it also probably indicates that bifaces and finished PPKs were brought to the site for finishing or repair, use, and finally discard. Wyandotte chert (13.3 percent of the cherts) displays elevated frequencies of unifacial tools (20.4 of the unifacial tools) showing this material was deliberately selected to make end-scrapers, retouched flakes, and denticulates. A total of 54 Wyandotte flakes (26.9 percent of the 201 total) have outer surfaces composed of cortex or a weathered cortical surface, while 147 specimens (73.1 percent of the 201 total) have no cortex at all. This strongly supports the belief that Wyandotte chert was collected near bedrock sources and transported to 12Sp7 as flake blanks, performs, and/or finished tools.

The Debitage Assemblage

The debitage assemblage from 12Sp7 is summarized in Table 4, and it is characterized by elevated frequencies of later stage flakes derived from a number of manufacturing sequences. Specifically, of the total 11,358 debitage specimens, flakes classified as being derived from unspecified reduction sequences (exclusive of initial reduction) account for 11.4 percent of the assemblage, while later stage biface manufacturing flakes account for close to 29 percent. The other two major classes include badly broken or burned, and hence unclassifiable flakes, at 18.2 percent and angular shatter fragments at 30.2 percent. The angular shatter accounts for 30.2 percent of the assemblage and comprises 62.2 percent of burned specimens. The following discussion focuses upon a sample of complete flakes and cores (n = 1639) collected during the Scientific Recovery. These represent 14.4 percent of the entire debitage sample.

Table 4 Debitage Assemblage from 12Sp7, Actual and Measured.

Artifact Type	Total (Entire Assemblage)		Total Measured Assemblage (percentage is based on total of type)	
Core/Bipolarized Piece	130	1.1%	130	100%
IRF	641	5.6%	309	48.2%
URS	1296	11.4%	481	37.1%
BIRF	56	0.5%	34	60.7%
BTF	2276	20.0%	443	19.5%
BFF	981	8.6%	146	14.9%
Chip	105	0.9%	33	31.4%
FLS	2063	18.2%	0	0.0%
ANS	3425	30.2%	0	0.0%
Microdebitage	257	2.3%	0	0.0%
Notch Flake	7	0.06%	5	71.4%
Flake from Bipolar Core	41	0.4%	13	31.7%
Janus Flake	80	0.7%	45	56.3%
Debitage Subtotals	11,358	100.0%	1639	14.4%

IRF = Initial Reduction Flake; URS = Secondary Unspecified Reduction Flake; BIRF = Biface Initial Reduction Flake; BTF = Biface Thinning Flake; BFF = Biface Finishing Flake; FSH = Flake Shatter; ASH = Angular Shatter

Flake Cores

The assemblage of cores is varied and almost exclusively geared toward flake production. The exception appears to be bipolar cores or bipolarized pieces that also produced long splinter-like shards. In one instance, a small splinter was converted into a microdrill, suggesting one purpose for these curious by-products of bipolar flaking.

The following Table 5 presents the quantitative and qualitative data for 129 bipolar cores, flakes cores and tested materials. Also included with this group is a single slab of Laurel chert.

Table 5 Quantitative and Qualitative Attributes of Cores.

Type/Attribute	Bipolar (n =16)	Flake Core (n =91)	Tested (n =22)
Quantitative Attributes			
Weight (grams)	6.3	21.4	51.4
Average Longest Dimension (mm)	24.5	36.2	47.2
Average Shortest Dimension (mm)	18.2	27.2	28.2
Average Longest Removal (mm)	19.1	20.5	20.3
Average Widest Removal (mm)	11.0	19.5	22.3
Average Number of Removals	5.5	5.3	2.0
Qualitative Attributes			
Platform Position			
Platform, Single	2	22	15
Platform, Bifacial	0	0	2
Platform, Crossed	0	14	1
Platform, Opposed	10	3	0
Platform, Alternate	1	9	2
Platform, Multidirectional	2	42	2
Platform, Missing Data	1	1	0
Cortex Type			
Smooth, Worn	8	72	22
Weathered Natural Surface	1	5	0
Cortex	2	3	0
Natural Surface	0	0	0
Sandy Cortex	0	0	0
Weathered Cortex	0	1	0
Patinated	0	0	0
Missing Data	1	4	0
Absent	4	6	0

The 12Sp7 bipolar and flake cores and tested materials appear to have been manufactured from local ―gravel chert" materials. A total of 102 (79.1 percent) of the 129 measured specimens display smooth, rounded natural surfaces indicative of water worn pebbles and cobbles, probably collected in close proximity to the site. These data strongly suggest that flake core reduction was probably expedient and meant to supply blanks for activities focused at the site.

In general, the cores are small, indicative of the original size of the raw material overall and the intensive flaking they were subjected to. The number of platforms on each flake core is elevated, 68 have more than one platform, while 22 have a single platform. Additionally, the average flake core weight at 21.4 grams, in the flaked and discarded specimens, is less than half of the tested pebbles/cobbles average weight. The latter are probably closer to the original raw material weight. These data indicate an attempt to intensively reduce the cores in a manner that maximizes available raw material.

It is interesting to note that the tested materials are on average between 2.5 to 8 times larger than the flake and bipolar cores, respectively. The average number of flake scars on the abandoned cores was over five, while the tested materials, not surprisingly, average just two removals. Due to flaking on an anvil, most bipolar cores have opposed platforms, while the flake cores typically display single or multiple platforms. The latter were probably flaked alternately by removing a flake and then using its scar as a platform for the next removal.

The Flake Assemblage

Table 6 provides a considerable amount of information regarding the measured sample of 1,509 flakes, flake shatter and angular shatter. The following discussion will focus on the significant trends in the data and their meaning within the context of tool manufacture and use at 12Sp7.

An examination of the quantitative measurements clearly shows what is meant by the process of reducing a block of raw material. Specifically, the flakes classified as representing initial reduction tend to have the heaviest average weight at 4.4 grams. At the other end of the manufacturing sequence, the late stage biface finishing flakes only average 0.3 grams. The flakes classified as being derived from biface initial reduction tend to be the largest, measuring on average, 27 x 21.5 x 4.2 millimeters as opposed to the biface finishing flakes measuring 11.5 x 10.2 x 2.0 millimeters.

The scatter diagram illustrated as Figure 3 indicates that the length and width dimensions for the flakes form a continuum from very small to large. It is clear that these specimens are derived from numerous different trajectories. Thus, it is impossible to determine which flakes belong to a certain manufacturing sequence. The biface finishing flakes cluster as a tight group, but these could have been entirely produced during the manufacture of a small PPK like a Matanzas Side Notched, and, hence, may not be finishing flakes at all. Conversely, they may have been detached at the final stage of reduction of a larger PPK like a Ledbetter Stemmed. Flakes classified as deriving from the initial stages of biface manufacture tend to be relatively large suggesting that substantial pieces of raw material were selected for some tools or bifacial cores.

Table 6 Attributes for Debitage at 12SP7

Flake Type/Attribute	Initial Reduction, Unspecified (n= 309)		Secondary Reduction, Unspecified (n = 481)		Biface Initial Reduction (n = 34)	Biface Thinning (n = 443)		Biface Finishing (n = 146)		Chip (n = 33)	Notch Flake ((n = 5)	Bipolar (n= 13)	Janus (n = 45)
Quantitative Attributes													
Average Length (mm)	19.2		22.0		27.0	23.3		11.5		8.7	7.4	19.9	22.0
Average Width (mm)	21.7		19.2		21.5	18.7		10.2		8.0	11.4	10.1	18.8
Average Thickness (mm)	6.0		4.7		4.2	3.0		2.0		1.2	1.2	4.8	2.8
Average Weight (grams)	4.4		2.9		2.9	1.6		0.3		0.1	0.1	1.2	1.7
Average Butt Width (mm)	10.5		9.5		6.9	7.0		3.9		3.2	6.1	10.2	8.0
Average Butt Thickness (mm)	4.6		3.7		2.6	2.3		1.6		1.1	1.3	4.8	2.3
Quantitative Attributes													
	N	%	N	%	N	N	%	N	%	N	N	N	N
Butt Type													
Broken	11	**3.6**	23	**4.8**	1	25	**5.6**	2	**1.4**	0	0	0	1
Crushed	34	**11.0**	45	**9.4**	3	33	**7.5**	7	**4.8**	2	0	10	1
Concave	2	**0.6**	1	**0.2**	0	3	**0.7**	1	**0.7**	0	1	0	0
Convex	4	**1.3**	34	**7.1**	6	97	**21.9**	14	**9.6**	5	1	1	13
Straight	5	**1.6**	20	**4.2**	5	81	**18.3**	11	**7.5**	2	2	0	6
Dihedral	8	**2.6**	19	**4.0**	1	15	**3.4**	7	**4.8**	0	0	0	1
Plain	109	**35.3**	227	**47.2**	12	178	**40.2**	101	**69.2**	21	1	1	21
Cortex	4	**1.3**	4	**0.8**	1	3	**0.7**	0	**0.0**	0	0	0	2
Natural Surface	0	**0.0**	107	**22.2**	5	7	**1.6**	3	**2.1**	3	0	0	0
Missing Data	132	**42.7**	1	**0.2**	0	1	**0.2**	0	**0.0**	0	0	1	0
Abrasion													
Yes	16	**5.2**	100	**20.8**	5	220	**49.7**	75	**51.4**	12	2	0	14
No	293	**94.9**	375	**78.0**	28	213	**48.1**	70	**47.9**	21	3	12	31
Missing Data	0	**0.0**	6	**1.2**	1	10	**2.3**	1	**0.7**	0	0	1	0
Flaking Mode													
Hard Hammer	176	**57.0**	198	**41.2**	4	42	**9.5**	6	**4.1**	2	0	5	12
Soft Hammer	52	**16.8**	169	**35.1**	24	327	**73.8**	97	**66.4**	12	0	1	27
Pressure	0	**0.0**	0	**0.0**	0	0	**0.0**	32	**21.9**	11	5	0	0
Unidentified	82	**26.5**	110	**22.9**	6	69	**15.6**	9	**6.2**	8	0	7	6
Missing Data	0	**0.0**	4	**0.8**	0	5	**1.1**	2	**1.4**	0	0	0	0

	N	%	N	%	N	N	%	N	%	N	N	N	N
Flake Terminus													
Feathered	103	**33.3**	238	**49.5**	24	363	**81.9**	131	**89.7**	27	5	2	30
Blunt	56	**18.1**	79	**16.4**	2	5	**1.1**	2	**1.4**	1	0	8	3
Pointed	16	**5.2**	25	**5.2**	1	6	**1.4**	4	**2.7**	1	0	0	1
Hinge	41	**13.3**	110	**22.9**	3	58	**13.1**	9	**6.2**	4	0	2	11
Step	1	**0.3**	2	**0.4**	0	3	**0.7**	0	**0.0**	0	0	0	0
Plunging	0	**0.0**	4	**0.8**	0	3	**0.7**	0	**0.0**	0	0	0	0
Cortex	91	**29.5**	6	**1.2**	4	1	**0.2**	0	**0.0**	0	0	0	0
Natural Surface	0	**0.0**	15	**3.1**	0	0	**0.0**	0	**0.0**	0	0	0	0
Missing Data	1	**0.3**	2	**0.4**	0	4	**0.9**	0	**0.0**	0	0	1	0
Number of Dorsal Scars													
0	111	**35.9**	1	**0.2**	1	1	**0.2**	1	**0.7**	1	0	1	6
1	117	**37.9**	73	**15.2**	3	0	**0.0**	1	**0.7**	4	0	1	9
2	49	**15.9**	135	**28.1**	15	10	**2.2**	7	**4.8**	10	0	0	8
3	27	**8.7**	126	**26.2**	7	53	**12.0**	34	**23.3**	10	2	5	9
4	2	**0.6**	90	**18.7**	4	120	**27.1**	48	**32.9**	7	0	3	3
5	0	**0.0**	37	**7.7**	4	145	**32.7**	55	**37.7**	0	3	3	0
6	0	**0.0**	13	**2.7**	0	62	**14.0**	0	**0.0**	1	0	0	0
7	0	**0.0**	3	**0.6**	0	31	**7.0**	0	**0.0**	0	0	0	0
8	0	**0.0**	0	**0.0**	0	14	**3.2**	0	**0.0**	0	0	0	0
9	0	**0.0**	1	**0.2**	0	2	**0.5**	0	**0.0**	0	0	0	0
10+	0	**0.0**	0	**0.0**	0	5	**1.1**	0	**0.0**	0	0	0	0
Missing Data	3	**1.0**	2	**0.4**	0	0	**0.0**	0	**0.0**	0	0	0	0
Dorsal Scar Pattern													
Unidirectional	131	**42.4**	295	**61.3**	3	54	**12.2**	46	**31.5**	25	1	4	0
Opposed	13	**4.2**	31	**6.5**	6	88	**19.9**	37	**25.3**	0	0	7	20
Crossed	49	**15.9**	124	**25.8**	9	116	**26.2**	35	**24.0**	8	4	1	10
Multidirectional	2	**0.6**	28	**5.8**	16	185	**41.8**	27	**18.5**	0	0	0	4
Cortex 100%/Absent	113	**36.6**	0	**0.0**	0	0	**0.0**	0	**0.0**	0	0	0	11
Missing Data	1	**0.3**	3	**0.6**	0	0	**0.0**	1	**0.7**	0	0	1	0
Percent Cortex													
0%	3	**1.0**	237	**49.2**	3	413	**93.2**	145	**99.3**	28	5	10	40
10%	1	**0.3**	33	**6.9**	1	18	**4.1**	1	**0.7**	0	0	1	4
20%	3	**1.0**	73	**15.2**	5	7	**1.6**	0	**0.0**	1	0	0	1
30%	3	**1.0**	65	**13.5**	11	2	**0.5**	0	**0.0**	2	0	1	0
40%	3	**1.0**	60	**12.5**	7	0	**0.0**	0	**0.0**	1	0	0	0
50%	18	**5.8**	2	**0.4**	5	0	**0.0**	0	**0.0**	0	0	0	0
60%	31	**10.0**	4	**0.8**	1	0	**0.0**	0	**0.0**	1	0	0	0
70%	21	**6.8**	2	**0.4**	1	0	**0.0**	0	**0.0**	0	0	0	0
80%	51	**16.5**	1	**0.2**	0	0	**0.0**	0	**0.0**	0	0	0	0
90%	60	**19.4**	1	**0.2**	0	0	**0.0**	0	**0.0**	0	0	1	0

	N	%	N	%	N	N	%	N	%	N	N	N	N
100%	115	37.2	0	0.0	0	0	0.0	0	0.0	0	0	0	0
Missing Data	0	0.0	3	0.6	0	3	0.7	0	0.0	0	0	0	0
Cortex Type													
Smooth, Worn	263	85.1	174	36.2	14	10	2.3	0	0.0	4	0	3	2
Weathered Natural Surface	25	8.1	39	8.1	11	5	1.1	1	0.7	1	0	0	0
Cortex	15	4.9	26	5.4	7	10	2.3	0	0.0	0	0	0	3
Natural Surface	1	0.3	1	0.2	0	0	0.0	0	0.0	0	0	0	0
Sandy Cortex	1	0.3	0	0.0	0	0	0.0	0	0.0	0	0	0	0
Weathered Cortex	1	0.3	3	0.6	1	0	0.0	0	0.0	0	0	0	0
Patinated	0	0.0	1	0.2	0	2	0.5	0	0.0	0	0	0	0
Missing Data	3	1.0	0	0.0	0	0	0.0	0	0.0	0	0	0	0
Absent	0	0.0	237	49.2	1	416	93.9	145	99.3	28	5	10	40

In terms of the dimensions of the butts, there is a clear trend toward size reduction as the manufacturing process proceeds. Initial reduction flakes have wide, thick butts averaging 10.5 x 4.6 millimeters, while biface finishing flake butts average 3.9 x 1.6 millimeters. This progression reflects the varied tools and techniques used at different times while working chert. Hard hammer non-marginal flaking characterizes the earliest stages of manufacture (IRF = 57.0 percent), while marginal soft hammer percussion or pressure flaking is used for biface thinning and finishing (BFF = soft hammer, 66.4 percent and pressure, 21.9 percent). Marginal soft hammer percussion and pressure flaking generally detach thin flakes with small butts.

As manufacture proceeds, the cortex on the dorsal surface of the flakes decreases, both in terms of the numbers of flakes with cortex and the percent of area covered. Among the initial reduction flakes, there are only three specimens that do not have any cortex and over 56 percent of the flakes have 90-100 percent of their dorsal surface covered. The biface thinning and finishing flakes, by way of contrast, display cortex on only 6.2 percent and 0.7 percent, respectively.

As raw materials are reduced, there is a tendency for the numbers of dorsal scars to increase as evidenced by a comparison of the initial reduction and unspecified reduction flakes with the later stage biface manufacturing flakes in Table 6. In addition, the dorsal scar patterns on these flakes tend to be more complicated with 67.8 percent of biface finishing flakes and 87.9 percent of biface thinning flakes having opposed, crossed or multidirectional removals. In the case of biface manufacture, greater attention is given to platform preparation to ensure the successful removal of invasive flakes. Thus, between 22.6 percent and 44.3 percent of the biface finishing and thinning flakes, respectively, display faceted butts.

While many of the observations above are intuitively obvious to most prehistorians with experience in flintknapping, they do offer the background by which to interpret manufacturing trajectories at 12Sp7. It is clear that the initial reduction flakes and secondary reduction flakes were probably detached from cores and bifacial cores, as well as during biface manufacture. Based on the data collected, it is clear that the earliest stages of manufacture were accomplished by non-marginal hard hammer percussion. As the cortical or natural surfaces were removed, there was a shift to soft hammer percussion which still involved non-marginal flaking.

In the case of biface manufacture, the thinning and shaping of the tool were achieved by using marginal soft hammer percussion. By this stage, the cortical or natural surfaces were almost entirely removed. Non-marginal flaking continued into the finishing stage which involved both soft hammer percussion and pressure flaking. The final stages of tool manufacture, such as notching for PPKs like the Big Sandy II type, involved pressure flaking entirely.

Bipolar flaking was utilized at 12Sp7 as evidenced by splintered pieces, splinter-like flakes, and pitted stones. In some instances, the purposes behind the use bipolar flaking are clear, for example, to initiate reduction of small spherical pebbles or, in one instance, to create a small narrow blank for a microdrill. In other cases, the purpose is unknown as the resulting by-products were short and thin and unsuitable for tool blanks. Bipolar flakes were typically detached with a hard hammer and display crushed or broken butts.

The artifacts classified as ―chips” (cf. Newcomer and Karlin 1987) result from core reduction, biface manufacture, and unifacial tool manufacture. It is likely they come from a variety of different activities like platform preparation or abrasion, as well as retouching tools like end-scrapers. The majority appear to have been detached by a soft hammer percussion or pressure. Finally, the Janus flakes were most often detached with a soft hammer. In as much as a flake blank is ready for biface manufacture as soon as platforms are created on its edges, this is not surprising. Janus flakes were predominantly made from cherts like Wyandotte (n = 13), Holland (n = 11), Muldraugh (n = 9) and Laurel (n = 5), suggesting the transport of flake blanks in higher quality materials.

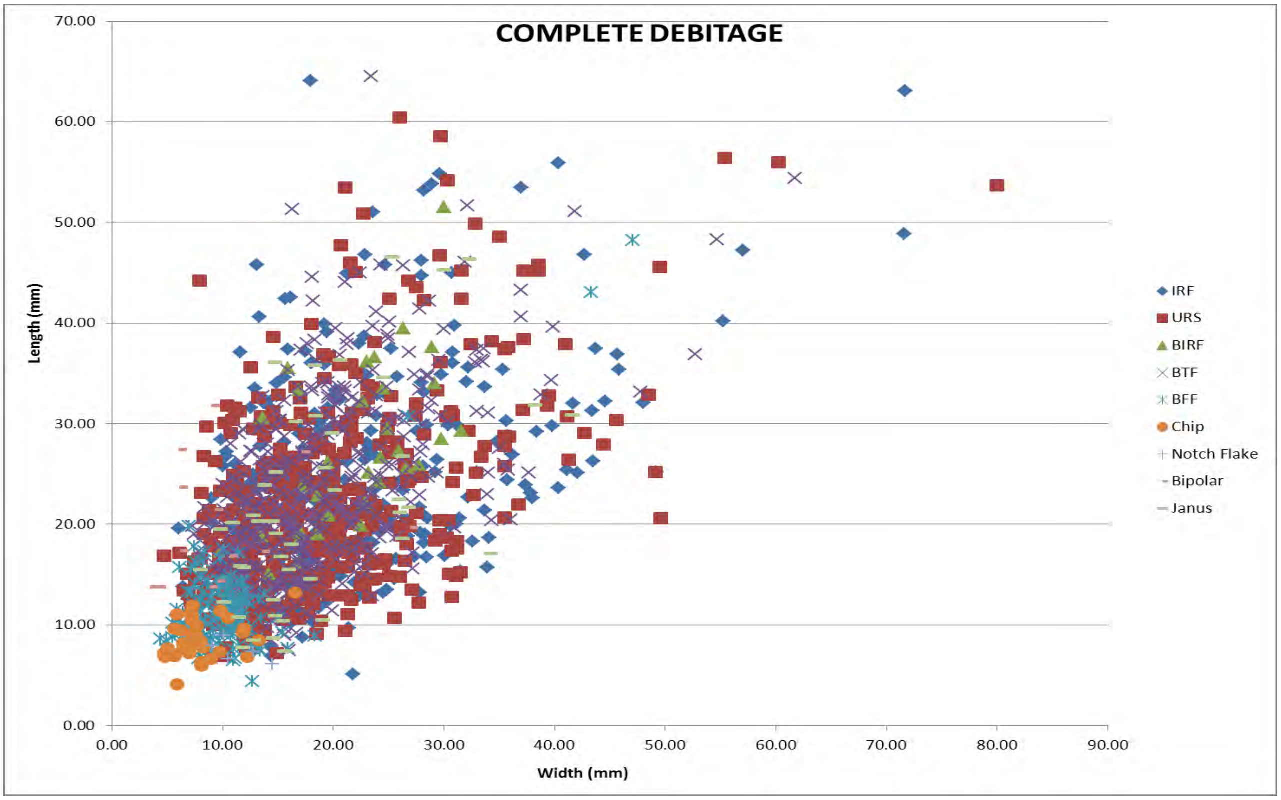


Figure 3. Scatter diagram illustrating Length and Width for the various types of flakes. (IRF = Initial Reduction Flake; URS = Secondary Unspecified Reduction Flake; BIRF = Biface Initial Reduction Flake; BTF = Biface Thinning Flake; BFF = Biface Finishing Flake)

Projectile Points/Knives (PPK)

A total of 271 PPKs (Figures 4-10) were identified in the collection, and 43.9 percent could not be assigned to a temporal affiliation. These specimens are excluded from the discussion below, as many are small and fragmented by knapping failures, use or burning. The remaining PPKs, listed in Table 7, date between the Early Archaic and Late Woodland periods. These artifacts are most commonly assigned a temporal affiliation that is more restricted, specifically between the Middle Archaic and the beginning of the Early Woodland. Tables 8 and 9 provide detailed information regarding the quantitative and qualitative attributes for the PPKs from 12Sp7.

Table 7 PPKs and Temporal Affiliation at 12Sp7.

Projectile Point Type	Total		Percentage without Unidentified Specimens
Early Archaic			
Charleston Corner Notched	2	0.7%	1.3%
MacCorkle Stemmed	1	0.4%	0.7%
Total	3	1.1%	2.0%
Middle Archaic			
Big Sandy II	10	3.7%	6.6%
Eva I	1	0.4%	0.7%
Total	11	4.1%	7.2%
Middle Archaic-Late Archaic			
Elk River Stemmed	3	1.1%	2.0%
Late Archaic			
Bottleneck Stemmed	1	0.4%	0.7%
Brewerton Side Notched	1	0.4%	0.7%
Brewerton Corner Notched	1	0.4%	0.7%
Brewerton Eared Notched	37	13.7%	24.3%
Brewerton Eared Triangle	4	1.5%	2.6%
Karnak Stemmed	5	1.8%	3.3%
Lamoka	4	1.5%	2.6%
Ledbetter Stemmed	3	1.1%	2.0%
Matanzas Side Notched	16	5.9%	10.5%
McWhinney Heavy Stemmed	18	6.6%	11.8%
Normanskill	1	0.4%	0.7%
Table Rock Stemmed	1	0.4%	0.7%
Total	92	34.0%	60.5%
Terminal Archaic			
Merom Expanding Stemmed	9	3.3%	5.9%
Trimble Side Notched	1	0.4%	0.7%
Total	10	3.7%	6.6%
Late Archaic-Early Woodland			
Delhi	1	0.4%	0.7%
Gary Contracting Stemmed	2	0.7	1.3%
Motley	1	0.4%	0.7%
Saratoga Expanding Stem	17	6.3%	11.2%
Saratoga Parallel Stemmed	5	1.8%	3.3%
Turkey-tail	1	0.4%	0.7%
Wade	2	0.7%	1.3%
Total	29	10.7%	19.1%
Early Woodland			
Robbins	1	0.4%	0.7%
Middle Woodland			
Lowe Flared Base	1	0.4%	0.7%
Snyders	1	0.4%	0.7%
Total	2	0.8%	1.4%
Late Woodland			
Jack's Reef Corner Notched	1	0.4%	0.7%
Unassigned Temporal Affiliation			
Unidentified	119	43.9%	N/A
Total	271		

Figure 4. Large Side Notched and Brewerton Corner Notched Cluster PPKs.

Figure 5. Matanzas Side Notched Cluster PPKs.

Figure 6. Matanzas Side Notched Cluster PPKs including hafted scrapers.

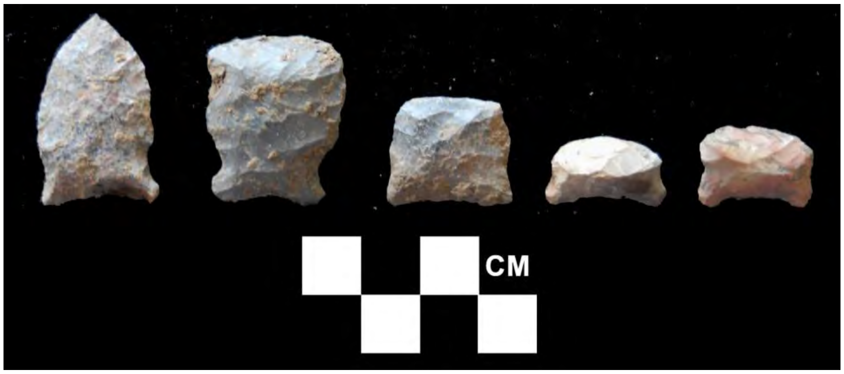


Figure 7. Matanzas Side Notched Cluster PPKs including hafted scrapers (note the extent of sharpening on the three specimens, center and right).

Figure 8. Saratoga Cluster PPKs.

Figure 9. Various stemmed PPKs including one hafted scraper (far right).

Figure 10. Merom Cluster PPKs.

Table 8 PPK Cluster and Type with Quantitative Measurements from 12Sp7.

Cluster	Type	PPK	Hafted Scraper	Drill	Complete N	Mean Weight (g)	Maximum PPK Length (mm)	Complete Mean Length (mm)	Complete Mean Lower Width (mm)	Complete Mean Shoulder Width (mm)	Complete Mean Middle Width (mm)	Complete Mean Upper Width (mm)	Complete Mean Thickness (mm)	Mean W : TH Ratio
Early Archaic														
Kirk Corner Notched	Charleston Corner Notched	2	0	0	1	2.0	25.7	25.7	21.2	18.9	13.3	4.2	4.2	3.2
Rice Lobed	MacCorkle Stemmed	1	0	0	0	-	-	-	-	-	-	-	-	-
Middle Archaic														
Eva	Eva I	1	0	0	1	5.1	-	-	-	-	-	-	6.0	-
Large Side Notched	Big Sandy II	9	0	0	2	6.8	46.4	44.1	18.6	18.0	15.1	5.5	7.6	2.0
Middle Archaic – Late Archaic														
Benton	Elk River Stemmed	3	0	0	1	14.1	76.3	76.3	18.2	22.5	20.6	5.8	6.8	3.0
Late Archaic														
Table Rock	Bottleneck Stemmed	0	1	0	1	2.6	23.1	23.1	11.5	17.8	16.8	-	5.6	3.0
Brewerton Corner Notched	Brewerton Corner Notched	1	0	0	0	4.6	-	-	-	20.4	-		7.6	-
Brewerton Corner Notched	Brewerton Side Notched	0	1	0	1	10.0	43.0	43.0	15.4	28.7	25.2	15.8	6.3	3.7
Lamoka	Lamoka	4	0	0	2	2.9	34.8	28.6	13.1	16.9	14.5	5.8	5.4	2.7
Lamoka	Normanskill	1	0	0	1	4.8	39.6	39.6	-	18.7	13.9	4.7	6.7	2.1
Late Archaic Stemmed	Karnak Stemmed	3	1	1	3	19.0	93.8	54.6	17.0	22.5	17.8	4.7	8.4	2.1
Late Archaic Stemmed	McWhinney Heavy Stemmed	11	6	0	14	11.2	71.2	46.4	15.8	23.3	23.2	11.2	9.5	2.4
Late Archaic Stemmed	Unidentified	1	0	0	1	7.6	52.4	52.4	18.9	22.5	22.4	13.5	11.9	1.9
Late Archaic Stemmed	Unidentified	1	0	0	1	14.1	68.6	68.6	12.7	22.3	21.9	7.5	7.6	2.9
Ledbetter	Ledbetter Stemmed	3	0	0	2	42.5	121.5	102.7	17.5	38.8	31.8	9.3	10.5	3.0
Matanzas Side Notched	Brewerton Eared Notched	34	13	0	26	54.2	69.5	60.5	19.8	19.7	18.8	10.4	8.1	2.3

Cluster	Type	PPK	Hafted Scraper	Drill	Complete N	Mean Weight (g)	Maximum PPK Length (mm)	Complete Mean Length (mm)	Complete Mean Lower Width (mm)	Complete Mean Shoulder Width (mm)	Complete Mean Middle Width (mm)	Complete Mean Upper Width (mm)	Complete Mean Thickness (mm)	Mean W : TH Ratio
Matanzas Side Notched	Brewerton Eared Triangle	2	0	0	0	8.6	47.0	46.3	19.8	20.6	18.2	5.5	8.8	2.1
Matanzas Side Notched	Matanzas Side Notched	9	4	0	9	6.2	55.5	37.2	18.6	20.0	18.9	6.8	7.3	2.6
Matanzas Side Notched	Unidentified	-	-	-	-	1.9	-	-	-	-	-	-	-	-
Table Rock	Table Rock Stemmed	1	0	0	0	3.8	-	-	13.4	24.0	-	-	-	-
Terminal Archaic														
Merom	Merom Expanding Stemmed	8	0	0	7	2.4	32.7	32.7	11.7	15.1	13.7	5.2	5.3	2.6
Late Archaic-Early Woodland														
Dickson	Gary Contracting Stemmed	1	1	0	0	14.3	-	-	-	-	-	-	-	-
Motley	Motley	1	0	0	0	4.4	-	-	-	-	-	-	-	-
Saratoga	Saratoga Expanding Stem	13	4	0	10	10.4	50.4	41.1	21.6	27.6	23.7	8.4	8.1	2.9
Saratoga	Saratoga Parallel Stemmed	4	1	0	1	9.1	46.1	46.1	21.9	19.9	19.9	6.5	7.9	2.5
Terminal Archaic Barbed	Delhi	1	0	0	1	21.0	67.5	67.5	15.6	39.7	35.0	8.7	6.3	5.6
Terminal Archaic Barbed	Wade	1	1	0	2	11.3	64.1	45.5	14.0	31.0	24.4	6.3	7.2	3.4
Turkey-tail	Turkey-tail	1	0	0	0	8.3	-	-	-	-	-	-	7.5	1.2
Early Woodland														
Early Woodland Stemmed Cluster	Robbins	-	-	-	-	-	-	-	-	-	-	-	-	-
Middle Woodland														
Lowe Cluster	Lowe Flared Base	1	0	0	1	14.9	60.2	60.2	19.4	25.9	22.1	8.0	9.3	2.4
Snyders	Snyders	0	1	0	1	12.2	38.4	38.4	24.3	20.1	37.9	29.5	8.7	4.5
Late Woodland														
Jack's Reef	Jack's Reef Corner Notched	1	0	0	1	1.7	20.7	20.7	17.2	17.0	31.6	5.0	5.0	2.7

Table 9 PKK Type with Qualitative Data from 12Sp7.

PPK Type/Attribute	Big Sandy II (n=9)	Karnak Stemmed (n=5)	McWhinney Heavy Stemmed (n=17)	Ledbetter Stemmed (n=3)	Brewerton Eared Notched (n=34)	Brewerton Eared Triangle (n=2)	Matanzas Side Notched (n=13)	Merom Expanding Stemmed (n=8)	Saratoga Expanding Stemmed (n=17)	Saratoga Parallel Stemmed (n=15)
Basal Shape										
Straight	7	5	3	1	13	0	7	5	11	5
Convex	0	0	5	1	0	0	0	2	6	0
Concave	1	0	1	0	20	2	3	1	0	0
Unfinished	1	0	6	1	0	0	0	0	0	0
Missing Data	0	0	2	0	1	0	3	0	0	0
Basal Grinding										
Yes	7	0	0	0	0	0	5	0	0	1
No	2	5	16	3	33	2	5	8	17	4
Missing Data	0	0	1	0	1	0	3	0	0	0
Lateral Grinding										
Yes	7	0	1	0	2	0	6	0	1	1
No	2	5	16	3	30	2	6	8	16	4
Missing Data	0	0	0	0	2	0	1	0	0	0
Basal Thinning										
Yes	1	0	2	0	8	1	3	0	5	1
No	7	5	13	3	23	1	8	8	11	4
Missing Data	1	0	2	0	3	0	2	0	1	0
Cross-section										
Plano-convex	3	3	15	2	17	2	4	4	8	3
Lenticular	2	1	2	1	12	0	7	4	6	0
Rhomboidal	0	0	0	0	0	0	0	0	3	0
Diamond	0	1	0	0	0	0	0	0	0	0
Missing Data	4	0	0	0	5	0	2	0	0	2
Tool Made on A Flake										
Yes	3	2	8	1	10	1	3	5	1	3
No	0	0	1	0	2	0	0	1	0	0
Unknown	5	3	8	2	19	1	10	2	16	2
Missing Data	1	0	0	0	3	0	0	0	0	0

PPK Type/Attribute	Big Sandy II (n=9)	Karnak Stemmed (n=5)	McWhinney Heavy Stemmed (n=17)	Ledbetter Stemmed (n=3)	Brewerton Eared Notched (n=34)	Brewerton Eared Triangle (n=2)	Matanzas Side Notched (n=13)	Merom Expanding Stemmed (n=8)	Saratoga Expanding Stemmed (n=17)	Saratoga Parallel Stemmed (n=15)
Technique of Manufacture										
Percussion	1	0	1	0	0	0	0	0	1	0
Pressure	2	0	1	0	24	1	11	8	0	0
Both	5	5	15	3	8	1	2	0	16	5
Missing Data	0	0	0	0	2	0	0	0	0	0
Beveling										
Yes	0	0	0	0	1	0	0	0	0	2
No	8	5	17	3	31	2	13	8	15	1
Missing Data	1	0	0	0	2	0	0	0	2	2
Serration										
Yes	0	0	0	0	0	0	0	0	0	0
No	8	5	17	3	32	2	13	8	13	3
Missing Data	1	0	0	0	2	0	0	0	4	2
Sharpening										
Yes	4	3	13	3	18	1	5	0	16	3
No	1	1	1	0	7	1	5	3	0	0
Unknown	0	0	0	0	9	0	3	5	1	0
Missing Data	4	1	3	0	0	0	0	0	0	2
Outer Surface of Material Visible										
Smooth, worn	0	0	0	0	0	1	1	4	0	0
Cortex	0	0	0	0	0	0	0	0	0	0
Weathered Natural Surface	0	0	0	0	0	0	0	0	0	0
None	9	5	17	3	34	1	12	4	17	5
Heated/Burned										
Heated	0	0	0	0	11	2	3	4	0	0
Burned	4	0	3	0	4	0	4	0	1	0

A review of Table 8 and Figure 11 reveals that the Late Archaic PPKs tend to be small or medium-sized and generally have a low width:thickness ratio with many less than 3.0:1. In other words, relative to their widths the PPKs tend to be thick. Extensive thinning did not take place with the exception of some types like the Delhi PPKs. The impression is that some of these PPKs were expediently manufactured either from pebble materials or through core and flake production. Some flakes were evidently thin enough to avoid protracted flaking by percussion and they could simply be pressured flaked into a suitable shape. Recycling of PPKs into other tool forms is best evidenced by hafted scrapers that appear commonly among the McWhinney Heavy Stemmed PPKs, Matanzas Side Notched Cluster PPKs and the Saratoga Expanding Stem PPKs (Figures 6 and 7). One Karnak Stemmed PPK was recycled as a drill.

The qualitative data in Table 9 clearly indicate the different knapping procedures were applied to the manufacture of these PPKs. For example, Brewerton Eared Notched PPKs are most frequently made on flake blanks, when this attribute could be identified, a not unsurprising association given their size. The manner in which they were shaped and finished frequently involved pressure flaking. In fact, the manufacturing chain probably consisted of raw material acquisition > core reduction > flake > pressure flaking > PPK. A similar pattern is evidenced for the Merom Expanding Stemmed PPKs. McWhinney Heavy Stemmed PPKs, on the other hand, were most often made by a combination of percussion and pressure flaking which probably involved the following manufacturing sequences: 1) core > thick flake > percussion flaking > pressure finishing of edges > PPK; or 2) pebble raw material > percussion flaking > pressure finishing of edges > PPK.

A curious feature of the biface assemblage discussed below is that even Stage 5 examples tend to be rather thick with width:thickness ratios closer to or less than 3.0:1 (Table 10). This seemingly does not indicate a failure or desire to successfully thin bifaces, but rather that the design template called for squatter, thicker preforms suitable for PPKs of the Matanzas Side Notched Cluster. A comparison of Tables 8 and 10, as well as Figures 11 and 12 show good correlation between the metrics for finished PPKs and the bifaces from 12Sp7. The PPKs show some distinct clustering in terms of the values for the width and thickness among the Brewerton Eared types, Matanzas Side Notched Cluster, McWhinney Heavy Stemmed, and Merom Cluster tools.

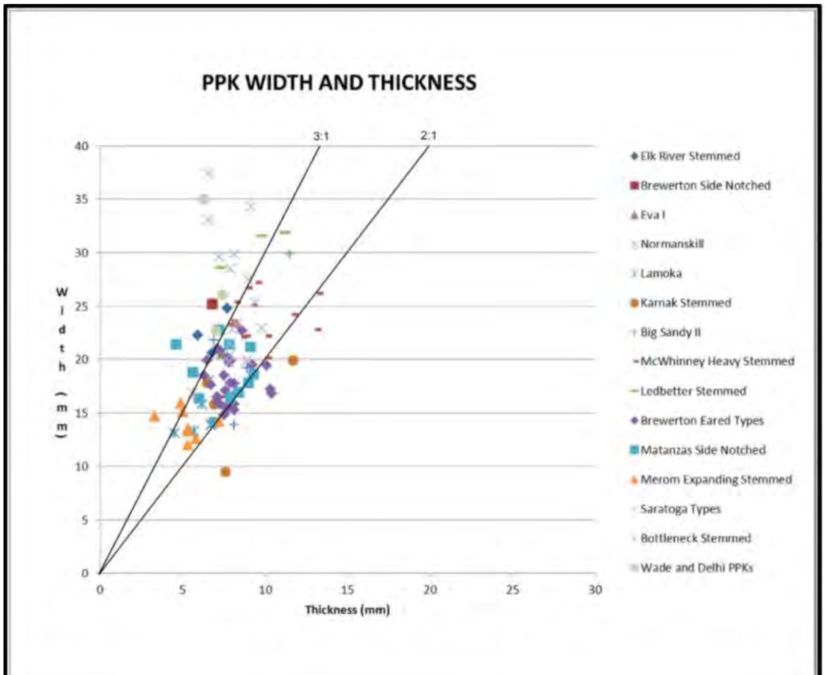


Figure 11. PKK width and thickness at 12Sp7.

Bifaces

The assemblage of bifaces or bifacial tools includes a variety of types like knives, scraping tools, drills, and unfinished preforms. There are a total of 326 bifacial tools in the assemblage and Table 10 provides detailed information on 211 (64.7 percent) of these artifacts. The additional 115 bifaces not included in the data below include 93 specimens (28.5 percent) that are badly broken and unclassifiable.

Table 10. Quantitative and Qualitative Attributes of Bifaces.

Biface Stage/Attribute	Stage 1 (n = 18)	Stage 2 (n = 21)	Stage 3 (n= 44)	Stage 4 (n = 40)	Stage 5 (n = 37)	Drill (n = 51)
Quantitative Attributes						
Average Length	35.3	37.3	48.8	36.7	51.2	48.1
Average Width	23.5	25.3	25.7	27.2	24.3	14.8
Average Thickness	7.2	9.5	12.0	10.4	10.7	11.1
Average Weight	9.4	10.3	15.7	8.3	16.4	29.0
AverageW:TH Ratio	3.3	2.7	2.1	2.6	2.3	1.3
Qualitative Attributes						
	N	**N**	**N**	**N**	**N**	**N**
Basal Shape						
Straight	0	1	1	4	7	9
Convex	1	2	9	10	8	4
Concave	0	0	0	0	0	0
Pointed	0	0	1	0	1	0
Unmodified	8	12	12	1	0	0
Missing Data	9	6	21	25	21	35
Basal Grinding						
Yes	1	0	0	0	1	4
No	9	13	21	15	14	10
Missing Data	8	8	23	25	22	37
Lateral Grinding						
Yes	0	0	0	0	0	4
No	9	13	22	14	14	11
Missing Data	9	8	22	26	23	36
Basal Thinning						
Yes	1	2	0	3	2	2
No	9	12	20	11	12	11
Missing Data	8	7	24	26	23	38
Made on a Flake						
Yes	11	17	22	12	6	14
No	4	2	8	1	2	1
Missing Data	3	2	14	27	29	36

Biface Stage/Attribute	Stage 1 (n = 18)	Stage 2 (n = 21)	Stage 3 (n= 44)	Stage 4 (n = 40)	Stage 5 (n = 37)	Drill (n = 51)
Method Manufacture						
Percussion	8	15	37	16	3	0
Pressure	7	4	2	5	10	40
Combination	2	2	5	18	23	10
Missing Data	1	0	0	1	1	1
Cortex Type						
Smooth, Worn	6	9	6	0	0	1
Weathered Natural Surface	3	2	7	1	0	1
Cortex	1	2	1	0	0	0
Natural Surface	0	0	0	0	0	0
Sandy Cortex	0	0	0	0	0	0
Weathered Cortex	0	0	0	0	0	0
Patinated	1	0	1	0	0	0
Missing Data	3	1	1	5	0	1
Absent	4	7	28	38	37	48
Heated/Burned						
Heated	1	2	9	2	5	
Burned	3	6	10	19	8	

The expected reduction in the width:thickness ratio as bifaces are finished is not seen in the biface sample from 12Sp7. Specifically, Stage 1 bifaces have a ratio of 3.3:1, while the measured Stage 5 bifaces have a ratio of 2.2:1 (see Figure 11). Over one-third (38.9 percent) of the 211 bifaces and drills in the sample were made on flakes. Thus, the width:thickness ratio provided for Stage 1 bifaces reflects the size of the blanks selected and not an attempt to reduce thickness.

As manufacture proceeds, however, there is a tendency for reduced percentages of cortex. Only four of the 18 Stage 1 bifaces display no cortex as opposed to 37 or 100 percent of the Stage 5 bifaces. Additionally, there is an increased use of combinations of percussion and pressure flaking on later Stage 5 bifaces (n = 23 of 37) as opposed to Stage 1 bifaces (n = 2 out of a total of 18). The earliest stages of biface manufacture are typically facilitated by a combination of hard and soft hammer percussion as opposed to pressure. Pressure flaking may have been used to prepare platforms, however.

The data indicate that Stage 3 and 4 bifaces are more frequently heated or burned, suggesting they may have been involved in a process of heat treatment or, at the very least, activities situated around hearths. At least four PPKs, including one Brewerton Eared, two Matanzas Side Notched, and one Merom Expanding Stemmed display good evidence for deliberate heat treatment. Further, a total of 35 measured flakes (2.3 percent of 1,509) displayed evidence of heat treatment. At what stage heat treatment was introduced in the manufacturing system is unknown, but the presence of heated pebbles and cobbles, as well as an initial reduction flake, suggest it involved unmodified raw material, flake blanks, and already worked bifacial preforms.

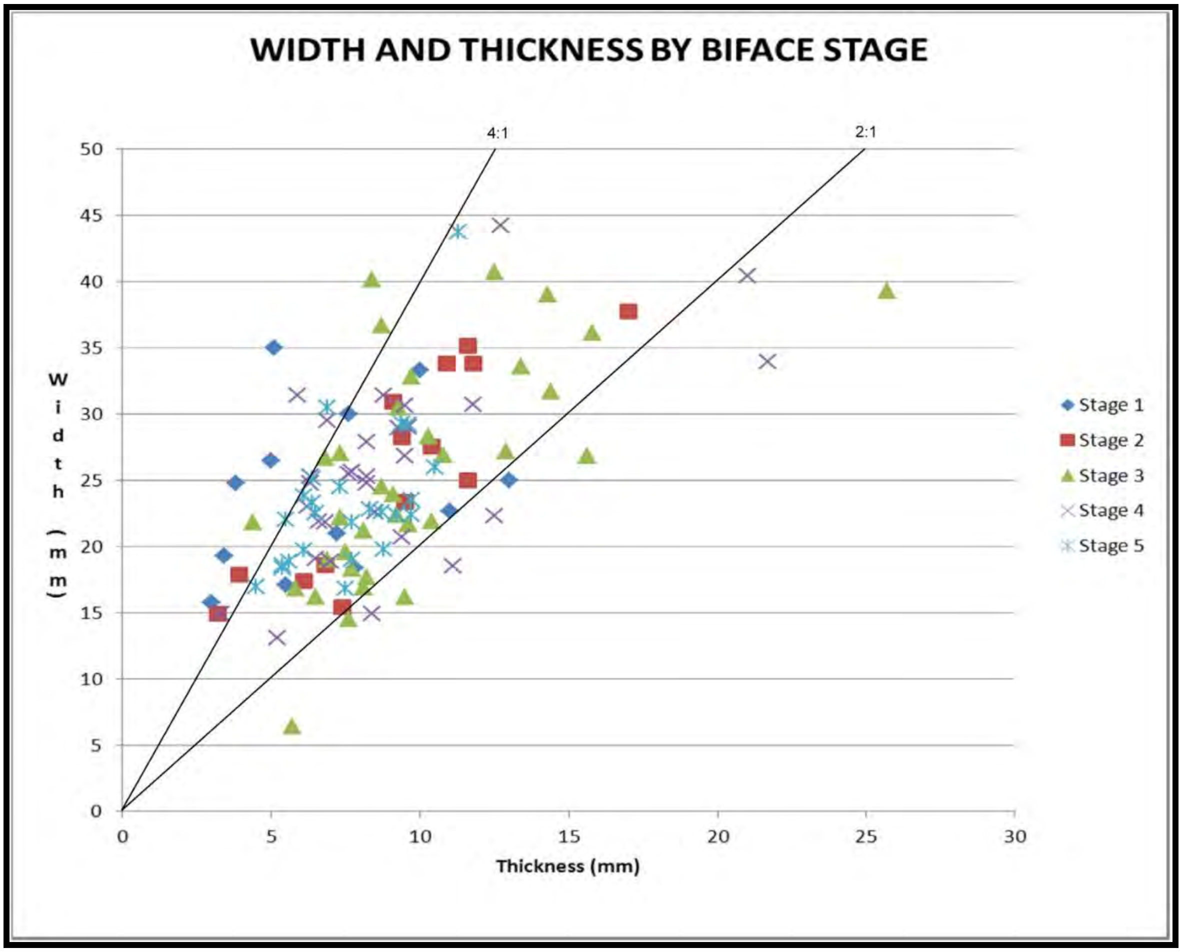


Figure 12. Biface width and thickness by manufacturing stage.

The ―biface" sample also includes 51 drills, and 44 of these are broken specimens consisting of shafts only. The majority have flexion or bending breaks (n = 29), but five examples have breaks due to torsion or twisting. A total of 40 specimens appear to have been shaped and finished by pressure, while 10 examples display a combination of percussion and pressure. The combination of percussion and pressure flaking is most often seen on unfinished drills or at the bases of the drills. Fourteen drills are made on flake blanks, and they have rhomboidal- or diamond-shaped cross-sections in the main shaft area.

Unifacial Tools

The unifacial tool assemblage numbers 108 specimens, and 107 of these are described in the following Table 11. The unifacial tools are varied in form and most are not standardized, comprising retouched and utilized flakes (61.7 percent of 107). Some of the retouched flakes in the assemblage have continuous direct semi-abrupt retouch and could also be termed ―side-scrapers."

Table 11. Quantitative and Qualitative Attributes of Unifaces.

Uniface/ Attribute	Bipolarized (n=11)	Denticulate (n =3)	End-scraper (n =18)	Microdrill (n = 6)	Notch (n = 1)	Piercer (n =2)	Retouched Flake (n = 66)
Quantitative Attributes							
Average Length	19.8	33.1	27.5	17.9			34.9
Average Width	16.4	16.7	25.8	7.3	24.2	20.5	22.5
Average Thickness	6.9	9.1	6.7	2.9	7.0	3.3	5.4
Average Weight	3.0	17.2	6.4	0.5	10.1	1.3	4.2
Qualitative Attributes							
	N	**N**	**N**	**N**	**N**	**N**	**N**
Blank Type							
IRF	0	0	2	1	0	1	8
URS	1	1	8	1	0	0	25
BIRF	0	0	0	0	0	0	2
BTF	0	0	4	0	1	1	20
BFF	0	0	0	0	0	0	0
Janus	1	0	0	0	0	0	2
Bipolar Flake	0	0	0	1	0	0	0
Shatter/slab	0	2	0	0	0	0	0
Unknown	0	0	3	3	0	0	0
Missing Data	9	0	1	0	0	0	9
Retouch Type							
Fine	0	0	0	0	0	0	5
Semi-abrupt	0	0	11	0	0	2	29
Abrupt	0	0	3	2	1	0	2
Combination	0	0	3	4	0	0	24
Invasive	5	0	0	0	0	0	3
Denticulation	0	3	0	0	0	0	1
Utilization	0	0	0	0	0	0	2
Missing Data	0	0	1	0	0	0	0
Retouch Position							
Inverse	0	1	1	0	0	0	12
Direct	0	0	14	2	1	2	42
Combination	6	0	2	1	0	0	10
Alternate	0	0	0	3	0	0	0
Alternating	0	0	0	0	0	0	1
Missing Data	5	2	1	0	0	0	1
Cortex Type							
Smooth, Worn	3	2	1	1	0	0	6
Weathered Natural Surface	0	0	0	0	0	1	4
Cortex	0	0	1	0	1	0	7
Natural Surface	0	0	0	0	0	0	0
Sandy Cortex	0	0	0	0	0	0	0
Weathered Cortex	0	0	0	0	0	0	1
Patinated	0	0	0	0	0	0	0
Missing Data	0	0	1	0	0	1	0
Absent	8	1	15	5	0	0	48
Heated/Burned							
Heated	2	0	0	1	0	0	7
Burned	0	0	7	0	1	1	11

(IRF = Initial Reduction Flake; URS = Secondary Unspecified Reduction Flake; BIRF = Biface Initial Reduction Flake; BTF = Biface Thinning Flake; BFF = Biface Finishing Flake)

The blanks most often selected for unifacial tools consist of unspecified reduction flakes (33.6 percent of 107) and biface thinning flakes (24.3 percent of 107). The use of biface thinning flakes as blanks for tools suggests that bifaces were occasionally treated as cores during the process of manufacture. In general, cortical or natural surfaces are absent on the unifacial tools (72 percent of the 107 measured specimens).

The tool blanks selected are generally the largest for denticulates (includes two tools made on shatter slabs) and the end-scrapers that measure on average 27.5 x 25.8 x 6.7 millimeters. The diminutive microdrills average 17.9 x 7.3 x 2.9 millimeters. The flake or unifacial versions of the microdrills differ from the bifacial versions in that they are made with semi-abrupt and abrupt retouch, direct, inverse, and/or alternate, rather than bifacial retouch. The retouched flakes are the least standardized tool forms as can be seen from Table 11, displaying all types of retouch in varying positions.

The most common type of retouch is semi-abrupt, which occurs on 11 of the 18 end-scrapers and 29 of the 66 retouched flakes. Combinations of fine, semi-abrupt or abrupt retouch, again emphasizing the non-standard nature of the retouched flakes, are also fairly common in that group (24 of the total of 66). The position of the retouch is most often direct, situated on the dorsal surface, which occurs on 57 percent of the 107 unifacial tools measured.

Lithic Manufacturing Sequences

The data presented above have been used to formulate a series of manufacturing sequences for lithic reduction at 12Sp7. The manufacturing sequences for the manufacture of flaked stone artifacts can be divided into two main categories based on the type of raw material. The vast majority of raw material identified at the site appears to have been collected at an –ore-enriched" deposit that is not primary bedrock. As indicated above, approximately 31 percent (n = 470) or nearly one-third of the 1,509 measured pieces of debitage display outer surfaces that are smooth and worn, abraded, and/or chattered (pock-marked by percussive blows). These data indicate that gravel cherts, displaced from their bedrock outcrops, played an important role in the technological organization at 12Sp7.

The raw materials from secondary source deposits utilized at 12Sp7 tend to be relatively small, with elongated oval or flat tabular shapes. The internal quality of these materials is highly varied, and they range from highly vitreous to saccharoidal or sugar-like and coarse in texture. Unsealed fractures also occur, which present difficulties to the knapper in successfully detaching flakes, while avoiding the shattering of the material into unusable pieces.

The manufacturing sequences listed above indicate a number of approaches to processing locally-obtained, secondary source materials including bipolar flaking, core reduction, and biface manufacture. In addition, many secondary source materials appear to have been heat treated in their original form prior to flaking. Basic approaches include the following:

1. Pebble > heat treatment > hard and soft hammer percussion, pressure flaking > biface or PPK
2. Pebble > hard and soft hammer percussion, pressure flaking > biface or PPK
3. Pebble > Bipolar flaking > flake > soft hammer percussion, pressure flaking > biface, PPK or uniface
4. Pebble core > hard hammer percussion > flake > soft hammer percussion, pressure flaking > biface, PPK or unifaces
5. Pebble > bipolar flaking > bladelet-like splinters > pressure flaking > microdrill

The manufacturing sequences involving transported raw materials is somewhat different in that they generally involved flake blanks, biface performs, or even tools in the process of sharpening, rather than blocks of raw material. These raw materials tend to be of higher quality, like Wyandotte chert. The basic manufacturing trajectories identified for these materials include the following:

6. Small tabular slab > hard and soft hammer percussion, pressure flaking > biface or PPK
7. Flake > soft hammer percussion, pressure flaking > biface or PPK
8. Flake > pressure flaking > PPK
9. Biface/bifacial core > flake > hard or soft hammer percussion> flake > percussion or pressure flaking > unifacial tool
10. Biface > used as a tool (e.g. scraper or knife) > hard and soft hammer percussion, pressure flaking > PPK
11. Bifacial core/Biface/PPK > bipolar flaking > bladelet-like splinters > microdrill

The 11 manufacturing sequences described above indicate the Late Archaic knappers at 12Sp7 were quite varied and flexible in their approach to tool manufacture. The southern Indiana/western Kentucky raw material catchment provided adequate materials in ore-enriched deposits like gravel bars. Additionally, longer distance transport of selected cherts was probably related to subsistence forays, as well as exchange through trade.

In particular, bifacial core technology (Figure 13) is particularly suited for prehistoric peoples practicing a semi-sedentary or mobile settlement system, or indeed movement of material as part of exchange practices, due to the following: 1) the versatility of the system yielding a diversity of usable by-products for tool production; 2) the multifunctional nature of bifacial tools; 3) the extended use life of bifacial tools; and 4) the overall portability of the bifacial toolkit.

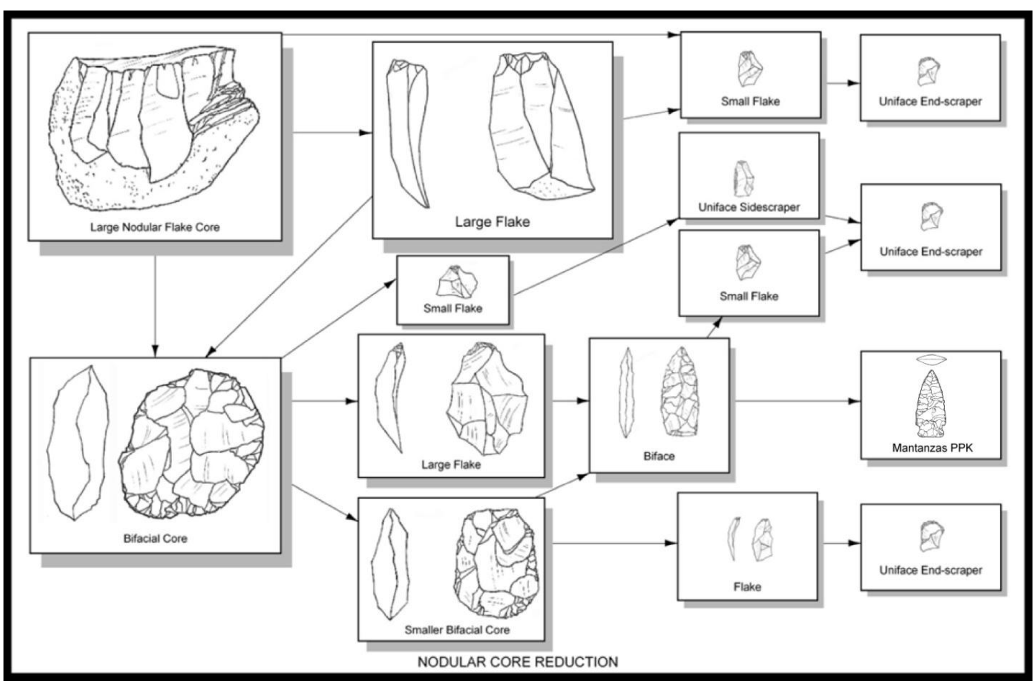


Figure 13. Flake core and bifacial core reduction using nodular chert involving several manufacturing sequences identified at 12Sp7.

Prehistoric Worked Bone, Antler and Tooth Assemblage

In his paper on bone pins and Mid-Holocene groups in the Midwest, Jefferies (1997:470) notes that while bone pins, for example, are found on a number of sites, they most often occur in broken form. Citing Bader (1992:284; Bader and Granger 1989), he notes that the KYANG site in west central Kentucky yielded only two complete pins and 207 fragmentary specimens. The same observation is applicable to the 12Sp7 assemblage that yielded two complete pins and 98 broken examples. Discounting breakage from the historic and modern episodes of disturbance at 12Sp7, it appears that flexion or bending stress is the most common source of breakage. This was also noted at the Black Earth site in southern Illinois where 74 percent of the sample is snapped at the shaft (Jefferies 1997:471). Although not evidenced on the more finely crafted pins, bone awls were repaired and sharpened when broken at 12Sp7 to extend their use life. The following Table 12 lists the raw material sources for the worked bone, antler, and teeth (n = 349 specimens). Due to extensive modifications, many of the artifacts were identified to class, specifically mammal (Mammalia) or large mammal. However, it is clear that raw material was also furnished by birds, carnivores, white-tailed deer (*Odocoileus virginianus*), and eastern box turtle (*Terrapene carolina*).

Table 12. Artifact Type and Raw Material for Worked Bone and Antler Assemblage.

Artifact Type	Number	General Raw Material	Species	Common Name	Element	Percentage
Atlatl Hook	1	Bone	Mammalia	Mammal family	Unidentified	
Total Atlatl Hook	**1**					**0.3**
Awl	2	Bone	Aves	Bird family	Unidentified	
Awl	9	Bone	Aves, large	Large bird	Unidentified	
Awl	58	Bone	Mammalia	Mammal family	Unidentified	
Awl	29	Bone	Mammalia, large	Large mammal	Unidentified	
Awl	1	Bone	*Odocoileus virginianus*	White-tailed deer	Phalanx	
Awl	4	Bone	*Odocoileus virginianus*	White-tailed deer	Metapoidal	
Awl	1	Bone	Carnivora	Carnivore family	Bacculum	
Missing Data	1	-	-		-	
Total Awl	**105**					**30.1**
Bead	1	Bone	Aves	Bird family	Unidentified	
Bead	1	Bone	Aves, large	Large bird	Unidentified	
Bead	2	Tooth	Carnivora	Carnivore family	Canine	
Bead	2	Antler	Cervidae	Deer family	Antler	
Bead	3	Bone	Mammalia	Mammal	Unidentified	

Artifact Type	Number	General Raw Material	Species	Common Name	Element	Percentage
				family		
Bead	2	Bone	Mammalia, large	Large mammal	Unidentified	
Total Bead	**11**					**3.2**
Circumferential Grooved Piece	14	Antler	Cervidae	Deer family	Antler	
Circumferential Grooved Piece	2	Bone	Mammalia	Mammal family	Unidentified	
Circumferential Grooved Piece	11	Bone	Mammalia, large	Large mammal	Unidentified	
Circumferential Grooved Piece	1	Bone	*Odocoileus virginianus*	White-tailed deer	Femur shaft	
Total Circumferential Grooved Piece	**28**					**8.0**
Longitudinal Grooved Piece	2	Bone	Mammalia	Mammal family	Unidentified	
Longitudinal Grooved Piece	2	Bone	Mammalia, large	Large mammal	Unidentified	
Longitudinal Grooved Piece	3	Bone	*Odocoileus virginianus*	White-tailed deer	Metapodial	
Longitudinal Grooved Piece	1	Bone	*Odocoileus virginianus*	White-tailed deer	Metatarsal	
Total Longitudinal Grooved Piece	**8**					**2.3**
Pin or Needle	1	Bone	Mammalia	Mammal family	Unidentified	
Total Pin or Needle	**1**					**0.3**
Pin	1	Antler	Cervidae	Deer family	Antler	
Pin	82	Bone	Mammalia	Mammal family	Unidentified	
Pin	13	Bone	Mammalia, large	Large mammal	Unidentified	
Pin	3	Bone	Vertebrata	Vertebrate subphylum	Unidentified	
Missing Data	1					
Total Pin	**100**					**28.7**
Pressure Flaker Tip	5	Antler	Cervidae	Deer family	Antler	
Missing Data	4					
Total Pressure Flaker Tip	**9**					**2.6**
Spatula	1	Bone	Mammalia	Mammal family	Unidentified	
Spatula	2	Bone	Mammalia, large	Large mammal	Unidentified	
Total Spatula	**3**					**0.9**
Tooth (chisel)	1	Tooth	*Castor*	Beaver	Incisor	

Artifact Type	Number	General Raw Material	Species	Common Name	Element	Percentage
			canadensis			
Total Tooth	**1**					**0.3**
Unidentified	3	Antler	Cervidae	Deer family	Antler	
Unidentified	3	Bone	Aves, large	Large bird	Unidentified	
Unidentified	53	Bone	Mammalia	Mammal family	Unidentified	
Unidentified	18	Bone	Mammalia, large	Large mammal	Unidentified	
Unidentified	1	Bone	*Odocoileus virginianus*	White-tailed deer	Unidentified	
Unidentified	2	Bone	*Odocoileus virginianus*	White-tailed deer	Metapoidal	
Unidentified	1	Bone	*Odocoileus virginianus*	White-tailed deer	Ulnar notch, right side	
Unidentified	1	Bone	*Terrapene carolina*	Common box turtle	Plastron	
Total Unidentified	**82**					**23.5**
Total Bone and Antler	**349**					**100.2**

A breakdown of the animal species contributing to the worked bone and antler assemblage indicates that 58.2 percent are identified as the Mammal family, while 22.1 percent are attributed to large mammals (Table 13). The latter almost certainly includes white-tailed deer and elk; the former was positively identified on 14 specimens accounting for 4.0 percent. An additional 7.2 percent of the worked bone and antler was identified as the family of deer or elk (Cervidae), primarily based on the identification of antler. Turtle and beaver (*Castor canadensis*) occur in isolated specimens, the latter being a tooth modified into a chisel. Large birds are also well-represented in the collection at 3.7 percent and long bones from turkey (*Meleagris gallopavo*) are especially suited for expedient manufacture of awls by simple grinding. It is worth noting that, similar to lithic artifacts, bone and antler tools and ornaments selectively utilize specific raw materials. As indicated in Table 12, awls are exclusively made from bone as is all but one of the pins. The pressure flaker tips are exclusively made from antler, while the spatulas are made from bone.

Table 13. Raw Material for Worked Bone and Antler Assemblage.

General Species	Number	Percentage
Bird, general	3	**0.9**
Bird, large	13	**3.7**
Mammal, general	203	**58.2**
Mammal, large	77	**22.1**
Carnivore	3	**0.9**
Deer, White-	14	**4.0**

General Species	Number	Percentage
tailed		
Deer, general	25	7.2
Vertebrate, general	3	0.9
Beaver	1	0.3
Turtle	1	0.3
Missing	6	1.7
Total	349	100.2

The worked bone and antler assemblage contains three basic types of artifacts. The first consists of discarded by-products from tool manufacture, while the second comprises finished artifacts like awls and pins. The last group consists of tools used to make other tools, specifically antler utilized for pressure flakers.

The first major group consists of circumferentially (n = 28) and longitudinally (n = 8) grooved objects including waste products and blanks for tool manufacture. The circumferentially grooved specimens include both antler (n =14) and bone (n =14), the latter of which includes a white-tailed deer femur shaft. Both materials were treated in the same way. A groove was incised around the circumference of an antler main beam/tine or a bone into the spongy or hollow cavity, and then the piece was snapped (Figure 14). This stage represented the initial processing of the raw material to reduce it to smaller workable pieces. In the case of antler, it was most likely achieved after the antler was soaked to soften the material. One large mammal bone had three grooves spaced along its length, perhaps for the purpose of making beads, a common practice for small barrel-shaped beads and tube beads made from bird bone at 12Sp7 (see Figure 22).

Figure 14. Circumferentially grooved pieces.

Figure 15. Longitudinally grooved pieces.

The longitudinally grooved specimens (Figure 15) number eight pieces, and these represent the next stage of manufacture whereby a long splinter is extracted for use. This stage may also be completed without using the groove and snap technique; in the case of deer long bones, parallel grooves can be incised along the length of the bone to divide it into two halves. All of the longitudinally grooved artifacts at the site involve bone and three are white-tailed deer metapodials and one is a metatarsal. The bone splinter illustrated in Figure 15 (center) measures 93.3 x 12.8 x 5.3 millimeters, which is shorter than the 131.4 or 130 millimeter length of the complete or nearly complete bone pins. It is much closer to the average length of 72.0 millimeters of the 12 complete awls. Another specimen, illustrated in Figure 15 (right), is a shaped piece of antler that probably was produced by a longitudinal groove and it measures 71.4 x 19.1 x 6.9 millimeters.

The pressure flakers from 12Sp7 are all made from antler, a logical choice given that antler tines, for example, can be quickly modified to fulfill this function. In addition, antler pressure flaker tips can be shaped from splinters and inserted into wooden handles. Antler, with its soft elastic character, is ideal for pressure work due to its compressive strength, ability to bite into the platform, and then bend and spring downward as the flake is detached. All of the objects identified as pressure flaking tools display cuts, striations, and microflaking at their tips, and one example appears to be ―mushroomed.” The largest complete specimen measures 56.1 x 8.5 x 6.9 millimeters.

Table 14. Awl and Pin Attributes from 12Sp7.

Attribute	Awl (Total = 105)	Percentage	Pin (Total = 100)	Percentage
Average Length	72.4 mm		134 mm, n = 1	
Average Width	9.8 mm		5.9 mm	
Average Thickness	5.4 mm		3.3 mm	
Average W:TH Ratio	1.8		1.4	
Total Average Weight	2.2 grams		1.2 grams	
Manufacture				
Manufacture, Grooving	0	**0.0**	0	**0.0**
Manufacture, Grinding	86	**81.9**	44	**44.0**
Manufacture, Grinding and Grooving	1	**1.0**	0	**0.0**
Manufacture, Grinding and Scraping	2	**1.9**	0	**0.0**
Manufacture, Drilling	1	**1.0**	3	**3.0**
Manufacture, Scraping	4	**3.8**	0	**0.0**
Manufacture, Unknown	11	**10.5**	53	**53.0**
Manufacture Striations				
Parallel Striations	10	**9.5**	8	**8.0**
Perpendicular striations	54	**51.4**	20	**20.0**
Parallel and Perpendicular Striations	20	**19.0**	12	**12.0**
Multidirectional Striations	8	**7.6**	4	**4.0**
Striations, Unknown	13	**12.4**	0	**0.0**
Manufacturing Traces Obliterated	0	**0.0**	56	**56.0**
Surface Treatment				
Surface, Unfinished	65	**61.9**	9	**9.0**
Surface, Incised	0	**0.0**	1	**1.0**
Surface, Highly Polished	12	**11.4**	70	**70.0**
Surface, Lightly Polished	28	**26.6**	20	**20.0**
Functional Wear				
Functional Wear Microflaking	12	**11.4**	1	**1.0**
Functional Wear, Bending Break	4	**3.8**	17	**17.0**
Functional Wear, Torsion Break	1	**1.0**	0	**0.0**
Functional Wear, Tip Rounded	26	**24.8**	5	**5.0**
Functional Wear, Tip Reworked	1	**1.0**	1	**1.0**

Attribute	Awl (Total = 105)	Percentage	Pin (Total = 100)	Percentage
Functional Wear, Tip Snapped	11	**10.5**	2	**2.0**
Functional Wear, Tip Crushed	1	**1.0**	0	**0.0**
Functional Wear, None Visible	49	**46.7**	74	**74.0**
Thermal Alteration				
Heated/Burned	16	**15.2**	39	**39.0**

Figure 16 provides a scatter diagram which compares the width and thickness of objects classified as awls as opposed to those classified as pins (Table 14). The awls tend to display cross-sections that include some rounded specimens, but most exceed a width:thickness ratio of 1:1 to a much greater degree and frequency than objects classified as pins. Thus, most awls are flattened in cross-section. To a certain extent, the shape of the cross-section is related to the fact that most specimens are made on blanks created by uncontrolled percussion and the resulting splinters selected for awls are generally long and flat. A total of 65, or 61.9 percent, of the 105 awls displayed unfinished surfaces (Table 14).

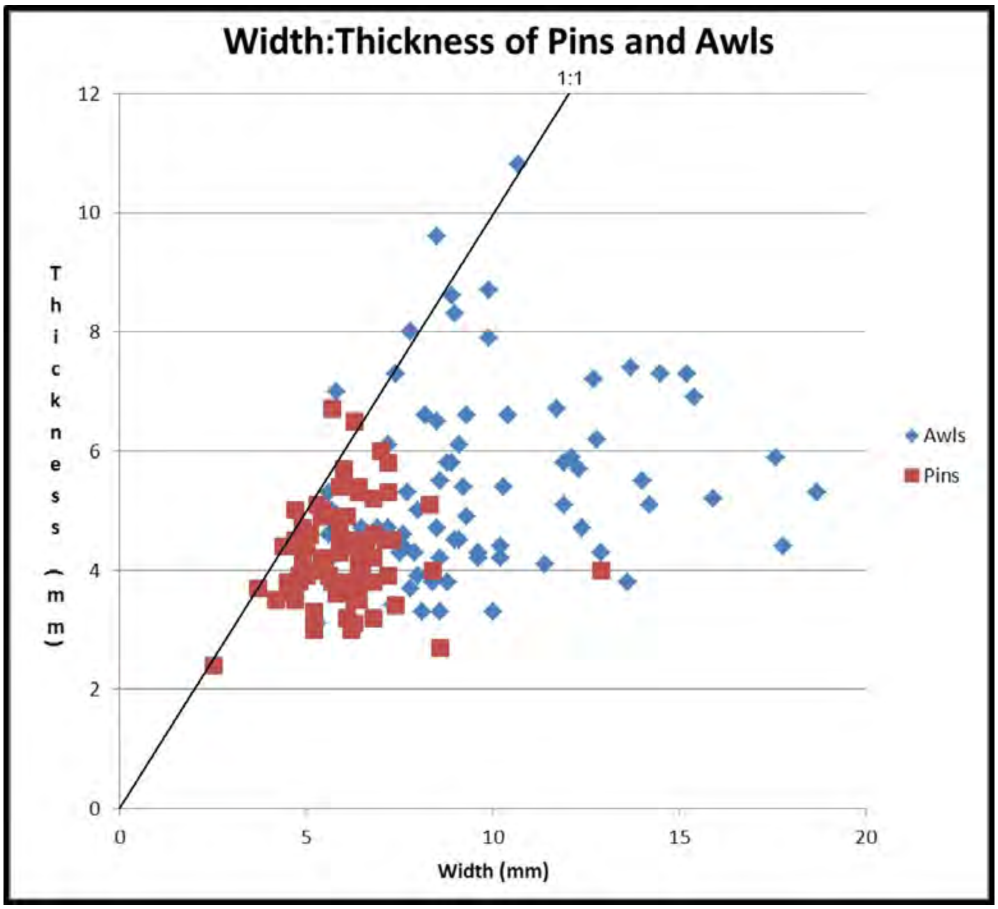


Figure 16. Scatter diagram of awls and pins by width and thickness.

The pins range in cross-section from those specimens that are rounded, with a width:thickness ratio close to 1:1, to those that are flattened and exceed this ratio as on the right side of the graph in Figure 16. The graph indicates that those specimens classified as pins form a continuum from round to flat sections, which may be related to raw material. Specifically, thicker walled bones yield round section pins and thinner walled bones or antler produce flatter-sectioned pins. Nonetheless, those artifacts classified as pins (Bergman 2011:Figure 7) tend to be rounder in cross-section than the awls.

Fine parallel, perpendicular, and multidirectional striations occur on 87.6 percent of the awls recovered from 12Sp7 (Figures 17 and 18). These, in the absence of chattermarks (cf. Newcomer 1987:Plates 3a and 3b), strongly suggest the awls were made by grinding using a sandstone slab, for example, or at very least finished by grinding. It is highly likely that a similar approach to shaping and finishing was employed in pin manufacture, given that 44 percent display striations rather than the chattermarks characteristic of scraping with a stone tool. However, while 61.9 percent of the awls display unfinished surfaces, 70.0 percent of the pins are highly polished as a result of manufacture or use, totally obliterating the earliest stages of manufacture. Regarding use, the awls most frequently display damage at the tip including rounding and microflaking. Aside from bending breaks noted on 17.0 percent of the pins, tip damage was negligible. Given that almost all of the pins were broken, the number of bending breaks should be higher, but tell-tale signs like lipping were not observed.

Figure 17. Various awls from 12Sp7 (note rodent gnawing on second specimen from left).

Figure 18. Various awls from 12Sp7.

Finally, a number of the decorated (Figures 19 and 20) pin styles described by Jefferies (1997) for southern and central Illinois, southern Indiana, and north central Kentucky, occur at 12Sp7 (Table 15). The presence of decorated pins suggests contact with other Middle-Late Archaic sites in the region. Most types are represented by single examples only, with the notable exception of four pins with fishtail-shaped heads (Figure 19). The fishtail-shaped head style has been reported from the Koster and Black Earth sites in Illinois and Crib Mound and McCain in Indiana (Jefferies 1997:Table 2), hinting at the presence of regional exchange networks among groups participating in similar cultural expressions.

Table 15. Jefferies (1997) Decorated Pin Types Identified at 12Sp7.

Jefferies (1997) Decorated PinType	Number
3 A-L, Crutch-top	1
3 Y-BB, Double-expanded	1
4 A, variant	1
4 A-H Fishtailed-cruciform, 4 L-O Cruciform	1
4 EE-FF Decorated	1

Jefferies (1997) Decorated PinType	Number
4 I-K Fishtail-shaped	2
4 I-K, Fishtail-shaped variant or 3 Y-II Double-expanded	1
4 M-N T-top	1
4 P-T, Spade-top	1
4 U-X Straight-concave -top- expanded side	1
Decorated, variant	1
Total	**12**

Figure 19. Fishtail-shaped pin fragments.

Figure 20. Various pin fragments showing surface decoration and a Crutch-top type with a hole.

Figure 21. Spatula-shaped objects.

Among the enigmatic bone and antler objects in the collection are spatula-shaped specimens. These are similar in appearance to medical tongue depressors with wide, flattened cross-sections, and they also resemble ethnographic examples of porcupine quill flatteners used by historic-era Native American tribes. All of the examples from the site are broken and made from mammal or large mammal bone. One tool is decorated with a wavy line pattern and consists of two refitted pieces (Figure 21).

Manufacturing Sequences for Bone and Antler Objects

The method of manufacture evidenced at 12Sp7 involved both controlled and non-controlled production of –blanks” for various tools or decorative objects like pins and awls, beads, as well as enigmatic objects that resemble medical tongue depressors. As with the lithic assemblage described above, a number of manufacturing sequences have been identified for bone and antler. These are summarized in the following Table 16.

Table 16. Manufacturing Sequences for Bone and Antler Objects, 12Sp7.

Raw Material	Manufacturing Sequences
Bone	
Awl	Bone > Uncontrolled Percussive Fracture > Splinter > Scraping and/or Grinding > Awl
Awl	Bone > Groove with Stone Tool > Split Lengthwise > Scraping and/or Grinding > Awl
Awl	Bone (bird, small mammal bone) > Grinding > Awl
Bead	Bone > Groove with Stone Tool > Snap/Cut Through to Cavity > Tube Bead or Barrel-shaped Bead
Hole – multiple production trajectories	Scratch surface until pierced, drilling with microdrill or hand-held piercer
Pin	Bone > Groove with Stone Tool > Split Lengthwise > Blank > Split Lengthwise > Grinding > Pin
Unknown – multiple production trajectories	Bone > Circular Groove with Stone Tool > Snap/Cut Through to Cavity
Unknown – multiple production trajectories	Bone > Circular Groove with Stone Tool > Snap/Cut Through to Cavity > Grooved Lengthwise and Split > Grinding
Antler	
Hole – multiple production trajectories	Scratch surface until pierced, drilling with microdrill or hand-held piercer
Main beam	Antler > Circular Groove with Stone Tool > Snap > Grind Snap and Surface > Plain Bead (or Incise for Decorated Bead)
Pin	Antler > Longitudinal Groove > Splinter > Scraping and/or Grinding > Pin,
Pressure flaker	Antler tine > Use as Pressure Flaker > Groove > Snap

Raw Material	Manufacturing Sequences
Pressure flaker	Antler > Longitudinal Groove > Splinter > Scraping and/or Grinding > Pressure Flaker
Unknown – multiple production trajectories	Antler > Circular Groove with Stone Tool > Snap

The manufacturing sequences include creating blanks by non-controlled percussive fracture of bone on an anvil as commonly used for awl manufacture. Manufacture of pins required greater precision utilizing long splinters, the size of which could be controlled by using grooving and splitting. Examples of awls made on large bird bones like turkey appear to have been shaped directly by grinding one end into a sharp tip. In all instances, except for six awls that showed some evidence for scraping with stone tools, grinding was the preferred shaping and finishing technique. Finally, a number of specimens were drilled, for example, carnivore canine teeth, but in some instances a hole was created by incising on both sides of an object until it was pierced.

Prehistoric Beads

The collection of beads from 12Sp7 is quite varied in terms of design and manufacture. They include drilled canine teeth, barrel-shaped beads made of antler, and tube beads made of bone (Table 17). The sample of 11 beads are predominantly made of bone (seven specimens), while there are two drilled carnivore canine teeth and two beads made of antler. Two beads are made of indeterminate bird bone, two are made from drilled teeth obtained from indeterminate carnivores, and two are made from deer antler.

Table 17. Bead Types and General Attributes, 12Sp7.

Bead Type	Number	General Raw Material	Species	Part	Manufacturing Traces
Tube bead	1	Bone	Aves	Unidentified	Circumferential groove and snap
Short barrel-shaped bead	1	Bone	Aves, large	Unidentified	Circumferential groove and snap
Drilled canine bead	1	Tooth	Carnivora	Canine	Drilled
Drilled canine bead	1	Tooth	Carnivora	Canine	Drilled
Bead	1	Antler	Cervidae	Antler	Circumferential groove and snap
Bead	1	Bone	Mammalia	Unidentified	Drilled
Bead	1	Bone	Mammalia	Unidentified	Drilled
Bead	1	Bone	Mammalia	Unidentified	Circumferential groove and snap

Bead Type	Number	General Raw Material	Species	Part	Manufacturing Traces
Bead	1	Bone	Mammalia, large, probably antler	Unidentified	Circumferential groove and snap
Bead	1	Antler	Cervidae	Antler	Circumferential groove and snap, finely incised
Bead	1	Bone	Mammalia, large	Unidentified	
Total	**11**				

The primary means of manufacture identified in the 12Sp7 collection include circumferential groove and snap, drilling, grinding and polishing, and incising. Tube beads are easily manufactured by simply grooving the circumference of the bone until the hollow interior is reached and the groove is snapped. This technique was used on six of the beads, while drilling was used to pierce the root end of two carnivore canines.

One bead, in particular, is worthy of mention. This specimen is a barrel-shaped bead, probably made from an antler main beam, but due to extensive modification it was conservatively classified as coming from a large mammal (Figure 22). The bead measures 30.5 x 21.4 x 21.4 millimeters and was made by the groove and snap technique in which the outer cortex of the antler was scored to the depth of the inner spongy material and then snapped. After smoothing and polishing the surface, the bead was finely incised with a looping pattern.

Figure 22. Variety of bead types from 12Sp7.

Prehistoric Groundstone Assemblage and „Other" Artifacts

The prehistoric groundstone assemblage is highly varied and includes axe and celt fragments, bannerstone fragments, fossils and collected stones, hammerstones, pitted stones and grinding stones, as well as red ochre (Table 18). Some of these objects are clearly not groundstone, but are included with this group for convenience. The following table lists each of these categories by type and weight which collectively number 163 specimens weighing roughly 10.7 kilograms.

Table 18. Groundstone and Other Artifacts by Number and Weight

Artifact Type	Number	Weight (grams)
Axe	1	175.8
Bannerstone fragment	3	95.6
Celt fragment	3	133.4
Concretion	1	33.8
Fossil Crinoid Stem	21	131.8
Cylindrical stone	1	3.5
Drilled Pebble	1	49.7
Flaked Hematite	1	53.5
Geode	3	106.8
Grindstone	2	86.7
Grooved Axe	3	331.2
Grooved Pebble	3	308.7
Ground Slate	1	12.2
Hammerstone	17	1394.5
Hematite, shaped	16	1213.3
Hematite, unworked	40	3649.3
Pitted Stone	7	1023.2
Red Ochre	24	92.4
Shale, Shale Disc	8	1000.0
Unknown	3	176.04
Waisted Pebble (cf. netsinker)	3	619.9
Water-rounded PPK	1	3.5
Total	**163**	**10,694.8**

The three bannerstone fragments are made from red banded slate, greenstone, and porphyritic basalt (Table 19), respectively, and they are fragmentary. The greenstone specimen is rectangular-shaped with a lenticular cross-section and is the best preserved of the group. All three specimens display longitudinal holes through their center sections which display rotary striations.

Table 19 Groundstone Artifacts and Raw Material Selection.

Raw Material/Type	Axe	Bannerstone	Celt	Grindstone	Grooved Axe	Grooved Pebble	Hammerstone	Pitted Stone	Waisted Pebble	Total
Andesite	0	0	0	0	0	0	1	0	0	1
Chert	0	0	0	0	0	0	4	0	0	4
Granite	1	0	0	0	0	0	0	0	0	1
Gneiss	0	0	0	0	0	0	1	0	0	1
Granite	0	0	0	0	0	0	2	1	0	3
Greywacke	0	0	0	0	0	0	2	0	0	2
Greenstone	0	1	1	0	0	0	0	0	0	2
Hematite	0	0	0	0	3	3	0	0	3	9
Limestone	0	0	0	0	0	0	1	0	0	1
Porphyritic Basalt	0	1	0	0	0	0	0	0	0	1
Quartzite	0	0	0	0	0	0	1	2	0	3
Red Banded Slate	0	1	0	0	0	0	0	0	0	1
Rhyolite	0	0	0	0	0	0	1	0	0	1
Sandstone	0	0	0	1	0	0	1	2	0	4
Siltstone	0	0	0	0	0	0	1	2	0	3
Unidentified	0	0	2	1	0	0	2	0	0	5
Total	1	3	3	2	3	3	17	7	3	42

The presence of fossils, geodes, and even water worn prehistoric tools of earlier manufacture is an interesting addition to the collection. A total of 21 crinoid stem fragments, three geodes, and a water worn PPK were identified. These specimens were probably collected during various subsistence or recreational forays and brought back to 12Sp7 by the Archaic inhabitants. Whether they were regarded as mere curios or invested with greater significance is unknown. At any rate, these data speak to the symbol, ritual, or aesthetic aspects of prehistoric lifeways.

Hematite in unworked form accounts for 40 specimens weighing nearly 3.6 kilograms. The use of hematite for tool manufacture is evidenced by a variety of artifacts made from this material such as grooved axes, grooved pebbles, and other unidentified tools. The basic manufacturing chains for hematite objects at 12Sp7 are as follows:

1. Hematite pebble > hard hammer percussion flaking or pecking > grinding > grooved axe, grooved pebble or other objects (Figure 23)

2. Hematite pebble > grinding > grooved axe, grooved pebble or other objects

The three grooved axes (Figure 24) collected from 12Sp7 are all made from hematite, the largest measures 78.5 x 50.5 x 23.5 millimeters and the smallest measures 71.1 x 53.3 x 23.6 millimeters. The grooves are continuous around the circumference of each tool and one specimen seems to have been manufactured by a combination of flaking, pecking, and grinding. Another hematite artifact type, somewhat enigmatic, is an elongated pebble that has been flaked, pecked, and ground, or some combination thereof, into shape. A deep groove is then incised into one end (Figure 25). The largest of these measures 98.4 x 21.9 x 19.3 millimeters.

Figure 23. Blank for a hematite object showing manufacture by both flaking and pecking.

Figure 24. Full grooved hematite axe.

Figure 25. Elongated polished and grooved hematite object.

There are 17 hammerstones which display battering at one or both ends. They are most often made of chert (n = 4), but a wide range of materials were utilized. The variation in material emphasizes stones which are hard and consolidated. However, one limestone hammerstone was identified and experimental studies using such hammers indicate that can function similar to a soft hammer made of organic materials. The average weight of the 17 measured specimens is 82.0 grams and the largest specimen measures 88.2 x 64 x 52.5 millimeters.

The pitted stones in the assemblage consist of four single pitted stones and three bi-pitted stones with the pits on opposing surfaces. Four of the tools were weighed and they total 1023.2 grams for a mean weight of 255.8 grams. One pitted stone has a pestle-like shape and five specimens also served as hammerstones. The largest complete specimen measures 106.7 x 78.2 x 66.5 millimeters.

Finally, a total of 24 pieces of red ochre were recovered and these weigh 92.4 grams. The specimens are small, averaging 3.9 grams. Thirteen pieces of red ochre display striations or deep scoring on their surfaces, suggesting use for colorant.

Prehistoric Ceramic Assemblage

A total of eight prehistoric ceramic sherds (Table 20) were collected from the North, East, and West berms, as well as the Backdirt Pile to the south side of the disturbed area (see Figure 2). These data coincide well with information provided by the Indiana University Archaeological Survey Form (1987) that indicated the presence of an ephemeral Woodland and/or Mississippian component at the site.

Table 20. Ceramic assemblage from 12Sp7.

Provenience	Count	Weight (g)	Thickness (mm)	Temper	Surface Treatment
E26 – Surface	1	5.5	6.3	Sand/grit with some possible ochre or hematite	Cordmarked/smoothed – body
BD - Surface	1	6.3	6.3	Sand/grit with some possible ochre or hematite	Cordmarked/smoothed – body
BD2 – Screen	1	4.8	6.8	Sand/grog with some grit and possible ochre or hematite	Plain – body
W9 - Surface Exterior	1	3.1	6.2	Sand with a little grit and possibly a little limestone	Plain – body
N12 – Screened Interior	1	6.3	6.9	Sand/grit with a little grog and some possible ochre or hematite	Plain - rim (some possible incising or impressed decoration, but appears to be incidental)
N20 - Soil Rake	1	0.9	N/A	Sand	Plain - sherd fragment
N15 - Soil Rake	1	3.1	N/A	Sand with a little grit	Plain – sherd fragment
N12 - Soil Rake Exterior	1	1.9	N/A	Sand	Plain – sherd fragment; possible rim portion
Totals	**8**	**31.9**			

Prehistoric Fire-cracked Rock and Heated and Burned Artifacts

Table 21 details the types of raw materials selected for use as hearth stones and other activities associated with heating rock, for example, use in sweat lodges. The FCR collected during the scientific recovery is a sample only, based on visual examination in the field. Thus, some rocks were discarded that may have been subjected to heating, but displayed no evidence like surface reddening. Additionally, small heated rock fragments were not collected.

While the context of these artifacts is unknown, due to the disturbed condition of their recovery, there is some behavioral information to be gained by looking at the raw materials identified. By far, the most common stones in the FCR assemblage (n = 1,854) are sandstones and siltstones. The latter are finer-grained, but also possess a loose to tightly consolidated sandy to silty sand texture. These two rock types have a combined weight of 44,666 grams or nearly 45 kilograms, which accounts for 89.5 percent of the 49,889 gram sample.

Table 21. FCR Raw Material, Number and Percentage.

Raw Material	Number	Percentage
Andesite	4	**0.2**
Basalt	5	**0.3**
Cherty Limestone	1	**0.05**
Conglomerate	5	**0.3**
Diorite	4	**0.2**
Fossiliferous Limestone	2	**0.1**
Gabbro	7	**0.4**
Gneiss	6	**0.3**
Granite	13	**0.7**
Greywacke	32	**1.7**
Hornfels	15	**0.8**
Ironstone	1	**0.05**
Limestone	19	**1.0**
Micaceous Sandstone	1	**0.05**
Quartz	4	**0.2**
Quartz Sandstone	29	**1.6**
Quartzite	44	**2.4**
Rhyolite	1	**0.05**
Sandstone	407	**22.0**
Siltstone	1240	**66.9**
Tourmaline Sandstone	1	**0.05**
Unidentified	13	**0.7**
Total	**1,854**	**100.05**

The numbers of heated and burned artifacts are summarized by major flake type in the following Tables 22 and 23. Overall heated artifacts make up 14.5 percent of the total debitage, while burned artifacts account for 41.6 percent. The high percentage of burned artifacts is the result of two categories, flake shatter and angular shatter, which together account for 88.3 percent of 4,730 burned artifacts. As indicated above, the high frequency of burned angular shatter may be related to the fact that heat treatment of chert raw material apparently involved unprocessed secondary source pebbles and cobbles. The 1,237 burned flake fragments account for nearly 60 percent (n = 2,053) of the flake shatter, clearly contributing to the overall frequency of this artifact type.

Table 22. Heated Artifacts by Flake Type and Location.

Type/Location	Backdirt Pile		North Berm		West Berm		South Berm		East Berm		Flotation		Surface	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
IRF	18	19.5	17	17.0	7	4.1	15	6.1	20	1.9	1	N/A	0	N/A
URS	14	15.2	16	16.0	8	4.7	14	5.7	22	2.1	0	N/A	0	N/A
BIRF	0	0.0	0	0.0	1	0.6	0	0.0	1	0.1	0	N/A	0	N/A
BTF	5	5.4	32	32.0	7	4.1	15	6.1	18	1.7	0	N/A	0	N/A
BFF	5	5.4	7	7.0	1	0.6	7	2.9	19	1.8	5	N/A	0	N/A
Janus	0	0.0	2	2.0	0	0.0	0	0.0	1	0.1	0	N/A	0	N/A
FS	42	45.7	16	16.0	138	81.7	184	75.4	51	4.9	0	N/A	0	N/A
ANS	8	8.7	10	10.0	7	4.1	9	3.7	901	87.2	5	N/A	1	N/A
Total	92	99.9	100	100.0	169	99.9	244	99.9	1033	99.8	11	N/A	1	N/A

Table 23. Burned Artifacts by Major Flake Type and Location.

Type/ Location	Backdirt Pile		North Berm		West Berm		South Berm		East Berm		Flotation		Surface	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
IRF	4	1.2	10	1.1	0	0.0	6	0.6	10	0.6	0	0.0	0	N/A
URS	8	2.4	21	2.3	18	2.5	17	1.7	37	2.3	1	0.9	0	N/A
BIRF	1	0.3	0	0.0	0	0.0	0	0.0	3	0.2	0	0.0	0	N/A
BTF	19	5.7	85	9.4	37	5.2	70	6.8	107	6.5	2	1.9	1	N/A
BFF	1	0.3	15	1.7	16	2.2	14	1.4	42	2.6	3	2.8	0	N/A
Janus	1	0.3	0	0.0	0	0.0	0	0.0	3	0.2	0	0.0	0	N/A
FS	105	31.3	189	21.0	272	38.0	316	30.8	321	19.6	34	32.1	0	N/A
ANS	197	58.6	581	64.5	372	52.0	602	58.7	1118	68.1	66	62.3	5	N/A
Total	336	100.1	901	100.0	715	99.9	1025	100.0	1641	100.1	106	100.0	6	N/A

Spatial Distribution of Artifacts in Disturbed Deposits

The spatial distribution of the artifacts has been largely compromised by the excavation of the retaining basin. As such, it is difficult to comment on elements of site structure such as artifact or feature distribution patterns.

In general, the horizontal distribution of artifacts appears to be remarkably homogenous with the exception of noting elevated frequencies of historic artifacts in the backdirt pile used to segregate the Ap. This observation, hardly surprising in terms of the –stratigraphy” of artifact deposition resulting from the recent disturbance, is countered by equally large numbers of historic artifacts in the East Berm. The concentration of historic artifacts is unexplained at this location, but may be related to the fact that the East Berm represents the area of deepest disturbance (see Figure 28). In contrast to the historic artifacts, the horizontal distribution of prehistoric artifacts appears more consistent in terms of types and frequencies. Nonetheless, during the fieldwork, concentrations of shell were noted along the South Berm, suggesting differential deposition patterns for some artifacts and cultural materials.

Within the stratigraphic sequence at 12Sp7, perhaps only the material recovered from the backdirt pile can be assigned a semblance of vertical context. Specifically, these segregated soils are known to come from the upper Ap to a depth of about 15 centimeters and incorporate occupational debris that is both historic and prehistoric.

Horizontal Distribution

The data regarding the horizontal distribution of artifacts has obviously been severely impacted by the degree of disturbance. Observation of the horizontal relationship between artifacts and/or features was not possible, except in the most general of terms. All of the artifacts have been displaced and formal excavation of *in situ* deposits was not possible. Nonetheless, some observations were made during fieldwork, notably a concentration of mussel shell identified within the South Berm, near the southeast corner of the basin. This suggests that discrete activity areas are probably still preserved in the intact portions of the midden.

In terms of the artifacts recovered, there is a remarkable degree of consistency in the types collected in each of the berms as illustrated by Table 24. This situation is also mirrored by the human remains and reflects the homogenization of the deposits as a result of several episodes of disturbance across a period of over 100 years.

Table 24. Artifact Type by Location of Recovery at 12Sp7.

Artifact Type/Unit	North Berm		West Berm		South Berm		East Berm	
Core/Bipolarized Piece	28	**1.2**	18	**1.2**	25	**1.2**	44	**1.1**
IRF	138	**6.2**	95	**6.6**	109	**5.2**	213	**5.5**
URS	254	**11.3**	184	**12.7**	252	**11.9**	410	**10.5**
BIRF	8	**0.4**	9	**0.6**	9	**0.4**	19	**0.5**
BTF	577	**25.7**	251	**17.3**	415	**19.6**	838	**21.5**
BFF	181	**8.0**	116	**8.0**	161	**7.6**	405	**10.4**
Chip	10	**0.5**	15	**1.0**	17	**0.8**	39	**1.0**
FLS	339	**15.1**	271	**18.7**	318	**15.1**	758	**19.4**

Artifact Type/Unit	North Berm		West Berm		South Berm		East Berm	
ANS	680	**30.3**	474	**32.7**	787	**37.3**	1118	**28.7**
Microdebitage	3	**0.1**	1	**0.07**	1	**0.05**	2	**0.05**
Notch Flake	2	**0.09**	0	**0.0**	2	**0.09**	1	**0.03**
Flake from Bipolar Core	6	**0.3**	10	**0.7**	6	**0.3**	16	**0.4**
Janus Flake	16	**0.7**	6	**0.4**	10	**0.5**	36	**0.9**
Debitage Totals	**2242**	**99.9**	**1450**	**99.9**	**2112**	**100.0**	**3899**	**99.9**
Projectile Point	46	**35.9**	36	**30.3**	54	**40.6**	96	**43.0**
Biface (including drills and other bifacial tools)	68	**53.1**	60	**50.4**	60	**45.1**	94	**42.2**
Unifacial Tool	14	**10.9**	23	**19.3**	19	**14.3**	33	**14.8**
Tools	**128**	**99.9**	**119**	**100.0**	**133**	**100.0**	**223**	**100.0**

An examination of Table 24, based on the frequency of artifacts collected from the berms, offers little evidence for discrete activity areas. Some of the type frequencies listed above reflect the field and collection methods and these include the smaller artifacts like the chips and microdebitage. Nonetheless, the larger artifacts seem to occur in similar numbers regardless of which berm they were collected from. These data offer little information regarding discrete activity areas as evidenced from the disturbed deposits investigated during the scientific recovery of 12Sp7. Given the lack of excavation or investigation of *in situ* deposits, no features were examined, although it is almost certain that they are still preserved in parts of the site.

Figures 26 and 27 illustrate the frequencies of temporally diagnostic PPKs from the Backdirt Pile and Basin and each of the four berms. An examination of the pie charts indicates the distribution of PPKs is generally similar at all locations with the exception of the Backdirt Pile that includes greater numbers of later prehistoric specimens. Late Archaic PPKs were found in significant numbers in each berm, along with Late Archaic-Early Woodland types; the exception to this is the West Berm that contained predominantly Late Archaic PPKs.

Despite this fact, it is clear that the density of artifacts (Table 25) recovered from 12Sp7 is impressive, even though the number of artifacts may have been originally three times greater. The screened sample was measured and collected in liters (19,302.96 liters total), allowing for a projected density of artifacts per cubic meter of soil. The number of flaked stone artifacts recovered in the screened sample accounted for 3280 specimens, 27.2 percent of the 12,065 total overall. The average number of flaked stone artifacts recovered by hand screening is 170 per m^3. Using this figure to project a total potential recovery for the disturbed 213 m^3 of deposits indicates that up to 36,210 flaked stone artifacts may originally have been incorporated into the berms. This suggests the field effort had an effective recovery rate of roughly 33.3 percent.

Table 25. Artifact Density at 12Sp7.

Major Artifact Class	N	Per m^3 (total = 213 m^3)
Total Lithic Artifacts	12,065	56.6
PPKs	271	1.3
Bifacial Tools	328	1.5
Unifacial Tools	108	0.5
Groundstone Tools/Object Category	163	0.8
Bone and Antler Tools	349	1.6
Total	1219	5.7

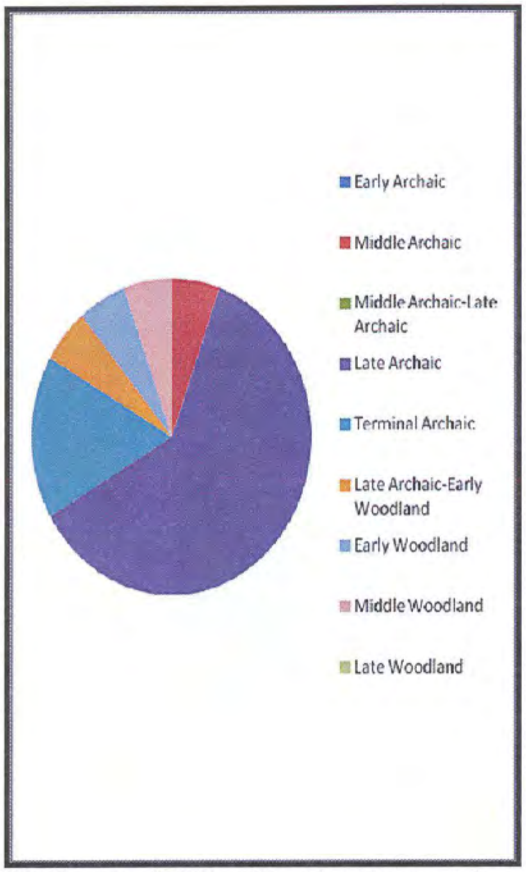
Vertical Distribution

The fieldwork did not result in any stratigraphic observations *per se*, with the exception that disturbed soils appeared to be deposited in a recognizable order as follows:

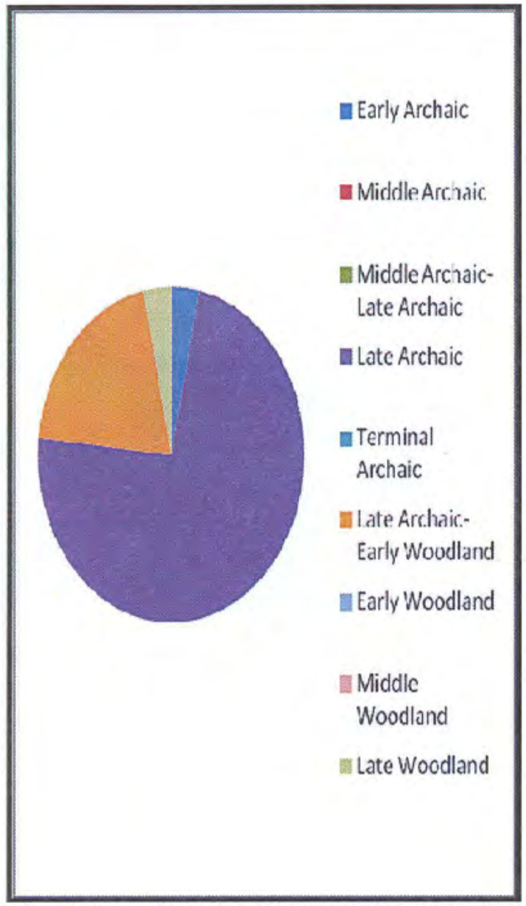
1. The backdirt pile contained the upper portion of the Ap from the surface to a depth of about 15.2 centimeters. These soils were segregated for two reasons: 1) to be able to replace the Ap if needed for agricultural purposes; and 2) the upper portion of the Ap did not possess a suitable water retention capacity for lining the inside of the basin. Field observations suggest that the backdirt pile contained later prehistoric components with a significant concentration of historic artifacts.

2. The disturbed berm deposits appeared to display a trend for prehistoric materials to be more concentrated at the surface and within each berm‘s upper portions. As the bases of the berms were reached, a tendency was observed for increased numbers of historic-era materials, a not unsurprising stratigraphic reversal.

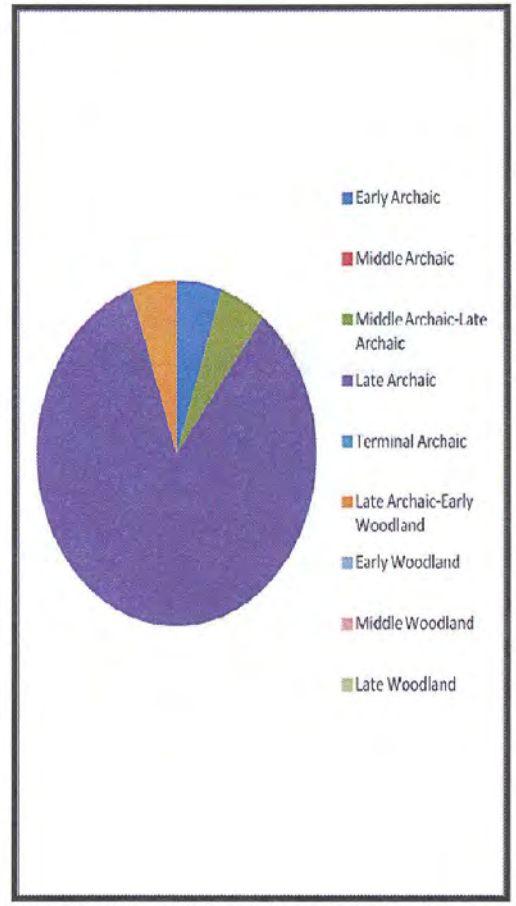
The profiling of eight wall –sections,” as well as the hand excavation of one, 1 meter wide, test unit allowed for more accurate and detailed stratigraphic observations. The basin walls were profiled at eight separate locations that corresponded with the meter strips numbered 7 and 17 at each of the cardinal directions (Figure 2, North 7 and North 17, West 7 and West 17, South 7 and South 17, and East 7 and East 17). Unit South 4 was entirely hand excavated at the beginning of fieldwork to act as a guide by documenting the depth of disturbed soils and their relation to *in situ* deposits.



Distribution of PPKs with assigned temporal affiliation, Backdirt Pile and Basin

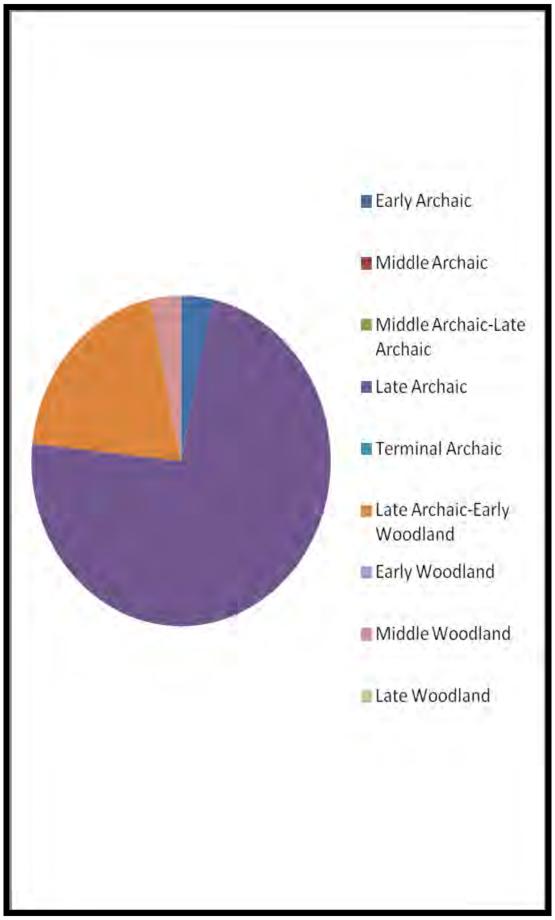


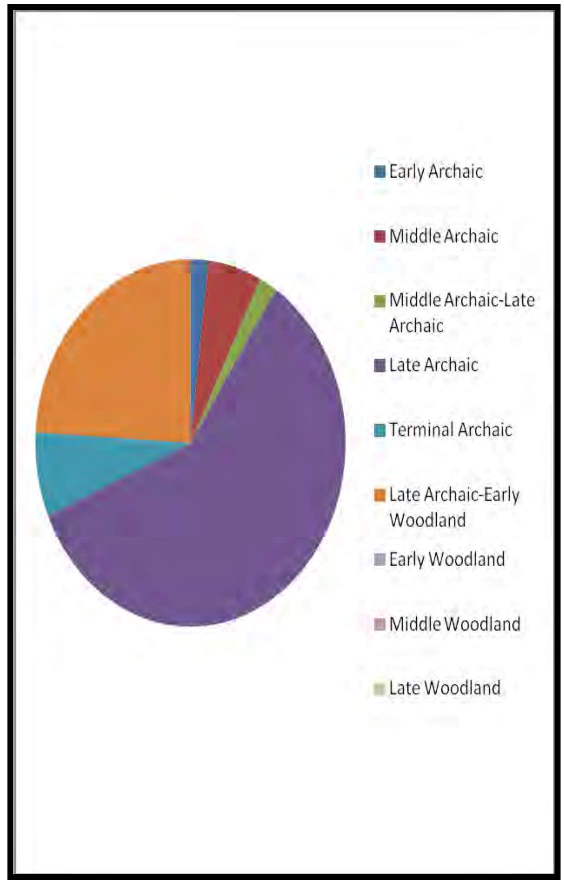
Distribution of PPKs with assigned temporal affiliation, North Berm



Distribution of PPKs with assigned temporal affiliation, West Berm

Figure 26. Spatial distribution frequency of temporally diagnostic PPKs.





Distribution of PPKs with assigned temporal affiliation, South Berm.

Distribution of PPKs with assigned temporal affiliation, East Berm.

Figure 27. Spatial distribution frequency of temporally diagnostic PPKs.

During the course of the field investigation, a stratigraphic sequence was developed to describe the context of artifact deposition, both in prehistory and as a result of historic-era and modern disturbance. The stratigraphy, as identified in the profile plan sections (Bergman 2011: Figures 5 and 6), is highly varied across the site and includes *in situ* archaeological deposits, as well as deposits disturbed in historic times. The following Table 26 lists the stratigraphic units identified at 12Sp7, as well as the associated artifact and other cultural material content.

Table 26. Generalized Stratigraphic Profile for 12Sp7.

Stratum	Soil Horizon	Average Thickness of Deposit (centimeters)	Texture	Primary Munsell Color	Additional Discoloration	Cultural Material and Inclusions
I	Disturbed deposits incorporated into berm	71.3 (deposited above present landsurface, varies across the site with the east berm ranging between 85 cm and 95 cm in thickness)	Silty Clay, Clay	10YR 3/1, 3/2, 4/1, 4/2	Mottled 7.5YR 6/8 and 5YR 5/8	Historic and pre-historic artifacts, shell, bone, burned earth, charcoal, an-gular stone and gravel
Ib	Disturbed deposits, earlier historic event	44.5 (highly variable)	Silty Clay	10YR 3/1, 3/2, 4/2	Mottled 7.5YR 6/8 and 5YR 5/8	Historic and pre-historic artifacts, shell, bone, burned earth, charcoal, an-gular stone and gravel
IIa	―Upper Ap”	15 (in backdirt pile, not verifiable stratigraphically)	Silty Clay	10YR2/1, 3/2	None observed	Historic and pre-historic artifacts, shell, bone, angular stone and gravel
IIb	―Lower Ap”	21.7	Silty Clay, Clay	10YR 3/1, 3/2, 4/1, 4/2	Mottled 7.5YR 6/8 and 5YR 5/8	Historic and pre-historic artifacts, smalller, pulverized shell fragments, bone, burned earth, char-coal, angular stone and gravel
III	Prehistoric Midden	31.2	Silty Loam, Silty Clay, Clay	7.5YR 3/1, 4/4, 4/3, 10YR 3/3, 4/1, 4/2	Mottled 2.5 YR4/8 and 7.5 YR6/8; and 7.5YR 6/8 and 5YR 5/8	Prehistoric artifacts, larger shell frag-ments, bone, burned earth, greater number of charcoal in-clusions, angular stone and gravel

In terms of general stratigraphy, the profile includes disturbed horizons which can be quite thick. The Stratum I disturbance averaged 71.3 centimeters in thickness, ranging between 51.0 and 95.0 centimeters. Stratum I was thickest within the eastern berm, coinciding with the deepest part of the basin (Figure 28). This stratum represents deposits pulled up from the basin and incorporated into the berms and, obviously, could not be recorded in the plan profiles as it was removed during the recovery phase of investigation. Consequently, its thickness was determined by measurements taken with the Total Station before and after excavation. Artifacts recovered from Stratum I include both historic and prehistoric materials.

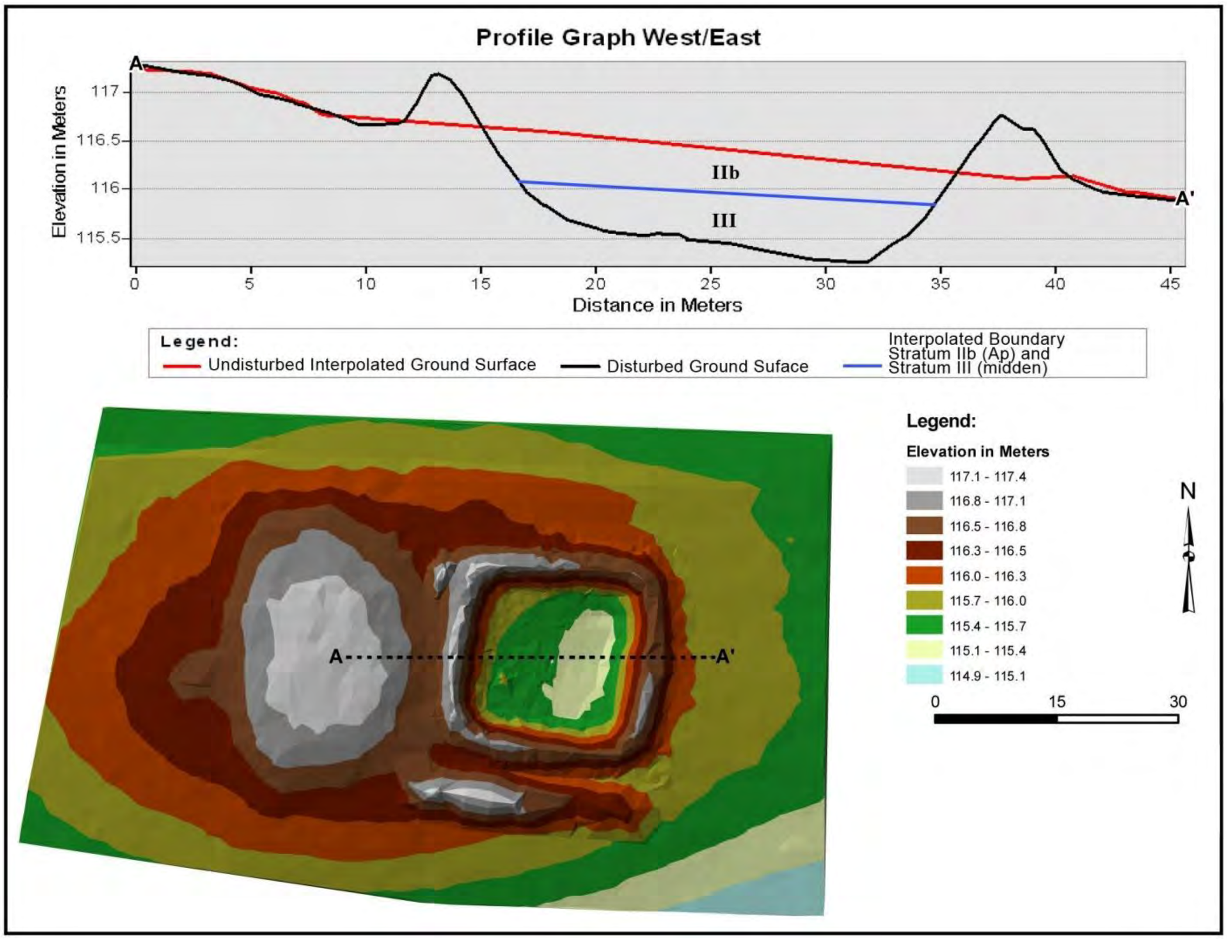


Figure 28. Reconstructed Cross-section of 12Sp7, West-East Profile.

Stratum Ib, believed to represent several discrete episodes of earlier historic-era disturbance achieved a thickness of 87.0 centimeters in Unit South 7 (see Figure 2 for grid). In South 7, Stratum Ib extends from just below the present surface to the base of the plan profile in one part of the meter strip and may reflect a reported episode of looting involving a backhoe. Stratum Ib also occurs in West 7 and South 17, but it is unclear whether this also relates to looting, the two structures erected on the site (see Figure 1), or some other type of historic-era disturbance. Both historic and prehistoric materials were recovered from, and noted within, the Stratum Ib disturbance.

The Ap at the site was arbitrarily divided into upper (Stratum IIa) and lower (Stratum IIb) portions based on the removal of approximately 15 centimeters from its top, which was subsequently segregated in a backdirt pile. Assuming the reported thickness of 15 centimeters for the ―Upper Ap” is a correct estimation, the plowzone apparently averaged about 37 centimeters. The Ap horizon at the site includes both historic and prehistoric artifacts.

Finally, the exposed midden deposits averaged 31.2 centimeters with their overall thickness being unrecorded. Due to the terms of the DHPA approved plan, and the need to avoid further intrusion into undisturbed deposits, no attempt was made to assess the stratigraphy beneath the basin. In terms of absolute elevation above mean sea level, intact midden deposits were encountered at maximum elevation of 116.30 meters on the western side of the basin and a minimum of 115.70 meters on the eastern side (Figure 27). This indicates that the deposits in the basin slope to east, a fact readily observable by the contours of the present landsurface (Figure 28). Only prehistoric materials were noted in the wall sections and plan profiles of Stratum III.

Zooarchaeological Data

The zooarchaeological data gathered from the analysis of the faunal assemblage from site 12Sp7 will be presented according to the location the samples were recovered from: North, South, East, or West berms (Figure 2). A total of 23,747 (32,396.06 g) specimens from site 12Sp7 were analyzed by Tanya Peres, Middle Tennessee State University, representing 45 different taxa, including both vertebrates and invertebrates. Mammals account for approximately 84 percent (n=17 taxa) of the total; birds 4 percent (n=6 taxa), amphibians less than 1 percent (n=1 taxon), reptiles 7 percent (n=7 taxa), bony fish less than 1 percent (n=5 taxa), gastropods less than 1 percent (n=2 taxa), and bivalves 3 percent (n=7 taxa). It is clear that the overall assemblage is dominated by mammals, especially large mammals. This is not unusual for sites in the Midwest, where deer and other terrestrial mammals are abundant. A summary of primary data by taxa for the entire assemblage is presented in Table 27.

North Berm

The total faunal assemblage from the North Berm of the site is 5,343 specimens, weighing 7,516.57 grams. A total of 5,343 (7,535.73) vertebrate and invertebrate specimens were analyzed. The distribution, by percent NISP, or Number of Identifiable Specimens, across class is as follows: indeterminate vertebrates (0.92 percent), mammals (86.41 percent), birds (2.71 percent), reptiles (6.81 percent), amphibians (0.11 percent), bony fish (0.90 percent), gastropods (0.04 percent), and bivalves (2.10 percent). A total of 984 specimens or 18.42 percent were heat altered; 1,453 or 27.19 percent were modified (typically cut marks or spiral fracturing); and 19 or 0.36 percent were identified as belonging to juvenile individuals.

Identified taxa include (NISP): opossum (*Didelphis virginiana*) (n=12), domesticated dog (*Canis lupus familiaris*) (n=1), coyote (*Canis latrans*) (n=2), bobcat (*Lynx rufus*) (n=2), striped skunk (*Mephitis mephitis*) (n=1), raccoon (*Procyon lotor*) (n=31), red fox (*Vulpes vulpes*) (n=1), family of elk and deer (n=59), elk (n=2), white-tailed deer (n=258), eastern mole (*Scalopus aquaticus*) (n=2), muskrat (*Ondatra zibethicus*) (n=3), squirrels (*Sciurus* spp.) (n=43), beaver (n=4), woodchuck (*Marmota monax*) (n=2), rabbits (Leporidae) (n=4), wild turkey (n=6), hawks (Accipitridae) (n=1), red-tailed hawk (*Buteo jamaciensis*)(n=1), mud/musk turtles (Kinosternidae) (n=26), common musk turtle (*Sternotherus* sp.) (n=3), water and box turtles (Emydidae) (n=40), eastern box turtle (n=186), softshell turtle (*Apalone spinifera*) (n=19), snakes (Serpentes) (n=6), frogs/toads (Ranidae/Bufonidae) (n=4), gar (*Lepisosteus* sp.) (n=2), channel catfish (*Ictalurus punctatus*) (n=3), freshwater drum (*Aplodinotus grunniens*) (n=8), family of freshwater mussels (Unionidae) (n=96), dromedary pearly mussel (*Dromus dromas*) (n=5), and pigtoes (*Pleurobema* spp.) (n=11). The white-tailed deer and eastern box turtle dominate the identified assemblage.

South Berm

The total faunal assemblage recovered from the South Berm is 6,731 specimens, weighing 10,391.07 grams. The distribution, by percent NISP, across class is as follows: indeterminate vertebrates (0.76 percent), mammals (82.3 percent), birds (4.04 percent), reptiles (7.12 percent), bony fish (0.97 percent), mollusks (0.12), gastropods (0.03 percent), and bivalves (4.43 percent). A total of 972 specimens or 14.44 percent were heat altered; 1,615 or 23.99 percent were modified (typically cut marks or spiral fracturing); and 25 (0.37 percent) were identified as belonging to juvenile individuals. The white-tailed deer and eastern box turtle dominate the identifiable assemblage.

Identified taxa include (NISP): dog/wolf/coyote family (Canidae) (n=12), domesticated dog (n=8), bobcat (n=6), raccoon (n=23), red fox (n=1), family of elk and deer (n=44), white-tailed deer (n=376), squirrels (n=60), beaver (n=3), woodchuck (n=2), family of hares and rabbits (n=1), rabbits (n=4), family of ducks and geese (Anatidae) (n=1), wild turkey (n=18), hawks/vultures (cf. Acciptriformes) (n=1), red-tailed hawk (n=2), rock pigeon (cf. *Columba livia*) (likely a historic/modern intrusion) (n=1), alligator snapping turtle (cf. *Macrochelys temminckii*) (n=1), mud/musk turtles (n=11), mud turtle (n=1), common musk turtle (n=1), water and box turtles (n=24), eastern box turtle (n=343), softshell turtle (n=34), snakes (n=13), family of frogs and toads (n=12), gar (n=3), freshwater catfish (Ictaluridae) (n=9), channel catfish (n=4), freshwater drum (n=20), campeloma (*Campeloma decisum*)(n=2), family of freshwater bivalves (n=244), purple wartyback (*Cyclonaias tuberculata*) (n=2), arcuate pearly mussel (*Epioblasma flexuosa*) (n=1), three-horn wartyback (*Obliquaria reflexa*) (n=1), white wartyback/sheepnose (*Plethobasus cicatricosis/P. cyphyus*) (n=7), pigtoes (n=29), mapleleafs/monkeyfaces (*Quadrula quadrula*/*Q. sparsa*) (n=1), and mapleleaf (n=1).

East Berm

The total faunal assemblage recovered from the East Berm is 7,467 specimens, weighing 9,446.29 grams. The distribution, by percent NISP, across class is as follows: indeterminate vertebrates (2.69 percent), mammals (82.8 percent), birds (4.16 percent), reptiles (6.79 percent), amphibians (0.20 percent) bony fish (0.78 percent), indeterminate invertebrates (0.04 percent), gastropods (0.08 percent), and bivalves (2.5 percent). A total of 1,655 specimens or 22.16 percent) were heat altered; 1,401 or 18.76 percent were modified (typically cut marks or spiral fracturing); and 27, or 0.36 percent, were identified as belonging to juvenile individuals. The white-tailed deer and eastern box turtle dominate the identifiable assemblage. The pig identified in this sample is likely an intrusive addition from historic/modern period activities at this site.

Identified taxa include (NISP): opossum (n=1), family of dog/wolf/coyote (n=6), domesticated dog (n=4), coyote (n=1), bobcat (n=2), raccoon (n=30), family of elk and deer (n=55), white-tailed deer (n=337), domesticated pig (*Sus scrofa*) (n=1) (historic/modern intrusion), eastern mole (n=5), squirrels (n=70), woodchuck (n=11), rabbits (n=5), wild turkey (n=13), family of hawks (n=3), sandhill crane (*Grus canadensis*) (n=1), family of mud/musk turtles (n=12), musk turtle (n=1), common musk turtle (n=1), family of water and box turtles (n=18), pond slider (*Trachemys scripta*) (n=1), eastern box turtle (n=331), softshell turtle (n=29), snakes (n=7), frogs/toads (n=15), family of gar (Lepisosteidae) (n=5), gar (n=1), bowfin (n=2), family of freshwater catfish (n=1), freshwater catfish (n=17), channel catfish (n=1), freshwater drum (n=11), family of pleurocerids or freshwater snails (Pleuroceridae) (n=2), geniculate river snail (*Lithasia geniculata*) (n=1), family of freshwater mussels (n=153), dromedary pearly mussel (n=4), three-horn wartyback (n=2), and pigtoes (n=11).

West Berm

The total faunal assemblage recovered from the West Berm is 4,179 specimens, weighing 4,827.20 grams. The distribution, by percent NISP, across class is as follows: indeterminate vertebrates (0.89 percent), mammals (83.6 percent), birds (3.80 percent), reptiles (7.04 percent), amphibians (0.26 percent), bony fish (1.01 percent), indeterminate invertebrates (0.05 percent), gastropods (0.14 percent), and bivalves (3.18 percent). A total of 853 specimens, or 20.41 percent, were heat altered; 830, or 19.86 percent, were modified (typically cut marks or spiral fracturing); and 11, or 0.26 percent, were identified as belonging to juvenile individuals. The eastern box turtle and white-tailed deer dominate the identifiable assemblage.

Identified taxa include (NISP): opossum (n=3), domesticated dog (n=6), raccoon (n=25), family of elk and deer (n=24), white-tailed deer (n=170), eastern mole (n=2), Ord‘s kangaroo rat (*Dipodomys ordii)*(n=1), squirrels (n=38), woodchuck (n=3), family of ducks and geese (n=2), Canada goose (*Branta canadensis*) (n=1), wild turkey (n=12), red-tailed hawk (n=1), family of mud/musk turtles (n=7), common musk turtle (n=2), family of water and box turtles (n=21), pond slider (n=1), eastern box turtle (n=192), softshell turtle (n=10), snakes (n=12), frog/toad (n=9), family of gar (n=4), bowfin (*Amia calva*) (n=3), freshwater catfish (n=7), channel catfish (n=1), freshwater drum (n=6), American black bass (*Micropterus salmoides*)(n=2), family of pleurocerids (n=3), rocksnail (*Lithasia* sp.) (n=1), geniculate river snail (n=2), family of freshwater mussels (n=100), arcuate pearly mussel (n=2), three-horn wartyback (n=2), and pigtoes (n=15).

Animal Exploitation at 12Sp7

A total of 23,747 (32,393.06 g) specimens from site 12Sp7 were analyzed, representing 45 different taxa. The faunal assemblage from 12Sp7 was analyzed and evaluated in light of its potential to provide information about animal use during the Late Archaic period in southern Indiana. The variety of taxa and modifications to the remains identified give us insight into how and why animals were exploited in the Late Archaic. Too often animals are interpreted only as food items, with other functions/roles downplayed or ignored. The use of multiple lines of evidence gives us a better understanding of how people and animals interacted in the past. In a landmark study of the dietary and extra-dietary roles of animals in chiefdom-level societies in the Southeastern United States, Jackson and Scott (1995:103) challenge other zooarchaeologists to move beyond ―simply interpreting general subsistence patterns" and to use the data to ―explore how patterns in the zooarchaeological record reflect the roles played by animals in economic, social, and ideological realms."

Late Archaic Subsistence at 12Sp7

The beginning of the Archaic Period is marked by the transition from the Pleistocene to the Holocene, widespread environmental changes, increasing variation in projectile point types, a diversified tool kit, and shifts in subsistence strategies. It is generally held that Late Archaic peoples practiced a type of ―primary forest efficiency" (Caldwell 1958), based on seasonally available food resources. They hunted white-tailed deer, turkey, small mammals, birds, and collected hickory nuts and acorns, and in some river drainages intensively exploited freshwater mollusks. Stafford et al. (2000) suggest that a change in forest composition during the Middle Holocene allowed for the proliferation of deer populations and nut availability. Thus, Late Archaic peoples focused their subsistence strategies on these forest resources versus aquatic resources as evidenced in the earlier part of the Archaic in the southern Midwest. The faunal assemblage analyzed from 12Sp7 falls in line with this type of subsistence strategy.

Terrestrial mammals, especially the white-tailed deer, dominate the faunal assemblage recovered from 12Sp7. It is clear that deer were butchered, as evidenced by cut marks and spiral fractures. Meat and hides were not the only resources deer could have supplied – bone marrow and grease could have been exploited as well. Some of the earliest evidence for marrow extraction has been recovered from Plio-Pleistocene sites in Africa (Blumenschine and Madrigal 1993; Bunn 1981; de Heinzelin et al. 1999) and has been viewed by some scholars interested in the nutritional aspect of animals as a food resource that is used by humans mainly in times of stress (Binford 1978). Ethnographic evidence from the Plains Indians, however, has shown that grease was used as an ingredient in pemmican, a mixture of dried lean meat and melted fat, the fat often being marrow (Brink 1997). Pemmican played a large role in food storage and trade. Titian Peale (1871), assistant naturalist and draughtsman to Major Long‘s expedition to the Rocky Mountains, was charged with recording the methods of skin and fur preparation used by the native peoples they encountered. He notes that marrow was –generally. . . esteemed as a luxury. . . and is held in high esteem” (Peale 1871:390). Thus, evidence of marrow extraction does not necessarily indicate that a population was under nutritional stress. It may be an indication of techniques used for food storage and preservation or it may indicate the success of a hunting party (Peale 1871:391).

Bone marrow is the congealed fat deposit stored in the interior cavities of long bones (i.e., femur, tibia, humerus). Bone marrow stores –are also the most reliable source of animal fat, because they are last in the fat-mobilization sequence of most animals” (Outram 2001:401). Thus, even if an animal is in dire nutritional straits, human hunters are still able to extract marrow. The fat and caloric importance of marrow for human populations subsisting off of lean meat sources cannot be overstated (Outram 2001).

While a more thorough analysis is necessary, the current data from 12Sp7 are highly suggestive that the long bones of large mammals, likely white-tailed deer, were split and fractured open to allow for marrow extraction. One marker of this activity is the presence of –bone flakes or splinters.” Bone flakes or splinters are defined as portions of indeterminate long bones that measure 75 percent or less of the total circumference of the diaphysis (longbone shaft) and do not contain any portions of the epiphyses or longbone ends (Brain 1981). A preliminary analysis of the 12Sp7 faunal assemblage yields a total of 5,256 (22 percent) specimens identified as bone flakes. Thus, nearly one-quarter of the entire assemblage is made up of bone fragments that are the direct result of processing an animal for marrow.

It appears that Late Archaic peoples were exploiting deer for marrow in addition to meat, and it is almost certain that the animals were exploited for hides as well (Swanton 1946). While the data are not assessed at this time for signatures of hide processing, Lapham (2005) provides an extensive background and case study for the archaeological correlates of this activity, and is an avenue for future research at other prehistoric sites in the region.

Non-food Uses of Animals at 12Sp7

In general, the 12Sp7 faunal assemblage is quite similar to that described for the Bluegrass Site (12Wl62), which has affinities with the French Lick phase (Stafford et al. 2000). The faunal assemblage recovered from the Bluegrass Site included animals exploited for subsistence, but also gives us insight into the multiple roles animals played in the daily and spiritual lives of the Late Archaic peoples of southern Indiana. For instance, the 11 dog burials that were recovered from the Bluegrass Site suggest that these animals held a special place in the lives of the humans, and it reminds us that not all animal remains should be classified as food waste. A single perforated canine, identified as probable coyote (cf. *Canis latrans*), was recovered from the East Berm of site 12Sp7 (Figure 29). The perforation occurs on the root, suggesting the object functioned as a pendant (see discussion of the 12Sp7 beads). Engraved bone pins, similar to ones recovered from 12Sp7, inform us about raw material choice, craftsmanship, and possible ornamentation.

Figure 29. Perforated coyote canine, East Berm (E10), 12Sp7.

A turtle shell rattle excavated from the Bluegrass Site is not an uncommon item for the Archaic and more recent periods and suggests that the numerous box turtle specimens (n=1,053) from 12Sp7 are likely attributable to a similar function, possibly more so than for subsistence purposes. Indeed, two box turtle specimens, both marginal, had perforations (Figures 30 and 31). In addition to these specific artifacts, bone and antler were fashioned into a variety of tools for use at the Bluegrass Site, both expedient and formal.

Figure 30. Perforations on box turtle marginal, West Berm (W82), 12Sp7.

Figure 31. Perforated box turtle marginal, West Berm (W73), 12Sp7.

There are several taxa at 12Sp7 that are notable in that they were likely not food animals. These include: bobcat, striped skunk, red fox, eastern mole, Ord's kangaroo rat, muskrat, red-tailed hawk, sandhill crane, gar, and bowfin. The eastern mole, Ord's kangaroo rat, and muskrat are likely commensal inclusions to the site. Gar and bowfin are known to be used for making scratching and/or tattooing implements up through historic and modern times. The striped skunk and red fox (and woodchuck and beaver for that matter) are fur-bearing animals, and thus were likely exploited for their pelts. The bobcat, red-tailed hawk, and sandhill crane are powerful images for late prehistoric Native Americans (such as at Cahokia Mounds), ideological attributes that may have originated in the Archaic Period. A left ulna, identified as bobcat, exhibited cut marks and was modified on the distal end. These modifications include possible sharpening/polishing (Figure 32). While we cannot definitively assign a function to any of these objects at this time, their non-food potential appears much greater than their food potential.

Figure 32. Modified left ulna, bobcat (*Lynx rufus*), South Berm (S83), 12Sp7.

Table 27 Summary of composite analyzed faunal assemblage, Site 12Sp7, Spencer County, Indiana.

Taxon	Common Name	NISP		Weight		Heat Altered		Modified		Juvenile	
		Qty.	%	grams	%	Qty.	%	Qty.	%	Qty.	%
Vertebrata	**vertebrates**	340	1.43	83.65	0.26	81	1.81	1	0.02	0	0.00
Mammalia	**mammals**	12191	51.34	5578.28	17.22	2412	53.97	31	0.70	0	0.00
Mammalia, large	**large mammals**	5588	23.53	11150.47	34.42	1543	34.53	4261	95.56	0	0.00
Mammalia, medium-large	**medium-large mammals**	90	0.38	109.44	0.34	8	0.18	4	0.09	0	0.00
Mammalia, medium	**medium mammals**	59	0.25	52.98	0.16	4	0.09	0	0.00	2	2.30
Mammalia, medium-small	**medium-small mammals**	32	0.13	10.62	0.03	3	0.07	0	0.00	1	1.15
Mammalia, small	**small mammals**	30	0.13	6.55	0.02	5	0.11	0	0.00	2	2.30
Didelphis virginiana (incl. cf.)	**opossum**	16	0.07	21.16	0.07	1	0.02	0	0.00	1	1.15
Carnivora	**carnivores**	16	0.07	6.96	0.02	0	0.00	0	0.00	0	0.00
Canidae (incl. cf.)	**dog, wolf, coyote family**	19	0.08	12.55	0.04	0	0.00	0	0.00	0	0.00
Canis spp.	**dog, wolf, coyote species**	1	0.00	0.71	0.00	0	0.00	0	0.00	0	0.00
Canis familiaris (incl. cf.)	**domesticated dog**	20	0.08	85.57	0.26	0	0.00	1	0.02	0	0.00
Canis latrans (incl. cf.)	**coyote**	3	0.01	6.20	0.02	0	0.00	2	0.04	0	0.00
Lynx rufus(incl. cf.)	**bobcat**	10	0.04	22.37	0.07	1	0.02	2	0.04	0	0.00
Mephitis mephitis	**striped skunk**	1	0.00	0.3	0.00	0	0.00	0	0.00	0	0.00
Procyon lotor (incl. cf.)	**raccoon**	109	0.46	155.97	0.48	8	0.18	1	0.02	1	1.15
Vulpes vulpes (incl. cf.)	**red fox**	2	0.01	0.83	0.00	0	0.00	0	0.00	0	0.00
Cervidae (incl. cf.)	**family of elk and deer**	188	0.79	756.69	2.34	23	0.51	20	0.45	0	0.00
cf. *Cervus Canadensis*	**elk**	2	0.01	26.48	0.08	0	0.00	0	0.00	2	2.30
Odocoileus virginianus(incl. cf.)	**white-tailed deer**	1145	4.82	7453.41	23.01	88	1.97	104	2.33	57	65.52
Sus scrofa	**domesticated pig**	1	0.00	1.25	0.00	0	0.00	0	0.00	0	0.00
Rodentia	**rodents**	59	0.25	21.94	0.07	3	0.07	0	0.00	0	0.00
Scalopus aquaticus	**eastern mole**	9	0.04	2.74	0.01	1	0.02	0	0.00	0	0.00
cf. *Dipodomys ordii*	**Ord's kangaroo rat**	1	0.00	0.49	0.00	0	0.00	0	0.00	0	0.00
Ondatra zibethicus(incl. cf.)	**muskrat**	3	0.01	2.26	0.01	0	0.00	0	0.00	0	0.00
Sciuridae	**squirrel family**	2	0.01	0.29	0.00	0	0.00	0	0.00	0	0.00
Sciurus spp. (incl. cf.)	**squirrels**	207	0.87	62.89	0.19	8	0.18	1	0.02	3	3.45
Sciurus carolinensis	**Eastern gray squirrel**	2	0.01	0.48	0.00	0	0.00	0	0.00	0	0.00
Castor canadensis (incl. cf.)	**beaver**	7	0.03	9.84	0.03	0	0.00	0	0.00	0	0.00
Marmota monax (incl. cf.)	**woodchuck**	18	0.08	34.21	0.11	1	0.02	2	0.04	0	0.00
Lagomorpha	**order of hares, rabbits, pikas**	3	0.01	1.99	0.01	0	0.00	0	0.00	0	0.00

Taxon	Common Name	NISP		Weight		Heat Altered		Modified		Juvenile	
Leporidae	**hares and rabbits family**	1	0.00	0.69	0.00	0	0.00	0	0.00	0	0.00
Sylivilagus spp. (incl. cf.)	**rabbits**	14	0.06	15.69	0.05	0	0.00	0	0.00	0	0.00
Mammalia/Aves	**mammal/bird**	5	0.02	1.12	0.00	0	0.00	0	0.00	0	0.00
Aves	**birds**	656	2.76	250.31	0.77	37	0.83	3	0.07	0	0.00
Aves, large	**large birds**	38	0.16	49.92	0.15	1	0.02	2	0.04	0	0.00
Aves, medium to large	**medium to large birds**	16	0.07	14.59	0.05	1	0.02	1	0.02	0	0.00
Aves, medium	**medium birds**	20	0.08	6.73	0.02	0	0.00	0	0.00	0	0.00
Aves, medium to small	**medium to small birds**	81	0.34	17.7	0.05	3	0.07	0	0.00	0	0.00
Aves, small	**small birds**	12	0.05	1.05	0.00	0	0.00	0	0.00	0	0.00
Anatidae (incl. cf.)	**ducks and geese**	3	0.01	1.14	0.00	0	0.00	0	0.00	0	0.00
Branta canadensis	**Canada goose**	1	0.00	3.05	0.01	0	0.00	0	0.00	0	0.00
Meleagris gallopavo (incl. cf.)	**turkey**	50	0.21	93.43	0.29	3	0.07	1	0.02	0	0.00
cf. Acciptriformes	**hawks, vultures**	1	0.00	3.02	0.01	0	0.00	0	0.00	0	0.00
Accipitridae (incl.cf.)	**family of hawks**	4	0.02	0.8	0.00	0	0.00	0	0.00	0	0.00
Buteo jamaciensis (incl. cf.)	**red-tailed hawk**	4	0.02	4.16	0.01	0	0.00		0.00		0.00
cf. *Grus Canadensis*	**sandhill crane**	1	0.00	1	0.00	1	0.02	0	0.00	0	0.00
cf. *Columba livia*	**rock pigeon**	1	0.00	0.68	0.00	0	0.00	0	0.00	0	0.00
Testudines	**turtles**	290	1.22	127.43	0.39	22	0.49	3	0.07	1	1.15
cf. *Macrochelys temminickii*	**alligator snapping turtle**	1	0.00	3.22	0.01	0	0.00	0	0.00	0	0.00
Kinosternidae	**mud and musk turtles**	53	0.22	19.94	0.06	4	0.09	0	0.00	0	0.00
Kinosternidae/Emydidae	**mud and musk/water and box turtles family**	3	0.01	0.56	0.00	0	0.00	0	0.00	0	0.00
Kinosternon spp.	**mud turtle**	1	0.00	0.80	0.00	0	0.00	0	0.00	0	0.00
cf. *Sternotherus* sp.	**musk turtle**	1	0.00	0.30	0.00	0	0.00	0	0.00	0	0.00
Sternotherus odoratus	**common musk turtle**	7	0.03	5.21	0.02	0	0.00	0	0.00	0	0.00
Emydidae	**water and box turtles**	103	0.43	70.01	0.22	2	0.04	2	0.04	0	0.00
cf. *Trachemys scripta*	**pond slider**	2	0.01	8.99	0.03	0	0.00	0	0.00	0	0.00
Terrapene carolina	**eastern box turtle**	1053	4.43	884.15	2.73	26	0.58	15	0.34	4	4.60
Trionychiade	**softshell turtle**	92	0.39	71	0.22	8	0.18	0	0.00	0	0.00
Serpentes (incl. cf.)	**Snakes**	38	0.16	6.94	0.02	2	0.04	0	0.00	0	0.00
Reptilia/Amphibia	**reptiles/amphibians**	1	0.00	0.13	0.00	0	0.00	0	0.00	0	0.00
Amphibia (incl. cf.)	**amphibians**	3	0.01	0.24	0.00	0	0.00	0	0.00	0	0.00
Anura	**order of frogs and toads**	3	0.01	0.19	0.00	0	0.00	0	0.00	0	0.00
Ranidae/Bufonidae	**frogs/toads family**	16	0.07	1.76	0.01	0	0.00	0	0.00	0	0.00

Taxon	Common Name	NISP		Weight		Heat Altered		Modified		Juvenile	
Rana / Bufo sp.	**frogs and toads**	24	0.10	4.04	0.01	2	0.04	0	0.00	0	0.00
Osteichthyes (incl. cf.)	**bony fish**	104	0.44	70.26	0.22	3	0.07	0	0.00	0	0.00
Lepisosteidae (incl. cf.)	**Gar**	10	0.04	3.6	0.01	0	0.00	0	0.00	0	0.00
Lepisosteus spp. (incl. cf.)	**Gar**	5	0.02	1.74	0.01	0	0.00	0	0.00	0	0.00
Amia calva (incl. cf.)	**bowfin**	5	0.02	0.99	0.00	0	0.00	0	0.00	0	0.00
Ictaluridae	**catfish family**	2	0.01	1.25	0.00	0	0.00	0	0.00	0	0.00
Ictalurus spp.	**freshwater catfish**	32	0.13	21.9	0.07	3	0.07	1	0.02	0	0.00
Ictalurus punctatus (incl. cf.)	**channel catfish**	9	0.04	5.21	0.02	2	0.04	1	0.02	0	0.00
Aplodinotus grunniens (incl. cf.)	**freshwater drum**	45	0.19	112.47	0.35	0	0.00	0	0.00	0	0.00
Micropterus salmoides (incl. cf.)	**American black bass**	2	0.01	2.66	0.01	0	0.00	0	0.00	0	0.00
Invertebrata	**invertebrates**	2	0.01	0.38	0.00	0	0.00	0	0.00	0	0.00
Mollusca	**mollusks**	11	0.05	2.62	0.01	0	0.00	0	0.00	0	0.00
Gastropoda	**gastropods**	3	0.01	1.87	0.01	0	0.00	0	0.00	0	0.00
Campeloma decisium	**campeloma**	2	0.01	15.28	0.05	0	0.00	0	0.00	0	0.00
Pleuroceridae	**Pleurocerids**	7	0.03	8.77	0.03	0	0.00	0	0.00	0	0.00
Lithasia spp.	**rocksnail**	1	0.00	1.01	0.00	0	0.00	0	0.00	0	0.00
Lithasia geniculata	**geniculate river snail**	3	0.01	2.97	0.01	1	0.02	0	0.00	0	0.00
Bivalvia	**bivalves**	44	0.19	19.66	0.06	28	0.63	0	0.00	0	0.00
Unionidae	**family of freshwater mussels**	593	2.50	3264.92	10.08	122	2.73	0	0.00	13	14.94
cf. *Cyclonaias tuberculata*	**purple wartyback**	2	0.01	21.45	0.07	0	0.00	0	0.00	0	0.00
cf. *Dromus dromas*	**dromedary pearly mussel**	9	0.04	148.45	0.46	0	0.00	0	0.00	0	0.00
cf. *Epioblasma flexuosa*	**arcuate pearly mussel**	3	0.01	32.39	0.10	0	0.00	0	0.00	0	0.00
Obliquaria reflexa(incl. cf.)	**three-horn wartyback**	5	0.02	94.51	0.29	0	0.00	0	0.00	0	0.00
Plethobasus cicatricosus/cyphyus (incl. cf.)	**white wartyback/sheepnose**	7	0.03	180.46	0.56	0	0.00	0	0.00	0	0.00
Pleurobema complex (incl. cf.)	**pigtoes**	66	0.28	1001.44	3.09	8	0.18	0	0.00	0	0.00
cf. *Quadrula* sp.	**mapleleafs/monkeyfaces**	1	0.00	14.55	0.04	0	0.00	0	0.00	0	0.00
Quadrula quadrula	**mapleleaf**	1	0.00	12.69	0.04	0	0.00	0	0.00	0	0.00
TOTALS		**23747**	**100**	**32393.06**	**100**	**4469**	**100**	**4459**	**100**	**87**	**100**

Paleobotanical Remains

The following section details a limited analysis of paleobotanical samples which were recovered from five gallon (18.92 liters) flotation of soils collected from Strata IIb and III. These represent the lower Ap and midden deposits, respectively, as identified in the plan profiles described above and in Bergman (2011). Aside from the identification of Middle-Late Archaic plant species usage, the general value of this limited study is that it demonstrates the preservation of plant remains at 12Sp7.

The paleobotanical remains recovered from 12Sp7 include a variety of different materials including wood charcoal, carbonized nutshells and seeds. The analysis proceeded in two steps, the first of which involved a small sample of nutshells, prepared for submittal to Beta Analytic for AMS dating. This sample (Table 28), drawn from Strata IIb and III in the profile strips at South 7, West 17, and North 7, provided only basic information about the paleobotanical remains and was focused upon identification of the nut species. The other materials, charcoal and unidentified plant parts, were segregated and saved for a second potential stage of analysis that focused upon the entire paleobotanical sample. Of the nutshell fragments selected for the dating sample and identified to genus-level, those represented by walnut and hickory are most common at 68 and 87 specimens, respectively. Oak acorns are poorly represented in the sample with only three specimens.

AMS Dating

Two samples consisting of carbonized nutshell (oak, hickory and walnut) were submitted to Beta Analytic for AMS dating. The samples were recovered from flotation of soils collected from Strata IIb and III, which represent the lower Ap and midden deposits as identified in the plan profiles described above. Beta Sample 284033 was collected from West 17 within a five (5) gallon flot and yielded a conventional radiocarbon age of **5300 ± 40 B.P**. Beta Sample 284032 was collected from South 7 within a five (5) gallon flot and yielded a conventional radiocarbon age of **4980 ± 40 B.P**.

Table 28 Identification of Nutshells Selected for AMS Dating.

FS #	Profile Strip	Stratum	Total Sample Size (liters)	*Juglans* sp. (Walnut)	Weight (grams)	*Carya* sp. (Hickory)	Weight (grams)	*Quercus* sp. (Oak)	Weight (grams)	Unident. Specimens	Weight
SF01	S7	III, Midden	18.92	24	1.7	29	2.0	0	0.0	20	1.4
SF03	W17	IIb, Ap	18.92	33	1.4	43	1.8	1	0.04	43	1.8
SF07	N7	III, Midden	18.92	11	0.2	15	0.3	2	0.04	88	1.8
Totals			56.76	68	3.3	87	4.1	3	0.08	151	5.0

Human Osteology

The analysis of the human remains from site 12Sp7 commenced in early 2011 and continued through September. All osteological analysis took place in the Indiana Prehistory Laboratory, the University of Indianapolis, and Christopher Schmidt was the sole analyst. When the analysis was completed, all human remains were reburied at a location close to 12Sp7.

Taphonomy

There is no clear patterning in the distribution of the skeletal remains among the various berms (see Figure 2) from which they were recovered. The bones are fairly evenly distributed throughout and highly fragmented. Nearly every bone was damaged post-mortem (the damage made the analysis of these remains extremely taxing and diminished the scientific information that could have been gleaned from these individuals). The damage is clearly post-mortem and much of it is quite recent because most of the fractures that are present have stark white boundaries and jagged edges. In addition, some longbone and cranial fragments have deep grooves that are consistent with modern metal tools or machinery. Some of the broken bones, however, have been stained suggesting breakage at an earlier time. It is known that 12Sp7 has been subjected to disturbance on multiple occasions over at least a century, including reported episodes of looting with a backhoe. Finally, a variety of fragments have a great deal of solar bleaching, indicating that they were on the ground surface for some time, perhaps several weeks or more.

These remains have very little in the way of rodent gnawing or damage from animals. Some have dark stains that are likely the result of plant roots. The overall color of the bones, which is a light brown, is typical for remains that have been interred underground from a long period of time in the absence of a coffin or crypt.

Evidence of human induced taphonomic alteration includes burning. Several small fragments of human bone were found to be thermally altered in a manner consistent with cremation (see Schmidt and Symes 2008). Therefore, it is possible that at least one cremation burial was present at the site; this individual, however, was not included in the MNI since it is possible that a person was only partly cremated and their unburned remains are already included in the inventory.

Minimum Number of Individuals (MNI)

The MNI is 41 including 24 adults and 17 subadults below the age of 18. MNI is determined by counting the presence of each element controlling for bone and side. However, highly fragmented assemblages, like this one, require that bone inventories are created by major aspects or landmarks on bones, rather than by bones in their entirety (Schmidt 1993; Ubelaker 1974). For example, for the current study it was necessary to break down the category ―femur” into several subcategories which were: head, proximal end, proximal shaft, midshaft, distal shaft, and distal end. Each of these categories has a diagnostic landmark that aided in fragment determination. Failure to do this would have resulted in a major overestimation of MNI. Bones that were small and resistant to significant post-mortem fracturing were not broken down into subcategories. Those bones tended to be carpals, tarsals, and phalanges. Teeth also were counted as entire entities.

Table 29 provides MNI counts for several bones, bone subcategories, and teeth that have at least 10 individuals represented. The best represented element for the adults was the right proximal femur shaft (n = 24). Also common were the right proximal ulna (n = 23), left proximal femur shafts (n = 22), and the external/internal occipital protuberance (n = 22). Some bones were so fragmented that they were not counted. Those bones include vertebrae and ribs. Cranial fragments were counted (adult n = 1,071; subadult n = 140), but were not used for MNI determination.

The most common tooth was the lower left first molar (n = 11), followed by the lower right first molar (10), and the lower left fourth premolar (10). Mandibular teeth are better represented than maxillary teeth, which is not surprising given that there were more mandible fragments found than maxillary.

It is clear from the MNI that the remains are not just fragmented, they also are very incomplete. If we had complete skeletons of all 41 people, then there should be a count of 41 for each bone, bone subgroup, and tooth. It is apparent that only a fraction of the total skeletal remains that were impacted have been collected and brought forth for osteological study. While the nature of the recent impacts to the site certainly hindered full recovery, it is also possible, given the century-long history of disturbance, that some of the remains were already displaced and no longer present.

Table 29. MNI skeletal inventory. Elements represented by at least 10 individuals.

Adult Element	Number
Right proximal femur shaft	24
Right proximal ulna	23
Left proximal femur shaft	22
External/Internal occipital protuberance	22
Left ulna midshaft	20
Right ulna midshaft	20
Left scapula spine	20
Left tibia midshaft	19
Right tibia midshaft	19
Left orbit (frontal)	19
Right femur midshaft	18
Right distal clavicle	16
Left humerus distal end	16
Left proximal ulna	15
Right proximal femur	15
Frontal at crest (glabella)	15
Right orbit (frontal)	15
Left radius midshaft	13
Right Mandibular ramus	13
Right petrous	13
Left proximal femur	13

Adult Element	Number
Left scapula at glenoid	13
Right distal humerus	12
Left femur midshaft	12
Left petrous	12
Left distal ulna	12
Right distal ulna	12
Left distal clavicle	11
Left mandibular corpus	11
Left proximal radius	11
Right scapula at glenoid	11
Left temporal	11
Right temporal	11
First cervical vertebra	11
Left humerus at deltoid	10
Right radius midshaft	10
Right third metacarpal	10
Left femur distal shaft	10
Left first metatarsal	10
Left fifth metatarsal	10
Right first metatarsal	10
Right mandibular corpus	10
Subadult Element	**Number**
Right femur	17
Left femur	14
Right humerus	14
Right ulna	13
Left humerus	10
Teeth	
Lower left first molar	11
Lower right first molar	10
Lower left fourth premolar	10

Demography

Ancestry. Considering taphonomy, context, and skeletal morphology, all of the fragments appear to be from Native American Indians.

Age. There are at least four young adults (18-35), two middle adults (35-50), and two old adults (50+) in the assemblage. These ages were determined using auricular surfaces of the pelvis. Unfortunately, very few were present. Even fewer pubic symphyseal faces were found. Dental wear was considered, but given the very high rates of macrowear for Archaic people (e.g., Schmidt 2001, 2010), it is impossible to seriate the teeth and accurately assign them to age categories.

For the subadults, most were less than 1 year old, with at least 10 being either fetal or newborn. This determination was based on the overall lengths of longbones, in particular the ulnae, humeri, and femora. Age estimates were made using Ubelaker (1989). Other ages include at least one aged 2-3, at least two aged 4-6, one aged 5-10, one aged 11-15, and two aged 16-20. Table 30 provides a complete inventory of all of the teeth, as well as the ages they represent. Table 31 gives a summary of the site's age distribution.

Table 30. Dental Ages (with complete inventory). Some teeth were unerupted; their developmental ages are recorded in the "Ages Represented" column. Teeth were "Adult" if they were fully formed and worn. The term "Subadult" is used in those instances where a tooth had fully formed but had almost no wear.

Tooth	Number	Ages Represented
Adult maxilla		
Right third molar	0	None
Right second molar	6	Adult
Right first molar	9	Adult, subadult, age 5-7
Right fourth premolar	7	Adult
Right third premolar	8	Adult, subadult, age 9-12
Right canine	6	Adult
Right second incisor	1	Adult
Right first incisor	2	Adult, age 4-6
Left first incisor	2	Adult, subadult
Left second incisor	6	Adult, subadult
Left canine	5	Adult
Left third premolar	7	Adult, subadult, age 8-10
Left fourth premolar	6	Adult
Left first molar	4	Adult
Left second molar	7	Adult
Left third molar	7	Adult
Mandible	**Number**	**Ages Represented**
Right third molar	8	Adult
Right second molar	4	Adult
Right first molar	10	Adult, age 4-6 (2 individuals)
Right fourth premolar	7	Adult
Right third premolar	4	Adult

Tooth	Number	Ages Represented
Right canine	5	Adult
Right second incisor	2	Adult
Right first incisor	2	Adult
Left first incisor	5	Adult, subadult
Left second incisor	5	Adult, subadult
Left canine	4	Adult, subadult
Left third premolar	5	Adult, subadult, age 9-12
Left fourth premolar	10	Adult
Left first molar	11	Adult
Left second molar	9	Adult
Left third molar	8	Adult, age 18
Deciduous Teeth	**Number**	**Developmental Age**
Maxilla		
Right fourth premolar	3	2-3, 1, 3+ (½ root, ¾ crown, complete root)
Right third premolar		
Right canine	1	1.5 yrs (Complete crown)
Right second incisor	2	1 (½ root)
Right first incisor	1	1-6 (complete root)
Left first incisor		
Left second incisor		
Left canine	1	
Left third premolar	2	
Left fourth premolar	2	2-3 (½ root)
Mandible		
Right fourth premolar	1	
Right third premolar	2	
Right canine	2	1-2 (½ root)
Right second incisor	1	0-1 (½ root)
Right first incisor		
Left first incisor		
Left second incisor		
Left canine		
Left third premolar	1	2-6 (complete root)
Left fourth premolar	1	3-6 (complete root)

Table 31. Age breakdown for 12Sp7. Subadult ages were determined by femoral lengths and epiphyseal fusion. The adult ages were determined by auricular surface morphology.

Age	Number (of those that could be aged)
0-1	10
2-3	1
4-6	2
5-10	1

11-15	1
16-20	2
YA	4
MA	2
OA	2

Sex. There are at least six females and six males present. These determinations come from the external occipital protuberances, orbital/supraorbital fragments, and proximal femur sizes. Of the four right pubic bones that were found, three provided both age and sex data: a young adult male, a middle adult male, and a young adult female.

Pathology

Because of the commingling it was impossible to determine the frequency of the various pathological conditions that occurred. Therefore, the descriptions below simply describe the conditions that were present.

Trauma

Fracture. At least six fractured bones were found, all of which were healing at the time of death. The most dramatic example was a proximal femur shaft that had broken obliquely and healed with a lateral displacement of the shaft as it neared the subtrochanteric region (Figure 33). The bone is heavily remodeled and a large foramen formed at the junction where the bones had healed together. This person did not necessarily die from the injury, although it certainly impacted their gait. Other fractured bones include a cranial fragment with a healed depressed fracture, a healed Colles fracture on a distal radius of a foramen, a manual phalanx (probably a proximal although only the distal aspect of the bone was present), a metatarsal, and a capitate, the largest of the carpal bones in the hand. These fractures were minor in comparison to that on the femur and all except the capitate were at or near a completely healed state. The phalanx was compressed and deformed and was likely transitioning to an arthritic state.

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Figure 33. Femur with healed shaft fracture (below) compared to healthy femur (above). The bones are in similar orientation with proximal ends to the left.

<u>Scalping.</u> Another example of trauma was a single cranial fragment with evidence of scalping. The piece was closely scrutinized and compared to other examples of evidence of prehistoric scalping victims. Moreover, it was observed using a white light confocal profiler to compare the cutmark kerfs to cutmarks made with stone and steel tools (e.g., Schmidt et al. 2011). It is clear that the cut marks on the 12Sp7 cranial fragment were made via several coarse strokes with a stone implement and were not created during the recent mechanical disturbance that unearthed the remains (see Figure 34).

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Figure 34. Scalping on frontal fragment. Coronal suture is to the bottom left.

3D Analysis of Scalping Marks

The cranial fragment with scalping marks was viewed with a white light confocal profiler (WLCP) in order to determine if the cutmarks themselves indicate if they were made with stone tools. This was accomplished by taking a 3D surface representation at 10X and 20X magnifications. The representation that results is a data cloud that, in this case, is quantified using a suite of standard surface microtopographic calculations (ISO 25178 height parameters) via SolarMap® software. The calculations measure maximum peak height, root mean square height, maximum pit height, maximum height, arithmetic mean height, skewness, and kurtosis. Previously Schmidt and Moore (Schmidt et al. 2011) established a preliminary database of cutmark height parameters. The cutmarks were made with stone (e.g., chert and slate) and steel (modern knives) implements. Here the height parameter data from the 12Sp7 cranial fragment are compared to the stone and steel data, which are dichotomous in the database. Overall, the 12Sp7 cutmarks are shallow relative to width and are closer in morphology to stone tool–made cutmarks than to cuts made with modern tools (Figures 35-37).

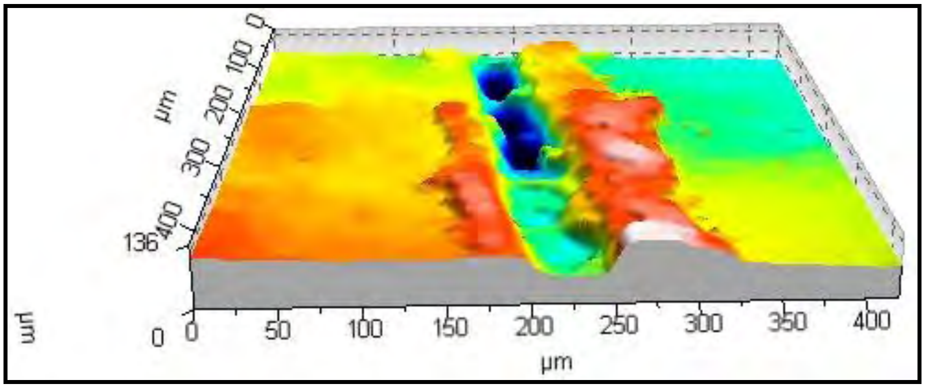

Figure 35. 3D profile of a steel knife cutmark. Notice the depth relative to width (20X).

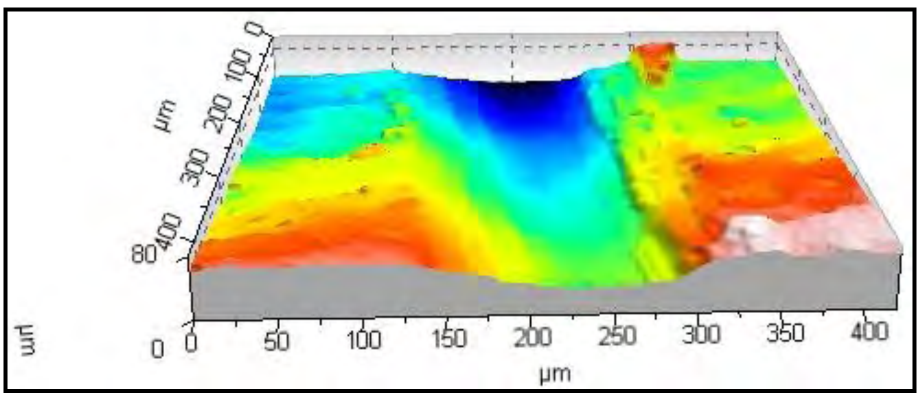

Figure 36. Cutmark made with chert. Notice the breadth of the cut relative to its height (20X).

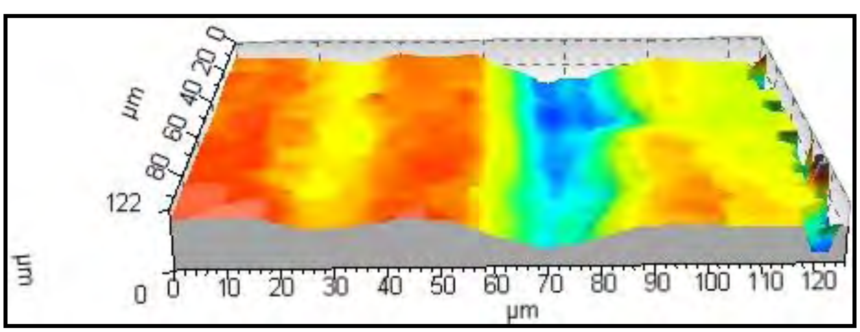

Figure 37. Cutmarks on cranial fragment from 12Sp7. This image is at a lower magnification than Figures 35 and 36 to emphasize the shallowness of two separate cuts (in yellow to left and in blue to aqua on right) (10X).

Degenerative Joint Disease (DJD) and Spondylopathy

DJD is the activity-related breakdown of articular surfaces (i.e., arthritis). It was found periodically on articular surfaces, particularly on the proximal ulna and the mandibular fossa of the temporal. An example of DJD on the glenoid of a scapula is shown in Figure 38. Most often it was expressed as lipping, pitting, and mild eburnation (polishing caused by bone-to-bone contact). Spondylopathy is a general term for joint breakdown in the spine. It includes lipping (osteophytosis) and depressions on the superior and inferior aspects of the vertebral bodies called Schmorl's nodes, which are caused by protrusions of the intervertebral disc. These conditions were found on several vetebral fragments but no evidence of bony fusions (ankylosis) was found.

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Figure 38. DJD on glenoid.

Periostitis, Osteitis

Nineteen tibiae, fibulae, and femoral fragments had evidence of periosteal reactions (Figure 39). The diagnosis was given only if raised areas of deposited bone existed on the exterior cortex. One example of osteitis is quite severe. Three femur fragments that are almost certainly from the same bone have heavily remodeled surfaces and marked stenosis of the medullary cavity (Figure 40). These bone fragments were compared to the fractured femur, but they did not match in terms of size or cortical surface morphology. The remodeling is akin to osteomyelitis, but no cloacae were found. Thus, at this time the etiology of this condition is unknown, but it was quite severe.

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Figure 39. Periosteal reaction on tibia fragment.

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Figure 40. Significant remodeling and stenosis in femur shaft fragment. Does not fit the femur in Figure 33 but is similar in size and in cortical texture.

Other varieties of osteitis include marked stenosis of a tibia shaft and severe remodeling of a maxillary sinus (Figures 41 and 42, respectively). The stenosis could be from a systemic or local infection. It does not seem to have been caused by local trauma. The remodeling of the maxillary sinus (which could be termed sinusitis) is a condition that the author has seen on several occasions in Middle and Late Archaic people from southern Indiana. Its etiology is unknown, although study is underway currently in the Indiana Prehistory Laboratory to better understand this condition.

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Figure 41. Stenosis in left tibia fragment perhaps related to infection.

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Figure 42. Remodeling inside right maxillary sinus (looking laterally into zygomaxillary aspect of sinus). Anterior is to the left, superior is to the top.

Anemia

The following two conditions have been linked to iron-deficiency anemia, although the etiology of the iron deficiency is not always clear. It could be caused by numerous factors including a low iron diet and infection (Stuart-Macadam and Kent 1992).

Cribra orbitalia. This is pitting in the orbital roof and it was found infrequently (three fragments representing a minimum of two individuals). The pitting was usually found in younger individuals, although at least one example was in a young adult.

Porotic hyperostosis. This condition, exemplified by raised areas of pitting on the cranial vault was found very regularly, although not frequently. Most of the time it was present on adult cranial fragments and was in a healed or healing condition. Of the over 1,000 cranial fragments, however, only 12 had distinct evidence of porotic hyperostosis.

Dental Health

The diet was likely quite abrasive, leading to the rapid erosion of dental hard tissues, pulp exposure, and eventual antemortem tooth loss. A few teeth had small carious lesions, but for the most part teeth lacked dental caries. Periodontal disease and abscessing occurred frequently. Overall the teeth wore down rapidly, were not in a particularly cariogenic environment, but did suffer from premature loss and alveolar infection.

Additional Analyses

Osteo/odontometrics. It is standard to take detailed measurements of bone. However, the extraordinarily fragmented nature (and incompleteness) of these remains obviated nearly all osteometric (bone measuring) and odontometric (tooth measuring) studies. The most common measurements were subtrochanteric; all told 27 femora provided both anterior-posterior (AP) and medial-lateral (ML) diameters. The platymeric index provides the relationship between these diameters. If the value is 100 then the two diameters are the same. For 12Sp7, the platymeric index (calculated [MD/AP]x 100) is 69.94 (see Table 32). This indicates that the subtrochanteric region is relatively flat with the AP diameter being approximately 70 percent of the MD diameter. The 12Sp7 platymeric index is consistent with other Archaic groups and indicates a lifeway requiring much use of the lower limbs. Some dental measurements were taken and those are provided below (Table 33).

Table 32. Mean Platymeric Index (measurements in millimeters).

Medial-Lateral	Anterior-Posterior	Index	Number
33.93	23.73	69.94	27

Table 33. Dental Measurements. Measurements in millimeters.

Tooth	Mesiodistal	Buccolingual	Number
Upper Third Molar	10.3	11.7	1
Upper Second Molar	9.8	10.7	2
Upper First Molar	10.4	11.6	3
Upper Second Incisor	7.8	6.3	2
Upper First Incisor	8.9	6.9	2

Tooth	Mesiodistal	Buccolingual	Number
Lower Third Molar	11.1	10.8	1
Lower Second Molar	11.2	10.8	1
Lower First Molar	11.9	10.5	5
Lower Fourth Premolar	7.6	9.0	1
Lower Third Premolar	7.5	8.3	1
Lower Canine	6.9	7.4	2
Lower Second Incisor	6.2	6.1	2
Lower First Incisor	5.5	5.6	2

12Sp7 in a Regional Context

In general, the 12Sp7 data conform well with what is known of the late Middle and Late Archaic context of southern Indiana. The site‘s affinities with the French Lick phase are unequivocal, a fact confirmed by the AMS dates which fall well within the age range for this cultural expression. Beta Sample 284033 was collected from Stratum IIb, West 17, within a five gallon flotation sample, and yielded a calibrated radiocarbon age of 4220 B.C. (conventional radiocarbon age of 5300 ± 40 B.P.). Beta Sample 284032 was collected from Stratum III, South 7, within a five gallon flotation sample and yielded a calibrated radiocarbon age of 3760 B.C. (conventional radiocarbon age of 4980 ± 40 B.P.).

A variety of raw materials were selected for use as stone for tools at 12Sp7. The raw materials recovered from the site are quite variegated, similar to other Late Archaic occupations. However, examination of the outer surfaces of many of the flakes indicates they display natural surfaces that are smooth and worn, due to weathering and transport, and can be classified as ―gravel cherts.” This utilization of local raw material sources characterizes the French Lick phase according to Stafford and Cantin (2009:309), who write that ―there was greater emphasis on local cherts regardless of quality and a greater diversity of chert types was used when compared with that seen in the Early Archaic.” Approximately 31 percent (n = 470) or nearly one-third of the 1,509 measured pieces of debitage at 12Sp7 display outer surfaces that are smooth and worn, abraded, and/or chattered. These data indicate that gravel cherts, displaced from their bedrock outcrops and probably collected locally, played an important role in the technological organization at 12Sp7.

The manufacturing sequences for the flaked stone artifacts can be divided into two main categories based on the type of raw material. The raw materials from secondary source deposits utilized at 12Sp7 tend to be relatively small, with elongated oval or flat tabular shapes. The internal quality of these materials is highly varied from highly vitreous to saccharoidal and coarse in texture. Unsealed fractures also occur which present difficulties to the knapper in successfully detaching flakes, while avoiding the shattering of the material into unusable pieces. The manufacturing sequences described above indicate the Late Archaic knappers at 12Sp7 were quite flexible, using a number of approaches for processing locally-obtained secondary source materials including bipolar flaking, core reduction, and biface manufacture. In addition, some secondary source materials apparently were heat treated in their original form prior to flaking. The extra-local, higher quality cherts, obtained by direct procurement as a result of subsistence forays or through exchange netwoks, arrived at 12Sp7 in already worked forms such as flake blanks, bifaces, or finished PPKs.

The Late Archaic PPKs tend to be small or medium-sized and generally have a low width:thickness ratio with many less than 3.0:1. In other words, relative to their widths the PPKs tend to be thick. The impression is that some of these PPKs were expediently manufactured either from pebble materials or through core and flake production. Some flakes were evidently thin enough to avoid protracted reduction by percussion and they could simply be pressured flaked into a suitable shape. Recycling of PPKs into other tool forms, thus extending their use life, is clearly evidenced by hafted scrapers that appear commonly in the assemblage. It is not known whether the 12Sp7 PPKs represent functional variants within the same ―French Lick” tool kit or whether they represent discarded tools belonging to different groups over time. The inability to assess this at 12Sp7 is directly related to the means of recovery and lack of excavation, but the authors believe this is an important question for future characterization of the French Lick phase and the Late Archaic as a whole.

The method of bone and antler tool manufacture evidenced at 12Sp7 involved both non-controlled (direct percussion) and controlled (grooving and splitting) production of ―blanks” for various tools or decorative objects like pins, awls, beads, as well as the enigmatic spatulas. Non-controlled percussive fracture was commonly used for awl manufacture, while the manufacture of pins required greater precision utilizing long splinters, removed by grooving and splitting longbone shafts. Examples of awls made on large bird bones like turkey appear to have been shaped directly by grinding one end into a sharp tip. Finally, a number of bone and antler specimens were drilled, for example, carnivore canine teeth, but in some instances a hole was created by incising on both sides of an object until it was pierced.

The presence of decorated pins suggests links with other Middle-Late Archaic sites in the region. Most of the 12Sp7 types are represented by single examples only, with the notable exception of four pins with fishtail-shaped heads. The fishtail-shaped head style has been reported from the Koster and Black Earth sites in Illinois and Crib Mound and McCain in Indiana (Jefferies 1997: Table 2), hinting at the presence of regional exchange networks among groups participating in similar cultural expressions.

The prehistoric groundstone and other artifact assemblage is highly varied and includes axe and celt fragments, bannerstone fragments, fossils and collected stones, hammerstones, pitted stones and grinding stones, as well as red ochre. The assemblage has parallels with other sites such as Bluegrass (12W162), as well as sites in Ohio where groundstone tools become more common after 5950 B.P. (Purtill 2009:574). In fact, the Late Archaic witnesses an explosion in groundstone artifact types similar to those recovered from 12Sp7, which include both hematite tools like small grooved axes and transport of unworked hematite nodules to the site.

In general, the 12Sp7 faunal assemblage resembles that described for the Bluegrass Site (12Wl62), which displays affinities with the French Lick phase (Stafford et al. 2000). Terrestrial mammals, especially the white-tailed deer, dominate the faunal assemblage recovered from 12Sp7. It is clear that deer were butchered, as evidenced by cut marks and spiral fractures. Meat and hides were not the only resource deer could have supplied. Bone marrow and grease could have been exploited as well. While a more thorough analysis is necessary, the current data from 12Sp7 are highly suggestive that the long bones of large mammals, likely white-tailed deer, were split and fractured open to allow for marrow extraction.

Other components of the faunal assemblage provide information on the non-subsistence related behavior of Late Archaic peoples in southern Indiana. Indeed, two box turtle specimens, both marginal, had perforations and may have been parts of rattles. Gar and bowfin are known to be used for making scratching and/or tattooing implements up through historic and modern times. Striped skunk and red fox (and woodchuck and beaver for that matter) are fur-bearing animals, and thus were likely exploited for their pelts. Bobcat, red-tailed hawk, and sandhill crane are powerful images for late prehistoric Native Americans (such as at Cahokia Mounds) and such ideological attributes may have originated in the Archaic Period.

Site 12Sp7 is similar to other Middle and Late Archaic mortuaries in southern Indiana along the Ohio River particularly in that it has a single individual with perimortem trauma. Sites such as Bluegrass (12W162), Meyer (12Sp1082), 12Hr6, and the Firehouse site (12D563) have one and in some instances two people missing a limb and/or their head or have some scalping (Lockhart Sharkey 2011). In general, trophy taking was more common than scalping during the Archaic period, but scalping was present in Indiana and neighboring states at that time (see Schmidt et al. 2010). The violence that produced the scalping and trophy taking was likely small scale and perhaps infrequent, but it did persist largely unchanged for millennia. Likewise the pathology, femoral subtrochanteric flatness, sizable percentage of children in the assemblage, and heavy dental wear make it consistent with its contemporaries in the region.

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SOCIAL DIMENSIONS OF THE TECHNOLOGICAL ORGANIZATION OF UPPER MISSISSIPPIAN LOGISTICAL CAMPS: IMPLICATIONS OF NOVICE PARTICIPATION IN THE LITHIC REDUCTION AT THE COLLIER LODGE SITE (12Pr36)

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The Collier Lodge site (12Pr36), located in Porter County, Indiana along the Kankakee Marsh, is a multi-component site that dates from the Early Archaic period to the very recent past. During the 2003-2011 field seasons, an intensive investigation was conducted by the University of Notre Dame in cooperation with the Kankakee Valley Historical Society and Indiana University South Bend. This study analyzes the debitage recovered from numerous Upper Mississippian roasting pit features, in order to assess reduction strategies and site use, in an anthropological attempt to recognize the presence of novice tool makers involved with the lithic reduction sequence. The results indicate that similar reduction strategies and trajectory along the reduction continuum were present across feature, pointing to the continuity in site use over time for similar purposes. The disproportionately high number of flakes exhibiting signatures of novice errors suggests that novices participated in the lithic reduction at the site. In this way, the data contribute to a fuller understanding of the demographic composition of Upper Mississippian task groups and technological organization at logistical camps.

Stone tool production is a popular topic of archaeological investigation, when lithic data are available and appropriate to consider. Such analyses may result in broad applications of archaeological theory due to the direct economic repercussions of tool manufacture and use, which have a potential to impact a great many members of any lithic-using society. Certainly, lithic data are also pragmatically important due to the high preservation potential of these artifactual materials, covering their complete lifespan from manufacture through discard. Because of the seeming ubiquity of lithic materials in their contexts, and their comparative potential for inter-site, regional, and ethnological strategies, investigators of the Late Prehistoric in eastern North America have used lithics to fruitfully approach anthropologically interesting questions as broadly spaced as gender, ethnicity, politics, and temporality (e.g. Arthur 2010; Cobb and Pope 1998; Johnson 1997; Logan and Hill 2000). In this anthropological vein, this article considers the questions of whether novices can be recognized in an archaeological assemblage (cf. Bamforth and Finlay 2008; Ferguson 2008; Högberg 2008) and what their recognition could mean for the interpretation of social dynamics at an Upper Mississippian limited use site for resource extraction, the Collier Lodge site (12Pr36).

In order to make a determination of the potential for differing levels of skill sets to be recognized in a lithic assemblage it is vital to employ clear expectations for what can be considered a skillful (or not) combination of knowledge and ability, as well as what the artifactual results of a community comprised of differing skill sets should look like (Bamforth and Finlay 2008). This is in keeping with best practices in lithic analyses generally. Since Sullivan and Rozen‘s (1985) call for clear terminology and replicability, debitage analysis has been used to examine individual style and variability (Whittaker and Kaldahl 2001; Williams and

Andrefsky 2011), knapping skill (Milne 2005), procurement (Beck et al. 2002; Beck 2008), site use (Cowan 1999; Healen 1995), and technological organization (Carr and Bradbury 2001).

Lithic production and use occurred within a much broader organization of technology that lies at the intersection of agency, behavior, and the cultural landscape. This interstitial relationship structured the systemic context of technology, beginning with procurement strategies and production, use and recycling, and terminating with the tool's eventual discard (Andrefsky 2005; Beck et al. 2002; Beck 2008; Carr and Bradbury 2001; Kelly 1988; Morrow 1997; Rinehart 2008; Schiffer 1972; Whittaker and Kaldahl 2001). Through studies of analogy, ethnoarchaeological research provides insight into craft pedagogy in prehistoric societies (see McCall 2012 for a survey). Specific to flintknapping, novices undergo intensive training in which children as young as eight years of age assisted with some of the tasks, with increased participation along the reduction continuum being a function of age and skill of the individual (Arthur 2010; Stout 2002). Craft pedagogy gave novices access not only to technical knowledge via a community of practice of lithic specialists (Lave and Wenger 1991), but also to new forms of cultural and social capital (Bourdieu 1977; 1991). In this way, craft pedagogy reproduced the organization of technology, which effectively shaped the structures of prehistoric society.

There are two methodological approaches to debitage analysis, involving either attribute or mass analysis. To choose between the two, the analyst must consider the types of questions to be answered and weigh these against the inherent advantages and disadvantages of each method. Analysts conducting attribute analysis examine individual flakes to answer particular questions. Common attributes that are analyzed are: maximum metric dimensions, weight, cortical coverage, number of dorsal scars, and platform type (Andrefsky 2005). Although individual analysis can offer detailed information on each flake, the process is problematic in that it can be costly in terms of time and energy expenditure, poorly defined attributes that are subject to interpretative error, and sampling bias (Ahler 1989). The alternative methodology, proposed by Ahler (1989), is called mass analysis. Mass analysis eliminates the sampling bias and time costs by using size grading to quickly sort through the total debitage assemblage and recording count, weight, and number of cortical flakes for each size category (Ahler 1989). Although mass analysis is useful for quickly analyzing large assemblages, it has been critiqued for its inability to differentiate multiple knapping events or mixed assemblages, and it does not account for stylistic or skill variation (Andrefsky 2007).

In this study, debitage was examined to look for intra- and inter-feature variability using a combination of aggregate and individual attribute analysis. These data were then analyzed in order to try to answer questions about reduction strategies, behaviors, and choices made by the Upper Mississippians who occupied the Collier Lodge site (12Pr36). The data indicate that the site was used by the Upper Mississippians to establish logistical camps. Further, similar reductive strategies were employed across all pit features. There is also evidence that novice flintknappers participated in the knapping activities at the site suggesting that apprenticeship was an important component of the task group organization.

Study Area

The Collier Lodge site is located in Porter County, Indiana along the Kankakee Marsh (Figure 1). The site is situated at a high point in the landscape and further provided an area to easily cross the Kankakee Marsh (Schurr 2006, 2011; Schurr and Wells 2012). This certainly would have been an attractive site in prehistory. Indeed, the Collier Lodge is a multi-component site that dates from the Early Archaic period to the very recent past (Schurr 2006, 2011; Schurr and Wells 2012). There is, however, no evidence of long term habitation at the site during prehistory.

The Collier Lodge was first recognized for its archaeological significance by McAllister (1932), who noted its value in providing data on Woodland and Upper Mississippian potsherds. During the 2003-2011 field seasons, an intensive investigation was conducted by Dr. Mark Schurr of the University of Notre Dame. In collaboration with the Kankakee Valley Historical Society, the public archaeology component brought dozens of volunteers and media coverage daily in order to increase awareness and stewardship of local history and appreciation of the field of archaeology. During the 2011 field season, Dr. Josh Wells and students from Indiana University, South Bend also assisted in the excavation of the site.

The Collier Lodge site has an extensive debitage assemblage (n = 15,178 flakes). This article, however, focuses on the debitage recovered from the Upper Mississippian pit features (n = 892 flakes) (Table 1). In addition to lithic technology, the pit features contained faunal skeletal elements and grit and shell-tempered sherds (Schurr 2006, 2011; Schurr and Wells 2012). Some of these features resemble other Upper Mississippian features found nearby at the Griesmer site which were concluded to have been used for roasting water tuber and lotus (Faulkner 1972). The Upper Mississippian use of the site was likely to establish logistical camps (*sensu* Binford 1980). These would have been made by task groups sent out to gather provisions for much larger settlements in the surrounding areas.

Figure 1. Aerial map of the Collier Lodge site showing the location of the Upper Mississippian pit features. Satellite imagery, dated October 2007, reproduced under allowable fair use described in the copyright terms by Google (2013).

The Upper Mississippian features date to the mid to late 1400s; however, a more precise chronology using sherds is not possible (Schurr 2006, 2011; Schurr and Wells 2012). Furthermore, none of the features overlap. This suggests that the features may have been made at the same time or that remnants of the roasting features were still visible on the surface when the site was revisited. If the latter, then the site would likely have been used over a relatively short period of time, perhaps over the course of a few seasons.

Table 1. Distribution of flakes by feature.

Feature Number	Debitage Amount	Weight (g.)	Average Weight/Flake	Average Dorsal scar/mm^2
3	160	93.9	.6	.019
10	261	86.5	.3	.023
18	90	43.6	.5	.017
26	11	3.6	.3	.021
28	2	1.1	.5	.015
40	2	0.4	.2	.016
42	5	3.6	.7	.011
43	181	81.4	.4	.021
47	11	5.4	.5	.024
48	166	65.2	.4	.021
50	2	.3	.3	.013
51	1	.2	.1	.009
Total	892	385.2	4.8	.21
μ	74.33	32.10	.40	.02
σ	93.4747	39.0444	.1706	.0048

Methodology

A total of 10 attributes were utilized to analyze the feature assemblage. These included: flake type, maximum length, maximum width, platform width, termination type, platform, modification, weight (nearest .1 g), number of dorsal scars (>1 mm), presence of cortex, and thermal alteration Metric measurements were taken using calipers to the nearest .05 mm.

Keeping with Sullivan and Rozen's (1985) contention with replicability, the operational definitions of the flake attributes will be defined. Each flake was initially categorized as complete, angular shatter, or incomplete. Complete flakes have a discernible ventral and dorsal surface, platform, and distal termination, and were further classified as either biface thinning flake, bipolar flake, or undifferentiated flake as illustrated in Figure 2. Biface thinning flakes are typically late stage flakes within the reduction continuum with usually an abraded or multifaceted striking platform, relatively high number of dorsal scars to weight and area ratio, the presence of a lip on the ventral side of the platform, and generally little to no cortex (Figure 2A) (Andrefsky 2005; Whittaker 1994; Whittaker and Kaldahl 2001). Bipolar flakes are produced when an anvil is used for compressive striking force and is associated with raw material size and quality, as well as lower skill of the knapper (Figure 2B) (cf., Arthur 2010 for a discussion on bipolar reduction as stylistic choice). Attributes present on bipolar flakes are: compression rings, a flat or crushed platform, and evidence of crushing on the distal end of the flake (Andrefsky 2005; Cotterell and Kamminga 1987; Jeske and Lurie 1993; Morrow 1997; Whittaker 1994). The undifferentiated flake category refers to any flake that did not fit into either category.

The platform is created at the point of impact where a percussive force strikes the core (Figure 3 arrows 1a and 1b) (Andrefsky 2005; Whittaker 1994). Platform attributes were categorized as: absent, abraded, crushed, flat, cortical, and complex. Platforms that appeared rounded under 10x magnification with evidence of microflakes removed were categorized as abraded (Andrefsky 2005; Odell 1989; Whittaker 1994). Complex platforms refer to any platform that had at least one facet removed. Both abraded and complex platform modifications are thought to represent a later stage in the reduction continuum, suggesting care and preparation to remove a desired flake (Andrefsky 2005; Whittaker 1994; Whittaker and Kaldahl 2001).

There are four types of distal terminations: feather, step, hinge, and *outrepassé* or plunging (Figure 4) (Andrefsky 2005; Cotterell and Kamminga 1987; Whittaker 1994). Feather terminations are created when enough force is generated during the strike of a percussor to smoothly detach a flake (Cotterell and Kamminga 1987; Whittaker 1994). Poor raw material quality or striking the platform with too little force produce step terminations, characterized by a sharp, right angled distal termination that results from poor quality raw material or striking the platform with too little force to fully detach the flake from the core (Cotterell and Kamminga 1987; Whittaker 1994). Hinge terminations have a somewhat rounded distal termination and result from too high of a striking angle with not enough force, or the detachment crack runs into a step termination (Cotterell and Kamminga 1987; Whittaker 1994). A core struck with too much force causes plunging terminations, and as the name implies, plunges into the core during the detachment phase (Cotterell and Kamminga 1987; Whittaker 1994). Thus, feather terminations are the most desirable in that they are a controlled detachment; whereas, step, hinge, and plunging flakes are the consequence of raw material quality or knapper error.

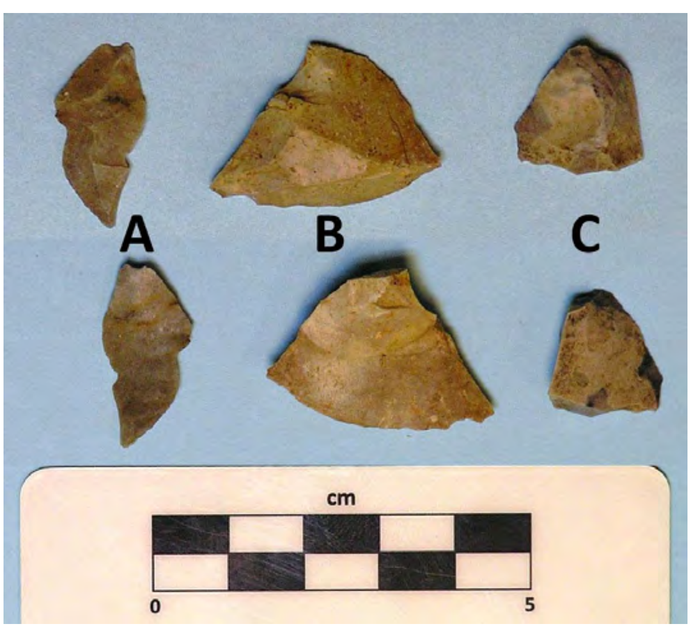

Figure 2. (A) Biface thinning flake, (B) bipolar flake, and (C) angular shatter; top row is the dorsal view, bottom row is the ventral view (photograph courtesy of the authors).

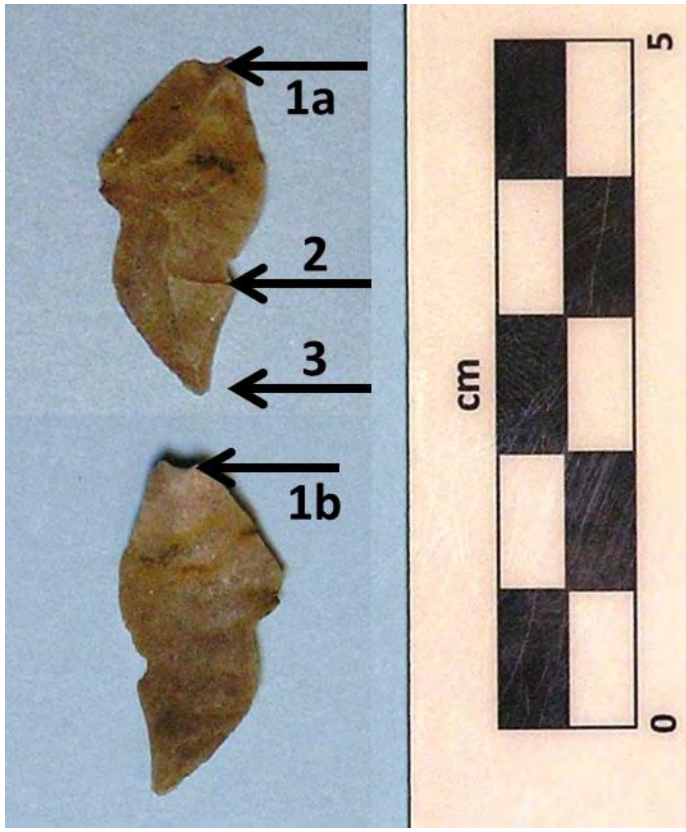

Figure 3. Flake attributes: platform (arrows 1a and 1b), dorsal scar (arrow 2), distal termination (arrow 3); top flake is the dorsal view; bottom flake is ventral view (photograph courtesy of the authors).

Angular shatter typically lack a discernible dorsal and ventral surface and often contain multiple flat surfaces giving it a blocky appearance (Figure 2C) (Andrefsky 2005) Angular shatter are also byproducts of bipolar reduction (Andrefsky 2005; Cotterell and Kamminga 1987; Jeske and Lurie 1993; Whittaker 1994).

Incomplete flakes are missing one or more of the characteristics noted above that define a complete flake. Flake shatter refers to both medial and distal flakes. Medial flakes, missing a platform and distal termination, have step terminations bisecting the flake (Andrefsky 2005). Flakes that have a distal termination, but do not have a platform, are distal flakes (Andrefsky 2005). Proximal flakes possess a striking platform, but are missing its distal termination (Andrefsky 2005). Flake shatter and proximal flakes are incomplete flakes and result from a variety of post-depositional processes (Andrefsky 2005). Of the incomplete flakes, proximal flakes contain the most information about the act of reduction.

The raw material was assessed for visible thermal alteration. Since heat treatment is considered one of the ways to improve the quality of poor raw material, presence of heat treatment was used to indicate how the prehistoric knapper categorized the quality of the stone (Andrefsky 2005; Whittaker 1994). In chert, heat treatment often reddens the raw material.

Figure 4. Distal terminations by type: (A) feather, (B) step, (C) hinge, and (D) plunging (photograph courtesy of the authors).

Results

Twelve Upper Mississippian pit features were identified at the Collier Lodge site. However, seven of these features contain less than four percent of the total debitage assemblage (n = 34 flakes). These features were only considered in aggregate analysis.

A comparison of the maximum metrics for complete flakes across all features revealed a strong correlation for each of the flake types (Figure 5). Several t-tests were used to look for a salient means for interpreting the complete flakes. Biface thinning flakes have more dorsal scars per mm^2 ($\bar{x}$ = .04, s = .02) than either bipolar flakes ($\bar{x}$ = .02, s = .02) and undifferentiated flakes ($\bar{x}$ = .02, s = .01). This difference was significant, t (190) = 8.53, $p < .001$, one-tailed in bipolar flakes, and t (130) = 9.64, $p < .001$, one-tailed. However, there is not a significant difference between the number of dorsal scars per mm^2 between bipolar flakes and undifferentiated flakes, t (163) = -.71, $p > .05$, two-tailed. This suggests that the primary difference between the undifferentiated flakes and bipolar flakes is the mode of flake production.

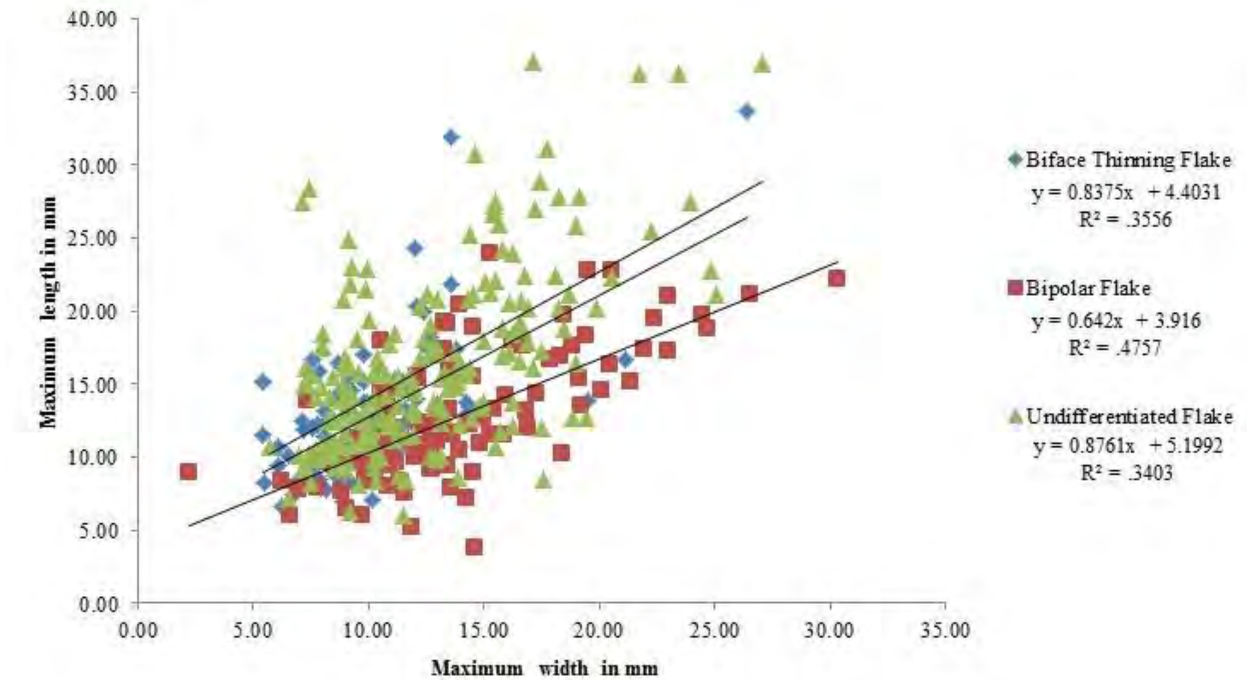

Figure 5. Distribution of complete flake metrics (graph created by the authors).

Nearly 50 percent of the complete flakes have step terminations, while only 35 percent have feather terminations (Figure 6). Raw material quality may account for a portion of this disparity. However, since about 17 percent of the flakes have hinge or plunging terminations, both resulting from knapping error, it is likely that the same can account for some of the step terminations.

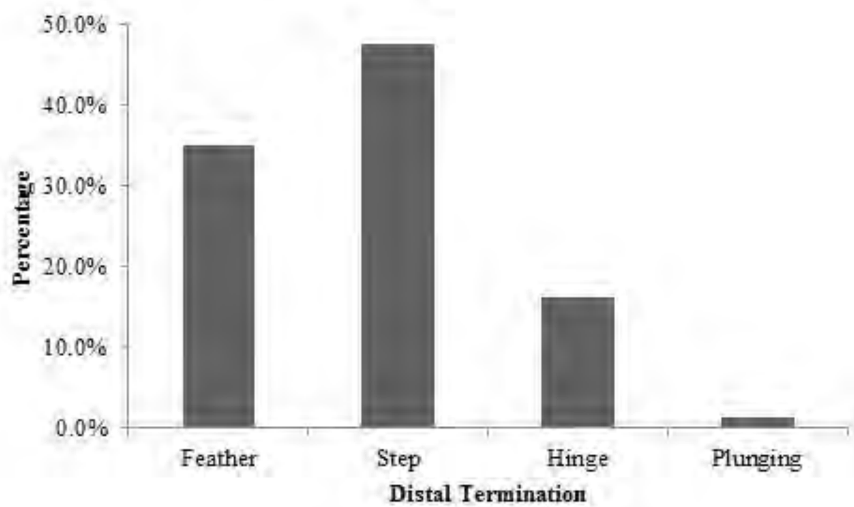

Figure 6. Proportion of distal terminations across Upper Mississippian features (graph created by the authors).

Only 10 percent of the debitage assemblage (n = 91 flakes) showed visible signs of thermal alteration. To determine if the heat treated flakes had an impact on the raw material, a t-test on total flake area was used. Heat treated flakes had a smaller surface area ($\bar{x}$ = 165.81, s = 92.84) than untreated flakes ($\bar{x}$ = 190.43, s = 140.11). This difference was statistically significant, t (208) = -2.24, $p < .05$, one-tailed. A comparison between the proportion of feather terminations between heat treated flakes (n = 29) and untreated flakes (n = 118) shows an 11 percent increase, while the proportion of step terminations for heat treated flakes (n = 28) and untreated flakes (n = 172) shows an 18 percent decrease. This suggests that the limited use of heat treatment did improve the control over detachment.

Both bipolar and undifferentiated flakes are used throughout the reduction process in similar proportions (Figure 7). Both bipolar and undifferentiated flakes were produced in similar proportions at each stage of the reduction sequence from raw material to highly worked cores. In terms of dorsal cortical coverage, there was only a significant difference in size between biface thinning flakes and undifferentiated flakes in the absent and < 49 percent cortical coverage categories: Absent (biface thinning flake: $\bar{x}$ = 138.52, s = 107.93; undifferentiated flake: $\bar{x}$ = 205.24, s = 130.56); < 49 percent (biface thinning flake: $\bar{x}$ = 137.46, s = 53.50; undifferentiated flake: $\bar{x}$ = 217.51, s = 147.76). This difference in area was significant, t *(148)* = -3.50, $p < .01$, two-tailed in the former, and t *(48)* = -3.62, $p < .01$, two-tailed in the latter category.

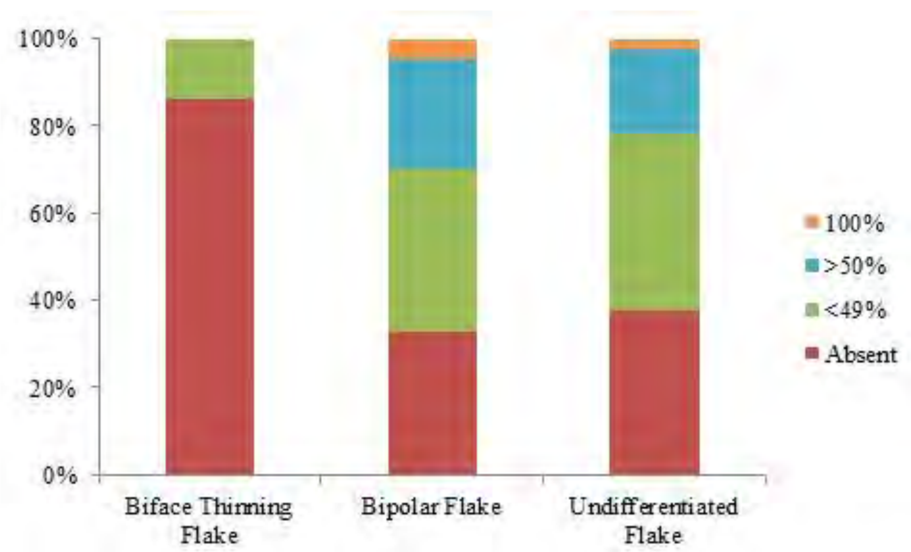

Figure 7. Proportion of dorsal cortical coverage by complete flake type (graph created by the authors).

Undifferentiated flakes occur more frequently than bipolar flakes. Undifferentiated flakes comprise about 45 percent of the flakes with a dorsal surface cortical coverage in the less than 49 percent and greater than 50 percent categories, while about 32 percent of the flakes have no cortex. Bipolar flakes, other the other hand, are fairly evenly distributed between each of the categories at about 25 percent except in the absent category (about 14 percent). Moreover, there is no predominant mode of flake production in the features analyzed.

The five densest features have a similar distribution of flake types (Figure 8) suggesting similar knapping strategies were employed at the site. Figure 9 shows the proportion of dorsal cortical coverage. In order to infer an arbitrary stage within the reduction continuum, the mean number of dorsal scars per mm^2 was calculated in relation to the dorsal surface cortical coverage (Table 2). Five stage categories were defined: early, early-middle, middle, middle-late, and late. These data indicate that while flintknapping occurred along the entire continuum of reduction, tool curation was the primary activity.

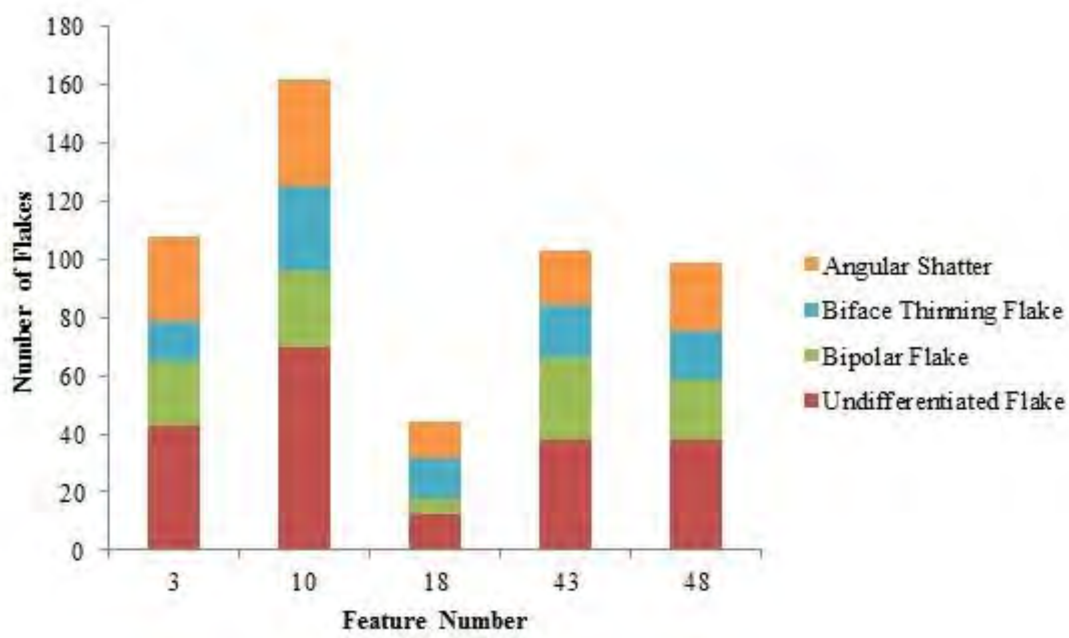

Figure 8. Distribution of flakes by type across features (graph created by the authors).

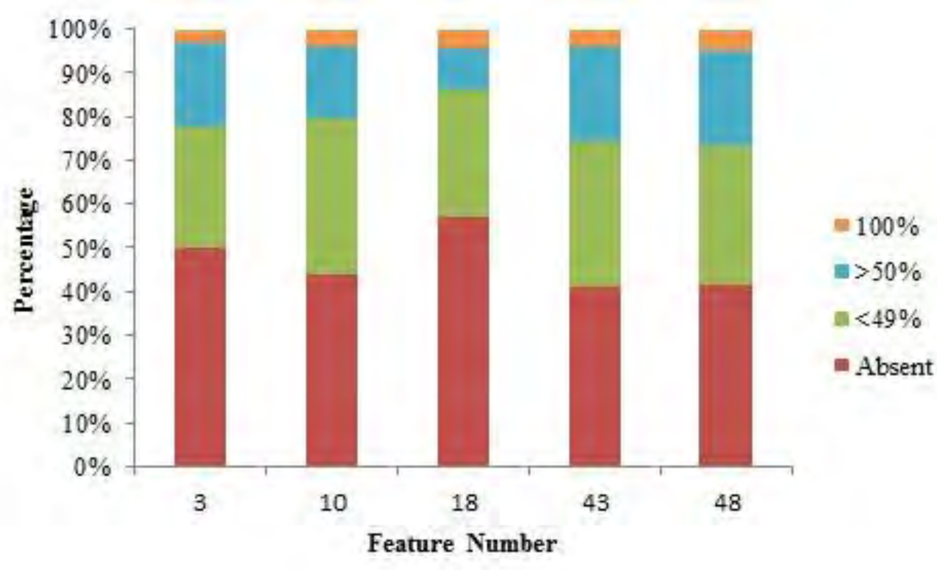

Figure 9. Proportion of dorsal cortical coverage across features (graph created by the authors).

Table 2. Stages of reduction by feature.

Stages of Reduction	Mean Dorsal scars/mm^2	Range	Features
Early	.0052	0 – 0.008	
Early-Middle	.0081	.0081 – 0.013	
Middle	.014	.014 – 0.0208	3, 18
Middle-Late	.0209	.0209 – 0.0247	10, 43, 48
Late	.0248	.0248+	

Discussion

A number of observations can be extrapolated from the data presented here. First, within each feature the full range of the reduction sequence is present. While the early stages of reduction did occur, it was infrequent across all features. The dorsal scar/mm^2 in conjunction with the dorsal surface cortical coverage and flake types present suggest that middle to late stage reduction primarily occurred at the site. This implies that the maintenance of tools happened most frequently.

Secondly, there is a disproportionately high number of step, hinge, and plunging terminations. Raw material quality likely explains a portion of these terminations, given that heat treatment was used as a means for improving the quality of the cores. This suggests that the Upper Mississippian knappers occasionally used the locally available, poor quality glacial chert. The high proportion of hinge and plunging terminations, however, cannot be attributable to the quality of the material since these terminations are created from too high of a striking angle or too much force behind a strike (Andrefsky 2005; Cotterell and Kamminga 1987; Whittaker 1994). Furthermore, only 21.5 percent of the step terminations have abraded or complex platform modifications. Distal terminations resulting from knapping error and infrequent platform preparation are examples of inexperienced knappers who have not yet acquired the knowledge to control detachment of flakes (Milne 2005; Whittaker 1994). As such, novice flintknappers may have used the locally available chert to practice various techniques without damaging good quality chert in times when it was infrequently available. Craft pedagogical practices often involve intensive training beyond just the skill itself (Arthur 2010; Stout 2002). These data suggest that apprentice participation in task groups was likely a component of the transmission of craft knowledge and embedded within the overarching technological organization of the Upper Mississippians.

Thirdly, there is a moderately strong correlation between the maximum length and maximum width of bipolar flakes ($r = .6897$). This contrasts with the expectation of unpredictability given the way that bipolar flakes are produced (Andrefsky 2005; Cotterell and Kamminga 1987; Jeske and Lurie 1993; Whittaker 1994). Additionally, bipolar flakes have a similar proportion as undifferentiated flakes along the entire reduction continuum. Following Arthur (2010), bipolar reduction may have been a stylistic choice in reductive technique that requires a high degree of skill and control, rather than simply a response to raw material constraints.

Conclusions

Attribute analysis offers a fine-grained lens with which to interpret data in a debitage assemblage. Despite its explanatory value, its cost in time and energy often necessitate a rigorous sampling strategy. This study benefitted from having a relatively small population size that permitted the analysis of the entire assemblage.

Ten attributes were used to examine intra- and inter-feature variation in reduction strategies. The Upper Mississippian component of the Collier Lodge site is comprised of ephemeral logistical camps created by highly mobile task groups. The lithic data suggest that the knapping that occurred at these camps utilized a consistent strategy over a relatively short period of time. Although this study focused on debitage recovered from a single site, future research could use a geographic information system in combination with artifactual, climatic, and seasonal datasets to develop models that map trajectories of task group mobility and predict logistical camp location.

Variation in skill is a recognized feature of novices in archaeological assemblages (cf., Bird and Bird 2000 on the differences in shellfish gathering techniques in children). Although children no doubt contributed to the formation of the archaeological record, their participation in activities are often invisible (Finlay 1997; Shea 2006). The imitation of adult lithic production is one way in which children may be rendered visible (Ferguson 2008; Högberg 2008). Besides physical factors that may have limited the ability of young children to participate in knapping activities (Ferguson 2003), a variety of social factors likely influenced the age of participation in apprenticeship. Important here, in agreement with Ferguson (2008), is that it is erroneous to conflate the terms ―novice” and ―child” by simply associating crudely made projectile points as being the work of a child. This ascription misses the mark insofar as it does not account for factors that can affect the end product of tool production, such as raw material constraints (Flenniken 1984), while at the same time it fails to consider the differences in how prehistoric hunter-gatherers may have viewed children and novices within their own society. Participation in a community of practice (Lave and Wenger 1991), like a craft apprenticeship, likely operated as a liminal state between childhood and adulthood in which the participant acquired not only new technical skills, but also new ways of interacting within the social dimensions of which they now had access. To account for this, it is incumbent upon analysts to develop the tools and language to be able to differentiate between lithic craft novices and child imitation so that future research can contextualize these differences within the social sphere of prehistoric societies.

The data presented in this article suggest that novice flintknappers participated in the lithic reduction at the site. Task groups may have played an important role in training apprentices, thereby reproducing the social components of the society‘s technological organization. Future investigations could analyze other aspects of the Collier Lodge assemblage, or similar limited use sites in the region, to see if evidence of novice craft participation is present. Additional research could look at craft production at other sites to examine variation in the transmission of technical knowledge to apprentices and the implication this has on social organization. In this way, the data would contribute to a fuller understanding of the range of craft pedagogical practices and how these are embedded within the social dimensions of prehistoric societies.

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Data Availability: The raw data used in the analyses of this article are publicly available for download at: https://iu.box.com/dullcollierlithics.

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THE STEWART CACHE OF BIPOINTED BIFACES, JACKSON COUNTY, INDIANA

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Abstract

The Stewart cache, Jackson County, Indiana described here is composed of large, wide, bipointed bifaces made of blue-gray chert. It is one among many biface caches known to occur widely in the Midwest and Great Lakes regions dating to the terminal Archaic to Early Woodland period. Some aspects of long distance exchange to account for the distribution of these biface caches are considered.

Introduction

During the Late Archaic, long distance transport of specific artifact types and raw materials increased in eastern North America (Griffin 1967; Jefferies 1997, 2004; Winters 1968). Notably, blue-gray chert in the form of specific biface types was transported over long distances in Late Archaic to Early Woodland times in the Midwest and Great Lakes regions (Didier 1967; Justice 1987). Commonly called Turkey-tail bifaces, these also include unnotched bipointed forms. Although Didier (1967:3) called them blanks, the term bipointed seems preferable to blank, and less awkward than unnotched Turkey-tail.

However, the regional social interaction evident in the Late Archaic was not unprecedented. A regional social network was established in the midcontinent in Middle Archaic times (Jefferies 1997, 2004). Likewise, long distance transport of bifaces appeared earlier. In Middle Archaic times distinctive bifaces made from raw material sources in western Kentucky and Tennessee were widely distributed in the Middle South (Johnson and Brookes 1989).

Study of long distance exchange is important to archaeologists because forms of exchange are in turn related to prehistoric social organization and, furthermore, external exchanges of matter, energy, and information compose a system essential to the survival of individual participating communities (Brown 1977:172-173; Flannery 1972; Ford 1972; Renfrew 1975, 1977; Wiesner 1982). For understanding prehistoric regional exchange in the Late Archaic to Middle Woodland time span the distribution of caches and characteristics of the bifaces composing them are essential data (Binford 1963; Didier 1967). The Stewart cache of bipointed bifaces appears not to have been described in the archaeological literature before. Considering it in the context of other bipointed biface caches provides some insight into prehistoric exchange networks.

At the outset it is appropriate to review the cultural milieu and chronological placement of the cache. Lacking any other artifacts from the site, morphology of the cache bifaces themselves provides the only basis for chronology. The bipointed bifaces more closely resemble those that are usually attributed to the terminal Late Archaic and Early Woodland (Didier 1967; Pleger 2000), than the disk or ovate forms found in Middle Woodland contexts (Ellis 1940; Halsey 1970).

A terminal Archaic to Early Woodland chronological attribution for the cache seems logical based on present evidence. Justice (1987:178) considered Turkey-tail bifaces to be diagnostic of the Late Archaic to early Woodland transition. Based on available radiocarbon dates he gave a time range of 1500 B.C. to 500 B.C. He noted both morphological and chronological overlap with the Adena ovate-base style (1987:191-192) characteristic of early Adena. In the upper Midwest and Great Lakes regions both Turkey-tail and bipointed bifaces are associated with the Red Ocher complex (Ritzenthaler and Quimby (1962:246-249). The Red Ochre complex is considered transitional Late Archaic and Early Woodland (Stevenson et al. 1997:143-150), dating to the span 1200 B.C. to 1 A.D. Ritzenthaler and Quimby (1962:253-256) considered the Glacial Kame culture of southern Michigan and adjoining northern Indiana and Ohio to be closely related to Red Ochre, distinguished by conch shell sandal sole gorgets, instead of Turkey-tail bifaces.

Bipointed blue-gray chert bifaces occur in Early Woodland Adena context as Tomak and O'Connor (1978) pointed out; for example, Tarleton mound, Fayette County, Kentucky (Webb 1943; Webb and Haag 1947). Ritzenthaler and Quimby (1962:244) considered Adena a distinct cultural entity from Red Ocher, although some artifact types are shared.

A couple of comments are relevant to radiocarbon dates cited for Turkey-tail bifaces and the Red Ocher complex. At the Red Ocher complex Riverside site in the Michigan upper penninsula bordering Wisconsin, four features containing bipointed bifaces have been radiocarbon dated (Crane & Griffin 1968; Hruska 1967; Pleger 2000). Recent radiocarbon analysis indicates an uncalibrated date no later than about 400 B.C. (Pleger 2000:177). Previously run radiocarbon dates for features containing blue-gray chert bipointed bifaces at the site are consistently too recent. In particular, the previously most recent date of A.D. 1 ± 130 (M-1715) reported by Crane and Griffin (1968) is about 400 years too recent compared to the rerun date of 430 ± 50 B.C. (AA19681/WG2407) reported by Pleger (2000:177).

Both Didier (1967:10) and Justice (1987:178) cited a radiocarbon date of 1220 ± 300 B.C. (M-659, Crane and Griffin 1960) from the Andrews site in central Michigan at the early end of the time range for Turkey-tail bifaces. Although Papworth (1967:32-100) made a compelling case that the date was valid for an assemblage at the site including Turkey-tail bifaces, the feature dated did not contain Turkey-tail bifaces.

Long Distance Movement of Biface Lots

Various models of exchange related to long distance movement of good have been proposed (e.g., Renfrew 1975, 1977). For the exchange network in which the Turkey-tail bifaces were transported long distances, at least two exchange models appear to be relevant. Taking an essentially mercantile view, in a down-the-line exchange model, over time bifaces are removed individually or in small lots from the original load leaving the workshop (Renfrew 1975, 1977; Wright and Zeder 1977). The implication is that lot size should decrease with increased distance, so the largest caches should be those nearest to the point of origin.

Such down-the-line exchange might be contrasted to the situation where the bifaces have high social value and lot holders placed a high priority on maintaining it as an intact set. This might be called a prestige model of exchange, although in Renfrew's (1977:77) discussion his prestige-chain exchange implied social ranking. Here it is simply meant that the bifaces have a recognized value beyond that of purely technological utility inherent to large pieces of high quality material for chipped stone tools. They have a symbolic significance in the social context (Brown 1977:172-173).

Exchanges among members of a community or band would move items only within the radius of the territory utilized by that social group. For long distance movement, exchange would be assumed to take place among individuals in different communities or bands. Neighboring band territories would be essentially comparable, at least not of random sizes, and each band would have direct contact with a limited number of neighbors. Similarly, individuals engaged in biface exchanges would have a small set of partners outside of the community. If so, exchange steps would be equal to the twice mean band territory radius, and with a low number, maybe four to six, alternative neighboring groups (Wilmsen 1973:11-12). Visits of individuals from neighboring bands, providing occasions for exchange outside the immediate community, may have occurred at social events on a regular cyclical basis, but a biface lot need not have been exchanged at regular intervals or annually (Ford 1974:393-394).

In the down-the-line model there would be little reluctance to make exchanges or distribute gifts of individual bifaces or to subdivide the lot either along the way or later when the lot reached its ultimate distance from the source. Bifaces may not be randomly removed, but rather selectively, thus making the lot more homogeneous with distance. While there may be a tendency to remove less esteemed bifaces from a lot, exchange recipients may be discriminating, too. If dividing a biface lot was avoided and the lot was maintained a long time, then it may undergo many exchange transactions and could travel a considerable distance from the source. Furthermore, in prestige exchange, an intuitive conjecture is that value in part derived from the lot size or characteristics of the bifaces composing it. Biface lot holders may try to enhance the size of their holding by adding bifaces as lots or even individually. If so, heterogeneity of the lot seems likely to increase. Therefore, it would be very interesting to analyze the relationship of cache size, morphological homogeneity, and source distance.

These two exchange models briefly discussed here are not strictly alternatives, as they could apply to the same biface lot in different situations. Near the source the bifaces may be essentially high quality material for chipped stone tool manufacture. As distance increases the bifaces may become increasingly considered high social value items. In any case, it is critical to be able to characterize the composition of caches both near and distant from the source.

Location and Documentation

The Stewart cache bifaces registered under National Museum of Natural History (NMNH) accession number 36778, have anthropology catalog numbers 206028 to 206057. A transmittal letter contains the only documentation for the find (L. W. Stillwell to W. H. Holmes, 14 December 1899, accession 36778, Office of the Registrar, NMNH). In 1894 a cache of 36 wide bipointed bifaces was plowed up on the farm of Charles Stewart, Jackson County, Indiana, Figure 1. Of these, 30 were obtained by a dealer in natural history specimens: L. W. Stillwell, of

Deadwood, South Dakota. He sold them to the U. S. National Museum, now the NMNH in 1899.

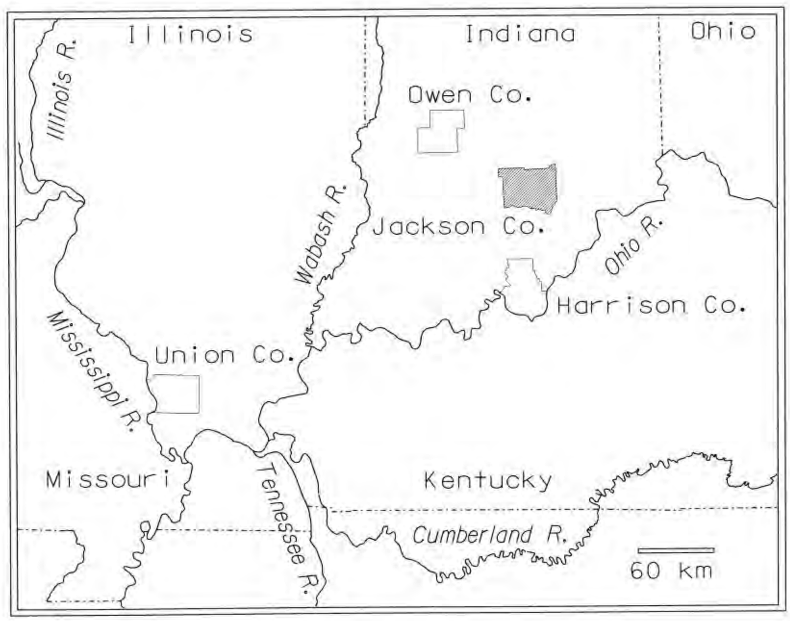

Figure 1. Location of Jackson County, Indiana (based on USGS National Atlas).

The environmental context is near the confluence of White Creek and the East Fork of White Creek. In turn White Creek joins the East Fork of the White River.

Biface Description

The bifaces are made of blue-gray chert. In the archaeological literature this distinctive raw material is called variously Indiana, Harrison County or Wyandotte flint or hornstone (Cantin 2008; Fowke 1928:522; Justice and Smith 1988; Morrow et al. 1992; Seeman 1975). Usually called Wyandotte chert, the geological stratigraphic distribution and characteristics of the blue-gray chert in Indiana are described elsewhere (Bassett and Powell 1984; Cantin 2008; Justice and Smith 1988; Tankersley 1984). One observation to keep in mind about the source is that the nodules were obtained from residuum left by decomposition of the original limestone matrix, where exposed and concentrated by erosion, or in stream alluvium (Justice and Smith 1988:19; Seeman 1975).

As has been observed by others, similar material was used for bipointed and Turkey-tail bifaces found widely distributed in the Midwest (Didier 1967; Justice 1987:173-179). Harrison and Crawford Counties, Indiana are not the only source of blue-gray chert. They are at one end of a distribution in a crescent on the margin of the Illinois coal basin extending through western Kentucky to southern Illinois in Union County (Morrow et al. 1992).

The blue-gray chert nodules vary in size (Seeman 1975:47). Nodules tend to be spherical and sometimes elliptical or conjoined into complex forms. The observed size of the Stewart bifaces, Table 1, indicates that only nodules over 190 mm diameter could have been used. In order to maximize biface length, flakes used as the initial reduction stage appear to have been struck across the center of the nodule.

Figure 2 shows 29 of the bifaces. Some have concentric bands of lighter and darker color, but none have bands surrounding a crystal filled inclusion (as in Figure 7a). The 30 bifaces obtained by the NMNH represent over 80% of the original cache and are assumed to represent the original composition. However, the six not obtained from the original cache may not have been randomly selected, so some systematic bias may have entered the collection studied here. One (206033) of the 30 bifaces received by the NMNH was exchanged with another museum and was not at hand for study. Its length and width are recorded in the anthropology ledger book catalog, although its thickness and weight are unavailable for analysis here.

The total weight of 29 bifaces is about 11 kg. Using the observed mean weight for 29 bifaces yields 13.68 kg for the original cache of 36 bifaces. Can this amount be assumed to represent a convenient back-pack load?

These bifaces would not be called quarry blanks. Quarry blanks are an early biface manufacture stage ready for further shaping and thinning into preforms (Whittaker 1994:201-202), whereas the Stewart bifaces are all carefully flaked and symmetrical. Only one is essentially unifacial. The thinning flake scars are generally very shallow. Some flake scars have a terminal hinge. Turkey-tails are thinned using a distinctive method leaving flake scars with a terminal hinge along the mid-line of the biface (Binford 1963:176-178; Justice and Smith 1988:28-29). Among the bifaces in this cache five cases have cortex on one end. As observed elsewhere bipointed bifaces and Turkey-tail bifaces may retain a vestige of cortex on the ends (Bache and Satterthwaite 1930:151; Beckman 2003; Binford 1963:176-178; Tomak and O'Conner 1978:91).

To describe and compare groups of artifacts, archaeologists often use quantitative variables, those that take numerical values. The reason to do so is that characteristics of groups of artifacts, as products of past human behavior, can reveal patterns in past activities. The Stewart bifaces can be described by length, width, thickness, and weight.

Table 1 summarizes descriptive statistics for these variables. Mean and median are measures of central tendency. The mean is familiar in casual use as the average. The median is the middle value with half the cases larger and half smaller. Standard deviation (S.D.) is a measure of dispersion about the mean, the root mean square of deviations from the mean. It shows how compact or dispersed the distribution is.

Means are sensitive to an asymmetrical or skewed distribution of values, or the presence of a few extreme values or outliers. For a symmetrical distribution of values, or one without outliers, then mean and median should be nearly the same. For the Stewart cache bifaces means and medians are similar, except for weight which departs most notably. Figure 3 shows that two long bifaces skew the distributions of length and weight. Table 1 shows, as would be expected, excluding these two long bifaces slightly reduces the mean and median of length, and substantially reduces the standard deviation of length. Likewise for weight, mean, median, and standard deviation are also reduced.

Figure 2. Stewart cache bifaces.

Table 1. Summary Statistics for Basic Biface Measurements.

	Length(mm)	Width(mm)	Thickness(mm)	Weight(g)	L/W ratio
Count	30	30	29	29	30
Minimum	190	84.3	13.3	230.1	1.8
Maximum	305	128.6	20.0	717.1	2.6
Median	218.0	107.4	15.5	347.1	2.1
Mean	220.9	106.2	15.7	380.0	2.1
S.D.	26.0	11.7	1.8	120.3	0.23
excluding cases over 260 mm length					
Count	28	28	27	27	28
Minimum	190	84.3	13.3	230.1	1.8
Maximum	248	125.3	18.8	566.8	2.6
Median	215	104.9	15.5	333.5	2.0
Mean	215.5	104.7	15.5	355.3	2.1
S.D.	16.1	10.6	1.5	80.0	0.22

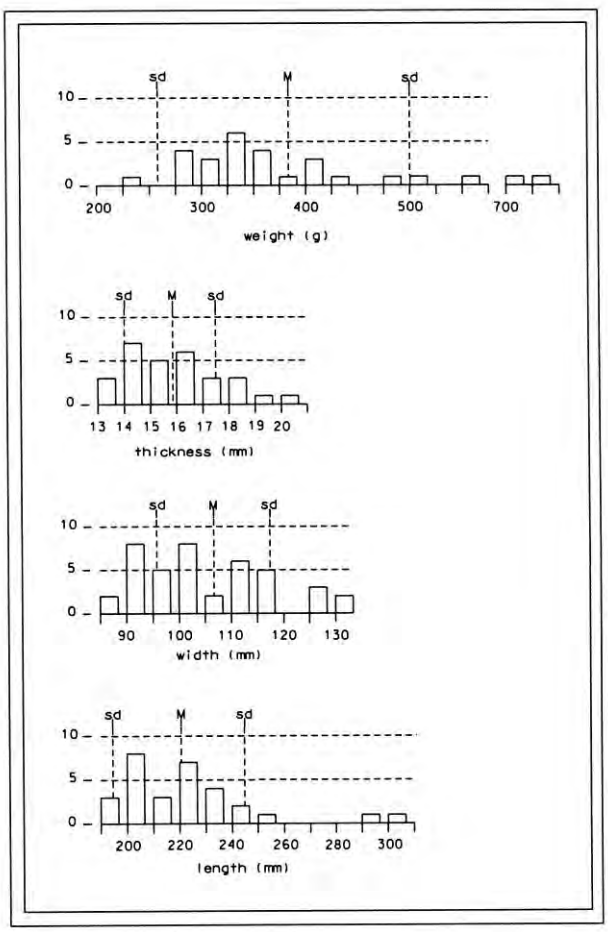

Figure 3. Distribution plot of biface length, width, thickness, and weight.

Figure 4 plots biface length and width. The biface lengths range between 190 mm and 250 mm except for two longer outliers (206028 and 206029). Although distinguished by length, the widths of these two, while at the maximum of the width range, are not notably dissimilar to the other bifaces. While the two longest bifaces might be considered a sub-cluster, it is at least possible that the gap might be filled by the six bifaces in the original cache not available for study.

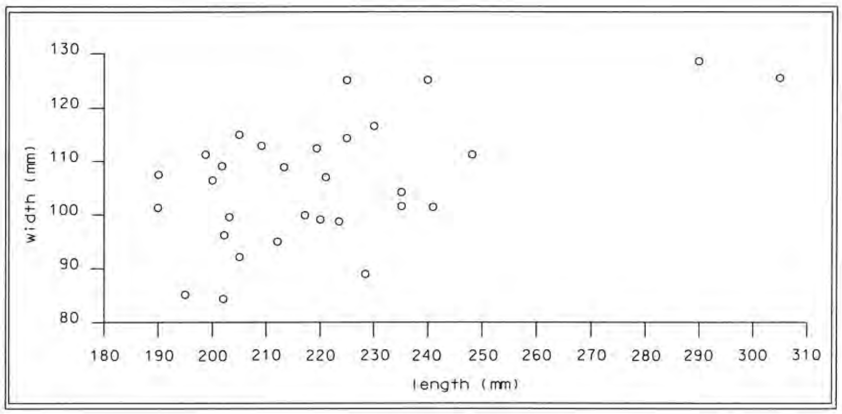

Figure 4. Plot of biface length and width.

To some degree length, width, thickness, and weight are each a function of biface size. How closely are these variables related? The correlation coefficient, r, measures the strength and direction of a linear relationship between two variables. Table 2 shows the correlation coefficients for each pair of the biface measurements. Notably length, width, and thickness correlate more highly with weight, perhaps the best measure of overall size, than they do with each other. Width and thickness have the lowest correlation. As width increases the difficulty of thinning a biface would increase (Whittaker 1994:199-207). Outliers can inflate the correlation coefficient. Elimination of the longest two cases (206028 and 206029) notably reduces the correlations for all pairs of variables.

Table 2. Measurement Correlations (r).

	29 cases		
	Length	Width	Thickness
Length	---		
Width	.557	---	
Thickness	.634	.454	---
Weight	.879	.808	.746
	27 cases		
	Length	Width	Thickness
Length	---		
Width	.327	---	
Thickness	.388	.271	---
Weight	.686	.779	.622

Shape may be examined using the ratio of length to width. The range of the length to width ratio is 1.8 to 2.6 with the mean and median about 2.1. In other words, length is about twice the width. The distribution of the ratios in Figure 5 shows no distinct mode, but it is difficult to say that there is more than one mode. It may be that the maker had no very fixed ratio in mind, although perhaps there was a minimal ratio and anything above that was permissible.

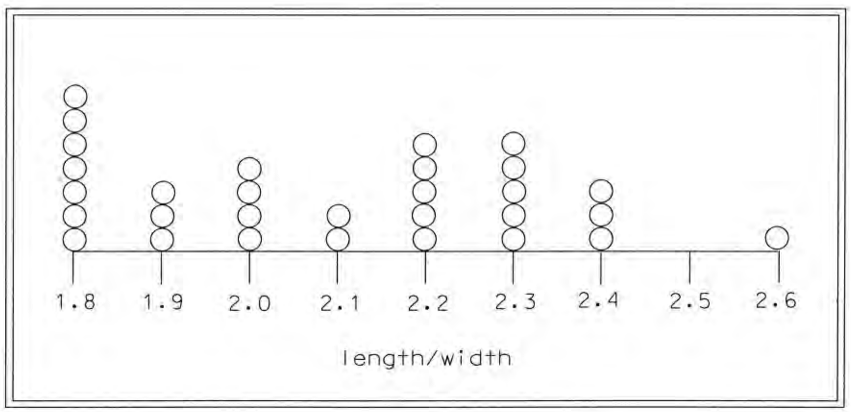

Figure 5. Distribution of length/width ratio.

Other Caches

The number of bipointed biface caches that have been found in Indiana is difficult to compile. Previously published reviews of biface caches made no pretense of being comprehensive compilations. Didier (1967) focused on notched or stemmed forms, Justice's (1987) Harrison, Fulton and Hebron Turkey-tail types. Ellis (1940) listed 13 biface caches among those previously unreported from Indiana, but his focus was on the putative later ovate or disk shaped forms of the Middle Woodland. He described six of the Indiana caches as consisting of leaf-shaped bifaces. Among these, Ellis (1940:117) reported a cache of 140 leaf-shaped bifaces found elsewhere in Jackson County.

Comparison with a few other biface caches shows that the Stewart cache bifaces are not of unique size or form. Furthermore, it is evident that caches of similar form bifaces have a wide distribution beyond southern Indiana. Similar in size is a group of six apparently blue-gray chert bipointed bifaces from a cache of unknown size from Jefferson County, Indiana (Dyer 1999). Length ranges from 191 to 248 mm for the six bifaces. Unfortunately no additional information is available about the cache (Dyer 1999).

In the NMNH collection are two bifaces from a cache apparently not previously reported in the published literature from Morgan Township, Owen County, Indiana. The only available information about the find is contained in a transmittal letter (E. P. Upham to Spencer Baird, 18 December 1882, Accession 12134, Office of the Registrar, NMNH). The cache location is only given as near Jordan Creek. The plow turned up 72 similar bifaces, but only two were obtained by the donor (60728, 60729). These are shown in Figure 6. Jordan Creek is a small tributary of the Eel River, which in turn joins the White River. Hence the environmental location would seem to be similar to that of the Stewart cache.

Figure 6. Two bifaces from a cache in Owen County, NMNH 60729 and 60728.

The two bifaces from the cache are worth comment, because they clearly indicate that two different biface forms are represented- unlike the Stewart cache. One (60728) is a wide bipointed biface, 167mm long, 85mm wide and 16.4 mm thick. It has a weight of 130.6 g.   Both ends are very close to the original nodule cortex. In comparison to those from the Stewart cache it falls at the lower range of length and width.

The other broken biface (60729) has a rounded end. Its form would not be called bipointed. The width of 101 mm and weight of 225.9 g, indicates that the complete original biface must have been larger than 60728. It is rather thin with a thickness of 12 mm.

To the south in western Kentucky, in Livingston County a similar bipointed biface cache apparently made of blue-gray chert has been reported (Gattis 1994). The 12 bifaces, ranging from 133 to 165 mm in length, are clearly smaller but similar in shape to those composing the Stewart cache described here. Another cache in Christian County contains blue-gray chert bifaces similar in shape but again of smaller size (Krakker 2012).

A couple of published reports suffice to show that caches of wide bipointed bifaces made of blue-gray chert, are not limited to southern Indiana and western Kentucky. One cache is reported from southeast Iowa (Thomas 1992). Another is reported in Waupaca County, Wisconsin (Buckstaff 1937).

Finally it is worth mentioning that bipointed bifaces are not the only type documented in a cache in the Stewart cache vicinity. In the NMNH collection are two Turkey-tail bifaces of the stemmed Hebron type from a cache of 90 bifaces in Jackson County found by Oscar Turrell in 1874. One was donated by Oscar Turrell (26967), Figure 7b. Both ends have a vestige of cortex. Its total length is 122 mm. Very similar is one Charles Rau obtained (138630), Figure 7a. It also has a vestige of cortex at both ends. The total length of 124 mm indicates the original nodule size.

Figure 7. Turkey-tail bifaces from a cache in Jackson County: (a) NMNH 138630; (b) NMNH 26967.

Some Simple Comparisons

Although quantitatively rigorous comparisons will not be attempted here, a few observations are instructive. Four caches of blue-gray chert bipointed bifaces from Michigan have a maximum length of 160 mm and maximum width of 50 mm (Krakker 1997). For example, the 76 bipointed bifaces in the Armstrong cache, Saginaw County Michigan have a maximum length of about 140 mm and maximum width 45 mm (Krakker 1997). Parenthetically, note that some of the notched Turkey-tail bifaces from Michigan are longer and wider. Only slightly smaller in size than the Armstrong cache bifaces are 15 bipointed bifaces reported by Tomak and O'Connor (1978) from Greene County, Indiana. These have a maximum length of 155 mm and maximum width of 47 mm. Length and width measurements are reported for 41 bifaces from Tarleton (Webb 1943; Webb and Haag 1947). Maximum length is 187 mm and maximum width is 45 mm. In addition, a small group of seven under NMNH accession 002579, excavated by Robert

Peter from Tarleton mound, have a maximum length of 124 mm and maximum width of 36.5 mm (personal observation). The Tarleton bipointed bifaces like those reported by Tomak and O'Connor (1978) are clearly smaller than those of the Stewart cache. These examples suffice to show that Stewart cache bipointed bifaces are on the larger end of the size range and perhaps that the Stewart cache is composed of bifaces selected for large size.

The Karmaman cache is worth a closer look as it shows that bipointed bifaces shorter than those in the Stewart cache are not inevitably relatively narrower. For 40 bifaces in the Karmaman cache, lengths range from 114 to 203 mm, although except for three the length ranges from 133 to 178 mm (Buckstaff 1937). Width ranges from76 to 113 mm. While the lengths are clearly shorter than the Stewart cache bifaces, the width range overlaps. As a measure of shape, the length to width ratio ranges about 1.4 to 2.0, except a single one at 2.3. The mean length to width ratio of 1.6 is less than that of 2.1 for the Stewart cache bifaces. The Karmaman cache bifaces are relatively wider, that is to say length is generally less than twice the width. Although Buckstaff (1937) divided the Karmaman cache into eight groups, examination of a plot of length and width gives no impression of sub-clusters (Figure 8). While the cache shows some size and shape variation, it is certainly not a heterogeneous amalgamation.

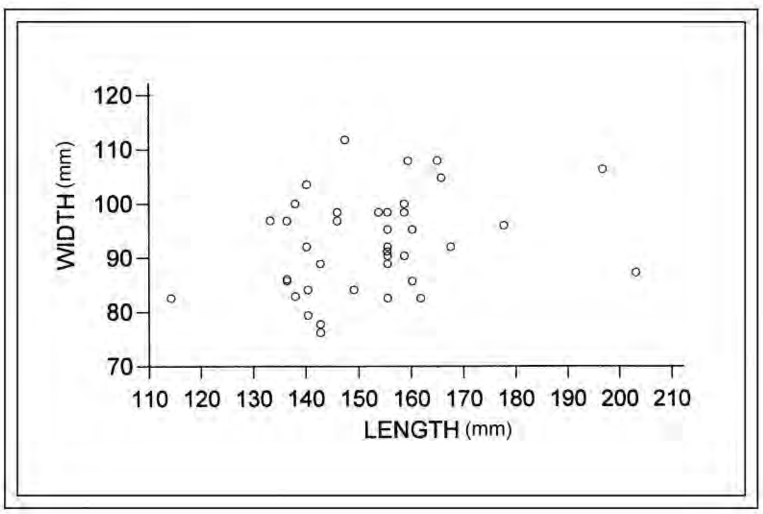

Figure 8. Plot of length and width of 40 bifaces in the Karmaman cache.

As discussed previously, the down-the-line and prestige exchange models have implications for size and composition of biface lots. These bipointed bifaces caches discussed here and others more briefly mentioned, individually show considerable consistency of biface size and form. Individual caches are not random samples from the total range of bipointed biface size and shape. The Stewart and other cache bifaces are not simple quarry blanks. They are carefully shaped and thinned consistent with artifacts having value other than simply utilitarian preforms for chipped stone tools. These characteristics of bifaces and caches are consistent with the prestige model of exchange.

Clearly some biface lots made of blue-gray chert have traveled long distances, commonly over 200 km. Furthermore the observation that the bifaces moved long distances as large lots, is more consistent with a prestige than down-the line exchange model. Two examples suffice to show large caches at times clearly traveled a great distance. The Karmaman cache of bipointed bifaces in Waupaca County, Wisconsin is composed of 43 bifaces (Buckstaff 1937). Similarly the Armstrong cache, Saginaw County, Michigan contains 76 bipointed bifaces (Krakker 1997). The possibility that some caches are composed of sub-groups is still open to investigation. The two bifaces from the Jordan Creek cache, Owen County, Indiana, suggest a possible example. So too, possible cultural, chronological, or geographical associations or trends of biface size and shape are open to further study.

Some Final Comments

The exact distance from the Stewart cache find spot to the nearest source of this raw material is unknown. However, the obvious large size of the bifaces means that only a source providing the largest nodules could have been used. The existence of blue-gray chert nodule sources in Crawford and Harrison Counties is extensively documented (Cantin 2008; Fowke 1928:522-530; Justice and Smith 1988; Morrow et al. 1992; Seeman 1975). Sources of Wyandotte chert nodules occur along and near the Ohio River, but are not known to be easily available very far north of the Ohio River. Wyandotte Cave itself is along the Blue River about 6 km upstream from the Ohio River (Fowke 1928:527). Nearby, Fowke (1928:527) described a workshop near a chert exposure about 8 km from the Ohio River. In the same vicinity Justice and Smith (1988:20) noted workshops and chert extraction activity near sink holes about 10 km from the Ohio River.

Even if the source was along the Ohio River, the distance would not need to be much more than 90 km in direct line. Raw material source and workshop are probably nearly contiguous (Fowke 1928:527; Justice and Smith 1988:26; Seeman 1975:49, 55). Turkey-tail bifaces occur in the workshops (Justice and Smith 1988:32; Seeman 1975:55). As Didier‘s (1967) compilation showed caches of blue-gray chert bifaces are reported 200 or 300 km and more from southern Indiana or Illinois sources. Hence, even 90 km for the Stewart cache in unremarkable.

How many exchanges were required to move the Stewart cache a maximum of 90 km from the raw material source? Estimates of territory size and band populations in Early Woodland times are sketchy at best. By Middle Archaic times and continuing into Late Archaic times increasingly intensive occupation of ecologically strategic locations is consistent with a decrease of both residential mobility and band territory size in the Midwest (Brown 1985; Ford 1974, 1977; Jefferies 2004; Stafford 1994). In the Late Archaic a corresponding increased reliance on local chert resources has been observed (Cantin 1989; Moore 2008; Stafford and Cantin 2009:308-309). The trends of residential mobility and chert utilization are difficult to translate into a specific estimate of territory size at the end of the Archaic in the midcontinent. Assuming that the Stewart cache represents only a single exchange step, in other words, that it is in a neighboring band territory from that originally manufacturing the bifaces, yields a territory radius of 45 km.

Certainly the Stewart and Jordan Creek caches are not in locations adjoining a major river, such as the White River itself, which might be a transportation corridor or focus of population concentration. The occurrence of biface caches in minor tributary stream watersheds is consistent with exchange from one community to the next, not necessary in a way that efficiently or most directly disperses them away from the source. Even if value in fact increases with distance from the source, that may not be known or considered in individual exchanges.

That is to say, no particular ultimate destination is considered and exchange rests purely on local and immediate circumstances.

The Stewart cache is not a great distance from the source. Why did it go no further in an exchange network that extended over the Midwest? Perhaps some caches simply represent lost goods, that is to say a biface lot stored, but not retrieved for further exchange. Still, other than random contingencies, open to conjecture are reasons that would have prompted final disposal of a biface lot as a cache or otherwise. For high social value items, as new biface lots enter the exchange system, some must be removed from the system in order to maintain value, such as by ritual use (Brown 1977:172-173; Ford 1972:23, 44-45). Value maintenance may have been a rather unstable and dynamic feed-back process. When oversupply decreased value, bifaces may have become utilitarian items. Bifaces in the technological context used in craft activities, eventually wear out and are discarded. Either as high social value or utilitarian items, the bipointed bifaces at times entered a mortuary context, presumably accompanying or bestowed by their owners.

Conclusion

The Stewart cache consists of large, systematically made, and homogenously shaped, bipointed bifaces made of blue-gray chert. The bifaces are a type widely distributed in the Midwest. In the Late Archaic to Early Woodland time span these circulated in a regional exchange network. Briefly considered here, the nature of the social transactions operating in that network remains open to investigation.

To conclude a perhaps overly long and conjectural discussion, for verification of any long distance exchange model, essential are data about cache locations and the characteristics of the bifaces composing them. In the past, almost inevitably, biface caches have been accidental discoveries made during farm operations or construction projects. As a result, even if basic cache location information has been recorded, too often the contents have been dispersed, and are now unavailable for detailed description, thus hindering comparative analysis. Existing museum collections have an obvious value for the study of biface caches and long distance exchange.

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REDEFINING THE NEW CASTLE PHASE: MIDDLE WOODLAND LANDSCAPES IN EAST CENTRAL INDIANA

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Abstract

The New Castle phase was originally defined in the 1970s based on the distribution of ceramics with incised nested-diamond designs found in mounds in Indiana and Ohio as well as a perceived mixing of Adena and Hopewell artifacts associated with earth mounds and circular enclosures. However, the geographic distribution of the sites was too broadly defined and the perceived mixing of components within sites was based on generalized site context rather than specific stratigraphic contexts within sites. Long-term investigations of the mounds and enclosures within a region defined as east central Indiana has revealed the contemporaneity of the sites and the segregation of artifacts typically identified as Adena and Hopewell. Further, analysis of the earthwork landscape reveals a complex organization involving spacing and alignments between sites. A contextual interpretation of the sites suggests that the earthwork landscape reflects elements of Middle Woodland social organization including a dual division as well as evidence for functional, and possibly seasonal, differences between site types. An integrative model of the earthwork landscape is proposed.

Introduction

The New Castle phase is one of four Hopewell-related archaeological units that have been defined within the boundaries of Indiana (Figure 1). These include the Mann phase in southwestern Indiana (Kellar 1979; Ruby 1997, 2006), the Worthington phase in west central Indiana (Tomak 1983), the Goodall tradition in northwestern Indiana (Mangold and Schurr 2006; Quimby 1941) and the New Castle phase of east central Indiana (Swartz 1976; Vickery 1970, 1979) (Figure 1). Mann, Worthington and Goodall are in resource rich areas of Indiana while the New Castle phase is in a resource poor area of the state. The New Castle phase is associated with Scioto Hopewell (Swartz 1976) while the others have ties to Havana or other Hopewell spheres. Additional units have been mentioned or proposed (e.g. Swartz 1981), but they are not formally defined. In addition, units defined outside the boundaries of Indiana extend into the state such as the Twin Mounds phase (Hawkins 1996) and others proposed by Clay (2005b) for the mouth of the Miami region.

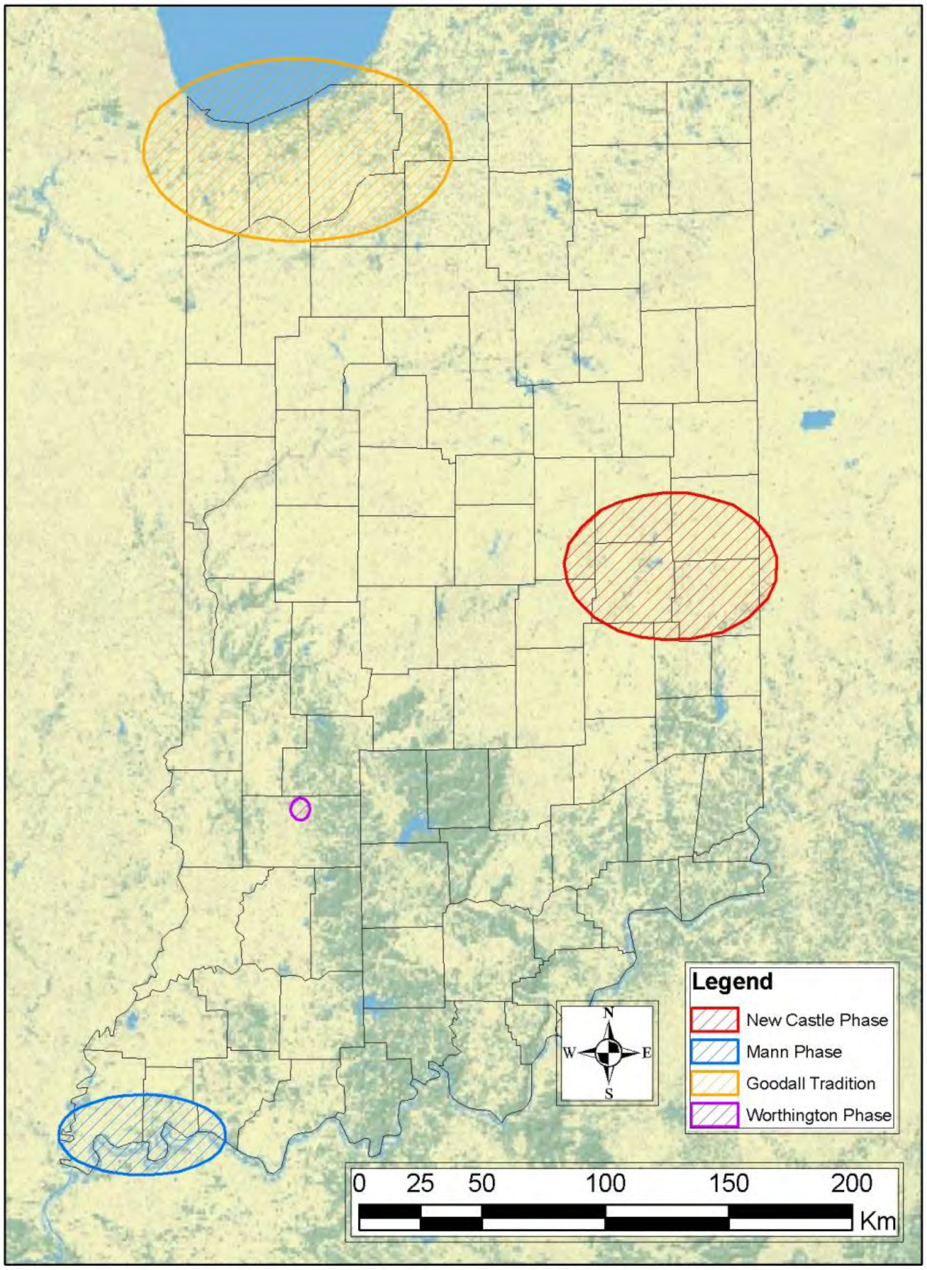

Figure 1. **Hopewell-related archaeological units in Indiana.**

The New Castle phase was initially interpreted to represent a mixing of the Adena and Hopewell complexes and fostered confusion over whether the phase was “reluctant” or “avant garde” in its connection with Ohio Hopewell (Griffin 1971; Swartz 1971; Vickery 1979). More recent research has demonstrated that the perceived mixing in the New Castle phase was based on comparison between site assemblages without detailed evaluation of the stratigraphic relationships between components within the sites (Cochran 1992, 1996). Further, long-term research with earthwork sites in east central Indiana has shown that they are contemporary components within a definable regional landscape and that both “Adena” and “Hopewell” are parts of the same ceremonial system in east central Indiana (McCord and Cochran 2008).

From the data we have collected from the east central Indiana earthworks (Cochran 1988, 1992, 1996; Cochran and McCord 2001; Kolbe 1992; McCord 2006, 2007a, 2008; McCord and Cochran 1996, 2000, 2007, 2008), it is apparent that they represent a unique regional expression specific to a local culture. Previously, we were reluctant to use the New Castle phase terminology because of the confusion associated with the term. In addition, we struggled with the historical constructs of Adena and Hopewell (Cochran 1992, 1996; Cochran and McCord 2001; McCord and Cochran 1996, 2000) and the increased ambivalence toward the use of these terms, especially “Adena.” (e.g. Applegate and Mainfort 2005; Clay 2002, 2005a; Greber 1991; Swartz 1971). We considered using the broad term “Moundbuilder,” but felt that would miss the local expression and contextual analysis that is called for by Clay (2005a) and Carr (2005).

We attempted various scenarios to redefine the east central Indiana earthwork phenomenon, but no scheme was satisfactory. Recently, with an adequate body of chronological and earthwork distributional data (McCord and Cochran 2008), we decided to redefine the New Castle phase to reflect its place in the regional sequence of archaeological developments in east central Indiana. This article follows and complements a recent synthesis of data from sites in the New Castle phase (McCord and Cochran 2008) and incorporates new radiocarbon dates for Fudge Mound and Windsor Mound not included in that paper.

In redefining the New Castle phase, we have followed the Willey and Phillips definition of phase:

> [A]n archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time [Willey and Phillips1958:22].

In this article we review the history of the New Castle phase, define the geographic boundaries, identify site types, review the radiocarbon-dated chronology, discuss the artifacts associated with the phase, and evaluate the earthwork landscape as a reflection of Middle Woodland social organization. In addition, we interpret aspects of the New Castle phase landscape organization as a reflection of of Middle Woodland social organization.

Middle Woodland social organization has traditionally been characterized as complex, reflecting increased population density, increased dependence on horticulture, and an associated decrease in mobility (e.g., Fagan 2000). This view is challenged by an emerging consensus that little changed in Middle Woodland community or settlement organization, in spite of the energy devoted to earthwork construction (Anderson and Mainfort 2002; Clay 2002). Clay (2002:184) further posits that Middle Woodland settlement in the Heartland remained a “dispersed and dispersing way of life." The New Castle phase contributes to the ongoing investigations of Middle Woodland social organization through an analysis of the earthwork landscape in terms of distribution of site types and interrelationships between sites. New data emerges that informs our understanding of the organization of Middle Woodland societies.

The New Castle Phase

History

Vickery (1970:147) first proposed the New Castle phase because of similarities between the earthworks at Anderson Mounds and the nearby New Castle site. Sites were included within the phase based on the presence of nested diamond incised ceramics, geographic proximity, and occurrence within a mound in a geometric earthwork. The sites were described as temporally within the Middle Woodland period and culturally transitional between Adena and Hopewell (Vickery 1970:59, 1979). Initially Anderson Mounds, the New Castle site, Mound Camp in eastern Indiana, and the Spruce Run site in central Ohio were included in the phase. The Bertsch site, Hayes Arboretum mound, Water Works mound, Whitehead mound, and Glidewell mounds were proposed as potential candidates for inclusion in the phase although incised ceramics were absent and the mounds were not associated with enclosures (Vickery 1970).

In proposing the New Castle phase, Vickery (1970) hypothesized that Anderson Mounds and the New Castle site represented cultures temporally in the Middle Woodland period, and culturally transitional between Adena and Hopewell (Griffin 1971; Vickery 1979). This hypothesis was based on two assumptions (Cochran 1988): (1) that all earthworks in each site were functionally equivalent and comparable; and (2) that all the earthworks in each site were constructed at the same time. Vickery (1970) and Swartz (1976) generalized the sites by comparing the structure and contents of the small conical mound in the Great Mound enclosure at Anderson with the large loaf-shaped Mound 4 within a panduriform enclosure at New Castle. By lumping artifacts from multiple contexts within the sites, a mixing of Adena and Hopewell material culture was interpreted to show that the sites were in transition. This treatment was not unique to Indiana. Archaeological research in southern Ohio has ignored overall site structure and enclosures and mounds were perceived as static features (Mainfort and Sullivan 1998:1).

The original definition of the phase was contained in a manuscript report (Vickery 1970). Use of the phase designation was adopted by both Vickery (1970, 1979) and Swartz (1976) although Swartz (1981) did not refer to the New Castle phase in his review of Indiana prehistory. Kellar (1993) only briefly mentioned the phase. The phase designation has not been widely used and it is absent from more recent state-wide syntheses (e.g., Jones and Johnson 2012).

A reexamination of the New Castle phase definition began in 1987 through an investigation of the chronology of earthwork construction at Anderson Mounds (Cochran 1988). The research is ongoing to date. While our research was guided by several goals from the beginning, interpretation of the data evolved through several shifts in perspective (Cochran 1992, 1996; Cochran and McCord 2001; McCord 2006). Most recently, our synthesis of the data resulted in an interpretation of the east central Indiana earthworks as a unique, regionally distinct and contemporaneous grouping of Middle Woodland earthwork sites incorporating both the Adena and Hopewell complexes as elements of the same ceremonial system (McCord and Cochran 2008). With the luxury of drawing on many years of research in the region, and a working interpretative model for the sites within the Middle Woodland landscape, a redefinition of the phase is now warranted.

Geographic Boundaries

The geographic boundaries of the New Castle phase are defined by the distribution of enclosure complexes, associated mounds, and isolated circular enclosures. The sites are located within the upper reaches of the Upper White River Drainage in both the East and West forks and the upper reaches of the Whitewater Drainage of east central Indiana (Figure 2). The regional is culturally rather than naturally defined as the geographic boundaries do not follow changes in terrain. This area of east central Indiana is within the eastern Till Plain region of Indiana (Gray 2000) (Figure 3). The sites are in the northeast section of the New Castle Till Plain and Drainageways and south the Bluffton Till Plain typified by concentric moraines (Gray 2000). Unlike the distribution of Ohio mounds, the New Castle phase region does not occur at an ecotone as suggested for Ohio (Dancey 1996). The terrain is predominantly flat, relatively homogeneous, resource poor. The earthworks are typically on the east or south side of drainages.

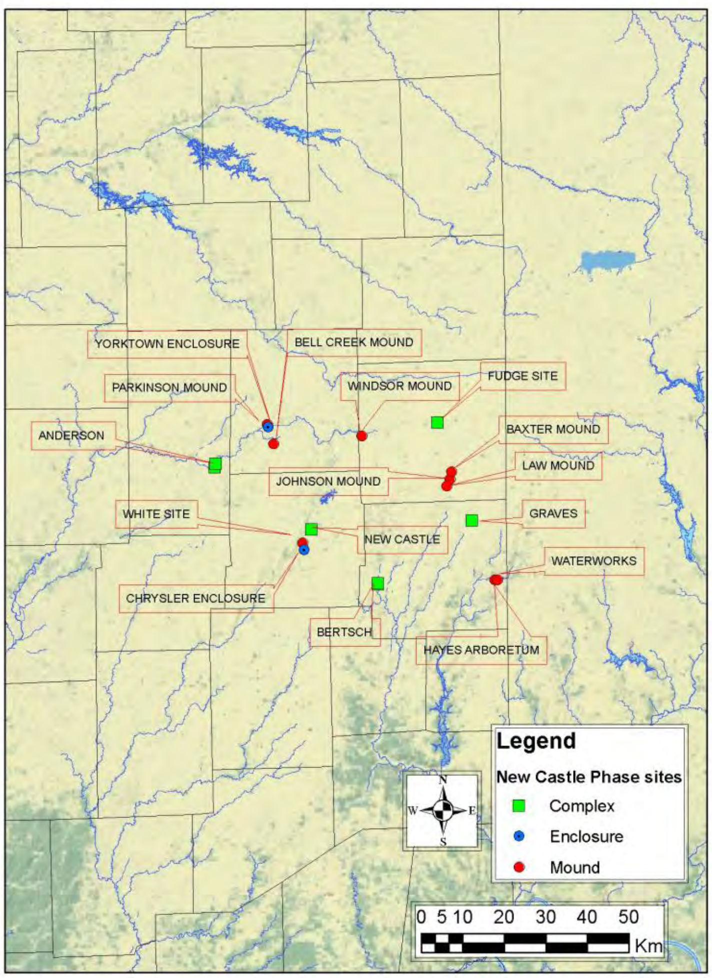

Figure 2. Distribution of New Castle phase sites.

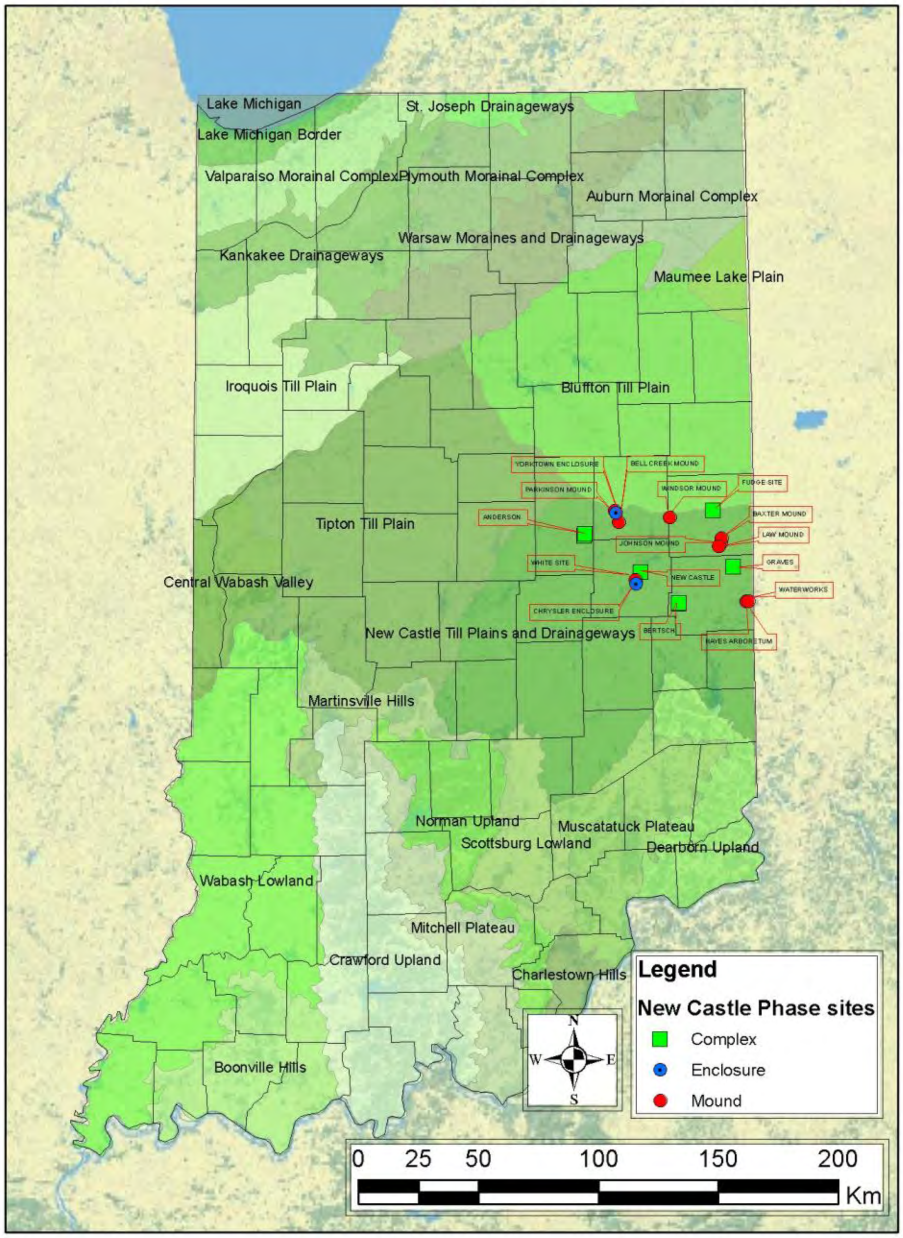

Figure 3. Physiographic regions (Gray 2000) and New Castle phase sites.

The West Fork White River serves as an apparent northern boundary for the phase as the earthwork sites are located south of the river. Few mounds exist in the Upper Wabash drainage immediately north of the West Fork White River. To the east, few mounds and only one earthwork are reported from adjacent counties in Ohio (Figure 4), demarking a clear interruption in earthwork distribution between the upper reaches of the Miami River and east central Indiana (Mills 1914). A similar break in earthwork distribution occurs to the west of the Anderson

Mounds. To the south in the Whitewater River basin, mound distribution is relatively continuous to the Ohio River, although fewer mounds are present just south of the New Castle phase sites.

Boundaries as shown in Figure 1 are defined by the West Fork White River drainage and a 12 km buffer around the earthwork complexes. The distance of the buffer is based on the spacing of the earthwork complexes.

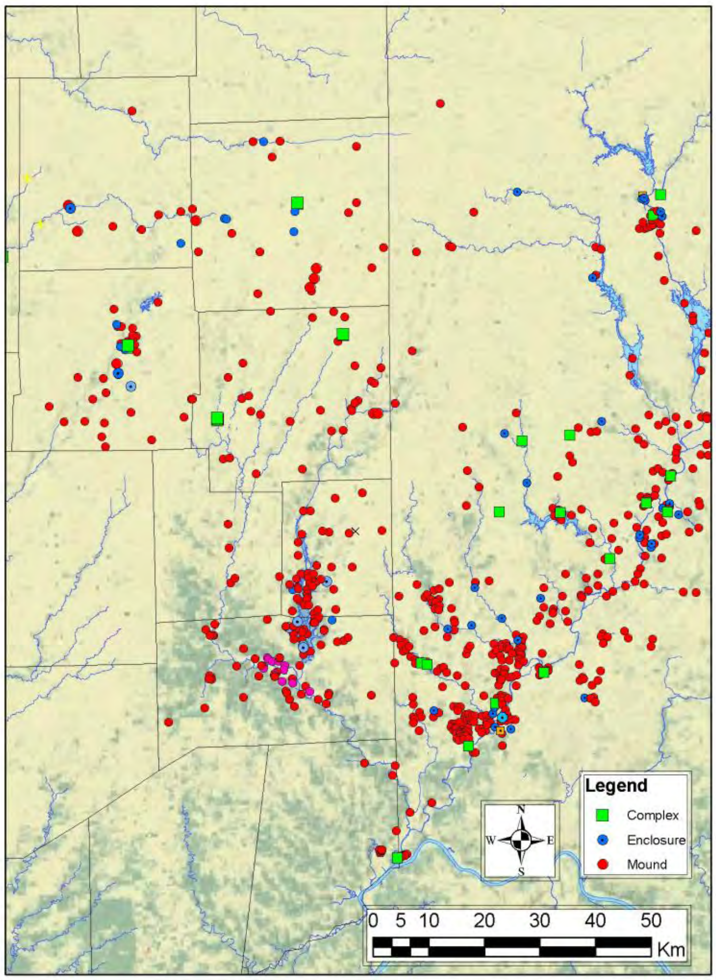

Figure 4. Distribution of earthworks along the Indiana and Ohio border (after Mills 1914).

Site Types

The sites included in the New Castle phase occur as enclosure complexes, mounds, and isolated enclosures. The specific sites currently defined as belonging to the New Castle phase as established by excavation data include: Anderson Mounds, New Castle site, Bertsch complex, Fudge site, Graves site, Wolford mound, Windsor mound, Law mound, White site, Waterworks mound, Hayes Arboretum mound, and Chrysler enclosure (Cochran 1988, 1992, 1996; Cochran and McCord 2001; Kolbe 1992; McCord and Cochran 1996, 2000). Other sites that are included in the phase based on the regional context, although without excavation data, are the Yorktown enclosure, Johnson mound, Baxter mound, Bell Creek mound, and Parkinson mound (McCord 2000; McCord and Cochran 2007). Other earthworks are reported within the boundaries of the New Castle phase, but they are currently not included within the phase due to a lack of data and a clear association with Middle Woodland.

Regional mounds range from small (8.5 m diameter, 1 m high) to quite large (40 m diameter, 4.5 m high). Excavation data shows that most, if not all, contain multiple building episodes and sterile caps. Most of the circular enclosures in the region are around 30 m in diameter, but diameters of 45 m up to 100 m are known. The earthwork complexes contain one large rectangular enclosure or multiple circular, panduriform, or rectangular combinations that involve several hectares of space (Cochran and McCord 2001; McCord 1998, 1999). Some mounds and earthworks in the region have been destroyed, and all have been damaged to some degree by uncontrolled digging for artifacts, agriculture, building construction, and other earthmoving. Recently, previously reported enclosures have been rediscovered at Anderson Mounds, and the Yorktown enclosure was accidentally discovered (McCord 2007a; McCord and Cochran 2007).

The definition of the New Castle phase is dependent on ceremonialism and mortuary practices. Mortuary activities at these sites include individuals as primary and secondary interments. Extended inhumations, bundle burials, and cremations have all been documented in the region, and multiple burial forms often occur within the same site. Burials may occur in prepared tombs, submound structures, or simply placed on the ground. Burials are only known from mounds in the New Castle phase. Earthwork construction within sites was sequential and could occur at the same time at different structures.

New Castle phase habitation sites are virtually invisible within the region, a long-standing problem (e.g., Swartz 1971:133). Based on surface data from the Upper White River drainage, Middle Woodland artifacts occur in low frequencies and show an equal distribution between till plain, floodplain, and terrace landforms (McCord 2005). No Middle Woodland ceramics have been found outside of earthworks (McCord 2005). Excavations in only two habitation sites in the region produced features with Middle Woodland dates. Sites 12M214 and 12M699 in Madison County near Anderson Mounds were investigated during Phase II compliance projects and small, plow-truncated basin-shaped features were encountered (Bubb 2006; Holsten 1984). Radiocarbon dates obtained from the features were 2000 ± 70 B.P. (Beta-10600) at site 12M214 and 2080 ± 50 B.P. (Beta-221416) at site 12M699. No diagnostic Middle Woodland artifacts were recovered from the features although the radiocarbon dates are contemporary with dates from Anderson Mounds. With this paucity of information, we do not have habitation data to incorporate into the phase definition. We would anticipate that habitation sites resemble the short term hamlets suggested for other regions (Clay 2009).

Chronology

A primary goal of our regional research has been the acquisition of radiocarbon dates to clarify the chronological relationships between mound and enclosure sites in east-central Indiana. Our intention has been to acquire dates from specific contexts to answer specific questions. To date, we have amassed a substantial database of radiocarbon dates with relevance for clarifying the relationships between New Castle phase sites (Table 1) (Figure 5). As currently defined, the time span of the New Castle phase is bracketed between cal 250 B.C. and A.D. 350 after outlier dates are discarded. A more intense concentration of radiocarbon dates occurs between cal 100 B.C. and A.D. 200. Most of these dates were previously reported (McCord and Cochran 2008), but additional dates from Windsor mound and the Fudge complex are now included in Table 1.

The best series of dates from the region is from the Anderson Mounds where multiple dates from three separate enclosures were obtained. The earliest dates document early construction episodes at the Great Mound and midden deposits from the Fiddleback structure (ca. cal 200 B.C. to A.D. 1). Dates from the subrectangular Circle Mound structure, and later additions to the Great Mound are post A.D. 1 (Cochran and McCord 2001; McCord 2007a). Recent dates from the northern embankment wall at the Fudge complex, a rectangular enclosure, again indicate early construction (ca. cal 110 B.C. to A.D. 220) (McCord 2006).

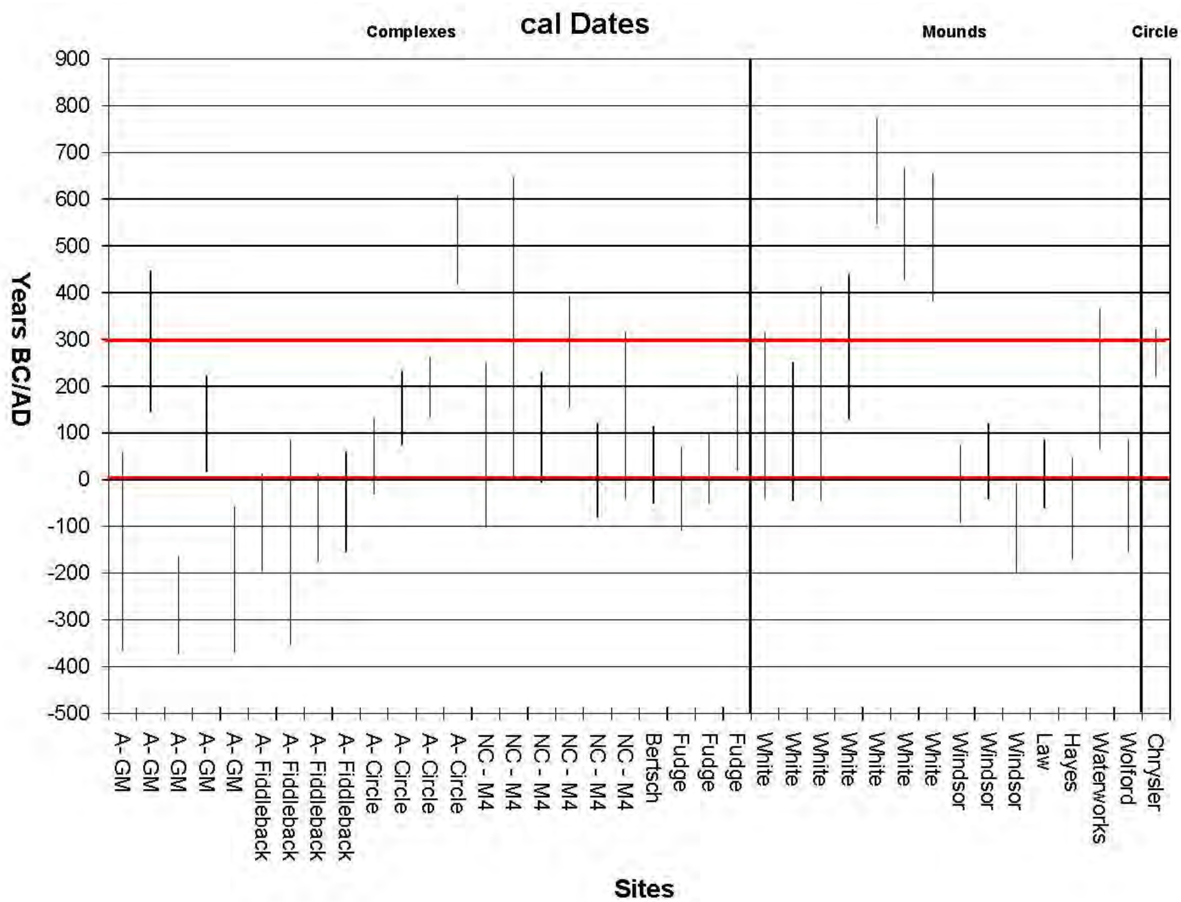

Figure 5. Calibrated radiocarbon dates.

The radiocarbon dates from the regional mounds, almost all of which were taken from samples recovered at or near a primary mound floor, range between cal 100 B.C. and A.D. 250. Radiocarbon dates for the final capping episodes for the regional mounds have not been obtained. The single date from the isolated Chrysler enclosure resulted in a cal date of A.D. 220

to 320, but the sample was from the bottom of the ditch and could represent ongoing use rather than a date of origination.

The radiocarbon dates from east-central Indiana challenge the broader view of Adena being ancestral and chronologically separate from the Hopewell complex. Dates from New Castle phase sites show that mounds, isolated enclosures and enclosure complexes were in use at the same time. Utilizing radiocarbon data in conjunction with artifacts and landscape use, the New Castle phase contains contemporary earthworks regardless of shape or form.

Artifacts

The artifacts recovered from the region vary by site but artifacts common to many sites include: Adena, Robbins, and Snyders points; sandstone tablets; expanded center bar gorgets; biconcave gorgets; platform pipes; different forms of imitation bear canines; various copper artifacts including beads, awls, a panpipe, a breastplate, and strips; various shell forms including disk and barrel-shaped beads, freshwater pearls, and conch shell dippers; and mica in forms of crescents or trimmed sheets (McCord and Cochran 2008). Lamellar bladelets are surprisingly rare in the New Castle phase with most found outside of earthworks. All are made from Flint Ridge chert (McCord and Cochran 2003:53). Unique artifacts sometimes occur within the sites as well, such as the limestone object from Windsor Mound (McCord 1996).

The ceramics recovered from these sites appear to represent a regionally distinct group. The New Castle Incised type (Swartz 1976) has been defined for incised ceramics that have various patterns of incised lines including nested diamonds and line-filled rectangles (Swartz 1976). Other variations in New Castle phase ceramics have been identified (McCord 2006). Overall, the ceramics have slightly sandy pastes that are variably mixed and tempered with crushed granitic rock. Rim forms are straight to slightly everted. Rims are typically thickened at the top and have either a rounded or beveled lip. The ceramics display some intra-site variability in terms of surface treatment and decoration. The New Castle Incised type (Swartz 1976) has been found only at the Anderson and New Castle sites (Swartz 1976). Some of the rims recovered from Windsor Mound have small notches incised across the lip (McCord 1996). One vessel from the Law Mound had a brushed surface treatment. Proposed ceramic types are based on decoration and include the New Castle Incised type and New Castle Plain (McCord 2006).

Earthwork Landscape of the New Castle Phase

The cultural landscape of the New Castle phase is documented in the patterned distribution and relationships between mounds and enclosures in east central Indiana. The natural landscape is dominated by a glacial plain that is predominantly flat with some low end moraines. The natural landscape offered no impediments to the development of the cultural landscape and sites within the earthwork landscape reflect intentional choices for earthwork placement. The important elements of the earthwork landscape of the New Castle phase include the following (Cochran 1992; Cochran and McCord 2001; McCord and Cochran 2006, 2008):

- Mounds, isolated enclosures and enclosure complexes were built and in use at the same time. The earliest dates are from enclosure complex sites.

- Earthworks are intentionally placed, both within sites and across the landscape.

- Earthworks are organized in relation to astronomical events as well as in spatial relationship with other earthworks in the region.

- Enclosure complexes divide the region into 5 parts. A sixth subdivision seems apparent although no earthwork complex has been documented there.

- Circular earthwork complexes are situated in the southwestern part of the region and rectangular complexes occupy the northeastern part of the region. The distribution divides the region into two parts.

- Mounds and small enclosures are located midway between the rectangular complex sites but not between the circular complexes.

Radiocarbon dates from earthworks within the region show that they were constructed and in use at the same time. Radiocarbon dating and stratigraphy reveal dynamic and continuous activities at the sites in the region. The earliest dates are from enclosure complex sites rather than isolated mounds as might be expected (Table 1; Figure 5). Sterile cappings on mounds in the region, some several meters thick (McCord 1996), as well as the absence of incomplete or abandoned earthworks show that the cycle of earthwork construction was completed and the cultural phenomenon that stimulated their construction ended or was modified into something other than earthwork construction (McCord and Cochran 2008).

Several lines of evidence show that earthworks were intentionally placed in relation to other earthworks within sites and across the cultural landscape. At Anderson Mounds, the Fiddleback enclosure was squeezed in between the embankment of the Great Mound and a ravine with the western Fiddleback embankment extending over the upper part of the ravine (Cochran and McCord 2001). Also at Anderson, a small circular enclosure was placed on the western slope of a small hill, presumably to align to the sunset at the winter solstice as viewed from within the Great Mound (Cochran and McCord 2001). At the New Castle site, Earthwork 2 partially crosses a small swale at the head of a ravine (McCord 1999). At Fudge, the linear embankment crossed over several small drainages although a slight shift in the embankment could have avoided infilling of the drainages (McCord 2006). Astronomical alignments within sites and across the landscape show that they were organized, at least in part, to reflect this principle (Cochran and McCord 2001; McCord 1999, 2006; McCord and Cochran 2007). Further, alignments between three and more earthwork sites across the landscape demonstrate the interrelatedness of site location within the region (McCord and Cochran 2007). It should also be pointed out that in addition to specific astronomical alignments documented at Anderson Mounds, New Castle, and Fudge, the earthwork complexes are also aligned in the direction of astronomical events. The circular complexes are aligned in the direction of sunset at summer solstice and sunrise at the winter solstice. The rectangular complexes are located along a line in the direction of sunrise at the summer solstice and sunset at the winter solstice. Both radiocarbon dating and alignments between earthworks demonstrate their interconnected relationships in the cultural landscape.

The earthworks of the New Castle phase are distributed across the landscape in definite patterns. The enclosure complexes show distinct distributional patterns related to the shape of the enclosures within each site. Circular earthwork complexes are located along a line that is south and west of the rectangular enclosure complexes. This distribution pattern effectively divides the earthwork landscape into two parts.

The distribution of the 5 earthwork complexes subdivides the region into at least 5 divisions (Figure 6). Space for a sixth subdivision, the Prairie Creek locality, exists between the Anderson Mounds and Fudge complexes although no earthwork complex has been identified there. Phinney (1882) records a circular enclosure near this locality but it has not yet been identified on the ground or on aerial photographs. In addition, midway between the rectangular complexes are situated groups of mounds and enclosures. In three instances, three earthworks mark the midway point. Additional evidence for the validity of a sixth subdivision is documented in the location of mounds and enclosures half way between that locality and Anderson Mounds and the Fudge site (McCord and Cochran 2008). Earthworks in the Anderson Mounds site are arranged as a microcosm of the regional landscape (Cochran and McCord 2001).

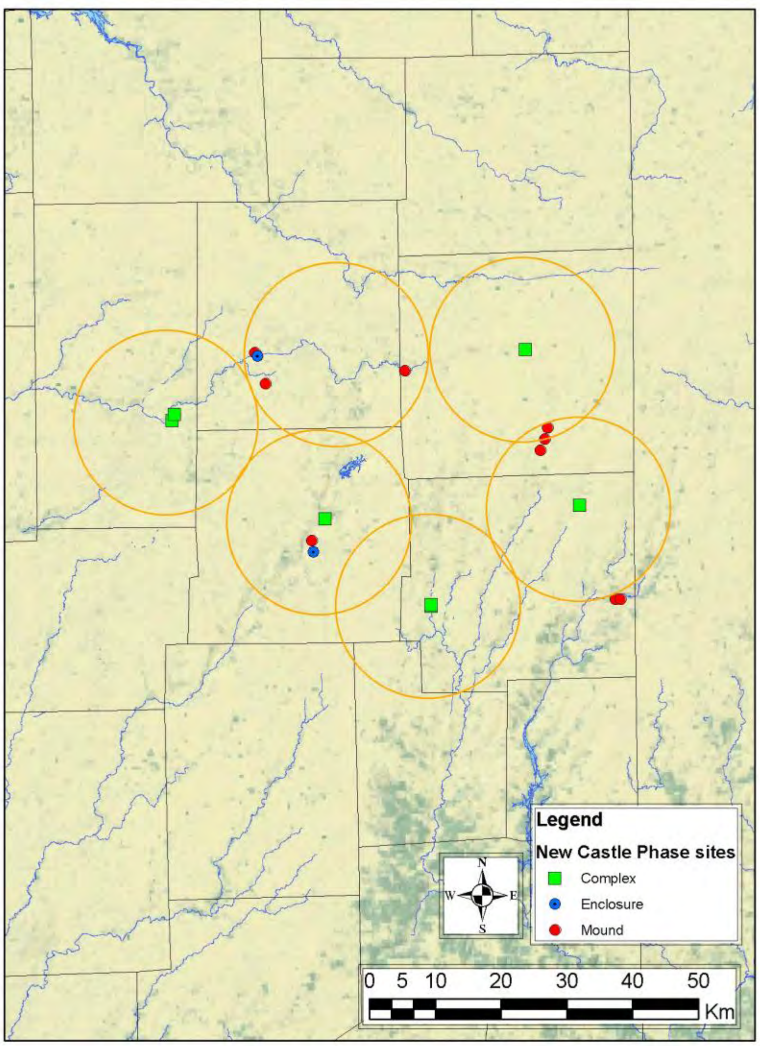

Figure 6. Regional subdivisions.

We interpret the patterned distribution and interconnections of the earthwork landscape of the New Castle phase as a cognitive map of the culture that produced the landscape (McCord and Cochran 2008). As such, we have explored the possibilities for elements of Middle Woodland social organization that could be represented in the earthwork landscape. Specifically, we have investigated aspects of seasonal representation and the possibility for a dual division within the local culture. Following DeBoer‘s (1997) hypothesized correlation of seasonal house shapes with enclosure shape, we interpret the division of the earthwork landscape as reflecting summer (rectangles) and winter (circular) subdivisions. This analogy is related to a duality theme recognized in Hopewell materials by several investigators (Byers 1987; DeBoer 1997; Greber 1996; Schurr 2013; Thomas et al. 2006). In addition to house shapes, we also note that the sun travels a southern course in the winter culminating at the winter solstice and a northern course in summer culminating at the summer solstice. Therefore, we reasoned that south is to winter as north is to summer. Following this line of reasoning, we interpret the distribution of circular and rectangular earthwork complexes in the New Castle phase as representing a winter and a summer subdivision.

The division of the earthwork landscape into two parts suggests that the local culture was organized as a dual division at least partly affiliated with seasons. Dual divisions within ethnographic Native American societies are common and serve a variety of purposes (Swanton 1979; Thomas et al. 2006; Trigger 1978):

- Teams for games (especially lacrosse)
- Races
- Eating contests
- Dances
- Regulate marriage
- Leadership roles
- Structuring opposition
- Residential structure of villages
- Ceremony and ritual (including reciprocal mortuary ritual)
- Warfare

Dual divisions served primarily as organizational systems for integrating smaller groups such as clans into larger subdivisions of a society. Dual divisions created mechanisms for interdependence and reciprocity for the smaller units. Most dual divisions identified in ethnographic Native American societies are classified as moieties which represent organization of clan groups (Thomas et al. 2006). Ethnographic examples of dual divisions in the eastern U.S.

were ―almost always referenced by encompassing categories or colors: earth versus sky, black versus white, or red versus white" (Weets et al. 2006:544). Radin (1923) shows the residential organization of some Winnebago villages as subdivided along a northwest to southeast line with the earth clans in the northeast and the sky clans in the southwest.

Within the New Castle phase, we can envision the dual division functioning to organize mortuary ritual and to schedule calendric ceremonial activities. While we have not specifically explored evidence for clan subdivisions within the New Castle phase local culture (e.g. Thomas et al. 2006), clans may be represented by the groupings of mounds and enclosures located midway between the rectangular complexes. Byers (2011) has recently presented a concept of non-kin based alliances or sodalities that generated the Ohio Hopewell episode.

Further subdivisions of the local culture are likely identified in the patterned distribution of mounds and small enclosures in relation to the earthwork complexes. Further, we envision a model of an integrated ceremonial system that revolves between different ceremonies and rituals at different sites. The places (Tilley 1999:177-178) of ritual activities most likely predate the earthwork landscape, possibly originating in the Late Archaic or with Glacial Kame concepts of the local landscape. The primary focus of earthwork construction is not mortuary ritual, although mortuary ritual is an important component at most sites. We suspect that human remains are saved for cyclical ceremonial events as in the Choctaw Model (Seeman 1979; Swanton 1979): individual earthworks and sites evolve through cycles of use and modification that include ongoing activities as well as new constructions. At some point, the earthwork construction cycle ended and sites were capped with sterile deposits. Our chronological data are not sufficient to determine whether all sites were terminated at a similar time or whether individual sites reached the end of their cycle and were sealed.

The New Castle phase occupies an area of Indiana that did not favor large populations or intensive horticulture. The flat glacial landscape dominated by a closed-canopy forest limited the aggregation of populations, and we have proposed a dispersed settlement model to reflect the dispersed natural resources of the area (Cochran 1994; McCord 2007b). The lack of Middle Woodland habitation sites supports this interpretation.

Conclusions

The New Castle phase is a viable phase with chronological and geographic limits. The natural setting of east central Indiana was not conducive to large scale settlements and limited the potential for horticulture throughout the prehistoric record of the area. Throughout the till plain region of central Indiana, Early and Middle Woodland habitations have a very low level of visibility on the landscape, surpassed only by Paleoindian sites. The lack of ceramics on sites outside of earthworks suggests that Middle Woodland lifeways were relatively unchanged from previous adaptations to the local environment. These patterns support interpretations for Middle Woodland in other regions (e.g., Clay 2002, 2005a). During the duration of the New Castle phase, prodigious amounts of earth were moved by the local population in creating the earthworks. Even with the limitations of the natural landscape, especially the lack of horticultural potential, the ceremonial system endured for several hundred years.

Some elements of the New Castle phase, however, differ from widespread views, especially in terms of the concepts of ―Adena" and ―Hopewell" (McCord and Cochran 2008).

For example, according to conventional thinking, conical mounds and isolated circular enclosures are associated with the Adena Complex and, therefore, should have the earliest dates (ca. 500 B.C. to A.D. 1) (Seeman 1986:566) while the large geometric earthworks and clusters of mounds and earthworks are viewed as Hopewell manifestations that should have later dates (A.D. 1 to A.D. 400) (Carr and Haas 1996). The radiocarbon dates from the New Castle phase contradict this viewpoint as all earthworks, regardless of association with the Adena or Hopewell complexes, were constructed and in use at the same time. Further, the integration of sites within the cultural landscape supports an interpretation of multiple sites within an organized and functioning ceremonial landscape. This interpretation shifts our perspective from individual sites to the regional organization and redirects our focus to a broader view of Middle Woodland culture and the interplay of the Hopewell phenomenon within various local cultures.

While we have amassed a sizeable data base for the sites in the New Castle phase, additional research is still needed. Reported earthworks remain to be verified and mapped. The Graves enclosure has not been surveyed or mapped and no radiocarbon dates or diagnostic artifacts have been acquired. The Bertsch site requires additional field investigations, especially since the embankment of the largest circle was impacted several years ago (Rick Jones, personal communication 2007). Radiocarbon dates from features in the central mound at the Fudge site are needed to investigate the chronological relationship between the mound and the embankment construction. Finally, research into the locality of the sixth complex is needed to determine whether an earthwork complex was located there. Additional research into Middle Woodland social organization as revealed in sites in the New Castle phase is ongoing.

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A DISTRIBUTIONAL APPROACH TO AN ARCHAEOLOGICAL SURVEY OF BLACKFORD COUNTY, INDIANA: AN ANALYSIS OF THE SOUTHERN PORTION OF THE COUNTY

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Abstract

The Applied Archaeology Laboratories (AAL) at Ball State University conducted a data enhancement project for archaeological resources in Blackford County, for a FY2012 Historic Preservation Fund Grant (Grant # 18-12-41921-3). Approximately 908.5 acres (367.7 hectares) of agricultural land were surveyed and 287 new archaeological sites were recorded. The survey recovered 838 prehistoric artifacts and 1,161 historic artifacts from 13 parcels of land within southern Blackford County. Cultural periods that are represented in the artifact assemblage include Late Archaic, Middle Woodland, and Late Woodland components from the pre-contact era. The average site density recorded for the project area for pre-contact sites was one site per 3.80 acres.

Introduction

The Applied Archaeology Laboratories (AAL) at Ball State University conducted a FY2012 Historic Preservation Fund Grant to survey portions of Blackford County, Indiana. The project involved a pedestrian survey of approximately 908.5 acres (367.7 hectares) of agricultural land. The main goals of the project were to increase the site database for the county (prior to this survey, there were 284 sites in SHAARD (Division of Historic Preservation and Archaeology 2013a), construct a cultural chronology for the county, refine settlement patterns of the pre-contact era, and enhance our understanding of the early Euro-American period. The Big and Little Lick Creek Valleys and southern half of the county were targeted for this project because they had not been systematically surveyed. In addition to the large-scale survey, a reported Late Archaic burial hill and historic Bowser‘s Station were targeted for re-investigation by pedestrian survey.

Figure 1. Location of Blackford County within Indiana (Yellowmap World Atlas 2012).

Background

To provide a framework for interpreting the data collected during this project, a review of the natural and cultural setting was undertaken. The background information presented in this paper includes environmental and archaeological information concerning Blackford County and the Big and Little Lick Creek valleys.

Natural Setting

Blackford County is located in central Indiana (Figure 1) and is bounded to the east by Jay County, to the south by Delaware County, to the west by Grant County and to the north by Wells County. The county is approximately 106,022 acres (42,905 hectares) in size (Kluess 1986). For the proposed research, the southern half of the county and the Big and Little Lick Creek Valleys were targeted which included approximately 71,200 acres (28,813 hectares).

Blackford County is within the general physiographic unit known as the Tipton Till Plain, an area of low relief with extensive areas of ice-disintegration features (Gray 2000). This gently rolling, almost featureless plain is almost entirely composed of glacial till and only slightly modified by post glacial stream erosion. The flat till plain is broken by end moraines, eskers, esker troughs and meltwater drainages (Schneider 1966:49-50).

The Salamonie River and the Big and Little Lick creeks are the major water sources running through Blackford County, however there are also many other smaller streams and creeks. The Big and Little Lick creeks drain into the Mississinewa River. The Salamonie and Mississinewa Rivers are tributaries of the Wabash River watershed which acts as a drainage system for two-thirds of the state flowing in a northeast-southwest direction (Schneider 1966: 50; Hale 1966:92). The Wabash River eventually deposits water and soil from Blackford County into the Ohio River, which is then ultimately transported to the Gulf of Mexico (Hale 1966:92). There are no naturally occurring lakes in Blackford County, only man-made ―lakes" such as flooded quarries and abandoned irrigation ponds.

Per Cantin (2008), no chert sources are in Blackford County or adjacent counties. However, nearby Huntington and Wabash counties offer sources of Liston Creek chert. Stratigraphically, Liston Creek chert occurs in nodules and is a member of the Wabash Formation of the Niagara series of the Silurian system (Cantin 2008:54). Liston Creek chert consists of various shades of grey ranging from medium to very light grey which can take the ―form of bands, variegations, mottles, amorphous ‗blobs,' or irregular-angular patches" (Cantin 2008:55). Texture is variable, ranging from coarse to medium fine; and luster ranges from sparkling, to dull and flat, to slightly lustrous (Cantin 2008:55). Possible fossil fragments occur as small rectangular and ovoid calcitic or siliceous flecks that are dispersed throughout Liston Creek chert, and crystalline vugs are quite common (Cantin 2008:55). Temporally, Liston Creek chert is found in all cultural periods in the Wabash basin (Cantin 2008:55).

Cultural Setting

The natural setting of Blackford County demonstrates a hospitable environment following the retreat of the Wisconsin glaciation. Site components in the county include Paleo-Indian through the historic period. Per SHAARD, the most frequently identified cultural affiliation is historic, followed by Early Archaic and Late Archaic (Division of Historic Preservation and Archaeology 2013a).

Archaeological investigations in Blackford County have been predominantly oriented toward surface surveys and only a small percentage of sites have been tested or excavated. Few major surveys have been conducted previously within and around the current research universe and include portions of the drainage basin of the Big and Little Lick Creek. The major surveys performed within the region consist of a reconnaissance survey in Hartford City resulting in three sites (12-Bl-108 to 110) with site 12-Bl-108 having a diagnostic Kirk Corner Notched projectile point (Jeske and Stillwell 1994a). A reconnaissance survey near Hartford City for a proposed ethanol plant resulted in nine sites inventoried (Jackson and Vosvick 2006). Just southwest of Montpelier, a reconnaissance survey of a proposed industrial park resulted in 13 sites inventoried (Stillwell 2003). Finally, a 915 acre pedestrian survey was conducted in 2011 to 2012 by Ball State University‘s AAL as part of a FY 2011 HPF Grant (Miller et al. 2012). Excavations within Blackford County consisted of an archaeological test excavation of site 12-Bl-110 to determine if any historic features were present; however none were found (Jeske and Stillwell 1994b). One major excavation of a burial site (12-Bl-1 and 12-Bl-2) was conducted in 1933, and a total of 18 burials, a refuse pit, two hearths, and numerous lithics and bone tools were uncovered (Black 1933, 1935).

The native peoples of what is now Blackford County were the Miami Indians. Chief Francois Godfroy, half French and half Miami, became an important individual in tribal affairs and an influential ambassador between the Miami Nation and the United States after the War of 1812 (Glenn 1979:19). With the Treaty of St. Mary‘s in 1818, the United States government granted land to Chief Francois Godfroy, now known as the Godfroy Reserve (Hill 2005:12), an allotment of six sections on the Salamonie River at La Petite Prairie (Glenn 1979:19). The first Euro-American settlers in Blackford County were Benjamin Reasoner and his family in 1831. The Reasoner family eventually settled in the southwest corner of Lick Creek valley of what is currently a part of Blackford County. The family‘s residence eventually became the epicenter of community life for other settlers and their families. Blackford County, named after Supreme Court Judge Isaac Newton Blackford, was officially organized in 1839 and was divided into four townships. These townships were: Washington, Licking, Harrison, and Jackson (Hill 2005:12). Three of the four townships were named after important figures in American history, while Licking Township was named in regards to the Big and Little Lick Creeks (Hill 2005:12).

An economic boom occurred for Blackford County when natural gas and oil were discovered in the town of Montpelier in 1887. Between 1870 and 1900 the population tripled within the county as the natural gas and oil industry bloomed in Montpelier giving it the name ―Oil City" and glass factories were built in Hartford City (Hill 2005:12). Unfortunately, economic decline occurred 20 years later. Blackford County is made up of mostly rural areas today.

Bowser‘s Station (12-Bl-18) is recorded in SHAARD as a railroad and United States Post Office dating to the 1870s (Division of Historic Preservation and Archaeology 2013b; Wepler et al. 1982:75). It was located along route 685 of the Ft. Wayne, Muncie, and Cincinnati Railroad, which opened in 1870. The railroad foreclosed in 1881 and was reorganized as the Ft. Wayne, Cincinnati, and Louisville Railroad (Baker 1976:627). Bowser‘s Station itself was opened on May 9, 1871 and permanently closed on November 8, 1875 (Baker 1976:902). There were four station masters, who also served as postmasters, during the four years that Bowser‘s Station was in operation.

Archaeological Survey

Introduction

Approximately 908.5 acres (367.7 hectares) of agricultural land were surveyed by pedestrian transects between September 6, 2011 and February 9, 2012. The survey sampled 908.5 acres of till plain and moraines. The survey documented 287 new archaeological sites and recovered 838 prehistoric artifacts and 1,161 historic artifacts.

The pedestrian survey was conducted by Ball State University‘s Applied Archaeology Laboratories‘ staff and students and took a total of fourteen days to complete stretched over a period of six months. The field survey was executed using pedestrian transects spaced at 10 meter intervals. The survey interval was reduced to 5 meter when artifacts were encountered. The areas surveyed by pedestrian transects had between 50 percent and 90 percent ground surface visibility. All artifacts were collected and bagged by site specific provenience, with the exception of brick and FCR which were counted and noted in the field. All artifacts were taken to the AALfor processing, identification and analysis. Artifacts were cleaned, classified and cataloged. Diagnostic point types were classified using Justice (1987). Lithic raw materials were identified by comparison with reference samples and published descriptions on file in the AAL (Cantin 2008). All chert identifications were made microscopically at 10x or greater.

Over 20 students in Ball State University‘s Department of Anthropology participated in either pedestrian surveys or lab analysis during the duration of this project. They were supervised by qualified archaeologists in the Applied Archaeology Laboratories. Student participation in this project was invaluable and provided multiple and varied learning experiences for all students involved.

Results

Approximately 908.5 acres were surveyed during this project, and 287 new archaeological sites were recorded. Thirteen parcels in Blackford County were surveyed. The survey documented the human occupation of Blackford County beginning from the Late Archaic period and extending until the Historic period. The distributional archaeological approach is an appropriate and financially salient choice for these large-scale surveys because it enables archaeologists to examine hundreds of acres of agricultural land in a variety of landforms and recover data that can be compared to data recovered in Phase II investigations (Miller 2013). Multiple site types were represented based upon the variation in artifact classes discovered on these sites. Of the 287 sites, 161 were found on Till Plain and Moraine landforms, which are the predominant landform in Blackford County, and 126 were found on Flood Plain landforms.

Artifacts

This project recovered 838 prehistoric artifacts and 1,161 historic artifacts (Table 1). The majority of prehistoric artifacts consisted of lithic debitage. The edge modification to several flakes indicates that debitage could have functioned as expedient tools. The minority of formal lithic tool types were projectile points dating to the Late Archaic, Middle Woodland, and Late Woodland, periods (Table 2; Figures 2-7). Other stone tools consisted of endscrapers, groundstone tools, and core tools. Historic artifacts included a variety of ceramics, glass, metal objects and brick (1650 to present).

Table 1. Artifacts Recovered.			
Prehistoric	**No.**	**Historic**	**No.**
Biface, Hafted	10	Redware	8
Biface, Non-Hafted	15	Stoneware	171
Bladelet	8	Whiteware	132
Unimarginal Tool	6	Ironstone	142
Drill	1	Porcelain	55
Spokeshave	1	Semi-porcelain	6
Endscraper	14	Pearlware	1
Sidescraper	8	Milkglass	83
Core Tool	13	Amber Glass	43
Core	40	Yellow Glass	1
Bipolar Core	1	Blue Glass	4
Exhausted Core	1	Cobalt Blue Glass	6
Flake, Edge Modified	86	Black Glass	1
Flake, Utilized	64	Olive Green Glass	2
Flake, Retouch	5	Green Glass	10
Flake, Proximal	141	Aqua Glass	156
Flake, Shatter	160	Red Glass	1
Angular Shatter	188	Pink Glass	1
Minimally Modified Core	26	Amethyst Glass	49
Groundstone Tool	43	Clear Glass	124
Hammerstone	2	Stub-Stemmed Pipe	1
Nutting Stone	1	Perfume Bottle	1
Chipped Stone Tool	1	Door Knob	3
Fire Cracked Rock (FCR)	3	Battery Core	2
		Metal, Air Tank Cap	1
		Metal, Bolt	2
		Metal, Bullet	1
		Metal, Fencepost	1
		Metal, Horseshoe	2
		Metal, Nail	2
		Metal, Nut	1
		Metal, Pipe	2
		Metal, Ring	1
		Metal, Spurs	1
		Metal, Unidentified	5
		Lintel	1
		Brick, Fragments	41
		Rubber	1
		Plastic, Button	1

Table 1. Artifacts Recovered.			
Prehistoric	**No.**	**Historic**	**No.**
		Clay Ball	1
		Slag	4
		Coal	67
		Bone, Non-Human	16
		Tooth, Non-Human	2
		Shell	5
Total	**838**	**Total**	**1161**

Table 2. Diagnostic Prehistoric Artifacts by Cultural Time Period.	
Cultural Period	**Projectile Point Styles**
Late Archaic	Late Archaic stemmed (1)
Early Woodland	
Middle Woodland	Bladelets (8), Snyders (1)
Late Woodland	Sequoyah (1), ―Humpbacked” knives (2)
Late Woodland/ Mississippian	Triangular Cluster (1)

Figure 2. Bladelets from sites 12-Bl-354, 382, 404, 485, 526, 555, 582, and 597 (photo by Joseph Miller, Ball State University).

Figure 3. Late Archaic projectile point (12-Bl-364-01) from Survey Area 3 (photo by Joseph Miller, Ball State University).

Figure 4. Late Woodland projectile point (12-Bl-407-01) from Survey Area 5 (photo by Joseph Miller, Ball State University).

Figure 5. Middle Woodland projectile point (12-Bl-440-01) from Survey Area 7 (photo by Joseph Miller, Ball State University).

Figure 6. Late Woodland projectile points 912-Bl-492-01 and 498-01) from Survey Area 8 (photo by Joseph Miller, Ball State University).

Figure 7. Late Woodland/Mississippian projectile point (12-Bl-557-01) from Survey Area 10 (photo by Joseph Miller, Ball State University).

In addition to the usual historic period artifacts (glass, ceramics, metal) recovered in large-scale pedestrian surveys such as this, a number of doll pieces including heads, legs, and arms were discovered in Survey Areas 1, 6, 7, and 10. Figure 8 shows a representative sample of the doll pieces that were found. The doll pieces from sites 12-Bl-327, 419, 440, and 548 all date from ca. 1860 to 1940 (Angione et al. 2007; Tubbs et al. 2009). All five doll pieces (12-Bl-327-27; 419-24; 440-48; 548-19 and 20) are bisque porcelain and date to the late 19th and early 20th century (Angione et al. 2007; Tubbs et al. 2009). Also, two battery cores made of compressed carbon were found in Survey Area 1 (12-Bl-332-03 and 336-31). The carbon battery cores from sites 12-Bl-332 and 336 were manufactured between 1866 and present (DoITPoMS 2012) (Figure 9). Two lightning rod insulators from Survey Area 7 were recovered: an aqua glass unthreaded lightning rod insulator from site 12-Bl-431, manufactured between 1840 and 1865 (Macky 2012); and an aqua glass threaded electrical insulator from site 12-Bl-431 manufactured between 1865 and 1970 (Macky 2012) (Figure 10).

Figure 8. Doll fragments from sites 12-Bl-327, 419, 440, and 548 (photo by Joseph Miller, Ball State University).

Figure 9. Compressed carbon battery cores from sites 12-Bl-332 and 12-Bl-336 (photo by Joseph Miller, Ball State University).

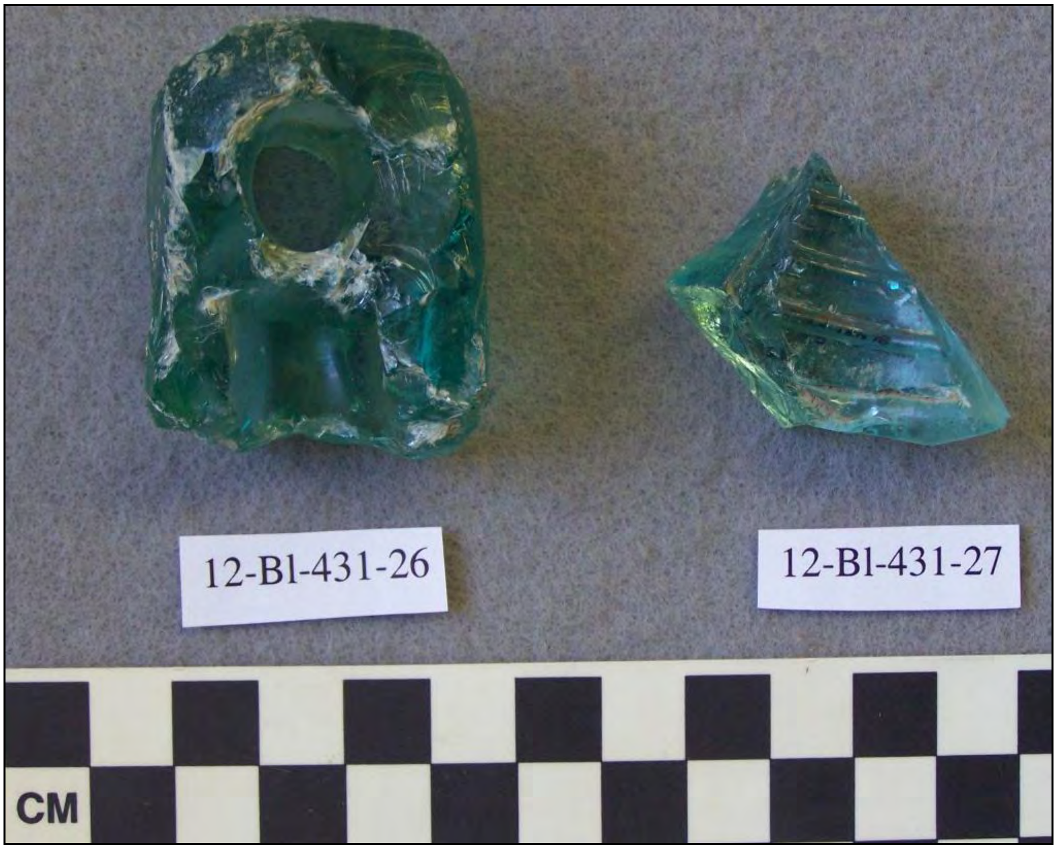

Figure 10. Unthreaded lightning rod insulator from site 12-Bl-431 and a threaded lightning rod insulator from site 12-Bl-431 (photo by Joseph Miller, Ball State University).

Chert

Lithic artifact chert types are shown in Table 3. The lithic artifacts were dominated by Liston Creek cherts (50.6 percent). There are no naturally occurring Liston Creek chert outcrops in Blackford County, but Cantin shows Liston Creek chert occurring in nearby Huntington, Wabash, and Miami Counties (Cantin 2008:9). Two of the projectile points were identified as being Liston Creek (12-Bl-407-01 and 492-01).

Indian Creek chert was the second highest identified material (5.13 percent). Indian Creek chert outcrops in Owen, Monroe, Greene, and Lawrence counties, and these are a significant distance (>130 km) from the project area. Derby chert is the third most common type of chert material (4.65 percent). Derby chert is only known to outcrop in Perry County, Indiana not far from the Ohio River and this is a significant distance from Blackford County (>275 km) (Cantin 2008:9, 56). Holland chert is the fourth most common type of chert material (3.82 percent). Holland chert occurs in Dubois and Spencer counties, and this is also a significant distance from Blackford County (>250 km) (Cantin 2008:9). Exotic cherts, chert that outcrops more than 80 kilometers from Blackford County, represent 43.67 percent of the total lithic material collected. With unknown chert materials excluded, exotic cherts represent 28.04 percent of chert material collected. Local cherts (Liston Creek, Fall Creek, Laurel, and Kenneth) represent 56.33 percent of the total lithic material collected. With Liston Creek excluded, local cherts only represent 5.73 percent of the total chert found.

Table 3. Chert Raw Materials Found in the Survey Area.					
Chert	**No.**	**%**	**Chert**	**No.**	**%**
Attica	11	1.31	Holland Dark Phase	1	0.12
Bryantsville	14	1.67	Indian Creek	43	5.13
Cataract	1	0.12	Jeffersonville	7	0.84
Delaware	11	1.31	Jeffersonville HT	8	0.95
Delaware HT	5	0.59	Kenneth	14	1.67
Derby	39	4.65	Keokuk HT	1	0.12
Ditney	10	1.19	Laurel	18	2.15
Fall Creek	16	1.91	Liston Creek	424	50.6
Flint Ridge	2	0.24	Liston Creek HT	7	0.84
Flint Ridge HT	4	0.48	Muldraugh	21	2.51
Haney HT	1	0.12	Unidentified	131	15.63
Holland	32	3.82	Upper Mercer	11	1.31
Holland HT	2	0.24	Wyandotte	4	0.48
HT = Heat Treated					

Sites

Of the 287 archaeological sites, 239 had unidentified prehistoric components (Table 4). The identified pre-contact components consisted of Late Archaic, Middle Woodland, and Late Woodland. Sixty-five sites had historic components.

Table 4. Site Components.		
Component	**No.**	**Comment**
Unidentified Prehistoric	239	30 Multicomponent (29 Historic) (1 Late Archaic)
Early Archaic	0	0 Multicomponent
Middle Archaic	0	0 Multicomponent
Late Archaic	1	1 Multicomponent (Unidentified Prehistoric)
Early Woodland	0	0 Multicomponent
Middle Woodland	10	4 Multicomponent
Late Woodland/ Prehistoric	4	0 Multicomponent
Historic	65	31 Multicomponent (29 Unidentified Prehistoric) (2 Middle Woodland)

The frequency of identified components encountered in the project area was similar to what had already been identified in Blackford County. One new cultural component, the Middle Woodland Hopewell, was discovered, which is discussed in detail later.

Historic Settlement

Results from the survey were not able to elucidate historic Native American or early Euro-American settlement within the study area. No artifacts were discovered that were definitively from historic Native American occupations and only a few dated to an early Euro-American time period. Thirty-nine sites contained historic components, a few of which were large historic scatters.

Density

The density and distribution of sites are important for modeling and prediction. The project documented an average one prehistoric site per 3.80 acres and an average density of one prehistoric artifact per 0.922 per acres surveyed.

Late Archaic Burial Hill

Introduction

As part of the FY 2012 HPF Grant, it was proposed to re-survey a reported Late Archaic burial hill (12-Bl-34) that was recorded in SHAARD in 1983 by S. Nickey. The site had 71 artifacts as seen in Table 5. Eight of these artifacts were returned to the collector and 63 were curated by Ball State University. The site had originally been reported to Ball State University by a collector who had found a cloud-blower pipe, an anvil stone, a Adena-like point made of quartzite, a graver spur, an Archaic point, an unclassified point, and a biface that is described as a ―chisel" (all returned to collector). Ball State University found more artifacts (including non-human bone) leading them to conclude that the site may have been a Late Archaic burial hill.

Table 5. Artifacts from site 12-Bl-34 (prior to FY 2012 survey).

Prehistoric	No.	Historic	No.
Tubular Pipe ―Cloud Blower"	1	Clear Glass	2
Biface, Hafted, Adena	1	Metal, Pocket Watch Face	1
Biface, Hafted	3	Metal, Engine Valve	1
Biface, Non-Hafted	1	Bone (non-human), Unidentified, Fragments	3
Flake, Retouch	5	Shell	5
Flake, Utilized	1		
Flake, Block	36		
Flake, Shatter	8		
Graver Spur	1		
Hammerstone	1		
Anvil stone	1		
Total	**59**	**Total**	**12**

There is some discrepancy as to the location of the proposed burial hill. The SHAARD database and site form at AAL show the site on one hill (Location 1); however, the topographic map at AAL shows the site located on another hill in the same parcel (Location 2). The site report and SHAARD both also included the investigator‘s comments saying that the hill was reported in one location (fails to mention which) but he suspected it was the opposite hill (also fails to mention which). Because of this discrepancy, AAL proposed to reinvestigate this survey area as part of this project to attempt to locate the burial hill and add more data to what is known about the site.

Based on an early field review and the density of artifacts found during this review, AAL changed its methodology for this survey area from the normal ten meter pacing to a reduced five meter pacing. This was done to ensure that the most archaeological data could be collected in an efficient and effective manner during the actual field surveys. Prior to the two survey dates, a flag was placed every 20 meters from east to west with another set of flags placed every 100 meters from north to south. This allowed the field crew to survey in 5 meter by 20 meter blocks. A label that included transect number and block number was printed for each 5 meter by 20 meter block with a total of 7,000 labels printed for this survey area. Each label was unique and identified a specific 5 meter by 20 meter space on the landscape. The field crew was spaced at five meter transects and were instructed to collect every artifact within their corn row and one corn row to the left and one to the right. At the end of the 20 meter interval the surveyor would either turn in a bag of artifacts with a pre-printed label inside, or would turn in a pre-printed label with no artifacts, if none had been found in that 5 meter by 20 meter block. All information was recorded in a master spreadsheet with either a positive (+) or negative (Ø) or a line (indicating that that transect ended) (Figure 11) for each 5 meter by 20 meter block. All artifacts were brought back to AAL‘s laboratory for cleaning and identification. All artifacts were kept in the field collection bag until all survey area maps were created and site numbers could be assigned to each site. Bags were then combined into the state site numbers.

The state site numbers were identified by correcting master field data spreadsheet for directionality and entering all of the positive intervals into another Excel spreadsheet. Each row was considered to be a 5 meter transect and each column was corrected for length to be comparable to a 5 meter transect. In this way, each square on the spreadsheet now represented a 5 meter by 20 meter block. The spreadsheet was printed out and re-configured to match the contours of the field and then groupings of positive intervals were identified as distinct sites. Site boundaries were identified by positive locations that were separated by more than 20 meters. As a result, 72 distinct sites were encountered in this survey area, and state site numbers were assigned from south to north and east to west over the newly created map (Figure 12).

After the artifacts were identified and grouped by sites, all sites were examined in the areas where Location 1 and Location 2 are reported. No artifacts were found that were diagnostic of the Late Archaic period or that gave any indication of a burial context (specifically no human bone or diagnostic artifacts were encountered). Therefore, the location of the reported Late Archaic burial hill remains inconclusive. The survey did produce several large prehistoric scatters that are recommended for further testing. The entire survey area as a whole is worthy of further study, as it represents the densest concentration of prehistoric artifacts recovered so far in Blackford County. Two bladelets were recovered in this survey area and a heretofore unrecorded point type in the county, the ―humpback" knife, was added to the county‘s cultural chronology.

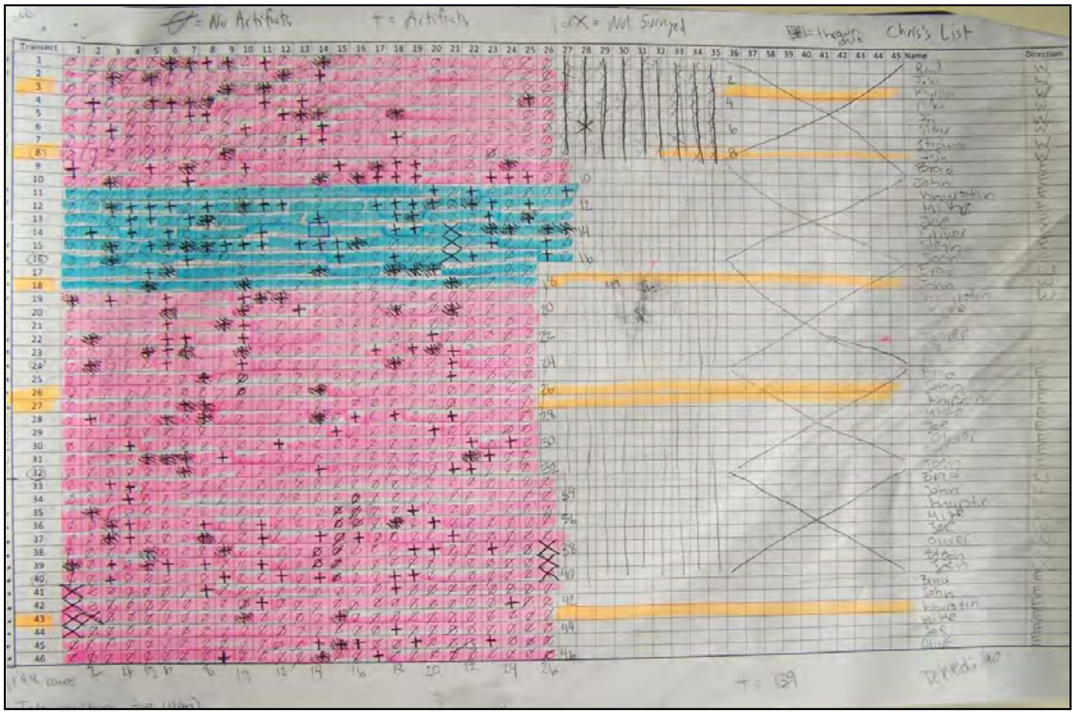

Figure 11. Artifact log from Survey Area 8 showing positive and negative intervals from field survey (photo by Joseph Miller, Ball State University).

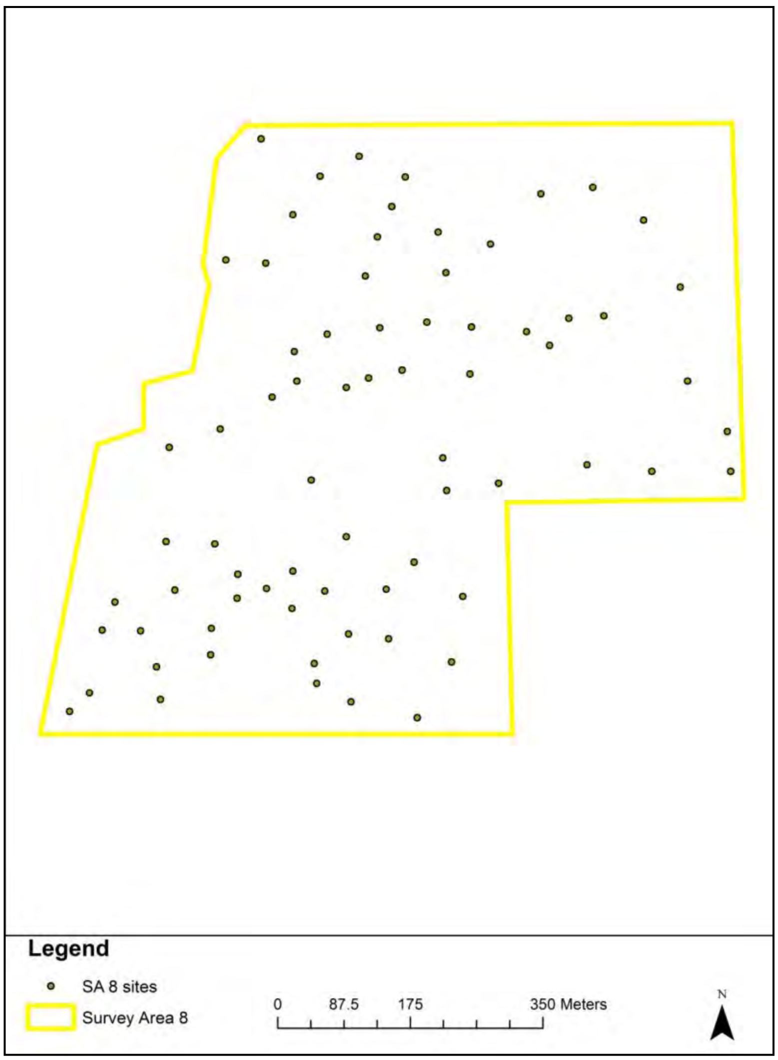

Figure 12. Map created showing location of all 72 sites from survey Area 8 after sites were identified. Note, site numbers are not included in this image (Shapefile created in ArcGIS by Joseph Miller, Ball State University).

Bowser’s Station

Introduction

Site 12-Bl-18 is notated as Bowser‘s Station in SHAARD and is described as a railroad station and US Post Office dating to the 1870s (Division of Historic Preservation and Archaeology 2013b; Wepler et al. 1982:75). Bowser‘s Station was located along railroad route 685 belonging to the Ft. Wayne, Muncie, and Cincinnati R.R. which opened in 1870. The railroad foreclosed in 1881 and was reorganized as the Fort Wayne, Cincinnati, and Louisville R.R. (Baker 1976:627). Bowser‘s Station itself was established on May 9, 1871 and temporarily closed for two months in 1874 and then remained open until November 8, 1875 when it permanently closed (Baker 1976:902). John Cole, Jacob Leden, William Maddox, and James Roberts are listed as the postmasters for Bowser‘s Station during this time. Andreas‘s map (1968) was consulted and the words ―Bowsers Station” are written on the east side of the railroad tracks; however, two buildings are shown on the west side of the tracks and the northwest building may be Bowser‘s Station. Also, a plat map from 1905 (Hixson 1905) was consulted for additional information on the possible location of Bowser‘s Station. Hixson‘s map also shows two buildings west of the tracks. The location given for Bowser‘s Station by Wepler (Wepler et al. 1982) would put the site in Survey Area 9; however the archaeology does not support this.

On October 14, 2012, AAL surveyed the fields to the west of the tracks as part of Survey Area 7. A very large historic scatter (12-Bl-440) was encountered where the building on the northwest side of the tracks is located on historic maps. On November 29, 2012, AAL surveyed the field (Survey Area 9) to the southeast of the tracks where SHAARD and Wepler show Bowser‘s Station being located. The survey produced two isolated finds (one historic and one prehistoric) and showed no evidence of Bowser‘s Station. Based on the absence of archaeological evidence from Survey Area 9, the presence of the large historic scatter in Survey Area 7 and additional historical background research, it was concluded that Bowser‘s Station is in fact in Survey Area 7 and is now designated 12-Bl-440. Site 12-Bl-440 also had a prehistoric component that was found amongst all of the debris of Bowser‘s Station; however, the prehistoric component appears to date to the Middle Woodland period and is not related to the later train station use of the area (Figure 13).

On February 28, 2013, the author visited the Blackford County Historical Society to review diaries, journals, plat maps, postal records, train memorabilia, and anecdotal minutiae to see if there are any records of Bowser‘s Station. Only two plat maps contained information that had not been previously seen by the author. The first plat map by Griffing, Gordon, and Co. (Griffing 1886) clearly shows Bowser‘s Station in Survey Area 7, which the archaeology substantiates. The second plat map by Walter R. Voght (1953) shows the same 3.59 acre parcel belonging to Alice Williams.

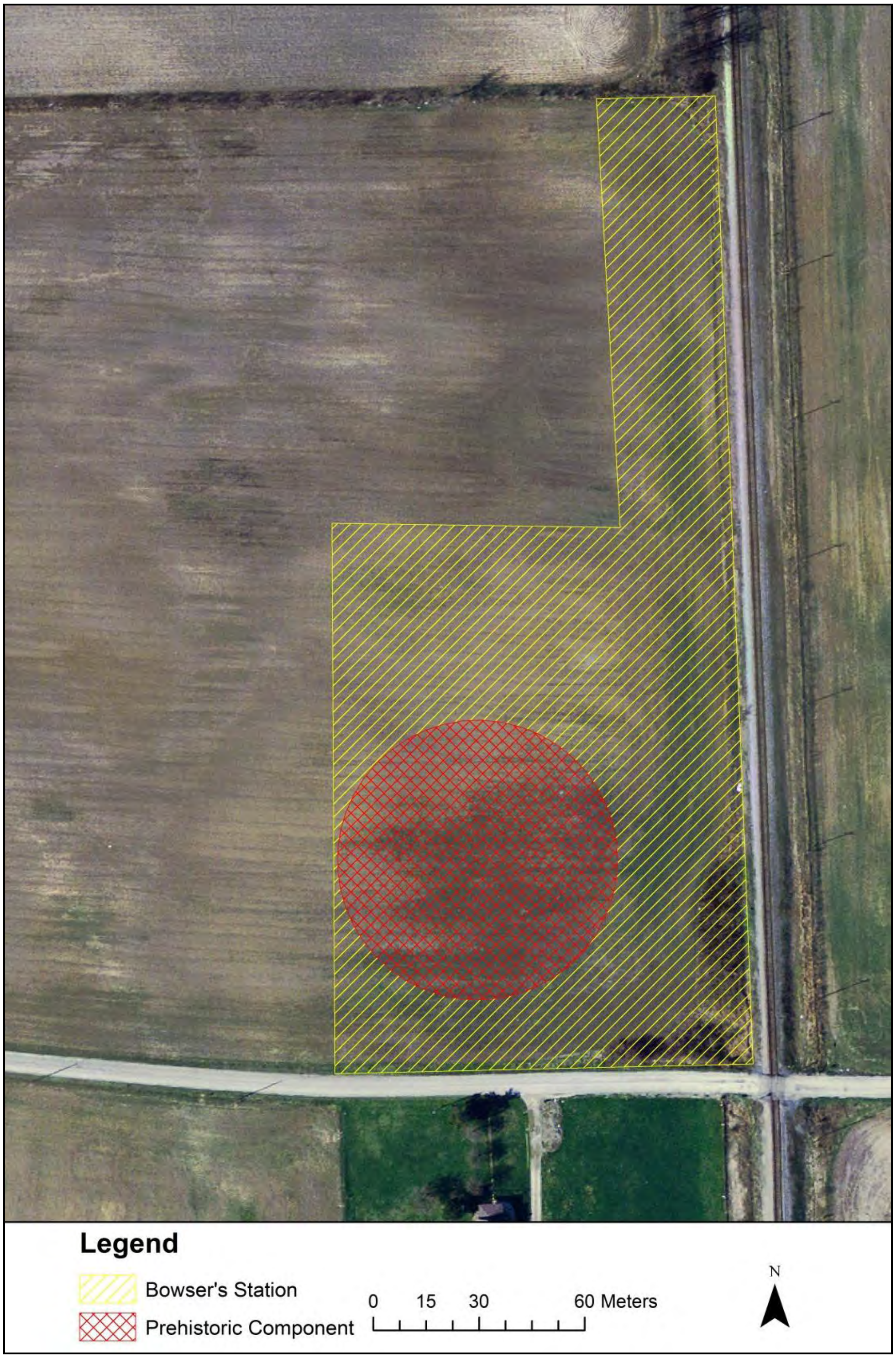

Figure 13. Site 12-Bl-440 (Bowser's Station) showing the location of the prehistoric component found within the site (Shapefile created in ArcGIS by Joseph Miller, Ball State University; Aerial photograph from Indiana Data Spatial Service).

Discussion

Site Density

The densities and distributions of sites are important for modeling and prediction. In the current study not only was site distribution tracked by landform and cultural period, but the amount of the surface that was covered by individual sites was used to demonstrate the percentage of utilized surface by landform (Table 6). For example, five small lithic scatters on a given landform may utilize a smaller portion of the landscape than one large lithic scatter on another landform. The percentage of utilized landscape may provide a further refined perspective of how settlement occurred within the research universe.

Table 6. Site Densities and Distributions By Landform.

Landform	# of acres	# of sites	Density	Distribution
Till Plain and Moraines	637	161	1 site per 3.96 acres	Sites cover 2.28% of surface area
Flood Plains	271.5	126	1 site per 2.15 acres	Sites cover 14.03% of surface area

Blackford County is predominantly comprised of Till Plain and Moraine landform, and nine of the parcels of land investigated in this project were found on this landform. Flood Plains also exist in the county, but only along the Salamonie River and the Big and Little Lick creeks (Kluess 1986). Four of the survey areas were on Flood Plains. Landowner permission was obtained to survey along the Big Lick Creek and four landowners granted permission for a total of 271.5 acres. Further testing along the Big and Little Lick creeks is recommended if these landowners will grant permission, especially in the fields surrounding the Secrest-Reasoner site in the vicinity (Black 1933, 1935). The general project area of Blackford County is worthy of additional investigation and study. It is especially recommended to concentrate future studies in the northwest and southeast portions of the county, in particular the Roll Quadrangle.

There is a site preference for clay loam texture soils. 55.05% of sites are located on clay loams (n=158), 29.27% of sites are located on silt loam (n=84), 6.97% of sites are located on silt clay (n=20), 6.62% of sites are located on clay (n=19), and 2.09% of sites are on loam (n=6). The reported Late Archaic burial hill was on clay loam. One site from the Middle Woodland period was located on silty clay, one Middle Woodland site was on clay, two Middle Woodland sites were on silt loam, and five Middle Woodland sites were on clay loam. Two of the Late Woodland period sites were located on clay loam, one was on silt loam, and the last was on clay. Of the prehistoric sites with diagnostic artifacts, there was a preference for clay loams (n=8) and silt loams (n=3), with two on clay, and one located on silty clay. The sites from the Historic period (not including isolated finds) are most frequently found on clay loams (n=14), silt loams (n=11), with silty clays (n=4) and clay (n=2) occurring in lower frequency.

Overall, moderately well drained soils (n=106) were the predominant drainage class with 36.93% of the sites occurring on these types of soils. 28.92% of sites were found on well drained soils (n=83), 20.91% of sites were found on somewhat poorly to moderately well drained soils (n=60), 6.97% of the sites occurring on poorly drained soils (n=20), and 6.27% of sites were found on very poorly drained soils (n=18). Of the diagnostic prehistoric sites, there was a preference for moderately well drained soils (n=8), followed in order of frequency by somewhat poorly to moderately well drained soils (n=2) and very poorly drained soils (n=2), with one site located on poorly drained soils, and one site located on well drained soils. In the Historic period (not including isolated finds) there was a preference for moderately well drained soils (n=14), with somewhat poorly to moderately well drained (n=8), well drained (n=5), poorly drained (n=2) and very poorly drained soils (n=2) occurring in lower frequency.

Landform Chronology

Results from the 908.5 acres of the FY 2012 HPF Grant survey show a heavy Middle and Late Woodland presence in the southern portion of the county (Table 7). No evidence of the Paleoindian or Early Archaic presence was recovered in this southern survey. Based on this survey, the settlement pattern for the Middle Woodland favored the Flood Plain settings. Four survey areas (2, 8, 12, and 13) were located on Flood Plains settings along the Big and Little Lick creeks, with five Middle Woodland bladelets were recovered in all four of these survey areas (2, 8, 12, and 13). Three additional Middle Woodland bladelets were discovered on the Till Plain and Moraine landforms which made up the other nine survey areas. Besides this Middle Woodland component data, settlement patterns for the different cultural contexts are difficult to ascertain due to the lack of recovered diagnostic materials in the southern portion of the county.

Table 7. Projectile Point and Bladelet Site Numbers and Cultural Periods Per Landform.

Landform	Sites and Cultural Periods
Till Plain and Moraines	12-Bl-364 (Late Archaic)
	12-Bl-382 (Middle Woodland)
	12-Bl-404 (Middle Woodland)
	12-Bl-407 (Late Woodland)
	12-Bl-440 (Middle Woodland)
	12-Bl-555 (Middle Woodland)
	12-Bl-557 (Late Woodland)
Flood Plains	12-Bl-354 (Middle Woodland)
	12-Bl-485 (Middle Woodland)
	12-Bl-492 (Late Woodland)
	12-Bl-498 (Late Woodland)
	12-Bl-526 (Middle Woodland)
	12-Bl-582 (Middle Woodland)
	12-Bl-597 (Middle Woodland)

Upon completion of fieldwork and artifact processing, this project has added to the cultural chronology of the county. Two hundred and thirty-nine Unidentified Prehistoric sites were added along with one Late Archaic site, 14 Woodland sites (ten Middle Woodland and four Late Woodland), and 65 historic sites. Prior to this survey project the Middle Woodland period Hopewell presence was not represented in the SHAARD database for Blackford County. The Middle Woodland period (ca. 200 B.C. to A.D. 600) is characterized by a blossoming of cultural activities and the manifestations of several distinct cultures (Jones and Johnson 2012:9). Also, there was a growing inter-regional trade that connected from the Great Lakes to the Gulf of Mexico. The Hopewell culture is generally thought to start between 200 B.C. to A.D. 1 and ends around A.D. 350 to 400 (Dancey 2005; Nolan 2005; and Seeman 2004). The Hopewell Interaction Sphere is the concept that connects all of the groups that evince diagnostic Hopewell cultural material throughout the eastern United States (Nolan 2005). However, the concept of ―Hopewell" is not monolithic, but should be seen as taking into account a great variety of inter- and intra-regional variation (Nolan 2005). The Middle Woodland bladelets recovered by this project can be seen as part of this broader Hopewell Interaction Sphere.

In addition, four previously unidentified projectile points were added to the knowledge of Blackford County‘s prehistory. A previously undocumented cultural presence (Middle Woodland Hopewell culture in the form of bladelets) was also added to the cultural chronology of the county. The diagnostic Middle Woodland bladelets are specialized proximal flakes that were heavily used by the Hopewell culture (Figure 2). The diagnostic Late Woodland projectile points were the ―humpbacked‘ knife and the Sequoyah point. ―Humpbacked" knives have a distinctive ―hump" in the middle, which Munson and Munson (1972:31) argue is a specialized form of knife or projectile point. They argue against these points as being a specialized scraper tool but are rather a knife that has some unknown function (Munson and Munson 1972:32). It seems unlikely that these are specialized knives as Munson and Munson contend, but are more likely unfinished triangular projectile points that the knapper failed to remove the large ―hump" and may have discarded to point after the failure. The Sequoyah point is part of the Scallorn Cluster, and is characterized by a slender form with serrations along the excurvate edges and has well defined shoulders (Justice 1987:223). These points are diagnostic of the Late Woodland period and are most commonly associated with the Caddoan Mississippian site in Spiro, Oklahoma.

Public Outreach

On August 30, 2012, the author took part in a presentation for homeschoolers at the Limberlost State Historic Site in Geneva, Indiana. A total of four sessions consisting of five to ten homeschoolers were held, in which the students learned about projectile points and some basics in archaeology. Students also had the opportunity to bring in their own ―arrowheads" or projectile points that they or family members had found, to be identified. A poster display for the Blackford County FY2012 Grant survey and artifacts found during the Blackford County FY2011 HPF Grant survey were included in this presentation. The methodology and goals of both the FY2011 and FY2012 Grant surveys were discussed with the students.

On September 22 and 23, 2012, Ball State University‘s Applied Archaeology Laboratories took part in Mound State Park‘s annual Indiana Archaeology Month activities. There were numerous hands-on demonstrations and participant activities for children. A poster display for the Blackford County FY2012 Grant survey and artifacts found during the Blackford County FY2011 HPF Grant survey were included in this display. The methodology and goals of both the FY2011 and FY2012 Grant surveys were discussed with the event attendees. Ball State archaeologists and students also spoke with numerous Blackford County avocational archaeologists that attended, fostering public interest and awareness in this HPF Grant survey. Approximately 150 members of the public attended this event at Mounds State Park.

On April 16, 2013, a public presentation was given to the Blackford County Historical Society by AAL archaeologist Christine Keller and Department of Anthropology students Joseph Miller, Josh Donaldson, Emma Hofeling, and Khyrstin Chance. The hour long presentation reviewed all aspects of the grant including background, methodology, and results. Both historic and prehistoric artifacts representative of newly discovered sites were available for the attendees to view. A student-created video was also shown that described and illustrated our methodology, field techniques, artifact processing, and identification. Over 55 people attended the presentation which included a question and answer session, and a short discussion of Indiana archaeology laws (Figure 14).

Throughout this project, there was broad support for the pedestrian surveys from the residents of Blackford County. Sixteen landowners gave permission to survey their properties totaling 1450 acres of agricultural land. Landowners who granted permission to survey their property were very enthusiastic and eager to have their fields surveyed. Landowners were deeply interested in the types of artifacts that were found and how their property was used in prehistory and during Euro-American contact. Numerous personal phone calls were made with various landowners who expressed great interest in participating in the survey and shared with the author the types of artifacts that had been surface collected on their property in the past. It became apparent that Blackford County has an active and involved Historical Society and a large community of avocational archaeologists fascinated with their county's prehistory and past.

Figure 14. Residents of Blackford County and members of the Blackford County Historical Society attending the presentation on April 16, 2013 (photo by Christine Keller, Ball State University).

In addition to public presentations and demonstrations, the results of the Blackford County HPF grant are being published in various ways. An article summarizing the results of both the FY2011 and FY2012 Blackford County HPF Grants is also being written for submission to the *Midcontinental Journal of Archaeology* (MCJA). The confusion between the Secrest-Reasoner site and site 12-Bl-1 (as recorded in SHAARD [Division of Historic Preservation and Archaeology 2013c]), and Bowser‘s Station will be the focus of at least two future journal articles. A master‘s thesis ―Site-Less Survey And Prehistoric Artifact Distribution For Blackford County, Indiana," by Joseph R. Miller (2013), focuses on the prehistoric artifacts gathered from both the FY2011 and FY2012 HPF grants in Blackford County.

Throughout this project, there was a large amount of Ball State University Department of Anthropology student involvement and participation. Twenty-two students were involved with the fieldwork and participated in field surveys. Three students were involved in cleaning, identifying, and labeling artifacts. Two students volunteered to label and photograph artifacts. Three students created the 7,000 artifact labels that made Survey Area 8 possible, and two other students assisted in cutting out and organizing the labels and baggies. Four students compiled and entered all of the data into the SHAARD database. Three students helped with the presentation to the Blackford County Historical Society on April 16, 2013, and one student created the methodology video that was shown during that presentation.

Figure 15. Student participation and involvement in the Blackford County HPF grant, April 2013 (photo by Christine Keller, Ball State University).

Alignment with Cultural Resources Management Plan for Indiana

This FY 2012 HPF Grant addresses various goals and objectives *in Indiana's Cultural Resource Management Plan For 2013-2019* (Indiana Division of Historic Preservation and Archaeology 2012) by increasing and fostering public awareness and interest in the archaeological resources of Blackford County. This grant project builds on and enhances the previous FY2011 HPF Grant, also done in Blackford County, and continues the relationships with the Blackford County Historical Society, Hartford City Public Library, landowners, and the general public.

The first goal of *Indiana's Cultural Resource Management Plan For 2013-2019* is to increase public awareness, public understanding, and public support for preservation archaeology. Through numerous waves of landowner letters mailed to over 100 families in Blackford County, both last year and this year, and through public events such as Archaeology Month Activities at Mound State Park in September 2011 and 2012, and with the public presentation held in Hartford City in April 2012 and 2013, AAL has been able to make the public aware of both our HPF grant surveys and the importance of archaeology. Throughout last year‘s and this year‘s projects, AAL has received broad support, interest, and enthusiasm from the people of Blackford County. The people of Blackford County are very interested in the history and prehistory of their county, and are excited to be a part of the surveys to learn more about their own property. They also realize the importance of protecting these archaeological resources as evidenced by the attendance and interest at the two presentations at the Hartford City Public Library. These activities have helped meet Indiana‘s objectives of increasing public awareness through varied efforts, media, and programs aimed at all Hoosiers; increasing public understanding of Indiana‘s cultural resources and our statewide heritage; and increasing the public support for heritage preservation by marketing its benefits.

The second goal of *Indiana's Cultural Resource Management Plan For 2013-2019* is to broaden the preservation and archaeology communities and promote archaeology preservation communities. As stated in the first goal, numerous public events and presentations have taken place as part of the FY2011 and FY2012 Blackford County HPF Grants. In addition, several journal articles are being submitted to the *Indiana Archaeology* journal, *Midcontinental Journal of Archaeology*, and other publications. Redacted versions of both grant reports will be available for public review on AAL‘s web site. The activities listed in Goal 1 and the publications listed here have helped and will help meet Indiana‘s objectives of building relationships among people and groups with similar or complementary purposes and to identify new partners and develop opportunities for collaboration.

The third goal of *Indiana's Cultural Resource Management Plan For 2013-2019* is to advocate for preservation opportunities and options for all community, cultural, and heritage resources. Although AAL‘s FY2011 and FY2012 HPF Grants did not have a direct impact on this goal, it is hoped that our grant projects could be the foundation for future preservation opportunities and options for Blackford County and the communities of Hartford City and Montpelier.

The final goal of *Indiana's Cultural Resource Management Plan For 2013-2019* is to advance preservation as economic development. Again, AAL‘s FY2011 and FY2012 HPF Grants did not have a direct impact on this goal. However, it is hoped that through the presentations, online journal articles, and the online redacted versions of the two grant reports the public may start to think of ways to protect and promote their cultural and archaeological resources.

Conclusions and Recommendations

This project targeted the Big and Little Lick creeks and the southern half of Blackford County, Indiana. The project area was selected due to the lack of known archaeological sites in the state database (SHAARD) and the identification of Blackford County as a data deficient region. The goals of the project were to increase the site database, construct a cultural chronology for the county, refine settlement patterns of the precontact era, and enhance our understanding of the early Euro-American period.

The survey produced eight bladelets and bladelet-like tools. In the previous survey conducted in the northern portion of the county, AAL did not encounter any bladelets. The discovery of bladelets in the southern portion of the county may indicate an area of activity in the Middle Woodland period that was not evinced in the northern portion of the county during that period.

Approximately 908.5 acres of agricultural land were surveyed during this project and 287 new archaeological sites were recorded. The survey recovered 1,999 artifacts consisting of 838 prehistoric artifacts and 1,161 historic artifacts. The majority of the precontact sites were unidentified by cultural period, however three prehistoric cultural periods were documented. Eleven sites (seven historic scatters and four prehistoric scatters) were recommended for further testing and 276 sites were recommended as not eligible for listing on the Indiana Register of Historic Sites and Structures or the National Register of Historic Places.

The survey added one previously undocumented cultural presence to the county‘s history, in the form of a Middle Woodland bladelets (12-Bl-354, 382, 404, 485, 526, 555, 587, and 597). Compared to previous large-scale surveys on the Tipton Till Plain (Smith et al. 2009), whose results show a greater occupation in upland areas than originally expected, Blackford County only represents Till Plain and Moraine and Flood Plain landforms. Because these results could be due to a number of different reasons, the general project area of Blackford County is worthy of additional investigation and study.

The average site density recorded for the project area for precontact sites was one site per 3.80 acres and an average density of one prehistoric artifact per 0.922 acres surveyed.

The project results suggest that precontact populations were using Blackford County in different ways and during different cultural time periods. Many factors could influence the project data including the locales that were surveyed, whether a parcel was tilled recently or not, and the lack of any large valley settings in the county which are preferable for human occupation. Further research into prehistoric landform usage is recommended within Blackford County.

Blackford County would benefit from further archaeological investigations such as this large scale pedestrian survey in both the southern portion of the county and also further investigation into the northwestern portion (i.e. Roll Quadrangle). Another avenue of investigation is through analysis and documentation of private projectile point collections from Blackford County to help fill in the gaps of the cultural chronology.

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A SURVEY OF FORT ANCIENT SITES IN SOUTHEASTERN INDIANA

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Archaeologists have been aware of the presence of a significant Fort Ancient occupation in southeastern Indiana since Warren K. Moorehead's excavation of a burial mound at the Laughery Creek site (12O18) in Ohio County in 1897 (Moorehead 1906). Investigations in Dearborn and Ohio counties by Glenn A. Black in the early 1930s confirmed the Fort Ancient affiliation of this site and made the archaeological community aware of such important villages as Haag, State Line, Guard, and Laughery Creek (Black 1934). Aside from excavations at Haag in the 1970s (e.g., Reidhead and Limp 1974), professional investigations of the region's Fort Ancient sites have been limited to surveys and small-scale cultural resource management mitigations. While Fort Ancient research has expanded rapidly in Kentucky and Ohio, our knowledge of comparable groups in southeastern Indiana has remained limited. The purpose of this article is to summarize what information is available pertaining to non-Oliver Fort Ancient groups in southeastern Indiana as a means of facilitating future research into this important component of Indiana prehistory.

Introduction

The Fort Ancient culture consists of Late Prehistoric village-based agricultural societies who inhabited the middle Ohio River valley of Indiana, Kentucky, Ohio, and West Virginia from ca. A.D. 1000 to 1750. Although the processes that led to the origins of Fort Ancient are poorly understood, current data indicate that the Fort Ancient tradition developed in situ from local Late Woodland groups like Newtown (Riggs 1986, 1998; Tankersley and Haines 2010). This lack of data pertaining to the origins of Fort Ancient is particularly prevalent in Indiana, although those data that are available indicate that Early Fort Ancient groups may have been confined to the Ohio River valley region. The Middle Fort Ancient subperiod, on the other hand, is marked by an expansion of the Fort Ancient culture area and the advent of the Oliver phase in central Indiana (McCullough 2000). Interestingly, the boundaries of the Fort Ancient culture area are marked by palisaded villages, suggesting conflict with adjacent peoples as Fort Ancient groups expanded their territories (Figure 1). By the Late Fort Ancient (post A.D. 1400), these groups' territories had contracted once more.

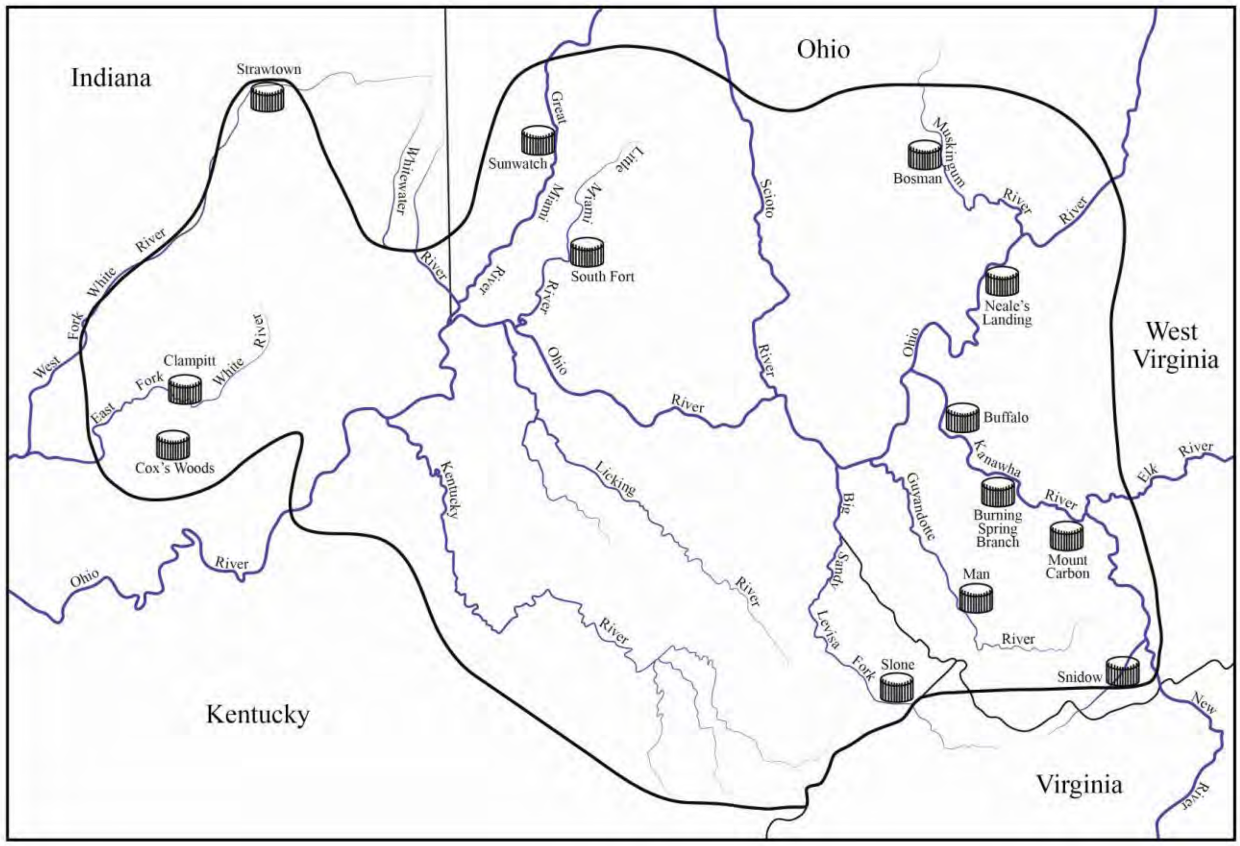

Figure 1. Fort Ancient Culture Area Map, including palisaded Fort Ancient villages. Adapted from a hand-drawn map created at the 1st Annual Fort Ancient Workshop, Strawtown Koteewi Park, August 2011.

Although the first archaeological investigations at Fort Ancient sites in Indiana date to the end of the 19th century (Moorehead 1906), very little is known about non-Oliver Fort Ancient sites in the state. The first systematic survey of Fort Ancient sites in Indiana was conducted in the 1930s by Glenn A. Black as part of general county-wide surveys of Dearborn and Ohio counties (Black 1934). These investigations led to the identification of several significant Fort Ancient villages in the southeastern corner of the state, including Haag (12D19), State Line (12D18), Guard (12D29), and Laughery Creek (12O18) (Black 1934). Unfortunately, aside from excavations at Haag by Indiana University in the 1970s (e.g., Reidhead and Limp 1974) and a few limited cultural resource management surveys and mitigation projects, Black's work remains the full extent of what we know about non-Oliver Fort Ancient groups in Indiana.

The general dearth of information pertaining to the Fort Ancient culture in southeastern Indiana precludes a detailed synthesis or analysis of the region's Late Prehistoric period. Rather, the purpose of this paper is to provide a descriptive summary of known non-Oliver Fort Ancient sites in the state, including the results of our own reanalyses of collections from the Haag and Tanners Creek (12D123) sites in Dearborn County. It is our hope that this summary will aid researchers in incorporating the Indiana data into regional discussions of Fort Ancient, as well as provide an impetus for future investigations at Indiana Fort Ancient sites.

Overview of Regional Fort Ancient

Fort Ancient groups were tribal or “transegalitarian” kin-based agriculturalists with a political organization characterized by situational, non-hierarchical leadership positions (Henderson 1998). The agricultural economy of Fort Ancient societies was focused on maize and beans, with sunflower, squash, and tobacco also grown and sumac encouraged. Nuts and fruits also were exploited, but in lower frequencies than during preceding Woodland periods and among contemporary Mississippian groups (Rossen 1992:206). Preferred animal species included white-tailed deer, bear, elk, and wild turkey, the latter of which may have been tended but not domesticated (Henderson 2008). In central Kentucky, this subsistence strategy was oriented toward ridgetop soils, salines, and springs, while in northeastern Kentucky, southeastern Indiana, and southern Ohio the extensive floodplains and terraces of the Ohio River valley and its tributaries also were exploited (Pollack and Henderson 2000).

The Fort Ancient period dates from ca. A.D. 1000 to 1750 and is divided into three major archaeological subperiods: Early (ca. A.D. 1000 to 1200), Middle (A.D. 1200 to 1400), and Late (post-A.D. 1400) Fort Ancient. Contact period tribes likely associated with Fort Ancient include, but are not limited to, the Shawnee, Yuchi, and Tutelo (Henderson 2008). Fort Ancient material culture, social organization, and settlement patterns exhibit a considerable amount of variation throughout space and time; however, the persistence of 1) a maize-based agricultural economy, 2) distinctive ceramic technological and decorative styles, and 3) a small-tool lithic tradition organized around the exploitation of locally available stone raw materials differentiate Fort Ancient from their Late Woodland and Late Prehistoric neighbors.

Early Fort Ancient (ca. A.D. 1000-1200)

Although very little is known about the transition from the Terminal Late Woodland to the Early Fort Ancient in southeastern Indiana, in Kentucky this transition is marked by paleobotanical assemblages indicating a marked increase in the consumption of maize and beans and decrease in native domesticates (Rossen 1992). At the same time, reduced mobility is indicated by the construction of more substantial dwellings (Pollack and Henderson 2000). Early Fort Ancient plain and cordmarked conoidal jars with straight or recurved rims are similar to Late Woodland forms but differ in that they include handles, incised necks, and the use of shell as temper (Henderson 2008).

Settlement data from Kentucky indicate that Early Fort Ancient groups were dispersed into small farming communities consisting of scattered households (Sharp 1996; Turnbow and Sharp 1988) and separate stone mounds and ritual sites (Clay 1984). Leadership among these groups was situational and production was organized at the household level by members of the same kinship group (Henderson 1998, 2008). The largest Early Fort Ancient communities consisted of 6 to 10 structures large enough for 24 to 40 individuals (Pollack and Henderson 1992, 2000). Projectile points found at these sites consist primarily of Type 2 Flared Base and Type 5 Straight Sided Triangular points (Railey 1992).

Middle Fort Ancient (A.D. 1200-1400)

From an archaeological perspective, population growth and the nucleation of populations into greater numbers of larger villages during the Middle Fort Ancient subperiod resulted in increased site size and visibility. These nucleated villages include circular and semi-circular/arc-shaped villages organized around a central plaza (Henderson 1992, 1998; Pollack and Hockensmith 1992; Sharp and Pollack 1992) and linear villages with structures distributed along ridges or terraces (Raymer et al. 2012). Those sites with central plazas also exhibit other evidence of intra-site spatial organization, including the presence of distinct mortuary, trash disposal and/or storage, and habitation zones (Dunnell 1972, 1983; Dunnell et al. 1971:41-42; Henderson 2008:773-775). Some sites contain low mounds (Black 1934:215-218; Henderson 1998; Henderson and Pollack 2000; Rafferty 1974; Raymer et al. 2012; Sharp and Pollack 1992; Turnbow 1992) and/or palisades (Dunnell 1972; Dunnell et al. 1971:41-42; Henderson 2008).

The low mounds and plazas found at Middle Fort Ancient sites indicate that community ritual and ceremonialism were likely important means by which these larger residential groups maintained order and a sense of solidarity. Thicker middens at these sites suggest they were occupied for longer periods than Early Fort Ancient sites, but scalar stresses related to living in close quarters with relatively large numbers of people may have made these communities unstable and prone to fragmentation (Henderson 1998, 2008; Pollack and Henderson 1992). Village locations likely shifted every decade or two due to depletion of local resources like game, firewood, and agricultural soils, as well as to relieve social tensions related to population increase and intra-village factionalism (Henderson 1998; Raymer 2008).

Like their Early Fort Ancient predecessors, Middle Fort Ancient groups were tribal societies, with autonomous communities containing multiple, unranked corporate descent groups (i.e., clans and lineages). The duality of the spatial organization of some Middle Fort Ancient circular villages may indicate the presence of moieties (Hawkins 1998:106; Henderson 1992:238). The low mounds suggest some achieved leadership positions (Henderson 2008), although the lack of grave goods other than a few utilitarian items and the occasional marine shell ornament indicates this status was not based on participation in a prestige goods network. The burial of newborns and infants in refuse disposal pits located outside the community mortuary zone provides further evidence against an ascribed system of ranking (Pollack and Henderson 1992).

Middle Fort Ancient villages typically contained between 20 and 30 dwellings (Sharp 1996), each large enough to hold 9 to 10 individuals. Groups of villages are characterized by regionally distinct ceramic technological and decorative styles (Pollack and Henderson 1992). According to Pollack and Henderson (2000:201): ―These stylistic similarities and complementary trends suggest that some kind of communication or interaction took place among Fort Ancient groups at this time, but the continued existence of identifiable regional ceramic series suggests that there was greater social integration within these regions than between them."

Shell tempering becomes more prevalent relative to the Early Fort Ancient, and new appendages appear at this time (Henderson 2008). Like the preceding Early Fort Ancient subperiod, jars are the dominant vessel form, although some bowls do appear at this time (Turnbow and Henderson 1992). Other diagnostic forms include chipped limestone discs; discoidals; and Type 2 Flared Base, Type 5 Straight Sided, and Type 3 Coarsely Serrated Triangular projectile points (Henderson 1998, 2008; Pollack and Henderson 2000; Railey 1992).

Late Fort Ancient (A.D. 1400-1750)

The Late Fort Ancient subperiod is characterized by the widespread Madisonville Horizon. It is at this time that the largest Fort Ancient villages and most non-local goods (eventually including European trade goods) appear in the archaeological record. In the western portion of the Fort Ancient culture area, circular and semi-circular villages are replaced by large clusters of 30 to 40 structures, while palisaded circular villages are found to the east. House size continues to increase at this time, with structures growing to accommodate as many as 13 to 26 individuals. In addition, burial mounds are completely replaced by cemetery areas associated with distinct village spaces. A new summer village/winter hunting camp settlement pattern appears after ca. A.D. 1400 (Henderson 2008; Pollack and Henderson 1992, 2000).

The larger size of Late Fort Ancient villages may indicate the coalescence of two or more communities. Leadership remained non-hierarchical but may have been based on achieved status obtained by elders and corporate group leaders participating in long-distance exchange networks. Economic organization remained primarily at the household level, however, and social organization continued to be fundamentally egalitarian (Griffin 1992; Henderson 2008). Increased interaction with Mississippian groups to the west and south is indicated by the presence of weeping eye and rattlesnake engraved marine shell gorgets and other trade goods, placement of vessels containing shell spoons in graves, small quantities of Mississippian pottery at Fort Ancient sites, and the construction of some wall trench houses (Pollack and Henderson 1992).

Increased integration of Fort Ancient groups after A.D. 1400 is indicated by the replacement of regionally distinct ceramic series by a single, homogeneous set of types consisting of the Madisonville and Todd ceramic series. Madisonville Horizon vessel forms include shell-tempered bowls, pans, colanders, and flared rim globular jars decorated with applied notched and beaded rim strips, negative painting, effigy rim riders, thin strap handles, and increased frequencies of incised and trailed decorations (Henderson 2008; Pollack and Henderson 2000). According to Pollack and Henderson (2000:206), these changes in ceramic forms may be attributable to changes “in the way food was served; perhaps new rituals were adopted that involved the consumption of food. Increased decoration on jar necks suggests individuals may have used this as a way to signal group identity to others with whom they were newly interacting.”

Diagnostic Late Fort Ancient stone tools include unifacial and bifacial teardrop-shaped endscrapers and Type 3.1 Finely Serrated, Type 4 Short Excurvate, Type 5 Straight Sided, and Type 6 Concave Base Triangular points (Henderson 2008; Pollack and Henderson 2000; Railey 1992). After contact, metal tools began replacing stone and ceramic forms at sites like Bentley in Kentucky (Pollack and Henderson 1984). Fort Ancient groups largely disappear from the area by the middle of the 18th century (Pollack and Henderson 2000).

Identifying Non-Oliver Fort Ancient Sites in the Literature

Fort Ancient sites located in central and south-central Indiana, and yielding grit-tempered plain and cord-marked ceramics with typical Fort Ancient decorations and vessel forms, belong to the Oliver phase (McCullough 2000). Given that McCullough‘s long-term investigations of Oliver phase sites in Indiana have provided us with a wealth of information pertaining to this aspect of Fort Ancient culture in the state, we felt it best to focus our efforts on those non-Oliver manifestations in southeastern Indiana that have not received much attention. Using the State Historic Architectural and Archaeological Research Database (SHAARD) and the state site files records at the Indiana DNR Division of Historic Preservation and Archaeology (DHPA) as guides, we identified six Indiana counties with either known Fort Ancient components or a high potential to yield Fort Ancient components. These counties are Switzerland, Ohio, Ripley, Dearborn, Franklin, and Jefferson, and they are the focus of the remainder of this paper (Figure 2).

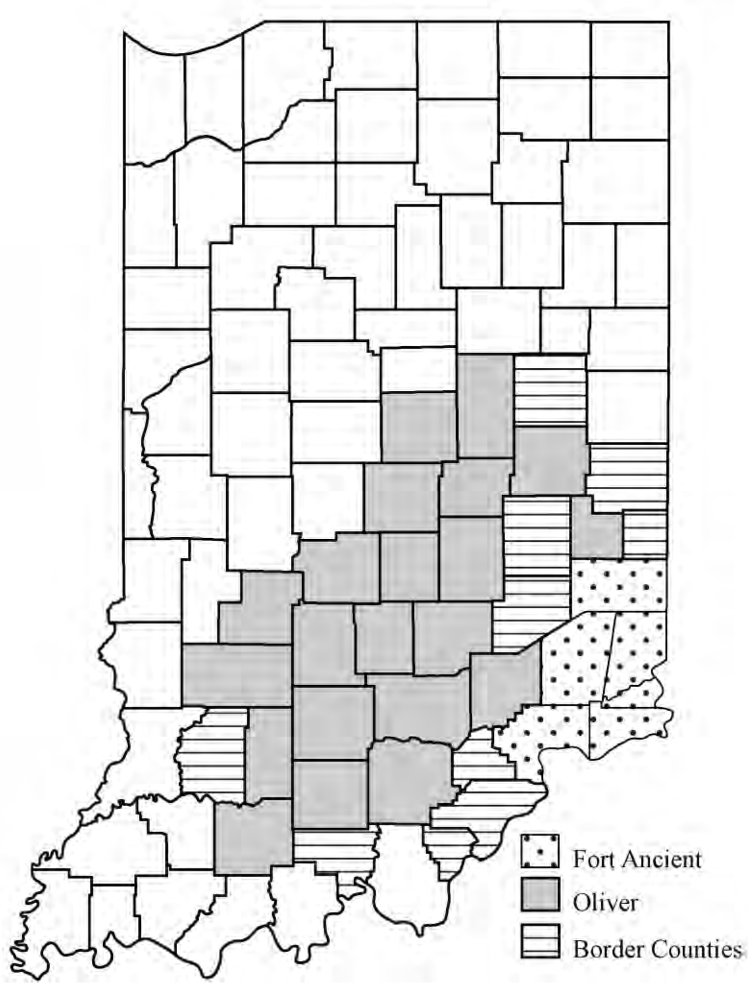

Figure 2. Map of Indiana counties with identified Fort Ancient sites. Created by the authors.

Identifying a site as Fort Ancient on the basis of SHAARD and Indiana site files data is not an easy task. A search for Fort Ancient sites in SHAARD yields few results and some of those are located outside the Fort Ancient culture area. Adding confusion to the problem is that most Fort Ancient (including Oliver) sites are listed in SHAARD as Late Woodland or Mississippian. To identify sites as Fort Ancient, then, required searching for all sites within the Fort Ancient culture area that were listed as Fort Ancient, Oliver, Mississippian, Middle

Mississippian, or Late Woodland/Mississippian, then examining the site forms of each of these sites for Fort Ancient diagnostics. Additionally, all survey and excavation reports for each of the Fort Ancient counties listed above were examined for evidence of Fort Ancient sites not represented in SHAARD. Sites were included in this report if they 1) were located within the six counties listed above (Fort Ancient sites located outside this six-county area yielded grit-tempered pottery and are considered to be Oliver phase) and 2) yielded shell-tempered pottery or 3) post-A.D. 1000 radiocarbon dates. A few sites not meeting these criteria are included as possible Fort Ancient sites for reasons that will be described below. A total of 32 non-Oliver Fort Ancient sites have been identified as a result of this survey. Locations of most sites are purposefully kept vague but can be obtained from SHAARD.

Before continuing to individual site descriptions, we should clarify that it is highly unlikely that all non-Oliver Fort Ancient sites in the state are confined to these six counties. Given the relative lack of information pertaining to Fort Ancient in Indiana, we felt it was important to remain conservative about identifying a particular site as Fort Ancient. It is possible, for instance, that some shell-tempered pottery-bearing sites identified as Mississippian in Clark, Crawford, and Floyd counties have Fort Ancient components. It is also possible that many of the sites located within the area we are considering Oliver (Bartholomew, Brown, Dubois, Fayette, Greene, Hamilton, Hancock, Henry, Jackson, Jennings, Johnson, Lawrence, Madison, Marion, Martin, Monroe, Morgan, Orange, Owen, Shelby, and Washington counties) belong to as yet unidentified non-Oliver Fort Ancient phases. Finally, it is highly probable that unidentified Fort Ancient and/or Oliver sites are present in Daviess, Decatur, Delaware, Rush, Scott, Union, and Wayne counties (Figure 2). Obviously, much more work needs to be done before we have a clear understanding of the nature and areal extent of Fort Ancient in Indiana.

Tanners Creek (Site 12D123)

The Tanners Creek site (12D123) is a Middle Fort Ancient Anderson phase village located within the bottomlands of the Ohio River near its confluence with Tanners Creek. Although aerial photographs indicate the site once consisted of a circular midden stain that likely represents the outline of a circular village, this stain is now bisected by a double railroad embankment and the southern portion of the site has been heavily impacted by construction of settling ponds (DHPA 2007). Investigations at Tanners Creek are limited to surface surveys and two small mitigation projects.

The first known investigations at Tanners Creek were conducted by amateurs Brian and Aaron Tonne, who collected materials from both sides of the railroad tracks that cut through the center of the site. Artifacts reported in their collections include human bones and teeth, bone tools, serrated Fort Ancient projectile points (not illustrated, but presumably Type 3 Coarsely Serrated Triangular points), and shell-tempered pottery, including sherds with convergent-sided strap handles, guilloche, line-filled triangles, and horizontal line motifs. Amateur excavations by Brian Tonne on the north side of the railroad tracks reportedly yielded a rectangular house pattern (DHPA 2007).

Resurvey of Tanners Creek was conducted as part of the Boomtown Landing project in Dearborn County. Of the 382 sherds collected by personnel from Indiana University‘s Glenn Black Lab (GBL), 351 were shell-tempered. Most were plain (n = 188) or cord-marked (n =

106) and one cordmarked sherd exhibited a node appendage. Decorated sherds consisted of four broad-line incised, plain sherds and two broad-lined incised, cord-marked sherds. Three mechanical trenches excavated adjacent to Tanners Creek in the southeastern corner of the site yielded midden containing pottery, debitage, FCR, charcoal, and faunal remains at depths ranging from 36 to 185 cm below surface (DHPA 2007; O'Brien 1995).

Stripping in the northwest corner of the site by the landowners and subsequent digging by looters exposed a portion of the site's midden and a hearth feature in 2006. Mitigation of this damage by Landmark Archaeological and Environmental Services, Inc. involved a systematic surface collection and excavation of the exposed hearth and a 2 x 2 m unit into the midden (Moore 2006). Analysis of the stone tools and ceramics recovered by this mitigation effort by the authors was used to establish the site's Middle Fort Ancient Anderson phase affiliation (Raymer and Moore 2011).

Stone tools recovered from Tanners Creek reflect of a full range of reduction activities utilizing local glacial and river redeposited cherts. Although a variety of chert types, including Laurel, Jeffersonville, Muldraugh, and St. Louis/Ste. Genevieve, are present in the assemblage, analysis of cortex found on cores indicates the site's Fort Ancient inhabitants obtained their raw materials from nearby stream gravels and/or the local glacial till. Of the nineteen cores and core fragments recovered by Landmark, eleven can be positively identified as originating from stream deposits based on the presence of a dark brown patina and/or bright, lustrous and rounded surfaces. Of the remaining eight cores, five exhibit a dull, rounded exterior surface indicative of redeposition by either a fluvial or glacial medium; one has a distinct dull, subangular cortical surface indicative of glacial transport; one is a small expended core of Laurel chert that may have been obtained either from glacial gravels or from a Laurel outcrop; and one is a small core fragment that retained no exterior surface. The cores and debitage from Tanners Creek are consistent with a general Fort Ancient pattern of use of small, locally available raw toolstone.

Other stone tools recovered from the site include various forms of small bifaces, a humpbacked knife, retouched and utilized flakes, a drill fragment, two gravers, and two microperforators. Diagnostic projectile points consist of four Type 2 Flared Base and three Type 5 Straight Sided Fine Triangular projectile points. Debitage and hammerstones indicate lithic reduction activities occurred at the site, and a single mortar indicates plant processing activities. Although no chipped stone discs were recovered, five unmodified flattened stone cobbles may have held a similar function or may be chipped disc preforms.

Only three potential bone/antler tool fragments were recovered. The first is an antler fragment with a slight bevel at one end and some indications of longitudinal drilling of the antler core. This artifact is classed as a possible antler projectile point fragment. The second artifact is the distal end of an antler tine that is somewhat battered, suggesting it functioned as an antler flaker. The final possible bone artifact is a piece of blackened, polished bone with small pock marks across one surface. It is unknown whether this is a portion of a larger polished bone tool or whether the polish and pock marks are from digestion and/or carnivore gnawing. In addition, one bone fragment was recovered that possessed all the characteristics of a flake (a striking platform, bulb of percussion, and a flattened cross section). This piece of bone may be debitage from bone tool production or a flake produced during marrow extraction.

Only uneroded and unspalled sherds measuring ≥ 4 cm^2 were included in the ceramic attributes analysis, resulting in a total of 175. The results indicate that the Tanners Creek Anderson phase assemblage consists entirely of jars with orifice diameters ranging from 20 to 29 cm. The vast majority of sherds (94%) are tempered with shell only. A little over half are plain surfaced (53%). S-twist predominated on the cordmarked jars. The jars have flared rims (n=9) ranging in thickness from 6 to 15 mm and rounded shoulders varying in thickness from 5 to 9 mm. Some rims are thickened with rim bands measuring between 16 and 29 mm wide. Vessel body thickness ranges from 4 to 11 mm and basal thickness ranges from 8 to 13 mm. Lips are predominantly rounded (73%) and range in thickness from 4 to 10 mm.

Approximately 21% of the sample is decorated and includes curvilinear and rectilinear guilloche motifs (Figure 3); left, right and alternating groups of oblique slashes; notching; and an example of paired castellations (raised areas) on the lip. Most decoration occurs on vessel necks and rims. A couple of the rim bands are incised with oblique slashes – one with groups of three alternating slashes. Punctated guilloches and cordwrapped dowel impressions are not present in the Tanners Creek assemblage. We identified three thick strap handles, including a unique example of a thick strap and semi-circular lug hybrid (Figure 4).

Figure 3. Decorated sherds from Tanners Creek. Photograph by Stacy Bennett.

Figure 4. Unique semi-circular lug strap handle from Tanners Creek. Photograph by Stacy Bennett.

Haag (Site 12D19)

Black's (1934) initial investigations at the Haag site indicated the presence of two spatially discrete components, one yielding grit-tempered ceramics and the other shell-tempered sherds. Investigations by Indiana University in the 1970s (Reidhead and Limp 1974) confirmed the presence of significant Late Woodland Newtown and Fort Ancient deposits at the site. While most of IU's work focused on the Newtown component, several deep Fort Ancient storage pits and burials concentrated at the southern end of the site were excavated. The storage pits ranged in size up to 8 ft in diameter and 8 ft deep (Reidhead and Limp 1974).

A total of ten human and six dog burials were included in the Fort Ancient component. Two of the human burials were associated with turtle shell bowls, and one burial contained a complete shell-tempered vessel containing a mussel shell spoon. A rectangular mussel shell bead was found with another (Reidhead and Limp 1974).

Over 3,000 shell and shell/limestone-tempered sherds and 164 rims were associated with the Late Prehistoric component at the site. Although Reidhead and Limp (1974) stated that the site lacked guilloche decorated pottery, examples were identified among the sample of sherds reanalyzed by the authors in 2011. Three radiocarbon dates associated with the Middle Fort Ancient component were obtained by GBL. Features 312 and 320, both clay-lined pits, each yielded wood charcoal dated to 720 +/-120 B.P. and 680 +/-110 B.P., respectively. Feature 75, a hearth, yielded wood charcoal dated to 950 +/-160 B.P. (Drooker 1997:77; Reidhead and Limp 1974).

Our analysis of the Fort Ancient ceramics and stone tools curated at GBL indicates that, like Tanners Creek, the Haag site Fort Ancient component is Anderson phase and dates to the Middle Fort Ancient. The diagnostic stone tools include triangular points and chipped limestone and slate discs. While Type 2 Flared Base points were most common, Type 5 Straight-Sided and Type 3 Coarsely Serrated points also were present. Groundstone artifacts noted include a large celt and a large, incised elbow-shaped sandstone pipe.

We focused our attention on ceramics from features that were clearly associated with the Fort Ancient component at Haag. Due to time constraints, we selected only rims, appendages and decorated body sherds measuring ≥4 cm^2 for analysis. The mortuary vessel from Burial 1 (Reidhead & Limp 1974:17, Fig. 10) also was included in our sample, as were two body sherds with a red slip on the exterior surface and one possible check-stamped sherd. This provided the greatest number of temporally diagnostic attributes per examined sherd.

The total number of sherds analyzed was 58. Jars were the most common vessel form. The three bowls mentioned by Reidhead and Limp (1974) also were observed in the sample and an additional bowl identified.

The majority (83%) of the sherds are tempered with shell only. Most are plain surfaced (81%). S-twist predominated on the cordmarked jars. Jar rims are predominantly flared (69%) ranging in thickness from about 4 to 13 mm. Both rounded and angular shoulders tempered with shell or shell and limestone are present and range in thickness from about 6 to 12 mm. The strongly everted rim form of the mortuary vessel was unique in the assemblage. Some rims are thickened with rim bands measuring between 13 and 23 mm wide. Vessel body thickness ranges from 3 to 10 mm. Lips are flat to flat-rounded (46%) or rounded (39%) and range in thickness from 8 to 12 mm. Appendages consist of a lug, loop handles, and thick strap handles. One loop handle was angular (elbow-shaped). Both loops and straps appear to have been attached to jars with rivets based on observed rivets on appendages and rims with rivet holes.

Decorations on jar rims include two examples of curvilinear guilloche; notching on the rim just below the lip; vertical stick impressions on rims just below the lip; and parallel, oblique rows of punctates on the neck. Lip decorations include a grooved lip, several examples of oblique cordwrapped stick impressions, and notching. The largest bowl rim has a large lug attached to the rim that extends above the orifice and is decorated with two large punctates on the interior side of the lug. Another of the bowls has a flattened lip decorated with fairly regularly spaced circular hollow punctates. Castellations are associated with handles and occur on the lips and handles singly, in pairs, or in sets of three (Figure 5).

Figure 5. Decorated sherds and handles from the Haag Site. Photographs by the authors. Courtesy of the Glenn A. Black Laboratory of Archaeology, Indiana University, Bloomington.

The most recent investigations at the Haag site were conducted by Ball State University (ARMS). Construction of an asphalt processing plant damaged a portion of the site and Ball State was hired to mitigate the damage. Most of the artifacts recovered by this investigation belonged to the Newtown component. Fort Ancient artifacts recovered included 11 triangular points and 12 shell-tempered sherds (1.2% of total), including one plain rim and a portion of a semi-circular lug appendage (Cochran et al. 1995).

Other Dearborn County Sites

12D4

Unfortunately, Site 12D4 largely has been destroyed by gravel mining operations. On October 11, 1932, Mr. Fred Steele discovered a child burial exposed by these mining operations. Associated with the burial was a small shell-tempered bowl with two loop handles. Inside the bowl was a freshwater mussel shell spoon. The vessel measures 7 inches in height, 6.5 inches in width, and has a rim diameter of 5 inches (Black 1934). A resurvey of the site in 1981 noted that significant portions had been destroyed by subsequent mining. Shovel probing and extraction of solid earth cores in the remaining portions of the site failed to yield evidence of intact subsurface deposits, although a possible stone mound was noted on the site but outside the project area boundaries (Richardson 1981).

State Line (12D18)

The State Line site is located on the Indiana and Ohio state boundary line, with portions of the site located in both states. The site is known to contain both Middle Fort Ancient Anderson phase and Late Fort Ancient Madisonville Horizon components. Three or four mounds are located on the Ohio side (DHPA 2007).

Both sides have been heavily impacted by construction and looting. For instance, several buildings have been constructed on the site, and a portion has been stripped for borrow fill by a contractor and destroyed. A letter on file at DHPA indicates that GBL had informed the contractor that he was not to impact the site. The contractor ignored their recommendation and proceeded with his borrow operations without regard to the site‘s historic value (C. Munson to G. Ellis, letter, 17 Oct. 1983, State Site Files, DHPA).

In his initial survey of the State Line site, Black (1934) describes several regularly spaced burials uncovered during excavation of a barn on the Indiana side of the state line. Shell-tempered vessels were recovered with the burials. Black (1934:191) describes the Fort Ancient pottery he collected as ―shell tempered, some cord marked, some plain; the bulk of those having rim decorations have an incised curvilinear design as the decorative motif. One sherd in the collection has the incised design augmented with impressed dots.” Other artifacts reported by Black (1934; Griffin 1966) include six triangular points (including one Type 3 Coarsely Serrated) and a limestone disc.

Given that they are the same site, it is fitting to briefly describe Vickery et al.‘s (2000) investigations of the Ohio portions of the State Line site (33Ha58). Vickery et al.‘s (2000) salvage excavations at State Line yielded a section of a large village with a plaza in the southeastern portion of the site. In addition to a large number of Anderson phase sherds associated with three radiocarbon dates (785 +/-60 B.P., 715 +/-55 B.P., and 695 +/-60 B.P.), the authors recovered or recorded numerous wall trench houses, shell gorgets, bowls and pans, water bottles, Oliver and ―Mississippi-like” ceramics, and a variety of other traits that are more reminiscent of the Late Fort Ancient Madisonville Horizon (Vickery et al. 2000).

Guard (12D29)

The Guard site is a circular Middle Fort Ancient village with 3 mounds. One of the mounds was damaged when a house was constructed on top of it; burials, including at least one with a pottery vessel, were uncovered while digging a basement. Construction of a power line across another of the mounds disturbed additional burials (DHPA 2007). Black‘s (1934) survey of Guard yielded shell-tempered pottery with guilloche designs and triangular points. Trailed line and punctate sherds were recovered during survey for a water line (DHPA 2007). Most recently, Robert Cook and Jarrod Burks conducted a geophysical survey at Guard. Magnetic susceptibility failed to produce clear results, but magnetic gradiometry provided an unusually clear pattern of intact rectangular structures arranged around a circular plaza (Cook and Burks 2011; Cook and Martin 2013). Testing of geophysical anomalies by Cook and Martin (2013) yielded over 54,000 artifacts and identified 47 features, including structural post holes, a wall trench, hearths, and pits radiocarbon dated to between A.D. 1025 and 1275.

Bratfish (12D74)

The Fort Ancient component at the Bratfish site was discovered during Phase II trenching prior to the construction of the Bratfish Marina at the confluence of Laughery Creek and the Ohio River. A total of 46 sherds were recovered during this testing, of which 42 were shell-tempered (Stafford and Cantin 1989). Phase III mitigation at the site identified 38 cultural features, 26 of which were assigned to the Early Fort Ancient component (Anslinger 1993).

Fort Ancient features at Bratfish were clustered in the southeastern portion of the site and include 8 refuse pits, 5 puddle clay-lined hearths, 2 oval basin hearths, 3 concentrations of reddened limestone slabs (one with oxidized soil), a cobble or FCR-filled pit, 2 caches, 3 debris concentrations, and 2 possible postmolds. The two caches were designated Features 23 and 39. Feature 23 consisted of three hammerstones, a large battered cobble with flake detachment scars, and an unmodified flattened cobble and is interpreted to be a celt or other groundstone tool manufacturing kit. Feature 39 contained two large bifaces that may be cores or blanks.

While 7949 prehistoric sherds were recovered from Bratfish, only about 30% were suitable for analysis. Of the 823 Fort Ancient ceramics analyzed from features, 679 (82.5%) were shell-tempered, 81 (9.8%) were shell/limestone-tempered, and 51 (6.2%) were limestone-tempered. Another 12 (1.5%) sherds found in Fort Ancient contexts are grit-tempered and are considered intrusive contaminants from the site‘s Woodland component. Forty-two of the limestone-tempered sherds were recovered from the same feature and represent a maximum of two vessels. Shell-tempered ceramics were found in all Fort Ancient features that yielded pottery (Anslinger 1993:51).

Most shell-tempered sherds from unit excavations originated in the upper 30 cm of the Ab horizon. The 30-40 cm level was mixed or transitional and shell tempering was rare and likely intrusive below 40 cm. Excluding grit-tempered ceramics, 358 sherds were recovered in the upper 30 cm. Of these, 254 (70.9%) are shell-tempered, 12 (3.4%) are mixed shell/limestone-tempered, and 92 (25.7%) are limestone-tempered. Some of limestone-tempered sherds in this zone could be Late Woodland (Anslinger 1993:51).

A total of 806 Fort Ancient sherds from features could be analyzed for surface treatment. Of these, 765 (94.9%) were smoothed or plain sherds and 41 (5.1%) were cord-marked. Three sherds from Feature 1 may be brushed. The smoothed/plain sherds were shell-tempered (n =

653, 85.4%), mixed shell/limestone-tempered (n = 64, 8.4%), and limestone-tempered (n = 48, 6.3%). The cord-marked sherds were shell-tempered (n = 19, 22%), shell/limestone-tempered (n = 26, 63.4%), and limestone-tempered (n = 6, 14.6%). Of the 281 Fort Ancient sherds from the upper 30 cm, 85.8% (n = 241) were smoothed and 14.2% (n = 40) were cord-marked. Smoothed sherds were 84.2% (n = 203) shell-tempered, 1.7% (n = 4) shell/limestone-tempered, and 14.1% (n = 34) limestone-tempered. Cordmarked sherds were shell- (n = 1, 2.5%) and limestone-tempered (n = 39, 97.5%) (Anslinger 1993:52).

Ten appendages were recovered. Of these, three were perforated lugs. One had two castellations on the lip above the lug. Another had a single castellation on the lip in the center of the lug. Two appendages were small strap handles. A horizontal lug or handle portion was found in Feature 26. Three other appendages are small fragments. The last appendage is ―horn-like" with a circular to oval profile. This sherd is shell/grog tempered and is similar to Mississippian bean pot handles (Anslinger 1993:54).

The only decorations were incising (n = 1 rim and 1 body) and stick impressions. The incised rim is from a unit context and is broadly trailed and may be a copy of a Ramey Incised design. The body sherd is from Feature 12 and has two parallel curvilinear lines in a guilloche design. Both sherds are shell-tempered. Two sherds exhibit nodes. No rim thickening is present (Anslinger 1993:55).

Chipped and groundstone tools assigned to the Fort Ancient component include 19 triangular points, 21 bifaces, 4 drills, 3 unifaces, 6 celts, 3 pitted stones, 4 hammerstones, and 1 sandstone abrader. Two radiocarbon dates were obtained from Fort Ancient features. These are A.D. 984 (1001, 1012, 1017) 1146 and A.D. 1039 (1161, 1185) 1217. Both dates were obtained on wood charcoal from refuse pits (Anslinger 1993).

Site 12D124

Site 12D124 was originally identified by GBL as a large, multicomponent site yielding dozens of triangular projectile points and shell- and limestone-tempered pottery with guilloche designs and cord-marking. Shell-tempered pottery was recovered during resurvey of the site by ARMS (DHPA 2007). ARMS also recorded a small collection of 42 shell-tempered plain and cord-marked sherds from the site. Included among these sherds were curvilinear and rectilinear trailed necks and one a convergent-sided strap handle with two castellations (Unpublished notes on file at DHPA).

Site 12D158

Site 12D158 was recorded by GBL in 1974 as a moderately dense scatter of stone tools and prehistoric pottery. Shell-tempered sherds, including some with guilloche designs, were recovered during survey, and shell-tempered body sherds are reported on the site form as common. The site‘s owners maintain a collection of several sherds and triangular points (DHPA 2007).

Levee (12D363)

Two shell-tempered sherds were recovered from the Levee site (12D363) by Cultural Resource Analysts (CRA) as part of the Argosy Casino Project. These sherds were classified as

Madisonville Plain but could be any plain Fort Ancient type. One of the sherds was found in Feature 7, a plow-impacted feature that may be the remains of an earth oven. This feature yielded seeds of spurge, skullcap, purslane, and bedstraw (Kerr and Bundy 2010).

12D400

Site 12D400 was located in 1994 and tested by deep trenching by GBL as part of the Boomtown Landing project. A total of 3 triangular points and 22 cord-marked sherds were recovered during this investigation, of which 2 were shell-tempered and 20 limestone-tempered. A feature of unknown age was recorded in one of the trenches, and charcoal and FCR were noted at depths of up to 130 cm below surface (DHPA 2007; O'Brien 1995).

Boomtown Landing (12D486)

The Boomtown Landing site (12D486) is likely a Terminal Late Woodland or Early Fort Ancient site investigated by Indiana State University (ISU) and GBL. Subsurface features were encountered during deep testing at the site, and survey of the eroding riverbank in front of the site yielded seven features associated with a midden that begins 60 to 80 cm below ground surface. Two of the features (3 and 4) were investigated. Feature 3 was a partially looted pit that yielded nearly 1000 sherds. Feature 4 was difficult to define but may have been a hearth (DHPA 2007).

Artifacts recovered from Boomtown Landing include a humpbacked knife and two triangular points. One of the points is a Type 3 Coarsely Serrated Triangular point. Analyzable ceramics are grit-tempered (n = 1), limestone-tempered (n = 394), and limestone/grit-tempered (n = 32). Thirteen sherds are decorated with cord-wrapped stick impressions in chevron patterns just below the neck. Two modified bone artifacts were recovered – a possible beamer fragment and an antler spatulate implement that may be a pressure flaking tool. Botanicals from Feature 3 include 140 maize kernels, 105 maize cupules & glumes, 2 *Cucurbita pepo* squash seeds, 1 little barley seed, and a variety of wild seeds and nuts in low quantities (O'Brien et al. 1997).

Keller (12D509)

A small Fort Ancient component was recorded during excavations at the Keller site. Locality J yielded four shell-tempered sherds classified as Madisonville Plain but that could be any plain Fort Ancient ware. All four sherds are from the same vessel. Three are from Feature 340, a shallow basin assigned to the site's Terminal Late Woodland component, and one is from general unit excavation. Two Fort Ancient dates from the site are considered anomalous by the excavators, but these could be associated with this small Fort Ancient component. These dates are 400 +/-50 B.P. from Feature 208, a pit hearth, and 240 +/-40 B.P. from Feature 254, a small pit hearth (Kerr and Bundy 2010).

Site 12D591

Phase II testing of site 12D591 yielded 110 artifacts, all confined to the plowzone. Included among these were one shell-tempered sherd and a triangular projectile point. The only subplowzone feature identified was a cluster of burned rock of unknown age (Kreinbrink 2010).

Other Small Sites

Two surveys of site 12D196 yielded several triangular points, an exfoliated shell-tempered sherd, two leached limestone-tempered sherds, and one piece of cord-marked grit-tempered pottery (DHPA 2007; Parish and McCord 1995). Survey of the Deer Marsh site (12D247) yielded shell-tempered pottery and triangular points; a mound is located at the site but it is not certain whether this mound is cultural. A shell-tempered rimsherd from site 12D316 was assigned to the Madisonville Horizon by GBL. A Nodena point, likely indicating a Late Fort Ancient affiliation, was recovered from site 12D317 by GBL. A diagnostic Fort Ancient Type 3.1 Finely Serrated Triangular point was recovered from site 12D462 by ARMS. A collection from the Kocher site (12D491) includes Early, Middle, and Late Fort Ancient pottery, shell hoes, and bone tools; burials and refuse pits are reported from the site (DHPA 2007). A single shell-tempered sherd was recovered in replaced topsoil in level 1 of Unit 13 during testing at site 12D511 (Kerr and Creasman 2003).

Ohio County Sites

Milton Village & Burial Site (12O14)

The Milton Village & Burial site (12O14) was first identified on the bank of Laughery Creek near the town of Milton by Black (1934). Artifacts recovered from the site include triangular points, a pottery vessel, and a pipe. A pit excavated by Black‘s survey crew contained 21 shell-tempered sherds, a grit-tempered sherd, a large shell-tempered decorated rim with a loop handle, some burned limestone, faunal remains, and a piece of a steel knife. The knife was stained red by a burned piece of limestone found in the pit, suggesting that it was not intrusive; however, the pit had been disturbed by widening of a driveway so Black (1934) was uncertain of its affiliation. Resurvey of the site by the Indiana Department of Highways indicated that portions of the site had eroded into Laughery Creek since Black‘s survey and that two stone tumuli had been looted (DHPA 2007). The steel knife recovered by Black may be from a Late Fort Ancient component associated with a historic Indian village reported to have been located on the opposite bank of Laughery Creek during the early historic period (Tomak 1978).

Of the sherds collected by Black (1934) at site 12O14, 38 were sent to the Ceramic Repository at the University of Michigan and included in James B. Griffin‘s (1966) classic study of Fort Ancient. Of these, 3 are eroded (―hole tempered”) and 35 are shell-tempered. Twelve of the shell-tempered sherds are plain and 12 are cord-marked. Five sherds exhibit curvilinear trailing and one is a four-line curvilinear guilloche. Four of the sherds are thickened rims, one decorated with three incised oblique lines, one with curvilinear guilloche, and one is adorned by a convergent-sided strap handle. One rim is not thickened but is obliquely notched and decorated with curvilinear guilloche (Griffin 1966:186-187).

Laughery Creek (12O18)

The Laughery Creek site (12O18) is one of the least reported, but perhaps most significant Fort Ancient sites in Indiana. In his survey report of Dearborn and Ohio counties, Black (1934:215) reported that Laughery Creek ―is by far the largest site encountered during the survey. On the second Ohio River terrace, starting at the south bank of Laughery Creek and extending south for slightly over a half mile, the ground is literally covered with village debris.” In addition to being located in the vicinity of the confluence of Laughery Creek with the Ohio River, a buffalo trace is reported to have crossed the river heading toward Big Bone Lick at this location, thus accounting for the site‘s size (Black 1934).

Warren K. Moorehead also was impressed by the size of the Laughery Creek site. According to Moorehead (1906), six mounds were visible at the site in 1897, although Black noted that only two were visible during his survey. Several whole ceramic vessels had been removed from the mounds prior to Black‘s investigations and burials were reported to have been plowed up by the landowners south of Mound 4 and north of Mound 1 (G. Black to C. B. Coleman, letter, 8 March 1931). Moorehead (1906) ―opened” three of the mounds. Seven burials were found in one, which was 2 m high and 34 m in diameter in 1897. One of the burials contained two bowls (Moorehead 1906).

Several hundred sherds collected by Black from Laughery Creek were sent to the Ceramic Repository at the University of Michigan and included in Griffin‘s (1966) study of Fort Ancient. All but three of these sherds were shell-tempered. Of the 420 undecorated sherds included in the sample, 76 were cord-marked, 117 smoothed over cord-marked, and 227 plain. Most sherds were from jars, although two rims are from plain bowls. No salt pans were included in the assemblage (Griffin 1966:187-188).

Of the 58 rims from Laughery Creek, 38 were undecorated (including 25 with thickened rims) and 20 were thickened and decorated with incised oblique lines. Decorated body sherds consist of 25 curvilinear trailed, 6 curvilinear trailed over cord-marking, 1 rectilinear guilloche, 2 line-filled triangles, 1 trailed spiral design, 1 rectilinear trailed with parallel punctates, and 1 sherd with punctates that are likely from the center of a curvilinear guilloche. All 14 strap handles are convergent-sided and one is adorned with castellations. One lug handle is decorated with vertical incised lines (Griffin 1966:187-188).

In addition to abundant ceramics, Black reported numerous stone artifacts from the site. Among the projectile points are Type 3 Coarsely Serrated, as well as unserrated triangular projectile points. Included among the village debris reported by Black are artifacts he described as celts, shell hoes or scrapers, perforated sandstone netsinkers or pendants, a small sandstone elbow pipe, chipped stone adzes or hoes, discoidals, cupstones, anvils, hammerstones, bone awls and beamer fragments, and many banded slate gorgets and amulets (G. Black to C. B. Coleman, letter, 8 March 1931). The only excavations other than Moorehead‘s reported in SHAARD were unsystematic diggings by Ray Tanner as part of a field school from the College of Northern Kentucky in Covington during the summer of 1974 (DHPA 2007).

Site 12O38

Black (1934) reported shell-tempered pottery among the large quantity of artifacts from site 12O38, suggesting an intensive occupation. Unfortunately, the artifacts recovered by GBL‘s 1974 resurvey are not listed in SHAARD. Phase II testing at the site by Landmark involved mechanical stripping of the plowzone and excavation of 9 trenches. Trenching exposed areas of Middle Woodland and Fort Ancient midden, but only two of these were tested before the client decided to terminate investigations and avoid the site. Four triangular projectile points and numerous shell-tempered sherds, including one large section of a plain surfaced jar, were recovered from the surface and from portions of the midden. A radiocarbon date, mean A.D. 1300, range A.D. 1265 - 1415, was obtained on a deer tibia recovered from the surface of one of the midden areas. Two other dates from the middens are Middle Woodland (Plunkett et al. 1996).

Shallow Burial (12O55)

The Shallow Burial site (12O55) was recorded by GBL in 1974. Although not described in much detail, the site form reports abundant shell-tempered pottery, including some decorated with guilloche designs, and triangular points (DHPA 2007).

Switzerland and Ripley County Sites

Although several sites recorded in Switzerland and Ripley counties may be Fort Ancient on the basis of the recovery of triangular projectile points, only two sites in Switzerland County meet the criteria as outlined in the methods section above. Site 12Sw98 is a Fort Ancient village that yielded large quantities of grit- and shell-tempered pottery during survey. Human bone found on the site‘s surface may have been from a burial disturbed by construction of a tower for a transmission line that runs across the site (DHPA 2007).

A triangular projectile point was recovered from the surface of site 12Sw382, and subsurface testing yielded intact midden to a depth of 120 cm below the ground surface. This midden was associated with sparsely distributed grit-, limestone-, and shell-tempered ceramics. One shell-tempered sherd was recovered at a depth of 37 cm below surface, and several eroded sherds were noted in a test unit (O‘Brien 1999).

Jefferson County Sites

The only confirmed Fort Ancient site recorded in Jefferson County is site 12Je1, first identified by James H. Kellar in 1962. Kellar recovered triangular projectile points from the site, and the landowner reported pits and a slab-lined burial. Resurvey of the site by Leon Hostetler in 1986 yielded small amounts of shell-tempered pottery and a triangular projectile point, but Hostetler noted that much of the Fort Ancient component had been destroyed by severe erosion (DHPA 2007). Other possible Fort Ancient sites in Jefferson County include the Smockville/Shelton Village site (12Je10), Parker‘s Tobacco Road (12Je169), and Barnes/Carlow North Field (12Je190) (DHPA 2007).

Franklin County Sites

Pierson Stone Mound (12Fr103)

The Pierson Stone Mound was excavated as part of Setzler's (1930) Whitewater River valley surveys. Like many Fort Ancient stone mounds reported in Kentucky, the Pierson Stone Mound was constructed from limestone slabs and earth. Excavation of the mound indicated that a hollow had been carved into the limestone bedrock at the base of the mound and the body of a child placed in this hollow. A crevice carved into the limestone yielded additional burials. Artifacts recovered from the mound consisted of two antler projectile points, five bone tools, debitage, shell-tempered pottery, and triangular projectile points (Setzler 1930).

The C. B. Stone Mound (12Fr110)

The C. B. Stone Mound (12Fr110) also was excavated by Setzler (1930). Although this burial mound yielded no diagnostic artifacts, its proximity to the Pierson Stone Mound and similarities in construction suggest that it too is Fort Ancient. Two crude slate celts were found among fragmentary human remains in this mound (Setzler 1930).

Site 12Fr336

Phase III investigations at site 12Fr336 as part of the Rockies Express (REX) Pipeline project resulted in the identification of two features of likely Fort Ancient affiliation. Feature 90 yielded a small triangular point fragment, but no ceramics. A two-sigma calibrated radiocarbon date of A.D. 1040 to 1260 was obtained from this feature. Feature 104 yielded primarily limestone-tempered ceramics assigned to the Terminal Late Woodland Argosy Cordmarked type, but some limestone/shell-tempered sherds also were present. This and a two-sigma calibrated radiocarbon date of A.D. 1160 to 1270 from this feature suggest that both the limestone and the limestone/shell-tempered sherds are Early Fort Ancient (Stevens and Lloyd 2010).

Site 12Fr355

Phase II testing of site 12Fr355 as part of the REX Pipeline project yielded shallow midden but no archaeological features. Shell-tempered sherds were recovered from portions of the site (DHPA 2007).

Site 12Fr377

Phase III investigations at site 12Fr377 were conducted as part of mitigation for the REX Pipeline. Unfortunately, no Fort Ancient ceramics were recovered from the site, although three triangular projectile points assigned to the Madison type may be Fort Ancient points and one possible Nodena point is consistent with a Late Fort Ancient occupation. A charcoal sample from Stratum 5 in Unit 164 yielded a date of 390 +/-40 B.P., and a charcoal stain in Stripped Area 13 yielded a date of 910 +/-40 B.P. Feature 29, a possible pottery kiln, yielded a date of 310 +/-40 B.P. Finally, Feature 34, a possible hearth, yielded a date of 550 +/-40 B.P. No diagnostic artifacts were reported associated with any of these dates (Rinehart and Chadderdon 2010).

Conclusions

While this survey of the available published and unpublished literature pertaining to non-Oliver occupations in Indiana yielded more information than we initially anticipated, much remains to be done before a thorough synthesis and analysis of Fort Ancient in the state will be possible. Systematic surveys, particularly along Laughery Creek and the lower portions of the Whitewater River, are needed to identify additional Fort Ancient sites, including small hunting camps, special-purpose activity areas, and ritual sites that are not represented above. Large-scale geophysical testing followed by major excavations at larger sites are needed to test the Fort Ancient ceramic and projectile point chronologies in the state and identify areas where the chronologies differ from those established in Ohio and Kentucky. In addition to refining the artifact chronologies, AMS dates obtained on maize and other annuals from Indiana Fort Ancient sites can provide useful information about the introduction and use of tropical domesticates. Finally, comparative studies are needed to integrate the Indiana Fort Ancient record with existing data from adjacent states.

Fort Ancient research in Indiana is in its nascent stages. Unfortunately, many of the sites described above are well known to local collectors and have been heavily impacted over the years by non-professional investigations. In addition to this ongoing problem, many of the state‘s largest villages are located along the Ohio River in areas of Dearborn County that are currently undergoing rapid industrial and commercial development and/or erosion. It is important that as many of these sites as possible be located, identified, investigated and, if possible, preserved before southeastern Indiana‘s Fort Ancient record is permanently lost.

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DISTRIBUTIONAL ANALYSIS OF ARCHAEOLOGICAL REMAINS IN THE UPPER WHITE RIVER BASIN: AN ARCHAEOLOGICAL SURVEY OF HAMILTON COUNTY, INDIANA

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Abstract

The Applied Archaeology Laboratories (AAL) of Ball State University conducted an archaeological reconnaissance project for archaeological materials in Hamilton County, Indiana, for an FY2012 Historic Preservation Fund Grant (Grant #18-12-41921-4). This Historic Preservation Fund grant project investigated the archaeological resources of Hamilton County, Indiana. This specific project focused on the White River and its associated tributaries, as well as the southern half of the county. Approximately 565 acres (228.55 ha) of agricultural land underwent pedestrian survey, uncovering 230 new archaeological sites and 1625 artifacts. Over 157 acres (63.54 ha) underwent soil phosphate survey, revealing multiple possible prehistoric agricultural fields or gardens. The project recovered 1154 prehistoric artifacts and 471 historic artifacts from 9 different parcels of land within Hamilton County. Multiple cultural periods are represented in the artifact assemblage, including diagnostics of the Early Archaic, Middle Archaic, Late Archaic, Middle Woodland, Late Woodland, and Historic periods. The average site density recorded for the project was one archaeological site per 2.46 acres (0.41 sites/acre). The average artifact density was one artifact per 0.34 acres (2.9 artifacts/acre).

A total of 13 sites are recommended as potentially eligible for Indiana Register of Historic Sites and Structures or the National Register of Historic Places.

Introduction

In the fall of 2012 through the spring of 2013, the Applied Archaeology Laboratories conducted an FY2012 Historic Preservation Fund Grant for Hamilton County, Indiana. Hamilton County, specifically the towns of Noblesville, Carmel, Westfield, and Cicero, are currently undergoing rapid construction and growth, requiring that the cultural resources of the area, both historic and prehistoric, be documented before the information is lost. The White River Valley in Hamilton County has been part of various archaeological projects, uncovering thousands of years of use by prehistoric Native Americans. Though the documentation for the county is already relatively dense, there are many developing areas of the county that remain unsurveyed.

The project consisted of 564.76 acres (228.55 ha) of pedestrian survey of nine different parcels of land, as well as 157 acres (63.54 ha) of soil phosphate surveys of three different parcels of land. This article focuses on the results of the reconnaissance survey only. All pedestrian surveys were conducted under the supervision of the author with the help of various undergraduate and graduate students under the employ of Ball State University's Applied Archaeology Laboratories.

The following research questions guided this project:

1. What is the nature of the Early and Middle Woodland occupation?
    a. What is the relationship between mound and non-mound sites?
    b. What are the relationships with the Havana and Scioto heartlands?
2. How is resource exploitation structured during various time periods?
3. Do different contemporary traditions occupy distinct or overlapping niches?
4. What is the general cultural chronology for Hamilton County?
5. What are the densities and distributions of archaeological sites on the various landforms within the county?
6. What is the average site density within the county?

Due to a variety of factors, we were not able to address each of these questions. However, we gathered particularly intriguing data related to questions 5 and 6. This will be the focus of this short article.

Background

Hamilton County is located in central Indiana, just north of Indianapolis (Figure 1). Hamilton County is within the glacial till plains that dominate the northern two-thirds of the state. As such the majority of the surficial deposits are of late Pleistocene or Holocene age (Gray 2000; Hosteter 1978; Schneider 1966; Shurig 1970; Wayne 1956, 1963, 1966). Hamilton County (Figure 2) occupies parts of the Tipton Till Plain and the New Castle Till Plains and Drainageways (Gray 2000). The Tipton Till Plain is comprised of large areas of ice-disintegration features and is generally considered to have low relief (Gray 2000). Wayne (1966) comments on the Tipton Till Plain's flat to gently rolling topography, noting that the Wisconsin glaciation also created a number of end moraines that cross throughout (Wayne 1966:34).

Hamilton County occupies two bedrock physiographic units (Schneider 1966). The western half of the county falls within the Scottsburg Lowlands and the eastern half of the county is within the Bluffton Plain (Schneider 1966:Figure 16). The Scottsburg Lowland is a strike valley composed of an outcrop of nonresistant late Devonian and early Mississippian shales covered by up to 150 feet of till. In the northern portion (where Hamilton County resides) this bedrock lowland is ill-defined, blanketed by surface till deposits, and thus the bedrock exerts little influence on surface geomorphology (Schneider 1966).

The Bluffton Plain (Schneider 1966:56), or Rensselaer Plain (Wayne 1956:30) is composed of middle Silurian dolomites and limestones underlain by Devonian and Mississippian limestones. Glacial deposits within the plain vary from 50 to almost 300 feet (Wayne 1956:31). The bedrock of this zone shows little relief.

The soils in Hamilton County are of primarily glacial parent material. There are five general soil map units (associations) in Hamilton County (Soil Survey Staff 2013): Crosby-Treaty-Miami, Fox-Ockley-Westland, Miami-Crosby-Treaty, Patton-Del Rey-Crosby, and

Sawmill-Lawson-Genesee (Figure 3). Hosteter (1978:3-4) describes the soils as nearly universally deep, and relatively level. Some upland soils are formed in thin layers of loess (e.g., Crosby). The Ockley-Westland-Fox soils occupy glacial outwash terraces. Floodplain soils (Sawmill-Lawson-Genesse) are generally well drained and productive (Hosteter 1978).

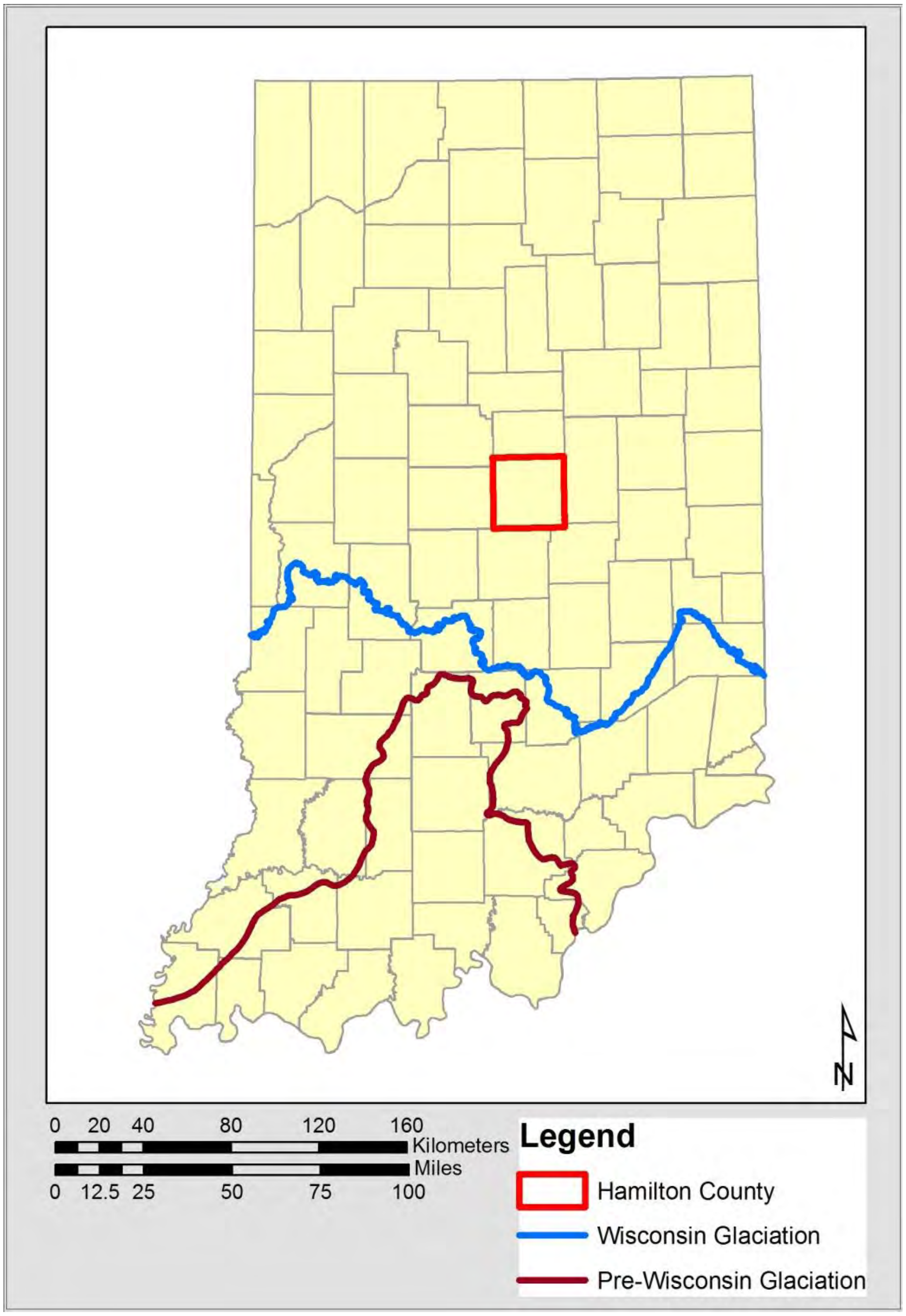

Figure 1. Hamilton County within the state of Indiana. Glacial limit shapefiles by Gray and Letsinger (2010).

There are thirty-one soil map units (SMUs) of twenty-one soil series recognized within Hamilton County (Figure 4). Soils range from very poorly drained to well drained, with the majority (70.3% by area) somewhat poorly or poorly drained. These SMUs are formed on till plains (79%), terraces (5.6%), outwash plains and terraces (2.3%), lake plains (5%), floodplains (5.3%), and miscellaneous and modified soils (2.9%) (Figure 5). Flooding is limited to a small proportion of the county, with 90.8% of the area classified as never flooding. Ponding occurs frequently on 31.3% of the county's surfaces. Erosion is noted for 16.4% of the county. Soil texture includes muck (0.2%), clay loam (2.1%), silty clay loam (31.8%), silty loam (59.7%), and loam (3.1%) (Soil Survey Staff 2011).

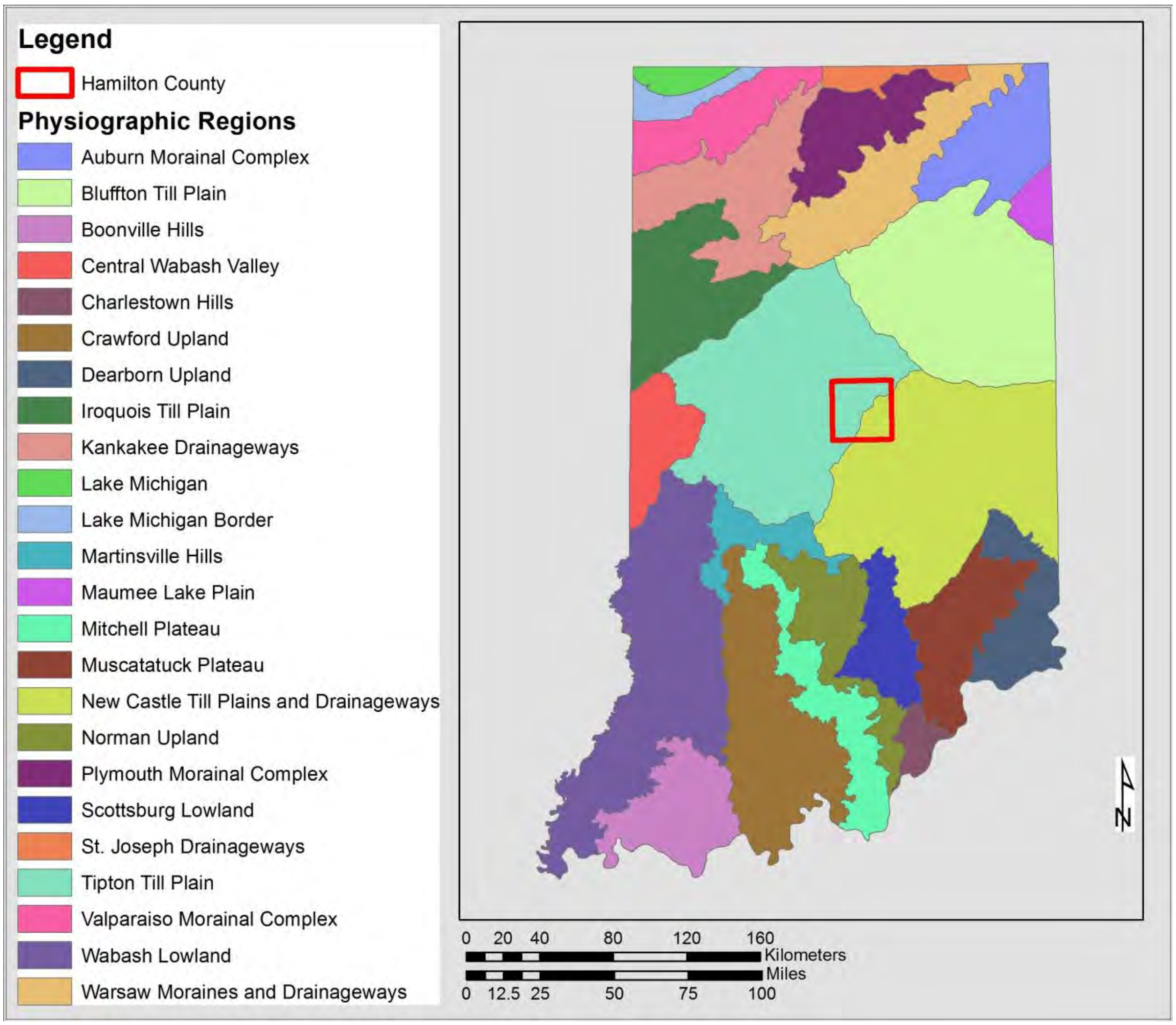

Figure 2. Physiographic regions of Indiana (Gray and Sowder 2002).

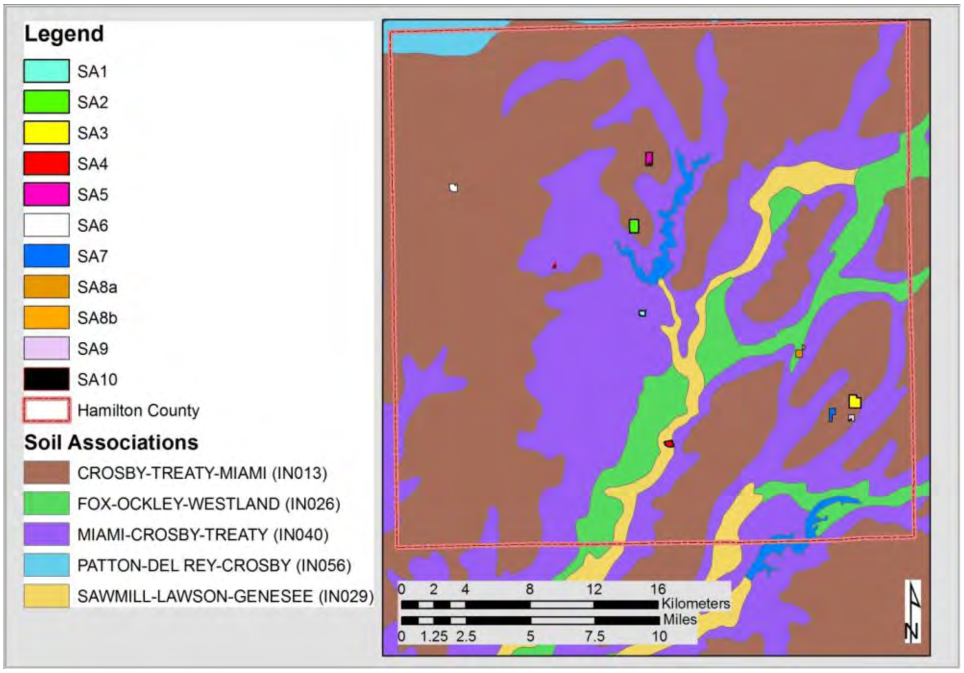

Figure 3. Soil associations within Hamilton County. Note: Hosteter (1978) only shows four associations and these bear a general similarity to the current State Soil Geographic (STATSGO) data (Soil Survey Staff 2013) map units; however, each specific description would be different.

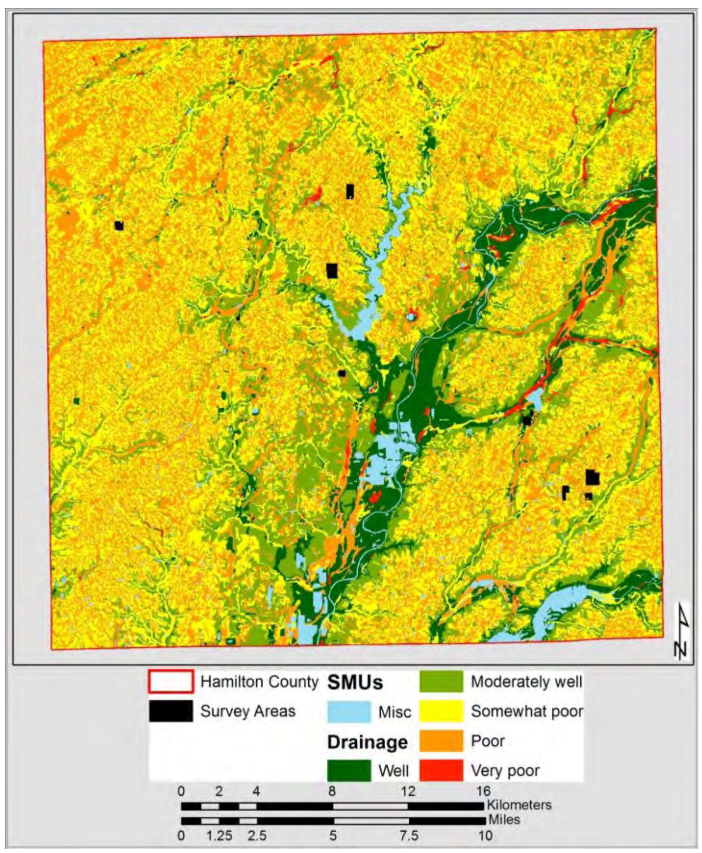

Figure 4. Soil drainage classes for Soil Map Units (SMUs) within Hamilton County. Note: Miscellaneous includes water, orthents, and pits; source: Soil Survey Geographic Database (SSURGO) (Soil Survey Staff 2011).

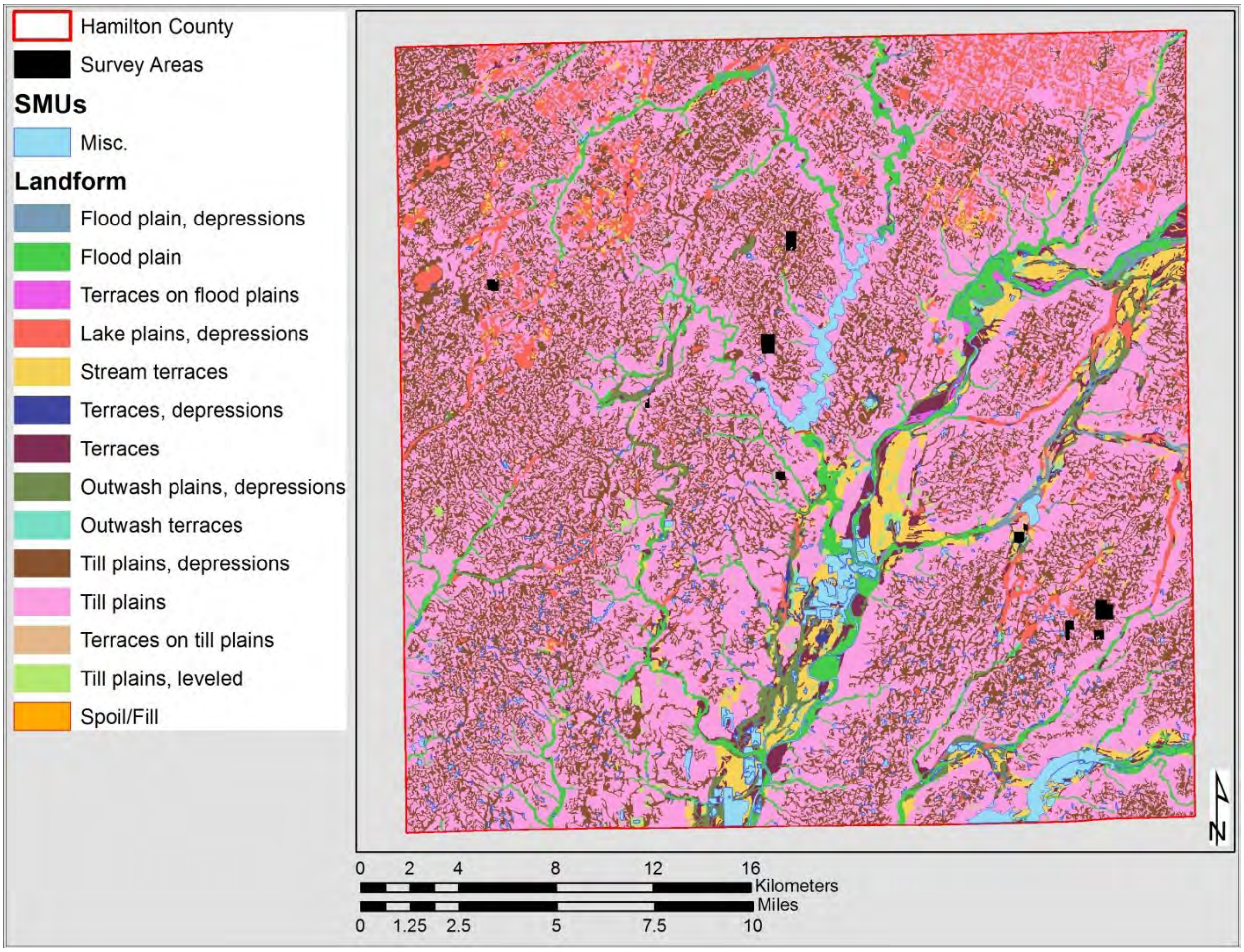

Figure 5. Soil Map Units (SMUs) classified by landform (Soil Survey Staff 2011).

Hamilton County is dominated by the White River, which splits the county on a northeast-southwest diagonal. Within the White River Hydrological Basin, there are seven USGS Watersheds (HUC10; USDA-NRCS et al. 2010) (Figure 7). The watershed boundaries might be expected to influence site distribution and interaction patterns. Water-borne travel easily provides access to exotic regions. Particularly, the White River and the Wabash watershed provide direct connection to the Lower Ohio Valley and extreme southeastern Indiana and western Illinois.

Archaeological Background

The Upper White River Valley is in an area that experienced substantial mixing and contemporaneous geographic overlap of several archaeological traditions or cultures, especially during the Late Prehistoric period (Dorwin 1971; Griffin 1966:Chapter XIV; McCord 2009; McCord and Cochran 2003; McCullough et al. 2004; White et al. 2002, 2003; see also chapters in Redmond and Jones 2003). This mixing and contemporaneity is particularly acute in Hamilton County, just north of Noblesville. There is a strong Oliver phase presence (Dorwin 1971:Figure 1; Griffin 1966:Map 1; McCullough et al. 2004:Figure 2.4) in the upper reaches of the White

River Valley evidenced by the Oliver, Bowen, and Strawtown sites (among others). Oliver phase sites exhibit a mixing of characteristics of the Western [Lake Erie] Basin Tradition Late Woodland and the Upper Mississippian Fort Ancient Tradition (Dorwin 1971; Griffin 1966; McCullough 2003; Redmond 2003). Immediately adjacent to the Strawtown (12-H-883) site there are two contemporary (or nearly so) villages associated with different archaeological traditions. The Castor Farm site (12-H-3) is a Late Woodland settlement that (with other Castor phase sites) does not adopt any Mississippian traits and maintains an identity similar to that of more northerly and easterly groups with a possible relation to the preceding Albee phase (McCord and Cochran 2003).

Only recently was Castor detangled from Oliver as a separate cultural manifestation (see discussion of ―Bowen” ceramics of the Oliver Phase in McCord and Cochran 2003). In the vicinity of Strawtown and Castor is the Taylor Village (12-H-25 site [Hill in prep; McCord 2009]). Taylor is an Oneota village, likely representing a late migration of Oneota or Oneota-related groups into the area. The assemblage from Taylor has been variously related to Oneota or Oneota-like groups such as ―Orr Focus, Fisher Phase and Huber Phase” (Cochran et al. 1993; Griffin 1966; McCullough 2000) (McCord 2009:4). The Oneota presence in the Strawtown locality (*sensu* McCord and Cochran 2003) is not limited to the Taylor site. McCord and Cochran‘s (2003) survey detected a single Oneota related site (flood plain site 12-H-1005). There is also a minor Oneota related component within the Strawtown enclosure (12-H-883), though the relationship between the Oliver occupation and the events that introduced the Oneota pottery remain unclear (McCullough et al. 2004:33). The Oneota connection to the Upper White River has been recognized for a long time, with Griffin (1966) suggesting a Fisher Focus influence in the Oliver Farm site and Bosson (also and Oliver phase site) ceramics. However, (and despite this being repeatedly pointed out [e.g., Cree 1991; McCord and Cochran 2003]) the nature of this cultural confluence is still little understood and the record is being swallowed by development at an ever increasing pace (Figures 3 and 4; see also Cree 1991:Appendix 3).

Previous surveys detected differences in the distribution of activity by time period, but also within the Late Prehistoric period by cultural affiliation. Albee and Castor phase groups tended to concentrate on the flood plain in the Strawtown vicinity, while Oliver phase groups were present on both the flood plain and the terrace. Oneota manifestations and Oliver phase are scarce in the region giving tantalizing clues about important concepts of their land use by ―their relative absence” (McCord and Cochran 2003:129).

Albee, Castor, Oliver, and Taylor Village Oneota groups are all variously characterized as depending on maize agriculture for subsistence. This strategy and the group‘s degree of commitment to it has distinct implications for choices of settlement location (see McCullough et al. 2004:29). Agriculture, and especially swidden systems, entails a peculiar pattern of landscape exploitation. Further, the presence of perhaps three contemporary groups of agriculturalists brings up the possibility of ecological competition among groups. The three groups typically are associated with different types of environments and their peaceful coexistence could be achieved by filling mutually exclusive niches, or at least geologically and ecologically distinct pockets of the same general niche. Despite proximity of their major habitation sites, it remains possible that Castor, Oliver, and Oneota populations were cultivating and gathering in fairly distinct pockets of the very productive and diverse environment provided by the Strawtown locality and the Upper White River in general.

Hamilton County had approximately 1,387 previously recorded sites. As part of our records review, we were given access to a disassembled version of the SHAARD database consisting of all of the constituent tables of the database with all records for Hamilton County; however, the delivered version did not retain the relational structure of the database. We have partially reconstructed the relational structure of the DBF files delivered in Microsoft Access. This reconstructed version of the SHAARD database forms the primary basis of our discussion of sites that follows. From the reconstructed relational database there are at least 1,392 components recorded in SHAARD, of which 1,321 have UTM coordinates.

Of the occupations with a reported cultural affiliation, the majority are unidentified prehistoric. There are 8 Paleoindian sites, 246 Archaic sites, 241 Woodland sites, 11 Mississippian-related sites, and 159 historic sites (SHAARD 2012; Figure 6; Table 1). The noticeable proliferation of Late Woodland sites is due in large part to the series of intensive surveys conducted on the terraces and floodplain of the Strawtown Koteewi Prairie Park (e.g., Arnold, et al. 2007; Arnold and McCullough 2009; Black n.d.; Cantin et al. 2003; Graham and Hipskind 2012; Hixon 1988; McCord 2001; McCord and Cochran 2003; McCullough 2011). Whether or not this temporal distribution is representative of the actual population of archaeological sites in Hamilton County is unknown; however, this seems very unlikely. A quick look at Figure 6 reveals a heavy spatial bias in the reporting of sites. This is particularly troubling in Clay and Delaware Township, as Indianapolis is rapidly encroaching on this area. The bias towards the river valley favors certain time periods over others. This is likely further contributing to the overrepresentation of Late Woodland sites in the database. Occupations of different time periods are concentrated in different ecological and geological settings in Hamilton County and surrounding regions (e.g., Cree 1991:Table 10; Striker and Rahe 2004:7-10).

Table 1. Distribution of Components among Cultural Periods for Previously Identified Sites in Hamilton County, from SHAARD. (2012)

Period	Occupations	%	% Prehistoric
Unidentified Prehistoric	727	52.2%	59.0%
Paleoindian	8	0.6%	0.6%
Archaic	65	4.7%	5.3%
Early Archaic	87	6.3%	7.1%
Middle Archaic	13	0.9%	1.1%
Late Archaic	77	5.5%	6.2%
Terminal Late Archaic	4	0.3%	0.3%
Woodland	60	4.3%	4.9%
Late Archaic/Early Woodland	2	0.1%	0.2%
Early Woodland	26	1.9%	2.1%
Middle Woodland	30	2.2%	2.4%
Terminal Middle Woodland	3	0.2%	0.2%
Late Woodland	120	8.6%	9.7%
Late Woodland/Mississippian	4	0.3%	0.3%
Mississippian	7	0.5%	0.6%
Historic	159	11.4%	
Total	**1392**	**100.0%**	**100.0%**

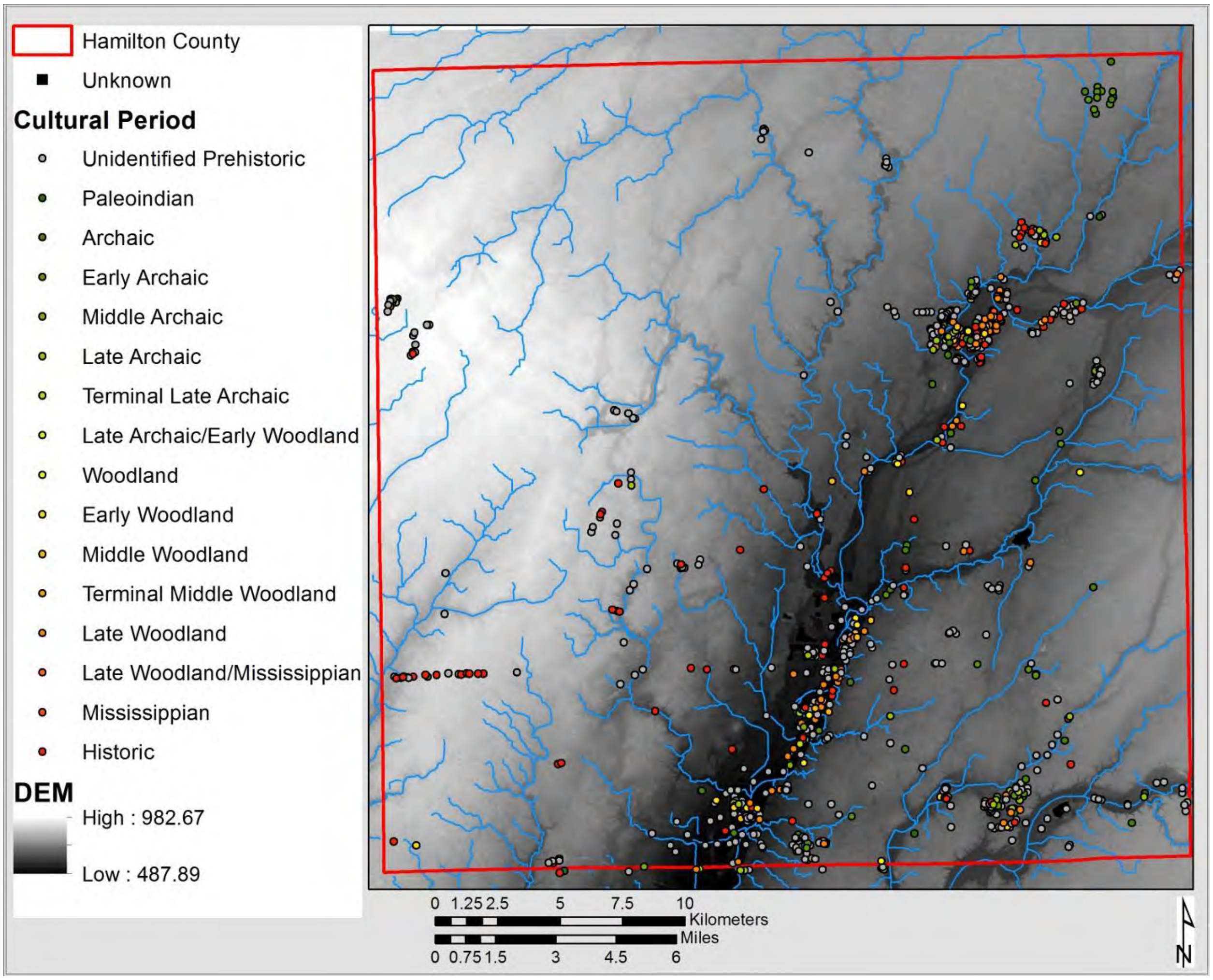

Figure 6. Locations of previously identified sites in Hamilton County, Indiana. Digital elevation model from 2012 Indiana Map data.

Survey: Sample and Methods

Approximately 565 acres (228.65ha) of agricultural land were surveyed by pedestrian transects during this project across nine Survey Areas (SAs). The purpose of the pedestrian survey was to identify cultural resources in a rapidly developing county, evaluate their nature, and assess their potential eligibility for state and national registers of historic places. All surveys followed DHPA guidelines for archaeological reconnaissance, and/or were conducted with a pre-approved plan for archaeological investigations.

Properties were targeted for pedestrian survey based on their distance from water in meters as well as a broad soil classification (loam, silty loam, silty clay loam). Properties with at least forty acres of agricultural field predominating and within areas annexed by a municipality were prioritized.

The field crew members were then spaced no more than ten meters apart and asked to walk in straight transect lines the length of the agricultural fields being surveyed. All prehistoric and historic artifacts were collected with the exception of fire-cracked rock (FCR). Fire-cracked rock was recorded in the field but not collected under most circumstances. Each artifact find location was recorded with Trimble GPS units and uploaded to a GIS in ArcMap 10.0 and 10.1.

Sites are defined analytically in the lab based on distribution of materials and types of assemblages. Generally, a 15 m buffer was used as a guide for clustering mapped points on the landscape. Laboratory analysis followed standard procedures for AAL. This includes microscopic examination of all chert samples in an attempt to identify most likely geological source of the raw materials.

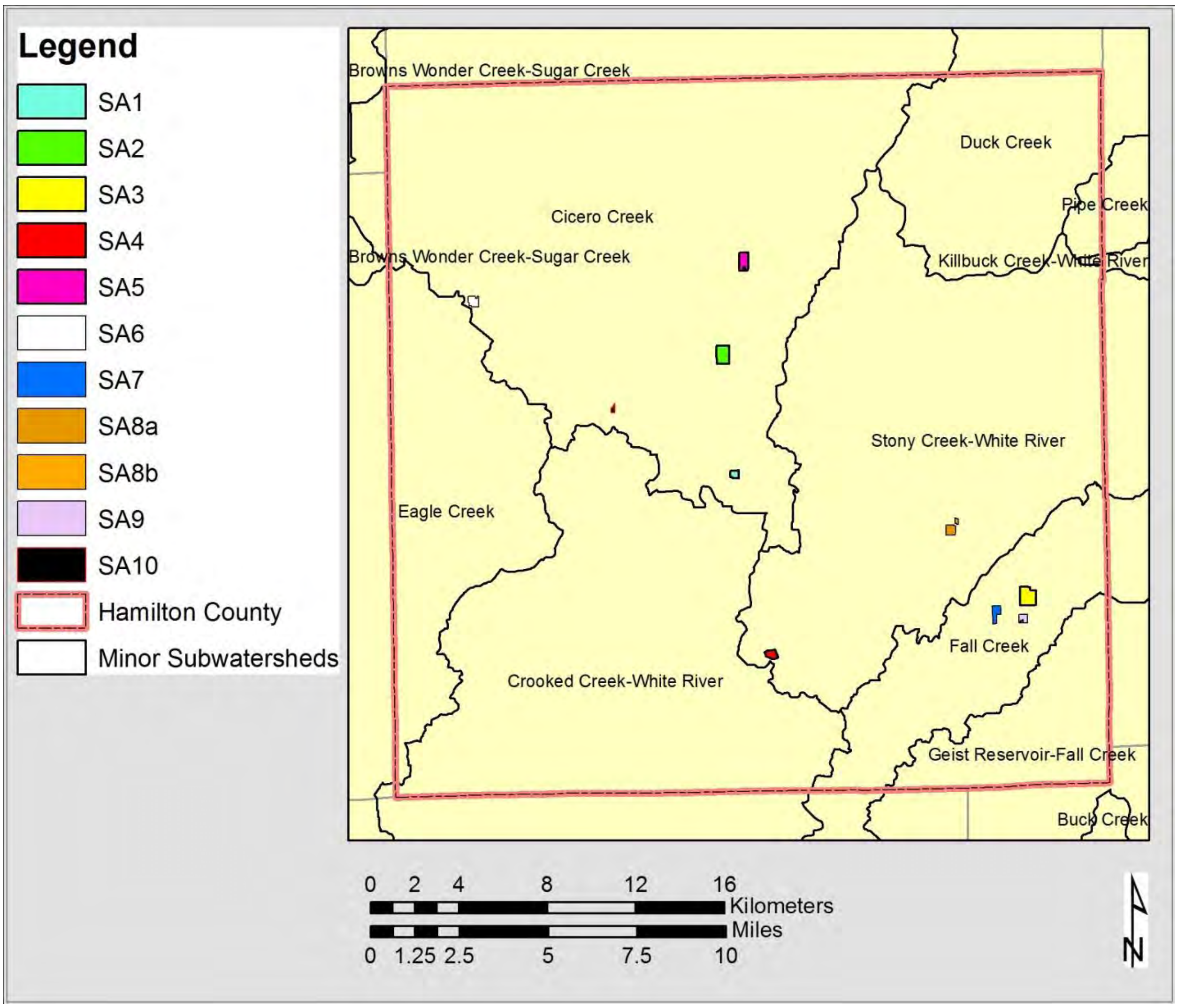

Figure 7. USGS watersheds (HUC10) for Hamilton County, Indiana (USDA-NRCS, USGS, and EPA 2010).

Most definitions of lithic artifact types used in this project come from Andrefsky's second edition of ―Lithics: Macroscopic Approaches to Analysis" (Andrefsky 2005). For determining typology of prehistoric flaked stone artifacts, a flow chart was designed specifically for the Hamilton County Project (Figure 8).

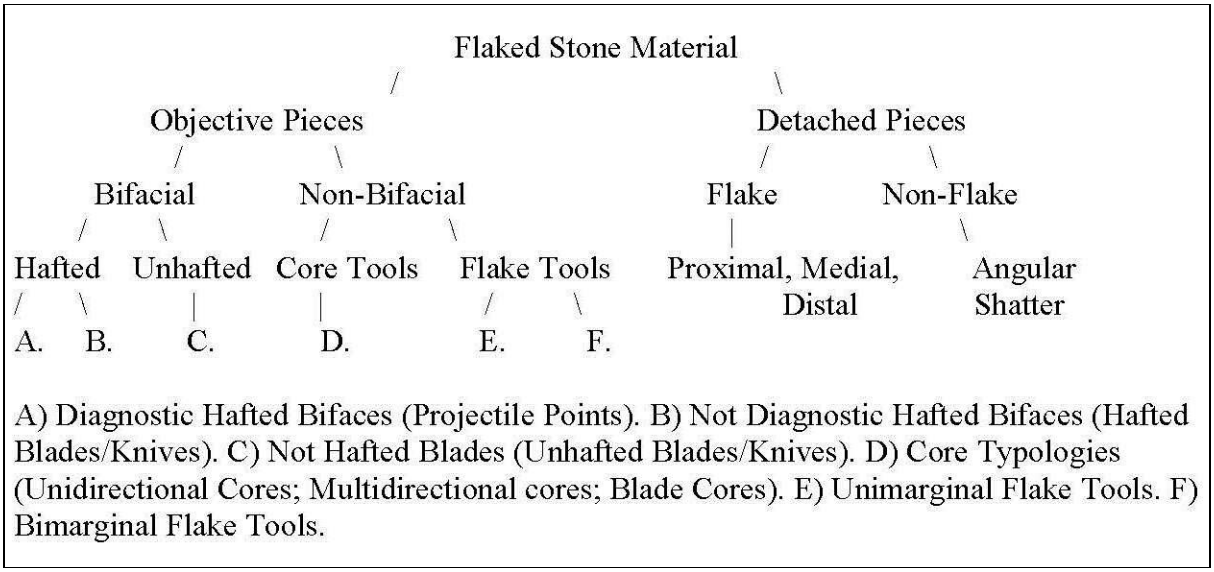

Figure 8. Flow chart of flaked stone implements. Adapted from Andrefsky (2005:76, Figure 4.7).

Results

A total of 230 new archaeological sites were discovered during this project over nine survey areas encompassing 564.76 acres (228.55 ha). On average one site every 2.46 acres (0.996 ha) was discovered, and one artifact every 0.35 acres (0.14 ha). Prehistoric artifacts were substantially more dense (1 every 0.49 acres) and frequent (N = 1154) than historic artifact (1 every 1.2 acres, N = 471; Table 2). Artifacts ranging from the Early Archaic through Late Woodland, and 19th Century through modern period were discovered. Most sites are small lithic scatters/historic scatters or isolates and not considered eligible for the NRHP. Thirteen sites are considered to possess significant information potential for important regional research.

Table 2. Summary of Distribution and Density of Sites and Artifacts for all Survey Areas.

	SA1	SA2	SA3	SA5	SA6	SA7	SA8	SA9	SA10	Total	N/acre	acres/N
Sites	11	21	37	43	6	16	59	18	19	230	0.41	2.46
Artifacts	38	296	189	165	12	41	542	126	216	1625	2.88	0.35
Historic	1	66	110	38		20	134	98	4	471	0.83	1.20
Prehistoric	37	230	79	127	12	21	408	28	212	1154	2.04	0.49
Acres	31.99	112.94	138.51	79.59	52.30	55.30	55.78	25.91	12.44			
Historic/acre	0.03	0.58	0.79	0.48	0.00	0.36	2.40	3.78	0.32			
Prehistoric/acre	1.16	2.04	0.57	1.60	0.23	0.38	7.31	1.08	17.04			

There are several interesting distributional patterns that emerge from this large survey project. While we surveyed a very small proportion (~0.22%) of Hamilton County, Table 3 shows that our sampling of soils and environmental zones produced a fairly good representation of the variability present in the county (see also Figures 4 and 5). Floodplains, clay loam soils, and moderately well drained soils are underrepresented. As floodplains are over-represented in the current sample of known sites within the county, this omission is tolerable. Inclusion of floodplain soils would likely increase our overall site density, but not significantly. Given the distribution of our sample across environmental variables, it seems that our density of approximately one site every 2.4 acres is probably fairly representative of the region. However, for a variety of reasons, site density is not the most pertinent variable in a distributional analysis.

Table 3. Proportional Representation of Various Geological Variables.

Landform	% County	% Survey	Texture	% County	% Survey	Drainage	% County	% Survey
Till Plains	79	85	**Mk**	0.2	0	**Very Poor**	0.8	0
Terraces	5.2	5.64	**CLm**	2.1	0.62	**Poor**	31.7	41.18
Floodplain	5.4	0	**SiCLm**	31.8	41.18	**Somewhat Poor**	38.6	42.49
Outwash	2.3	2.71	**SiLm**	59.7	55.91	**Moderately Well**	18.3	8.43
Lake Plains	5	5.63	**Lm**	3.1	2.3	**Well**	7.8	7.9
Spoil/Fill	0	0						

Our sample (coincidentally) cuts a southeast to northwest cross-section across Hamilton County (see Figure 4), sampling most of the watersheds in the county (Figure 7). Fall Creek and Cicero Creek are more heavily sampled (though Cicero is the largest in the county). Cicero Creek has the highest average (per SA) prehistoric artifact density at 4.41 artifacts per acre; however, this is heavily influenced by SA10 (17.04/acre) (Table 2). On a per acre average, Cicero Creek watershed weighs in with a 2.51 artifact/acre density. The Stoney Creek/White River watershed is represented by SA8 and exhibits a density of 7.31 prehistoric artifacts/acre, 2.41 historic artifacts/acre, and 9.72 artifacts/acre. The Fall Creek drainage weighs in with the lowest densities with 1.6 artifacts/acre (Table 2). However, watershed explains very little of the variability in artifact density.

The SAs encompass a wide range of elevation, and nearly the full range in the county (Figure 9). SA6 occupies the highest elevation (~954.32 ft, 290.88 m) sampled and nearly the highest elevation in the county and yielded the lowest artifact densities. The SA with the next highest elevation is SA10 (~908.08 ft, 276.78 m) which exhibited by far the highest artifact density, ~10/acre more than any other and nearly 10 times the average (Table 2). Survey Areas 2, 3, 5, and 9 (~850 ft, 260 m) occupy approximately the same elevations and vary from 0.57 (SA3) to 2.62 (SA2) artifacts/acre. Survey Areas 1 and 7 occupy the next lowest elevation range (~825 ft, 252 m) and they exhibit relatively divergent artifact densities of 1.19/acre and 0.74/acre, respectively. SA8 occupies the lowest elevation sampled and exhibits the second highest artifact density, ~5 artifacts more per acre than the third most dense, SA9 (also ~5 more prehistoric artifacts than the third most dense prehistoric concentration, SA2).

From this point forward, only prehistoric artifact densities will be discussed, as a few small, but dense historic sites throw off artifact densities for some SAs.

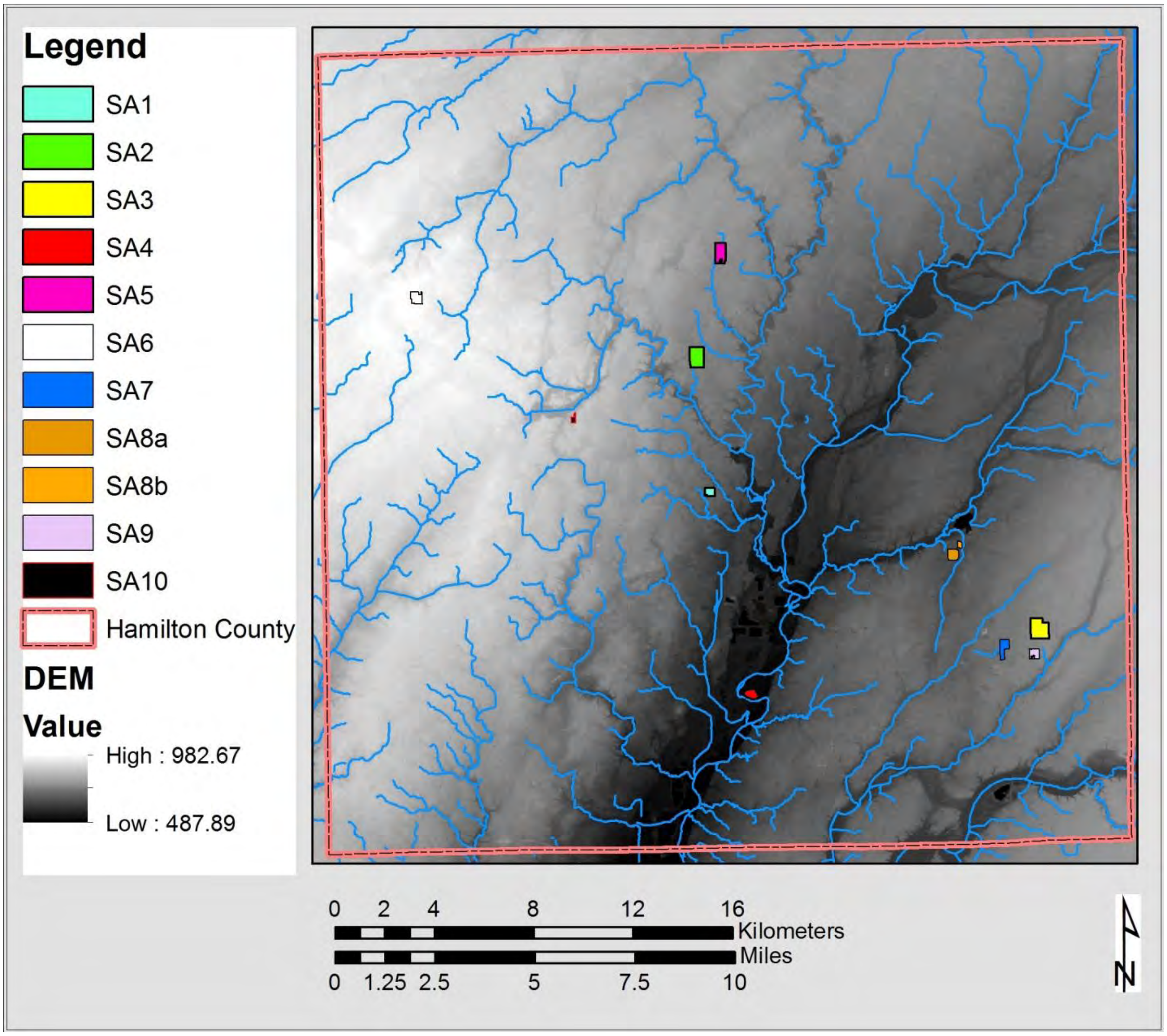

Figure 9. Location of survey areas over a Digital Elevation Model (DEM) of Hamilton County.

Figure 10 shows that the vast majority of the county is within 500 m of some form of stream. Survey Areas 6 and 3 occupy the furthest distances from any form of stream and have two of the lower densities. Figure 4 illustrates that the vast majority of the county is poorly drained, and Figure 3 shows the majority of the county and sampled area constituted of uplands. Site and artifact densities do not appear to be patterned completely by these variables, though SA8 is immediately adjacent to water on lowland soil associations.

The one survey area that stands out in all this discussion is SA10. This tract is set in the uplands and occupies nearly the highest spot in the immediate setting. There is no major water source, though there is a small intermittent drainage that is cut into the hills and defines the northwest boundary of the area surveyed. SA10 yielded one Archaic period diagnostic projectile point for every 4.2 acres (Figure 11) and a single terminal Middle Woodland/Late Woodland diagnostic (1/12.44 acres). This is a very dense concentration of temporally diagnostic material. Further, several of the sites are considered to be short-term camps based on the presence of FCR.

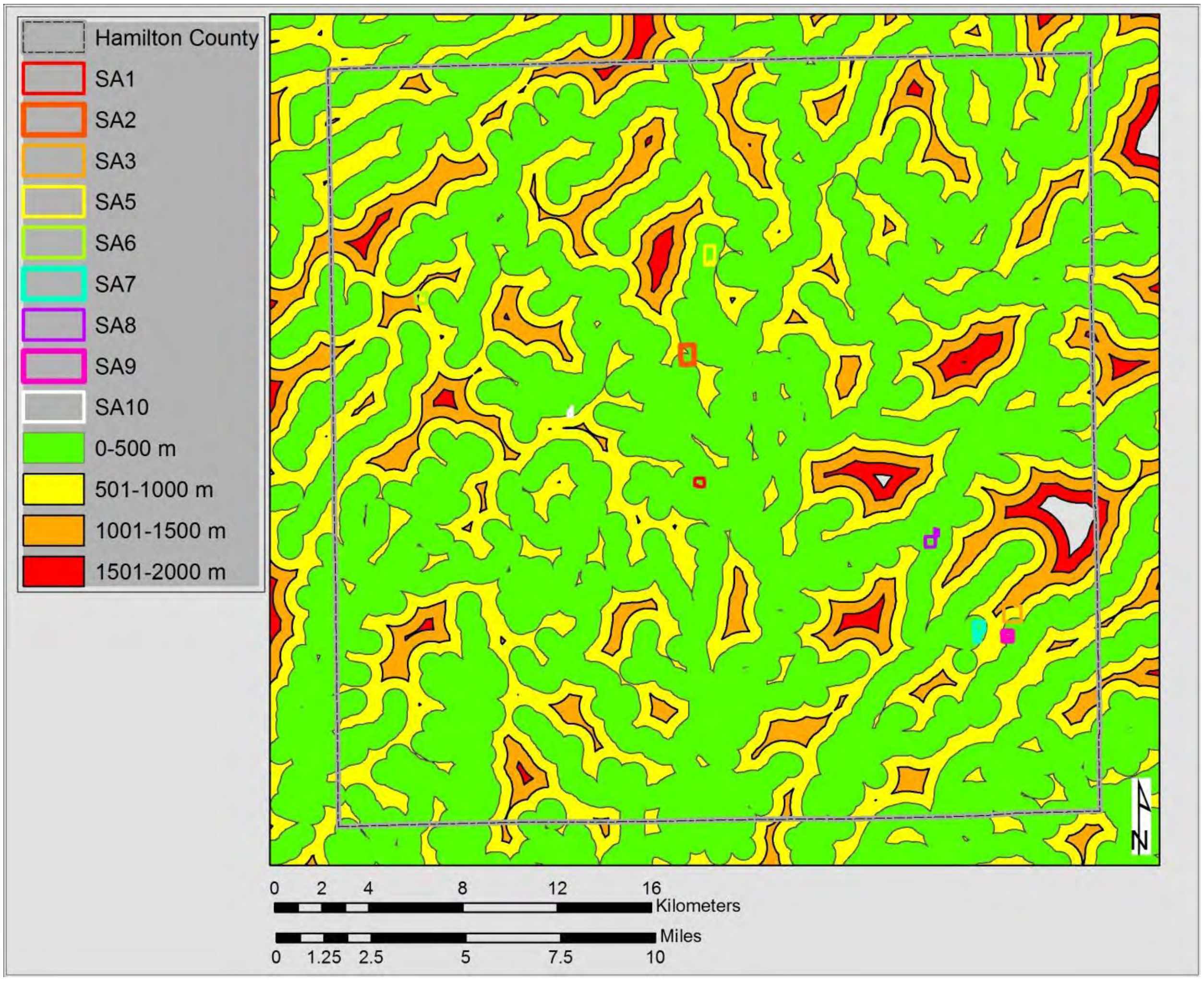

Figure 10. Survey areas over 500 m buffers of distance from streams (Buffers created by author). Note: Greater than 2000 m is displayed as the same as the background.

Figure 11. Diagnostic projectile points discovered in SA10. Photo by Matthew Swihart, Applied Anthropology Laboratories, 2013.

At first glance this is a highly improbably place for such an intense concentration of occupation debris. The soils are moderately well drained clay loams (8.22 acres), somewhat poorly drained silt loam (3.9 acres), and poorly drained silty clay loam (0.32 acres). The abundance of moderately well drained soils likely accounts for some of the realized artifact density. This factor gains special importance when the larger region is taken into account. As shown in Figure 4, SA10 occupies the southern edge of an island of moderately well-drained soils in a sea of poorly drained uplands approximately 10 km from the White River. This island creates a variety of ecotonal opportunities. The uniqueness of the local setting is further illustrated by examination of the landform classification in Figure 5. The well-drained till-plain soils of SA10 are immediately adjacent to one of the larger outwash plains deposits and several areas of poorly drained floodplain. This ecological diversity, combined with the favorable drainage creates an ideal place for repeated forays into the uplands and perhaps a favorable location for seasonal base camps. This setting and these sites deserve more investigation to determine if our small sample of this island yields and accurate picture of the prehistoric utilization of the area. The periods of primary occupation (especially the Early Archaic) are recognized as times of relatively high residential mobility. Few habitation sites associated with the Early Archaic are known, and the Jack's Reef Horizon is a regionally (beyond Indiana) poorly understood period of time with increased residential mobility postulated for many areas. Further, the absence of Early and Middle Woodland and the later Late Woodland is interesting, if a potentially biased view.

A total of 26 prehistoric components can be assigned to a temporal period (Table 4). These occupations represent the entire scope of prehistory except the Paleoindian period. The Middle Woodland is overrepresented in our sample relative to previously identified occupation frequency, and the terminal Middle Woodland/early Late Woodland is heavily overrepresented. Late Woodland is underrepresented in our sample. Perhaps the reason for the difference is that Jacks Reef and Lowe Cluster Points have been included in Late Woodland by other investigators while they were included in terminal Middle Woodland here. Another possible reason is that we sampled a larger portion of the uplands than the previous surveys. If the post-Hopewellian and pre-maize agricultural populations employed distinctive settlement patterns as they did in other regions (e.g., Pollack and Henderson 2000; Seeman and Dancey 2000), the latter explanation would be more plausible.

Table 4. Temporal Distribution of Newly Discovered Occupations.

Period	Occupations	%	% Prehistoric	%ID'd	Found	% Found
Unidentified Prehistoric	727	52.20%	59.00%		0	
Paleoindian	8	0.60%	0.60%	1.58%	0	0%
Archaic	65	4.70%	5.30%	12.85%	0	0%
Early Archaic	87	6.30%	7.10%	17.19%	5	19%
Middle Archaic	13	0.90%	1.10%	2.57%	1	4%
Late Archaic	77	5.50%	6.20%	15.22%	5	19%
Terminal Late Archaic	4	0.30%	0.30%	0.79%	0	0%
Woodland	60	4.30%	4.90%	11.86%	0	0%
Late Archaic/Early Woodland	2	0.10%	0.20%	0.40%	0	0%
Early Woodland	26	1.90%	2.10%	5.14%	1	4%

Middle Woodland	30	2.20%	2.40%	5.93%	4	15%
Terminal Middle Woodland	3	0.20%	0.20%	0.59%	8	31%
Late Woodland	120	8.60%	9.70%	23.72%	2	8%
Late Woodland/Mississippian	4	0.30%	0.30%	0.79%	0	0%
Mississippian	7	0.50%	0.60%	1.38%	0	0%
Historic	159	11.40%				
Total	**1392**	**100.00%**	**100.00%**		26	

Conclusion

A review of previous archaeological research and the results of our survey of 0.22% of the county shows that the sheer number of sites recorded in Hamilton County belies a gaping hole in our knowledge of the distribution of prehistoric activity on the landscape within the county. The distribution of previously identified sites within the county (see Figure 6) is far from representative of the nature and distribution of prehistoric activity. This amounts to a massive oversampling of the floodplains and stream terraces. As a result we have captured only a small portion of the cultural systems we hope to study. Even with an oversampling of the uplands, our survey yielded are very high site density (1/2.4 acres, 1/ ha) and even higher artifact density. Hamilton County was intensively utilized prehistorically, and not just along the course of the White River. Our window of opportunity to document this diversity is ever more rapidly eroding as the city of Indianapolis and its suburbs eat away at the open land that remains within the county. It has already been observed by many archaeologists the volume of information that has been lost within Marion County. It is not yet too late to fill in the gaps in Hamilton County's history.

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BIOARCHAEOLOGY OF THE VIGO COUNTY HOME CEMETERY (12VI976/CR-84-129): RECOVERING SOCIAL SYSTEMS OF CARE FOR THE IMPOVERISHED, INFIRM, AND DISABLED

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[Editors' note: Please be advised that this article contains descriptions and photographs of human remains.]

Introduction

During the summer of 2011 staff from Indiana State University identified and excavated burials associated with the Vigo County Home (VCH), Terre Haute, IN. This article documents the findings of the excavation and the preliminary analysis of the skeletal remains. Historical records (VCH Records DC 1 & 2) indicate that the VCH operated as a traditional poorhouse in that the elderly, infirm, or those otherwise determined to be in an ―unfortunate" state were admitted. Such institutions, in Indiana and across the nation, provided room and board to the needy, thereby serving as a local tax supported safety net (Hassett 2013). Merging the documentary records with the findings from skeletal analysis adds an important layer to the understanding of the social system developed to serve the needy in nineteenth century America. The skeletal findings demonstrate rare conditions, some not yet reported from North American historic period archaeological contexts, likely due to dynamic aspects of the VCH. Taken together, this study provides an insight into the care of dependent groups, many of which, such as the disabled, are often invisible in both the historical and archaeological records.

The Vigo County Home

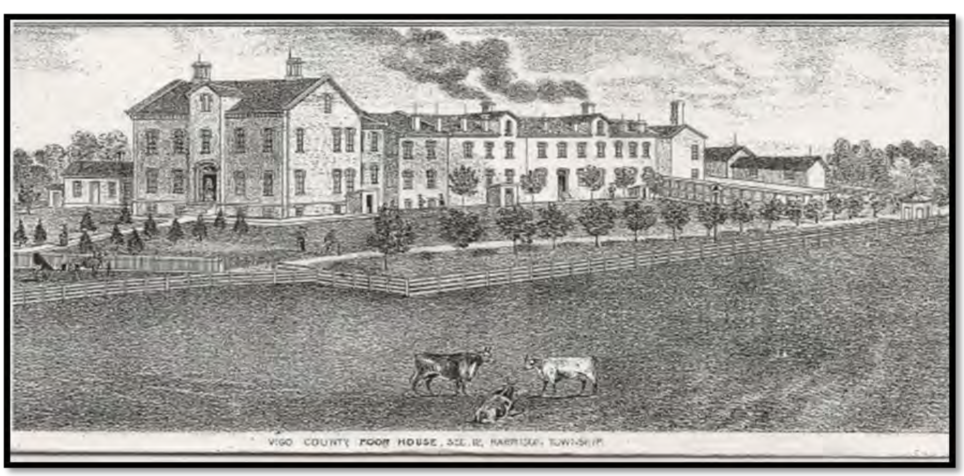


Figure 1. Postcard of the Vigo County Home circa 1880. (Photo courtesy of VCH Records).

The first poorhouse in Vigo County was constructed in Terre Haute in 1853 on 80 acres. Due to the rapid growth of the city, however, that facility was inadequate for the county‘s needs and was beyond capacity by 1856. A new, larger, county home was constructed in 1866 (Figure 1). This home, located on Maple Avenue in Terre Haute (Figure 2), at the site of the excavation, sat on 135 acres and had amenities such as ―engine boilers" for hot water (Bradsby 1969:581). The home was improved on a number of occasions, with the latest major improvement in 1936 (Figure 3) and an expansion in 1976. The home continued to operate in service to the county‘s unfortunates, transitioning largely into a convalescent facility for the elderly, finally closing in 1992. Upon closure the structure was demolished and the elderly were transferred to a newly constructed private nursing home on the grounds of the former county institution (VCH Records DC 2, Folder 38).

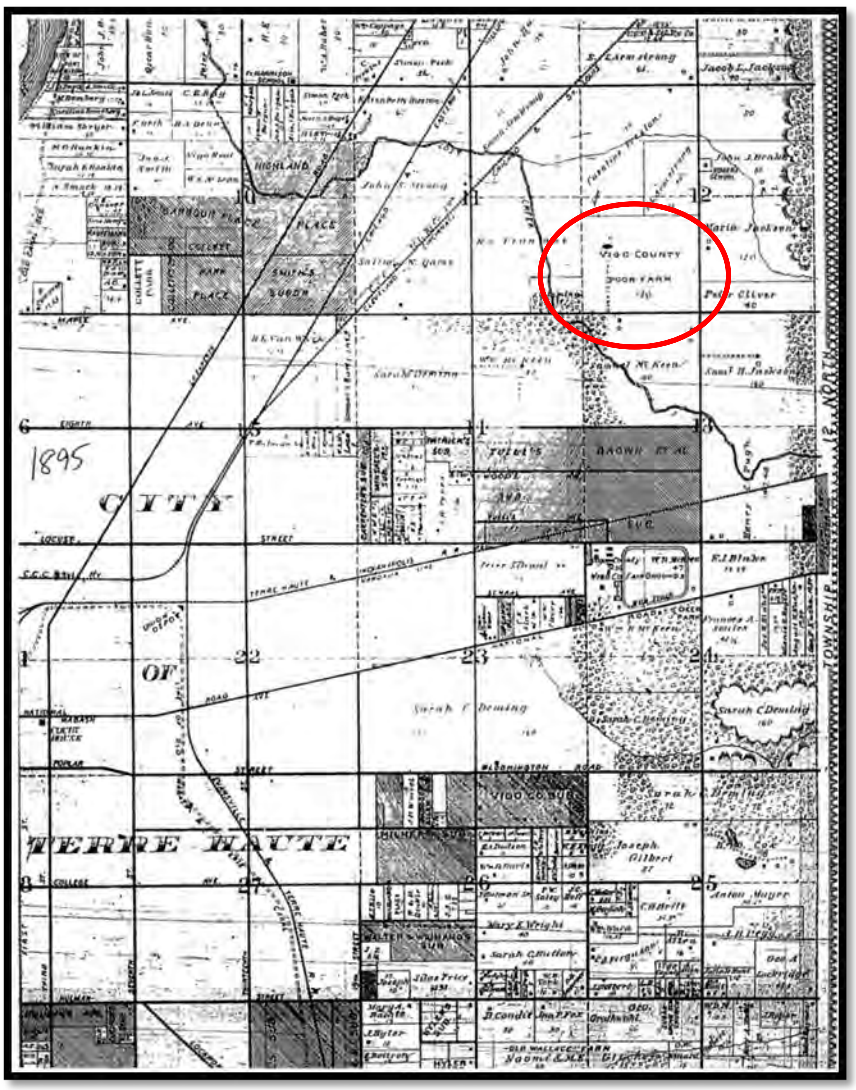


Figure 2. 1895 Plat map of Terre Haute indicating the location of the Vigo County Home (VCH Records).

Figure 3. Vigo County Home in 1936 (Photo courtesy of VCH Records).

Fields north of the home were referred to as the “poor farm” and were used to grow crops (Bradsby 1969; VCH Records, DC 1). VCH residents worked the fields and the produce helped to sustain those in the home. Historic maps show the cemetery on the northern edge of the farm. Once the cemetery no longer took interments circa 1930, it was lost to community memory and plowed over in the subsequent decades (VCH Records #991012). The land once used for the poor farm was sold to the city of Terre Haute during the building expansion in 1976 (VCH Records, DC 1). The city developed the property as a Police/Firefighter Training Facility. During the summer of 2011, while digging a water line for a fire hydrant for an industrial plant on an adjacent property, skeletal remains were discovered by city employees (Figure 4).

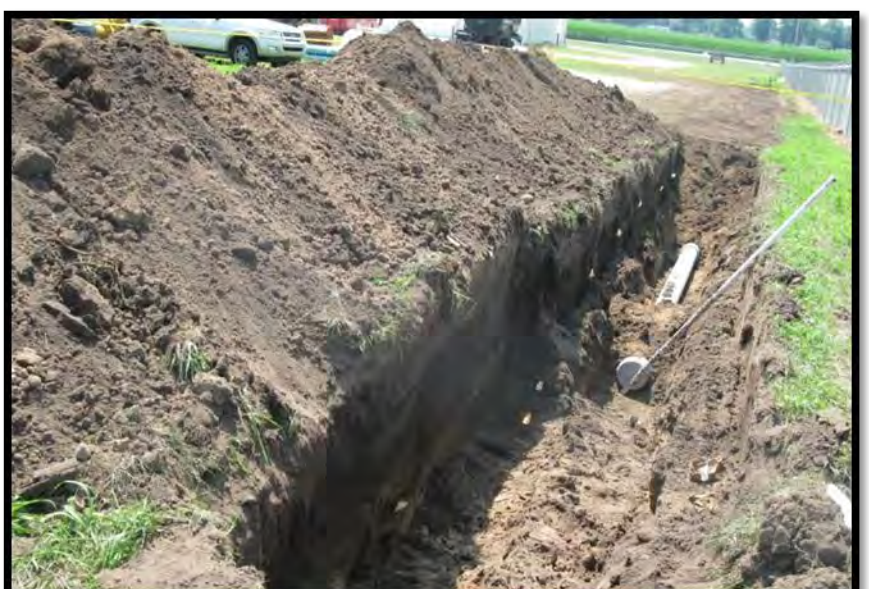


Figure 4. Backhoe excavation for a fire hydrant disturbed several historic period graves. Photo taken by Shawn M. Phillips.

After consultation with the County Medical Examiner and Dr. S. M. Phillips, Indiana State University, the remains were identified as human. Grave shaft outlines in the trench and coffin wood, nails, and other artifacts indicated the remains were associated with late nineteenth century burials (Figure 5). A survey of historic maps demonstrated the location of the county home cemetery in the location of the grave disturbance.

Figure 5. Decorative thumbscrew used for coffins circa the 1880s found in the back dirt. Photo taken by Shawn M. Phillips.

Bioarchaeology of County Homes

To date, five bioarchaeological studies of county homes in the United States have been reported. Those include the Uxbridge Almshouse, Massachusetts (Elia and Wesloskey 1991), the Monroe County Poorhouse, New York (Lanphear 1988), the Albany County Almshouse, New York (Phillips 2001a), the Milwaukee County Poorhouse, Wisconsin (Richards 1997), and the Oneida County Asylum, New York (Phillips 2001a). The demographics of all these institutions are similar in that they served an adult to elderly population. By the midpoint of the nineteenth century, most communities, including Terre Haute, had facilities specific for children from families in need. Standard health markers indicated the populations faced a number of issues such as poor oral health, a high infectious disease burden, and higher than expected rates of trauma. For a review of these studies, see Phillips (2002).

Scholars have been tempted to use skeletal samples as reflective of the health of the ―poor" during the nineteenth century. Others, however, have pointed out that poverty is a transient state. One may live a life outside of poverty and fall on hard times only during the final years (Phillips 2001b). Since skeletal and dental tissues reflect many indicators of the entire life span, observers must exercise caution in assigning what segment of the general population a county home cemetery actually reflects.

Materials & Methods

The exposed burials were archaeologically excavated per Indiana Code (IC) 14-21-1 and 312 IAC 22-3-3 (approved plan #2011032). The excavation of the disturbed burials, however, presented some unique problems due to the process of the disturbance. It was determined that the existing dirt pile (~50'L x 8'W x 5'H) would need to be hand screened (1/4 mesh) since at least 7 burials had been impacted by the waterline work. Once the dirt pile screening was completed, a backhoe with a smooth edged bucket was used to widen the trench for safe archaeological excavation. Also, the overburden was removed to just a few inches above the burials to expedite the hand excavation process. All work with the backhoe was monitored by a qualified professional archaeologist. 12 grave shaft outlines were identified with the waterline down the middle of each. For more details on the excavation, see the work plan developed under IDNR-DHPA guidance (Phillips 2011).

The skeletal analysis was completed at the Human Osteology Laboratory at Indiana State University per *Indiana Code* (IC) 14-21-1. Standard osteological methods were used to take observations for age, sex, and individuation (Buikstra and Ubelaker 1994). Differential diagnosis protocols were utilized to assess health indicators from the dental and skeletal remains (Auferheide and Rodriguez 1998; Ortner 2003). For this analysis, overall oral heath will serve as an general health indicator for the collection, while the skeletal remains of each individual will be presented to reflect the context of the VCH (i.e., health per individual).

Finally, historical maps, documentary records, and historic photographs were consulted to better understand the functioning of the VCH. In addition, a number of members of the community (physicians, nurses, relatives of former inmates, etc.) volunteered information on the county home from memory.

Results

Twelve burials were recovered, most of which were in good condition and 70% (or more) complete. See Table 1 for an overview of the skeletal analysis. The primary disturbance was to the middle of each burial due to the waterline. The vertebrae and ribs of seven burials were compromised as a result of that disturbance. The other burials were intruded upon as well but the only the coffins were disrupted. Over 500 hundred skeletal fragments, pieces of coffin wood/hardware, and miscellaneous material culture objects were recovered from the back dirt pile.

Table 1. General Skeletal Observations.

Burial	Sex	Age	Height	Pathology & Other Salient Observations
1	M	30-35	69”	Dental Caries, Blunt force trauma to knee
2	M	35-40	68”	Active periostitis in right orbit, bilateral diploic expansion of right & left clavicles
3	F	50+	61”	Antemortem tooth loss; senile hyperostosis
4	F	25-30	62”	Trepanemal infection, caries sicca and bilateral diploic expansion of right and left tibiae
5	F	50+	63”	Antemortem tooth loss

6	M	45-50	66”	Multiple well-healed blunt force trauma injuries
7	F	60+	46”	Short stature, possible achondroplastic dwarf
8	M	60+	71”	Antemortem tooth loss
9	F	60+	60”	Multiple lytic lesions, possible cancer
10	F	60+	67”	Antemortem tooth loss
11	--	--	--	Only feet preserved, remains lost to the disturbance
12	M	35-40	67”	Dental caries, gold fillings and a gold cap

In addition to the skeletal remains, 215 oral tooth sockets were available for observation. Caries Rate (CR) and the Diseased and Missing Tooth Index (DMI) are two indexes used to assess the oral health of skeletal populations. CR demonstrates the proportion of observable diseased tooth crowns to healthy tooth crowns (Hillson 1996). The formula for CR is:

Diseased Teeth/# Healthy Teeth X 100 = Caries Rate

DMI demonstrates the number of observable diseased tooth crowns and non-observable teeth lost to disease processes in proportion to the number of observable healthy tooth crowns. It is possible, by assessing the state of the alveolar bone to determine if a tooth was lost to disease process or if it was lost post-mortem (Hillson 1996). The formula for DMI is:

Diseased and Missing Teeth/# Healthy Teeth X 100 = Diseased & Missing Tooth Index

Taken together, the VCH CR is 19.8 and the DMI is 56.7. See Table 2 for further elaboration of these indexes. See Table 2 for comparison of these indexes with other nineteenth century institutions.

As with all county home cemeteries, the grave goods were minimal (Figure 6). Since the grave goods were sparse, the best temporal evidence to suggest interment dates was coffin shape. Hexagonal coffins were used in the U.S. up until around 1880. After that time, four sided coffins, with dimensions similar to those still used today came into use (LeeDecker 2009). 11 of the 12 graves were hexagonal wooden coffins (Figure 7). One of twelve was a four sided coffin that had a glass viewing plate that ran the length of the coffin lid. This feature was desired for home wakes in which the clothing of the individual was important for the mourning ritual. Thus, assuming the burials were interred in a row in an orderly sequence it‘s likely the burials were interred circa 1880 +/- 10 years. Finally, it is unclear why such an ornate coffin would be interred in a county home cemetery since it suggests funds were available for such an expense. Such a finding is not unprecedented, however, as during the Albany County Almshouse excavation in 2002 (Phillips 2002 Field Notes), an elderly female was found interred in a more costly metal coffin rather than the basic wooden coffin typically found in county home cemeteries.

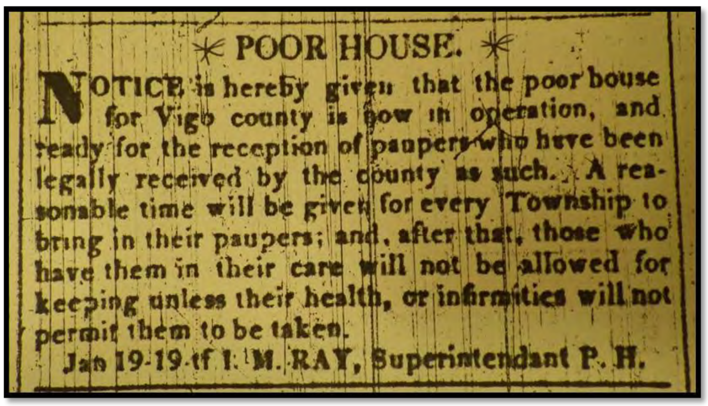

a.


b.

Figure 6. Material culture from the graves was minimal, primarily limited to buttons and safety pins from nightclothes or plain sheets used as a burial shroud. There was one ring with a non-precious stone found on the ring finger of one elderly female. Photos taken by Martin Maynard.

Figure 7. Hexagonal coffin. Note the tapering toward the foot end of the coffin. This design widened at the elbow/shoulder and then tapered again at the head end. Photo taken by Shawn M. Phillips.

The historical record (registry, photographs, newspapers, etc.) provides additional information on the VCH. For example, as a tax supported entity, there were public announcements of its services (Figure 8). Registry documents (VCH Records, DC 1) demonstrate the cause of individual‘s need for admittance to the county home. An overview of those records suggests that age-related problems or lack of family support was the most common cause of dependency at the VCH. The records also show that other ailments, such as disability, may have led to admittance to the VCH (Figure 9). Historic photographs of the home show, as expected, separate wards for men and women (Figure 10), and ―Cell Wards” where inmates, mostly disabled, were incarcerated (Figure 11).

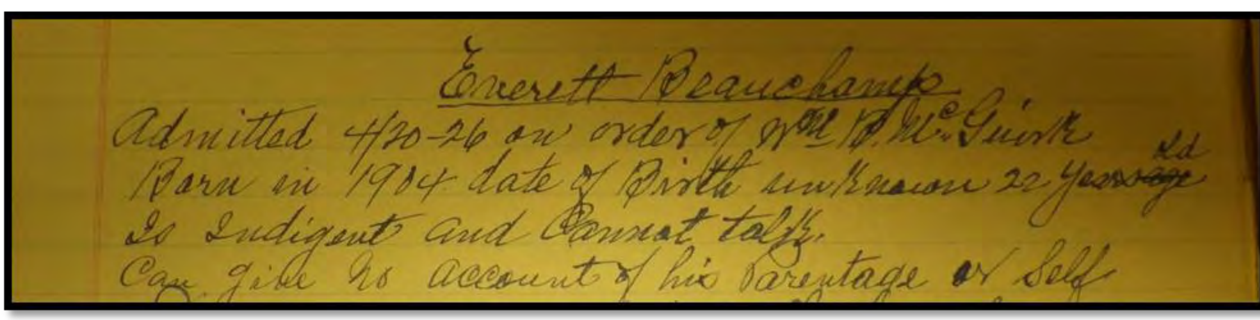


POOR HOUSE.

NOTICE is hereby given that the poor house for Vigo county is now in operation, and ready for the reception of paupers who have been legally received by the county as such. A reasonable time will be given for every Township to bring in their paupers; and, after that, those who have them in their care will not be allowed for keeping unless their health, or infirmities will not permit them to be taken.

Jan 19-19-tf I. M. RAY, Superintendant P. H.

Figure 8. Public notice of the VCH‟s services (Photo courtesy of VCH Records).



Everett Beauchamp

Admitted 4/30-26 on order of Wm B. McGuirk

Born in 1904 date of Birth unknown 22 years old

Is Indigent and Cannot talk.

Can give no account of his parentage or Self

Figure 9. Registry entry for a man with some form of disability (Photo courtesy of VCH Records).

Figure 10. VCH Women‟s Ward (Photo courtesy of VCH Records).

Figure 11. VCH Men‟s Cell Ward. Notation states "Does not speak, is cross-eyed" (Photo courtesy of VCH Records).

Discussion

It is important to consider the dynamic context of the VCH when evaluating the skeletal remains from its cemetery. Given the nature of the VCH in the wide categories of dependents that it admitted and incarcerated, the cemetery is likely to represent a spectrum of dependency rather than a cross-section of poverty from late nineteenth century Vigo County. It should be noted that other states, such as New York and others, constructed institutions specific to the category of dependency (Dwyer 1987; Phillips 2001b). Also, it is necessary to note VCH registry records indicate that families and funeral homes were involved in some individuals' burials that had resided in the wards. It is likely, then, that those who ended up in the VCH cemetery had lost contact or had otherwise been abandoned by their families. From this it is inferred that the cemetery may have contained a disproportionate number of interments from the ―Cell Wards." Below is a review of the findings from the skeletal and dental analyses.

Oral Health

As a broad indicator of health, the condition of the oral cavity serves as a good proxy since it is a measure of long-term experiences and the oral cavity is in a constant state of decay. The only way to slow the decay process is with a healthy diet and basic hygiene. Of the twelve individuals, 215 sockets were observable. This included 116 teeth and 99 teeth lost antemortem. Of the 99 observable teeth, 23 were diseased with dental caries. See Table 2 for comparisons of VCH oral health with the other nineteenth century institutions.

Table 2. Comparison of Caries Rate (CR) and Diseased and Missing Tooth Index (DMI).

Sample	CR	DMI
Vigo County Home	19.8	56.7
Oneida Asylum	36.1	70.1
Albany Almshouse	16.9	49.0
Uxbridge Almshouse	10.6	53.9
Highland Park Almshouse	10.0	50.4

The oral health of the VCH, based on CR and DMI, is the second poorest reported for a nineteenth century population. The oral health indicators fall between the Albany County Almshouse and those of the Oneida Asylum. The Oneida Asylum was a county custodial facility and, therefore, differed from the other three institutions in the list (Phillips 2001a). Since those in the VCH cemetery were also likely to have been receiving long-term, custodial type care, it is not surprising their oral health indicators are comparable to those of the Oneida Asylum. Upon admittance to the VCH it is unlikely that inmates, especially custodial inmates, received the benefit of any form of oral hygiene.

Gold Cap & Fillings

Figure 12. Gold cap on premolar 2 of Burial 12. Photo taken by Martin Maynard.

Although no frequency data are available, gold fillings are not an uncommon finding in the teeth of Americans from the second half of the nineteenth century (Sledzik and Moore-Jansen 1991). Fillings, however, are rarely reported from individuals from poorhouse contexts. Phillips (2001a), identified two from the Oneida Asylum inmates. That one of the twelve individuals had two gold fillings and a gold cap (Figure 12), is certainly a rare finding – of the 4,000+ burials examined from county home contexts, this is the first gold cap reported.

Unlike modern dentistry, 19th century practice was more focused on cosmetic fixes and extraction than it was on prevention (Glenner 1990; Hillam 1989; Miller 1881). The benefits of tooth scaling and polishing to oral health were not yet recognized. In fact, the contemporary notion of preventative oral health care was not realized until the 1930s, and only later encouraged to the broader population through public health outreach initiatives (Geschwind 1986; Hillam 1989). Once a tooth became diseased, there were basic treatments. The use of gold foil to treat dental caries was commonplace in dental practice by the midpoint of the nineteenth century. If a tooth was diseased to the point that the crown was compromised beyond the point of saving it, extraction was the most likely course of action. After 1855, techniques for the fabrication of dental ―caps” or ―crowns” improved, which provided a preferable restorative option to extraction. Despite that option, crowns from gold castings did not gain in popularity until the early decades of the twentieth century (Geschwind 1986; Glenner 1994; Hillam 1989). Thus, the presence of a gold cap in the VCH sample is a rare occurrence and likely reflects life from a more prosperous time than when the individual required admittance to the county home.

Cancer

Skeletal lesions indicative of cancers have long been identified in the archaeological record. However, compared to findings in contemporary populations, the frequency of cancers recovered from archaeological contexts has been low (Brothwell 2012). This has led to the need for paleopathologists to document and consider the occurrence of each case. The low frequency of recovery is likely to be associated with any number of issues ranging from the possibility that cancer was less common in past populations due to a less toxic environment to the possibility that past populations simply did not live long enough for the malady to affect bone. In addition, most lytic (when bone is destroyed and resorbed) cancerous lesions reported from bioarchaeological contexts are identified as metastatic carcinoma – secondary sites that have metastasized from a primary location (Ortner 2003). Few cases of lytic myeloma, a cancerous lesion indicative of the cancer‘s site of origination, have been identified. In fact, most recent paleopathological reference guides suggest that multiple myeloma and lytic metastatic carcinoma cannot be differentiated. However, a differential diagnostic protocol that relies on clinically documented cancers has been published (Rothschild et al. 1998). This work uses that protocol to assess the lesions identified in the individual under investigation.

The skeletal remains for Burial 9 were over 70 percent complete and, in locations, were in a very weathered state. Still, most of the recovered remains retained cortical bone which enhanced diagnostic observations. Based on those assessments, the individual was found to be an elderly female, likely to be 60+. One of the most salient observations for this individual was the presence of >80 lytic lesions distributed throughout her skeletal remains. Differential diagnostic observations were taken to eliminate a number of lytic lesions that may resemble the current case. Based on that process, lytic cancerous lesions were the most likely diagnosis. Still, this left the needed distinction between a primary and secondary cancerous lesion.

Based on the diagnostic protocols developed by Rothschild et al. (1998) Table 3 includes the observations that suggest the identification of multiple myeloma (Also, see Figure 13).

Table 3. Observations in Burial 9 Indicative of Multiple Myeloma.

Spheroid lesion shape
No erosion of spongy bone
No bone remodeling
Defined edges of the lesions
Both vault tables are perforated
Articular surfaces and orbit affected
Wide dissemination throughout the skeleton
Radiographic evidence indicates lesions are formed within vault tables

Multiple myeloma is rarely diagnosed in skeletal remains from archaeological contexts. Even the few reported cases in the published literature, reviewed by Rothschild et al. (1998), were only suggested as "possible" cases of multiple myeloma by the original authors of those studies. Subsequently, those possible cases were later rejected as such once subjected to the differential diagnostic observations developed by Rothschild et al. (1998). Those assessments would leave the current case as the only archaeological example, at least for the historic period, of multiple myeloma to be documented in North America.

Figure 13. Burial 9. Comparison of cranium photograph (left) and radiograph. Note in the radiograph the presence of multiple lytic lesions not visible in the image on the left. This demonstrates the lesions originate within the cranial tissues and are diagnostic of multiple myeloma. Photo and radiograph taken by Martin Maynard and Michael Moroz.

Dwarfism

Dwarfism is rarely reported from archaeological contexts, and to date, in fact, none have been reported from an archaeological context in historic period North America. The medical definition of dwarfism is an individual whose adult height is less that 58" in height. There are over 200 causes of dwarfism, with the most common being achondroplasia which accounts for 70% of dwarfism (Ortner 2003). In clinical cases, however, it often is not possible to determine the etiological cause of dwarfism. Moreover, the characteristics of dwarfism can manifest in a variety of ways. Common characteristics are proportionate and disproportionate variation in features, head morphology, and limb length (Ortner 2003).

Burial 7 of the VCH was immediately recognized as an adult of diminutive stature. The *in situ* height was recorded as 46”. The skeletal remains indicated the individual was a female that was over 60 years old. However, standard methods may not apply to an individual outside standard height and weight parameters. Given the individual‘s height, it is possible to identify them as a dwarf. The cause of the dwarfism is not possible to determine. Based on the proportionality of the skeletal remains, however, it is possible to suggest the individual was a ―proportionate” dwarf. See Figure 14 for example, which demonstrates the small, yet proportionate size of the cranium.

Figure 14. In this image two calvaria are compared. The same skeletal elements are present in both individuals (the facial bones are absent). The upper skull is from Burial 7 and is identified as a “dwarf.” The lower skull is from Burial 4, an adult female that was 62” in height. Photo taken by Shawn M. Phillips.

Trauma

Traumatic injury is commonly reported from skeletal remains from archaeological and forensic contexts (Auderheide & Rodriguez-Martin 1998). This form of pathology is useful in interpreting important aspects of an individual's life, or in some cases, aspects of their death. The individual reported here is unusual in the number bone fractures and their locations. Figures 15-18 of Burial 6 demonstrate this man, who was about 45-50 years at the time of his death, had a number of well healed fractures incurred from blunt force trauma. He had a fracture to his nasal bones that shifted his nasal aperture to the left, a large depression fracture to the back of his skull (4cm by 5cm), a fracture, with reduction of his right clavicle, and a fracture to his right tibia and fibula.

This suite of fractures is quite extreme and it is impossible to determine if they all took place in one tragic accident or collected over a number of years. Despite this ambiguity it is tempting to suggest that his injuries are in line with those incurred during military combat (Pfieffer and Williamson 1991; Sledzik and Moore-Jansen 1991). If his age at death was 45-50 and he died around 1880, which would make him in his mid-20s to early 30s during the Civil War. Given those potentialities it is possible that he is a Civil War Veteran. Still, it is not possible to make such an assertion with certainty- only that this individual has an unusually high number of dramatic injuries that conform with military combat.

Figure 15. Burial 6. Fractured nasal bones. Note the nasal aperture is shifted to the individual's right. Photo taken by Shawn M. Phillips.

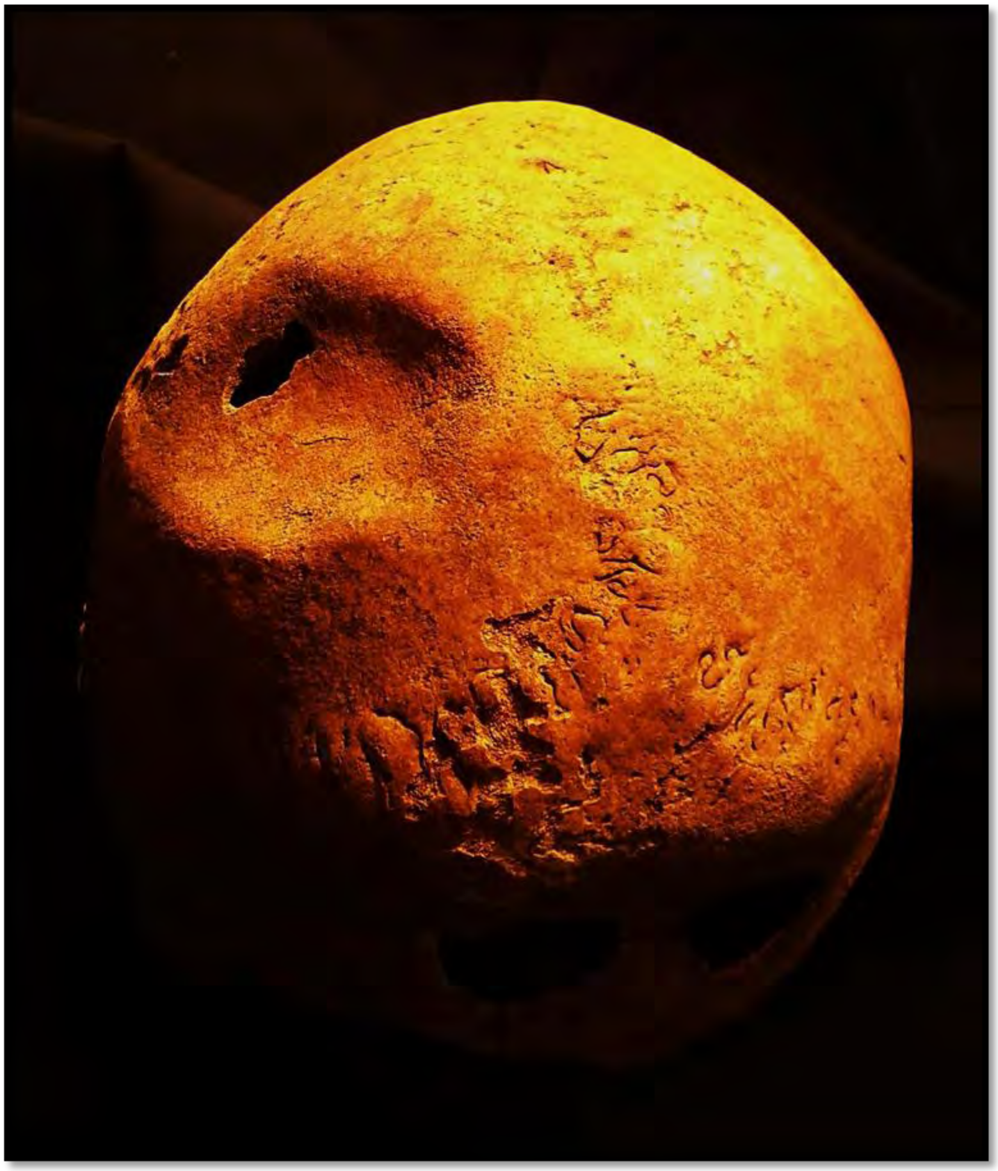


Figure 16. Burial 6. Large depression fracture due to blunt force trauma to the left side of the posterior aspect of the skull. The proportions of the depression fit well with those of the butt of a rifle. Photo taken by Shawn M. Phillips.

Figure 17. Burial 6. Fractured tibia and fibula. Photo taken by Shawn M. Phillips.

Figure 18. Burial 6. Inferior aspect of the right and left clavicle. The lower clavicle (the left) is badly fractured with reduction. The entire left shoulder girdle exhibited osteoarthritic degeneration associated with this injury. Photo taken by Shawn M. Phillips.

Trepanematosis

Trepanematosis is a bacterial infection that has multiple modes of transmission (Ortner 2003). In historic period North America, however, the primary mode of transmission was commonly known as venereal syphilis. Venereal syphilis, in the pre-antibiotic era, was a fatal condition that passed through three distinct stages. Primary syphilis involves the development of a chancre at the site of infection on the genitals. Secondary syphilis involves the development of ulcerating lesions throughout the body but mainly concentrating on the trunk and cranium. Tertiary syphilis involves cavitating lesions and soft tissue resorption that can involve bone and generally precedes death in the absence of modern medical treatment. Typically, tertiary syphilis impacts the skeletal system in that the cavitating lesions on the skull are recognized as caries sicca (appear as pitting on the external surface of the skull) and, typically, long bones are affected in pairs with diffuse diploic expansion (when the inner spongy bone expands and gives the external bone a swollen appearance) (Aufderheide and Rodriguez-Martin 1998; Ortner 2003).

In the VCH sample two individuals (Burials 2 and 4), of eleven possible to observe (18.2%), were identified with venereal syphilis infections. It should be noted that this is the highest frequency of syphilitic infection reported from an archaeological site in historic period North America (Comparison data reported in Phillips 2001a). Burial 4 exhibits classic tertiary syphilis. A caries sicca lesion is present on the skull (Figure 19) and the right and left tibiae demonstrate tissue expansion along the anterior aspect of the bones which is typical of the disease (Figure 20). Burial 2 demonstrates a possible earlier stage of venereal syphilis, perhaps between the secondary and tertiary stages. Figure 21 demonstrates an ocular infection that was active at the time of death and likely resulted in the loss of the eye. The infection, if linked to syphilis, is likely associated with an ulcerating lesion common in secondary syphilis that compromised the eye. The eye infection alone is not enough to suggest syphilis. However, the individual also had symmetrical diploic expansion of the right and left clavicle (Figure 22), which is a typical finding in cases of syphilis. Since the individual did not have any detectable caries sicca, it is likely that the individual succumbed during the transition from the secondary to teritiary stages of syphilis. While it is not possible to determine if the syphilis infection was the cause of death, it is possible to suggest that the infection contributed to the cause of death.

Figure 19. Burial 4. Note caries sicca lesion above orbit on frontal bone. Photo taken by Shawn M. Phillips.

Figure 20. Burial 4. Right and Left tibiae demonstrate tissue expansion commonly deemed “sabre shaped” shins. Photo taken by Shawn M. Phillips.

Figure 21. Burial 2. The interior aspect of the orbit demonstrates hypervascularization and reactive bone due to an active infection at the time of death. Photo taken by Shawn M. Phillips.

Figure 22. Burial 2. The clavicle in the middle is healthy. The clavicles on either side are the right and left clavicles of Burial 2 and their "puffy" appearance demonstrates diploic expansion. Photo taken by Shawn M. Phillips.

Conclusion

The burials of the VCH reflect the nature of the institution as a ―catch-all” for a wide range of dependent groups and not well reflective of the general population. The records suggest the institution admitted a wide range of dependent groups, only some of which were buried on the grounds. By the 1920s, many individuals had prior arrangements with funeral homes for a private burial. Thus, individuals without the capacity for such arrangements were those left to be buried in the VCH cemetery. Still, of those interred, a similar pattern of poor health is reflected in the skeletal remains from the VCH burial sample. Individuals that were disabled or otherwise dependent due to infirmary and lack of familial support were left to the care of public support. While their specific health issues reflect the nature of the VCH, their overall health status is better reflected in their oral health – which is among the poorest reported for a 19th century skeletal population. Close examination of the functioning of the VCH and the dependent classes it served suggests that rather than just focusing on County Home inmates as the ―poor” it might also be informative to consider how social systems of care for individuals with other forms of dependency, such as the disabled, were developed in past populations. To date, little bioarchaeological research has been devoted to those segments of past populations.

Acknowledgments: Firstly, we thank the people of Terre Haute and Vigo County for embracing and supporting this project. The City of Terre Haute and Vigo County provided financial support for the excavation. Indiana State University provided time and support for the completion of the lab and archival work. The Indiana University Medical Center provided access to radiographic equipment and materials for the featured x-ray. The Vigo County Public Library provided access to the VCH documentary records.

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REPORTS / FEATURES

To disseminate further archaeological information of local, topical, and community interest, this section of the journal includes occasional ―reports” or ―features” on various archaeological topics pertinent to specific regions, counties, or city/towns of Indiana.

ARCHAEOLOGICAL SITE FORMS, REPORTS, AND MAPPING … OH MY!: AN UPDATE TO “INDIANA‟S FIRST COMPUTERIZED ARCHAEOLOGICAL DATABASE”

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Indiana‘s first computerized archaeological database has come a long way since first presented in William Feldhues‘ 1997 article, ―Indiana‘s First Computerized Archaeological Database.” Advances in technology have allowed data to be gathered and shared more efficiently, which has led to an increase in accuracy and completeness of the current database. Most archaeological information is now readily available to qualified researchers without a visit to the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology (IDNR, DHPA) office and plans are on the table to continue the digitization process.

This article will look at the early stages of Indiana‘s computerized archaeological database and how far the system has come in the years since Feldhues‘ 1997 article. From the first in-house database, to the early database described by Feldhues, and then the introduction of the State Historic Architecture and Archaeological Resource Database (SHAARD) and subsequently SHAARD GIS, Indiana‘s archaeological resources have a long history of being made more accessible for archaeological research.

The Early Databases

SMPCRPP

The first database developed for archaeological research at DHPA was funded through a grant issued by the Office of Surface Mining (OSM), through the IDNR Division of Reclamation in 1988 (Ellis et al. 1990). The Surface Mining and Reclamation Cultural Resources Protection Project (SMRCRPP) was created out of a need to document archaeological resource information for counties impacted by coal mining. These twenty-one counties were limited to the southwestern part of the state and included Clay, Daviess, Dubois, Fountain, Gibson, Greene, Knox, Martin, Orange, Owen, Parke, Perry, Pike, Posey, Putnam, Spencer, Sullivan, Vanderburgh, Vermillion, Vigo, and Warrick counties (Figure 1) (Ellis et al. 1990:2).

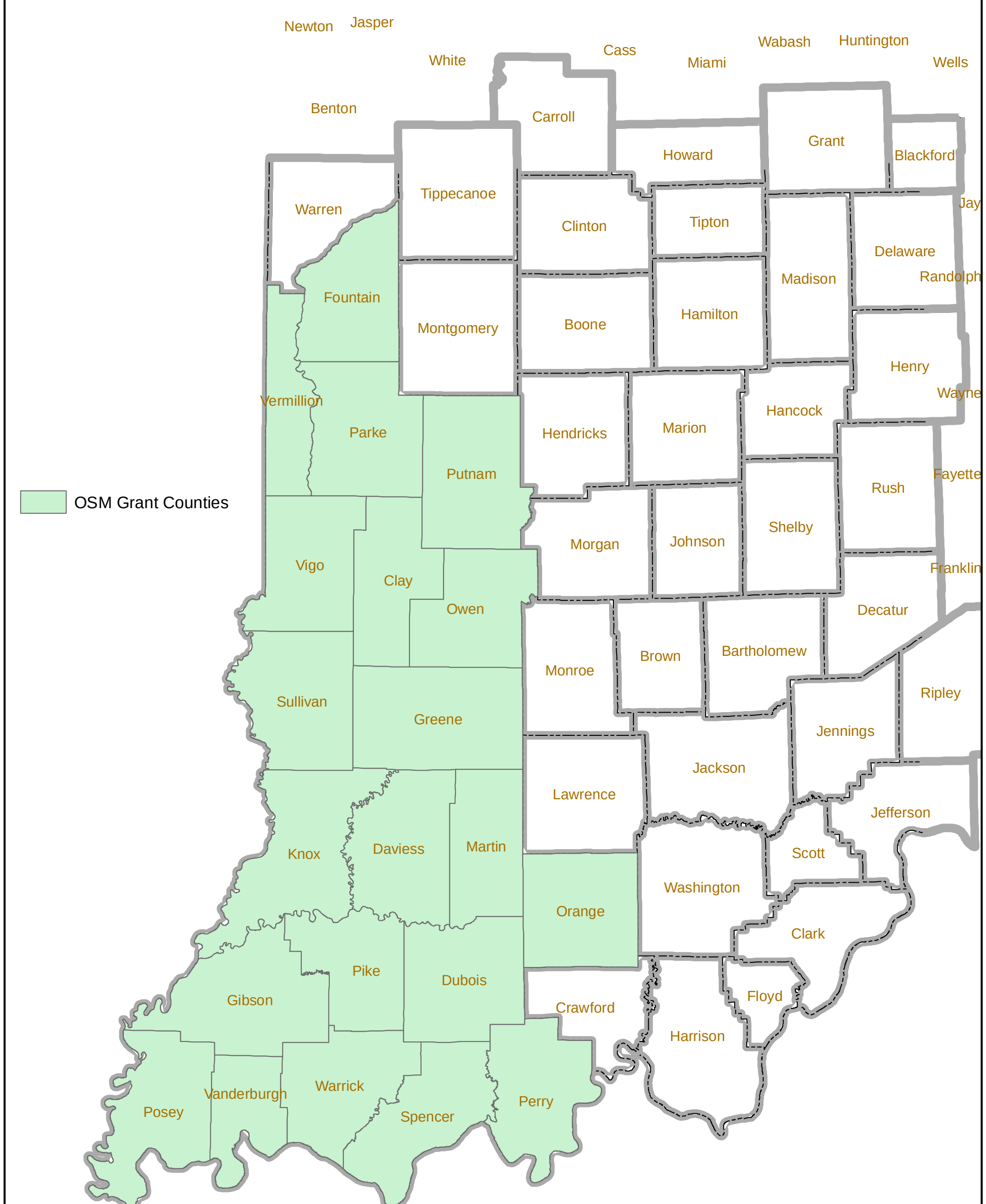

Figure 1. Indiana counties included in the original OSM grant (Map created by author, after Ellis et al. 1990:2).

The team working on SMRCRPP (Gary Ellis, Rick Jones, Donna Oliva, Lisa Maust, and Amy Johnson; Figure 2) gathered site records from universities housing archaeological information and added them to those already housed at DHPA so that 11,078 records would be entered into the new inventory system (Ellis et al. 1990:4, 8). This same region currently has 21,735 documented archaeological sites, an increase of 10,657 sites over 26 years.

Figure 2. The OSM Grant staff and supervisors at the end of the project in 1990. From left to right: Rick Jones, Amy Johnson, Donna Oliva, Lisa Maust, and then State Archaeologist Gary Ellis (photo courtesy of Amy Johnson).

Each record was transcribed into a DATAPOINT hardware system (Figure 3) and site boundaries were mapped on topographic maps. This ―new” computer database made it possible to search by specific fields of information, such as time period or physiographic region (or both) and to access site records in a single location. However, this project did not include the rest of the state and the program holding the information quickly became outdated, so a new database needed to be developed.

Figure 3. Amy Johnson entering archaeological data into the DATAPOINT system (photo courtesy of Amy Johnson).

Filemaker (C-Master)

The DHPA received an Intermodal Surface Transportation Efficiency Act (ISTEA) grant in 1995 through the Indiana Department of Transportation (INDOT) (in addition to donations from the IDNR, Indiana Historical Society, and the Glenn A. Black Laboratory of Archaeology at Indiana University) to continue the archaeological database effort (Feldhues 1997). Set in FileMaker Pro 4, this new database allowed not only the review of mining activities, but also environmental review as it included information for archaeological resources for the whole state of Indiana. An important goal of this grant included ensuring that IDNR, DHPA was the central repository for all the state‘s archaeological information. To accomplish this goal, those involved with this project travelled to institutions such as the Archaeological Resource Management Service at Ball State University and the Glenn A. Black Laboratory of Archaeology at Indiana University to make copies of any information not on file at DHPA. As of 1995, the number of site records in the database had increased to somewhere near 50,000 entries, although a backlog of new material had developed as the Database Manager position remained vacant for a number of years (Draeger-Williams 2005:5, 13).

By making DHPA a central location for all information about Indiana‘s archeological resources, records checks became more accurate and timely. Previously, records checks were a multi-step process involving looking at maps, writing down site numbers, and then going to the files to pull those site forms, or going through all the site forms for a county by hand, looking for those listed in your project area. Not only was this time consuming, but the information was spread over at least three different institutions. As Feldhues (1997:127) reported, it took him only a minute or so to search for a specific project area using the FileMaker database, as opposed to the hours of research and travel it would have taken previously. Another aspect of the database was that it not only told researchers what sites were within their project area, but made it possible to access all the information on the site forms.

The ISTEA grant also covered the possibility of creating site forms that could be submitted to DHPA electronically, in order to aid in the quick inclusion of new archaeological sites into the database. The digital nature of the site information made it possible for the database to interact with a Geographic Information System (GIS). In his 1997 article, Feldhues demonstrates the possibility of searching the database of archaeological sites for specific site location information (such as Natural Region), or cultural information (e.g., Archaic) and then generate results in the form of maps. Those that are familiar with using SHAARD and SHAARD GIS can see the skeleton of those programs in this early database.

SHAARD

The State Historic Archaeological and Architectural Resource Database (SHAARD) was launched in 2008 courtesy of funding from the Federal Highway Administration (FHWA) (Division of Historic Preservation and Archaeology 2006, 2008). This web-based database incorporates all of the information from the FileMaker database, and also includes information on properties listed in the Indiana Historic Sites and Structures Inventory (IHSSI), National Register of Historic Places, Cemetery Registry, and information about historic theatres. SHAARD allows qualified professional archaeologists to have accounts for the database that permit access to archaeological information via web browser. The electronic site forms were designed to characterize the paper State Archaeological Site Form more than the FileMaker entries. By August, 2010, the paper forms were no longer accepted, and professional archaeologists were encouraged to enter their site information directly into the database (Division of Historic Preservation and Archaeology 2010).

In 2012, SHAARD enhancements included a feature that allows researchers to access archaeological survey reports through the database. This new feature makes possible for select records checks and research to be completed remotely, without an in-person visit to DHPA. The Archaeological Report section of the database houses online information that gives the basic run-down of the report, such as project area, sites found, and investigator/investigating institution. Also included are a PDF of the full report and a map of the project area. The sites investigated during the survey are available through a direct link to the SHAARD Archaeological Site Form, so looking up additional information on sites is quick and easy.

SHAARD GIS

One of the most beneficial enhancements to SHAARD in recent years was the development of SHAARD GIS. This web-based interactive map allows researchers to visually determine what historic sites, cemeteries, National Register properties, and archaeological sites may be in their project or research areas. Users can select a historic property or archaeological site (for example) and then immediately access the SHAARD form for the structure or site (Figure 4). SHAARD GIS displays information found in the GIS layers maintained by DHPA, so any change to the maps by DHPA staff will immediately be reflected in the SHAARD GIS system.

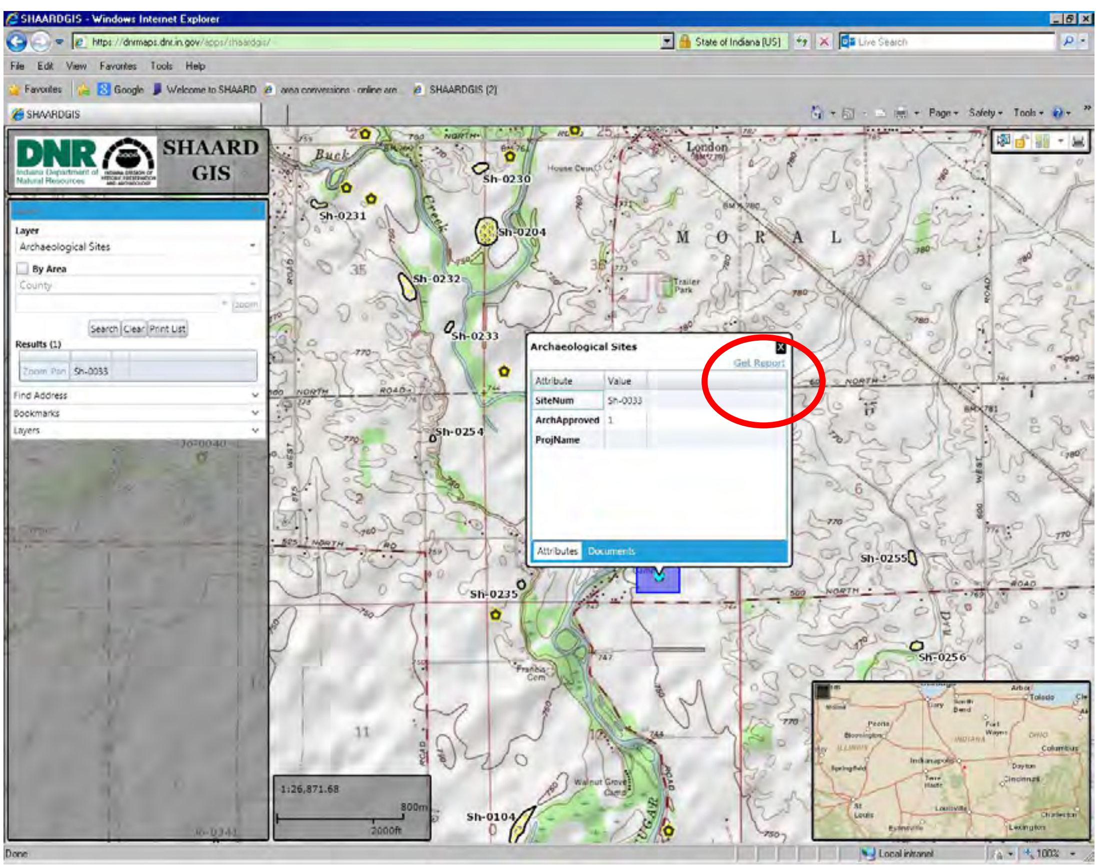

Figure 4. Screen-shot of SHAARD GIS showing the "get report" feature (red circle) that allows users to access the SHAARD file on an archaeo-logical site or other historic resource.

For more information on SHAARD and SHAARD GIS, please visit the Division of Historic Preservation and Archaeology webpage at http://in.gov/dnr/historic/4505.htm.

Current Progress

The DHPA currently has six full time data entry staff who are dedicated solely to uploading information into SHAARD. Their efforts, in conjunction with the DHPA staff who spend additional time on quality control, mapping, and more data entry, have created a surge of progress over the past year. For example, in Fall 2012, 32 counties had all of the data from site forms housed at DHPA entered into the database. By Fall 2013, this number increased to 43 counties (Figure 5). In terms of number of site forms, this means that the number of entries in the database increased from 57,803 to 61,084 (Table 1). Archaeological survey report data entry also showed impressive growth over this same period. In Fall 2012, only six counties had their reports scanned and uploaded into SHAARD (n=1,617), which increased to 31 counties in Fall 2013 (n=8,431) (Figure 6; Table 1).

Table 1. Comparison of numbers of archaeological site forms and reports in SHAARD for Fall 2012 and Fall 2013.

	Fall 2012	**Fall 2013**	**Difference**
Total number of site forms in SHAARD	57,803	61,084	***+3,281***
Total number of archaeological reports in SHAARD	1,617	8,431	***+6,814***

Additionally, we know that investigators were very busy during that year, as the number of archaeological sites increased from 61,704 sites documented as of Fall 2012 to 64,339 sites in Fall 2013 (an increase of 2,635 sites). DHPA staff are also working hard to make sure that SHAARD GIS reflects all currently known cultural resources, just as they are checking to make sure the data for archaeological site forms and survey reports is complete and accurate.

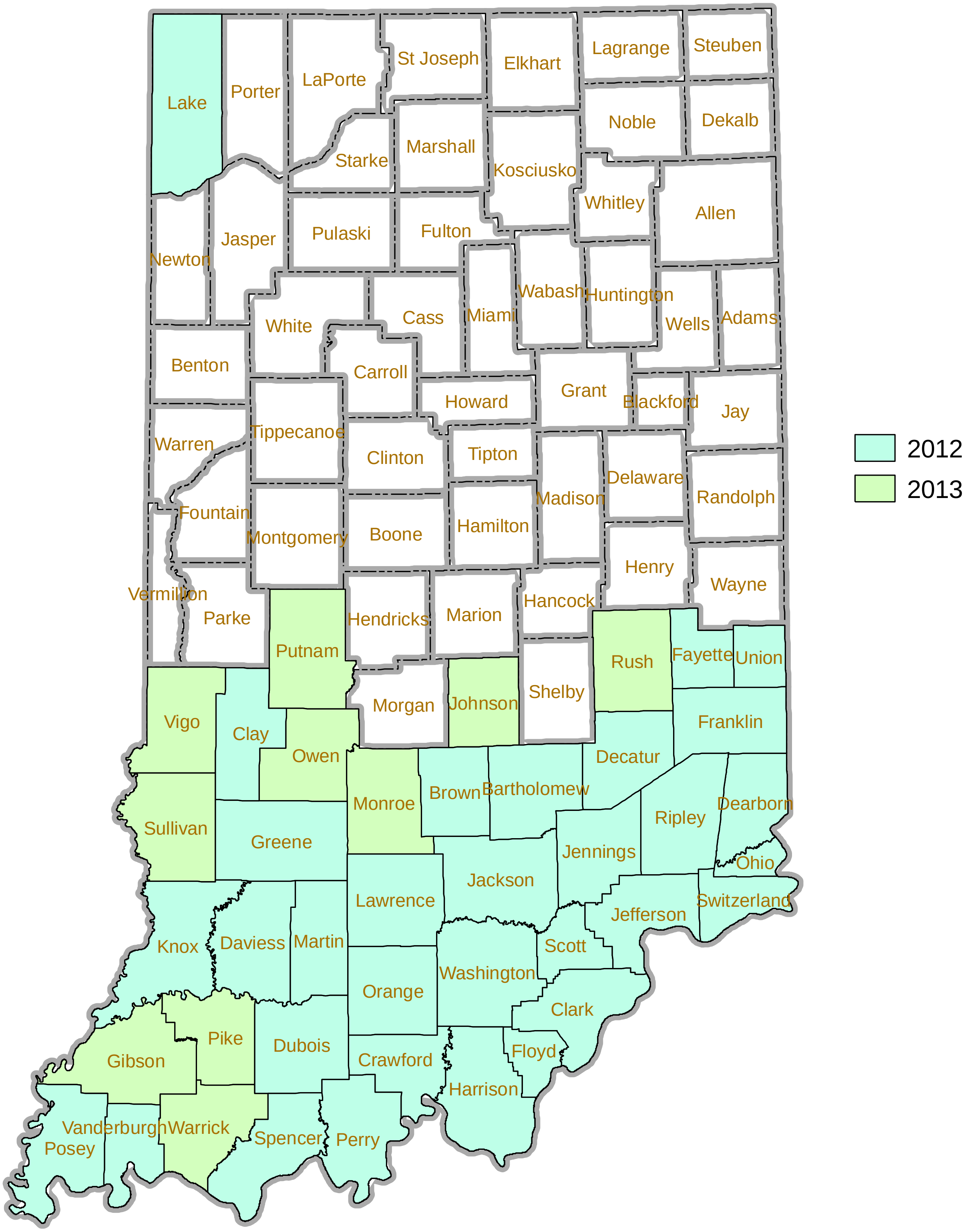

Figure 5. Indiana map showing counties with archaeological site information entered into SHAARD by 2012 and those completed in 2013. Map created by author.

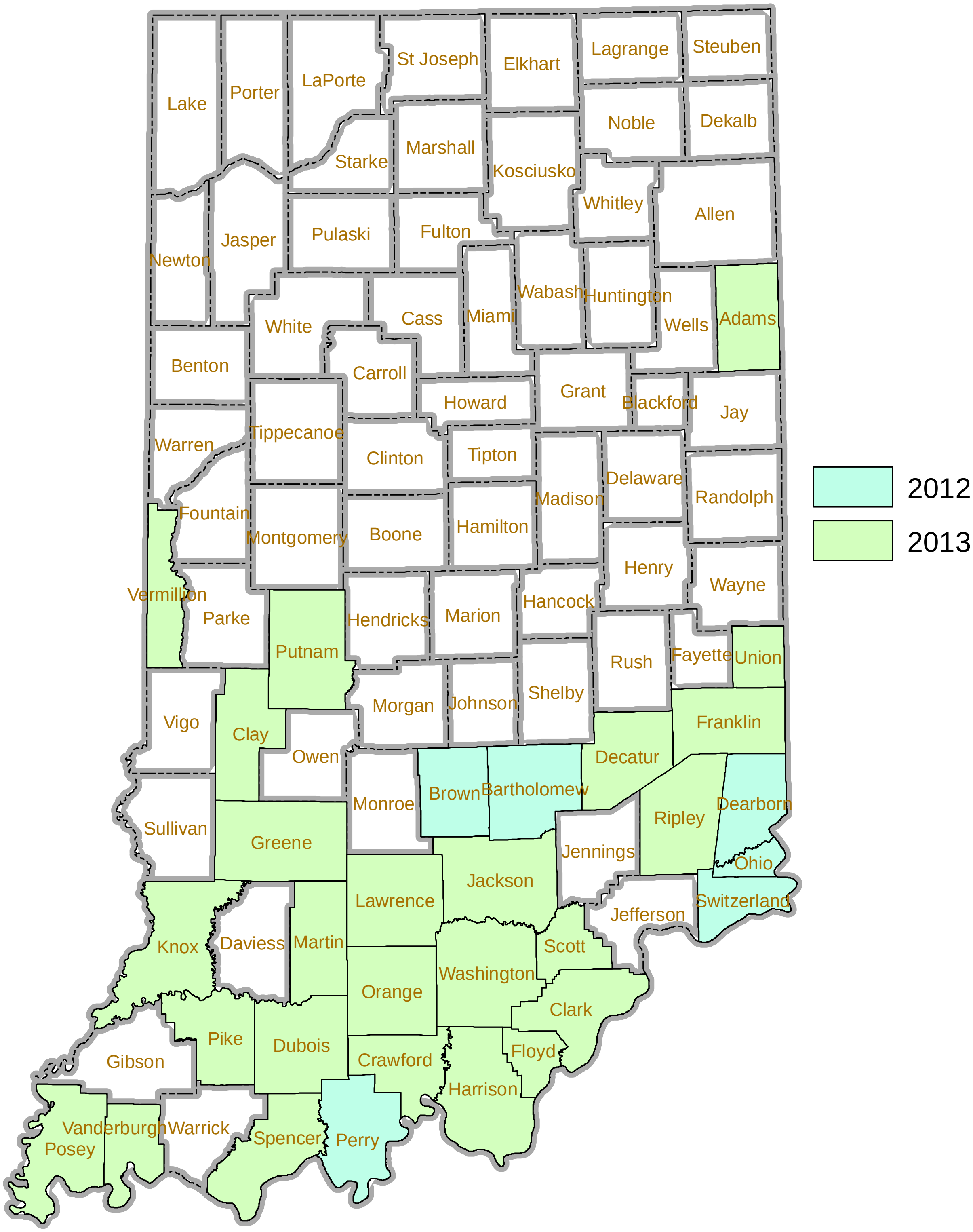

Figure 6. Indiana map showing counties with archaeological survey report information entered into SHAARD by 2012 and those completed in 2013. Map created by author.

Future Goals

Immediate goals for SHAARD include continuing to get the information found on paper site forms, structure cards, and archaeological reports into the database, as well as verifying site locations for SHAARD GIS. Long term goals involve developing a way to document surveyed areas on SHAARD GIS, trouble shooting information already in the system, and reaching out to the archaeological community to fill in any –gaps” in the data: missing site forms, reports, etc.

It is valuable to understand that SHAARD will never be –done.” There will always be a newly found site form to enter, a report finally submitted, or a new site discovered on an old map. As the planet moves further into a paperless world, there will always be new site forms and reports being submitted to the database. There will always be a chance to go back and make the information already in SHAARD more complete. We have come a long way in developing Indiana‘s computerized archaeological database, and we hope to continue making considerable strides in the future.

Acknowledgments: Special thanks go out to Amy Johnson, Cathy Draeger-Williams, and Jeannie Regan-Dinius for their insights into the history of DHPA‘s databases. SHAARD would not be possible without the help of our data entry staff, Marlina Shaw, Darlina Shaw, Terri Dorsey, Sara Head, Tiffany Howard, Amy Marisavljevic, and Elizabet Biggio, or the DHPA staff that have spent many hours entering, checking, and mapping Indiana‘s cultural resources. An additional special thanks to Rick Jones and Amy Johnson for their patience as editors.

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ARCHAEOLOGICAL SURVEY IN JASPER COUNTY: SURVEY IN A DATA DEFICIENT COUNTY

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Abstract

The current project carried out much-needed Phase Ia reconnaissance of 1,344 acres (544 hectares) at multiple high probability locations within Jasper County. Targeted areas included well drained soils: 1) near wetland resources (extant or drained); 2) near the Kankakee River; and 3) near the Iroquois River. During the survey 137 newly discovered archaeological sites were recorded, 12Js106 to 12Js242. The survey recovered 1,824 artifacts including 1,316 prehistoric artifacts and 508 historic artifacts. Artifacts diagnostic of the Early Archaic, Middle Archaic, Late Archaic, Early Woodland, Middle Woodland, Late Woodland and historic periods were documented. The results of the survey indicate that, due to its unique environment, Jasper County settlement appears to be significantly different from other portions of the state in occupational density, and in site selection.

Introduction

This project was structured to identify and assess undocumented and poorly documented cultural resources in Jasper County, Indiana (Figure 1). The Jasper County area, which contains important archaeological resources ranging from the Paleoindian to the historic periods, has a high population growth rate. The area is also being utilized for aggregate mining at an increased rate. The lack of documented resources within the county has resulted in Jasper County receiving ranking from the IDNR-DHPA as a high priority geographical target area. Prior to the current survey, only 105 sites were recorded within Jasper County, with 30 having no information available beyond an assigned site number. Of the remaining 75 sites, nine were recorded as part of the Ball State General Land Office Survey records (Maust and Cochran 1989) and have not been field verified. Surrounding counties, especially those bordering the Kankakee River, have a wealth of archaeological sites. Adjacent Porter County has 605 site documented. Newton County, which, similar to Jasper County, has had little archaeological assessment, has 261 recorded sites. It was determined that it was highly probable that Jasper County contained a large amount of undiscovered archaeological resources.

The current project carried out much-needed Phase Ia reconnaissance of 1,344 acres (544 hectares) at multiple high probability locations in the county. Targeted areas included well drained soils: 1) near wetland resources (extant or drained); 2) near the Kankakee River; and 3) near the Iroquois River. During the survey 137 newly discovered archaeological sites were recorded, 12Js106 to 12Js242. The survey recovered 1,843 artifacts including 1,335 prehistoric artifacts and 508 historic artifacts. Artifacts diagnostic of the Early Archaic, Middle Archaic, Late Archaic, Early Woodland, Middle Woodland, Late Woodland, and historic periods were documented.

Andrew Smith, Interim Director of the Indiana University-Purdue University Fort Wayne Archaeological Survey (IPFW-AS), served as Director and Principal Investigator for the project.

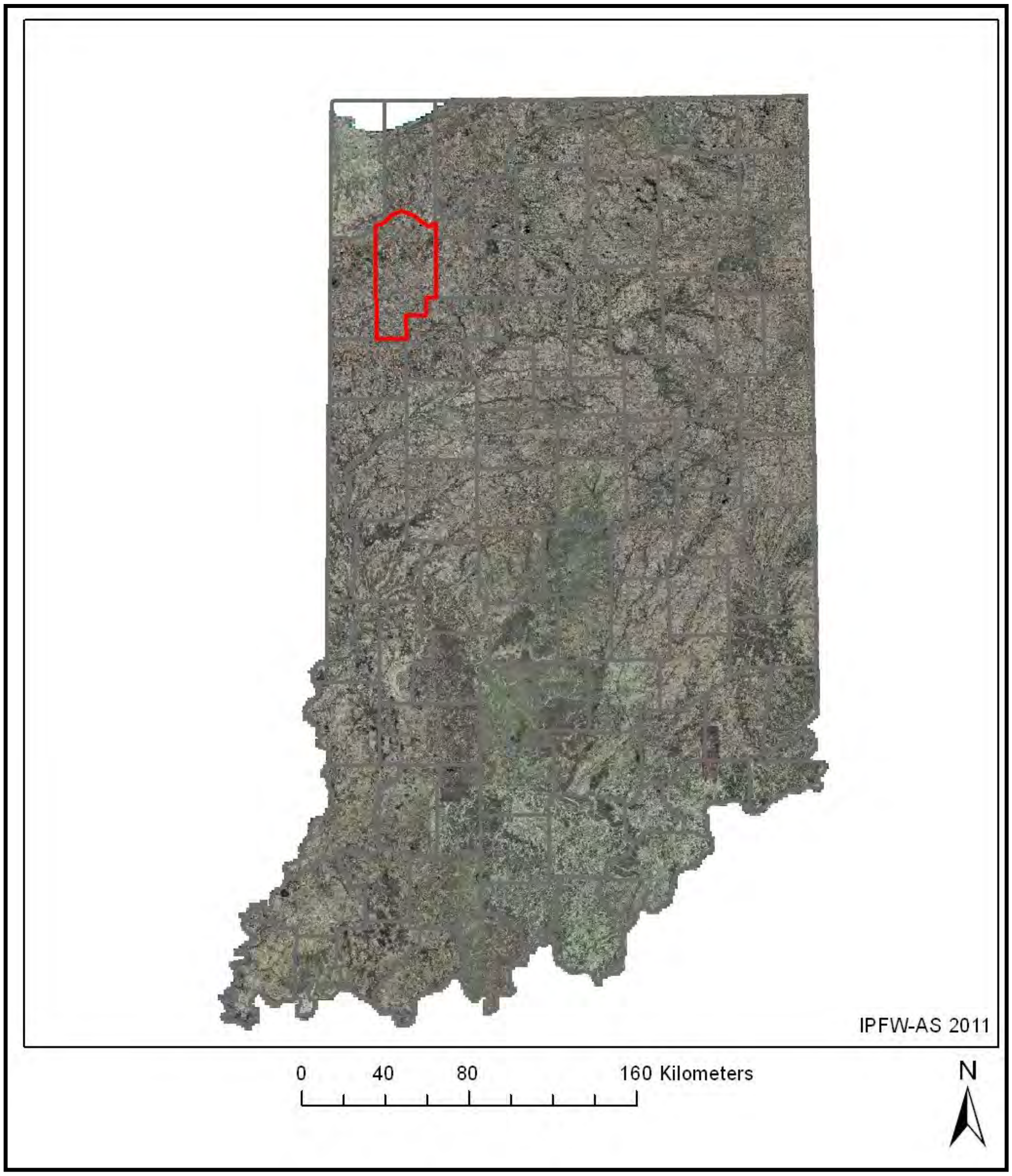

Figure 1. Jasper County within the state of Indiana (Indiana Spatial Data Portal).

Overview and Background

Jasper County contains archaeological resources associated with every general prehistoric period identified in Indiana, as well as some historic resources. Until the recent historic era, settlement was almost certainly limited to the higher well drained soils within the county. Only through extensive drainage projects has it been possible for a greater portion of the county to be settled and farmed. Specific knowledge about many aspects of the prehistory of northern Indiana is quite thin, and the dearth of documented sites within Jasper County makes its place in prehistory especially problematic.

Research Objectives, Project Goals and Methodology

This project was designed to address one of the DHPA‘s high-priority areas in a framework of research-oriented field surveys. The project has three main research goals: 1) to assess what knowledge the artifact collector community has that could help generate data on landscape archaeology (Brown and Sasso 2001); 2) to field survey and identify cultural materials in the county; and 3) to employ a geographic information system (GIS) framework to begin research into the temporal/spatial distribution of sites within the county. The focus of the project within Jasper County will yield important data for understanding the prehistory and history of a very poorly understood part of the state.

This project sought to add to the known archaeological sites within Jasper County. A records check performed at the DHPA revealed a paucity of known sites within the county. Surrounding counties, especially those bordering the Kankakee River, have a wealth of archaeological sites. Adjacent Porter County has a documented 605 sites and Newton County 261.

Natural Setting

The following represents a brief synthesis of the available information regarding the physical and environmental setting of the project area to provide a context for archaeological investigations.

Geology and Geography

Jasper County is located in the northwest portion of the state and lies within the Muscatatuck Regional Slope physiographic zone (Schneider 1966). This ―gently sloping plain” zone is commonly described as ―a structural plain or stripped surface on the rather resistant westward-dripping Silurian and Devonian carbonate rocks that lie beneath” (Schneider 1966:44). The Muscatatuck Regional Slope physiographic zone is within the Grand Prairie Natural Region, which is divided into three sections: Grand Prairie Section, Kankakee Sand Section, and Kankakee March Section, all present in Jasper County (Homoya 1997:158). The bedrock geology within Jasper County is primarily composed of Pennsylvanian rocks, Devonian limestone, and Devonian and Mississippian shale with a small portion of Mississippian rocks in the south western tip of the county (Gutschick 1966). Pleistocene deposits are of the Outwash and Dune Facies, Cartersburg Till Member, and Lacustrine Facies (Wayne 1966).

Flora and Fauna

Based upon descriptions prior to extensive Euroamerican landscape alteration, the Muscatatuck Regional Slope was primarily forested. Western Mysophytic forests predominated, but dry prairie and wetland environments also occurred (Lindsey 1997:120). Many aquatic as well as mammalian species would have been available throughout the prehistoric period. These species would have been representative of the eastern deciduous woodland fauna and could have included any of the following: porcupine, black bear, fisher, eastern spotted skunk, river otter, wapiti (elk), bison, opossum, eastern cottontail, woodchuck, gray squirrel, fox squirrel, southern flying squirrel, beaver, raccoon, striped skunk and white-tailed deer (Reidhead 1981). All were abundant in the prehistoric eastern woodlands, and their remains have been well documented at archaeological sites within the state (Reidhead 1981).

Soils

There are thirteen soil associations within Jasper County as described in the General Soils Map (Smallwood and Osterholz 1990; Figure 2). Since the archaeological survey covered different areas throughout the county, specific soils within each of the areas surveyed are described in further detail in the individual project areas.

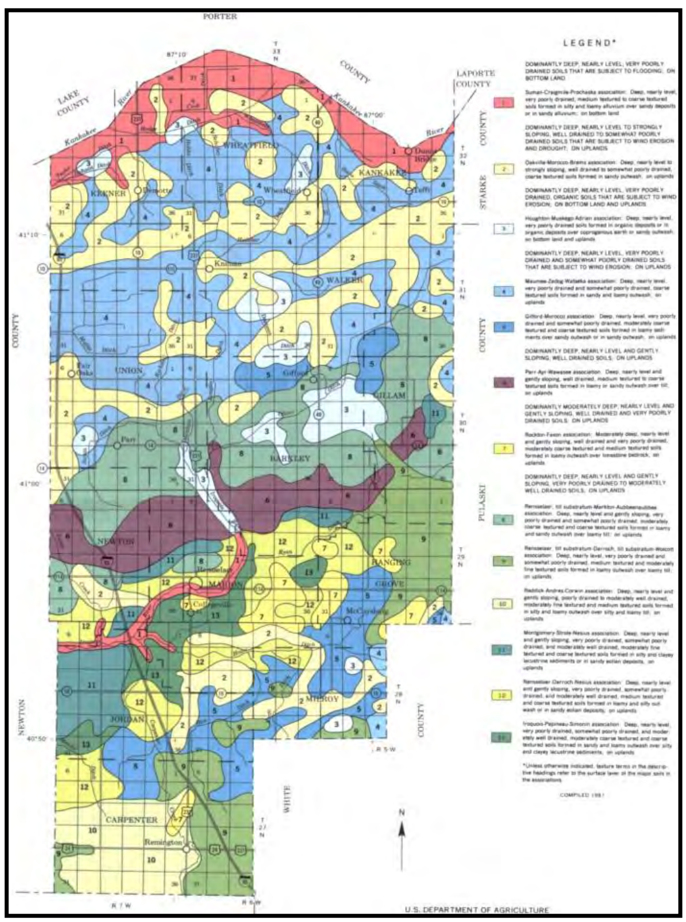

Figure 2. Soils map from Smallwood and Osterholz (1990).

Archaeological Investigations

Approximately 1,344 acres (544 hectares) were surveyed for the current project within 13 survey areas. Survey areas were selected based on drainage and elevation characteristics and were based on where landowner permission could be secured. Survey was conducted within agricultural fields with crops in, after harvest, and some after tilling and weathering over winter. The survey recovered 1,843 artifacts including 1,335 prehistoric artifacts and 508 historic artifacts. The results of the survey are presented by survey area below.

Methods

Field

Original plans called for the survey of 900 acres with an anticipation of recording 140 sites. Areas were selected for survey based on topography and soil drainage characteristics, as well as the presence of nearby permanent wetland resources in prehistory. Fields with the greatest percentage of visibility were sought, but if landforms of interest had greater than 30% visibility they were also targeted. Every attempt was made to sample high probability areas evenly throughout the county, but this was not as successful as originally intended because high probability areas were not evenly distributed throughout the county, and survey was limited to areas where landowner permission could be secured.

Survey areas were investigated by experienced personnel from the IPFW-Archaeological Survey, with the assistance of one landowner. Survey was carried out between July 23, 2012 and April 5, 2013. All survey was conducted by pedestrian transects spaced at 10 m which were reduced to 5 m intervals when artifacts were encountered to aid in defining site boundaries. Survey areas had surface visibility that ranged from 40 to nearly 100 percent. All artifacts encountered with the exception of fire cracked rock and brick, which were counted in the field, were collected by site, and the location was recorded with a Trimble GeoXT GeoExplorer 2008 series GPS unit.

Laboratory

All artifacts that were collected in the field were assigned a field specimen number and were returned to the laboratory for additional analysis. Artifact separation by provenience was maintained throughout processing. Artifacts were washed, sorted, and catalogued according to IPFW-AS established procedures and classifications. Identification of hafted bifaces were made using Justice (1987). Where possible chert types were identified using the IPFW-AS comparative collection and were made under a microscope with at least 10X magnification. Historic artifacts were identified by comparison with the IPFW-AS collection and with the aid of many works referenced with the artifact descriptions. State site numbers were obtained from the DHPA staff, and a site form for each site was entered into the SHAARD database. According to IPFW-AS procedures each site was given a separate accession number. All artifacts generated by this project were returned to landowners. Because artifacts were returned to landowners additional photographic and metric documentation of the artifacts were undertaken in accordance with DHPA guidelines.

Summary

Approximately 1,344 acres (544 hectares) were surveyed during this project and 137 new state sites were recorded from 13 survey areas. No previously recorded sites were resurveyed. Site and artifact densities were relatively low throughout the county. Site components fit with other surveys throughout Indiana with Late Archaic dominating identified components (Cochran 1994; McCord 2005, 2007; Smith et al. 2009). However, where many times Late Woodland is the next most commonly identified component followed by Early Archaic components the current survey identified the opposite. Tables and Figures showing the distribution of site components within the county are included below in Table 1 and Table 2.

Table 1. Site Components Documented.

Temporal Period	Total	Temporal Period	Total
Paleoindian	0	Woodland	2
Early Archaic	6	Unidentified Prehistoric	98
Middle Archaic	1	Historic	7
Late Archaic	7	Unidentified Prehistoric and Historic	9
Early Woodland	1	Early Archaic and Woodland	1
Middle Woodland	1	Late Archaic and Middle Woodland	1
Late Woodland	3	Late Archaic and Woodland	1

Table 2. Instances of Components Including Individual Components from Multi-component Sites.

Temporal Period	Total	Temporal Period	Total
Paleoindian	0	Middle Woodland	1
Early Archaic	7	Late Woodland	3
Middle Archaic	1	Woodland	4
Late Archaic	9	Unidentified Prehistoric	108
Early Woodland	1	Historic	15

Chert

Chert identifications can provide information on the importance of trade or movement of people within a research universe. The current research universe is within a bedrock chert poor region of the state because so much of the ground surface is comprised of thick glacial till. The geological survey for Jasper County mentions a cherty limestone exposed in the banks of the Iroquois River near Rensselaer (Collett 1883). However, investigations of the Iroquois River bank by the IPFW-Archaeological Survey staff did not reveal any exposed bedrock of any kind. This is likely due to the major channelization of the river for better drainage. The nearest bedrock exposures of chert to the county are Attica chert to the south, Kenneth chert to the southeast, and Liston Creek exposures to the southeast. None of the known bedrock exposures is nearer than 40 km from the southernmost parts of Jasper County. Of the chert types nearest to the research universe, Attica has the most widespread distribution and reputation as a high quality traded lithic resource (Cantin 2008). Liston Creek, though used extensively near bedrock and till exposures has a limited presence in traded chert types (Cantin 2008).

It was anticipated that till cherts would be represented highly as unidentified chert types brought in by glacial processes, followed by Attica and perhaps Burlington cherts. In previous research the author has been able to identify over 90 percent of chert types from areas near known chert exposures (Smith et al. 2008; Smith et al. 2009). Identification of similar percentages of chert types within the current project area were not possible (see Table 3). However, this is not entirely unexpected as in a similar setting to the current research universe in a segment of the Wabash River not near to bedrock chert exposures, the author was only able to identify a similar percentage of named chert types due to the heavy use of till cherts (Smith et al. 2012).

Very few exotic cherts were encountered within the project area, with representation by Burlington, Flint Ridge, and Wyandotte cherts, and an English gun flint. Together these chert types made up only 1.3 percent of chipped stone artifacts. For a complete breakdown of chert types recovered see Table 3.

Table 3. Chert Types Encountered within the Project Area.

Chert Type	Number	Percentage	Chert Type	Number	Percentage
Unidentified	1,056	81.0%	Kenneth	2	0.2%
Striped Unknown	104	8.0%	Heat Treated Burlington	2	0.2%
Attica	98	7.5%	Heat Damaged Unidentified	2	0.1%
Heat Treated Unidentified	10	0.8%	Flint Ridge Moss Agate	1	0.1%
Liston Creek	9	0.7%	Middle Jeffersonville	1	0.1%
Burlington	8	0.6%	Heat Treated Attica	1	0.1%
Wyandotte	4	0.3%	Heat Damaged Attica	1	0.1%
Devonian	3	0.2%	English Flint	1	0.1%

Artifacts

A total of 1,824 artifacts were recovered, composed of 1,316 prehistoric and 508 historic artifacts. A breakdown of the artifact types recovered is included in Table 4. The most commonly identified prehistoric artifact type was chipped stone debitage, followed by unrefined bifaces (see Figures 3-5). The most commonly identified historic item was container glass.

A small number of points were recovered from the project and are listed by Cultural Period in Table 5. The most identified type of point from the project was Matanzas.

Table 4. Artifact Totals by Category, Excluding Fire-Cracked Rock and Burned Bone.

Artifact	**Totals**	**Artifact**	**Totals**
Core	6	Whiteware	60
Debitage	1,175	Yelloware	5
Refined Biface	25	Glass Closure	2
Refined Hafted Biface	25	Container Glass	182
Unrefined Biface	51	Flat Glass	22
Blade	1	Glass Lighting Fragment	1
Formal Uniface	17	Other Glass	2
Nonformal Uniface	25	Glass Tableware	6
Pitted Stone	1	Unidentified Glass	3
Cord-Marked, Grit Tempered, Body Sherd	1	Aluminum Button	1
Plain, Grit Tempered, Body Sherd	1	Copper Flat Fragment	1
Dentate Stamped, Grit Tempered, Rim Sherd	1	Iron Bale Handle	1
Non-diagnostic Sherd	1	Iron Door Fragment	1
Earthenware	6	Misc. Iron Fragments	6
Ironstone	106	Wire Nail	1
Porcelain	14	Lead Musket Ball	1
Stoneware	75	1945 Dime	1
Terra Cotta	2	Tin Canning Jar Lids	4

Figure 3. 1975/13 Matanzas, 1974/02 Raddatz, 1975/15 Matanzas, 1977/02 Triangular Cluster Drill, 1995/01 Drill, 1987/03 Karnak Unstemmed, 1997/01 refined biface, 1975/06 refined biface, 1978/03 refined biface, 1982/04 refined biface, 1986/08 refined biface, 1986/09 refined biface.

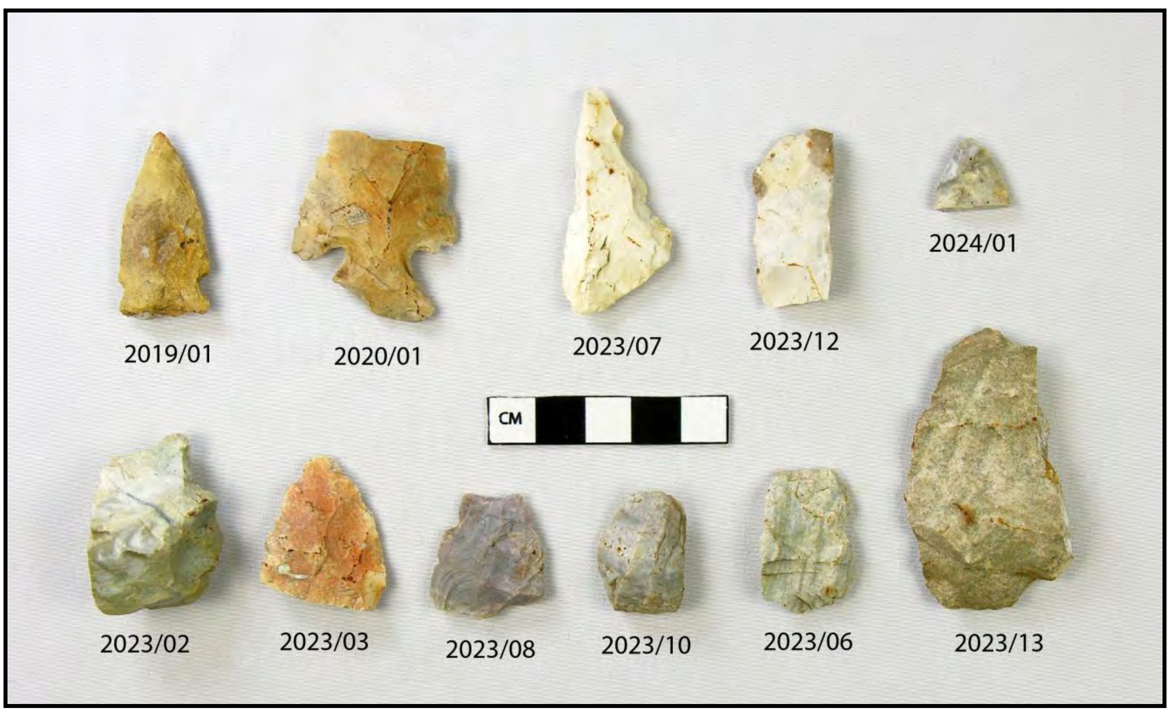

Figure 4. 2019/01 Matanzas, 2022/01 Thebes Cluster, 2023/07 refined biface, 2023/12 refined biface, 2024/01 refined biface, 2023/02 unrefined biface, 2023/03 unrefined biface, 2023/08 unrefined biface, 2023/10 unrefined biface, 2023/06 unrefined biface, 2023/13 unrefined biface.

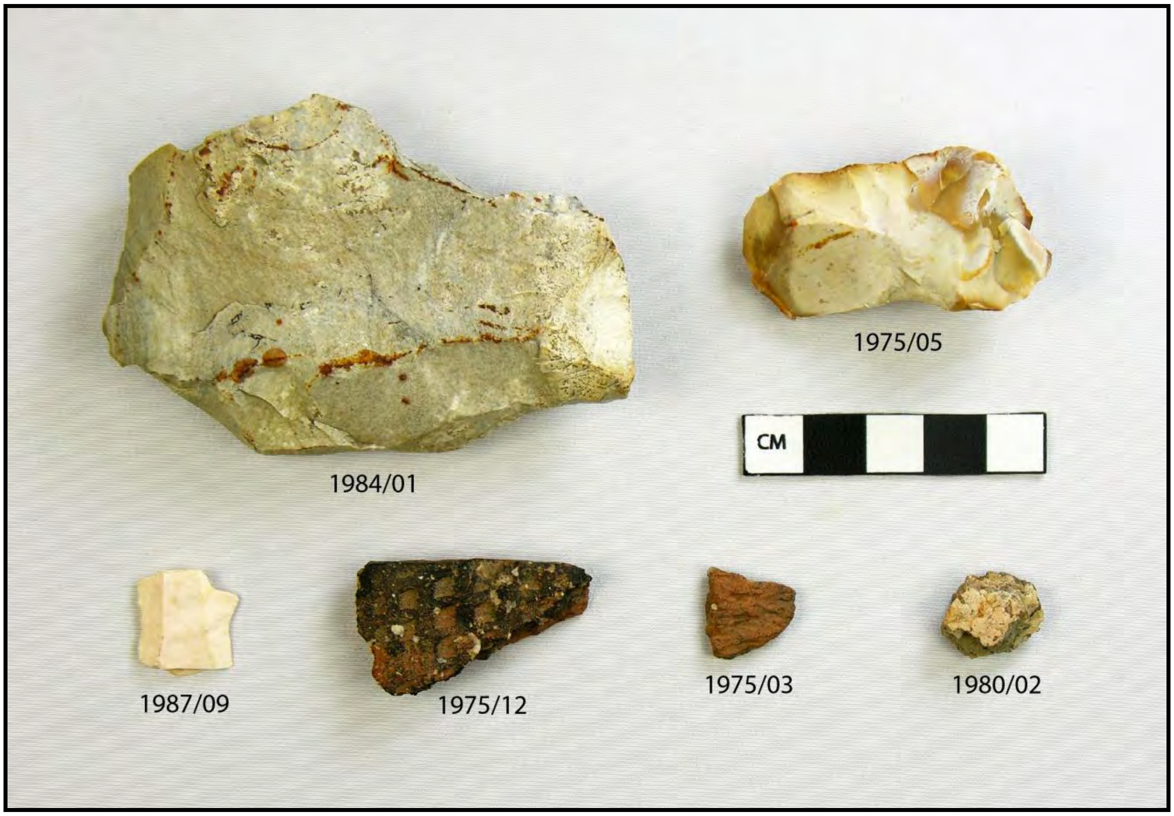

Figure 5. 1984/01 core, 1975/05 core, 1987/09 blade, 1975/12 dentate stamped, grit tempered, rim sherd, 1975/03 cord marked, grit tempered, body sherd, 1980/02 plain, grit tempered, body sherd.

Table 5. Point Types by Cultural Period.

Cultural Period	**Point Type**
Early Archaic	Unidentified Early Archaic (2), Kirk Corner Notched (1), Thebes Cluster (1), Stanley Stemmed (1), Hardin Barbed (1), Fox Valley Truncated (1)
Middle Archaic	Raddatz Side Notched (1)
Late Archaic	Unidentified Late Archaic (3), Brewerton (3), Matanzas (4), Karnak Unstemmed (1)
Early Woodland	Adena Stemmed (1)
Late Woodland	Triangular Cluster (3)

Site Locations and Density

Sites were predominantly discovered on well drained sandy soils on outwash plains and recessional moraines (Table 6). Although well drained outwash plains and recessional moraines are common features within Jasper County, they make up only 35 percent of the county (see Table 7), yet contained nearly all sites discovered. While soil type did appear to effect prehistoric site selection the presence of a specific soil was not determinative in site selection. Multiple other factors, many of which remain undiscovered, likely affected site selection. Among the most compelling factors appears to be the presence of permanent and probably deep wetland resources. This is certainly borne out by what was discovered with Survey Area 5 which had the most artifacts and sites of any area investigated. Additional evidence supporting the necessity of deep and permanent wetland resources for site selection come from Survey Areas 1 and 2. Both survey areas had very well, or excessively drained soils composed of outwash deposits. However, wetlands around the landforms would have been saturated, but would have lacked standing water for a large part of the year. These isolated landforms surrounded by saturated soils would have been difficult to access by boat which may explain the lack of apparent use.

Table 6. Soils and Topographic Settings Where Sites Were Encountered.

Topographic Setting	Soil Type	Number of Sites	Total Sites
Outwash Plain	Brems Loamy Sand	47	106
	Oakville Fine Sand	14	
	Morocco Loamy Sands	19	
	Martinsville Fine Sandy Loam	11	
	Oakville Sand, Moderately Wet	5	
	Whitaker Fine Sandy Loam	4	
	Chelsea Sands	3	
	Watseka-Maumee Loamy Sands	2	
	Rensselaer Loam	1	
Recessional Moraines	Rensselaer Fine Sandy Loam, Till Substratum	11	27
	Metea Loamy Sand, Moderately Permeable	8	
	Metamora Fine Sandy Loam	4	
	Parr Fine Sandy Loam	1	
	Corwin Loam, Moderately Permeable	1	
	Octagon Fine Sandy Loam	1	
	Parr-Ayr Complex	1	
Ground Moraines	Darroch, Till Substratum Odell Complex	3	3
Flood Plain	Suman Loam, Frequently Flooded	1	1

Table 7. Soil Association Information for Jasper County (Smallwood and Osterholz 1990).

Outwash and Moraine Soil Associations with Moderately Well and Well Drained Characteristics	**Soil Association**	**Percent of County**	**Total Percent**
	Oakville-Morroco-Brems	19	35
	Parr-Ayr-Wawasee	4	
	Reddick-Andres-Corwin	5	
	Resselaer-Darroch-Nesius	7	
Lacustrine and Outwash Soil Associations with Poorly Drained Characteristics	Suman-Craigmile-Pochaska	7	65
	Houghton-Muskego-Adrian	3	
	Maumee-Zadog-Watseka	23	
	Gilford-Morocco	8	
	Rockton-Faxon	1	
	Rensselaer-Markton-Aubbeenaubbee	7	
	Rensselaer-Darroch-Wolcott	8	
	Montgomery-Strole-Nesius	4	
	Iroquois-Paineau-Simonin	4	

Site and artifact density varied considerably throughout the county as is demonstrated in Table 8. Survey Area 5 showed by far the greatest diversity and density of prehistoric artifacts discovered during the current survey. Although survey could not be conducted on other areas around the large Houghton muck soils due to limitations of the grant and the failure to secure landowner permission, it is highly probable that additional survey of the margins of the prehistoric lake will reveal additional significant sites. Survey Areas 2 and 3 had no and low artifact counts respectively, and this appears to be explained by the previously mentioned lack of permanent and deep wetlands in the area. Survey Area 12 also had a low artifact and site density which is more likely the result of good agricultural practice than actual low site density, as some of the more likely areas for sites to be located on were removed from agriculture due to low natural fertility and high erosion potential. As a side note, this agricultural best practice is common across the county, with some of the highest potential site locations removed from agricultural practice. This is good for site preservation, but bad for pedestrian survey site discovery techniques. It is worthy of note that with the increase in price of corn, some marginal lands with a high potential for erosion and concurrent site destruction are being brought back into agricultural production within the county. These high probability areas are also being affected by residential developments.

Although Jasper County is considerably different from other till plain locations because of the unique nature of the Kankakee valley, it is interesting to compare site and artifact densities to other large-scale till plain surveys. A comparison of eight large-scale surveys reveals that Jasper County is on the low end of site and artifact density as compared to other till plain locations Table 9. Although two surveys established lower site and artifact densities (Jeske 1992,

1996) the results of those surveys are very questionable considering the density of sites recorded within those research universes.

Table 8. Site Density and Artifact Density by Survey Area.

Survey Area	Acres	No. Sites	Acres Surveyed per Encounter-ed Site	No. Artifacts	Artifacts per Acre
Area 1	90	2	45.0	18	0.2
Area 2	50	--	--	--	--
Area 3	40	2	20.0	2	0.1
Area 4	150	23	6.5	220	1.5
Area 5	215	47	4.6	761	3.5
Area 6	235	18	13.1	328	1.4
Area 7	42	8	7.0	18	0.4
Area 8	48	5	9.6	46	1.0
Area 9	145	7	20.7	96	0.7
Area 10	48	2	24.0	33	0.7
Area 11	58	5	11.6	236	4.1
Area 12	102	1	102.0	4	<0.1
Area 13	116	17	6.8	62	0.5
Total	**1,344***	**137**	**9.8**	**1,824**	**1.4**

*Table total higher because of rounding not noted in the table.

Table 9. Large Scale Survey Area Data in Comparison to the Current Investigation.

Area	Acres Surveyed	Acres Surveyed per Encountered Site	Artifacts per Acre
White River Valley (McCord 2005)	155	3.97	7.45
Upper Wabash River (Wepler and Cochran 1983)	262	1.06	26.7
St. Joseph River Valley (Jeske 1992)	2,830	50	0.1
St. Mary's River Valley (Jeske 1996)	2,011	15.3	1.3
Wabash Valley (Smith et al. 2009)	791	1.7	13.7

Area	Acres Surveyed	Acres Surveyed per Encountered Site	Artifacts per Acre
Tipton Till Plain, Hancock County (McCord 2009)	787	4.9	2.1
Till Plain Sluiceway (Smith et al. 2008)	388	2.3	5.6
Sugar Creek Valley (Murray et al. 2011)	915	4.2	1.9
Current Survey	1,344	9.8	1.4

Site Recommendations

A total of 137 new sites were added to Indiana's SHAARD database from this project. Of those, only twelve sites were recommended for additional archaeological assessment. These sites were selected because they appeared to have the potential for significant archaeological data. Most of the sites were selected because of the high numbers of prehistoric artifacts recovered. However, two sites were recommended because of the very dense amounts of fire-cracked rock discovered. These two sites may be the most intriguing sites discovered as chipped stone artifact totals on the sites were very low (12Js123 *n*=4, 12Js125 *n*=1). These sites may be large processing sites and seem to be the most likely sites discovered to contain intact subsurface features.

Table 10. Site Recommendations.

Recommendations	Sites
No Further Assessment	12Js106 to 12Js117, 12Js119 to 12Js156, 12Js158 to 12Js161, 12Js163 to 12Js172, 12Js175 to 12Js182, 12Js184 to 12Js204, 12Js206 to 12Js210, 12Js212 to 12Js218, 12Js220 to 12Js239, 12Js241, 12Js242
Geophysical Investigations	12Js123, 12Js125
Phase II Testing	12Js118, 12Js157, 12Js162, 12Js173, 12Js174, 12Js183, 12Js205, 12Js211, 12Js219, 12Js240

Conclusions

This survey targeted well drained soils in areas within Jasper County near wetland resources. The project was conducted because of a lack of systematic survey within Jasper County and a concomitant data deficiency. In addition to the lack of systematic data on archaeological resources within the county, archaeological sites within Jasper County are increasingly at risk of destruction from development, particularly along the I-65 corridor. The goals of this project were to investigate previously unsurveyed properties within the county and to provide a general idea of the potential and density of artifacts and sites within the county.

The current project accomplished the survey of 1,344 acres of agricultural land within Jasper County in 13 areas that contained well drained soils near prehistoric wetland resources. The survey resulted in the recording of 137 new state sites for Jasper County, more than doubling the sites recorded within Jasper County. The survey discovered 1,824 artifacts of which 1,316 were prehistoric and 508 were historic artifacts. Most of the prehistoric sites had unidentifiable components. Prehistoric components were identified on 134 sites and historic components were identified on 15 sites. Of the 137 sites discovered only 12 sites were recommended as potentially eligible for listing on the State or National Registers.

The average site density recorded within the project area was low, at one site discovered per 9.8 acres of survey. Site locations were more patterned than other till plain locations the author has investigated. Sites were almost exclusively discovered on sandy outwash deposits near wetland resources. However, the presence of well drained sandy outwash deposits near wetland resources was not sufficient to predict the incidence of prehistoric use. This is likely due to the non-conterminous nature of many of the sand hills within the research universe and the difficulty in accessing various landscapes due to wetland barriers. Additional survey in a very similar setting, Newton County, Indiana, is recommended to try to add to the information gathered during the current survey, and to add to a predictive model of site discovery.

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GLOSSARY OF ARCHAEOLOGICAL TERMS

A-horizon soil
The upper layer of soil, nearest the surface.

Anthropology
The study of humankind, with particular emphasis on its cultural and biological adaptations.

Archaeology
The anthropological study of past lifeways, cultures, and cultural processes through the investigation of material remains left behind by humans.

Artifact
Any portable object made, used, and/or modified by humans. Or, more generally, any evidence of human behavior. Common prehistoric artifacts found archaeologically include spear points, arrowheads, knives, chipped or broken stone debris, ground stone axes, grinding stones, mortars and pestles, awls, adzes, gouges, pottery, clothing and ornamental pins, decorative items and ornaments, scraping tools, hammerstones, bone fishhooks, stone perforators, and beads.

Associations
The relationships of artifacts and features at a site, based on provenience and context.

Atlatl
A spearthrower.

Avocational archaeologist
A person who participates in archaeology but does not practice it as a profession. Avocational archaeologists may volunteer to work with qualified professional archaeologists, and many take courses and gain substantial experience in archaeological methods and techniques. Others may be involved in archaeology as a hobby. Generally, avocational archaeologists subscribe to a preservation ethic to protect archaeological resources and to responsibly and legally preserve and study information from sites.

B.P.
Before present. By professional agreement present was established to be A.D. 1950 based on radiocarbon dating. For example, 1000 B.P. means 1000 years before A.D. 1950, or A.D. 950.

Celt
An ungrooved axe. Celts may be made of pecked and ground stone, or hammered copper. It is thought that celts appeared in Late Archaic times, and they continue to occur through later prehistory.

Ceramics
Pottery vessels or potsherds.

Chert
Stone of microscopic or small quartz particles used for the making of stone tools. Some types of chert include flint, agate, and jasper.

Chiefdom
A non-egalitarian hierarchial social organization with a fixed and permanent role for a chief/leader.

Collared
A thickened area present below the rim and above the neck on a clay pottery vessel.

Complicated stamped
Decorations of curvilinear or rectilinear design paddle stamped into a clay vessel.

Context
The position of an artifact or feature in its soil matrix, horizontal, and vertical location, and its relationship with other artifacts and features, related to the behavioral activities which placed it there.

Cord-impressed
Impression into a clay vessel surface before firing by a stick wrapped with cord, or cord on the edge of a paddle.

Cordmarked
Cordage impressions on a pottery vessel as a result of stamping with a cord-wrapped paddle.

Core
A stone which exhibits one or more flake scars, showing that it has been used as a raw material for flintknapping.

CRM
Cultural resource management. The protection, preservation, and recovery of information from archaeological sites, under federal and state laws. Universities and private archaeological companies often are hired to conduct CRM archaeology mandated under federal or state statutes.

Culture
A system of shared, learned, symbolic human behavior for adaptation to our natural and social environment. Culture may be thought of as a system composed of interrelated parts or subsystems, where a change in one part affects or influences the other parts. Subsystems interrelated with culture include technology, communication (and language), biological and physical characteristics, psychology, economics, social and political organization, beliefs and values, subsistence, settlement, environment, etc.

Excavation
The systematic recovery of archaeological deposits through the removal and screening of soil. These can be either test excavations (termed Phase II in CRM investigations) or large-scale excavations (termed Phase III in CRM investigations).

Fabric-impressed
Impressions of woven fabric in the surface of a pottery vessel.

Feature
Non-portable evidence of past human behavior, activity, and technology found on or in the ground. Prehistoric features commonly include fire pits and hearths, burned earth and clay, trash and garbage pits, post molds, evidence of house floors or basins, storage pits, clusters of artifacts (e.g., chipped and broken stones, caches of projectile points, ceramics or pottery sherds), human and animal burials, clusters of animal bone, earthworks (such as mounds and circular enclosures), petroglyphs and pictographs, and middens.

Flake
A by-product of flintknapping, toolmaking, use, or other human activities, resulting in a fragment of stone detached from a parent stone. Often, a flake has evidence of purposeful removal, including a bulb of percussion, ripple marks, a striking platform, etc.

Gorget
Decorative object worn on the chest.

Grog-tempered
Ceramics tempered with fragments of crushed pottery.

Lithics
Stones used or modified for human activities such as the manufacture of prehistoric tools, cooking, hunting, etc.

Microtools
Small tools, predominately of stone, manufactured and used to perform certain tasks.

Midden
Cultural refuse or deposits built up at a site.

Multicomponent
An archaeological site with occupations from more than one culture or time period.

Petroglyphs
Naturalistic or symbolic representations or depictions carved into stone.

Pictographs
Pictures or drawings painted on rocks, cave walls, stone outcrops, or rockshelters.

Prehistory
Human activities, events, and occupations before written records. In North America, this primarily includes Native American prehistoric cultures, but does not imply that these cultures did not have long, rich, and varied cultural and oral histories and traditions.

Protohistory
Protohistoric cultures can be defined as those prehistoric groups developing or continuing directly into early recorded history, some associated with early historic artifacts.

Provenience
The horizontal and vertical location of an artifact at a site.

Red Ochre
Late Archaic-Early Woodland culture with burial practices, usually in mounds, involving the use or placement of red ochre (a red hematite pigment).

Shell-tempered
Ceramics (pottery) tempered with fragments of crushed shell.

Site
The presence or occurrence of one or more artifacts or features indicates an archaeological site. An archaeological site is an instance of past human behavior or activity, where humans conducted some activity and left evidence of it behind, on or in the ground. Some common prehistoric site types include artifact caches, villages and camps, cemeteries, burials, workshops (e.g., stone debris from flintknapping activities), quarries, and earthworks (mounds, embankments, enclosures, fortifications, etc.).

Stratigraphy
Horizons, strata, or layers of soil deposited at a location, where the deepest strata were deposited the earliest, and the more recent layers deposited higher in the stratigraphic sequence.

Survey
The systematic discovery, recovery, and recording of archaeological information such as site locations, artifacts, and features by visually inspecting the surface of the ground if the soil is visible. Or, the use of shovel probes, cores, and/or augers near the surface, if surface visibility is restricted or poor. Termed Phase I in CRM investigations.

Test excavation
Systematic excavation of a representative portion or percentage of a site to evaluate and determine its nature and extent, what information is present, whether there are intact or in situ deposits present, and the degree of disturbance to the site, often to determine whether it is eligible for the National Register of Historic Places. Termed Phase II in CRM.

Wyandotte
A type of dark blue-gray chert found in southern Indiana.

For those with access to the Internet, the following sites also provide opportunities to access definitions and additional information regarding archaeological terms and concepts:

http://www.archaeological.org/education/glossary
http://archaeology.about.com/od/rterms/g/radiocarbon.htm

PREHISTORIC INDIANS OF INDIANA

Note- The word prehistory is a technical term used by archaeologists to indicate information about cultures before written records were kept—in North America at first by Europeans and people of Old World descent—in that area. It does not imply by any means the cultures described did not have long, rich, and varied cultural and oral histories and traditions. All of the cultures certainly did.

Paleoindians:

Paleoindians are the first known people who lived in the Americas, including Indiana. They lived here during the last stages of the last glacial advance, or ice age, and the early part of a changing environment and climate as the glaciers retreated. These people occupied the area now known as Indiana some 12,000 years ago, and lasted until about 10,000 years ago.

These early peoples probably lived in small groups of related individuals who moved around a lot, hunting large game animals, including some now extinct, such as the Mastodon, a large elephant-like creature. They also relied upon the gathering of wild plants to eat for their survival. Their population was very low.

The Paleoindians had very well-made stone tools, made out of a type of stone archaeologists call chert, which is a fine-grained rock that breaks a little like glass when hit by hard materials like another rock or a piece of deer antler. The tools they made by chipping, flintknapping, and flaking included long spearpoints, cutting and scraping implements, and engraving items. Some of their spear and piercing tools are called Clovis, Gainey, Barnes, Cumberland, Holcombe, Quad, Plainview, Hi-Lo, and Agate Basin points.

Evidence of these peoples is often found in Indiana on land near water sources like major rivers and springs, and where chert is found. Little is known about the Paleoindians since they moved around a lot and did not occupy any one place for a very long time. Therefore, they did not leave behind much evidence of their lives in any one place.

Archaic Indians:

American Indians known as the Archaic peoples lived here for a long time: some 6-7,000 years. Although these people did change over time, increasing in population and using new tool types and food preparation techniques, they did share certain general characteristics. These included new types of spear points and knives, with various types of notches and stems for hafting to wooden handles and shafts. Some of the projectile point types of the Archaic Period are called Kirk, Thebes, MacCorkle, LeCroy, Faulkner, Godar, Karnak, Matanzas, Brewerton, Riverton, and Terminal Archaic Barbed points.

They also used ground stone tools such as stone axes, woodworking tools, and grinding stones. The grinding stones were used to pound, crush, and grind wild nuts, berries, seeds, and other plant foods. They were hunters and gatherers of wild plants and animals, and moved around in their natural environments by season, often scheduling their movements to coincide with the appearance of foods like nuts, fish, deer, and wild seeds. Over time, they became very selective in what kind of resource they were pursuing.

During the Archaic Period, the spearthrower was used. This consisted of a shaft with a handle, weighted for balance with a ground and smoothed stone, and a hook on the end. A spear was fitted onto the hook, and was thrown with the spearthrower shaft.

Towards the end of the Archaic, more evidence of mortuary activities is found, including human burials with a red pigment coloring remains or grave goods. Burial mounds appear. During the Archaic, the cultures became more different from one another, and more types of artifacts were used. Their settlements became more permanent. One type of settlement was along large rivers, where they discarded large amounts of mussel shells. These sites are called shell middens or "mounds," although they are not really constructed, burial mounds. The general Archaic period ended at about 1,500 B.C., although some Terminal Archaic peoples lived until 700 B.C.

Woodland Peoples:

During the Woodland Period, a number of new cultural characteristics appear. A notable event was the appearance and use of ceramics and pottery vessels. Another significant occurrence was the use and increase of horticulture. A remarkable feature of some Woodland sites is earthen mounds and earthworks, such as embankments. The Woodland peoples persisted for over 1,500 years in Indiana.

During the early portion of the Woodland Period, the pottery was thick and heavy. One early Woodland culture called the Adena people had elaborate mortuary rituals, including log tombs beneath earthen mounds. Projectile points during this time included Adena, Kramer, Dickson, and Gary Contracting Stemmed types.

A little later in time, in the Middle Woodland, there were also elaborate burial rituals, but also long-range trade of exotic goods like mica, marine shells, copper, obsidian, copper axes, drilled wolf and bear teeth, and other goods from region to region throughout the Eastern Woodlands area of North America. Some of these groups were called Hopewell peoples. Their ceramics had all kinds of incised and stamped decorations. During this time, the Woodland Indians were likely organized into groups we might recognize as what we today call tribes. Projectile points from the Middle Woodland include Snyders, Lowe Flared Base, Steuben, Chesser, and Baker's Creek.

The latter part of the Woodland Period is called Late Woodland. In Late Woodland, two important events occur. One is the first appearance of agriculture; that is, intensive cultivation and modification of crops such as corn and squash. Another important occurrence is the appearance of the bow and arrow. Prior to this time, most of the chipped stone tools were either spearheads, knives, engraving tools, or scrapers. In Late Woodland, however, small, triangular points occur which are true arrowheads. One type of these arrowheads is called Madison. Other point types are termed Jack's Reef Pentagonal and Raccoon Notched. Settlement during the Late Woodland time changed from the earlier more permanent and nucleated villages to a pattern of smaller sites dispersed more over the landscape. In some regions of the state, Woodland groups may have persisted almost until historic times, although in general, the Woodland Period ends at A.D. 1,000.

Mississippian Period:

The Mississippian peoples In Indiana lived in some cases almost until contact with Early European explorers, missionaries, soldiers, and traders. They lived from about A.D. 1,000 until possibly as late as A.D. 1650. A noticeable change during this period is the nucleation of some peoples into large settlements akin to "towns," such as at the Angel Mounds site near Evansville, Indiana. These towns had large public areas such as plazas and platform mounds—like truncated or flat-topped pyramids—where influential or important public individuals lived or conducted rituals. Thus, there was social stratification and ranking of individuals in Mississippian societies. There were probably chiefs and religious leaders. The towns were supported by the harvesting of large agricultural fields growing corn, beans, and squash. People living in sites such as these are termed Middle Mississippian.

Notable artifacts indicating Mississippian settlements include large, chipped stone hoes, and pottery bowls and jars tempered with crushed shell. Straps, loops, and handles for these containers characterize this time period as well. Stone tools include point types known as Madison, Nodena, and Cahokia, and other implements such as mortars, pestles, pendants, beads, anvils, abraders, and other items.

Another less elaborate type of Mississippian society called Upper Mississippian was present in the state, with people living in hamlets and villages. Many of these people lived in northern and southeastern Indiana. They also grew and harvested maize, beans, and squash. One group to the southeast was called Fort Ancient, and lots of shell-tempered vessels with straps are found at these sites. In northern Indiana, incised shell-tempered pottery fragments are found on Upper Mississippian sites that are often located near the beds or former beds of lakes.