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and Archaeology (DHPA)

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INDIANA DIVISION OF HISTORIC PRESERVATION AND ARCHAEOLOGY

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TABLE OF CONTENTS

Notes: Several of the projects discussed in some 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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This is a refereed, open access journal. All articles and reports/features are reviewed by the Editor, Guest Editor, and two professional archaeologists not with the DHPA. The HPF articles were also reviewed by one of the other DHPA archaeologists in their capacity as the HPF archaeology grant liaison.

INTRODUCTION

The Division of Historic Preservation and Archaeology (DHPA) is proud to present this volume of the journal *Indiana Archaeology*. 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.

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).

To view previous volumes of *Indiana Archaeology*, go to http://www.in.gov/dnr/historic/3676.htm.

- We thank our colleagues who contributed peer reviews for the journal.

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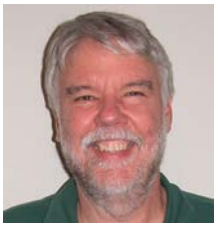

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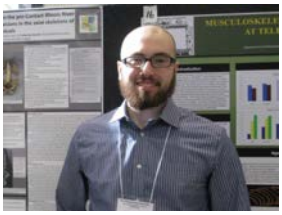

uses skeletal analyses for the interpretation of disability in archaeological contexts.

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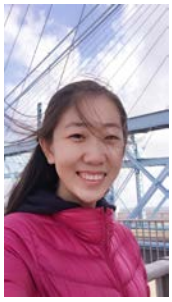

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USING TREE-RING GROWTH PATTERNS TO IDENTIFY CONSTRUCTION DATES OF TWO NINETEENTH CENTURY TIMBER STRUCTURES IN CRAIG TOWNSHIP, SWITZERLAND COUNTY, INDIANA

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Introduction

This article reports the use of dendroarchaeology (application of tree-ring techniques for the dating of historic timber buildings) to date the construction and modifications of a nineteenth century log house and timber barn located in Craig Township, Switzerland County, Indiana. The goals of the project were to establish construction and modification dates, interpret the structures within the framework of vernacular architecture and landscapes, and expand upon the chronologies of timber species common to nineteenth century building construction. Establishing construction and modification dates for historic timber structures helps archaeologists, historians, and preservationists make informed management and interpretive decisions. For the authors, who work closely with local museums and individuals interpreting historic structures in public history, public schools, and university settings, the dendroarchaeology of historic structures is approached within a framework of interpretive archaeology (Baas and Rubino 2012, 2013b, 2014; Rubino and Baas 2014; Rubino and Hanson 2009; Wilkie 2009).

Field work reported in this article was performed in July and October of 2016. The house and barn are part of an active farm. The log house is a residence for the property owners, and the barn is used to house animals and to store hay and farming equipment. We refer to these buildings as the Johnston House and the Anderson Barn based upon a series of supporting primary sources linked by the dates established by dendroarchaeology. The property containing the house and barn is part of a quarter-section land grant to William Johnston (b. 1791 in Virginia) dated December of 1823 (United States Government 1823). In 1820 Johnston moved to Indiana with his wife Mary (b. 1797 in Maryland) from Culpepper County, Virginia (Weakley, Harraman & Co. 1885). He paid the General Land Office in Cincinnati $197.90 for 158.4 acres. Johnston deeded the land to James V. Anderson and Morris McKay in 1865, who later divide it

into individual farms. An 1883 plat map shows the house and barn's location on the 159-acre property (Figure 1). The hay press barn investigated in this study is labeled a "Tobacco Warehouse," and the atlas lists Anderson's position as a "Tobacco Dealer" (Lake 1883). The 1884 *Indiana Gazetteer* lists Anderson's business focus as "tobacco and grain" (Polk & Co. 1884). The 1860, 1870, and 1880 population census forms show Anderson (b. 1830 in Ohio) and his wife Mary (b. 1837 in Indiana) residing in the house with their five daughters and three sons.

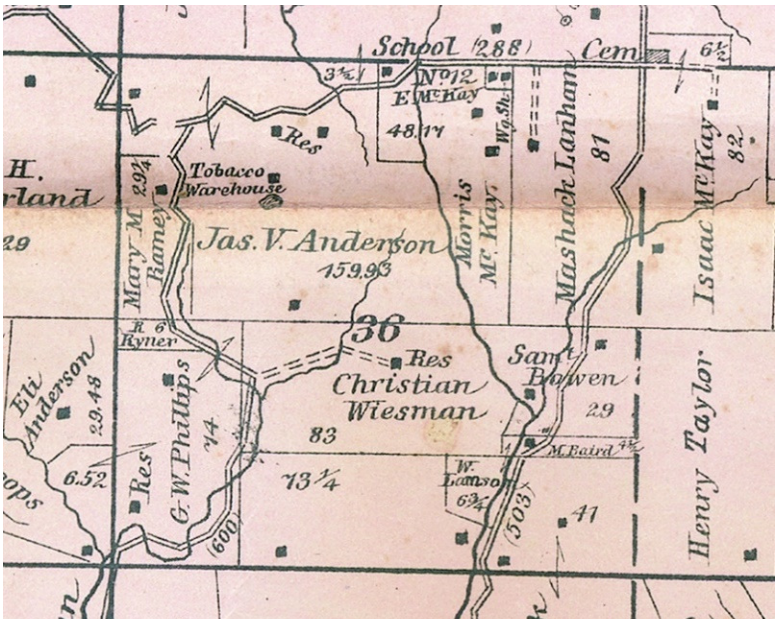

Figure 1. James V. and Mary Anderson property in *An Atlas of Switzerland and Ohio Counties* published in 1883 (Lake 1883).

Nineteenth Century Log Houses and Timber Frame Hay Barns in Southern Indiana

Historical Contexts for Nineteenth Century Log Houses in Southern Indiana

Log houses in the United States have been described nationally in seminal works by Fred Kniffen (1965) and Henry Glassie (1968), and for southern Indiana by Warren Roberts (1996). Log house form and construction methods in Indiana have European antecedents that most often represent English and German vernacular and folk building traditions (Glassie 1968; Jordan 1985; McAlester and McAlester 1988; Roberts 1996). Early colonists brought house designs (vernacular floor plans, elevations, and construction methods) to America where they were transported by waves of settlement into the American interior via New England, Middle Atlantic, and Southern migration streams (Kniffen and Glassie 1986; Roberts 1996). Material culture from

all three streams are evident throughout Indiana via settlement era Great Lakes, National Road, and Ohio River transportation systems.

Roberts describes two house forms pertinent to this study: the one-and-one-half story house, and the central-hall house (often referred to as a dogtrot). Roberts found that the one-and-one-half story house typically measured 21’ x 17’ in plan, with the 21’ length paralleling the roof’s ridge. A single fireplace was located on the gable end. Doors, flanked by windows, were located in the center of the longer, non-gable walls. Roberts explains how the rectangular form, along with fireplace, door, and window locations facilitates heat, light, and air into the log structure (Figure 2). The central-hall house is essentially two log structures separated by a center hall, and covered by a common roof. Roberts describes Hoosier examples of this house as 44’ x 19’, or two square log structures approximately 19’ x 19’ in size that are separated by a 6-foot-wide passage (Figure 3). Fireplaces are located on the outside ends of the house, and the doors open into the central hall—not the exterior walls (Roberts 1996:128-144).

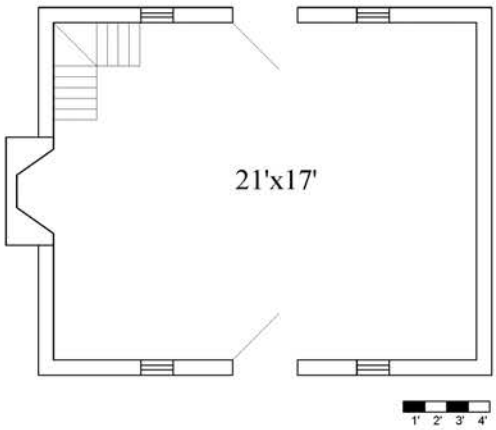

Figure 2. Plan of a one-and-one-half story house. Illustration by Pan Jiang based on Roberts (1996:128).

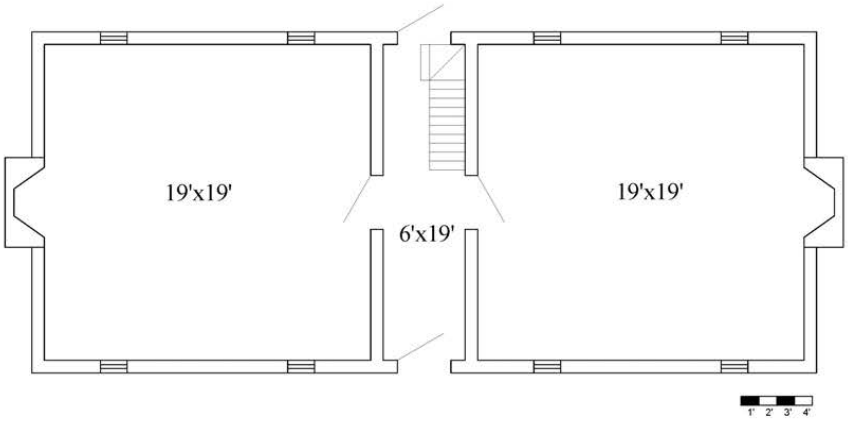

Figure 3. Plan of a central-hall house. Illustration by Pan Jiang based on Roberts (1996:143).

The timber constructed portion of the Johnston House is now nestled in a multi-roomed structure of presumably piecemeal additions. A one-and-one-half story kitchen and bedroom expansion has been added to the west wall of the log structure, and two one-story shed, bedroom additions are located on the south wall (Figures 4 and 5). A 1940s depiction of the house's plan provided by the current owners shows an alternative location for the stairs, and oral history confirms the historic location of a fireplace on the east wall of the log structure (Figure 6).

Figure 4. North and west façades of the Johnston House looking southeast. Photo from ThinkGIS (2017).

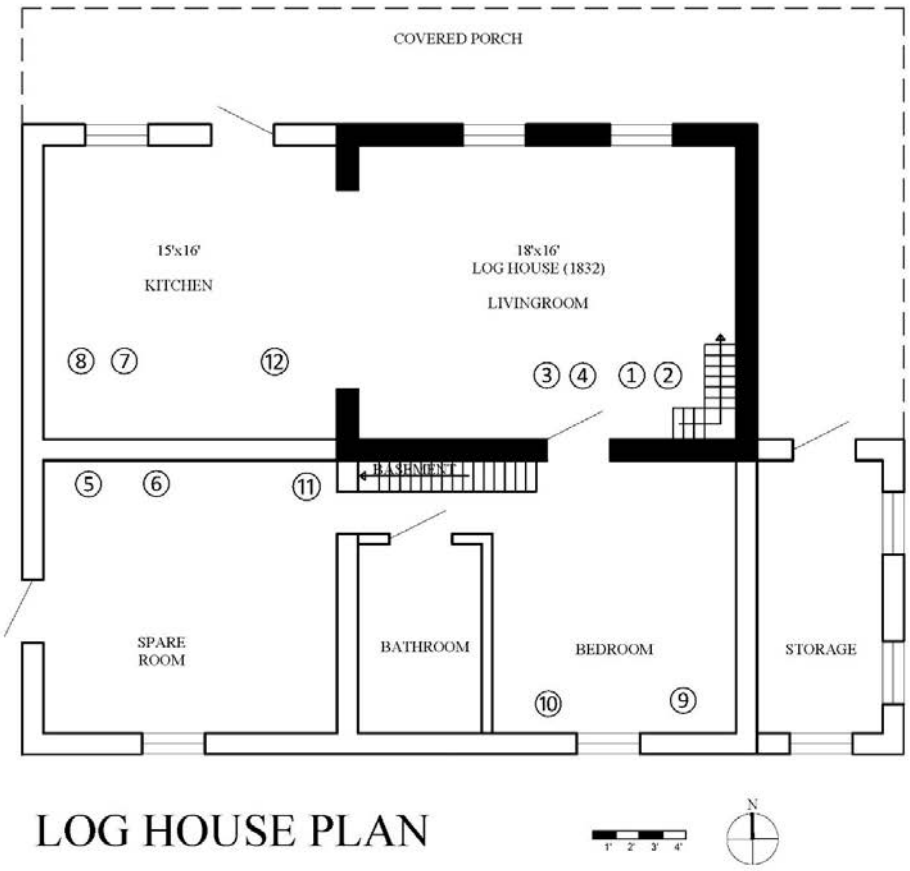

Figure 5. Plan of Anderson House with dendroarchaeological sample locations collected from the cellar. The sketch is based on fieldwork completed in 2016. Illustration by Pan Jiang.

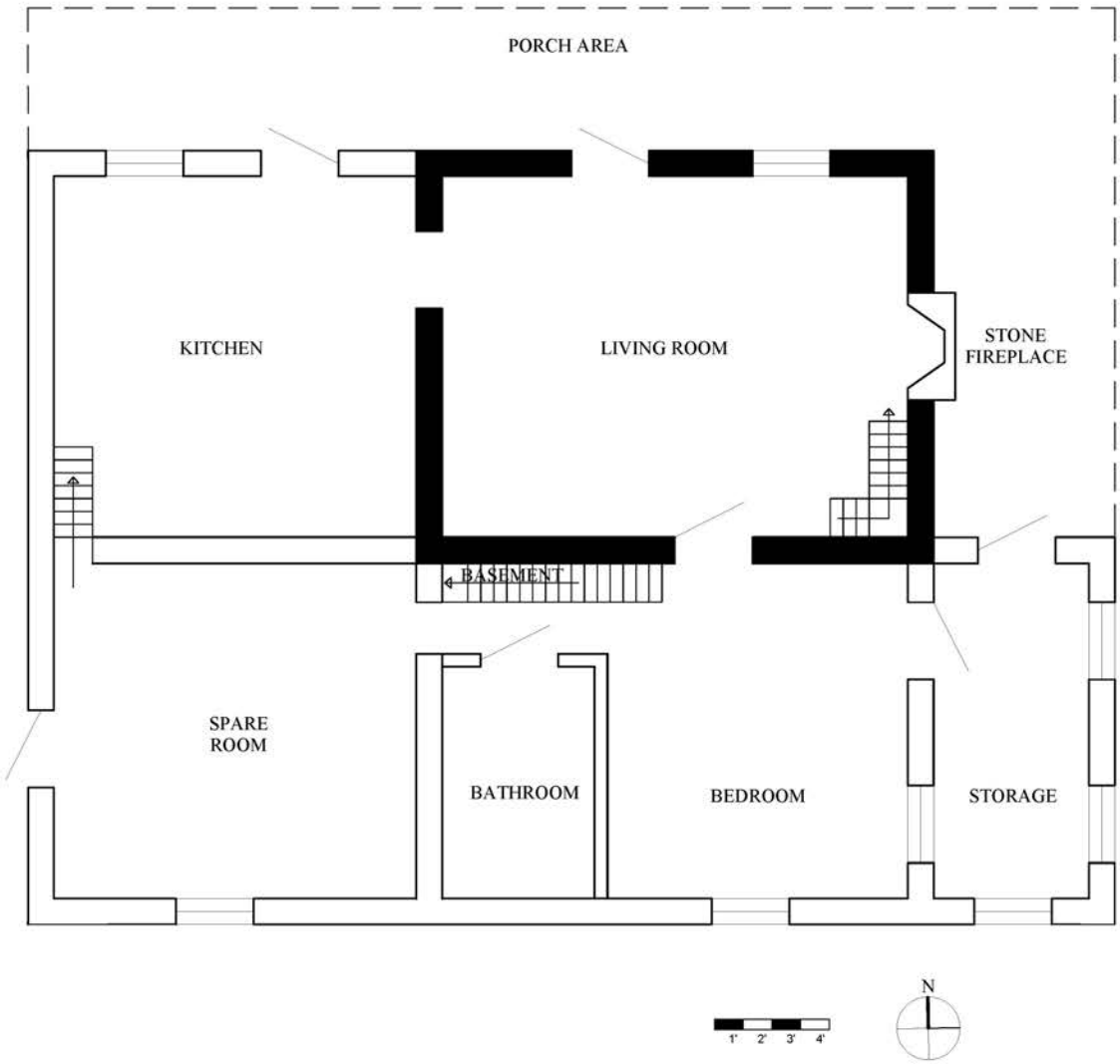

Figure 6. Plan of Anderson House in the 1940s based on the 2016 oral history of Sonny Reed and a 2016 sketch of the house. Illustration by Pan Jiang.

Historical Contexts for Southern Indiana and Northern Kentucky Hay Press Barns

The Anderson Barn is evaluated within the framework established by the authors' field work and published scholarship documenting agricultural resources, specifically the growing, storage, pressing, and shipping of hay in southeastern Indiana and northern Kentucky. We have previously described how the beater hay press was patented in 1843 by Samuel Hewitt of Allensville, Switzerland County, Indiana. The animal-powered machine compacted timothy and other grasses by dropping a massive wooden block—guillotine style—into a hay-filled box. The

invention was typically referred to as a "beater press," but following Hewitt's conversion to Mormonism, it became known as a "Mormon Press," or "Mormon Beater Press." The machine produced 2' x 3' x 4,' 400 pound bales. The ability to press bales of this size and mass simplified the handling, storage, and transportation of hay. In turn, Mid-Ohio Valley farmers became wealthy shipping bales to New Orleans, then on to East Coast cities to feed urban horses (Baas and Rubino 2013a).

Hewitt's press required the structure and physical layout of a barn to efficiently operate. As a vernacular architecture barn type, we have described press barns based upon their construction, use, and form (Baas and Rubino 2014:5-7; Glassie 1968):

> *Construction*- Press barns are constructed with timber frames that rest on rock cellar walls or footings. The exterior is clad in vertical siding. Barns and presses display timber species distinct to the region: tulip poplar, red and white oak species, and beech are commonly used.
>
> *Use*- Press barns were specifically constructed to house a beater hay press and to facilitate the operations of pressing and baling hay (as opposed to curing tobacco, threshing wheat, housing livestock, or dairying operations). The baling floor was used for storing and pressing hay. The cellar space housed the horse-related operations of the press. A three-story space was allotted for the storage and curing of the season's hay harvest. Ramps, bridges, and aisles accommodated wagon traffic in and through the barn.
>
> *Exterior Form*- Press barns are three stories in height, but they might also be described as two stories over a cellar. They have gable roofs. Since they are located on farmsteads with both flat and rolling topography, they are either constructed into a hillside, like a bank barn, or are freestanding. The barn accommodates wagon traffic on the baling floor level, so hillside barns utilize topography for access, and barns on flat terrain use earthen ramps and wood bridges.
>
> *Interior form*- In section, the barn interior displays two distinct spaces for pressing hay. The first is a cellar that houses hay storage and the press' sweep and screw. Some press barns display provisions for stabling horses. The second space is the baling floor that is located over the cellar; it facilitates the feeding of hay into the press and extracting the bale.
>
> A barn bent is an assemblage of timbers that ties a barn's sidewalls together and frames interior spaces. Bents in press barns are perpendicular to the roof ridge, and are typically assembled on the ground and raised into place. Press barns contain two bent forms specific to the barn type. The first is a set of twin press bents constructed to carry the weight of the machine and accommodate the torque and pounding of its operation. Because the base of the press is a pulley that hovers over the cellar floor, the machine hangs from these bents. In true vernacular fashion, the design of these bents varies among

barns. The second is a hay bent located between the baling floor and the barn's hay storage bay. It is assembled with a large portal to facilitate the movement of cured hay from storage to the baling floor. Like the press bents, farmers and barn builders chose a variety of methods to frame this opening.

A major goal of our research is to understand if regional farmers transformed an existing barn type to accommodate the beater press and its operations (for instance, the raised version of the English Barn), or if the form was an invention along with the press. As a potential "missing link," Anderson's barn is important to illustrating the barn type's evolution because it has all the spatial forms and components of a Mormon Beater Hay Press Barn except for the timber bents and the space in between these bents that holds the press. To date, this is the only identified and documented example of this type of structure (Figures 7-11). A construction date established by tree-ring analysis allows this barn to be compared to other hay press barns by both form and time of construction.

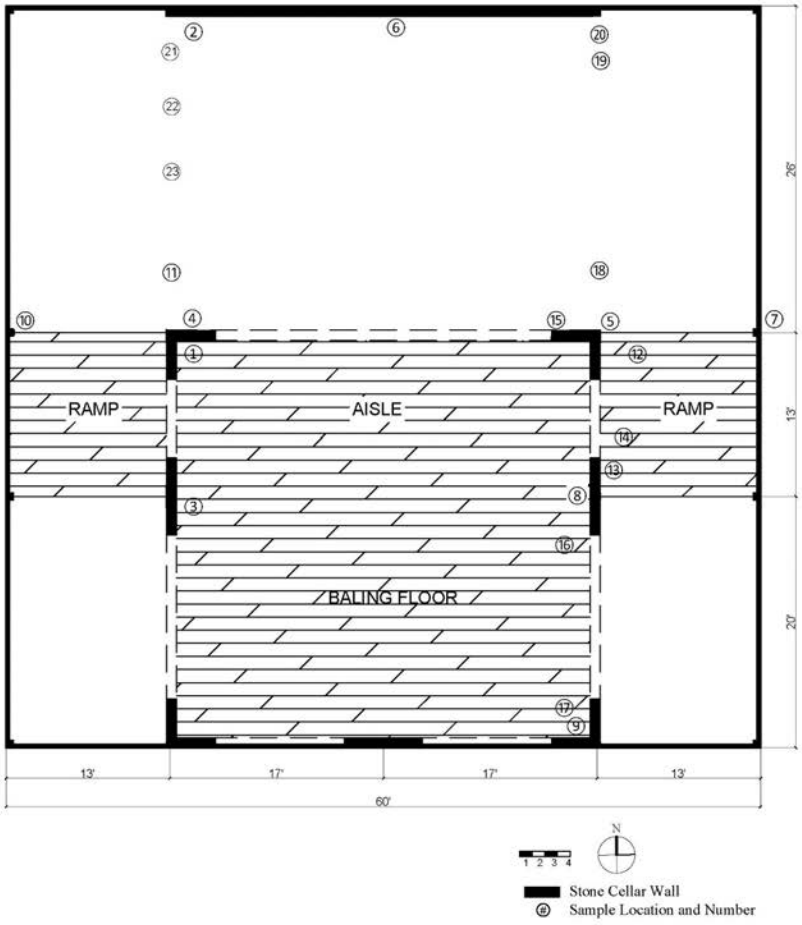

Figure 7. Anderson Barn plan with dendroarchaeological sample locations based on fieldwork completed in 2016. Refer to Table 3 for provenience of each sample. Illustration by Pan Jiang.

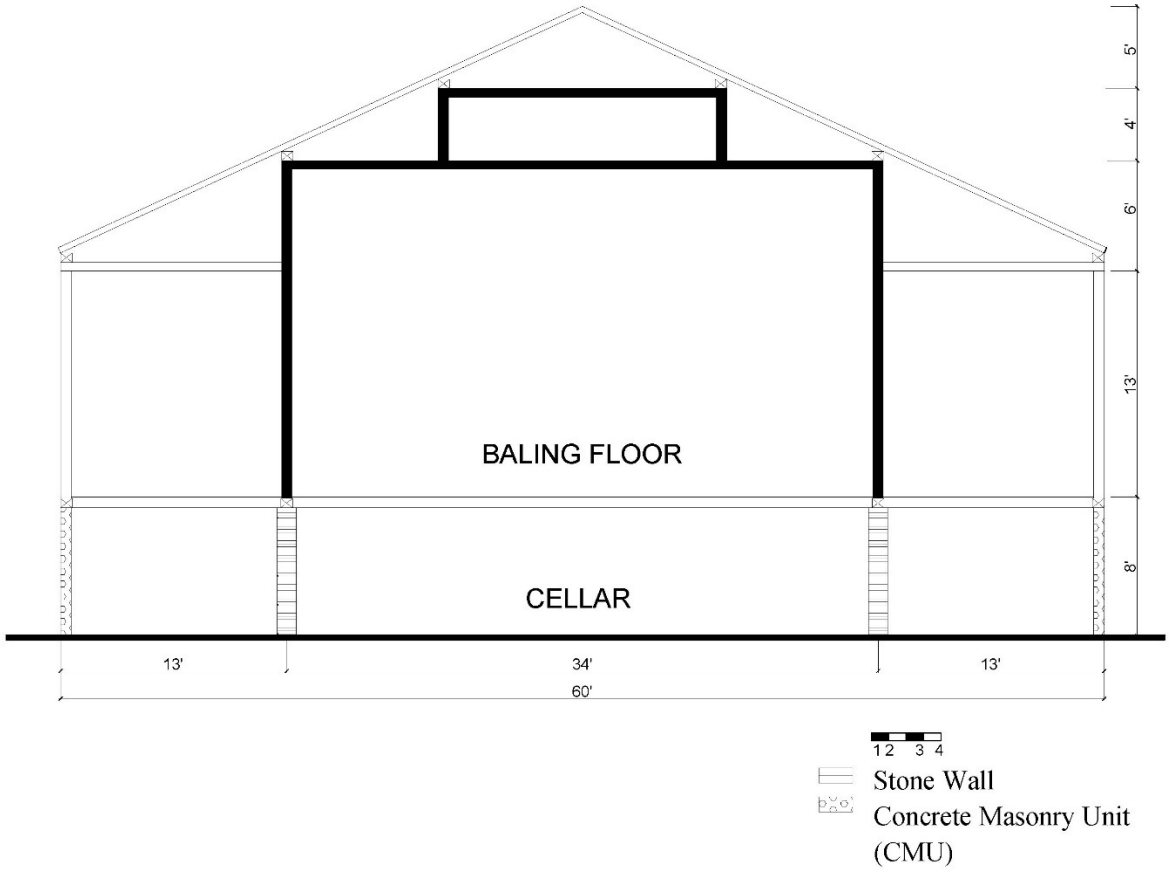

Figure 8. Anderson Barn hay bent. Illustration by Pan Jiang.

Figure 9. Anderson barn east façade showing door to the central aisle. Photo courtesy of Christopher Baas.

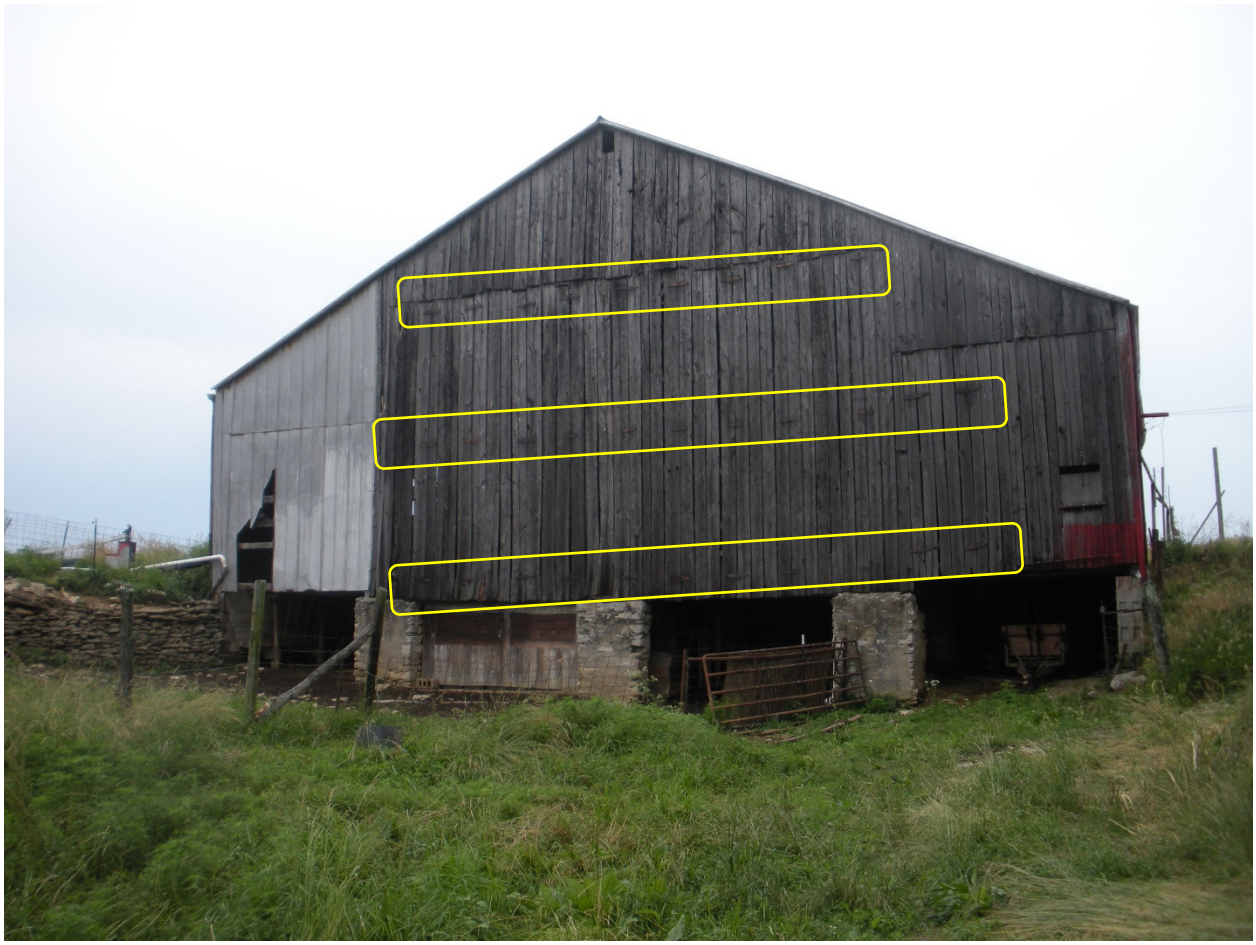

Figure 10. Anderson barn south façade illustrating how the stone foundation is constructed into a small hill that serves as ramps to the aisle. The hinged openings in the siding, highlighted by the yellow boxes, promoted the flow of air through the structure for curing tobacco and are a later addition to the barn. Photo courtesy of Christopher Baas.

Figure 11. Anderson barn interior showing timber construction typical to hay press barns: stone foundation, horizontal sill with a shiplap connection, and a vertical post. Photo courtesy of Christopher Baas.

Tree-ring Analysis

Dendrochronology is the science of studying tree growth patterns and assigning accurate calendar dates to the formation of individual tree rings. Dendroarchaeology is a sub-field of dendrochronology that utilizes dendrochronological techniques to date the creation of wooden objects or the construction of buildings. Dendroarchaeological analysis enables the dating and/or verification of construction dates and modifications of buildings. Tree-ring dating has been successfully used throughout the United States to date building construction (e.g., Bortolot et al. 2001; Grissino-Mayer and van de Gevel 2007; Stahle 1979; Therrel 2000; Towner et al. 2001; Wight and Grissino-Mayer 2004). Regionally, the authors have published the application of dendroarchaeological techniques to date the construction of a Switzerland County hay press barn, a community house in New Harmony, two hay press barns in northern Kentucky, and a dogtrot house in Posey County (Baas and Rubino 2012, 2013b, 2014; Rubino and Baas 2014).

Using tree rings to determine or verify the construction date of a structure requires sample collection, sample surface preparation, tree ring identification, measuring each tree ring, and crossdating. Briefly, for this project, samples were obtained using a drill and dry wood boring bit (Figure 12); samples were glued into mounting boards (Figure 13); and progressively finer and finer grits of sandpaper were used (Stokes and Smiley 1968) to allow for tree-ring identification and measurement. Individual rings were assigned years, not calendar dates, at 40× magnification using a boom dissecting microscope. At this stage in the dating process, each of

the samples' tree-ring series are considered floating since individual rings were simply assigned years and not calendar dates. Assignment of calendar dates to individual rings was performed by crossdating the samples taken from a structure to regional tree-ring chronologies (series of accurately dated and measured tree rings compiled from studying living trees or other historically erected buildings). Crossdating is a method of pattern matching that utilizes the pattern of small and large rings in tree-ring series with known dates to samples of unknown age. Crossdating was performed using graphical methods (skeleton plots) and with a computer once each of the tree rings was measured to the nearest 0.01 mm (0.0004 in). A more detailed explanation of methodology (and pertinent references) can be found in Baas' and Rubino's (2012:42-47) successful dating of a Switzerland County barn and Community House No.2 in New Harmony (2013:13-20) previously published in *Indiana Archaeology*.

Figure 12. Core samples were obtained using a drill and dry wood boring bit. Photo courtesy of Christopher Baas.

Figure 13. Sanded cores with years identified for (top to bottom) ash (RAH03A), white oak (RCH06A), and black walnut (RCH14B) samples. Photo courtesy of Darrin Rubino.

The likely construction date of a building can be determined if numerous timbers from throughout a structure share a common (or comparable) death or harvest date. The outermost ring in a timber can be considered a tree's death date if bark or wane is present, since the ring would have been the last formed growth increment prior to death. Wane is identified by a uniform, rounded outer timber surface that is free of any tool marks; it is simply the outermost ring that was adjacent to the bark. Bark is often stripped prior to construction or sloughs off over time or from handling during construction. Since the main goal of this investigation was to determine the construction date of the house and barn, sampling focused on timbers that either had a bark or wane edge. Additionally, sampling was performed throughout each of the buildings (i.e., cellar, main floor, etc.) so that original timbers and subsequent additions could be accurately identified and dated.

For each sample, digital photographs were taken, and the timber location was noted. Samples were assigned an identification containing three parts: a three-letter structure identification (RCH for the Anderson barn and RAH for the Johnston house), a two-digit provenience identification (individual timber), and a letter indicating the individual series obtained from a timber. For example, RAH09B identifies the second series (B) taken from the ninth sampled timber (09) of the Anderson house. Often, more than one sample was taken from an individual timber to help ensure that a timber did in fact have a wane edge. Additionally, several timbers in both the house and barn were black walnut. We do not frequently encounter this species and were uncertain of its crossdating reliability; consequently, we took multiple samples from a timber. We also took multiple samples since we were uncertain of black walnut's propensity to form missing rings. Missing rings (years when no tree ring forms over the entire trunk or formed at all in a given year) are caused by extreme stress, such as a drought or injury. By taking two samples from a timber, the likelihood of reliably crossdating it increases.

Each timber was identified to the lowest possible taxonomic rank. Identification was made using macroscopic and microscopic wood anatomical structures and the identification keys prepared by Panshin and de Zeeuw (1980). Thin sections were made from the cores using

double-edged razor blades; these sections were subsequently viewed under a compound light microscope (100, 200, and 400× magnification). Using wood anatomy, identification to species level is not always possible. For example, a white oak timber could have been taken from any of the white oak (*Quercus* subgenus *Lepidobalanus*) trees species native to the area. In this instance, such a timber could be a bur-oak, chinkapin-oak, etc. (Table 1).

Results

Dated dendroarchaeological samples, from both the barn and house, were obtained from three different timber types (white oak, ash, and black walnut; Tables 1 and 2). Three samples could not be confidently crossdated: one cork or rock-elm (*Ulmus thomasii* Sarg.), one "hard" maple (either *Acer nigrum* Michx. f. or *A. saccharum* Marshall), and one white oak. From the barn, a total of 26 samples were dated from 20 different timbers (Table 2), and from the house 14 samples from 12 timbers were dated. Ash was the most commonly sampled timber and yielded a chronology spanning from 1693 to 1873. A description of each of the timbers sampled can be found in Table 3, and the location of timbers is noted in Figures 5 and 7. In Table 3 "First" and "Last" refer to the first and last rings either measured or present in a sample. We do not measure the outermost ring in a sample since we do not know if the ring was complete. For example, if a tree is cut in June, a ring would be present for that year but not completely formed since the growing season had not yet ended. This is why the last ring present will have a later date than the last year measured. Also we often are unable to measure all rings of a sample due to breaks in the wood, extensive insect damage, scars, irregular growth patterns caused by branching, etc. Measuring these rings would lead to the inclusion of growth irregularities in our measurement files. These irregularities would make the dating process difficult and potentially unreliable. As an example, note the irregularities in the innermost rings of sample RAH03A in Figure 13.

The mean annual growth (composite chronology made from all timbers) for all three timber types is found in Figure 14. The mean ring width of the ash, white oak, and black walnut rings was 1.10 ± 0.41, 0.99 ± 0.38, and 0.86 ± 0.42 mm, respectively (1 inch = 25.4 mm; Table 4).

Table 1. Timber types analyzed from the Johnston house and Anderson barn. More than one species of tree may be called by a single timber type because identification to the species level is not always possible for various timber types. A species is considered possible and is listed below if its natural distribution occurs in Switzerland County, Indiana. Species distributions are based on Jackson (2004); taxonomy and nomenclature follows Gleason and Cronquist (1991).

Timber type	Scientific name	Common name
White oak	*Quercus alba* L.	White oak
	Q. bicolor Willd.	Swamp white oak
	Q. macrocarpa Michx.	Bur-oak
	Q. michauxii Nutt.	Swamp chestnut-oak
	Q. *muehlenbergii* Engelm.	Chinkapin-oak
Ash	*Fraxinus americana* L.	White ash
	F. pennsylvanica Marshall	Green ash
	F. quadrangulata Michx.	Blue ash
Black walnut	*Juglans nigra* L.	Black walnut

Table 2. Chronologies (series of measured and dated tree rings) created from dendroarchaeological samples collected from the Johnston house and Anderson barn.

Timber	Number of proveniences	Number of series	Number of tree rings	Time span
Barn				
Ash	14	16	1323	1707 – 1873
White oak	2	3	242	1766 – 1869
Black walnut	4	7	446	1690 - 1869
House				
Ash	10	12	1247	1693 – 1831
White oak	1	1	116	1716 – 1831
Black walnut	1	1	82	1748 – 1829
Totals				
Ash	24	28	2570	1693 – 1873
White oak	3	4	358	1716 – 1869
Black walnut	5	8	528	1690 – 1869
All samples	32	40	3456	1690 – 1873

Table 3. Series data for each of the samples dated from the Anderson barn and Johnston house. "First" and "last" refer to the first and last years measured or present in a series. "Outer" refers to the outermost ring present in a sample; "w" indicates the presence of wane, "b" indicates bark, "s" indicates several years of sapwood are present but bark and/or wane is absent thus the outermost date is near the death date of the tree, and "v" indicates the outermost ring is very near to the outermost ring present in the sample based on observations in the field (outer ring destroyed by sampling, beetle damage, etc.). See text for an explanation regarding the identification code of individual series obtained from a provenience. See Figures 5 and 7 for provenience location. All samples have been archived in the Hanover College botanical collection.

	Present			Measured		
Sample	First	Last	Outer	First	Last	Provenience
BARN						
Ash						
RCH02A	1788	1865	v	1789	1864	Post southwest corner of aisle
RCH03A	1834	1870	w	1835	1869	Post southwest corner of aisle
RCH03I	1771	1829		1772	1828	
RCH04A	1788	1839		1789	1838	North/South oriented, horizontal timber in aisle over west door
RCH09A	1843	1870	w	1850	1869	Post in the southeast corner of the south wall
RCH09B	1835	1868	v	1837	1867	
RCH10A	1800	1874	w	1802	1873	North post of door in the west wall
RCH12A	1779	1865	v	1780	1864	North-most joist in the east addition's ramp
RCH13A	1785	1870	w	1786	1869	North/South sill in original barn's east wall
RCH16A	1705	1870	w	1707	1869	East/West joist
RCH18A	1763	1858	w	1764	1857	Cribbing timber
RCH19A	1742	1858	w	1743	1857	Cribbing timber
RCH20A	1740	1858	w	1742	1857	Cribbing timber
RCH21A	1743	1858	w	1744	1857	Cribbing timber
RCH22A	1750	1858	w	1751	1857	Cribbing timber
RCH23A	1753	1858	w	1754	1857	Cribbing timber
White oak						
RCH05A	1767	1870	v	1820	1869	Post at northeast corner of aisle
RCH06A	1763	1870	w	1766	1866	North wall middle post
RCH06B	1773	1866		1775	1865	
Black walnut						
RCH07A	1820	1869	w	1821	1868	North post at the east wall's door opening
RCH07B	1823	1855		1824	1854	
RCH14A	1831	1863	s	1832	1862	Joist in the east addition
RCH14B	1789	1870	w	1790	1869	

RCH15A	1834	1870	w	1835	1869	Sill/joist on north cellar wall of aisle
RCH15M	1689	1851	s	1690	1850	
RCH17O	1740	1869	v	1808	1867	East/West running joist at south portion of barn
HOUSE						
Ash						
RAH01A	1707	1832	w	1708	1831	Timber house; third joist from east wall; hewn
RAH03A	1691	1833	w	1693	1832	Timber house; fifth joist from east wall; log
RAH04A	1727	1833	w	1730	1832	Timber house; fourth joist from east wall; log
RAH05B	1771	1851	b	1772	1850	Southwest addition; second joist from west wall; log
RAH07A	1728	1872	w	1729	1871	West addition; second joist from west wall; log
RAH08A	1786	1872	b	1787	1871	West addition; first joist from west wall; log
RAH09A	1771	1838	v	1772	1836	Southeast addition; second joist from south wall; log
RAH09B	1720	1838	w	1722	1837	
RAH10A	1724	1850	v	1725	1848	Southeast addition; first joist from south wall; log
RAH10B	1822	1851	w	1823	1850	
RAH11A	1772	1851	w	1776	1850	Southwest addition; eastern most joist; log
RAH12A	1706	1872	b	1707	1871	West addition; fourth joist from west wall; log
White oak						
RAH02A	1714	1832	w	1716	1831	Timber house; second joist from east wall; hewn
Black walnut						
RAH06A	1747	1830	w	1748	1829	Post; most likely recycled from west wall of log house

Accurate date assignment for individual series was assessed by 1) comparing each of the series against other series collected from the house and barn (internal dating assessment), and 2) combining each of the timber types into a composite chronology and comparing this composite to other regional chronologies containing accurately dated and verified tree-ring series (external dating assessment). Analyses were performed for each timber type separately; in our experience, we have found that each timber type exhibits a unique historical growth pattern since individual timber types react differently to annual variations in precipitation and temperature. For both internal and external assessment methods, series were broken into 50-year segments that overlapped each other by 25 years (e.g., 1700 – 1749, 1725 – 1774, 1750 – 1799, etc.). To assess internal consistency in dating, each of the series was broken into segments and correlated against all other series collected from the house and barn. Significant correlations thus indicate a statistically supported date assignment among each of the series obtained from the buildings. For all timber types there was a very strong and significant ($P < 0.001$) series intercorrelation (ash: r

= 0.53; white oak: r = 0.60; black walnut: r = 0.59; Table 4). Additionally, nearly all of the individual 50-year segments were significantly correlated ($P < 0.01$) with the other series obtained from the buildings. These findings suggest that internal dating is correct.

To check for external dating accuracy (accurate dating of the structure compared to other chronologies), the composite chronology was compared and correlated to other regional tree-ring chronologies. The composite chronology was broken into overlapping segments to ensure dating was accurate throughout the entire length of the chronology. For all timber types, we compared growth in the samples to regional chronologies of the same timber type. Since we have had limited experience with dating black walnut we chose to compare our date assignments to several different timber types commonly encountered throughout the region. For all timber types, individual segments were strongly and significantly correlated with the regional chronologies (Tables 5-7). We conclude that date assignments for all three timber types are correct both internally and externally.

Table 4. Series and segment (50-year segments overlapping by 25 years) correlation analysis and mean and standard deviation (mm) of each dated series from the Johnston house and Anderson barn. In each column headed by a set of dates the correlation coefficient found by correlating each of the series' segments against all other series of that timber type is given. A correlation coefficient greater than 0.33 indicates a statistically significant correlation ($P < 0.01$). "Series *r*-value" is the correlation coefficient obtained by correlating each individual series (in its entirety) against all other series for a particular timber type.

Series	1700 – 1749	1725 – 1774	1750 – 1799	1775 – 1824	1800 – 1849	1825 - 1874	1850 – 1899	mean	SD	Series *r*-value
Ash										
RCH02A				0.55	0.57	0.61		1.17	0.52	0.56
RCH03A						0.64		1.31	0.31	0.64
RCH03I			0.74	0.74	0.71			1.53	0.40	0.69
RCH04A				0.57				1.60	0.58	0.57
RCH09A							0.68	1.07	0.20	0.68
RCH09B						0.49		1.09	0.21	0.49
RCH10A					0.70	0.40		1.65	0.43	0.57
RCH12A				0.69	0.60	0.55		0.74	0.20	0.61
RCH13A				0.63	0.79	0.74		1.56	0.38	0.67
RCH16A	0.22	0.33	0.52	0.46	0.33	0.40		0.87	0.33	0.36
RCH18A			0.59	0.70	0.69	0.67		1.13	0.34	0.66
RCH19A		0.52	0.55	0.74	0.67	0.67		1.16	0.36	0.62
RCH20A		0.53	0.57	0.72	0.71	0.68		1.32	0.60	0.66
RCH21A		0.25	0.31	0.48	0.39	0.25		1.01	0.30	0.37
RCH22A			0.54	0.55	0.65	0.61		1.02	0.33	0.60
RCH23A			0.62	0.49	0.45	0.36		1.05	0.25	0.50

RAH01A	0.49	0.71	0.69	0.59	0.62			1.28	0.47	0.59
RAH03A	0.56	0.73	0.66	0.62	0.66			0.77	0.21	0.62
RAH04A		0.50	0.50	0.67	0.66			1.06	0.54	0.59
RAH05B			0.37	0.37	0.39	0.37		1.57	0.37	0.37
RAH07A		0.18	0.48	0.70	0.46	0.27		0.80	0.49	0.42
RAH08A				0.76	0.76	0.60		1.16	0.28	0.67
RAH09A			0.44	0.43	0.42			0.97	0.59	0.46
RAH09B	0.40	0.44	0.39	0.27	0.24			0.94	0.52	0.35
RAH10A		0.36	0.43	0.55	0.44			0.84	0.22	0.43
RAH10B					0.24			0.89	0.20	0.24
RAH11A				0.70	0.69	0.68		1.49	0.35	0.69
RAH12A	0.21	0.33	0.36	0.48	0.60	0.71		1.01	0.79	0.44
All ash								1.10	0.41	0.53
White oak										
RCH05A					0.21			1.75	0.50	0.21
RCH06A			0.74	0.72	0.61	0.47		0.86	0.34	0.63
RCH06B				0.79	0.82	0.78		0.87	0.33	0.78
RAH02A			0.59	0.56	0.59			0.88	0.41	0.60
All white oak								0.99	0.38	0.60
Black walnut										
RCH07A					0.64			1.12	0.66	0.64
RCH07B					0.69			1.30	0.67	0.69
RCH14A						0.71		0.82	0.31	0.71
RCH14B				0.55	0.62	0.64		1.22	0.57	0.53
RCH15A						0.68		0.45	0.23	0.68
RCH15M		0.74	0.74	0.59	0.64	0.65		0.95	0.46	0.70
RCH17O					0.37	0.31		0.33	0.11	0.30
RAH06M		0.70	0.71	0.42	0.45			0.60	0.28	0.60
All black walnut								0.86	0.42	0.59

Table 5. Correlation results of 50-year segments (overlapping by 25 years) for the composite ash chronology compared to regional ash chronologies. Correlations are significant ($P < 0.01$) if the correlation coefficients are greater than 0.33. Parenthetical dates below each of the chronologies are the start and stop date of that chronology. The Thiebaud barn is a hay press barn located approximately 3 miles east of the Anderson farmstead.

Segment	Switzerland Co, IN (1619 – 1889)	Thiebaud Barn (1684 – 1867)
1693 – 1742	0.50	0.54
1718 – 1767	0.59	0.63
1743 – 1792	0.69	0.74
1768 – 1817	0.71	0.83
1793 – 1842	0.57	0.83
1818 – 1867	0.56	0.76

Table 6. Correlation results of 50-year segments (overlapping by 25 years) for the composite white oak chronology compared to regional white oak chronologies. Correlations are significant ($P < 0.01$) if the correlation coefficients are greater than 0.33. Parenthetical dates below each of the chronologies are the start and stop date of that chronology.

Segment	Switzerland Co, IN (1630 – 1875)	Jefferson County (1590 – 1899)	Thiebaud Barn (1650 – 1855)
1716 – 1765	0.36		0.47
1741 – 1790	0.66	0.46	0.74
1766 – 1815	0.67	0.49	0.66
1791 – 1840	0.68	0.61	0.68
1816 – 1865	0.50	0.62	

Table 7. Correlation results of 50-year segments (overlapping by 25 years) for the composite black walnut chronology compared to various regional chronologies. Correlations are significant ($P < 0.01$) if the correlation coefficients are greater than 0.33. Parenthetical dates below each of the chronologies are the start and stop date of that chronology.

Segment	Switzerland Co, IN White oak (1630 – 1875)	Jefferson Co, IN White oak (1590 – 1899)	Switzerland Co, IN Tulip poplar (1613 – 1856)	Thiebaud Barn White oak (1650 – 1855)	Thiebaud Barn Ash (1684 – 1867)
1690 – 1739	0.48	0.40	0.38	0.36	0.25
1715 – 1764	0.46	0.33	0.39	0.28	0.33
1740 – 1789	0.63	0.63	0.63	0.66	0.59
1765 – 1814	0.58	0.68	0.68	0.61	0.45
1790 – 1839	0.48	0.59		0.49	0.47
1815 – 1864	0.47	0.54			0.42

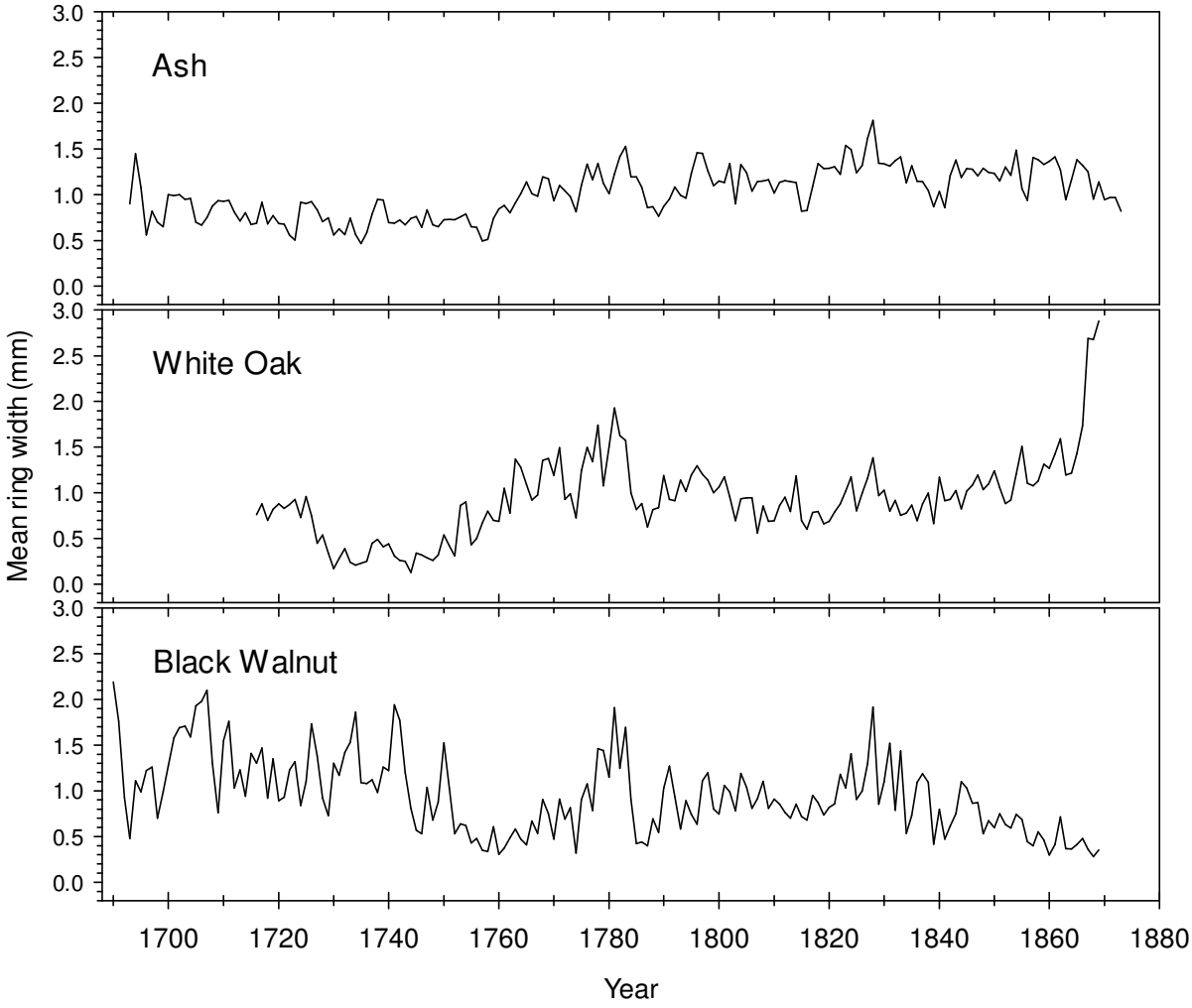

Figure 14. Mean annual growth of ash, white oak, and black walnut samples obtained from the Anderson barn and the Johnston house.

Discussion

The goal of this study was to use dendroarchaeological methods to investigate two historic timber structures located on a farmstead in southeast Indiana and interpret their historical significance. Based on dendroarchaeological evidence, the farmstead's log house was most likely constructed in 1833 and the hay barn in 1870.

Interpreting the Historic Timber House

Interpreting the farmstead's log house is challenging because it is currently inhabited by the property owners. Since an in-depth study requires the removal of both interior and exterior wall coverings (siding, paneling, drywall, etc.) to establish the historic locations for window and door openings—a procedure too invasive at this time—our interpretation of the structure is limited.

From the cellar, we were able to access and sample several of the original log structure's floor joists, floor joists from the house's various alterations, and a post. Based upon the species, dimension, shape, and traces of whitewash matching the house's walls, we concluded that the post, sample RAH06A, was originally in the house's west wall, and then later repurposed as a post supporting floor joists in the cellar.

Samples show the trees that became the log house have death dates from 1830-1833. Samples RAH03A and RAH04A died after the spring of 1833, and before the spring of 1834. We are assuming that timber harvested was quickly incorporated into the house's construction. Therefore, we are assigning a construction date of 1833.

Dendroarchaeological evidence alone does not enable us to understand the sequence of how additions were added to the original 1833 log house. For example, the southwest addition shares only a corner with the original log house (Figure 5). The two joists sampled from this part of the structure have an outermost ring dating to 1851. However, the west addition to the house yielded three joists with a death date of 1872. It is highly improbable that the southwest addition was added to the corner of the house 21 years prior to the construction of the west addition; the structure would have been two diagonally-connected pens sharing a corner. Furthermore, joists from the southeastern addition of the house yielded two distinct death dates, 1851 and 1838. Our inability to document how additions were made is likely due to the use of recycled timbers from other log structures. During sampling we noted logs having unneeded mortises and saddles suggesting that the logs were used in another building prior to being incorporated into the house. A multitude of scenarios could explain how the house reached its current form. For example, prior to 1872 only the original log structure served as the house. At some unknown date after 1872 several buildings (including one built in 1872 and 1851) were disassembled, and timbers were added to the existing 1833 log house. Other scenarios are conceivable (and must account for the joist with an 1838 death date), but without extensive and destructive excavation we are unable to document how the house was built over time.

In addition to the collection of samples, field work resulted in measured drawings for the house. The current property owners provided a sketch representing a 1940s version of the house's plan communicated to them in October of 2016 by Sonny Reed who resided on the farm as a boy (Figure 5). While the sketch shows a recent, mid-twentieth century variation of the house that is close to its present form, it confirms that a stone fireplace was once located on the log structure's east gable wall like Roberts would suggest.

We are interpreting the original log house's form using Roberts' text. The house's 16' x 18' plan is smaller and more square than Robert's 17' x 21' rectangular plan for a one room, one-and-a-half story house form he concludes is typical to southern Indiana. Furthermore, the relationship of the doors and windows to the location of the fireplace does not correspond with

his findings (Figure 2). However, the house's 16 x 18 foot, nearly square plan, along with the fireplace and window locations, more closely represents one half of the southern Indiana central-hall (dogtrot) house form (Figure 3). For a comparison to other dogtrot houses, our documentation of a Posey County dogtrot example has rooms measuring 16' x 20' (Rubino and Baas 2014).

Therefore, we offer two hypotheses. The first, in the context of Roberts' research, is that the house is an anomaly that does not follow vernacular log house plans typical of southern Indiana. The second that the log house was originally central-hall in form, and that the western half—including the trot passageway—was removed when the house was altered with the addition of a space currently used as the kitchen. Unfortunately, we cannot resolve this question at this time, because the removal of interior and exterior materials would be required to do so.

Regarding the house's method of construction, attempts were made to view the corner notching from both the house's exterior and the cellar. Corner notching can indicate the cultural heritage of the carpenter or owner. Unfortunately, access to the house's corners proved impossible since they are covered in siding or encased within the house's alterations. One corner notch, a V-notch, was visible from the enclosed space over the porch (Figure 15). In southern Indiana, the V-notch and the half dovetail are the most common corner joinery (Kniffen and Glassie 1966; Roberts 1996). However, some buildings display multiple types, so there is a possibility the house also includes dovetail or other joints (Roberts 1996). The chinking between the horizontal logs is common to southern Indiana. It is comprised of local field stone that is small in size, laid in a 45-degree angle, and coated in clay (Figure 16).

Figure 15. Anderson house corner V-notch located in the roof space over the porch of the original log structure. Photo courtesy of Christopher Baas.

Figure 16. Anderson house stone chinking located in the roof space over the porch. Photo courtesy of Christopher Baas.

Interpreting Historic Timber Hay Barns

In our documentation of hay resources in southeastern Indiana and northern Kentucky, we have struggled with the question of whether the Mormon beater hay press barn is derived from a precedent vernacular barn form, or if an existing barn form was adapted to accommodate the press and its operations. Dendrochronology has established construction dates for approximately eighteen press barns. The 1851 construction of the Justi Thiebaud barn (also in Craig Township, Switzerland County) is the earliest we have dated, and the majority of the other barns were constructed in the 1860s and 70s. Based on our fieldwork documenting nearly twenty beater press barns, the Thiebaud barn is significant in that it displays all the character defining features of a press barn a mere eight years following the patent of Hewitt's machine, and suggests the adaption of an existing barn form. However, we have not been successful in locating and dating regional barns predating Hewitt's invention, which is a challenging task when the window of time is small. For instance, large-scale regional settlement began about 1800, and the press was invented about forty years later. We have presented counter ideas regarding the barn as a definitive vernacular type, with the press barn potentially being a sub-type of the English Barn (Baas 2012), or the press invention being the product of the confluence of historic "dialogues" resulting in a new barn form (Baas and Rubino 2013a).

The Anderson barn is unique in that it contains all the character defining features of a Mormon press barn (two stories over a cellar, gable roof, entry on the eaves side, entry ramps, a wagon aisle through the center of the barn, a three-story space for storing and seasoning hay, bents that allowed the movement of hay throughout the barn, and a pressing floor over a section of the cellar). It is only missing the bents and spaces required for a Mormon press. Our initial thoughts were that the structure might be a Mormon press barn precedent, but dendroarchaeology has concluded that its construction dates more towards the end of the region's hay culture in the late 1870s than its beginnings in the 1840s.

We hypothesize why a regional press barn form might have been constructed without the press. First, Anderson might simply have used the hay he grew to feed his own animals. However, the 1870 Agricultural Census reports that Anderson did not have the number of livestock (5 horses, 1 milk cow, 1 head of cattle, and no sheep) required for the construction of a hay barn of this scale (Indiana State Archives 1870). Hay produced and stored for on-site consumption would not require baling, only storage. This was typically achieved in vernacular barn or shelter forms that already existed or in hay stacks located in the field.

Second, we wondered if Anderson built his barn to store and season hay, then press it at another location. We have identified and documented four Mormon hay press barns within the vicinity, including a large, two-aisle press barn just a half-mile to the east. Perhaps Anderson paid neighbors to press his hay. While this required additional labor and time to transfer hay from his barn to a press at a different location, it was a practice not uncommon in the region. We point to our conclusions that John Wycoff constructed a press barn in Allensville, Indiana to bale hay from surrounding farms, and the Schenk family constructed a warehouse in nearby Vevay, Indiana to press area farmers' hay for their shipping enterprise (Baas and Rubino 2012; Vevay Reveille 1878). Anderson's hay barn would have accommodated the offloading, storage, and reloading of hay by use of the central wagon aisle. However, the presence of a baling floor in the barn's southern bay would not be required, and hinders storing nearly as much hay as is in the northern, open, three-story bay.

Finally, we wondered if Anderson made use of a different press design that did not require the support of the barn structure, but a press that simply sat on the baling floor. While the region was known for the invention of the Mormon press, there is evidence of other presses being available. Hay presses came in a variety of forms that incorporated different combinations of beaters, screws, and levers. Bullock's half-circle hay press was sold as early as 1850 in nearby Lawrenceburg, Indiana, and the *Vevay Reveille* reported that farmers from the neighboring community of Avonburg, Indiana were making bales with a Dedric Press, a New York company that patented and manufactured presses throughout the latter half of the nineteenth century (*Independent Press* 1850; *Vevay Reveille* 1885). These freestanding press designs, and an array of others, could have easily sat on the Anderson barn's pressing floor.

Anderson reported 33 tons of hay in 1870, and this amount increased to 40 tons by 1880. Only the 1880 census records the number of acres of land a farmer committed to a crop (Indiana State Archives 1880). At 60 of 138 tilled acres of his property in hay, we know that about 40% was dedicated to the grass (followed by 33 acres in wheat and 12 acres in corn). The hay market collapsed in the late 1870s, and like other farmers in his county, Anderson's 1880 hay production

indicates that he had not yet abandoned the grass as a cash crop. Switzerland County's hay production more than doubled between 1870 and 1880 (10,000 to 26,000 tons), but the ensuing decade between 1880 and 1890 witnessed decline to only 19,000 tons.

Regional farmers responded to the demise of the region's hay culture by growing tobacco. For instance, in Switzerland County tobacco production increased nearly 5,000% (1,405 lbs. to 70,208 lbs.) between 1870 and 1880, and ballooned another 3,000% to more than 2.5 million pounds between 1880 and 1890. It appears that Anderson was an early participant in the transition, but perhaps more as a trader and shipper than farmer. While Anderson does not report growing any tobacco in the 1870 Agricultural Census, in 1880 he had committed only four acres of his farmstead to the crop and harvested 5,400 pounds (however, this was 7% of the county's crop). By 1883 the atlas map identifies the hay barn as a "Tobacco Warehouse," and Anderson promotes himself as a tobacco and grain dealer which we are interpreting to mean that he purchased produce from area farmers for shipping to southern markets (Lake 1883). The region was full of these entrepreneurs, with the Schenk family being the biggest players. Also, Weakley's history of the county points toward the Anderson family having a history in trading and flatboats (Weakley 1885).

The hay barn, like nearly all the press barns we have documented, was modified to cure tobacco prior to market. To accomplish this, Anderson (or a later property owner) used timber cribbing from a recycled structure dating to 1858 to support a floor in what would traditionally have been a three story space for seasoning hay. While this is not common to hay press barns we have studied, we are aware of the expansion of the pressing floor into the three-story hay storage space in a barn near Braytown, Indiana, and we documented press barns that were expanded with timbers from recycled buildings.

Conclusions

For this analysis, we utilized dendrochronology within a framework of interpretive archaeology to explain the significance of early timber structures. We conclude:

1. Dendrochronology provided the dates that allowed us to link timber structures to the names of their builders. This established links to primary and secondary sources (oral history, population and agricultural census data, atlas, property deeds, and county histories) that allowed us to more fully interpret the house, barn, and cultural landscape.
2. The study contributed to the understanding of vernacular barn forms constructed as part of the region's nineteenth century hay culture currently being interpreted by local historic and preservation-related organizations.
3. While the analysis of the house resulted in more questions than answers, it is our start into a dendrochronological study of timber houses in the state.
4. The study confirms the historic practice of recycling timbers from old buildings to construct new modifications. A former structure became cribbing in the barn, and multiple former structures were reused to expand the house.

5. The study reinforces the importance of collecting samples from throughout a building or landscape. Limited samples, especially from buildings with recycled timbers, can result in false construction dates.
6. Finally, the reporting of black walnut to date historic timber structures is rare. This project established a 528-year black walnut chronology using eight samples from five timbers. We are reporting here that black walnut exhibits inter-annual variability that permits reliable cross-dating, and that it appears to be a viable species for dating historic structures.

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THE PAINTED DAUB OF THE ANGEL SITE (12Vg1)

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Abstract

Daub is non-fired clay that is applied to house structures in the southern Midwest and Southeast of the United States by Pre-Contact peoples of the Americas. It is often imagined as mud-brown, or the color of most clay in these areas. In the East Village of the Angel Site in Evansville, Indiana, circa the mid-13th to 14th centuries A.D., some daub pieces were found by archaeologists that were painted with red, tan, white, black, brown, and silver-blue pigments in patterns that mimic stylistic motifs seen in painted pottery from this time period. This article describes these stylistic motifs and how these patterns are linked to non-domestic structures in the East Village and how this impacts how we imagine buildings of the past.

Introduction

While rarely reported elsewhere in the North American midcontinent, the painted daub of the Angel Site is documented in Glenn A. Black's posthumously published monograph on excavations from 1938-1965 (Black 1967). Black describes these artifacts as "a small remnant of a structure wall. The surface has been smoothed and the clay puddled so that the finer particles were brought to the surface . . . a design of some kind was painted upon this smoothed surface. The colors are a brick red and bluish gray. We would give a good deal to see an entire wall thus treated . . ." (Black 1967:126). Aside from this wistful remembrance by Black, very little attention was paid to these remarkably well-preserved cane and thatch-impressed daub pieces beyond Black's initial publication. One of the reasons these artifacts received little attention over the years was a lack of detailed reporting and that they were thought to be misplaced. While inventorying a box of copper artifacts at the Glenn A. Black Laboratory of Archaeology in Bloomington, Indiana where they are curated, I found what looked like very thick painted ceramics. As I subsequently noted the plant impressions on the rough backsides of the clay objects, I realized that these were not thick pieces of ceramic (some pieces were over 9 cm thick), but painted daub. Never having seen daub that was painted before this rediscovery led me to examine all of this artifact type curated at the GBL.

Daub is the byproduct of wattle-and-daub house construction and has been used all over the world for thousands of years, and is still used in some communities. Wattle-and-daub houses

are made by weaving river cane, wood, and vines into a frame, which is then coated with clay plaster, called daub by archaeologists. The roofs were either thatched with grass or shingled with bark. As the clay coating is a type of weatherproofing, these structures were constructed at ground level. While the clay used for daub is not fired, it does harden in place, sealing the house and keeping it cooler in the summer and warmer in the winter. In contrast, pole-and-thatch houses that were built by the Mississippian peoples of the Midwestern United States between the 11th and 14th centuries A.D. are semi-subterranean. Deep basins were dug into the earth for temperature control instead of being plastered. Wall trenches were dug into the bottom of these basins and then prefabricated walls of lashed together wooden poles were erected in the trenches and used to hold interwoven thatch and cane. Both types of house construction are meant to serve as a way to weatherproof the structure, with wattle-and-daub found more commonly in Ohio River Valley and the Southeast and pole-and-thatch structures found in northern midwestern areas such as Illinois (Lacquement 2007).

When I went to study this artifact class noted by Black in the above quotation, I noted very clearly painted designs ranging from circular motifs with red rays similar to that found in negative painted pottery at Angel (c.f. Hilgeman 2000) to patterns that seem to mimic the wall upon which it was painted with a woven motif. These remnants of past buildings are remarkable in their uniquely preserved state as pigments and unfired clays objects such as daub preserve very poorly in the acidic soils of the Midwestern United States. To study the motifs and distribution of painted daub at the Angel Site I looked at all of the identified painted daub in the catalog of artifacts from the Angel Site (catalog on file at the Glenn A. Black Laboratory of Archaeology) as well as regular daub that came from the same context for evidence of pigmentation. Not all daub pieces that were previously identified as painted had evidence of pigments added to their surface and no further examples of painted daub were located amongst the standard daub artifacts during this inventory. However, when I plotted the context of these painted daub pieces on the associated excavation maps, daub with painted motifs seemed to be associated with specialized buildings such as large circular rotundas and buildings used for public activities. I will demonstrate that the structures that were painted at the Angel Site near Evansville, Indiana were special public buildings that were being marked with stylistic motifs that compare well to those that are seen in pottery in the Lower Ohio River valley. As such, I argue that these fragments of painted walls may mark special buildings and places that were used for public or ceremonial usages.

Archaeological Context

The Angel Site (12Vg1) was a palisaded Middle Mississippian civic-ceremonial mound center near Evansville, Indiana located along the Wabash and Ohio Rivers. Known since the late 19th century, the site has been under study since the 1930s. Glenn A. Black oversaw several Works Progress Administration (WPA) excavations of the site as well as multiple Indiana University field schools until his death in 1965. During this time, the site was mapped (Figure 1) and a large

portion of the East Village and Mound F were excavated. Eleven mounds (A-K) were identified, in addition to more than two kilometers of palisade walls extending around the site. There are two segments, an "outer" and an "inner" palisade, both of which include bastions (Black 1967; Krus et al. 2013). Houses were distributed within neighborhoods around the site, with the eastern village being the most populous (Peterson 2011). Radiometric dating, as compiled by Monaghan and Peebles (2010), suggests that the bases of the mounds were first constructed around A.D. 1100 and the site was abandoned by A.D. 1450. The East Village, the area of the site where the majority of the painted daub was found, had structures that date somewhat late in the site's history with a mean range of A.D. 1281-1382 (Krus et al. 2013; Monaghan and Peebles 2010).

Figure 1. Topographic map of the Angel Site. The red outlined area is the portion of the East Village at the Angel Site that was excavated by Glenn A. Black from 1938-1963. Map courtesy of the Glenn A. Black Laboratory of Archaeology.

While research at the Angel Site restarted in the 1980s after the hiatus following Black's death, as all of the painted daub artifacts found to date were excavated during the WPA era, this article will not discuss this more current research in depth. One study that came from recent excavations does have an impact on this analysis, however. In 2010, the northern extent of Black's East Village excavations was located, and researchers sampled the discarded backfill from Black's excavations and determined that, on average, only approximately 75% of ceramics were collected (Marshall and Krus 2013). WPA excavations did not involve the use of mesh screens and excavators, who were mostly WPA workers with limited archaeological experience, pulled artifacts out by hand, leaving a bias as to artifact collection. As daub is a class of artifact that is often overlooked, it is likely that an even higher percentage of daub was discarded or not collected. This bias was understandable considering the scale of WPA excavations as well as site formation processes where the frequent flooding of the Ohio River created a sheet midden over the site of excavations. However, it does make analyses of materials from these excavations more difficult, as is often noted in re-analyses of this era of large-scale excavations.

When Black first designed the large-scale excavations that were performed by WPA crews, he used an arbitrary grid system to partition the site. Each division measures 100 feet x 100 feet that are divided into four subdivisions (A, B, C, & D), which are further subdivided into 10 feet x 10 feet blocks marked out from the centerline of each subdivision to the left and right (Black 1967). Each block was recorded as an individual context and each field specimen (FS) number was given a depth in feet, with limited stratigraphic control. No other distinction was made inside of these blocks unless particular features or burials were specified. Few artifacts were piece-plotted on section maps, so if the artifact is not identified as belonging to a particular feature in the field specimen log, it is difficult to determine where certain artifacts were located.

Interestingly, while specific daub and burned clay patches are mapped in original excavation documents, no piece of painted daub was piece plotted or linked to a specific feature, although all pieces were given distinct field specimen numbers and bagged separately to other artifacts (field notes on file at the Glenn A. Black Laboratory of Archaeology). As the samples discussed here were excavated during this era of excavation at the Angel Site, it is difficult to contextualize particular artifacts to specific structures and features. A simple presence or absence model is used here to cluster artifacts to a specific locality when possible.

The majority of the painted daub was recovered from subdivisions W-10-D and W-10-C in the East Village (Figure 2), although two small pieces of whitewashed daub were recovered from 0-13-D in a block predominated by large superimposed pits very near to Mound I. Aside from the concentrations in the East Village and near Mound I, no other painted daub has been documented throughout the rest of the Angel site. The East Village is an approximately 5,700 m^2 habitation area with multiple superimposed structures located just within the southeast extent of the outer palisade walls. The geographic extent of the East Village likely extends up to Mound A and Mound B. The determination of which structures these daub pieces came from may be problematic, but the general clustering of the daub in locations near to mounds may point to buildings in this monumental landscape near the mounds being specially marked. Though not from burned structures, the daub at the Angel site is remarkably well preserved, although no cane or thatch has survived which could be used in radiocarbon dating the specific pieces of painted

daub. As such, the patterned daub must be dated relative to the structures to which they can be identified and compared to the occupation histories of the Angel Site put forth by Monaghan and Peebles (2010), Hilgeman (2000), and Peterson (2010), as no radiocarbon assays have yet been done on materials from these contexts.

Figure 2. A compiled plan map of structures and features in the East Village excavated from 1938-1963 A.D. Blocks W-10-C and W-10-D are highlighted. Modified from maps curated at the Glenn A. Black Laboratory of Archaeology.

Description of the Painted Daub from the Angel Site

Clustered in one particular area of the East Village (Figure 3) are all the excavation blocks where painted daub was recovered, save the two whitewashed pieces from O-13-D. Note the clustering around the circular structure, a house just to the south of the circular structure with multiple puddled clay firepits, and a group of structures that superimpose the early palisade. The size and shape of these structures indicate that they were likely communal public buildings through which significant traffic passed. F.16 and the cluster of four puddle clay pits in the structure superimposing the early palisade trench, point to a space used for gathering and marking social identities. Using ethnohistoric sources of Omaha practices James Brown (1997) has interpreted certain circular structures as sweatlodges. However, circular structures at the foot of mounds at Cahokia and East St. Louis, and on the summit of Mound 8 at Kincaid, and perhaps this one at Angel, are so large that several scholars are calling these large rotundas council houses (Butler et al. 2011; Emerson 1997; Faulkner 1977; Pauketat 1998, 2005). Whether interpreted as sweat lodges or council houses, these circular structures were clearly not typical domestic spaces. By marking these spaces with painted designs, it can imagined that ideological and cultural memory is being transmitted and reified through visual reminders of the cosmos and world order.

According to Black's field notes, the large circular rotunda is likely the last structure to have been built in the sequence of occupation in the East Village. As the painted daub is not found throughout the site, but is predominantly localized to this area of the East Village, it can be hypothesized that the painting of these structures with elaborate designs as opposed to white or red-washing the structures, which is found more commonly elsewhere, was a chronologically late practice. Furthermore, there is no evidence of painted designs being layered on top of old plaster and painted layers. These structures were either only painted a single time, perhaps for a single event. Interestingly, in the excavation notes describing Feature 16, a cluster of stacked puddled clay firepits, the clay used in the puddled firepits was described as similar to that used in the daub, possibly from the same stock of material mixed for the purpose of constructing these clay architectural elements. The painted daub also clusters around structures that overlay the early palisade, indicating a later place in the chronological sequence of the East Village and the Angel Site.

The daub with clear painted patterns is more tightly grouped (Figure 4). The patterned daub pieces were excavated from contexts around the circular structure and the superimposed structures near the palisade bastion. The painted patterns include circular motifs in reds, blues and blacks, and reds-whites, as well as striped patterns in different shades of red that mimic line-in-triangle motifs seen on pottery throughout the Ohio River Valley (Figure 5). A sort of woven or layered pattern that may have been meant to mimic or represent a textile or woven mat is also present on some of the pieces (Figure 6). Interestingly, you see the blue layers interweaving with red pigment, reminiscent of the colorful constructed mound layers from Mississippian mounds in the Southeast (Pursell 2004).

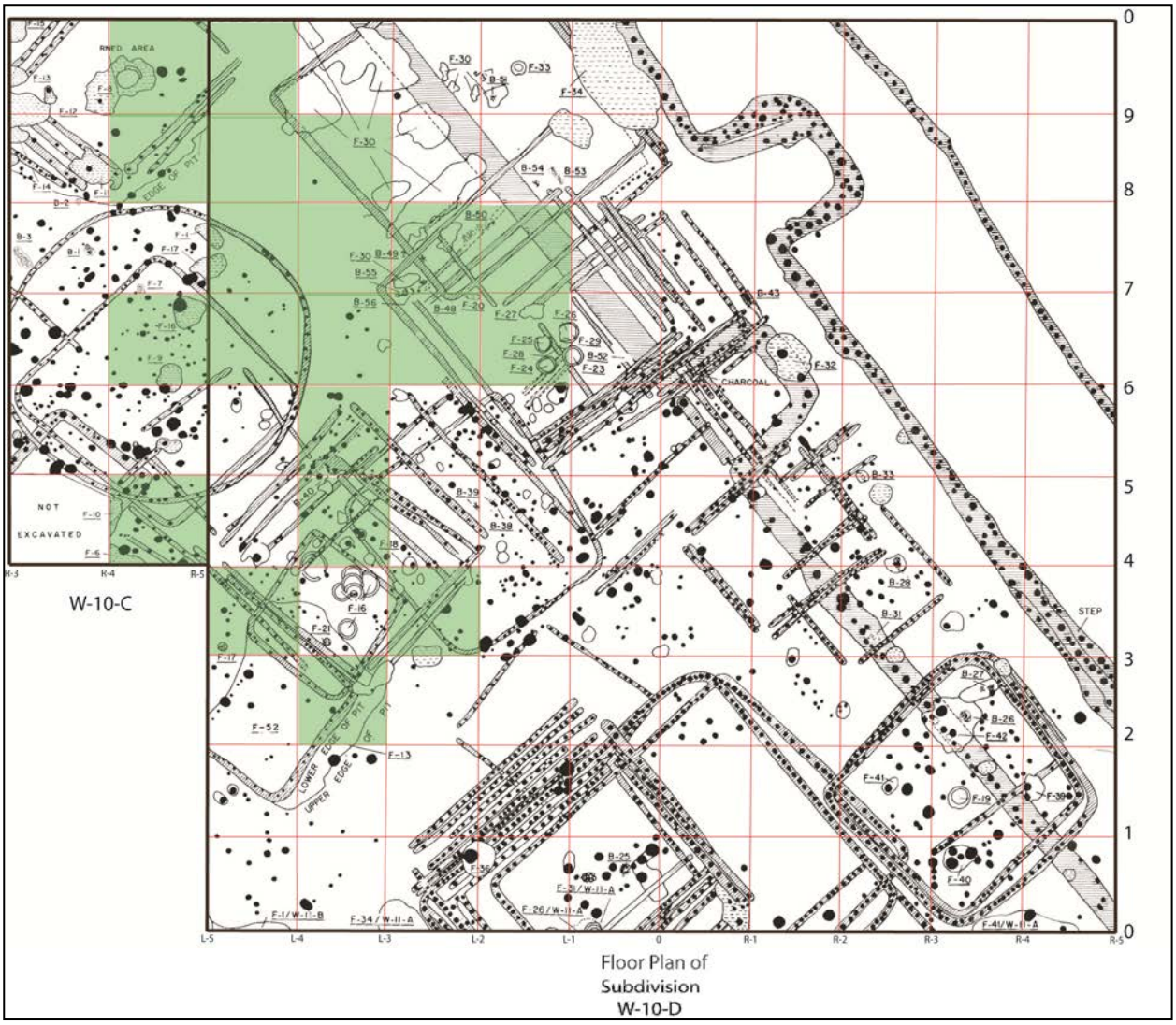

Figure 3. Map of the East Village divisions W-10-C and W-10-D with blocks shaded green to indicate the areas where all painted daub from the East Village was recovered. Modified from maps curated at the Glenn A. Black Laboratory of Archaeology.

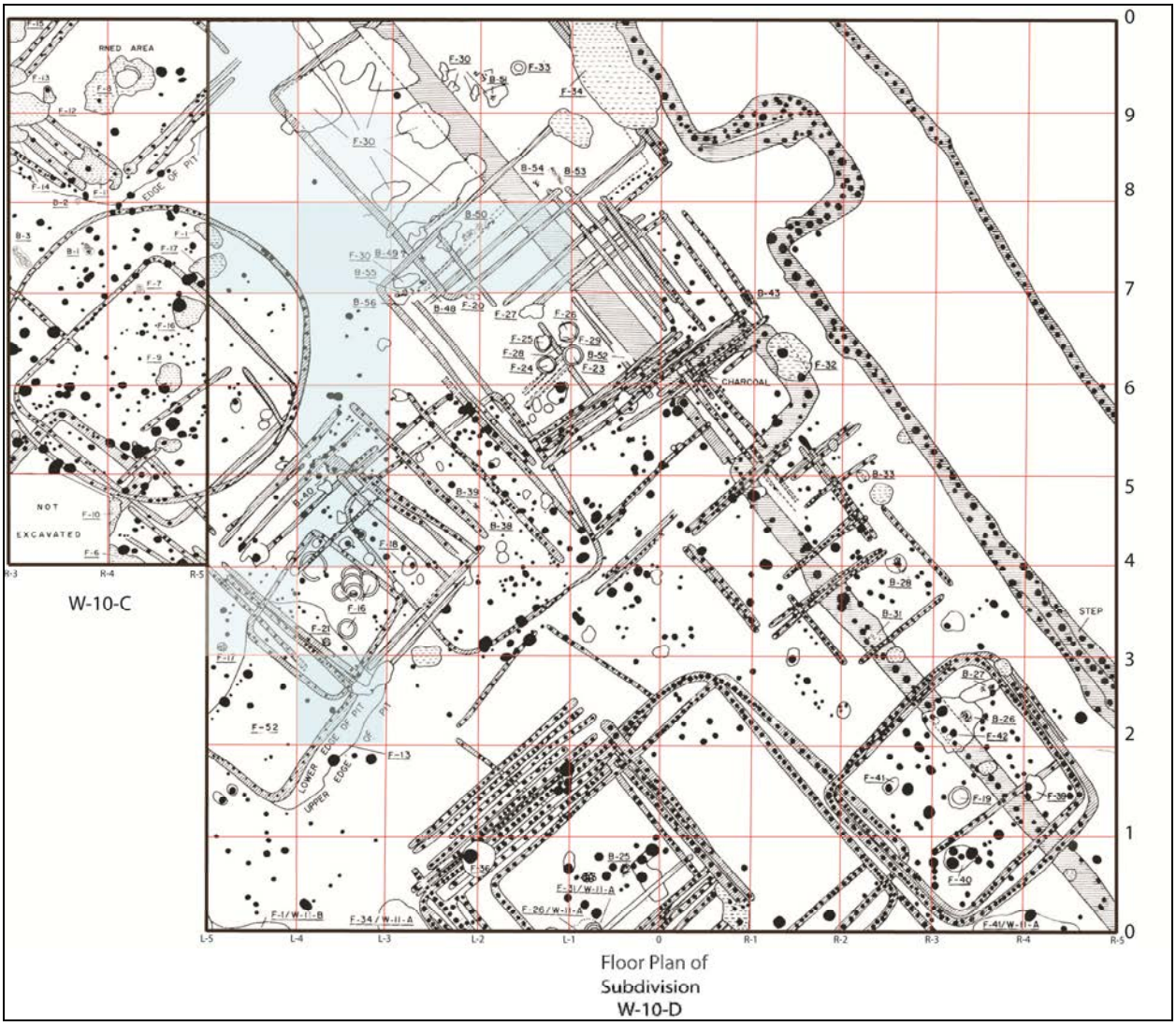

Figure 4. Map of the East Village divisions W-10-C and W-10-D with blocks shaded blue to indicate the areas where painted daub with patterns was recovered. Modified from maps curated at the Glenn A. Black Laboratory of Archaeology.

Figure 5. A piece of painted daub from (left; Artifact association: W-10-D/17100) showing a similar motif to Angel Negative Painted Pottery (right) with the zig-zag, cross-in-circle, and line-filled triangle motifs. All artifacts curated at the Glenn A. Black Laboratory of Archaeology and photographed by the author.

Figure 6. Painted daub with woven or layered designs from the East Village of the Angel Site (Artifact association: W-10-D/8680). Artifact curated at the Glenn A. Black Laboratory of Archaeology and photographed by the author.

Figure 7. Examples of painted daub where negative space is used as part of the design element. Artifacts curated at the Glenn A. Black Laboratory of Archaeology and photographed by the author. (Artifact associations from left to right: W-10-D/16429, W-10-D/9015, W-10-D/16615).

Some pieces are not painted on the entirety of their surfaces. Intentional curvilinear patterns have been left bare of paint. These areas have not been engraved into the daub surface but left bare of paint to create areas of negative design (Figure 7). This method used to create the negative spaces seems to be very similar to that thought to be used to create negative painted pottery. The patterns are difficult to interpret as the pieces with the negative fields are small and fragmentary, but linear and triangular shapes are emphasized, clearly demonstrating an intentional design element and not a flaw in the painting.

The most common motif in the painted daub patterns is circular (Figures 9 and 10). These motifs cluster around the structure holding F. 16, the group of puddled clay firepits, which marks this structure as a likely public meeting place. The circular motifs also cluster around the structures superimposing the early palisade trench, one of which has a concentration of four puddled clay firepits in a cosmologically significant pattern that mirrors the four corners of the world (c.f. Hall 1997; Figure 8). Interestingly, the circular motifs do not correlate with the location of the circular structure, perhaps the structures surrounding it were used in a similar way and the people at Angel wanted to reference the events or meanings associated with a circular structure. The patterns on the daub pieces depicted here are curved arcs of color that were likely cross-in-circle patterns or some portion of a sun motif.

Discussion

Quite often, when Mississippian scholars talk about the built landscape of Mississippian settlements, we discuss the plaza-centric community organization, the conformity to the wall-trench pole-and-thatch house construction plan, and the built environment of the monumental landforms that were created (Blitz 1996; Rogers and Smith 1995). Many have discussed the importance and significance of house plans and community structures in the Mississippian conception of space and the cosmos, but the physical appearance of these structures is little remarked upon other than in structural terms. However, the painted walls mentioned by Black represent evidence that reveals an important aspect of how Mississippian peoples lived their lives, signaled their identity, and likely passed on their knowledge that has been more or less ignored.

Although culturally meaningful color categories are not monolithic amongst Native American groups, the colors and patterns on the daub have been demonstrated to be highly significant in Mississippian cultures. Robert Hall (1997), among others, has traced ethnohistoric stories of cultural practice and cosmological meaning among the Native Americans of the Midwest and Southeast. Objects and patterns in reds, whites, and blacks were linked to cosmological events and ceremonial actions. Sun circles and radiating rays were symbols that were often depicted in reds and blacks. The importance of sun symbolism in Mississippian ideology is its association with rites of renewal, rebirth, and fire. Cross-in-circle symbols express a 4-part conception of the world in many Native American cosmological schemes. Tied to origin

myths and the four corners of the world, red, black, white, and blue also symbolize the four cardinal directions (Hall 1997; Hilgeman 2000).

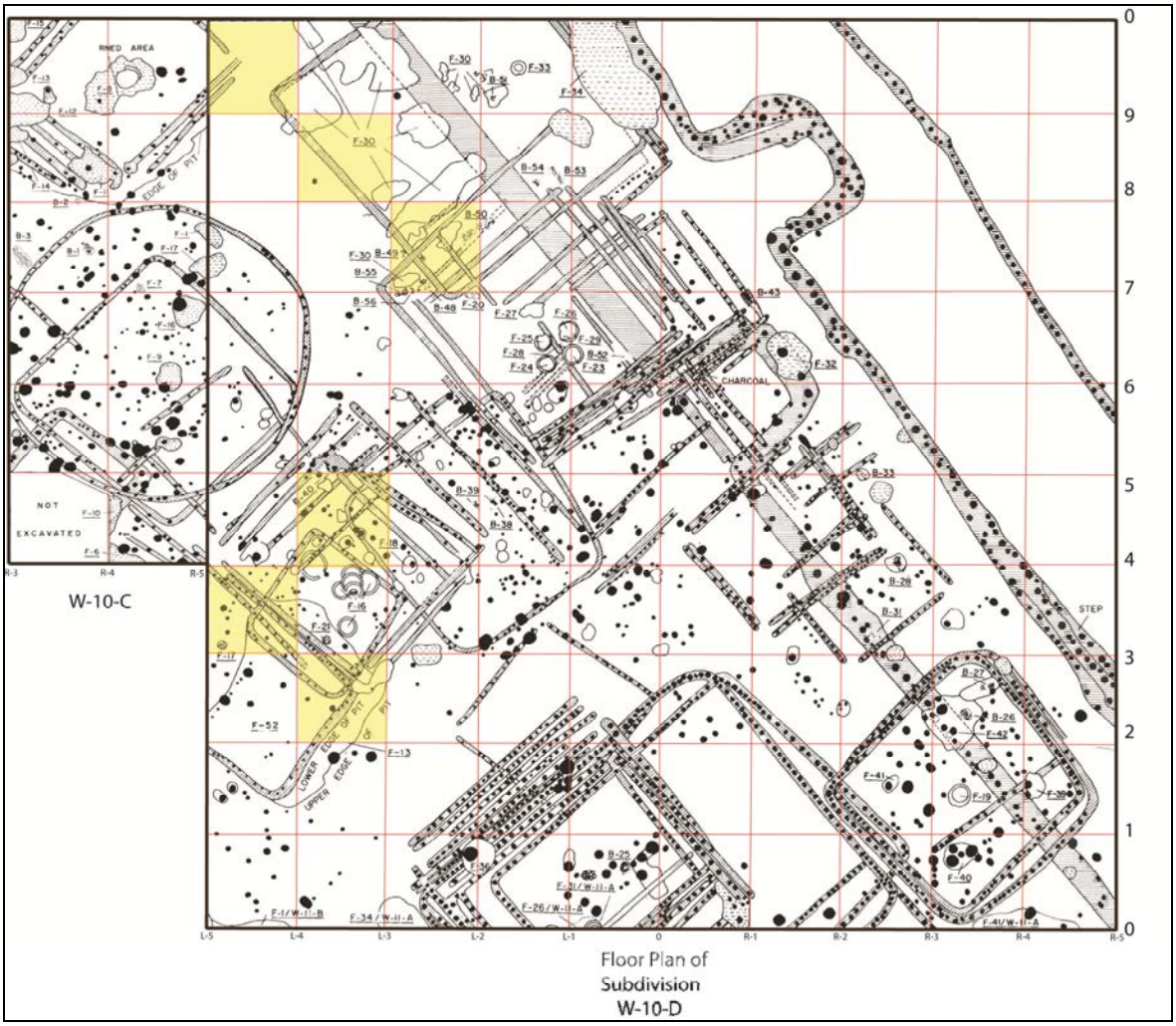

Figure 8. Map of the East Village divisions W-10-C and W-10-D with blocks shaded yellow to indicate the areas where painted daub with circular motifs was recovered. Modified from maps curated at the Glenn A. Black Laboratory of Archaeology.

Figure 9. Examples of painted daub with circular motifs in black and grey, red and steel blue, as well as red and tan. Artifacts curated at the Glenn A. Black Laboratory of Archaeology and photographed by the author. (Artifact associations from left to right: W-10-D/15415, W-10-D/16704, W-10-D/17100).

Figure 10. An example of painted daub from the Angel Site with a circular motif in black and steel blue with the original field specimen label and collection bag from 1946. Artifacts curated at the Glenn A. Black Laboratory of Archaeology and photographed by the author. (Artifact association: W-10-D/15014).

To try and understand the Angel painted daub Glenn Black pulled out a passage from the ethnohistoric account of William Bartram, an American naturalist who traveled amongst Creek Native Americans in the late 18th century. Bartram noted that the paintings at Creek villages were commonly on smoothed clay-plastered walls of houses along the public square, where red painted walls would have figures and symbols drawn on it with white clay, paste, or chalk and white painted walls were painted with figures and symbols in red, brown, or bluish-black (Bartram 1928[1853]). As Black notes, the colors and application of the smooth clay paste closely matches a description of the painted daub found at Angel. Additionally, Jean Ribault, a French Naval officer, recounts colorful pillars that were painted red, yellow, and blue used for sleeping platforms by the Timucua (Ehrmann 1940). However, such illustrative accounts are rare. John Swanton (1911, 1946), using much more simplistic phrasing, relates several ethnohistoric accounts of Native Southeastern groups that daub their houses with special red clay. Lt. Henry Timberlake (1927) likewise describes houses that have been daubed and white-washed and further identifies the white material used to be composed of decayed oyster shells, coarse chalk, or white marly clay. Aside from Bartram's account locating the painted houses along the public square, these accounts do not specify whether this was a normal practice or if such houses were specially located.

Archaeologically, the closest example of this level of complexity in a painted landscape other than at the Angel Site is the red cross-in-circle painted on a fired clay floor of a Mississippian house structure excavated by Dr. Kit Wesler in 1994 at Wickliffe Mounds in Kentucky (Wesler 2001). The structure was located between the cemetery Mound C and the smaller platform Mound B and included a puddled clay firepit, similar to those found at the Angel Site by Black, where the painted daub was found. Additionally, Wesler has reported what he called "finished daub" that he later describes as possibly being whitewashed daub with red paint adhering to it (Wesler 2001). The location of this structure in the proximity of two mounds and the ideologically important image of the sun circle mark this structure as important. The inclusion of the puddled clay firepits in both this structure and the two structures at the Angel Site where painted daub was recovered support the idea that the buildings at the Angel Site that were painted were special structures or used in communal activities.

The motifs painted on the buildings at the Angel Site mimic stylistic motifs seen on Ohio River Valley ceramics and painted daub as well as on the house floor at Wickliffe Mounds (see Figure 5 above as well as Hilgeman 2000). A striking resemblance is observed with much of the negative painted pottery that is the second most abundant decorated ware at the Angel Site behind Old Town Red ceramics that have a simple red-painted finish (Baumann et al. 2013; Hilgeman 2000). Angel Negative Painted pottery consists of a shallow container with wide rims that create a large decorative field. This field is decorated with filled-in triangles, cross-in-circle motifs, and sunbursts in a negative painting process that produces clean, dark contrasts in black-on-buff, red-on-buff, and black-on-red varieties.

Hilgeman (2000:164-203) links the imagery found in negative painted pottery to a four-part system with sunrays emanating from the central axis point of the plate. The radiating patterns rotate around the broad rim surface of the plate in much the same way as Ramey Incised pottery, with a visual reference to the four corners of the world and the above and below worlds

(Pauketat and Emerson 1991). She further stipulates that these plates were likely ceremonial serving dishes to be used in public rites, specifically dealing with fire and the sun (Hilgeman 2000:164-203). At the Angel Site, negative painted pottery was recovered from all areas of the site. However, it is in subdivision W-10-D, where our painted daub was found, that the second largest concentration is found (Baumann et al. 2013). The most dense concentration of Angel negative painted pottery is actually in a rectangular feature in Mound F itself, a locality with a great deal of cosmological meaning, lending strength to Hilgeman's argument for a ceremonial usage for negative painted plates at Angel. By extension, the large concentration in subdivision W-10-D should tell us about the activities that were being performed in this area of the East Village. The many structures superimposing each other with multiple building episodes, in this area of the Angel site may be testimony to the import of this particular piece of the landscape, perhaps it was too important to ever leave empty. The evidence demonstrates that this particular neighborhood held a large portion of ceremonial and prestige artifacts, hinting at ceremonial or public activities such as feasting, which is currently under study in the nearby Feature 34 by Glenn A. Black Laboratory researchers. The painted daub in this area may be another kind of prestige, marking buildings of import, or signaling the import of what happened in those buildings. It is also possible that the markings themselves were a way to sanctify certain spaces, much as motifs are thought to mark some vessels as appropriate for sacred use.

Conclusion

In summary, the evidence suggests that painted walls were quite rare, and that at Angel painted daub occurs within a limited region of the site. The neighborhood within a neighborhood in the East village of the Angel Site where the majority of the painted daub was uncovered clearly expresses the common set of iconographic and stylistic patterns found throughout the Ohio River Valley and the Southeast both in the painted daub and on special ceramic vessels. The singular nature of these pieces of daub in their preservation is remarkable. The familiar motifs suggest that people were meant to understand what they represented, while at the same time the limited distribution of the buildings with painted walls might also suggest that while all might understand the message not all could display that message. The subject bears being investigated more closely on a regional scale, looking at local stylistic variation and how painted walls impact the experience of the built environment, and what such marked places convey about systems of meaning. As researchers, we can only wish as Glenn Black did, that one day we will find that entire wall plastered, painted, and forgotten and be able to answer all these questions about the physical, temporal, and social landscape in the Lower Ohio River Valley in the late 13th century.

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Archaeology, which is also funding my current investigation of the mineral and geochemical composition of the pigments used to make the paint on the daub.

Photo Credits: All maps of the Angel Site are courtesy of the Glenn A. Black Laboratory of Archaeology and the Trustees of Indiana University. The author photographed all artifact images with the permission of the Glenn A. Black Laboratory of Archaeology.

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MISTAKEN IDENTITY? A REASSESSMENT OF THE ANGEL MOUNDS STATE HISTORIC SITE'S HISTORIC CEMETERY USING X-RAY FLUORESCENCE

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This article presents the results of experimental research on the usefulness of identifying residues present on human remains left behind from copper or copper alloys. A collection of human skeletons from Mound F at Angel Mounds State Historic Site was recovered in the 1940s and determined to be Euro-American based on the presence of a single historic gravestone and several pieces of coffin hardware. However, during a recent rehousing of the Euro-American individuals, several were discovered to have blue-green staining on their crania. If the staining was the result of native copper rather than a copper alloy, it would be more likely that the individuals were Native Americans buried during the Mississippian Period occupation of the site. Differentiating between copper and copper alloys has significant implications for the future of these individuals, as a reassignment of "Native American" to these human remains will cause the collection to fall under the purview of the Native American Graves Protection and Repatriation Act. An evaluation of the elemental composition of the copper staining using a portable X-ray fluorescence spectrometer (XRF) has shown that the copper staining present in the burials was likely caused by funerary hardware composed of Euro-American copper alloys.

As archaeologists and museum professionals increasingly turn towards research based on legacy and other curated collections, they are often confronted with mistakes, misidentifications, and mysteries left behind by previous generations of researchers, or with brand new avenues of research. In recent years, the proliferation of portable, non-destructive technologies has allowed archaeologists to ask new questions of old collections. Large collections associated with major federal projects conducted in the twentieth century (e.g., Works Progress Administration, Tennessee Valley Authority) are ripe for answering new research questions. Taking a closer look at collections that have been curated for decades customarily provides new insights into

collection history and past assumptions, and may yield new and possibly unexpected interpretations related to cultural affiliation.

In this article, we highlight a new line of questioning that emerged during the rehousing of human skeletons reported to have been excavated from a Euro-American cemetery atop Mound F at the Angel Mounds site in the 1940s. Several skeletons from Mound F that had been designated as Euro-American were found to have blue-green staining reminiscent of copper on their crania. Excavation notes report the presence of historic artifacts from Mound F, but none were reported from the burials with the possible copper or copper alloy staining. The presence of the copper staining, the absence of artifacts, and the lack of conclusive archaeological evidence that these burials were historic led to the questioning of whether all of the Angel Mounds Euro-American burials were correctly identified. In order to answer this question, we used a portable X-ray fluorescence spectrometer (XRF) to determine the elemental composition of the stains present on several of the crania in the Angel Mounds historic burials. The presence of copper alloys would conclusively demonstrate that the burials post-date European contact; the presence of native copper would be suggestive of pre-contact burial practices and would merit further research to determine the age of the burials.

Copper and Copper Alloy Use in the Americas

Copper has been used by indigenous Americans for thousands of years (Ehrhardt 2009). The principal source of native copper in North America can be found along the southern shores of Lake Superior, with additional sources in Canada and along the Appalachians (Fregni 2009:123; Levine 1999:186; Rickard 1934:271). Native copper is typically 99.60% to 99.90% pure with traces of silver and iron; European smelted copper is lower in percentage, with traces of lead, nickel, tin, arsenic, and antimony (Ehrhardt and Kaiser 2011:3; Levine 1999:194; Rickard 1934:271). According to Mantler and Schreiner (2000:3), the deliberate combination of copper with other metals has varied from region to region and this knowledge can be used to infer the geographic origin of artifacts and/or its alloyed materials.

Copper objects and repousséd plates have been found throughout the southeastern U.S. during the Mississippian Period (ca. A.D. 1000-1600). Copper repoussé plates from the Etowah site were found buried with humans in stone box graves (King 2003; Moorehead 1932; Thomas 1894). Elaborate mortuary contexts such as those associated with the Craig Mound at Spiro, Oklahoma were replete with copper, to the extent that copper salts contributed to the preservation of organic materials (Sievert 2011:162, 170). Copper is known to have been used in items of apparel, including headdresses, and copper has been found in association with human crania, notably at Etowah (see King 2003:68). The origin point for many of the copper plates and objects found at Mississippian sites appears to have been the Cahokia Mounds site in southwestern Illinois, where nuggets of highly pure native copper were flattened into sheets through hammering and annealing (Chastain et al. 2011). Over 100 pieces of copper have been recovered from Mississippian contexts at Angel and most pieces are fragments from flattened

sheets of copper. Many of these objects would have been valued due to their associations with the places in which they were made, the people who made them, the people who possessed them, and their supernatural origins and associations (Lankford 2007a:28-29, 2007b:119-121; Trevelyan 2004). In addition to those associative linkages, certain raw materials were (and still are) believed to have possessed intrinsic powers based on their physical properties and locations of origin (*sensu* Helms 1998). The use of exotic and powerful materials, including copper, linked sites along the great rivers, and across both physical and cosmological Mississippian worlds.

As European explorers came into contact with indigenous communities, European trade copper and other metals (silver, copper alloys, and iron) began to displace native copper as the major source for the valued metal (Hancock et al. 1991:69; Trevelyan 2004:197). The elemental composition of copper objects directly correlates with the introduction of European metals in the Midwest, as many native groups which had been working native copper made the transition to smelted metals (Dussubieux and Walder 2015; Ehrhardt and Kaiser 2011). However, recent archeometric research on raw native copper and copper artifacts have complicated what we know about native copper. While native copper can be more than 99% pure, erosion and corrosion can have a significant impact on the elements present, including lead and zinc (Dussubieux et al. 2008). Elements like iron, zinc, and lead (key additions for the creation of copper alloys) can be found in trace amounts in native copper; these trace elements can be useful for differentiating copper, copper resource areas, and alloys, but requires quantitative analysis (e.g. Dussubieux et al. 2008; Dussubieux and Walder 2015; Hill 2009; Hill, Greenlee, and Neff 2016; Lattanzi 2008; Rapp et al. 2000).

According to Hancock et al. (1991:69), the presence of European copper at an archaeological site in North America is indicative of direct and/or indirect contact with European settlers. Additionally, common copper alloy such as brass (copper and zinc) and bronze (copper and tin) would be indisputable evidence of post-Contact materials (Dussubieux and Walder 2015). Abel and Burke (2014) used XRF to differentiate between native copper, European copper, and alloys present among metallic artifacts from late prehistoric and protohistoric sites in northeast Ohio. They discovered that while the majority of metallic artifacts had European origins, several were made from native copper. Thus, it is a mistake to assume that all metal at Native American protohistoric sites was European metal.

The Angel Mounds State Historic Site and Collection Context

The Angel Mounds State Historic Site (12Vg1) was a Mississippian Period city with a palisade and multiple monumental earthen mounds (Figure 1). The site was occupied from approximately A.D. 1100-1450, with the peak of the settlement in the 1200s (Monaghan and Peebles 2010; Peterson 2010). At its height, over 1200 people would have lived at Angel, with hundreds more inhabiting associated villages, hamlets, and farmsteads up and down the Ohio River. Research at Angel in the 1930-1940s led to the excavation of domestic and ritual contexts, resulting in the collection of over two million artifacts and human remains from approximately 300 burials

(Black 1967). Like Mississippian peoples throughout the Midwestern and Southeastern U.S., the people of Angel engaged in the long distance trade of raw materials (e.g., copper, marine shell, catlinite, shark and alligator teeth), and finished objects (e.g., Negative Painted pottery, shell gorgets), and participated in elaborate religious celebrations and ceremonies, many of which would have involved those objects and materials (e.g., Hilgeman 2000).

During the 1800s, a 500-acre parcel of land along the Ohio River near present day Evansville, Indiana was settled by Joshua Angel. This property included the Mississippian site that would later be named after the Angel family. The Angel farm remained in the family until 1938, when Eli Lilly, pharmaceutical industrialist, donated money to the State of Indiana in order to purchase the property. Archaeological excavations at Angel commenced in the 1930s as Works Progress Administration (WPA) workers under the direction of Glenn Black, archaeologist for the Indiana Historical Society, exposed large portions of densely populated East Village area, and excavated portions of several mounds (Black 1967).

Mound F is a pyramidal, flat-topped earthen monument located in the southwest corner of Angel's palisaded perimeter (Figure 2). The excavation of Mound F was prompted by Eli Lilly's interest. Lilly had been in contact with Fay-Cooper Cole who was leading excavations at the Kincaid Mounds site, located downstream near the Ohio River. Cole and his crews had uncovered what they interpreted to be evidence of flood deposits at Kincaid (Cole et al. 1951:43, 83). Lilly believed that if similar deposits were present at Angel, there would be definitive proof that the two sites were contemporaneous. Mound F was selected due to its size (smaller than Mound A, but big enough to yield stratified deposits), its potential for the recovery of artifacts, and because it was located on the west side of the site, making it a good comparison to the domestic contexts excavated in Angel's East Village area (Black 1967:229). Black tasked WPA workers with the near complete excavation of Mound F.

Cyrus Thomas, who visited Angel prior to 1890, identified a cemetery atop Mound F. Eli Lilly reported that the mound was said to have been used to bury Native Americans (evidenced by the presence of stone box graves) and served as a Euro-American cemetery (Lilly 1937:46). During his 1932 visit to Angel, Glenn Black recorded a single tombstone in a grove of trees that had grown in the northeast corner of the mound (Black 1967:230-231). Before excavations began, Black rediscovered portions of the tombstone (for John Hubbard who died in 1846) partially buried in the plowzone. At the start of excavations in 1939, he reported that "a great many more pioneer graves were found on the east and south slope as well as within the east half of the mound apex" (Black 1967:232). The WPA excavations documented two mound construction stages: the primary mound contained a very large Mississippian structure (Figure 2); the secondary mound stage contained the historic Euro-American graves, Angel's iconic fluorite figurine, the burial of an eighteenth or early nineteenth century Native American man (often referred to as "Mound F Man"), and multiple Precolumbian burials (Black 1967). A preliminary trench excavation into Mound F encountered the Mississippian structure and the secondary mound construction was rapidly removed to expose the entirety of the structure. Notes from the excavation of the purported "pioneer graves" from the secondary mound are scant and few artifacts were recorded or retained. Borstel (1987) reported that 127 Euro-American burials were excavated, but only the remains from fifty-four are extant.

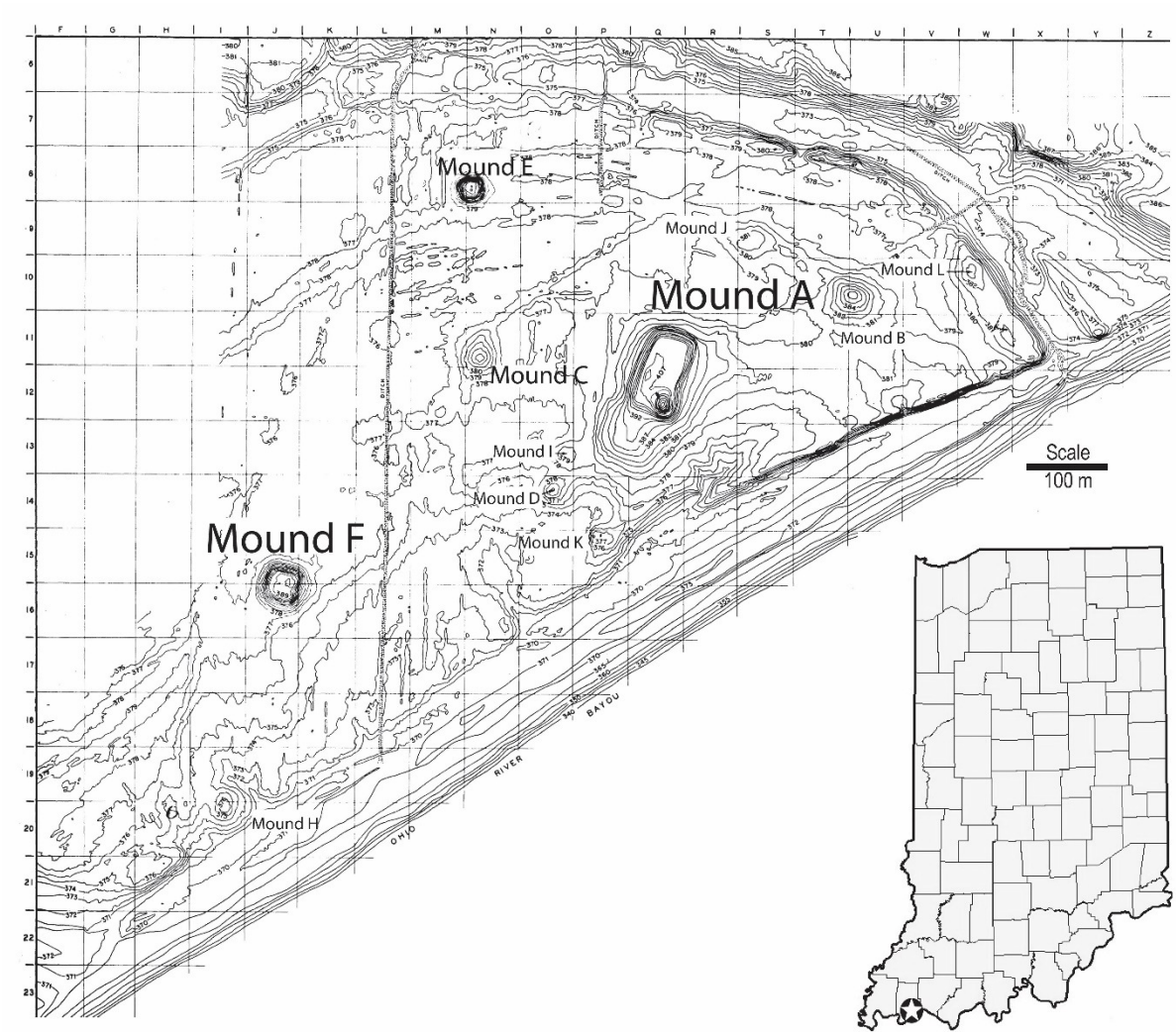

Figure 1. Topographic map of Angel Mounds State Historic Site (modified from Black 1967:Figure 14).

Figure 2. Aerial photograph of Mound F following the removal of the secondary mound construction stage (Photo courtesy of the Glenn A. Black Laboratory of Archaeology).

The practice of placing Euro-American cemeteries atop and around Native American mounds is not uncommon. Today, historic cemeteries can be found on Native American mound sites at Mound Hill Cemetery (Eaton, Ohio) (http://www.moundhillcemetery.com/history.html), Forest Hill Cemetery (Madison, Wisconsin) (http://foresthill.williamcronon.net/effigy-mounds/), and Lost Mound Cemetery (Savanna, Illinois) (Phillip G. Millhouse, personal communication), to name a few. Closer to Angel Mounds, the Williams site (12W61) was reported as having stone box graves (presumably Mississippian) and the site file indicates that it may have also been used as a burial location by Shawnee people during the Historic period (Martin and Martin 1952). Due to the commonality of historic (re)use of pre-contact mounds, it is little wonder that Black and others assumed that the burials in the secondary construction of Mound F were the remains of American settlers and farmers of European ancestry, despite very little evidence. The presence of the tombstone and some historic artifacts clearly indicate that some of the burials in the secondary mound were historic, but it is unclear whether or not all of them were. Cyrus Thomas' recording of stone box graves visible on the surface of Mound F (Lilly 1937:46), the excavation

of a historic Native American burial, and the excavation of nine Mississippian burials within the mound highlight the complexity of the funerary activities that took place at Angel's Mound F.

Today the collections from Angel Mounds are housed at the Glenn A. Black Laboratory of Archaeology (GBL) at Indiana University. Since their excavation in 1939/1940, the Euro-American burials, or the "white" burials as they were labeled by excavators, have largely been ignored and, as noted above, many of the burials and associated funerary objects have gone missing. In the decades following their excavations, the Euro-American burials have been the subject of two research projects at Indiana University. The first project was Chris Borstel's (1987) inventory and assessment of the extant collections. Borstel makes no mention of blue-green staining present on any of the crania, however this may be due to Borstel focusing on the curational condition of bone in the collection rather than the specific condition of individual burials. The second project was a Master's Thesis completed by Anne Lise Sullivan (2010). Sullivan conducted a health assessment of the individuals from the Angel historic cemetery and questioned the assumption that all of the burials were Euro-Americans. While Sullivan was correct to question this assumption, and found evidence to suggest the presence of African Americans, she did assume that all of the burials were historic.

In 2014, as part of collections rehousing efforts at the GBL, the burials labeled as Euro-American were briefly examined prior to their storage (Alvey 2014). During that examination, four burials were found to have blue-green staining present on their crania. The stains, coupled with a lack of known associated artifacts from the burials, led researchers at the GBL and the Indiana University Office of the Native American Graves Protection and Repatriation Act (NAGPRA) to question whether or not all of the Euro-American burials were in fact historic or if they possibly could have come from the pre-contact, Mississippian Period occupation of the Angel site. The blue-green stains on the crania could have come from either native copper (in use primarily during the pre-contact era) or from copper alloys (introduced after European contact). If it could be determined that the stains were produced by copper alloys, we could conclusively argue that the burials were historic in age (although ancestry would still be undetermined); if the stains were made through contact with native copper, there would be a higher probability (although not absolute; see Abel and Burke 2014) that the burials were interred prior to European contact, or that some were post-contact Native Americans, like the historic Native American man excavated from Mound F by the WPA.

Materials and Methods

Four burials from the Euro-American cemetery atop Mound F were found to have blue-green staining on their crania. Very little is known about these burials (see Table 1); no artifacts were reported to have been found with any of these burials. All four burials were subjected to X-ray fluorescence analysis.

Table 1. Data on burials in this study

Burial No.	Age[a]	Sex[a]	Ancestry[a]	Pathologies[a,b]
6	40	F	African American	Healed left femur fracture
23	40	F	Euro-American	
39	40	M	Euro-American	Resorption of alveolar bone, possible pathology on left ramus
45	50	M?	Euro-American	Asymmetry of sacrum, thickened right tibia, curved right fibula

[a] from Sullivan 2010, [b] from Borstel 1987

Within the last decade, the development of portable X-ray fluorescence (XRF) spectrometers has provided archaeologists with the means to bring elemental analysis to non-transportable or difficult-to-study archaeological materials (e.g., Shugar and Mass 2012; Tantrakarn et al. 2009:121). The XRF analyzer emits X-ray radiation, which excites the constituent elements in samples, producing fluorescent radiation. The reflection of the fluorescent energy is recorded. This non-destructive, handheld device has allowed for the in situ elemental analysis of materials found during excavations and has aided in the assessment of material culture (Bardelli et al. 2011:3148; Gersch et al. 1998:85; Yekutieli et al. 2005:3). Analyzing the physical properties and chemical composition of artifacts has allowed archaeologists to assign objects to particular contexts, provenances, and technological manufacturing categories (Mantler and Schreiner 2000:3; Schreiner et al. 2004:1). This technology has also been brought to bear on questions of possible contamination of older collections with preservatives such as arsenic (Odegaard et al. 2005; Robbins 2014; Shugar and Sirois 2012), especially for collections that may be repatriated to federally recognized tribes.

The XRF instrument used in this analysis was a Bruker Elemental Tracer IV, owned by the Indiana University Office of NAGPRA and housed at the GBL. The samples received no special treatments and were analyzed unaltered. All of the samples were run for twenty seconds at 40kV and 10 µA using the Bruker yellow filter (Ti and Al); the spectra were recorded and analyzed using the program S1PXRF. Since the intention of this study was simply to determine if there was the presence or absence of certain elements that may aid in differentiating between native and Euro-American metals, the samples were not compared to any certified standards or quantified. Quantification and comparison of results requires that the material being analyzed meet certain conditions including comparability of parent materials. For example, hypothesized copper objects from archaeological sites could be compared to a certified copper sample in order to determine how the elements present in the archaeological material deviates from pure copper. However, human bone tissue would not be directly comparable to a pure copper standard since human bone is necessarily going to have large proportions of elements (like calcium) present that are not present in copper. Analysis of human remains using a comparison against a copper standard would generate numbers, but those numbers would be meaningless in this context (Bruker 2017). Thus, sample readings were taken on the areas of the Angel Mounds crania with blue-green staining and portions of the crania without staining in order to differentiate which elements were related to the stains and which related to the elemental composition of the skeleton itself.

Results

Archaeological Copper

Two samples of copper (both housed in GBL collection) from secure archaeological contexts were analyzed using the XRF in order to provide an example of elements that should be present in native copper (Figure 3). A piece of copper from the Late Woodland (ca. A.D. 700-1200) Albee Mound (12Su1) and another from Angel were used. The sample from Albee is nearly pure copper–no other elemental spectra were visible. The sample from Angel is also primarily copper, with trace amounts of iron and calcium. This difference in the elemental composition of the two samples may be due to their particular source materials or due to the particulars of the soil geology at the different sites (i.e., the soils at Angel might have naturally occurring iron present). As noted earlier, archaeometric analyses of native copper have recorded trace amounts of lead; no lead is present in the Angel or Albee copper spectra. Zinc can be a trace element in copper, however, there is no zinc present in the spectra from the two archaeological copper samples.

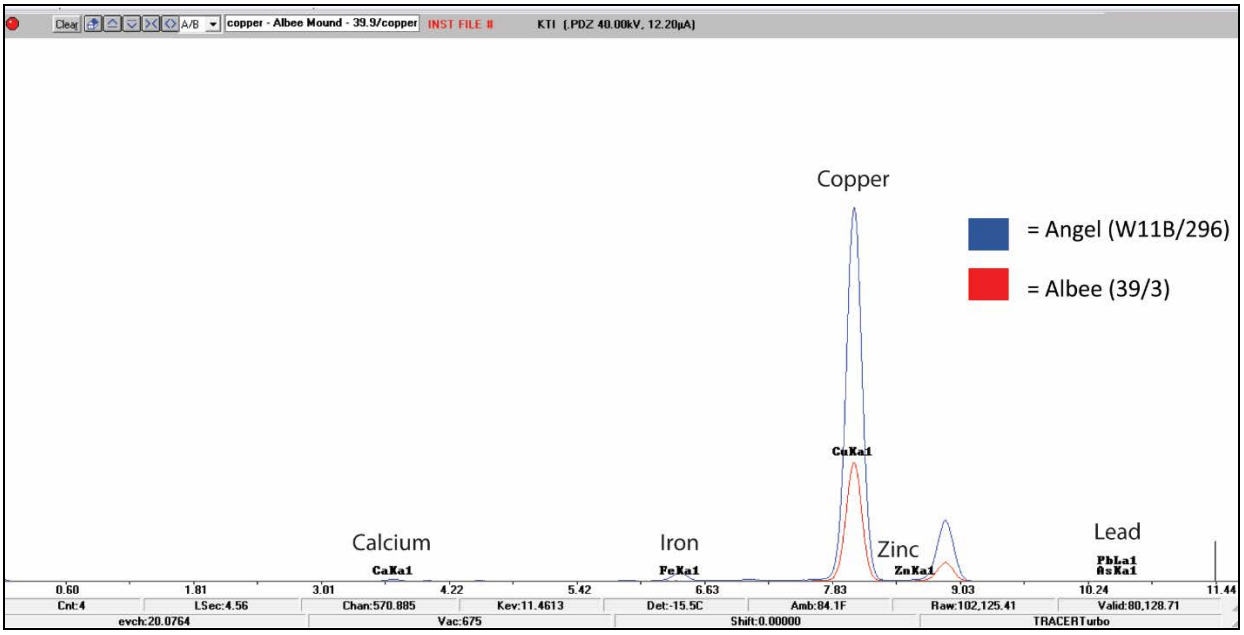

Figure 3. Elemental composition of copper artifacts from Albee (red) and Angel (blue).

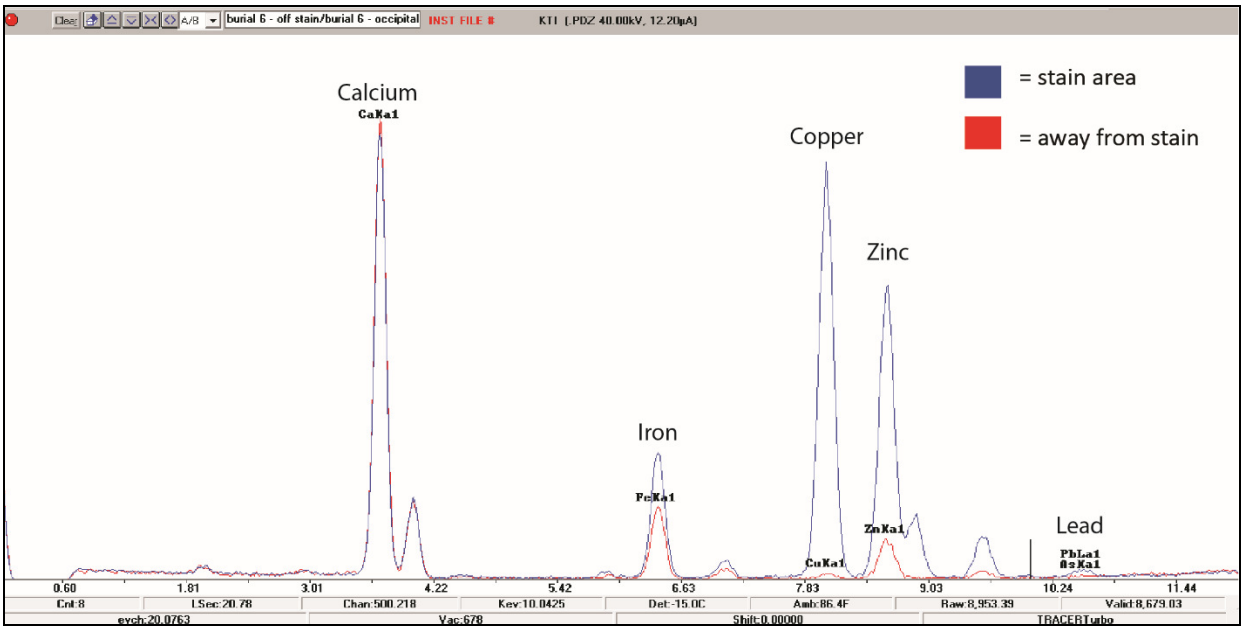

Figure 4. Elemental composition of Burial 6 from Angel. Blue spectral peaks are from areas associated with blue-green staining, red spectral peaks are from another portion of the cranium without staining present.

Burial 6

The most common element present in this sample (and all of the samples) is calcium (Figure 4). This is unsurprising given that the primary material in the samples is bone. Following calcium, there are large spectral peaks for copper, zinc, and iron and there is a small peak present for lead (PbLa1). There are also small amounts of zinc and iron present in parts of the skeleton away from the blue-green stain. Like calcium, zinc is commonly found in human bone (e.g., Pemmer et al. 2013). Lead can also be present in bone tissue (e.g., Pemmer et al. 2013); however, lead is present in the blue-green stain area of Burial 6, but not in the other part of the cranium sampled (the "away from stain" spectra in Figure 4). Native copper can contain trace amounts of lead, although none was present in the spectral readings from the Albee and Angel copper objects. Thus, the lead present in Burial 6 may have come from whatever material caused the stain. The much higher proportions of copper and zinc present in the blue-green stain area are likely also the result of the material that was in contact with Burial 6. Brass, a copper and zinc alloy, can also contain lead.

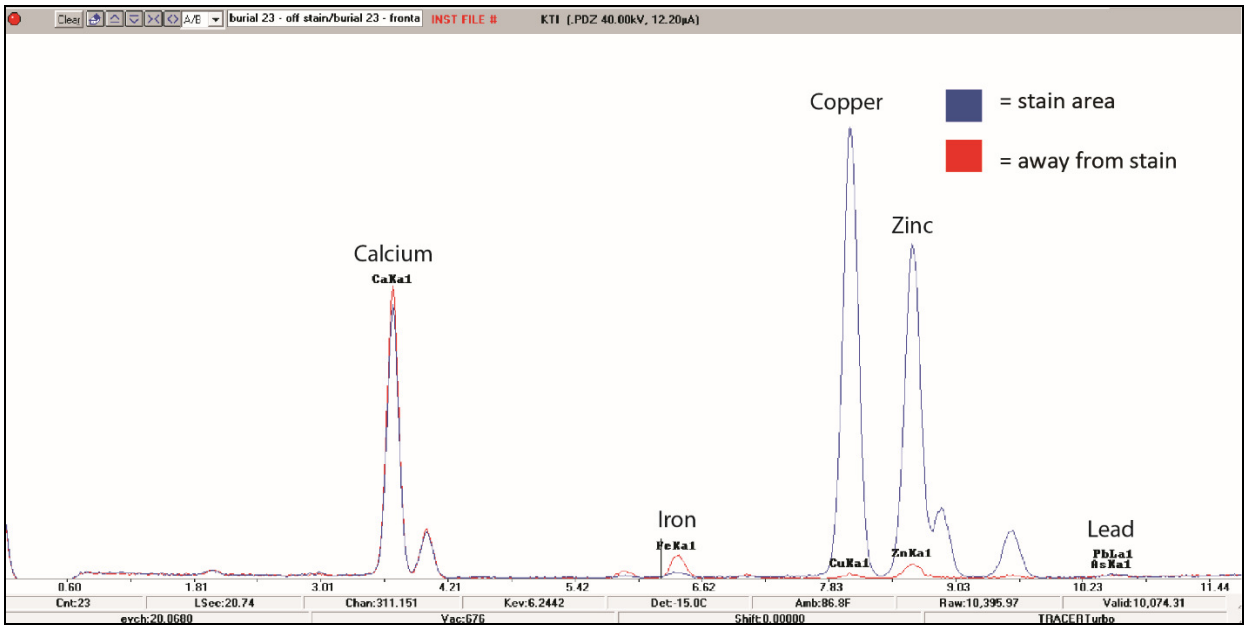

Figure 5. Elemental composition of Burial 23 from Angel.

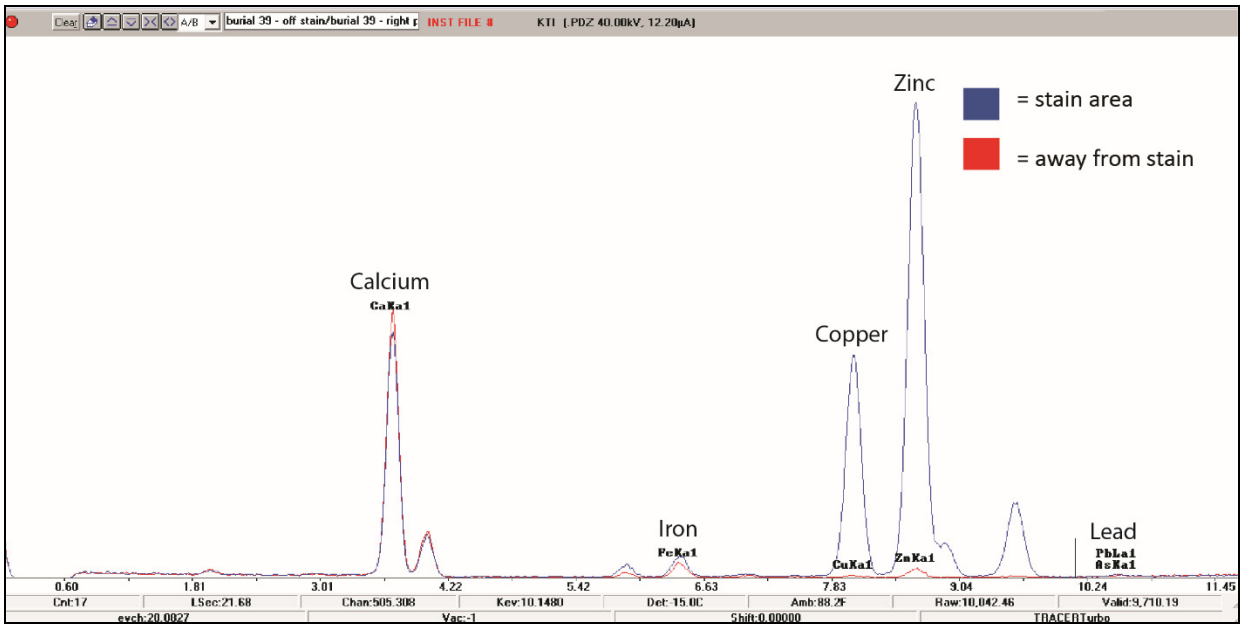

Figure 6. Elemental composition of Burial 39 from Angel.

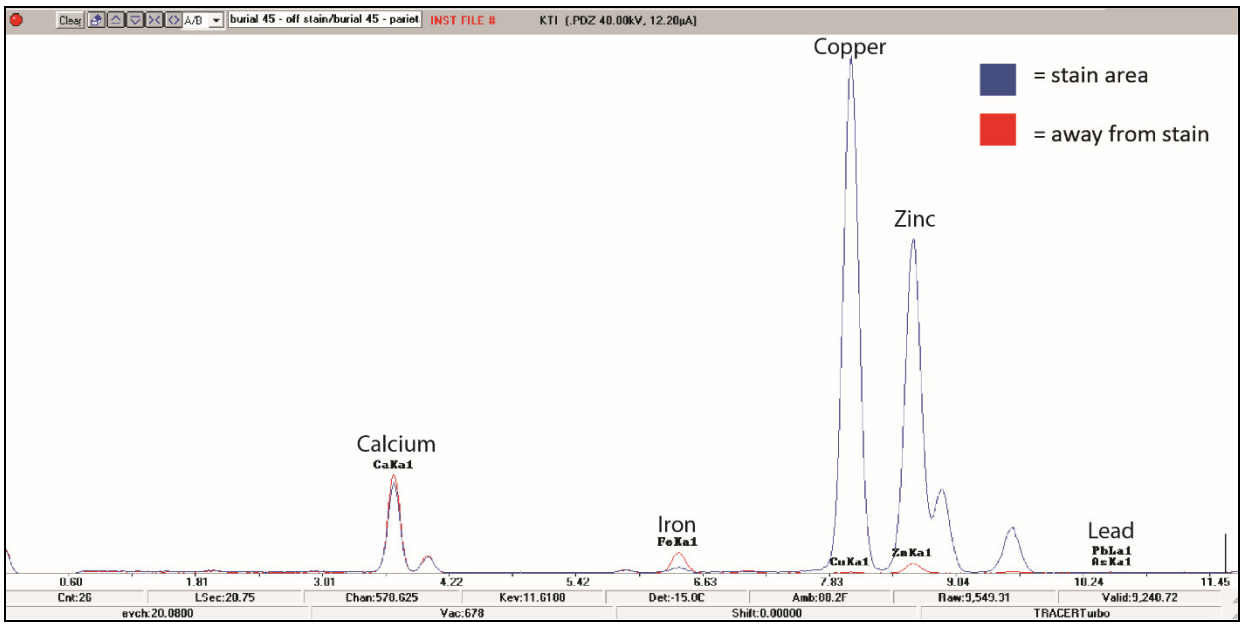

Figure 7. Elemental composition of Burial 45 from Angel.

Burial 23

Like Burial 6, there are strong peaks for copper and zinc associated with the blue-green stain area on Burial 23 (Figure 5). There is very little iron present in the stained area and there is more present in the unstained portion of the cranium sampled. If the iron was introduced into the samples through contact with local soils (discussed above), the differences between the stained and unstained areas may reflect the unique depositional history of the burials; parts of the burial that were protected from exposure to soils (as a result of funerary architecture) may have had less iron present. Sampling additional portions of skeletons could aid in clarifying this issue. However, native copper can also have trace amounts of iron present. The very strong peaks of copper and zinc would most likely be caused by brass rather than native copper which would only have trace amounts of zinc.

Burial 39

The strongest peak in Burial 39 is zinc (Figure 6). There is also copper and iron present in the area associated with the blue-green stain. As is the case with Burials 6 and 23, there is iron present in both the stained and unstained portions of the cranium, again highlighting the likelihood that there is naturally occurring iron in the soils at Angel. Based on the presence of more zinc than copper in burial 39, the material that produced the blue-green stain may have been brass.

Burial 45

Like the rest of the burials, Burial 45 (Figure 7) has high amounts of copper and zinc present in the blue-green stained portion of the cranium. Low amounts of iron were present in both the stained and unstained areas. The presence of high proportions of both copper and zinc again points to brass as the possible source of the blue-green staining on Burial 45.

Interpretations and Conclusions

The presence of high amounts of copper, zinc, and the occasional presence of lead indicates that the blue-green stains present on the crania of four burials at Angel may have been result of a copper alloy (brass) rather than native copper. Copper alloys like brass would not have been available in North America until after European contact, confirming that these burials were historic and not pre-contact Native Americans. However, both zinc and lead can also be present in native copper, although typically in trace amounts. While the results in this study were not quantified and cannot conclusively rule out native copper, the strong spectral peaks for zinc in all of the burials indicates that zinc was present in more than trace amounts. Burial 39 had zinc present as the most abundant element; this almost certainly indicates that the stain present on Burial 39 was the result of an alloy.

While the results of this may confirm the historic age of the burials (particularly Burial 39), it does not provide any information on the ancestry of the individuals from Burials 6, 23, 39, and 45. Glenn Black and subsequent researchers (with the exception of Sullivan [2010] who included the possibility of African American individuals in her study) have assumed that the burials were all Euro-American, despite knowledge that there was a Native American man buried during the Historic Period in the same mound. The burials involved in this study were missing critical diagnostic cranial features that are often used to determine ancestry; it should also be noted that cranial features are not perfect indicators of ancestry (Blumenfeld 2011:30).

Following the passage of NAGPRA in 1990, researchers have revisited legacy collections in order to determine the cultural affiliation of Native American burials. The 2010 changes in the legislation now allows for the repatriation of culturally unaffiliated Native American burials. However, determining whether or not a burial is considered Native American (as defined in NAGPRA legislation) can still be a contentious process. For example, during litigation over the disposition of the Ancient One (also referred to as Kennewick Man), the Oregon District Court authorized additional study of the skeleton because the court concluded that the U.S. Army Corps of Engineers failed to prove that the Ancient One was in fact Native American (Bruning 2006). That ruling meant that the Ancient One did not fall under NAGPRA legislation. Recent DNA analysis of the Ancient One demonstrated that he was most closely genetically related to modern Native American populations, most specifically the Confederated Tribes of the Coville Reservation (Rasmussen et al. 2015). While cases related to some of the oldest skeletons in the U.S. hinge on problems with how “Native American” is defined in NAGPRA legislation, they

should also cause archaeologists to question how other ethnic and cultural designations have been applied to burials from other time periods.

The burials from atop Mound F at Angel have always been assumed to have been Euro-American with very little extant archaeological evidence to back up such an assertion. Our XRF results indicate that the blue-green stains may have been caused by copper alloys and thus, the skeletons would post-date European contact. These results do raise more questions: are all of the supposed historic burials really Euro-American or could some of them possibly be historic Native Americans? Is it possible that there were some Mississippian burials in the secondary mound that were mistaken for historic Euro-American burials? Why is the blue-green staining only present on crania? The placement of the blue-green stains is particularly problematic. If the stains were found to be native copper, the presence of copper on crania would not have been outside of known Mississippian use of copper and bundles bearing copper in burial contexts. Within a post-contact burial context, this placement is curious; we are unaware of any historic Euro-American burial practices or funerary/coffin hardware that would result in such a pattern. Mound F man (the historic Native American burial) was documented as having metal objects that were interpreted as hair beads (Black 1967:254-255). It is possible that similar metal hair ornaments were once buried with the skeletons that had blue-green staining on their crania. In the future, DNA analyses could clarify if the individuals in this study were Native American, Euro-American, African American, or of mixed ancestry. Additional archaeometric analysis of the blue-green staining may yield quantifiable results that will all age determination with greater certainty.

Our results did not necessarily overturn what had been previously published or thought about the Euro-American burials from Angel. However, the presence of unusual features or characteristics (in this case the blue-green stains) highlighted the need to revisit a largely ignored collection in order to see if it could reveal new information about the past inhabitants of Angel and about past archaeological excavation and collection methodologies. Non-destructive technologies like XRF can aid archaeologists, museum specialists, and descendant communities in asking new questions of old collections. Not only will this research help in clearing up mysteries and controversies, it will likely also complicate archaeological interpretations previously thought to have been solid. In the case of Mound F, our research questioned the long held assumption that burials recovered near the surface of the mound were unambiguously Euro-American. While the burials with blue-green stains were likely the result of copper alloys and thus date to the Historic Period, the mystery of who those individuals were still remains.

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IDENTIFICATION OF A MIDDLE WOODLAND PERIOD MANN PHASE HAMLET: AN ARCHAEOLOGICAL INVESTIGATION FOR A PROPOSED DEVELOPMENT PROJECT IN POSEY COUNTY, INDIANA

Mark Doperalski

Abstract

A Mann phase hamlet was recently discovered during an archaeological investigation conducted as part of a proposed development project in Posey County. The site (12Po340) was identified one-quarter mile northeast of the well-known Mount Vernon Site (12Po885) Hopewell ceremonial center within an actively cultivated agricultural field situated on a high terrace near a terrace-upland margin overlooking the Ohio River. A large amount of lamellar blades in association with Lowe Cluster projectile points, ground stone tools, and thin-walled, grit, grog, and limestone tempered, cord-marked and plain, smoothed-over ceramics were identified at the site. The surface assemblage consists of an estimated 10,000 artifacts based on a five percent controlled sampling strategy; however, little is known regarding the subsurface patterning and integrity of the archaeological deposits at 12Po340. More extensive archaeological investigation, including the use of magnetometry, will be necessary to determine if such resources have survived below the plow zone and if the site will render information further illuminating Middle Woodland period lifeways at a Mann phase hamlet in close proximity to a major Hopewell ceremonial center.

Introduction

A Phase I archaeological and geomorphological investigation was conducted in 2014 as part of the permitting process for a proposed development project in Posey County, Indiana (Doperalski and Anderson 2014). The proposed development project (project) required permitting through the United States Army Corps of Engineers (USACE), and therefore, needed to comply with Section 106 of the National Historic Preservation Act of 1966, as amended (Section 106). Consultation with the Indiana Department of Natural Resources (IDNR), Division of Historic Preservation and Archaeology (DHPA) was required as part of the permitting process.

The purpose of the investigation was to determine whether the project area contained previously recorded or unrecorded archaeological resources that may be potentially eligible for listing on the National Register of Historic Places (NRHP). The archaeological investigation consisted of a review of literature regarding previously recorded sites within one mile (1.6 kilometers) of the project area and of surveys previously conducted within the project area, as

well as a Phase I archaeological field survey to identify any previously unrecorded archaeological sites within the project area. The geomorphological investigation consisted of a review of locations with the potential to contain paleosols and/or landforms that had the potential to be human-made as well as a field investigation to explore the soil stratigraphy and geomorphology at such locations. The investigation was conducted under DHPA approved plan 2013044.

During the investigation, five previously recorded and nine newly recorded archaeological sites were identified within the project area. One of these sites, 12Po340, appears to represent a Middle Woodland period Mann phase hamlet. Lowe Cluster projectile points (e.g., Bakers Creek), indicative of the Middle Woodland to Terminal Middle Woodland periods (Justice 1987:308-214), were identified at 12Po340 during the 2014 investigation. The investigation also found the site to contain thin-walled, grit, grog, and limestone tempered, cord-marked and plain, smoothed-over ceramics as well as numerous bladelets[1], exceptionally thin in nature and often exhibiting prismoidal cross-sections. Bladelets such as these in association with Lowe Cluster projectile points and these ceramics are indicative of a local manifestation of the Hopewell culture known as the Mann phase (Ruby 1993, 1996, 1997). Based on Ruby's (1996) definitions of Mann phase settlements, as discussed below, 12Po340 appears to represent a hamlet. A site of this nature may have the potential to reveal additional important information regarding the local manifestation of Middle Woodland period Hopewell culture and may be a constituent of the greater Hopewell ceremonial landscape.

Site Location and Context

Site 12Po340 is located in Posey County, Indiana approximately one mile (1.6 kilometers) northwest of the Ohio River and northeast of the well-known Mount Vernon Site (GE Mound; 12Po885), a ceremonial center of the Middle Woodland period Hopewell culture (Munson et al. 1995; Seeman 1994; Tomak 1994).

Cultural Context – Middle Woodland Period (200 B.C. to A.D. 600)

The Middle Woodland period in Indiana is characterized by the inception and expansion of the Hopewell culture. The Hopewell manifestation has been described as a florescence of cultural activities. The trends of previous cultural periods continued with increasing sedentism,

[1] For this analysis, the definition of a blade was not as restrictive as Sanger (1970:106-107) and Ruby (1997:213) suggest, but rather followed the more general criteria defined as a flake with parallel lateral edges and a length-width ratio exceeding 2:1. It should be noted that flake fragments exhibiting parallel lateral edges and parallel dorsal ridges were also categorized as blades despite not meeting the 2:1 ratio due to having been broken. It should also be noted that many of the artifacts categorized as blades at 12Po340 exhibited two or more paralleling dorsal ridges demonstrating sequential blade removals, meeting Sanger (1970:106-107) and Ruby's (1997:213) more restrictive requirements.

population growth, horticultural activity, and investment in ceremonialism including construction of mounds and the use of a diverse assemblage of exotic ceremonial goods. Evidence suggests astronomical alignments within and between mound complexes of the Middle Woodland period. A majority of Middle Woodland period sites in Indiana are found along major drainages (Jones and Johnson 2012:9).

Diagnostic projectile points include Snyders, Chesser Notched, Bakers Creek, Lowe Flared Base, and Steuben Expanded Stemmed (Jones and Johnson 2012:9; Justice 1987). Ceramic traditions diagnostic of the period include Havana, Scioto, Late Crab Orchard, Mann, and Allison-Lamotte. Other diagnostic tools include blades, blade cores, clay figurines, copper celts, panpipes, and platform pipes. Exotic materials found at Middle Woodland sites include galena, copper, mica, marine shell, and obsidian (Jones and Johnson 2012:9).

The Mann phase is a local manifestation of the Middle Woodland Hopewell culture in southwestern Indiana (Ruby 1996, 1997). Ruby (1996) defined three classes of Mann phase settlements; short-term extractive camps, hamlets, and corporate ceremonial sites. Short-term extractive camps are the most numerous Mann phase site type and are characterized by Lowe Cluster projectile points and distinctively thin lamellar blades. Short-term extractive camps are most commonly identified on floodplains, terraces, and interior landforms. Hamlets, the second most numerous Mann phase site type, are characterized by utilitarian ceramics (thin-walled, grit, grog, and limestone tempered, cord-marked and plain), Lowe Cluster projectile points, thin lamellar blades, a wide-range of lithic tool types and debitage, middens, and postholes (Ruby 1993, 1996). Hamlets are limited to bottomland settings, some within active floodplains. Corporate ceremonial centers are the least numerous Mann phase site type and are characterized by supra-household activities, large earthworks, numerous ceremonial items, human remains (burnt and unburnt), and ceremonially destroyed items. Corporate ceremonial centers are found on terrace landforms and upland locations overlooking bottomland settings (Ruby 1996, 1997).

Environmental Context

The site is located on a slight rise within a gently undulating agricultural field, which falls within the Wabash Lowland Physiographic Region (Schneider 1966:49). Underlain by siltstone and shale of Pennsylvanian age, this region is characterized by broad valleys and smoothly rounded hills with gentle bedrock slopes. In addition to a partial blanket of glacial outwash, the region is underlain by widespread lacustrine and alluvial sediments; particularly within the broad terraced valleys along the Ohio, Wabash, and White Rivers. Much of the upland surfaces and upper valley walls are blanketed by windblown sand and silt (loess) of late Wisconsin origin (Schneider 1966:49).

No bedrock outcrops are present within the general vicinity of the site area; however, raw materials for stone tool manufacture would have been locally available in the form of highly siliceous gravel and cobbles derived from glacial outwash. West Franklin chert represents the closest known chert outcrop to have been quarried during the prehistoric-period. The outcrop is located in the extreme southwestern portion of Vanderburgh County (Cantin 2008:69-71). West Franklin chert can also be obtained in secondary deposits in streams to the west of Evansville,

Indiana (Cantin 2008:69-71). Wyandotte chert, a highly desirable raw material outcropping only a few counties to the east of the site area, is the most heavily represented lithic raw material type at most prehistoric-period archaeological sites in Posey County. The distribution of Wyandotte chert is widespread both geographically and temporally (Cantin 2008:71-75).

The surrounding area is dissected by several small drainages. Water flows to the southeast within these drainages and discharges into the Ohio River. Several of these drainages have severely incised the terrain creating deep ravines.

The site is located on a loess-capped high terrace near the terrace-upland interface. The major soil associations of the site include Alford and Evansville (McWilliams 1979). The bulk of the site is situated on well-drained Alford soils with the fringes of the site reaching highly fertile and poorly-drained Evansville soils. This location would have allowed the site inhabitants the advantage of a variety of soil properties to mitigate for the effects of environmental variability upon agricultural crops. The location of the site, near the border between the Driftless Section of the Southwestern Lowlands Natural Region and the Southern Bottomlands Natural Region, would also have allowed for access to a variety of wild plant food resources (Homoya et al. 1985). The vegetation in this location prior to and at the time of European-American settlement was predominately Oak-Hickory forest (Green 1984:441-446; Homoya et al. 1985:257-258; Lindsey et al. 1969; McWilliams 1979; Petty and Jackson 1966:280). The forest was dominated by black and white oak as well as hickory (Green 1984:441-446; McWilliams 1979). The nuts of these trees in addition to the sap of red maple and sugar maple trees and the seeds and fruits of black cherry, hackberry/sugarberry, honey locust, mulberry, pecan, and persimmon would have been available to the inhabitants of the site (Green 1984:441-446; Homoya et al. 1985:257-258). The most common animal species available to the site inhabitants would likely have been deer, turkey, raccoon, backwater fishes, turtle, and migratory waterfowl. Much of the landscape in this region was cleared and developed into agricultural fields subsequent to European-American settlement.

Site History

Reported to Indiana University in 1978 by an artifact collector, 12Po340 was recorded as a Mississippian period (A.D. 1000 to 1650) artifact scatter with shell-tempered ceramics and unspecified surface features within an agricultural field; however, the site was never verified by an archaeologist[2] prior to the investigation carried out in 2014. Additionally, the site had not been evaluated for inclusion in the NRHP, though it was stated on the site form that the archaeological deposit had been disturbed by agricultural activities and subsequent erosion (DHPA 2007a).

Archaeological Survey

[2] The site form clearly indicates that an archaeologist did not visit the site area. It is unclear as to whether or not the collection compiled by the collector was viewed by an archaeologist; however, the notation, “shell temp ceramics reported,” suggests that the artifacts were not viewed or inspected by the recording archaeologist.

The 2014 archaeological investigation of site 12Po340 resulted in the identification of a very dense prehistoric period artifact scatter at this location. The artifact scatter was identified on a slight rise within an actively cultivated agricultural field (Figure 1). At the time of survey the site area exhibited remnant soybean detritus from the previous season that had been subsequently tilled under and subjected to a number of heavy precipitation events, allowing for conditions that presented 80 to 95 percent ground surface visibility. Due to the large size of the site area and high artifact density, survey along 10 meter (m) interval transects was conducted to establish an initial site boundary. Subsequently, survey along 5 m interval transects was conducted along the initial site boundary to refine and define the final site boundary presented herein. During the surface survey, collection of prehistoric-period artifacts was limited to those observed within a one-half-meter wide swath along each 10 m interval transect due to the incredible density of the artifact scatter. A total of 463 prehistoric period artifacts were collected at the site during the surface survey. The collected artifacts represent approximately five percent of the total surface scatter.

Figure 1. Overview of site 12Po340, facing northwest. Photograph by Mark Doperalski.

The boundary of site 12Po340 was extended to encompass the extent of a 5 m buffer of all surface find locations within the survey area. As a result of the 2014 investigation, the 12Po340 site area was increased by 3.26 acres (1.32 hectares) from 2.04 acres (0.82 hectares) to 5.30 acres (2.14 hectares).

Due to excellent surface visibility, only four shovel tests were excavated at the site to assess soil stratigraphy at the location and check for the presence of buried archaeological deposits. Two of the four shovel tests were positive for prehistoric period archaeological resources and produced a total of six additional artifacts. All archaeological materials identified within shovel tests were identified within or just below the Ap horizon (plow zone). Two soil cores were placed within the site boundary as part of the geomorphological investigation to further assess the site. The geomorphological investigation determined that the site is situated on a highly eroded late Wisconsinan loess capped terrace.

It should be noted that an extremely sparse historic-period artifact scatter was also identified at this same location. The historic period artifact scatter covers a very large area (17.74 acres [7.18 hectares]) and encompasses three separate prehistoric period deposits. As a result, in consultation with the DHPA, the historic period artifact scatter was assigned a separate site number for resource management purposes. In this manner the three separate prehistoric period deposits as well as the all-encompassing historic period deposit could each be discussed and evaluated separately.

Analysis and Interpretation

The observed prehistoric period assemblage at site 12Po340 consists of 469 artifacts (Table 1). Six of these artifacts represent subsurface finds identified within shovel tests. The remaining 463 artifacts were identified on the ground surface within one-half-meter-wide swaths along transects spaced at 10-m intervals. Thus, the 463 artifacts represent approximately five percent of the overall prehistoric period surface assemblage indicating that the overall surface assemblage consists of approximately 10,000 artifacts. The observed prehistoric period assemblage is comprised of chipped stone artifacts (n = 338), ground stone artifacts (n = 9), ceramic vessel sherds (n = 111), and fire-cracked rock (n = 11).

The chipped stone artifact assemblage consists of Lowe Cluster projectile points (n = 2), the base of what appears to be a Lowe Cluster projectile point (n = 1), an unclassified projectile point missing portions of its base (n = 1), biface fragments (n = 8), end scrapers fashioned from blades (n = 2), a crudely formed biface/knife (n = 1), a spokeshave (n = 1), utilized flakes and flake fragments (n = 21), utilized blades and blade fragments (n = 104), utilized shatter (n = 12), flakes and flake fragments (n = 46), blades and blade fragments (n = 38), shatter (n = 92), blade cores (n = 4), a bipolar blade core (n = 1), a micro-blade core (n = 1), and a core/biface fragment (n = 1). The ground stone artifact assemblage consists of a celt fragment (n = 1) and fragments of indeterminate ground stone tools (n = 8). The ceramic assemblage consists of vessel fragments in the form of rim sherds (n = 10) and body sherds (n = 101). The artifact assemblage is further explored below.

Chipped Stone Raw Material Assemblage

The raw materials used for chipped stone tool production at 12Po340 consist of five identifiable raw materials as well as indeterminate chert, chalcedony, quartz, quartzite, and limestone. Table 2 and Figure 2 summarize the lithic raw materials by count and mass, providing a percent representation by count and mass for each raw material type. By far the most common identifiable material is Wyandotte chert (n = 233), which accounts for nearly 70 percent of the chipped stone artifacts (by count; over 50 percent by mass) identified at the site. Other identifiable raw materials present at the site include Burlington chert (n = 20), Flint Ridge chert (n = 28), c.f. Holland Dark-Phase chert (n = 4), and cf. Muldraugh chert (n = 1).

Table 1. Artifact assemblage by type and count at 12Po340. Table by Mark Doperalski.

Artifact Class, Type, and Morphology	Artifact Count
Ceramic; Fired Clay	**111**
Sherd	**111**
Body Sherd	101
Rim Sherd	10
Fire-Cracked Rock	**11**
FCR	**11**
FCR	11
Lithic; Chipped Stone	**338**
Core	**7**
Blade Core	4
Bipolar Blade Core	1
Micro Blade Core	1
Core/Biface Fragment	1
Debitage	**176**
Complete Blade	1
Complete Flake	11
Distal Blade	6
Distal Flake	9
Medial Blade	23
Medial Flake	7
Proximal Blade	8
Proximal Flake	16
Shatter	92
Split Flake	3
Tested Cobble	**2**
Cobble Fragment	2
Tool	**153**
Biface Fragment	8
End Scraper	2
Knife	1
Projectile Point	3
Projectile Point Base	1
Spokeshave	1
Utilized Complete Blade	4
Utilized Complete Flake	7
Utilized Distal Blade	27
Utilized Distal Flake	4
Utilized Medial Blade	46
Utilized Medial Flake	1

Utilized Proximal Blade	27
Utilized Proximal Flake	8
Utilized Shatter	12
Utilized Split Flake	1
Lithic; Ground Stone	**9**
Tool	**9**
Celt Fragment	1
Indeterminate Fragment	8
Grand Total	**469**

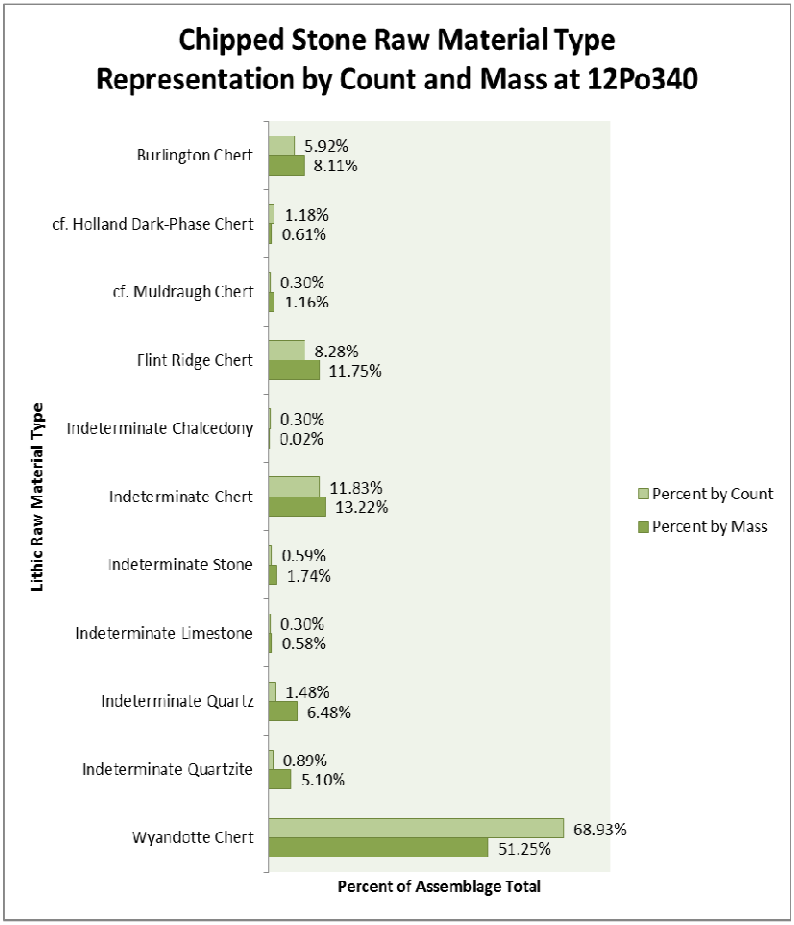

Figure 2. Chipped stone raw material type by percent count and mass at 12Po340. Figure by Mark Doperalski.

Table 2. Chipped stone raw material representation by count and mass at 12Po340. Table by Mark Doperalski.

Raw Material	Artifact Count	Percent Total Count	Artifact Mass (grams)	Percent Total Mass
Burlington Chert	20	5.92%	49.0	8.11%
cf. Holland Dark-Phase Chert	4	1.18%	3.7	0.61%
cf. Muldraugh Chert	1	0.30%	7.0	1.16%
Flint Ridge Chert	28	8.28%	71.0	11.75%
Indeterminate Chalcedony	1	0.30%	0.1	0.02%
Indeterminate Chert	40	11.83%	79.9	13.22%
Indeterminate Stone	2	0.59%	10.5	1.74%
Indeterminate Limestone	1	0.30%	3.5	0.58%
Indeterminate Quartz	5	1.48%	39.2	6.48%
Indeterminate Quartzite	3	0.89%	30.8	5.10%
Wyandotte Chert	233	68.93%	309.8	51.25%
Total	**338**	**100.00%**	**604.5**	**100.00%**

The artifact assemblage indicates a heavy reliance on local raw materials at the site. The geologic distribution of Wyandotte chert appears to be limited to Harrison and Crawford counties, Indiana and Meade, Breckinridge, and Hardin counties, Kentucky (Cantin 2008:71). Wyandotte chert can be obtained in tabular form at exposed outcrops and in nodular form at numerous stream beds and residual exposures within these counties as well as in Ohio River gravel bars. Holland Dark-Phase chert has been identified just east of Evansville at outcrops in Dubois and Spencer counties, Indiana (Cantin 2008:35-37). Muldraugh chert is geologically distributed along the Ohio River in Harrison County, Indiana (Cantin 2008:56-57).

The presence of Flint Ridge chert and Burlington chert demonstrates connections to other regions, most likely through trade. The geological distribution of Flint Ridge chert is limited to the Vanport limestone located in southeastern Licking and western Muskingum counties in east-central Ohio (DeLong 1972). The geologic distribution area of Burlington chert encompasses a large area covering southeastern Iowa, western Illinois, and northeastern Missouri (Morrow 1994:118). Burlington chert can be obtained in tabular form at exposed outcrops and in nodular or weathered tabular fragment form at numerous stream beds and residual exposures within its geologic distribution area.

Lithic Took Kit

The chipped stone tool-kit is relatively large, representing nearly half of the total chipped stone assemblage (n = 153 of 338; 45.3 percent). The tool-kit is comprised of Lowe Cluster (c.f. Bakers Creek – Figure 3:b and c) projectile points (n = 2), the base of what appears to have been a Lowe Cluster projectile point (n = 1), an unclassified projectile point (Figure 3:a) missing portions of its base (n = 1), biface fragments (n = 8), end scrapers (n = 2), a spokeshave (n = 1), utilized flakes and flake fragments (n = 21), utilized blades and blade fragments (n = 104),

utilized shatter (n = 12) and one crudely formed biface/knife (see Table 1). The Lowe Cluster projectile points are indicative of the Middle Woodland to Terminal Middle Woodland periods (Justice 1987:308-214).

Figure 3. Projectile points identified at 12Po340: a) unclassified point, Wyandotte chert (PSF 9); b) c.f. Bakers Creek point, Burlington chert (PSF 22); and c) c.f. Bakers Creek point, Wyandotte chert (PSF 23). Photograph by Mark Doperalski.

Figure 4. Bladelets identified at 12Po340: a) utilized medial blade, Wyandotte chert (PSF432); b) utilized distal blade, Wyandotte chert (PSF 408); c) utilized medial blade, Wyandotte chert (PSF453); d) utilized proximal blade, Wyandotte chert (PSF 372); e) utilized medial blade, Flint Ridge chert (PSF 263); f) utilized medial blade, Burlington chert (PSF 314); g) utilized complete blade, Wyandotte chert (PSF 69). Photograph by Mark Doperalski.

The blades identified at 12Po340, exceptionally thin in nature and often exhibiting prismoidal cross-sections, can be indicative of the Middle Woodland period, and more specifically a local manifestation of the Hopewell culture, the Mann phase (Ruby 1996, 1997). Though all the blades (and for that matter all the flakes) may have been utilized, only those that exhibited clear edge wear resulting from utilization, as observed with the aid of a 10x hand lens, were categorized as utilized and subsequently included as constituents of the tool-kit. Despite this fact, nearly 75 percent of the blades and blade fragments appeared to have been utilized (n = 104 of 142; 73.2 percent). This high rate of utilization of blades is not uncommon at Hopewell sites. In a recent study, Miller (2014:90-91) notes that nearly 100 percent of the blades (n = 65 of 66; 98.5percent) identified within the Moorhead Circle at the Fort Ancient Earthworks showed evidence of prehistoric period utilization under high-powered magnification (50x to 500x). The study also determined that blades were used to perform numerous and varied tasks such as cutting, graving, scraping, perforating, and sawing differing materials including dry hide, meat/fresh hide, bone/antler, and wood (Miller 2014:91-92). Figure 4 depicts examples of utilized blades identified at site 12Po340.

Lithic Reduction Technology

The lithic reduction technology at 12Po340 can be explored through analysis of various aspects of the chipped stone assemblage, such as presence or absence of cortex and debris morphology. These quantifiable aspects are related to the scale and intensity of reduction, and can be compared for different kinds of materials, revealing possible differences in the way in which materials were procured and utilized. The chipped stone assemblage contains a relatively high number of blades and blade fragments (n = 142 of 338; 42.0 percent). Additionally, nearly 70 percent of the chipped stone tools observed at 12Po340 were utilized blades or blade fragments (n = 104 of 153; 68.0 percent), indicating that core-blade technology was an important aspect of the lithic technological organization at the site. Blades of Wyandotte chert, Holland Dark-Phase chert, Flint Ridge chert, and Burlington chert were identified at the site.

Cores of Burlington chert, Wyandotte chert, and indeterminate quartz were identified at 12Po340 (Table 3). The assemblage contains six blade cores and one possible core of an indeterminate nature. Figure 5 depicts two of the blade cores identified at the site. Of the six blade cores, one appears to exhibit bipolar removals. This bipolar core is made of quartz material and is small in size. It is either an example of an exhausted core or was formed with the intention of micro-blade production. Another of the blade cores is a large flake of Wyandotte chert exhibiting blade removals only on the distal margin. This core also appears to have been intentionally employed in the manufacture of micro-blades.

Nearly one-fourth of the debris exhibit cortex (n = 41 of 176; 23.3 percent) and nearly one-fifth of the utilized flakes and blades exhibit cortex (n = 22 of 125; 17.6 percent). However, when considering the percent cortex present on the dorsal surface of complete flakes and blades as well as complete flake and blade tools it is observed that 63.6 percent of these artifacts exhibit zero percent cortex, 18.2 percent of these artifacts exhibit 1 to 10 percent cortex, 18.2 percent of these artifacts exhibit 11 to 40 percent cortex, and zero percent of these artifacts exhibited more

than 40 percent cortex. This indicates that overall raw material was partially reduced prior to arriving on site. A breakdown of cortex present on flake and blade artifacts among the three most highly represented identifiable raw materials identified at 12Po340 shows zero percent of Burlington chert and 10 percent of Flint Ridge chert flake and blade artifacts exhibit cortex while over 20 percent of Wyandotte chert flake and blade artifacts exhibit cortex (Table 4). This indicates that the more local material, Wyandotte chert, may have been less formally prepared prior to its arrival on site than the more exotic materials.

Table 3. Cores identified at 12Po340 by raw material type. Table by Mark Doperalski.

Row Labels	Lithic Raw Material Type			
	Burlington Chert	Indeterminate Quartz	Wyandotte Chert	Total
Bipolar Blade Core	0	1	0	1
Blade Core	2	0	2	4
Core/Biface Fragment	0	0	1	1
Micro-Blade Core	0	0	1	1
Total	**2**	**1**	**4**	**7**

Table 4. Presence of cortex on complete flake and blade artifacts by raw material type at 12Po340. Table by Mark Doperalski.

Raw Material Type	Artifacts		Total Artifacts
	Cortex Absent	Cortex Present	
Burlington Chert	10 (100%)	0 (0%)	10
cf. Holland Dark-Phase Chert	3 (100%)	0 (0%)	3
Flint Ridge Chert	17 (89.5%)	2 (10.5%)	19
Indeterminate Chert	13 (68.4%)	6 (31.6%)	19
Indeterminate Stone	1 (100%)	0 (0%)	1
Wyandotte Chert	125 (79.6%)	32 (20.4%)	157
Total	**169 (80.0%)**	**40 (19.1%)**	**209**

Table 5. Presence of shatter by raw material type at 12Po340. Table by Mark Doperalski.

Raw Material	Count
Burlington Chert	6
cf. Holland Dark-Phase Chert	1
Flint Ridge Chert	8
Indeterminate Chalcedony	1
Indeterminate Chert	19
Indeterminate Stone	1
Indeterminate Limestone	1
Indeterminate Quartz	4
Indeterminate Quartzite	3
Wyandotte Chert	60
Total	**104**

Figure 5. Blade cores, Wyandotte chert and Burlington chert (PSF 250 & PSF 383) identified at 12Po340. Photograph by Mark Doperalski.

The presence of blade cores (n = 6) as well as the presence of shatter (n = 92), utilized shatter (n = 12), and the number of debris and flake/blade tools (n = 63 of 301; 20.9 percent) exhibiting cortex suggest that blade production was carried out on site and even a minimal amount of core preparation particularly with regard to Wyandotte chert material.

Ground Stone Tool Assemblage

The ground stone tool assemblage at Site 12Po340 consists of a stone celt fragment (Figure 6) and eight fragments of indeterminate ground stone implements. Four of the fragmented pieces of ground stone implements appear to exhibit evidence of intense heat or burning and exhibit fracturing similar to that of fire-cracked rock.

Figure 6. Ground stone tool (PSF 2) identified at 12Po340. Photograph by Mark Doperalski.

Ceramic Assemblage

The ceramic assemblage consists of vessel fragments in the form of rim sherds (n = 10) and body sherds (n = 101). Agricultural activities have certainly taken their toll upon the assemblage as the largest sherds observed are scarcely larger than a thumb nail. Table 6 presents the morphology, surface treatment, and temper/inclusions of each of the 111 ceramic vessel fragments. It should be noted that an attempt was not made to determine whether sand was naturally occurring within the clay body nor was an inclusion abundance estimate applied to any of the other tempers/inclusions noted in Table 6. It should also be noted that when limestone was identified solely based on characteristic voids left behind by leached limestone, the designator "limestone-l" was used as opposed to when limestone was visually observed in the sherd in which case the designator "limestone-o" was used. The analysis of temper/inclusions was conducted macroscopically with the aid of a 10x hand lens and it should be noted that hydrochloric acid was not used to confirm the presence of visually observed limestone.

Table 6. Ceramic artifact assemblage by morphology, surface treatment and temper at 12Po340. Table by Mark Doperalski.

Artifact Morphology, Surface Treatment, and Temper/Inclusions	Artifact Count	Sum of Weight (g)	Average Thickness (mm)
BodySherd	**101**	**159.1**	**5.46**
Cord-Marked	**26**	**51.5**	**5.69**
Grit & Grog	2	1.6	4.53
Grit & Sand	2	6	6.76
Grit, Grog, & Limestone-l	2	2.7	5.91
Grit, Grog, & Sand	3	6.3	5.61
Grit, Grog, Limestone-l, & Sand	2	5	4.92
Grit, Limestone-o, & Sand	1	1.9	3.92
Grog	1	1.3	8.01
Grog & Limestone-l	1	2.7	6.30
Grog & Sand	9	20.9	6.15
Grog, Limestone-o, & Sand	1	1	3.85
Limestone-l & Sand	2	2.1	4.69
Plain; Smoothed-Over	**73**	**107.2**	**5.42**
Grit	2	2.1	5.55
Grit & Grog	12	18.1	5.55
Grit & Sand	1	1.2	6.73
Grit, Grog, & Sand	5	6.9	5.89
Grit, Limestone-l, & Sand	2	2.8	6.03
Grog	13	11.9	5.04
Grog & Limestone-l	3	4.3	5.47

Grog & Limestone-o	1	0.8	5.57
Grog & Sand	14	27.1	5.48
Grog, Limestone-l, & Sand	15	24.6	5.32
Grog, Limestone-o, & Sand	1	2.6	5.74
Limestone-l & Sand	2	2.2	4.27
Sand	2	2.6	5.53
Not Observed; Exfoliated	**1**	**0.2**	**3.02**
Grit, Grog, & Sand	1	0.2	3.02
Not Observed; Too Small	**1**	**0.2**	**4.90**
Sand	1	0.2	4.90
RimSherd	**10**	**24.3**	**6.70**
Cord-Marked	**1**	**2**	**5.99**
Grog, Limestone-l, & Sand	1	2	5.99
Plain; Smoothed-Over	**9**	**22.3**	**6.78**
Grit, Grog, & Sand	1	1.8	5.44
Grit, Grog, Limestone-l, & Sand	1	3.9	6.20
Grog	1	1.7	5.76
Grog & Sand	4	9.8	7.97
Grog, Limestone-l, & Sand	1	2.5	5.57
Sand	1	2.6	6.14
Grand Total	**111**	**183.4**	**5.57**

Figure 7. Ceramic rim sherds identified at 12Po340: a) cord-marked surface treatment with grog, limestone-l, and sand temper (PSF 448.3); b) plain, smoothed-over surface treatment with grog and sand temper (PSF 131). Photograph by Mark Doperalski.

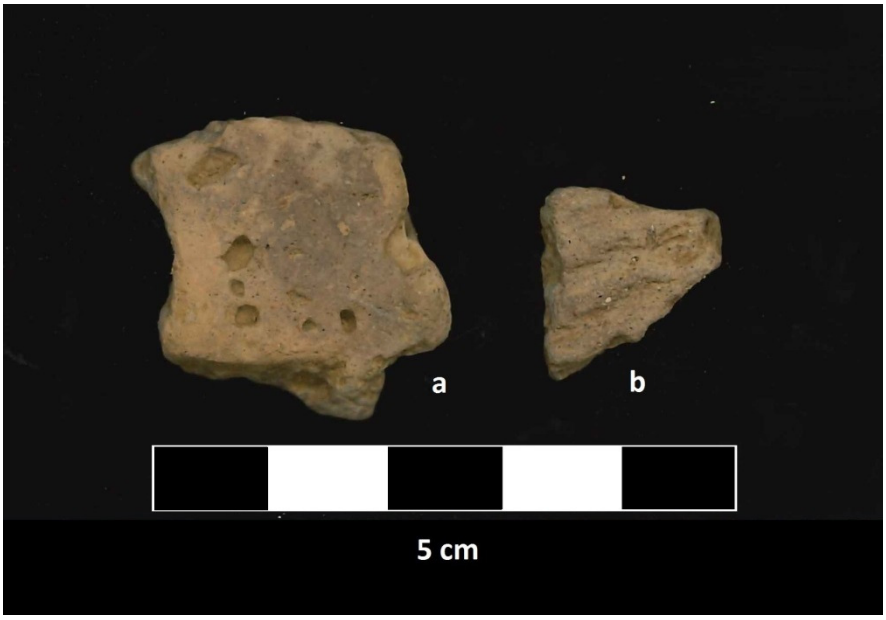

Figure 8. Ceramic body sherds identified at 12Po340: a) plain, smoothed-over surface treatment with grog, limestone-l and sand temper (PSF 331); b) cord-marked surface treatment with grog, limestone-o, and sand temper (PSF 134). Photograph by Mark Doperalski.

Of the ten rim sherds, one exhibited a cord-marked surface treatment and nine exhibited a plain, smoothed-over surface treatment. Figure 7 provides examples of rim sherds at 12Po340 exhibiting each of these two types of surface treatments. The single cord-marked rim sherd exhibited grog, limestone-l, and sand temper/inclusions while the nine smoothed-over rim sherds exhibited a range of differing tempers/inclusions as indicated in Table 6. Of the 101 body sherds, 73 exhibited a smoothed-over surface treatment and 26 exhibited cord-marked surface treatment. The surface treatment exhibited by the remaining two body sherds could not be observed due to either being too small of a fragment or having incurred excessive exfoliation. Figure 8 provides examples of body sherds at 12Po340 exhibiting each of these two types of surface treatments. The body sherds exhibited a range of differing tempers/inclusions as indicated in Table 6.

Ruby (1993:9) notes that,

> Mann phase ceramics are predominantly thin-walled cord-marked and plain subcoidal jars often with restricted necks and notched lips, and tempered with grog (60%), limestone (28%) and grit (12%). Of these attributes, vessel wall thickness, (averaging ca. 4-6 mm), grog and limestone tempering, and notches placed on the superior lip surface are most useful in distinguishing Mann phase components from other Middle Woodland cultural manifestation in the region (these include Crab Orchard tradition).

Though the use of microscopy (25x or higher), hydrochloric acid, and inclusion abundance estimates during future investigations of the ceramics at 12Po340 would likely produce more refined conclusions regarding temper/inclusions as demonstrated by Greenan and Mangold's (2016) recent study of clay figurines at the Mann site (12Po2), the current observations regarding temper at 12Po340 should be adequate for comparison with the characterization of other ceramic assemblages. The ceramic assemblage identified at 12Po340 corresponds well with Ruby's (1993:9) characterization of Mann phase ceramics. The sherds observed at 12Po340 exhibit exclusively cord-marked or plain, smoothed-over surface treatment and 91.9 percent (n = 102 of the 111) of the sherds exhibit grog and/or limestone temper/inclusions. The overall average thickness of the body sherds observed at 12Po340 is 5.46 mm with 64 of the 101 body sherds falling within Ruby's (1993:9) 4-6 mm average range and another 27 falling within 1 mm of that range leaving only 10 of the body sherds exhibiting a thickness beyond 1 mm of the 4-6 mm average range. This data in conjunction with the diagnostic lithic artifacts observed at 12Po340 suggests it is likely the ceramic assemblage is associated with the Middle Woodland period and more specifically the Mann phase.

Historic Context

Radiometric dates are not available for 12Po340; however, the Lowe Cluster projectile points and the exceptionally thin blades exhibiting prismoidal cross-sections in conjunction with the thin-walled, plain and cord-marked vessel fragments tempered largely with grog and limestone are indicative of the Middle Woodland period (200 B.C. to A.D. 600), and more specifically a local manifestation of the Hopewell culture, the Mann phase.

Site Type and Function

Based on Ruby's (1996) definitions of Mann phase settlements, this site appears to represent a hamlet. Hamlets, the second most numerous Mann phase site type, are characterized by utilitarian ceramics (thin-walled, grit, grog, and limestone tempered, cord-marked and plain), Lowe Cluster projectile points, thin lamellar blades, a wide-range of lithic tool types and debitage, middens, shallow basin-shaped pits, and postholes[3] (Ruby 1993, 1996). Hamlets appear to represent small-scale occupations exhibiting shallow basin-shaped pits indicative of food-processing rather than storage. Hamlets are generally limited to bottomland settings, which is the single aspect of Ruby's (1996) definition of a Mann phase hamlet that does not seem to match the findings at 12Po340 as the site is located on a late Wisconsinan loess-capped high terrace.

Stone tool work focused on blade production, utilization, and subsequent discard with a much smaller focus on bifacial tool production. The raw materials used for chipped stone tool

[3] Though middens, pits, and postholes were not identified at 12Po340 during the archaeological survey, based on the size and character of the artifact assemblage such features were almost certainly part of the site prior to the impacts of agricultural activities if they do not yet remain extant below the plow zone. More extensive investigation in the form of formal excavation units, magnetometry, and/or mechanical stripping would need to be conducted to ascertain if such features are present below the plow zone.

production at 12Po340 consist of five identifiable raw materials as well as indeterminate chert, chalcedony, quartz, quartzite, and limestone. By far the most common identifiable material is Wyandotte chert (n = 233), which accounts for nearly 70 percent of the chipped stone artifacts (by count; over 50 percent by mass) identified at the site. Other identifiable raw materials present at the site include Burlington chert (n = 20), Flint Ridge chert (n = 28), c.f. Holland Dark-Phase chert (n = 4), and c.f. Muldraugh chert (n = 1). The artifact assemblage indicates a heavy reliance on local raw materials at the site. The presence of Flint Ridge chert and Burlington chert demonstrates connections to other regions, most likely through trade. Analysis indicates that the more local lithic raw material, Wyandotte chert, may have been less formally prepared prior to its arrival on site than the more exotic materials. The presence of blade cores (n = 6) as well as the presence of shatter (n = 92), utilized shatter (n = 12), and the number of debris and flake/blade tools (n = 63 of 301; 20.9 percent) exhibiting cortex suggest that blade production was carried out on site and even a minimal amount of core preparation particularly with regard to Wyandotte chert material.

No direct evidence of seasonality during which the site was occupied was observed. The location of the site on a high terrace overlooking the Ohio River suggests that proximity to water resources, fertile soils, nut and sugar producing trees, and a vast transportation corridor could have been a factor in site selection making it a relatively plentiful location for resource procurement and opportune place along a major trade route. However, it seems that close proximity to a large Hopewell ceremonial center, the Mount Vernon Site (12Po885), may also have been an important factor in site location. Evidence of food procurement and preparation were not observed at the site, although agricultural activities may have destroyed organic remains including faunal material.

Discussion

As discussed in the preceding section, site 12Po340 appears to represent a Mann phase hamlet. A review of records maintained at the DHPA indicates that the majority of comparable Mann phase sites were identified or revisited as part of Ruby's (1993) *An Archaeological Investigation of Mann Phase Settlement Patterns in Southwestern Indiana*. As part of his investigation, Ruby (1993) noted the identification of 50 small-scale habitation sites (what he would later reclassify as hamlets) in Gibson, Posey, Spencer, Vanderburgh, and Warrick counties. These sites are defined by the presence of Mann phase ceramics in combination with Lowe Cluster projectile points and/or lamellar blades or blade cores (Ruby 1993:57). Unfortunately, few sites exhibiting a Mann phase hamlet component have been intensively investigated and reported. Several that have include the Grabert (12Po248), Martin (12Vg41), Hovey Lake (12Po10), Kuester (12Vg71), and Ellerbusch (12W56) sites (DHPA 2007b, 2007c, 2007d, 2007e, 2007f; Ruby 1993). Investigations at these sites have consistently identified thin middens, scattered postholes, and shallow basin-shaped pits containing fire-cracked rock (Ruby 1993:57). Two of these sites, the Grabert and Martin sites, are also characterized by conical mounds. Interestingly the original

1978 site report for 12Po340 notes that features were present and visible at the site (DHPA 2007a) suggesting that 12Po340 may also have exhibited similar surficial features as noted for the Grabert and Martin sites that are no longer visible due to intensive agricultural activities over the subsequent 35 years.

The Mann phase artifact assemblages identified at the Grabert, Martin, and Ellerbusch sites have been described in detail (DHPA 2007b, 2007c, 2007d; Ruby 2003) and compare well the assemblage identified at 12Po340. It should be noted that the Grabert and Martin sites as well as 12Po340 appear to be single component Mann phase sites; whereas, the Ellerbusch site exhibits a Middle Mississippian period Angel phase component in addition to a Mann phase component. All four sites exhibit Lowe Cluster projectile points, lamellar blades, and blade cores. The observed 12Po340 chipped stone assemblage contains three Lowe Cluster projectile points, six blade cores, and is dominated by blades and blade fragments. Ground stone tools are also a common element across all four site assemblages. Additionally, all four of these sites are noted to exhibit thin-walled grog and limestone tempered plain and cord-marked ceramics. The Grabert site and 12Po340 also were found to have thin-walled grit-tempered ceramics and the Grabert and Ellerbusch sites exhibited complicated stamp ceramics. The ceramics identified at these four sites certainly correspond well with Ruby's (1993:9) characterization of Mann phase ceramics. As noted earlier, the overall average thickness of the body sherds observed at 12Po340 is 5.46 mm with 64 of the 101 body sherds falling within Ruby's (1993:9) 4-6 mm average range and another 27 falling within 1 mm of that range leaving only 10 of the body sherds exhibiting a thickness beyond 1 mm of the 4-6 mm average range. Conversely, the Crab Orchard tradition ceramics from the Yankeetown (12W1) site exhibit an average thickness of 8.6 mm (Ruby 1994:40).

At this time, little is known regarding the subsurface patterning and integrity of the archaeological deposits at 12Po340. Site 12Po340 would certainly be a good candidate for magnetometry as it has the potential to contain subsurface features similar to those identified at the Martin site where magnetometry was used to more directly inform subsurface patterning and integrity than that based solely on controlled surface collections and limited shovel testing. Based on subsurface deposits identified at comparable Mann phase sites such as the Grabert site, it is certainly conceivable that subsurface features such as postholes, middens, and shallow basin-shaped pits with fire-cracked rock may remain intact below the plowzone at 12Po340.

There appears to be a strong correlation between Mann phase hamlets and highly productive terrace and floodplain soils of the Wabash and Ohio river valleys. Ruby (1993) found that many of these sites fall within active flood plains or low terraces precluding year round occupation, which indicate that Mann phase settlement centered on extended family units that would disperse into lowland habitats during the flood-free warm season. Site 12Po340 is situated on a high terrace of the Ohio River as are the Grabert and Hovey Lake sites; whereas the Martin and Ellerbusch sites are located on low terraces of the Ohio River and the Kuester site is located in the floodplain of the Ohio River (DHPA 2007b, 2007c, 2007d, 2007e; Munson 1998). Located near the terrace-upland interface, site 12Po340 is situated on well-drained Alford soils with the fringes of the site reaching highly fertile and poorly-drained Evansville soils (McWilliams 1979). This location would have allowed the site inhabitants the advantage of a variety of soil properties

to mitigate for the effects of environmental variability upon agricultural crops. The location would also have allowed for access to a variety of wild plant food resources (Green 1984:441-446; Homoya et al. 1985:257-258); Lindsey et al. 1969; McWilliams 1979). Future investigations at the site should employ measures aimed at collecting data on botanical remains to determine the exploitation of wild and domestic plant resources at this site.

Significance and Recommendations

Under Criterion D of the NRHP, an archaeological site is considered significant, and thus eligible for listing in the NRHP, if it has the potential to answer important research questions. Other factors in determining the eligibility of a site can include the site's relationship to other similar sites and the site's function with regard to resource procurement patterns and socio-political settlement patterns. Though the NRHP eligibility of site 12Po340 remains un-determined, a site such as 12Po340 has the potential to reveal important information regarding the local manifestation of Middle Woodland period Hopewell culture and may be a constituent of the greater Hopewell ceremonial landscape. No intact archaeological features (e.g., middens, postholes, activity areas, etc.) were identified at the site during the archaeological survey work; however, more extensive archaeological investigation, including the use of magnetometry, will be necessary to determine if such resources have survived below the plow zone and if the site is eligible for listing in the NRHP. If such features and deposits remain intact at 12Po340, the site would have the potential to render information further illuminating Middle Woodland period lifeways at a Mann phase hamlet in close proximity to a major Hopewell ceremonial center.

The archaeological investigation conducted in 2014, as part of the permitting process for a proposed development project, resulted in a recommendation that impacts to 12Po340 be avoided through the strategic placement of project components beyond the boundary of the site. It was also recommended that 12Po340 be protected during construction through the use of exclusion fencing. The project proposer agreed to implement these recommendations; and therefore, no direct impacts to 12Po340 are expected as a result of the project.

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A MISPLACED NEIGHBORHOOD: INVESTIGATING THE PEOPLE AND STRUCTURES MISSING FROM THE WEST WASHINGTON DISTRICT, SOUTH BEND, INDIANA

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Abstract

Sometimes, archaeology illuminates the history of "big men." This article narrates the history through archaeological investigation of one city corner in South Bend, Indiana, and the contribution of the businesses that occupied it in the city's most formative years. Manufacturing successes within South Bend such as the Oliver Plow Works, and Studebaker, are well known and researched. What is less well known are the supporting businesses and people that made up the representative sample of this influential city. This article sheds light on the establishment, growth, and community influence of the businesses it housed, supported by extensive archival research, and recovered artifacts. A humble tinsmith became the proprietor of the area's largest hardware and lumberyards. A German immigrant and his friend established one of the area's largest and longest-running grocery stores that would propel both families into more prosperous circles. Elite families blended interests, forming a neighborhood.

History Is Written, but Also Erased

Sometimes, archaeology and history illuminate the lives and actions of those with the most power. They own the most goods, have the biggest houses, and seem to have the strongest influence over others. The maxim that "history is written by the victors" applies to the business world as well as the world of politics and wars. Historical documentation is a very deliberate system of record keeping, with elaborate discussions written of the prosperous bankers, industrialists, and merchants. Commercial industry successes within South Bend such as the Oliver Chilled Plow Works and Studebaker Brother Manufacturing Company are well known and researched (e.g., Bonsall 2000; Howard 1907; Palmer 2003; Young 1922). There are books written both of and at the founding of South Bend with titles like *South Bend and the Men Who Have Made It* (Anderson & Cooley 1901) and subtitles that celebrate *Biographies of Many Prominent Men of Northern Indiana* (Godspeed Brothers 1893). But those who do not have the most goods, the biggest house, the strongest influence are left silent. They have no biographers, and as such, they leave no historical mark.

Sometimes the lives of the everyday people can be erased in addition to being ignored. This seems to be the case at one city corner in South Bend, Indiana. During archaeological excavation conducted by IU South Bend in the summer of 2015 at site 12-Sj-0497 (see Figure 1), it was found that buildings in an entire block were razed in a very short window of time (Finnigan and VanderVeen 2016). In the attempt to flatten part of a neighborhood, the contributions of the businesses that occupied it were at risk of being lost forever. Without their buildings, and the potential for the resulting loss of artifacts, these people who were not as distinguished in the business and civic fields were all but removed from the archaeological record. Little evidence existed of the supporting businesses and business people that made up the representative sample of a city. This article investigates the establishment, growth, and community influence of the businesses that the missing neighborhood housed, supported by extensive archival research and recovered artifacts. As it turns out, a German immigrant and his friend established one of the area's largest, and longest-running grocery stores that would propel both families into more prosperous circles. Elite families blended interests forming a vibrant if short-lived neighborhood. The West Washington neighborhood was one of gaslights and trolley cars, nouveau-rich, and the fruits of American industrial expansion in the early 1900s. The mansions and extant structures in the district are recognized on the National Register of Historic Places. Contributions from the wealthy helped build opera houses and churches, but it was the corner businessmen that formed the heart and soul of South Bend.

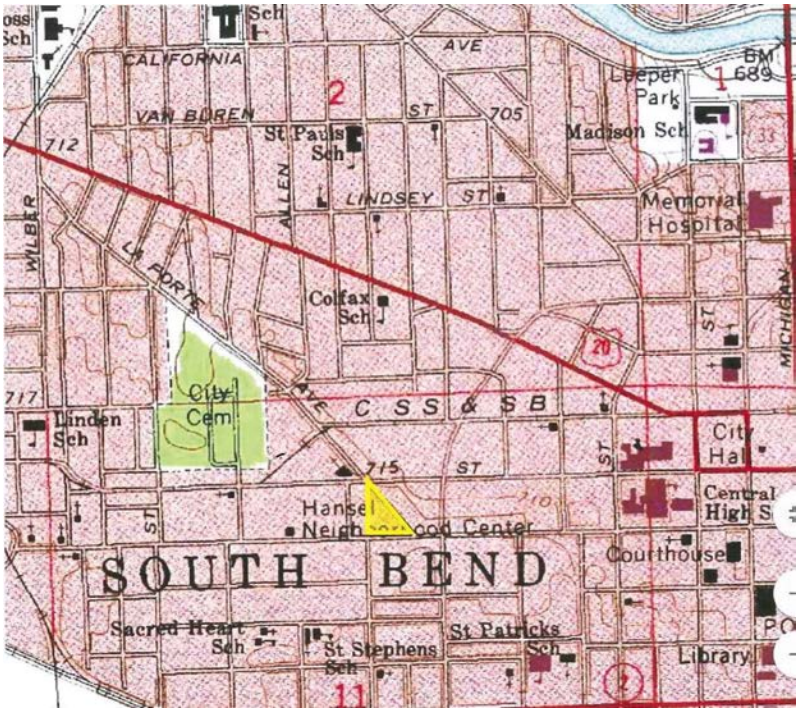

Figure 1. Detail of South Bend West, Ind. 1:24000 topographic map, showing Section 11. Site 12-Sj-0497, highlighted here with a triangle, is on the northwest corner of La Porte Ave and West Washington Street (not labeled).

The "Triangle Lot" had only a brief period of commercial significance but it possess historical value all the same. Named because of its three-sided shape, it lies in the heart of the West Washington neighborhood, standing out as being a rare undeveloped plot of land on the northwest corner of LaPorte Avenue and West Washington Street in South Bend, Indiana, an area mixed with 19th century Victorian homes and mansions (Figure 2). Now owned by the History Museum of South Bend, the Triangle Lot was previously controlled by the prestigious Oliver family of South Bend. Prior to that, it was occupied by a corner grocery, meat market, and transitory businesses such as a tinsmith and cobbler (Sanborn Map Publishing Company 1875-1949). The grocery and other businesses stood on this corner from the initial settlement of the city. A pair of South Bend businessmen, Solomon Fox and Frank Baker, started their grocery business here shortly after, and they enjoyed some success until the Olivers built their beautiful mansion, known as "Copshaholm" across the street, at 808 West Washington in 1895-1896 (Figure 3).

Figure 2. Aerial image of the 900 block of West Washington/Site 12-Sj-0497, showing approximate locations of excavation units A-H. (Source: "West Washington Street, South Bend, Indiana." 41˚40'34.99" N 86˚15'45.86" W. Google Earth. 13 October 2016.)

Figure 3. The Oliver family house, called "Copshaholm." (Photograph by author VanderVeen.)

Sometime between April 1903 and October 1904, the Olivers purchased the Triangle Lot across from their new home and, according to the curator of Copshaholm, had the buildings torn down and plowed under because they "did not like the view" (Kristie Erickson, personal communication 2015). After the buildings were destroyed, the lot remains vacant to the present day. The docents at the History Museum of South Bend explain on the tours of Copshaholm that the family had initially intended for the lot to be a garden area for their daughter Gertrude, but their plan was never completed. In 1987, Gertrude, the last remaining child of industrialist Joseph D. Oliver, passed away. Her family turned the mansion, as well as the vacant Triangle Lot across the street, over to the Northern Indiana Historical Society, which operates the History Museum and Copshaholm. The History Museum has been using the land intermittently as an overflow parking area for large events they host. The vacant lot, however, is not without value as a landscape (Anschuetz et al. 2001). As it exists now, it is used as a short cut between streets, a place for neighborhood children to play, and even hosts a block party or yard sale every now and again. Because it was never developed after the initial razing of the buildings, the property has also become a preserved snapshot of a period that could be explored archaeologically. Although the built environment was struck from history, we were able to explore the story of the families and businesses that occupied this lot, as well as demonstrate that a motive behind the Oliver family's purchase and demolition of structures on the land was possibly due to a personal conflict between the grocery owners Solomon Fox and Frank Baker, and the plow manufacturing

Olivers. In a sense, although history was written by the victors, we can see a rough draft that tells a different tale.

Evidence into the past can come from biographies and memoirs and archived business records, but it can also be interpreted from maps, directories, and the archaeological record. For the reconstruction of the lives of the more humble citizens of South Bend, we relied heavily on a combination of the latter three. For instance, business owners would purchase insurance on their buildings before the advent of municipal fire departments. The maps would show all the structures in the area, not just those of the people who were paying, because knowing details about neighboring buildings is as important as recognizing the risks within one's own when it comes to the spread of fire. There are a number of maps of the neighborhood compiled by the Sanborn Company to assess damage liability, and they provide structural details and describe building use patterns over many decades. From these maps (Sanborn Map Publishing Company 1875-1949), we can place now missing buildings back on the property and view what was added, modified, and then taken away. In much the same way, city directories provide an objective view of commercial history. They can be used to determine what businesses were located where, even if that business is a cobbler or tinsmith or another humble profession. As long as there was a need, from sewage removal to laundry and tailoring, customers would find someone willing to provide that service. The directories of South Bend companies date as far back as 1867 and were published by Farr's (Tribune Printing Co. 1883, 1886, 1889), Hibbard's (South Bend & Mishawaka Directory Company 1901, 1905, 1908), Holland's (Western Publishing Company 1867), Hupp and Greene (1881), and (most famously) Polk's City Directory (Polk and Company 1921, 1925, 1926). Each was referenced to find names and addresses that were not recorded in the histories of South Bend.

Humble Beginnings

Neither Solomon Fox nor Frank Baker were born into elite families like their neighbors the Studebakers or the Olivers. Little is known of the early lives of either man. Solomon Fox was born 25 October 1848 in Nova, Ohio to German immigrants. He moved to South Bend in 1869, and he was working as a clerk at the J.C. Knoblock & Co. grocery at 116 West Washington in 1877. Fox boarded at various locations during his time as a clerk (*South Bend Tribune,* 28 July 1931). On the other hand, the grocery's owner, John Knoblock, was among the early South Bend elite. Known for being one of the first, and most successful grocers, Knoblock followed several paths that led to him being seen as an innovator and public servant. In 1865, he started the first wagon delivery service in the city and employed the first "cash girl" in South Bend. He also had the first gas piped into his residence. He served for four years as county commissioner and went on to became president of the Miller-Knoblock Electric Company, which manufactured electrical appliances, as well as the treasurer of the St. Joseph County Savings (Anderson & Cooley 1901). With his brother William, he later became one of the primary stockholders of the South Bend Chilled Plow Works, the only competition to the Oliver Chilled Plow Works. He has been

described as "one of the millionaires of the city," and occupied a beautiful home on the corner of Market and Lafayette Streets, placing him among the top of the elite families in the area who would make the West Washington district their home (Robinson 2003: 48). Knoblock Street in South Bend is named after the family.

In 1881, Knoblock sold his grocery business to William H. Oren. Like the Knoblocks and Solomon Fox, William Oren was born to German immigrants, and was a successful South Bend businessman throughout his life. As a young man, William Oren worked as a clerk in a grocery in his hometown of Pottsville, Pennsylvania, before moving around the country, finally settling in South Bend in 1880. Arthur D. Baker (no relation to Frank Baker) was another West Washington Street businessman of esteem. Although he was a partner of the Oren and Baker grocery, Baker was little involved with the business. Instead, he focused on his duties as treasurer of the Knoblock's South Bend Chilled Plow Company (Godspeed Brothers 1893), one of two plow works in the city at the time.

Arthur Baker's position in the offices of the Olivers' competitor ensured the grocery remained under the influence of the Knoblock family, despite the transfer of the business name to Oren and Baker. At this time John Knoblock served as Vice President of the South Bend Chilled Plow Company, while William was the President. The Knoblocks were extremely astute and diversified businessmen, keeping multiple revenue streams spread throughout varied family members and relative associations. A generation later, in 1925, John B. Oren, William Oren's son, would serve as Secretary/Treasurer of the South Bend Chilled Plow Company, indicating that familial ties to these businesses were incredibly strong and interwoven in early South Bend culture. The familial and business bonds soon grew when Solomon Fox, clerk at the Oren and Baker grocery, married Liesetta Knoblock, in June of 1877 (Indiana Genealogical Society 2016). Liesetta was the daughter of William Knoblock and the niece of the owner of the Oren and Baker grocery. The newlywed Mrs. Fox would not be married to a simple grocery clerk for long, however. Soon, Solomon Fox opened Fox and Baker grocery with Frank Baker. The timing of the Fox and Baker grocery suggests very strongly that Solomon Fox was able to do so with financial support from his millionaire father-in-law.

The other half of "Fox and Baker" was Francis M. (Frank) Baker, born in Brooklyn, New York on December 13, 1845 (*South Bend Tribune* 1933). Virtually nothing is known of his early years, and Baker seemed to have lived a much less public life than Solomon Fox would. According to the U.S. Census, Frank Baker lived to South Bend at least as early as 1870, and, like Fox, stayed in boarding homes for several years at first. In 1875, Baker opened a small bakery and confectionary on East Water Street (now named LaSalle Street), and he lived in a room above. City restructuring caused the address at his Water Street storefront to change several times over the years, although it eventually settled on 428 East Water. This placed his business directly across from the East Race, and very close to the city center, where Oren and Baker's grocery was located. The First Presbyterian Church, located first at 101 S. Lafayette, then congregating at 333 West Colfax Avenue was the home church for not only Solomon Fox and Liesetta Knoblock, but for Frank Baker and the Olivers, as well. One assumes that normal church fellowship would have led these families to intimately know each other and their businesses to a strong degree.

The West Washington Neighborhood

Just south of Water Street, where Frank Baker's bakery overlooked the industrious East Race, ran Washington Street. In the downtown area, at 116 Washington, stood Oren and Baker's popular grocery, which, like Frank Baker's establishment, is now long gone and is paved over into a large parking lot. If this area served as the heart of the town, the richest blood was flowing west down Washington Street. Magnificent Victorian homes and mansions were being built in this area to support the wealthy families beginning their fortunes and legacies in this emerging town.

The Fox and Baker grocery stood at 901 West Washington. It was the easternmost building on the Triangle Lot of land that held 901, 903, and 909 West Washington, and it was located on the prominent corner lot position. 901 West Washington was also the first building built on the block (Sanborn Map Publishing Company 1875-1949). Unfortunately, very little is known of the actual buildings that Fox and Baker made their business. No tax or property assessment records exist from that time period, having been destroyed by the township assessor's office in the 1950s. There are no known photographs, and no physical descriptions of the buildings found in any advertisement or surviving papers. From the scale listed on the Sanborn maps, the building was two stories tall, approximately thirty meters long, and approximately 10 meters wide (Figure 4). Early Sanborn maps show that the grocery was built of brick, and the archaeological evidence supports this. A large amount of whole bricks and brick debris was found during our excavation. The masonry appears to be "Notre Dame brick," a distinctive yellow brick that make up the first buildings on the University of Notre Dame campus, made from sand from the lakes on the campus property (Allen 2015). These bricks were very popular at the time, and they were used in a number of early building projects across South Bend, especially in the West Washington neighborhood. Few buildings remain in town featuring this type of brick, and they have not been made in over one hundred years.

As drawn on the Sanborn maps, 901 West Washington was a corner lot, angled with its front door toward the corner, in a style distinctive to Chicago and some New Orleans architecture. Historical research provides no other descriptive information about the building proper, aside that it had an apartment on the upper floor. William Fox Jr., the great-grandson of Solomon Fox, stated that the only thing he knew about his great-grandfather was that he

> . . . owned a grocery. My grandfather told me he had this huge safe in the back, where, every night, at the end of the workday, merchants in the area would come give him their money to keep in his safe. The next morning, they would come get it, as it seemed they trusted him more than the banks [William S. Fox, Jr., personal communication 2015].

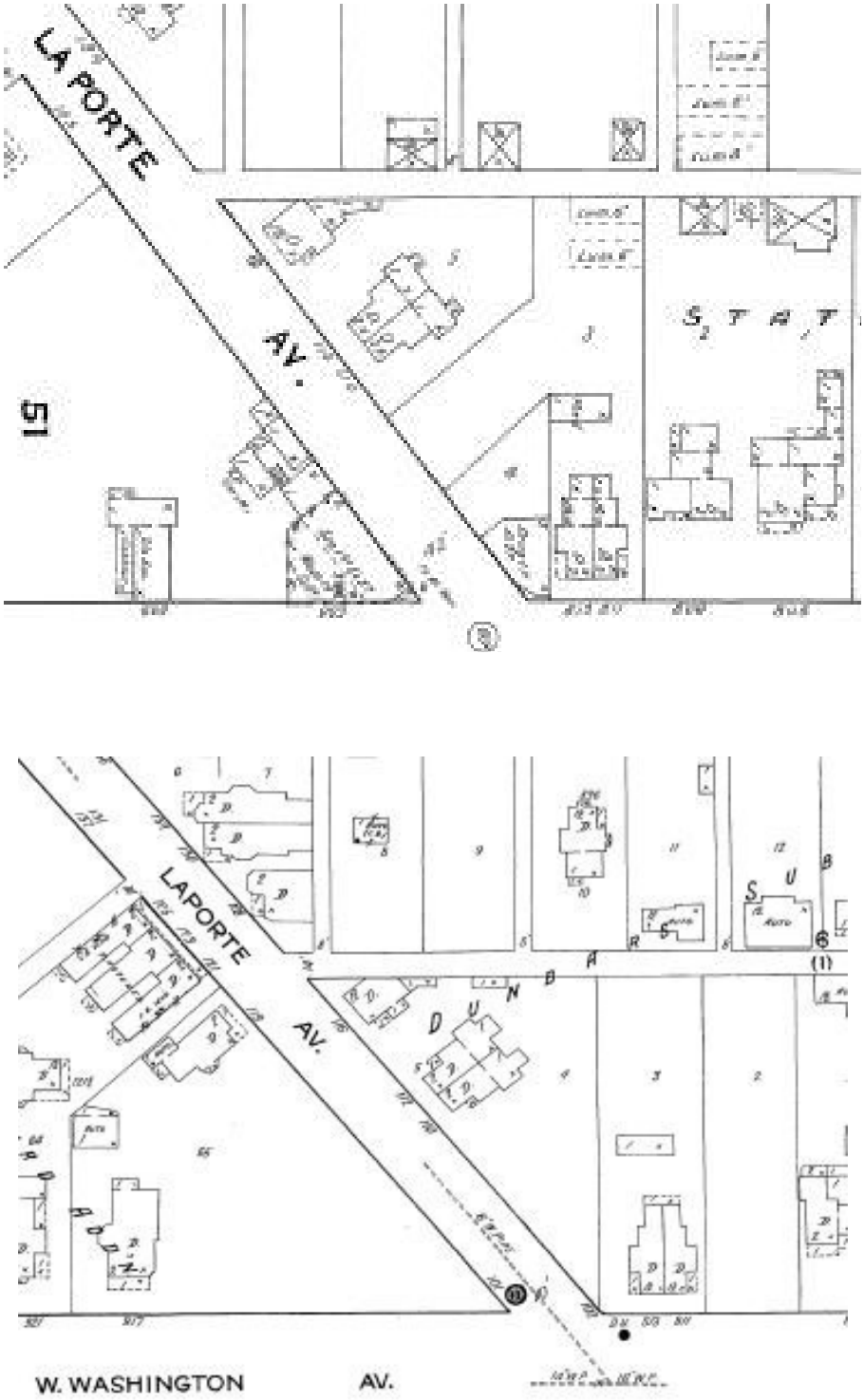

Figure 4. Details of fire insurance maps (Sanborn Map and Publishing Company 1875-1949) showing the property at the corner of LaPorte and Washington in 1891 (above) and 1917 (below).

This story cannot be verified, but it seems that Frank Baker, and to a greater degree, Solomon Fox, had an expansive and powerful network of business associates. Later ventures indicate that Fox had acquired an admirable reputation, and he was considered quite trustworthy. Archaeological evidence of the safe is inconclusive, but a large D-shaped handle was found with a heavy bolt protruding from the bottom of it (Figure 5). A large nut was screwed onto the distal aspect of the bolt, and if it had been tightened with the bolt running through something, it would have left a large amount of space for a thick timber or support beam. A small section of chain with incredibly thick links was attached to the D-ring, suggesting something very large and valuable was chained and bolted to something else quite substantive. This D-ring was found where the back left corner of the store would have been, very near an area where we found direct evidence of an incinerator that was well-used. In fact, the incinerator may be related to the adjacent smokehouse, tying the many uses of buildings on the block together.

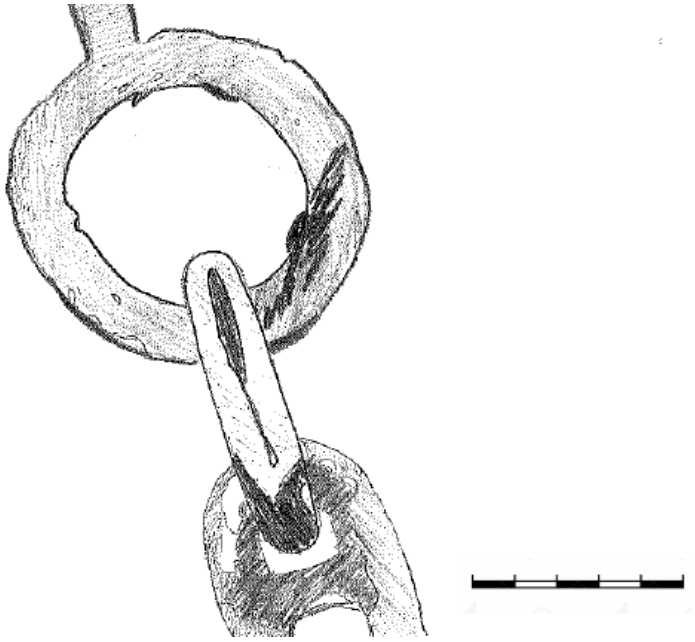

Figure 5. Detail from a drawing of metal ring and chain link from Unit D, approximately 120-130 cm below surface. The ring ends in a threaded rod and nut (too corroded to photograph well) and any remaining chain links were absent. (Drawing by author VanderVeen.)

Although the most successful tenants, Fox and Baker were not the first to occupy the grocery. The first proprietor at 901 West Washington was J.W. Taylor, who appears at that address in city directories dating to 1882 (Hupp and Greene 1881). Taking over for him in 1883 was Robert Clement Crawford (Tribune Printing Co. 1883). In 1884 or 1885 Clem Crawford opened a butcher shop directly next door to his grocery (Tribune Printing Co. 1886). Sanborn maps show a smokehouse attached to the back end of the grocery, and it is likely that Crawford provided smoked meats in the 901 West Washington storefront before expanding to a separate building next door at 903 West Washington. Frederick E. Wentzel began renting that butcher storefront in 1885 (Tribune Printing Co. 1886), and also lived above it, apparently in a second floor, although there is no surviving documentation to support or deny the existence of an upper-level apartment. The atmosphere of a late-1800s meat market and ventilation technologies of the time suggest heavily, however, that there were separate floors for living quarters from the butcher shop.

The late 1880s saw a very tumultuous time of tenant movement for the 900-block of West Washington Street. Clem Crawford abandoned his grocery management in 1886 or 1887 (Tribune Printing Co. 1889). Charles A. Miller took over his grocery business, but stayed there for only about a year (Tribune Printing Co. 1889). A new building was built in 1887 on the Triangle Lot that would become 909 West Washington, approximately twenty-five meters west from the meat market at 903. Its first owners were E.C. Chapman, a druggist, and Amandus H. Shelt, a barber who also sold cigars and tobacco out of their mutual establishment (Tribune Printing Co. 1886). They were gone, however, in 1889, when the anchor grocery at 901 West Washington got its final, and most productive, proprietors (Tribune Printing Co. 1889).

Fox and Baker Grocery

The Fox and Baker grocery was run by two men seasoned in the field. Solomon Fox was forty-one when he heard of the vacancy for a grocer at 901 West Washington (*South Bend Tribune* 1931). Although the site of his home is now a parking lot (in fact, every building where Fox is known to have worked is now paved over), he lived next door to the Olivers at the time, and this area was among the upper class in the 1880s. Whether Fox lived there from exceptional financial management and savings abilities, or from monetary assistance from his Knoblock in-laws, we cannot be sure; but it seems that after his marriage to Liesetta Knoblock, Fox demonstrated strong financial capabilities.

From the dates on the gravestones at Riverview Cemetery in South Bend, it is clear that Solomon Fox expanded his family soon after marriage. Solomon and Liesetta had two children at the time the 901 West Washington vacancy came around; Josephine Fox, born in October 1878, and Elmer Lee Fox, born in March 1881. Their third, and final child, Horace W. Fox, would be born nine years later. While Frank Baker had yet to have children with his new bride, he soon would. Perhaps in anticipation for a growing family, Baker partnered with Fox at some

point in 1888, and in 1889, the two formed Fox and Baker, the anchor grocery in the 901 West Washington building.

Fox and Baker each brought strengths to their initial partnership. Fox had been a clerk at Oren and Baker (*South Bend Tribune* 1931), and so he lacked business ownership experience. He did possess significant financial and social backing of his powerful in-laws. Throughout his life, Fox worked his way up throughout local business, turning each of them into successful ventures. With no known formal education, it may be that Solomon Fox simply possessed a natural ability for business that assisted him greatly, making up for his relative lack of a prestigious starting point. His experience at Oren and Baker, along with likely capital from his wealthy in-laws allowed Fox to leave Oren and Baker in 1888, and join with Frank Baker to form their own business. Combining Fox's grocery management skills and experience with Baker's entrepreneurship and ability to provide baked goods and confectionaries suggests that the Fox and Baker grocery was one of the city's premier partnerships, producing a true convenience store much like today's 7-Eleven.

Fox and Baker seemed to have taken to the South Bend grocery business like successful entrepreneurs. In addition to the sale of staples and produce, they were also landlords. In 1889, their first year as the owners of their own property, the room above 901 West Washington was rented out for the first time, to a local dressmaker, bringing a separate revenue stream with it (Tribune Printing Co. 1889). According to city directories, the two businessmen also quickly rented out the next door meat market at 903 West Washington, and the storefront at 909 West Washington to John H. Freehafer, and Nelson K. Berger, respectively. Freehafer lived at the meat market. The boarding rooms above the businesses may or may not have been fully operational or existent at the time of their building. The 2015 IU South Bend archaeological investigation indicates multiple series of construction in the form of a massive amount of nails of varying morphology (Finnigan and VanderVeen 2016). Many of the nails present with an older, square-headed and shafted type, while others show little to no corrosion, and are of the framing nail or round-headed and shafted type. While the brick is all of the yellow "Notre Dame" variety, the varying nail types suggest that the buildings were markedly retrofitted and remodeled inside after their initial erection. No boarders or roomers are found in city directories at the 901 West Washington site until Fox and Baker take possession in 1889.

Serendipitous for Fox and Baker's new business, the electric streetcar service opened down Washington Street in 1890 (*South Bend Tribune* 2015). The trolley enabled a growing public transportation system within South Bend to expand beyond horse-cars and pedestrian traffic, allowed more consumers to reach businesses, and to transport a larger amount of goods per trip. The economic advantage this brought to Fox and Baker only a year after their grand opening was extremely fortuitous, and played a key role in assisting the expanding West Washington neighborhood. The archaeological excavation on this site provided a five-cent token that may have been used for the trolley system or perhaps a nickelodeon that Fox and Baker may have had.

The 1890s were a decade where Fox and Baker solidified both their family and business names within South Bend. It appears the Fox name was being accepted into the elite families of the city, as Fox's daughter helped add a social aspect within town. The *South Bend Tribune*

wrote of Josie Fox and the social events she was attending. Young and beautiful, her trips out of town as well as social visits within town were reported. Also in the newspaper were Frank Baker's two girls, Grace and Ruth, as they grew older. The gossip and social columns of the two local newspapers printed anecdotes of the girls attending social events, as well as providing their services as lady ushers for engagements in the city (*South Bend News-Times* 1914). Meanwhile, Fox and Baker became masters at business networking. The two joined and formed local grocers' associations (Tribune Printing Co. 1898), as well as developed business and political associations that would favor them throughout the years (Figure 6). Trade journals and directories featured the two, often together, but sometimes apart. When not featured together, it was usually Solomon Fox whose name appeared, suggesting that he was the driving force behind the spread of the Fox and Baker name.

Figure 6. South Bend Grocers and Butchers Association, ca. 1890. Solomon Fox is in back row, fifth from left. Frank Baker is not pictured. (Photograph courtesy of Mary Jane Fox, originally published in the *South Bend Tribune*, date unknown.)

Solomon Fox and Frank Baker's inspiring entrepreneurialism was certainly one of South Bend's early success stories in business networking, but the Triangle Lot launched others. Nelson Berger, the druggist who occupied 909 West Washington moved across the street after Fox and Baker moved in, and later moved back to the north side of the road, this time on the west side of LaPorte, running a drug store on the corner of Washington and LaPorte in the 800 block, next to the Kizer mansion (Haynes & Co. 1916). This site was previously excavated by archaeologists from Indiana University South Bend with excellent results, including some insight into the later suffragette movement in South Bend, as evidenced by recovered hatpins and symbolic jewelry (VanderVeen and Gibson 2013). Largely considered an upper-class movement by many, the presence of a strong suffragette movement in this area is another testament to the nobility of the West Washington neighborhood at the turn of the twentieth century. After Berger moved across the street, his 909 West Washington drug store and barber shop was turned into a tinsmith's shop in 1891. First occupied by William Henry Brugger, he spent much of the 1890s at this address providing tinsmith services. By overlaying Google Maps images of the lot onto Sanborn maps of the time, the archaeological team was able to utilize extant landmarks to determine the approximate locations of these buildings. In the area of Brugger's tin shop, a tin spoon was recovered (Figure 7). After his time smithing spoons and other tin work, W.H. Brugger expanded his trade elsewhere to open a large retail store with tin and sheet iron stock. The Brugger hardware store provided enough success that William Brugger would eventually find himself on the Board of Directors of the St. Joseph County Loan and Savings of South Bend.

All of this business helped to form the backbone of the city. Grocers in South Bend at this time worked closely with the farmers that surrounded the town, both buying and selling goods. Those farmers would in turn buy the South Bend Chilled or Oliver Chilled Plows, thereby putting that money back into the local economy for the employees of the growing factories and industrial plants. William Brugger's hardware store supplied tools for the farmers; with the money from their purchases, he was able to shop for food and groceries within town, purchase wagons, or visit the druggist. The economy of the city supported itself while growing upon the tireless work of these early entrepreneurs and industrialists who formed a powerful ecosystem of their own, and all being presented without ever mentioning the name Studebaker. The history of these early small businesses has been plowed under by the big wagon and farm implement manufacturers, leaving them all but forgotten in the historical and archaeological record.

Figure 7. Tin spoon excavated from Unit G, 20-30 cm below surface. (Photograph by author VanderVeen.)

Fox and Baker's building, and potentially their story, was erased sometime between April of 1903 and October of 1904. The Oliver family moved into Copshaholm at 808 West Washington Street directly across from Fox and Baker after their gorgeous mansion was finished in 1896. As the founders and owners of the Oliver Chilled Plow Works, much has been written about the family and their outstanding contributions to South Bend as well as their incredible business success and wealth (e.g., Romine 1978). Their new home on Washington Street exemplified this, like a castle over the neighborhood marking a center of financial strength in the area. As mentioned above, the docents at Copshaholm, across the street from the property that once held Fox and Baker's grocery, state the Olivers removed the structures in the Triangle Lot shortly after moving into their new home because they "did not like the view." The Olivers bought the land that the businesses were on, and then tore them down to provide a space for their daughter's garden. However, the material culture excavated and the condition of the debris recovered that suggest that the story of the building's demolition is incorrect.

One theory for the demolition of the Fox and Baker grocery is that the buildings were not destroyed, but in fact moved. Moving buildings was very popular in the early 1900s. It was also decidedly popular for the Olivers. When they purchased the land that their home was built upon, a beautiful new Victorian home sat at 902 West Washington, owned since its construction in just 1889 by the Buzby family. In the winter of 1905, the Olivers wanted that land for a garden, so they had the home moved across the street, just north of where the Fox and Baker grocery stood, to 119 LaPorte Avenue. One of the authors discovered this possibility as he was walking through the neighborhood looking at these homes and noticed that the one at 119 LaPorte had a markedly different foundation. Instead of brick, like other homes, it had the distinctive granite blocks of which the Oliver Mansion was built, complete with the same cut and joining that is specific to their home. Further analysis of the properties in the area supports the theory that the foundation was built by the Olivers with the same stone that was used on Copshaholm, and that it previously sat on their property (Finnigan and VanderVeen 2016). Although not exactly a grocery, this does show that the Olivers were capable of, and indeed, inclined to move buildings to provide space for their own growth. They also appeared to have provided the new foundation, which was a philanthropic touch. This suggests that the Olivers were cognizant of their presence as the wealthiest family on the block, and they were perhaps inclined to get along with their neighbors the best they could, making transitions for their home and property as smooth as possible. In fact, the Olivers were well-known throughout town for providing multiple donations and building projects for the people of the city (Romine 1978).

Were the Olivers equally amicable with Fox and Baker? We know that Solomon Fox lived next door to the Olivers in 1880, and the two families attended the same church, First Presbyterian, where Solomon Fox served as a deacon (*South Bend Tribune* 1931). As active and important businessmen in a growing town, they certainly knew of one another and almost certainly had the same or similar social circles. The presence of Fox's popular grocery store in the West Washington neighborhood before the Olivers moved into that area made the Olivers the

"new kids on the block." Solomon Fox, however, with his partner Frank Baker, was the successful proprietor and son-in-law of William Knoblock, owner of the South Bend Chilled Plow Company, the largest competitor to the Oliver family's own plow business. This made him a markedly different neighbor than everyone else on West Washington.

The docents' story was that the Olivers "did not like the view;" if you take that term literally, does not seem to be supported by evidence. Not only did the Olivers not place their garden in their new lot, they never put anything on it at all. Wise businesspersons, the Olivers would have been remiss to purchase a large plot of land, tear down the successful businesses that stood there, and then never improve on it. That would be an incredibly large and public display of conspicuous consumption (Branton 2009; Kealhofer 1999). The West Washington neighborhood was the most desirable area of town, and land directly across from the Oliver Mansion sharply increased in value simply by the Olivers' presence. To not build on it severely affected the Olivers return on their investment, which would be out of character for a family who used wood-stained putty on their crown molding to give the look of real wood without the cost ("The History of the Oliver Mansion Workers," docent script, Copsaholm House, South Bend, Indiana). While the Studebaker family spent money with aplomb, the Olivers managed to build an equally, if not more impressive, home at a fraction of the cost. Buying a valuable plot of land, as well as the profitable grocery on it only to tear it down and never rebuild anything, all the while incurring recurring property tax bills on the land, was not concomitant with the Oliver family or any successful business nature.

It should also be noted that the view hardly "improved." In fact, it opened up for the Oliver family a direct line-of-sight to St. Paul's Church on the corner of LaPorte and Colfax. While St. Paul's is certainly a lovely church, it was also erected by Clem Studebaker, who had his own likeness painted into the $40,000 stained-glass window on the east side of the building. According to the current pastor at the church, the window is valued at over $1,000,000 today; however, as it is one of the only windows of its kind in America done by the German artists Mayer and Company, it is essentially priceless (Reverend Tom Thews, personal communication 2015). Visible from Copshaholm, The Olivers had a perfect view of the church built by their competitors-in-fortune after having torn down the simple and practical grocery across the street. Landscapes carry with them meaning. They are not purely natural in their creation or their display. A garden, or lack thereof, suggests a symbolic as well as practical purpose. Through changing the appearance of the property around them, the Olivers are making their view of the world known to all passersby. Their historical influence on the landscape attends to "how the organization of sight, control of movement, and the structure and pattern of space constructs our subjectivity – our sense of who we are and how we relate to one another and the world around us" (Kryder-Reid 1996:228-229).

It is the assertion of this article that the Olivers (or those in the present speaking on their behalf) used the phrase "did not like the view" in reference to looking outside their window to see what was essentially another successful Knoblock business staring them down. There was no rational business explanation for the demolition of the Fox and Baker grocery; the Olivers were acting upon emotion. They purchased the land from Solomon Fox and Frank Baker, and instead

of keeping a grocery there and diversifying, or even renting it out to others, they tore it down completely.

The archaeological presence of massive amounts of broken glass and damaged building materials in small pieces spread over a disproportionate area of the lot indicates that not only were the buildings torn down with notable force, but that there was no intent to use the land afterward for gardens, or anything else of a personal nature. Broken glass and bent nails do not lend themselves to a grandiose garden the likes of which we see at Copshaholm today. There is no evidence of re-sodding or dirt cover on top of the field of debris that was excavated, and no stratigraphic evidence to support a cleanup effort to bury the debris. This runs contrary to all other Oliver building projects around their home, and contrary to any rational business acumen. This was a personal decision on the part of the powerful Oliver family to change the "view" from one of perpetual Knoblock success to one of Oliver conquest.

Out of the Rubble

The Oliver's conquest did not last long, and Fox and Baker displayed the kind of determination necessary to be successful in our post-industrial revolution climate. After the destruction of their grocery at 901 West Washington, they simply rebuilt a block west at 1001 West Washington (Johnson Publishing Co. 1903). The new Fox and Baker grocery would prove to be immediately successful. The lack of records from this time makes it impossible to know what the Olivers paid them for their space on the Triangle Lot. In the end, not only was the new Fox and Baker grocery larger and successful, but Fox and Baker themselves almost immediately spent a large amount of money. In 1904 or 1905, Baker moved down the street a few houses to 146 LaPorte, a much larger and more beautiful house, where he would remain. Instead of moving into a newer home, Fox chose to invest heavily into the South Bend Wholesale Grocers' Company, and started that business as its Vice President in 1905. Located in a large warehouse at 330 Carroll, the South Bend Wholesale Grocers' Company also proved immediately successful. Much larger than his grocery, the South Bend Wholesale Grocers' Company owned a large, three-story building that had multiple addresses for rental use to other companies (South Bend & Mishawaka Directory Company 1905). Its first meeting was even accompanied by an orchestra and string quartet. In 1905, the new company saw an initial investment of $40,000, and in 1906 alone saw an increase in stock investment of over $25,000 (Sims 1908:132).

Both Frank Baker and Solomon Fox retired from all business projects in 1914; Solomon at the age of 66, and Baker 69. Solomon Fox died on the morning of July 28, 1931 after a week-long illness and cardiovascular disability (*South Bend Tribune* 1931). Frank Baker became ill around that time, and passed away a year and a half later, around midnight on January 19, 1933 (*South Bend Tribune* 1933). The two of them left their mark on South Bend business in powerful, yet subtle ways. Without expansive mansions or opera halls and hotels named after them, Solomon Fox and Frank Baker rose from pioneer entrepreneurs to heavily-networked and savvy businessmen that left behind inspirational stories for their families to follow with pride. The

South Bend Wholesale Grocers' Company later became the Levi-Ward Wholesale Grocers Company, and then went vacant before the building and the entire city block, including the road itself, were demolished in the early 1970s to build a U.S. Post Office depot, and the expansive Crowe Horwath building. Their parking lot covers where Carroll Street and the warehouse once prospered.

Solomon Fox's great-grandchildren remain in South Bend, and continue the Fox family tradition of business success. During the 2015 Indiana University South Bend archaeological field school, the family was invited to the excavation of the Triangle Lot, and they were able to see the ground their great-grandfather worked upon to elevate their family from the world of a pioneer American overcoming challenges. The family did not remember many of the events and items that were recovered through our research. Not only was the historical and archaeological investigation worthy in terms of acquired knowledge about the community's past, it also served as a form of outreach to the extended family of Solomon Fox.

The Story is More than the Victors'

The Studebakers and Olivers were, and to some degree still are, the face of South Bend, Indiana. It was every other businessperson that made up the spine, however, holding it all up; each of them were vertebrae with their own nerves stretching out through the entire organism to both feel the input from the city as well as to provide their own touch. Solomon Fox and Frank Baker were as unseen and forgotten as a vertebrae, but they were also as important to the overall function of the body that was South Bend. They were connections in the long history of the city, as it moved from a small fur-trader town to be propelled into one of the most celebrated in the Midwest. Home now to extensive businesses and several museums and universities, South Bend is a redeveloping city experiencing a new breath of life after having taken its first due to the hard work and spirit of people like Solomon Fox and Frank Baker.

And while the "victors" of the city's history had a profound influence on Fox and Baker, the two men were able to overcome their influence, and prosper. The two men were not erased from history. Instead, they left their mark on South Bend business in meaningful, yet subtle ways. Without expansive mansions or opera halls and hotels named after them, Solomon Fox and Frank Baker rose from pioneer entrepreneurs to heavily networked and savvy businessmen that left behind inspirational stories for their families to follow with pride. They were successful in that families across the city relied on their store for food, supplies, and conversation. They were powerful in that they formed a neighborhood of merchants, from a seamstress to a butcher and baker to a druggist, all of whom drew customers from blocks around for everything they needed during a normal day. They were influential in that their descendants went into the insurance business, the military, and other fields while participating in the community through their efforts with the church, the scouts, and one even became South Bend's Man of the Year a half-century after the grocery was plowed under (personal conversation, William Fox, Jr. 2015).

The Knoblocks, Studebakers, and Olivers are, like the Fox and Baker grocery, gone to history. The spirit of these people remain, however. The Oliver family destroyed the Fox and Baker grocery on the corner of 901 West Washington. It was a personal and powerful decision that would have sandbagged many other entrepreneurs; however, Solomon Fox and Frank Baker decided to turn it into profit. Perhaps we should reexamine who history defines as the "victors."

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A DATA DEFICIENT REGION: AN ARCHAEOLOGICAL SURVEY OF NEWTON COUNTY, INDIANA

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Abstract

The Applied Anthropology Laboratories (AAL) at Ball State University conducted a data enhancement project for archaeological resources in Newton County, Indiana for a FY2014 Historic Preservation Fund Grant (Grant #18-14-FFY-03). This Historic Preservation Fund grant project investigated the archaeological resources of Newton County, Indiana with a focus on the Iroquois and Kankakee Rivers and the southern half of the county (Beaver, Grant, Jackson, Jefferson, Iroquois, and Washington townships). Approximately 902.84 acres (365.33 hectares) of agricultural land were surveyed, and 89 new archaeological sites were recorded. The survey recovered 55 prehistoric artifacts and 1274 historic artifacts from eight parcels of land within Newton County. No human remains were discovered as a result of this grant project. Cultural periods that are represented in the artifact assemblage include Late Archaic components that were documented from the precontact era, in addition to historic components. The average site density recorded for the project area for precontact sites was one site per 36.11 acres and for Historic was one site per 12.20 acres. This article will concentrate on the prehistoric results of this project.

Introduction

The Applied Anthropology Laboratories (AAL) at Ball State University was awarded a FY2014 Historic Preservation Fund Grant to survey portions of Newton County, Indiana. The project involved a pedestrian survey of approximately 900 acres of agricultural land. The main goals of the project were to increase the site data base, resolve any inconsistencies in the State Historic Architectural and Archaeological Database (SHAARD), refine the cultural chronology for the county, and examine evidence for the settlement and interaction of the Euro-American settlers and Native Americans along the Iroquois River. Specifically, we hope to add to the understanding of the various prehistoric cultural periods of the county and to add to the understanding of the prehistoric periods of the county based on the low number of previously documented sites comparison to the surrounding counties. We also hope to add to the

understanding of the Euro-American presence and Native American interaction in Newton County. Newton County had 178 archaeological sites recorded in SHAARD (Division of Historic Preservation and Archaeology 2014) prior to this survey. This investigation focused on the southern portion of Newton County, as well as areas near the Iroquois River.

The following research questions, while not exhaustive, guided this project. This article will concentrate on the prehistoric results of this project.

1. What is the cultural chronology for Newton County?

2. What are the densities and distributions of archaeological sites along the Iroquois River and on Iroquois Till Plain within the county?

3. What is the settlement pattern for Euro-American people along the Iroquois River?

4. What is the average site density within the county?

5. Is there evidence for interaction between Euro-American settlers and Native American tribes at and after the time of settlement?

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 article includes environmental and archaeological information concerning Newton County, Indiana.

Natural Setting

The project area is located in Newton County (Figure 1), which has an area of 258,080 acres (104.41hectares) (Barnes and Osterholz 1998:1). For the proposed research, we targeted areas surrounding the Iroquois River in the southern half of the county.

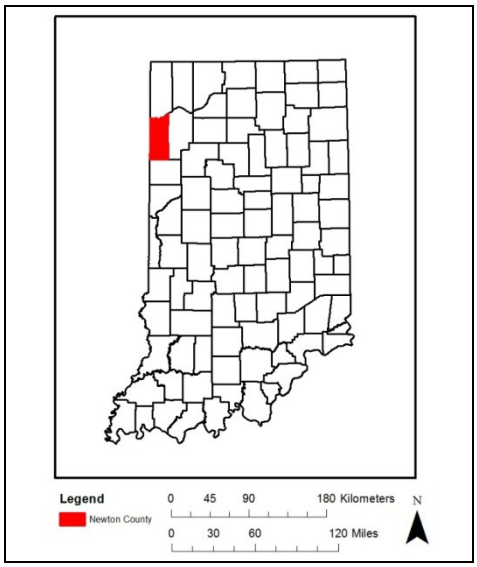

Figure 1. **Newton County within the state of Indiana (based on Yellowmap World Atlas 2015).**

Newton County is within the general physiographic units known as the Northern Moraine and Lake Region and the Tipton Till Plain (Schneider 1966). Gray (2000) places the county within the Kankakee Drainage ways (north half) and the Iroquois Till Plains (south half). The Northern Moraine and Lake Region, Kankakee Outwash and Lacustrine Plain is characterized as poorly drained lowland around the Iroquois, Tippecanoe, and Kankakee Rivers (Schneider 1966:52). As well, it can be characterized as "a structural plain or stripped surface on the rather resistant westward-dipping Silurian and Devonian carbonate rocks that lie beneath" (Schneider 1966:43-44). The Tipton Till Plain is an area of low relief with extensive areas of ice-disintegration features. It covers a small portion of the southern part of Newton County (Schneider 1966:41). The portion of Newton County that falls within the Northern Moraine and Lake Area is characterized as being part of the Kankakee Outwash and Lacustrine Plain. This is an area that is predominantly underlain by sand deposited as outwash during the retreat of the last glaciers which resulted in a predominance of poorly drained sediments (Schneider 1966:52). These poorly drained soils, combined with the low lying topography, contributed to the formation of the Kankakee Marsh which covered much of northern Newton County until its draining, in the mid-19th thru early 20th centuries, for agricultural purposes (Smallwood and Osterholz 1990:1).

Precipitation is the primary source of surface water for Newton County (Hale 1966:92). Eight to 20 percent of precipitation becomes surface water as it collects in rivers, streams, lakes, and reservoirs (Bechert and Heckard 1966:100). The Kankakee River is the major water source running in Newton County (Heistand 2005:9-10). However, there is also the Iroquois River and Beaver Creek, both tributaries of the Kankakee River, and many other smaller streams and creeks. Both the Kankakee and the Iroquois Rivers are slow-flowing, low gradient meandering streams on glacial outwash deposits. The glacial outwash of the Kankakee is described as a "nearly level relief with low meandering sand dunes or ridges that occur irregularly" (Barnes and

Osterholz 1998:3). Aeolian processes also affected the sandy sediments along the Kankakee River. Sand was blown out of the outwash deposits resulting in the formation of numerous small dunes, called islands, even though they are no higher than five feet above the alluvial plain, flanking the river in the Kankakee lowlands (Wayne and Zumberge 1983). The Iroquois River, which this survey focused around, is slower and smaller than the Kankakee River. The Iroquois River flows for 94 miles through farmland in neighboring Jasper County and in Newton County (Heistand 2005:8). Both the Kankakee and the Iroquois Rivers ultimately flow westward into Illinois. Newton County has only one major lake, J.C. Murphy Lake, as well as some smaller ponds, and all are manmade (Barnes and Osterholz 1998:4). In northern Newton County, Beaver Lake covered 16,000 acres with an additional marshland of 26,000 acres and was a major source of resources for the Native Americans who once populated the area (Heistand 2005:8-9). Beaver Lake was drained near the end of the Civil War to the north of Morocco through Lake Ditch and into the Kankakee River (Taylor 2009:12).

The vast majority of Newton County is characterized by pre-settlement vegetation of wetlands with tongues of dry prairie north and south of the Iroquois River, and several pockets of Oak-Hickory (Petty and Jackson 1966:280). The low grade of the rivers, the poorly drained nature of the predominant wetland soils, and the relatively high precipitation (Woods et al. 2003) exerted substantial influence on the prehistoric and early historic use of the area. Settlement of the county by Euro-Americans was slow until the mid-19th century when concerted drainage efforts were undertaken (see Heistand 2005:11). The rivers and wetlands would have been major sources of resources for both Native Americans and early colonial settlers populating Newton County (Sandy et al. 2002:xii).

Attica chert, Liston Creek chert, and Kenneth chert are the documented bedrock cherts in the region around Newton County (Figure 2). Stratigraphically, Attica chert is a member of the Muldraugh Formation of the Borden Group of the Mississippian Period (Cantin 2008:15). Attica chert (a.k.a. Wabash Green) is described as being blue-green in color with blue-grey streaks, bands and mottles (Cantin 2008:11-12). Liston Creek chert is both a nodular and bedded chert found in Liston Creek limestone which is a member of the Wabash Formation, Niagara Series, of the Silurian System (Cantin 2008:54). Liston Creek chert is always grey in color, but the shade of grey varies from very light to medium grey. As it weathers, Liston Creek chert can develop tan or brown patches. Kenneth chert is a bedded chert found in Kenneth limestone which is a member of the Salina Formation of the Silurian System (Cantin 2008:46). Kenneth chert is known to be white to light grey in color, with light to dark grey and, or brownish-grey patches. These color variations can all be present within one sample. When weathered, Kenneth chert's appearance and texture become chalky white.

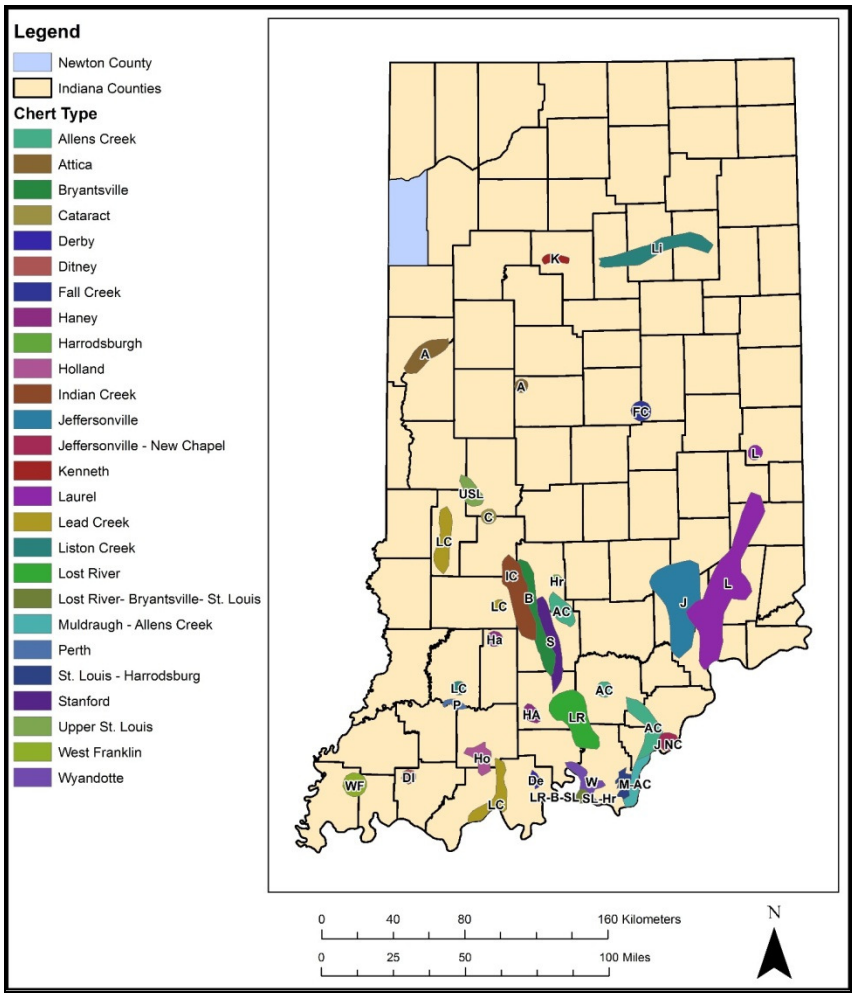

Figure 2. Chert outcrop locations in Indiana (Digitized by Brad Painter from Cantin 2008).

Cultural Setting

Newton County is characterized by sporadically habitable rises dispersed in fluctuating wetlands. Occupations and land use in the county likely track the fluctuations in surface moisture. In Newton County, previous research indicates that Native Americans inhabited the region from the Paleoindian period through the Historic period. The majority of sites documented in Newton County are of Unknown prehistoric period. Of the known periods of occupation, the most frequently identified has been Unidentified Woodland (n=23), followed by the Historic (n=18), and Late Woodland (n=12) (Division of Historic Preservation and Archaeology 2014). Dorwin (1966:Figure 1) reports a very low density of Paleoindian sites where SHAARD records none. The prevalence of historic sites is to be expected as historic occupations typically display better

preservation and a larger footprint than prehistoric sites. The most dominant prehistoric sites being of Unidentified Woodland and Late Woodland cultural affiliation is distinct from neighboring counties (e.g., Macleod et al. 2015) and may not be representative of the true archaeological record due to low numbers of observations and limited extent of investigations. The nearly nonexistent representation of the Paleoindian culture period is also consistent with the low frequency of these sites within the Midwest region (Shott 2004:208).

Archaeological investigations in Newton County have been predominantly oriented toward surface surveys and only a small percentage of sites have been tested or excavated. A Phase Ia investigation of 505 acres of land was conducted by Archaeological Research, Inc. in 2005 within McClellan Township. Within the project areas were previously recorded sites; however, this investigation did not discover any new sites (Keene and Hayes 2005). A Phase Ia investigation of 90 acres located in Lincoln Township was conducted in 1982 with no sites discovered (Fabyan 1982). In 2006, around 60 acres was surveyed for the Kentland Municipal Airport in Jefferson Township. This survey was carried out by Archaeological Resources Management Service of Ball State University. The results of this survey were two previously undocumented sites. These site contained lithic materials consisting of two chert flakes and no FCR (Cochran 2006). In 2003, Willow Slough Fish and Wildlife Area in McClellan and Beaver townships was surveyed by William Mangold of the Indiana Division of Historic Preservation and Archaeology. Nine new sites were documented during this investigation. These sites contained ceramic, lithic, and faunal materials (Mangold 2003). All other surveys and investigations that have been conducted within Newton County were generally smaller and have documented little to no cultural materials. The amount of material culture collected does not necessarily reflect a dearth of sites. Since sites can consist of isolated finds, there can exist limited cultural materials, but a moderate abundance of sites, which appears to be the case for Newton County.

In the times before European settlers made their way to Newton County, multiple Native American groups, like the Miami, Wea, Kickapoo, and Potawatomi, populated the area (Heistand 2005:8). French fur traders' movement into these groups' original homelands along the Great Lakes has been considered as one of the possible causes of these Native American groups moving southward into Indiana. The Kickapoo, Potawatomi, and Miami tribes were the most pervasive tribes in the prairies surrounding the Kankakee River in what was to become northwest Indiana (Callendar 1978:681; Callendar et al. 1978:656-657; Clifton 1978:725-726). They created small villages along the Iroquois River and hunted and trapped throughout the area and its aquatic sources. However, after siding with the British in the War of 1812 against the United States, and continuing bad relations and broken treaties with the Americans, the Potawatomi were forcibly removed from Indiana in 1838 in a federal government action known as the Potawatomi Trail of Death, which began in Fulton County, Indiana (Carmony 1998). Members of the Miami tribe were forcibly removed in 1846, starting in Peru, Indiana, and traveling via canal boat and riverboat following major waterways through Ohio and Indiana westward to Kansas (Strack et al. 2011).

Archaeological Survey

Methods

This project was conducted by AAL Archaeologists and AAL student employees. Principal Investigators were AAL Archaeologist Christine Thompson and Senior Archaeologist Kevin C. Nolan. Parcels were selected by a random sample of those occupying various landforms and soil types, and which parcels were surveyed was dependent on landowner permission and crop schedule. As much as practicable, we attempted to maintain proportional representation for each landform and soil order. The field survey was conducted between August 6, 2014 and November 1, 2014. The field survey was executed using pedestrian transects spaced at 10 meter intervals. The survey interval was reduced to 5 meters when artifacts were encountered. The areas surveyed by pedestrian transects had between 70 and 95 percent ground surface visibility. All artifacts that were within two meters of the first artifact encountered were collected, bagged and given a temporary transect and find numbers. Objects found farther apart within the same transect were given the same transect number and the next sequence number. If a site only consisted of one collection point, a 10 x 10 meter radial survey was conducted around the point. Each new radial find was assigned a new find number. When artifacts and clusters were encountered, short transects were surveyed at five meter intervals to refine the boundaries of the cluster. Fire-cracked rocks and bricks were counted in the field, but were not collected. Find points were mapped with a Trimble GeoXT Series GPS with a minimum of 20 readings logged for each find spot. GPS data was post-processed to sub-meter accuracy using Trimble GPS Pathfinder Office series 5.3 software and exported to ESRI shapefile formats (UTM NAD83 Zone 16N) for inclusion in the project GIS. Field notes were maintained by AAL field supervisors.

All materials generated by this project were accessioned under AAL Accession number 14.29. All project materials were curated at Ball State University, Department of Anthropology. Landowners were given their choice of having the artifacts returned to them or having the artifacts curated at Ball State University. In this survey all landowners opted to have their artifacts returned to them upon the completion of the grant project. Therefore all artifacts were identified, analyzed, measured, labeled, and photographed per DHPA guidelines and returned to the landowner.

Results

A total of 902.84 acres (365.33 ha) were surveyed by pedestrian transects during this project. All survey areas were located on till plains/moraines and floodplains and were within the Iroquois River drainage system, with some survey areas located directly along the river. The survey documented 89 new archaeological sites and recovered 55 prehistoric artifacts and 1274 historic artifacts. No human remains were discovered as a result of this grant project. Eight parcels in southern Newton County were surveyed. The prehistoric occupations documented during this survey include the Late Archaic period with the strongest presence, a possible Middle Woodland

component, and the remainder unidentifiable prehistoric periods. The Historic period is the most strongly represented in the assemblages recovered during our survey. Considering the limitations of Phase I surveys, it is presumptuous to assign functionality to sites identified during this survey. Site types were therefore not defined beyond isolates and scatters. However, it appears likely based upon the variation in artifact classes discovered on the sites that multiple sites types were represented.

Artifacts

The field survey recovered 55 prehistoric artifacts (1/16.4 acres) and 1,274 historic artifacts (1/0.71 acres; see Table 1 and Figure 3 - Figure 10). The majority of prehistoric artifacts consist of lithic debitage. The edge modification of approximately 20 flakes indicates that those pieces debitage functioned as expedient tools. Two of the seven formal lithic tools were projectile points dating to the Late Archaic period (Justice 2006:115-116, 119-121) (Table 1). Additionally, a blade-like flake may represent Middle Woodland period activity (Greber et al. 1981; Montet-White 1968). Other stone tools consisted of three expedient groundstone tools, and flake tools. Historic artifacts included various types of ceramics, various colors and types of glass, metal objects, and brick fragments.

Figure 3. A Brewerton Side-Notched diagnostic point from 12-N-75 (Photo by Felicia Konrad, Ball State University).

Table 1. Artifacts Recovered.

Prehistoric	No.	Historic	No.
Biface, Hafted, Brewerton Side-Notched	1	Glass, Amber	49
Biface, Hafted, Matanzas Side-Notched	1	Glass, Amethyst	90
Biface, Hafted, Unidentified	4	Glass, Aqua	293
Biface, Unhafted	2	Glass, Clear	164
Core	2	Glass, Cobalt	10
Core, Fragment	1	Glass, Green	10
Flake, Proximal	21	Glass, Milk	68
Flake, Distal	1	Glass, Red/Pink	1
Flake Tool	2	Glass, Yellow	1
Flake, Blade-like	1	Ceramic, Creamware	3
Flake, Shatter	12	Ceramic, Ironstone	41
Angular Shatter	2	Ceramic, Porcelain	18
Groundstone Tool	3	Ceramic, Redware	6
Shell	2	Ceramic, Semi-Porcelain	5
		Ceramic, Stoneware	104
		Ceramic, Whiteware	164
		Ceramic, Yelloware	4
		Ceramic, Industrial Porcelain/Insulator	4
		Ceramic, Prosser Button	2
		Metal, Buckle	1
		Metal, Shotshell	2
		Metal, Rivet	1
		Metal, Nail	2
		Metal, Cat	1
		Metal, Slotted Spoon	1
		Metal, Ring	3
		Metal, Drive Train	2
		Metal, Chain Links	1
		Metal, Hook	1
		Metal, Bracket	1
		Metal, Washer	1
		Metal, Disc	1
		Metal, Unidentified	28
		Battery Core	2
		Brick (114 not collected)	19
		Graphite	1
		Clinker	15
		Coal	16
		Slag	138
Total	**55**	**Total**	**1274**

Figure 4. **A Matanzas Side-Notched diagnostic point from 12-N-284 (Photo by Felicia Konrad, Ball State University).**

Figure 5. **An unidentified point from site 12-N-273 (Photo by Felicia Konrad, Ball State University).**

Figure 6. Representative historic glass artifacts from Survey Area 5 (Photo by Felicia Konrad, Ball State University).

Figure 7. Representative historic ceramic artifacts from Survey Area 2 (Photo by Felicia Konrad, Ball State University).

Figure 8. Representative historic metal artifacts from Survey Area 5 (Photo by Felicia Konrad, Ball State University).

Figure 9. Glass fragment impressed "Bottling Works Lafayette" recovered from 12-N-91 in Survey Area 5 (Photo by Felicia Konrad, Ball State University).

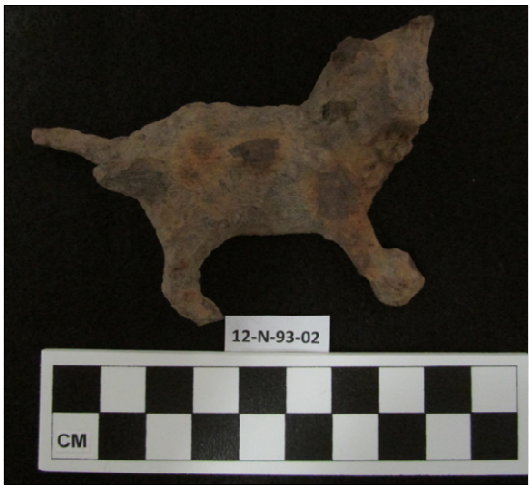

Figure 10. **Metal cat figurine recovered from 12-N-93 in Survey Area 5 (Photo by Felicia Konrad, Ball State University).**

Chert. Lithic artifact chert types are shown in Table 2. The chert identification is listed by geologic time period as this is the most accurate and consistent means of identification. Chert was then listed by which type it is most consistent with as described in Cantin (2005, 2008) and in comparison with specimens in the AAL comparative collection. If the artifact material displayed characteristics that were consistent with multiple chert types, all applicable types were listed in the identification. The locations of chert outcrops in Indiana are shown in Figure 2.

The lithic artifacts for this survey were dominated by Silurian cherts (78%). Of the Silurian assemblage an overwhelming majority was consistent with Liston Creek chert (72%). No natural chert outcrops exist within Newton County. However, outcrops of Liston Creek exist in Miami, Wabash, and Huntington counties, the closest of which being approximately 116 km to the east of Newton County (Cantin 2005). Specimens consistent with Laurel chert appear in four percent of the assemblage recovered from the survey areas. The closest outcrop of this chert exists in Wayne County, which is approximately 230 km to the southeast of Newton. None of the projectile points recovered were made from Silurian chert. This may indicate that Silurian age chert, particularly that consistent with Liston Creek, was used primarily for non-point tool manufacture, or even expedient tool manufacture.

Mississippian chert had the second greatest representation in this survey (20%). Of the Mississippian material recovered, those consistent with Attica comprised the majority of the collection (10%). Outcrops of Attica exist in Boone, Fountain, and Warren counties, all of which are located approximately 70 km southeast of Newton County. All six of the hafted projectile points recovered were made from Mississippian chert, which were consistent with Elwood-Joliet, Burlington, Attica, and Muldragh chert (from sites 12-N-75, 89, 90, 273, 281, and 284). The two identifiable points date to the Late Archaic period (from sites 12-N-75 and 284) were made of chert consistent with Attica or Muldragh. Elwood-Joliet chert (4%) and Burlington chert (2%) come from central and western Illinois and are typically higher quality material than what is

found in northwest Indiana (c.f. Cantin 2008; Stelle and Duggan 2003). Burlington chert in particular can be an exceptional material and would have been highly prized in prehistoric times, and in fact was widely traded at various periods in prehistory. The distance to these materials indicates that trade would likely have been active at least at some point between the areas that are now northwest Indiana and central/southwest Illinois.

Pennsylvanian chert is the third greatest in abundance (2%) with specimens most consistent with heat treated Holland chert forming the entire Pennsylvanian assemblage. The low amount of Pennsylvanian chert is to be expected as the sources of these cherts in Indiana are located exclusively in the southern half of the state. Holland in particular outcrops about 300km to the south in Dubois County. None of the points recovered during field survey were made of Holland chert.

The breakdown of the chert tells us that prehistoric people living in Newton County were likely relying primarily on the closest chert sources (Liston Creek and Attica to the south and southeast of Newton County) (Table 2). It also indicates that this heavy reliance on the closest chert resources was supplemented occasionally with more exotic lithic materials from further south and southeast such as Laurel and Muldragh, as well as from central and southwest Illinois in the form of Burlington and Elwood-Joliet. The breakdown of the lithic assemblage could indicate that the peoples that inhabited Newton County during prehistoric times migrated from south and southwest of the county, bringing chert materials with them. Newton County may not have been an area of primary habitation due to the inhospitable wetlands (see Faulkner 1972; Schurr 2003:10), but the locations of the projectile points north and south of the Iroquois River, in the uplands, could show areas of hunting used during the Late Archaic period. The wetlands, though mostly uninhabitable, would have been a rich source of resources.

Table 2. Chert Raw Materials.

Chert	No.	Percent of the Whole Assemblage
Silurian Chert	**39**	**78**
Consistent with Laurel	2	4
Consistent with Liston Creek	35	70
Consistent with Liston Creek Heat Treated	1	2
Consistent with Kenneth	1	2
Mississippian Chert	**10**	**20**
Consistent with Attica	5	10
Consistent with Attica and Muldragh Heat Treated	1	2
Consistent with Burlington	1	2
Consistent with Cataract	1	2
Consistent with Elwood-Joliet	2	4
Pennsylvanian Chert	**1**	**2**
Consistent with Holland Heat Treated	1	2
Total	**50**	**100**

Sites

Of the 89 archaeological sites discovered in our survey, 23 had Unidentified Prehistoric components (Table 3). The identified precontact components consisted of two Late Archaic sites. Seventy-four sites had Historic components, dating from the early 18th century to present.

Based upon the current survey results, precontact settlement within Newton County is dominated by Late Archaic and Late Woodland cultural periods, though numbers are very low overall. These results are likely skewed for several reasons. The presence of the marshy wetlands across southern and central Newton County area during most human occupation is undoubtedly the largest factor in the dearth of artifacts recovered both in this survey and in previous surveys of Newton County (Petty and Jackson 1966:280). Prior to draining of the marshy areas of the county, habitable landforms would have been limited, and variable depending on moisture regime and season. Identifying more of these areas in the future will be key to recovering the quality and quantity of artifacts necessary to understanding how habitation in, and use of, the area has changed over time. Large scale change in local geomorphology, especially as a result of changes in wetlands extent and location, can affect which areas have high site potential for a given time period. Knowledge of these changes will allow researchers to look in specific areas to target one or a few distinct cultural phases depending on expected available landforms for the period of interest. Another reason the cultural phase representations may be skewed is due to development. Newton County is primarily farm land, and as such remains largely within the private sector. Compared to other counties, Newton County has had less archaeology conducted as a result of federal requirements or state regulations. These archaeological surveys have helped build the cultural chronology in other counties by requiring investigations in areas that would not have otherwise been targeted by researchers. As a result it is likely that the surveys conducted in Newton County have not been extensive enough or have not sampled enough landforms within the county to locate underrepresented cultural time periods. With these surveys, especially in those areas not typically surveyed, we will begin to reconstruct the history of use, and the differential spatial patterns of exploitation associated with fluctuations of the marshy areas across the county.

Table 3. Site Components Recorded as a Result of Survey.

Component	No.	Comment
Unidentified Prehistoric	23	10 Multicomponent (10 Historic)
Late Archaic	2	0 Multicomponent
Historic	74	10 Multicomponent (10 Unidentified Prehistoric)
Total	**99**	

Prehistoric Sites. The frequency of sites with prehistoric components encountered in the project area as a result of survey was not similar to what had already been identified in Newton County. The only similarity that could be identified was the frequency of which prehistoric sites are recorded as unidentified prehistoric components. Of the diagnostic prehistoric components, only Late Archaic diagnostic materials (12-N-75, and 284) were encountered and recorded. This

is not consistent with the trend in Newton County of Late Woodland and Unidentified Woodland sites being the most frequently encountered and recorded, though is similar to the extant records for Jasper County (see Macleod et al. 2015).

Historic Sites. Seventy-four sites with historic components were discovered. These sites ranged from small to extensive historic scatters and were occasionally multicomponent with Unidentified Prehistoric isolates or scatters. The historic component sites yielded the vast majority of artifacts (n=1274) recovered during the project. For further details on the Historic period materials and sites, the reader is referred to the full survey report (Leeuwrik et al. 2015).

Density

The project documented an average of one site per 10.14 acres and an average artifact density of one artifact per 0.68 acres surveyed. The project documented an average artifact density of one historic artifact per 0.71 acres surveyed and an average artifact density of one prehistoric artifact per 17.03 acres surveyed.

Private Collection Analysis

On June 3, 2015 Nolan and Steinwachs visited the Newton County Public Library in Morocco, Indiana to examine a private collection donated by Mr. David L. Carlson to the library. While there are two collections at the Morocco library, we focused on the Carlson collection exclusively as the collection was generated entirely within Newton County and collected from fields on and around the former Carlson property. The Carlson Collection consists of over 300 artifacts, of which 265 are diagnostic tools or points with intact bases. The collection is organized into six display cases, five of which are exclusively chipped stone tools, and one of which is sherds of pottery.

Following the procedure established by Macleod et al. (2015), Nolan and Steinwachs organized each of the five display cases with lithic tools by base shape. A complication in our analysis was that some of the materials were glued onto the felt mounting for display, including all of the ceramics. This moderately hampered our analysis and limited the data we could collect. Each base category for each case was analyzed in two groups, those free for handling, and those glued to the mounting. We counted totals for each base type by tray and identified raw materials based on macroscopic examination. Due to time constraints, raw material identifications were performed quickly resulting in over 58 percent of the specimens being relegated to Unknown (Table 4). All free specimens were scanned with a Cannon LiDE 110 scanner on both sides. The mounted specimens were photographed multiple times. Table 4 presents the results of this analysis.

The collection was relatively evenly split between side notched (29.06%), stemmed points (28.3%), and triangular (26.79%) making up the vast majority of the collection. This is rather distinct from the private collection examined by Macleod et al. (2015) predominantly from Jasper County. Side notched points are the plurality in both, indicating a possible strong Middle

Archaic signal in both Jasper and Newton counties. Triangular points, most of which fall into the Late Woodland/Late Prehistoric period, are a surprising occurrence. This indicates a rather intense utilization of the area near Beaver Lake in the latter portion of the pre-Euro-American sequence. At least one point would be classified as a Cahokia point (Justice 1987:232-235), and there were several possible Nodena Cluster specimens in the glued and unanalyzed portion of the collection. While the fine triangular points are not unique to Mississippian groups, the Cahokia and Nodena points indicate a connection with Mississippian groups in Newton County.

The lower proportion of corner notched points also indicates a distinction from the Jasper County collection. While this base type is not limited in distribution, it may indicate a lessened use during the Middle and early Late Woodland periods. This impression is somewhat contradicted by the pottery collection which was collected "at various sites in Newton County, Indiana" according to the label on the back of the display case.

Figure 11 shows all of the sherds in the donated collection. There are 41 total sherds in collection, of which 21 are decorated. There are several Middle Woodland sherds in the collection including one with classic rocker stamping (Figure 11, top row, third from left), and one with dentate rocker stamping that is possibly painted (Figure 11, middle row, third from left). Other designs are reminiscent of general Middle Woodland and Transitional Woodland dentate designs (e.g., Bennett 1952:112, 119, Figure 47), while others may be related to Mississippian designs (e.g., Pollack 2004:Figure 3.14) with one shell tempered sherd and a shell tempered fragment of a human effigy figuring (middle of bottom row in Figure 11). The dentate stamped sherds are also similar to a handful of sherds from the smaller ceramic collection recorded from a Jasper County collector as part of a FY2014 Historic Preservation Fund grant (Macleod et al. 2015; this volume).

Late Archaic and Early Woodland Stemmed points are also well represented, and some of the ceramics likely date to the Early Woodland Period. There are only a few Paleoindian points in this collection which is another contrast with the Jasper County collection. Only two points (0.75%) were identified as Paleoindian types. While one or two of the triangular or unnotched points may fit within Paleoindian types, this still represents less than two percent of the collection compared to the nearly seven percent representing the same period in the Jasper collection. The combination of these two collections together indicate the possibility of a relatively strong Paleoindian presence in northwestern Indiana, more than quadrupling the officially recorded presence in the area (c.f. Dorwin 1966:Figure 1; Division of Historic Preservation and Archaeology 2014).

It is important to note that the pattern of occupation and use of Newton County derived from just one moderate sized collection paints a distinctly different picture than the official records generated by academic and professional archaeologists (c.f. Table 3). While it is not likely that Mr. Carlson's collection is representative of the entire county, it is a strong reminder that professional investigations only net a small proportion of the local archaeological record, and a more comprehensive and extensive record may be contained within private collections that professional archaeologists may ignore at the peril of misrepresenting the past (LaBelle 2003; Peebles and Shott 1981; Pitblado 2014; Shott 2008).

Table 4: Distribution of Base Types and Chert Types for the Carlson Collection from the Newton County Public Library.

	Side Notched		Unnotched	Triangular		Paleo	Stemmed		Corner Notched			
Chert Type	**Free**	**Glued**	**Free**	**Free**	**Glued**	**Free**	**Free**	**Glued**	**Free**	**Glued**	**Total**	**%**
Attica	6	0	0	5	0	0	6	1	0	0	**18**	6.79
Blanding/Elwood-Joliet	9	5	0	4	4	0	8	3	2	3	**38**	14.34
Burlington	1	0	0	0	0	0	0	0	0	0	**1**	0.38
Burlington (HT)	0	0	0	0	0	0	1	0	0	0	**1**	0.38
Dongola	0	0	0	0	0	0	0	0	0	0	**0**	0.00
Flint Ridge	0	0	0	1	2	0	0	0	0	0	**3**	1.13
Flint Ridge (HT)	0	0	0	0	0	0	0	0	0	0	**0**	0.00
Harmilda	0	0	0	0	0	0	0	0	0	0	**0**	0.00
Harmilda/Kenneth	1	4	0	1	0	0	2	0	1	0	**9**	3.40
Holland	1	1	0	2	2	0	2	0	0	0	**8**	3.02
Jeffersonville	0	0	0	0	0	0	0	0	0	0	**0**	0.00
Jeffersonville (HT)	1	0	0	1	1	0	0	1	0	0	**4**	1.51
Laurel	0	0	0	2	0	0	1	3	0	1	**7**	2.64
Laurel/Jeffersonville	3	0	0	0	0	0	1	0	2	0	**6**	2.26
Laurel/Jeffersonville (HT)	0	3	0	0	0	0	0	0	0	0	**3**	1.13
Liston Creek	0	1	0	2	0	0	1	1	1	0	**6**	2.26
Muldraugh	0	0	0	0	0	0	1	2	0	1	**4**	1.51
Wyandotte/Cobden	0	0	0	0	0	0	2	0	1	0	**3**	1.13
Unknown	20	19	1	13	31	2	26	10	10	14	**146**	55.09
Unknown (HT)	2	0	0	0	0	0	1	2	0	3	**8**	3.02
Total	**44**	**33**	**1**	**31**	**40**	**2**	**52**	**23**	**17**	**22**	**265**	
%	16.60	12.45	0.38	11.70	15.09	0.75	19.62	8.68	6.42	8.30		
Combined%	29.06		0.38	26.79		0.75	28.30		14.72			

Figure 11. Ceramics from the Carlson Collection, Newton County Library, Morocco, Indiana (Photo by Erin A. Steinwachs, Ball State University).

Discussion

Cultural Chronology

Prior to this year's survey, Newton County had 115 Unidentified Prehistoric sites, no Paleoindian sites, six Archaic sites (2 Early Archaic, 1 Middle Archaic, 2 Late Archaic), 43 Woodland sites (4 Early Woodland, 4 Middle Woodland, 8 Late Woodland), one Late Prehistoric site, and 18 Historic sites (Table 5). This project has added to the cultural chronology of the county with 23 Unidentified Prehistoric site components, two Late Archaic site components, and 74 historic site components. In addition, two previously undocumented projectile point types were added to the knowledge of Newton County's prehistory. The two diagnostic Late Archaic projectile points recovered were a Matanzas Side Notched point and a Brewerton Side Notched point. We also discovered one blade-like flake, hinting at the possibility of this artifact category at other places within Newton County (see also Smith and Sanchez 2013:Figure 28).

Table 5. Number of Site Components Added.

Cultural Period	Added	Previous	Total
Unidentified Prehistoric	**23**	**115**	**137**
Paleoindian (ca. 10,000 – 7500 B.C.)	**0**	**0**	**0**
Archaic	**2**	**7**	**9**
Early Archaic (ca. 8000 – 6000 B.C.)	0	2	2
Middle Archaic (ca. 6000 – 3500 B.C.)	0	1	1
Late Archaic (ca. 4000 – 700 B.C.)	2	3	5
Unidentified Archaic	**0**	**1**	**1**
Woodland	**0**	**43**	**43**
Early Woodland (ca. 1000 – 200 B.C.)	0	4	4
Middle Woodland (ca. 200 B.C. – A.D. 600)	0	4	4
Late Woodland/Late Prehistoric (ca. A.D. 500 – 1650)	0	8	8
Unidentified Woodland	**0**	**27**	**27**
Mississippian	**0**	**2**	**2**
Protohistoric/Contact	**0**	**5**	**5**
Historic (post A.D. 1650)	**74**	**18**	**92**
Unknown	**0**	**25**	**25**
Total	**99**	**207**	**296**

Precontact settlement within Newton County is only very sparsely known with only 27 (15.5%) sites identified to a period of occupation (Table 5). Late Archaic (N = 9) and Late Woodland (N = 8) occupations are the most well represented. Very little information has been recovered for the Early and Middle Archaic, Early and Middle Woodland, and Paleoindian periods. After our survey, the same biasing factors noted above still apply, but we are left with an intriguing absence of sites distinct from most other similar surveys conducted by AAL (Macleod and Donovan 2014; Macleod et al. 2015; Miller et al. 2012; Murray et al. 2011). Likely factors include chance with the distribution of permissions, and the nature of the wetlands environment.

Landform Distribution

We tracked sites by landform, cultural period, and the amount of the surface area covered by individual sites to demonstrate the percentage of utilized surface by landform (Table 6, Table 7, and Table 8). Newton County is predominantly comprised of till plain/moraine landform, and all eight of the Survey Areas investigated in this project occupy this landform with Survey Areas 2 and 3 also partially upon floodplains.

The results from the 902.84 acres of the FY2014 HPF Grant survey show a Late Archaic presence in the southern portion of the county. No evidence of the Paleoindian or Woodland presence was recovered in this survey. Eight-two percent of the sites discovered in this survey were located on till plains/moraines. There were two survey areas and 18 percent of the total sites located close to the river located partly on floodplains; however, floodplains account for only approximately 7 percent of the land surveyed. The location of projectile points further north and south of the river could indicate use of upland features more for hunting rather than

habitation purposes. This relationship should be investigated further. This low percentage of lowland landforms surveyed needs to be kept in mind when comparing results to previous HPF grant surveys conducted (Macleod and Donovan 2014; Swihart and Nolan 2013, 2014). While it is possible that some sites are hiding on the floodplains, it is unlikely that large habitation sites or Mississippian villages lay hidden on the floodplains, as these areas would have been more regularly inundated, and inhospitable. Aside from the Late Archaic period, the settlement patterns for different prehistoric cultural contexts are impossible to analyze due to the lack of recovered diagnostic materials during our surveys in the southern portion of the county. The fact that survey was limited to a majority of upland landforms means that the sample of the archaeological record in Newton County obtained during our efforts is mostly representative of one type of taphonomic, geomorphic, and pedogenic process, that is, the till plain/moraine setting.

Table 6. Projectile Point Site Numbers and Cultural Periods Per Landform.

Landform	Sites and Cultural Periods
Till Plain and Moraines	12-N-75 (Late Archaic) 12-N-284 (Late Archaic)

Table 7. Site Densities and Distributions By Landform.

Landform	# of acres	# of sites	Density	Distribution
Till Plains/Moraines	836.92	73	1 site per 11.46 acres	Sites cover 3.21% of surface area
Floodplains	65.92	16	1 site per 4.12	Sites cover 8.31% of surface area

Table 8. Number of Artifacts per Landform.

Landform	# of artifacts	% of artifacts recovered
Till Plain/Moraines	1069	80.4%
Floodplains	260	19.6%

The majority of sites were discovered on silty clay loam and silt loam texture soils. Twenty-five sites were located on silt loams (28.10%), 35 sites were located on silty clay loams (39.33%), 13.48 percent of sites are located on loam (n=12), 17.98 percent of sites are on sandy loam (n=16), and 1.12 percent of sites were located on muck (n=1).

Moderately poorly drained soils (n=31, 34.83%) constitute a plurality of site locations. A total of 30 sites were found on moderately well drained soils (33.71%), 25 sites were found on somewhat poorly drained soils (28.1%), two sites occur on very poorly drained soils (2.25%), and only 1 percent of sites was found on well drained soils (1.12%).

Historic Settlement Patterns

Historic cultural material was recovered in Survey Areas 2-8 and was representative of the initial mid-19th century settlement of the county through modern times. Mean dates were calculated for each survey area (Table 9), excluding non-diagnostics and types with unanchored parameters (i.e. pre-1940). Results indicate that the majority of survey areas were most active during the late 19th and early 20th centuries. This is corroborated by the mean historic date of the whole survey which was 1899. Both of these pieces of information are in keeping with the literature narrative concerning the draining of the wetlands beginning in the 1850s and completed by 1880 (Barnes and Osterholz 1998:2) which progressively opened up the county for farming.

Table 9. Survey Area Mean Dates for Historic Artifacts.

Survey Area	Mean Date
Survey Area 1	N/A
Survey Area 2	1904
Survey Area 3	1895
Survey Area 4	1901
Survey Area 5	1905
Survey Area 6	1925
Survey Area 7	1909
Survey Area 8	1854
All Survey	**1899**

Public Outreach

On September 27, 2014, Ball State University's Applied Anthropology Laboratories took part in Mounds State Park's annual Indiana Archaeology Month activities. There were numerous hands-on demonstrations and participant activities for visitors. Posters depicting the methods and results of several previous HPF grants were on display and this was used to discuss both the methodology and goals of the FY2014 Grant surveys in Jasper and Newton counties. Ball State archaeologists and students used this public event to speak with numerous local individuals fostering public interest and awareness in this HPF Grant survey. Approximately 150 members of the public attended this event at Mounds State Park, Anderson, Indiana.

In October 2014, an Open House was held in the Applied Anthropology Laboratories. The goals of the open house were to showcase current projects that included student involvement, encourage additional student involvement, and to invite possible community and professional collaborators to view our work and in-process projects. The focus of the Jasper County FY2014 Grant exhibit was twofold. Historic and prehistoric artifacts were displayed and explained to the public in order to demonstrate the diversity of knowledge necessary for

archaeological investigations such as this. In addition, chert and lithic identification with hands-on demonstrations of the identification and cataloging processes were given to Open House attendees.

On April 27, 2015, a public presentation was given at the Newton County Government Center in Morocco, Indiana, by AAL archaeologist Christine Thompson and Department of Anthropology graduate student Jamie Leeuwrik. The presentation was sponsored by the Newton County Historical Society. 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 60 people attended the presentation which included a question and answer session, and a short discussion of Indiana archaeology laws. This presentation and project proceedings in general were also posted to the AAL's Facebook page and various other social media sites.

Throughout this project there was broad support for the pedestrian surveys from the residents of Newton County. Fourteen landowners gave permission to survey their properties totaling 1,251.08 acres of agricultural land available for survey, of which 902.84 acres was surveyed. 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. All landowners requested that the artifacts discovered be returned to them. 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 Newton County has an active and involved public that displays a great interest in their county's history, both historic and prehistoric.

Conclusions and Recommendation

This project primarily targeted the Iroquois River drainage, as well as adjacent upland areas in the southern half of Newton County, Indiana. The project area was selected due to the lack of known archaeological sites in the SHAARD database and the identification of Newton County as a data deficient county. The goals of the project were to increase the site database, construct a more complete cultural chronology for the county, understand and refine both the settlement patterns, as well as the patterns of interaction between and among early Euro-American settlers and Native Americans. This article concentrated on the prehistoric results of this project.

Our survey areas in Newton County exhibited a lack of artifacts as compared to similar county surveys in Indiana. This is similar to the results of previous surveys conducted in and surrounding Newton County (Macleod and Donovan 2014; Murray et al. 2011). It is very likely that the presence of such a high concentration of marshes and wetlands in the southern and

central portions of Newton County during prehistoric times and into the mid-1800s heavily influenced the habitability of the area (Petty and Jackson 1966:280). The marshes were great sources of resources for the prehistoric people of the area, who tended to settle along the Iroquois river (Heistand 2005:8-10). However, the same marshy environment would have dramatically restricted both livable land and resources in the area for the incoming Euro-American settlers during the historic period. This constraint would have concentrated those individuals who were there to select upland and well drained features in order to avoid the marshlands that were so prevalent throughout the county. The large scale changes to the environment brought about by the historic draining of Beaver Lake brought in a relatively late Euro-American settlement pushing the majority of the historic settlement dates to much later in the 19th century. Before the draining, much of the Euro-American settlements were located along streams in the southern portions of the county (Heistand 2005:10-11). These streams were then drained into the Iroquois River when larger scale farming practices became more prevalent and streams exist today as dry ditches.

The two diagnostic prehistoric artifacts recovered from the survey areas date to the Late Archaic period. Though the amount of recovered prehistoric diagnostics from the survey is not enough to make generalizations regarding occupation habits, we may be able to use this information in order to identify the use of the land during the Late Archaic period. The points were found in areas located both north and south of the Iroquois River in the uplands. Since prehistoric habitation sites would have been located closer to a water source, the location of the points so far from the river could indicate that those areas were used as hunting grounds, temporary camps, or other extractive activities. The majority of the precontact sites were unable to be identified by cultural period; however one prehistoric cultural period, the Late Archaic, was documented. Due to the high number of artifacts, site density, and the variety of artifacts with end dates dating to the mid-1800s, one historic site (12-N-90) was recommended for further investigation, and the remaining 88 sites were recommended as not eligible for listing on the Indiana Register of Historic Sites and Structures or the National Register of Historic Places. An anomalously high density of historic artifacts in the western area of Survey Area 5 indicates that further research into this area would be beneficial for a more complete understanding of the historic settlement of Newton County.

The surveys conducted in Newton County cannot be compared to those conducted in counties whose results show a greater evidence of land use in upland areas because of the disproportionate survey of upland features in Newton (Macleod and Donvan 2014; Swihart and Nolan 2014). Much of the evidence discovered on the floodplains consisted of historic artifacts with few prehistoric artifacts and no prehistoric diagnostics. As the vast majority of surveys being located on upland landforms it is difficult to analyze occupation patterns by landform. Survey of a greater variety of landforms would be beneficial in understanding occupation patterns across the county. Many factors could have influenced the project data including the location of the surveyed properties, whether a field was tilled recently or not, the collection of fields by lithic enthusiasts, and even local weather patterns prior to field survey. Further research into prehistoric landform usage is recommended within Newton County.

The analysis of the Carlson collection re-illustrates that we are collectively missing a large portion of the full story of our shared past. Not only did the Carlson family document time periods which all of the professional investigations are silent on (i.e., Paleoindian), but the collections shows that there are many unidentified prehistoric lithic scatters that remain where once there were abundant diagnostic lithic and ceramic artifacts. The presence of Middle Woodland ceramics, and Mississippian stone tools highlights large gaps in our understanding. However, we should not exclusively focus on these "sexy" period of the past, but seek to explore the full range of prehistoric landscape use. Accomplishing this from Phase Ia surveys and limited testing is not possible. We must incorporate private archaeological collections and records into our databases (see Society for American Archaeology (1996); Principles of Archaeological Ethics 1 and 7).

Newton County would benefit from further archaeological investigations, especially those focusing on the procurement of diagnostic prehistoric materials and systematization of landform use prehistorically. Included in this should be further large scale pedestrian surveys to complement the findings in this report as well as identify potentially new areas of interest. This would include particularly surveys that attempt to capture representative samples of the topographic, geomorphic, hydric, and texture properties of landforms and soils, given the peculiar hydrological history of this area and the already documented peculiar distribution of archaeological materials in this portion of the state (Leeuwrik et al. 2015; Macleod et al. 2015; Surface-Evans et al. 2005). Surveys designed in this way could add not only to our understanding of shifting resource procurement and settlement strategies throughout prehistory, but could also be used to hypothesize changes in overall drainage properties of the region related to the formation of the various marshes, and marsh-like environments that predominated in this region.

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ARCHAEOLOGICAL INVESTIGATIONS OF THE SOUTHERN HALF OF JASPER COUNTY, INDIANA

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Abstract

The Applied Anthropology Laboratories (AAL) at Ball State University conducted a data enhancement project for archaeological resources in Jasper County, Indiana for a FY2014 Historic Preservation Fund Grant (Grant #18-14-FFY-02). This Historic Preservation Fund grant project investigated the archaeological resources of Jasper County, Indiana with a focus on major waterways such as the Iroquois and Kankakee Rivers in the southern half of the county. Approximately 900 acres (364.22 hectares) of agricultural land were surveyed, and 112 new archaeological sites were recorded. The survey recovered 209 prehistoric artifacts and 307 Historic artifacts from seven parcels of land within Jasper County. No human remains were discovered as a result of this grant project. Cultural periods that are represented in the artifact assemblage include Middle Archaic, Late Archaic, and Late Woodland/Late Prehistoric components that were documented from the precontact era, in addition to Historic components. The average site density recorded for the project area for precontact sites was one site per 15 acres and for Historic was one site per 13.85 acres. This article will concentrate on the Prehistoric results of this project.

Introduction

The Applied Anthropology Laboratories (AAL) at Ball State University was awarded a FY2014 Historic Preservation Fund Grant to survey portions of Jasper County, Indiana. The project involved a pedestrian survey of approximately 900 acres of agricultural land. The main goals of the project were to increase the site database, refine the cultural chronology for the county, build on the FY2012 Historic Preservation Fund (HPF) grant survey conducted by Indiana University-Purdue University Fort Wayne Archaeological Survey (IPFW-AS), and examine the interaction of the Euro-American settlers and Native Americans along the Iroquois River. Specifically we hoped to add to the understanding of the Early Woodland and Middle Archaic periods of the county based on the low number of previously documented sites for these cultural periods in comparison to the surrounding counties. Jasper County had 196 archaeological sites recorded in

the State Historic Architecture and Archaeological Research Database (Division of Historic Preservation and Archaeology 2014) database prior to this survey, 137 of which were added as a result of a FY2013 HPF Grant conducted by IPFW-AS which focused efforts on the well-drained soils and wetland resources surrounding the Kankakee and Iroquois rivers (Smith and Sanchez 2013). The investigations in this report focus on the southern portion of the county, especially areas adjacent to the aforementioned Kankakee and Iroquois waterways. The southern half of the county is primarily comprised of till plain and moraine landforms. The majority of the survey areas consisted of these landforms with some alternative landforms (such as floodplains) also being surveyed due to landowner permissions and visibility.

Background

We provided a framework for interpreting the data collected during this project by reviewing the natural and cultural setting. The background information presented in this article includes environmental and archaeological information concerning Jasper County, Indiana.

Natural Setting

Jasper County (Figure 1) has an area of 359,321 acres (145,412 hectares) (Smallwood and Osterholz 1990:1). For the proposed research, we targeted areas surrounding the Iroquois River in the southern half of the county, as well as locations that were noted in IPFW-AS's FY2013 HPF Grant report (Smith and Sanchez 2013) to include historical churches or schoolhouses. Due to the lack of landowner permissions we did not survey any land parcels that included or were adjacent to churches or historic school houses in Jasper County.

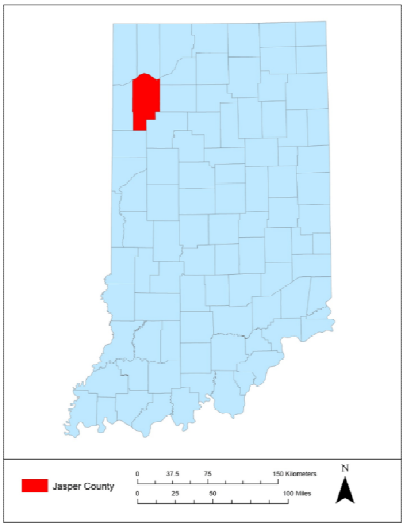

Figure 1. Jasper County within the State of Indiana (based on Yellowmap World Atlas 2015).

Jasper County is within the general physiographic units known as the Northern Moraine and Lake Region and the Tipton Till Plain (Schneider 1966). Gray (2000) places the county within the Kankakee Drainageways (northern third of the county) and the Iroquois Till Plain (southern two-thirds of the county). The Kankakee Drainageways is characterized by "broad tracts of sandy outwash, lake plains, and scattered clusters of dunes" (Gray 2000:Plate 1). It is a flat and poorly drained area, with broad shallow lakes and blanket sand formed by receding glaciers, and sand dunes created by westerly winds. The area was extensively ditched and drained at the turn of the 20th century, but still remains mostly poorly drained (Gray 2000:3). The Iroquois Till Plain, part of the Central Till Plain Region, is characterized as "till plain of very low relief with minor areas of end moraine" created by the Lake Michigan Lobe of the Late Wisconsin glacier (Gray 2005:5 and Plate 1). As with northern Jasper county, much of the Iroquois Till Plain region remains poorly drained, even after extensive ditching (Gray 2000:5-6). These poorly drained soils, combined with the low lying topography, contributed to the formation of the Kankakee Marsh which covered much of this area until its draining, in the mid-19th thru early 20th centuries for agricultural purposes (Smallwood and Osterholz 1990:1).

The Kankakee River, and its tributary the Iroquois River, both run through Jasper County. The Kankakee River lies in the north and forms the northern boundary of the county. The Kankakee River flows westward through 13 counties, including Jasper, until it leaves Indiana and flows into Illinois where it eventually meets the Iroquois River. The Kankakee River is surrounded by the Kankakee Outwash Plain, which is described as being nearly level land with low, meandering sand dunes or ridges (Smallwood and Osterholz 199082:2; see also Gray 2000). As it is a tributary of the Kankakee River, the Iroquois River is notably smaller than the Kankakee River and also flows westward into Illinois where it ultimately meets the Kankakee. The Iroquois river is surrounded by the Iroquois lacustrine plain which is characterized as nearly level with low sand ridges rising a few feet. Throughout Jasper County, there are many other tributaries of these two rivers and some small manmade ponds (Smallwood and Osterholz 1990:2). Both rivers are slow-flowing, low gradient meandering streams on glacial outwash deposits. The vast majority of the county is characterized by pre-settlement vegetation of wetlands. In addition, there is a tongue of dry prairie north of the main body of the Iroquois River and several pockets of Oak-Hickory forest (Petty and Jackson 1966:280). The low grade of the two rivers, the poorly drained nature of the predominantly wetland soils, and the relatively high precipitation (Woods et al. 2003) exerted substantial influence on the prehistoric and early historic use of the area. Settlement of the county by Euro-Americans was slow until the mid-19th Century when concerted drainage efforts were undertaken (see Heistand 2005:11). The rivers and wetlands would have been major sources of resources for both Native Americans and early colonial settlers populating Jasper County (Sandy et al. 2002:xii).

Attica chert, Liston Creek chert, and Kenneth chert are the bedrock cherts in the region of Indiana around Jasper County (Figure 2). Attica is a Mississippian Period chert from along the western reaches of the Wabash River. Attica chert (a.k.a Wabash Green) is blue-green in color with blue-grey streaks, bands, and mottles. Attica chert takes on a purple color with pinkish bands and streaks upon heating. Texture ranges from fine-medium to medium-coarse; luster is

dull to slightly glossy (Cantin 2008:12). Fossil inclusions are rare. Temporally, Attica chert is found in all cultural periods in Indiana (Cantin 2008:13).

Liston Creek chert is both a nodular and bedded chert of the Silurian System (Cantin 2008:Table 1; see also Cantin 2008:54). Liston Creek ranges from light to medium grey with patches of tan or brown also being commonly found within samples. The texture varies from coarse to medium-fine. Small fossils are occasionally found within Liston Creek chert (Cantin 2008:55).

Kenneth chert is a bedded chert also of the Silurian System (Cantin 2008:Table 1, 46). The base color of this chert is white to a light grey with occasional patches of deeper grey or brown-grey. Fossils are common; however, they are small "siliceous blobs" (Cantin 2008:47). Kenneth chert was used by Native Americans more within the Tipton Till Plain and in areas where qualities of chert were limited and of low quality (Cantin 2008:48).

Cultural Setting

The natural setting of Jasper County demonstrates an area with interrupted habitable areas. For long periods the area was minimally occupied. However, after each retreat of the glaciers and following fluctuations of the local surface water (both rivers and wetlands), Jasper County experienced geographically scattered habitation. These different occupation patterns track the fluctuating moisture levels (natural and anthropic) in the area that modify the availability and location of habitable land. Sites and site components that have been documented in the county illustrate that Native Americans inhabited the region from the Paleoindian period through the Historic period. Most sites within Jasper County are of an Unknown Prehistoric cultural affiliation. Of the cultural affiliations known in the area, historic sites are most frequent with 30 sites being documented, followed by Late Woodland and Late Archaic sites of which there are 10 documented sites each (Division of Historic Preservation and Archaeology 2014). Dorwin (1966) reports very low density of Paleoindian points from local collections. The prevalence of historic sites is expected as historic occupations typically display a larger footprint and better preservation than prehistoric materials, and after artificial drainage during the 19th Century, more of the landscape was more consistently available for settlement. The prehistoric dominance of Late Archaic and Late Woodland sites in Jasper County is distinct from neighboring counties (e.g., Leeuwrik et al. 2015) and may not be representative of the true archaeological record due to low numbers of observations and limited extent of investigation.

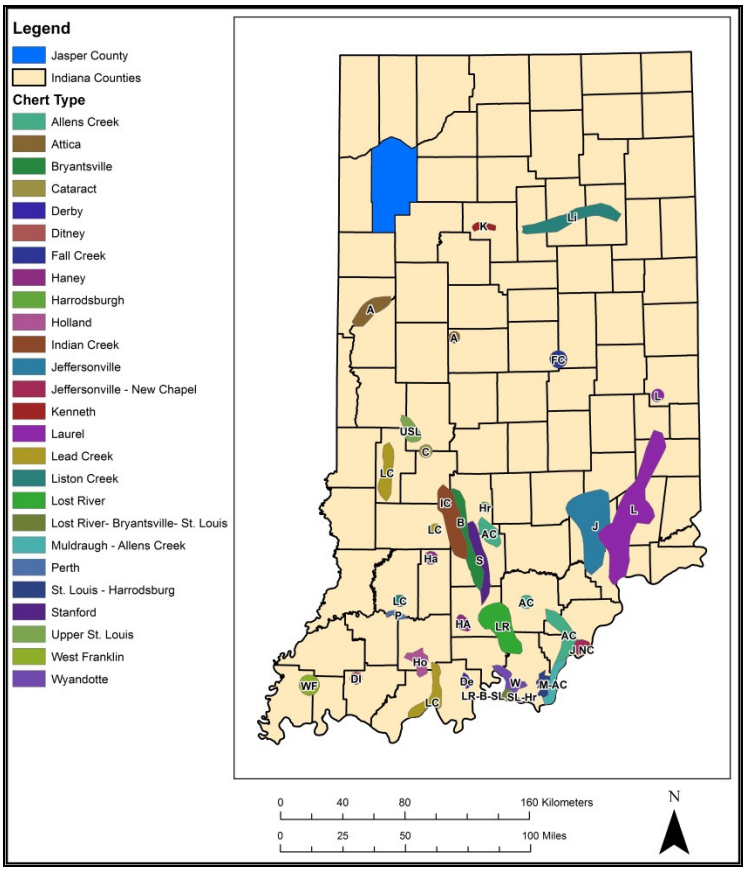

Figure 2. Indiana chert outcrop locations (Digitized by Brad Painter from Cantin 2008).

Archaeological investigations in Jasper County have been predominantly oriented toward surface surveys and only a small percentage of sites have been tested or excavated. Several larger scale surveys have been conducted within Jasper County and have been successful in discovering cultural materials. In 1989, Thomas Beard conducted a survey on areas for bridge replacements and road improvements along US 231 in which 90.3 acres were surveyed and three previously unrecorded Prehistoric sites were discovered (Beard 1989). In 2003, a field reconnaissance was conducted on approximately 110.19 acres of land by Archaeological Consultants of Ossian. The area being surveyed was the proposed site of an interchange of State Road 14 and I-65 in Newton Township. Two previously unrecorded sites were discovered as a result and these sites contained lithic materials (Stillwell 2003). One of the most recent surveys conducted in the county was completed by Indiana University-Purdue University Fort Wayne Archaeological Survey (IPFW-AS). In 2013, IPFW-AS conducted a survey of 1,344 acres of Jasper County through a phase Ia survey documenting 137 previously unrecorded sites. The sites discovered in this survey contained a variety of cultural material. Historic materials such as ceramics, metals, glass, and bones, as well as prehistoric lithic materials, were found among the various sites (Smith and Sanchez 2013).

Before European settlers made their way to Jasper County, multiple Native American groups, like the Miami, Kickapoo, and Potawatomi, populated the area. These groups, particularly the Kickapoo moved considerably up to and during contact times. The Kickapoo, Potawatomi, and Miami tribes were the most pervasive tribes in the prairies surrounding the Kankakee River in what was to become northwest Indiana (Callendar 1978:681, Callendar et al. 1978:656-657, Clifton 1978:725-726). They created small villages along the Iroquois River and hunted and trapped throughout the area and its aquatic sources. However, a series of events such as westward expansion and the Kickapoo siding with the British in the War of 1812 against the United States, solidified bad relations and broken treaties with the Americans, most of the tribes in the area were forcibly moved from Indiana. Many, if not most of these individuals were moved to Kansas in 1838 in a federal government action known as the Potawatomi Trail of Death (Carmony 1998; Clifton 1978:725; Heistand 2005:8; Sandy et al. 2002:xii).

The first Europeans to come to the Jasper County area were French explorers from the expedition of Rene-Robert Cavalier de LaSalle in 1679. The harshness of the Grand Kankakee Marsh, which characterized most of this area at the time, kept permanent colonial settlements from being established for nearly another 200 years. Once Indiana was declared an official state in 1816, more and more settlers began to slowly move into the state ultimately making their way to Jasper County beginning in the 1830s (Sandy et al. 2002; see also Heistand 2005).

Around this same time Jasper County was officially recognized as a county, however its boundaries with modern day Benton, Newton, and Porter Counties were ill-defined. Settlement in the area did not increase in the following years and due to small populations, Jasper and Newton County were combined into one county in 1839. Jasper, Newton and Benton counties were intertwined until 1840 when Benton County was organized separately and finally in 1859 Jasper and Newton County were formed as separate counties (Sandy et al. 2002:xii).

With the recognition of Jasper as its own county more settlers began to gradually inhabit all the areas of the county. Even into the 1880s the population of Jasper would be considered sparse at best. Most of the land in Jasper County was used for large scale agriculture until the late 1800s when more settlers arrived and smaller agriculture began to take place. As rail travel became a more popular form of movement throughout the country, the railroads began projects in northwestern Indiana including Jasper County. These rail lines assisted in the growth and development of small towns in the county. With more people populating the area there grew a greater need for open agricultural plots. This came by way of the Kankakee Ditch which was started in the late 1800s and was completed in 1907. This project drained much of the Kankakee Marsh and straightened the Kankakee River in order to make the surrounding land more manageable and useful to the residents of the county. Accompanying the advent of the automobile and the large scale shift in infrastructure associated with its inception such as highways, the residents of Jasper County gained access to goods, services, and markets that they were previously isolated from (Sandy et al. 2002:xii).

Archaeological Survey Methods and Results

Approximately 900 acres (364 hectares) of agricultural land on till plains/moraines and floodplains were surveyed by pedestrian transects. We examined seven survey areas, recorded 112 new archaeological sites, and recovered over 500 artifacts. No human remains were discovered as a result of this grant project. The survey documented the human occupation of Jasper County from the Middle Archaic period and extending through the Historic period. Considering the limitations of Phase I surveys, it is presumptuous to assign functionality to sites identified solely by pedestrian survey. Site types were therefore not defined beyond isolates and scatters. However, it is likely based upon the variation in artifact classes discovered on the sites that multiple sites types are represented. In addition to the field survey, a collector visit was also conducted which yielded information concerning the presence of unrepresented artifact classes as well as information concerning probable site locations for time periods and site types not encountered during the field survey.

This project was conducted by AAL archaeologists and AAL student employees. Principal Investigators were AAL Archaeologist Christine Thompson and Senior Archaeologist Kevin C. Nolan. The field survey was conducted between August 12, 2014 and September 13, 2014. The field survey was executed using pedestrian transects spaced at 10 meter intervals. The survey interval was reduced to 5 meters when artifacts were encountered. The areas surveyed by pedestrian transects had between 70 and 95 percent ground surface visibility. All artifacts that were within two meters of the first artifact encountered, except fire-cracked rock and brick, were collected, bagged, and given temporary transect and find numbers. Objects found farther apart within the same transect were given the same transect number and the next sequential find number. When artifacts and clusters were encountered, short transects were surveyed at five meter intervals to refine the boundaries of the cluster. Each new radial find was assigned a new find number. Fire-cracked rocks and bricks were counted and mapped, but were not collected. Find points were mapped with a Trimble GeoXT Series GPS with a minimum of 20 readings logged for each find spot. GPS data was post-processed to sub-meter accuracy using Trimble GPS Pathfinder Office series 5.3 software and exported to ESRI shapefile formats (UTM NAD83 Zone 16N) for inclusion in the project GIS. Field notes were maintained by field supervisors.

All materials generated by this project were accessioned under AAL Accession number 14.28. All project materials were curated at Ball State University, Department of Anthropology. All landowners opted to have their artifacts retained by Ball State University to be used for educational purposes. Therefore all artifacts were identified, analyzed, measured, labeled, and curated per Division of Historic Preservation and Archaeology guidelines.

In addition to field and laboratory investigations, AAL archaeologists were contacted by an artifact collector from Jasper County. Nolan and Macleod documented the collection. The collection was examined initially in order to assess general artifact classes and material association. Once this was roughly determined, the predominantly lithic artifacts were scanned and/or photographed in order to keep a record of the collection. Material type and artifact class

were recorded for groups of diagnostic points. The collector also provided information regarding the location of certain fields that produced many of the artifacts which were recorded using a combination of two hard copies of Jasper County plat books (Jasper County Abstract Company 1984; Town & Country 1978), which were generously donated to AAL. These hard copies were scanned and digitally reproduced along with other survey information (see Macleod et al. 2015:Appendix H). This information and that held in other similar collections will be essential to developing a fuller understanding of the content of Jasper County's cultural resources.

Artifacts

The field survey recovered 209 prehistoric artifacts and 307 historic artifacts (Table 1; see Macleod et al. 2015). The majority of prehistoric artifacts consist of lithic debitage. The edge modification to several flakes indicates the debitage likely functioned as expedient tools. The majority of formal lithic tool types were projectile points dating to the Middle Archaic (n=1), Late Archaic (n=1), and Late Woodland/Late Prehistoric (n=2) periods (Figure 3, Figure 4, Figure 5, Figure 6). Other stone tools consisted of endscrapers, sidescrapers, groundstone tools, burins, flake tools, and core tools. Historic artifacts consisted mostly of various types of ceramics, various colors and types of glass, metal objects, with only occasional unique items (Figure 7 and Figure 8). Some of the more unique materials include red glass, a blue glass marble, a ceramic insulator, and an oblique toothed gear, likely a differential gear off of a tractor or other piece of machinery.

Table 1. Artifacts Recovered.

Prehistoric	No.	Historic	No.
Biface, Hafted	4	Porcelain	12
Biface, Unhafted	5	Ironstone	16
Core, Tool	2	Whiteware	52
Core	15	Stoneware	30
Flake, Tool	25	Ceramic Insulator	1
Flake, Proximal	74	Ceramic Doll Fragment	1
Flake, Shatter	69	Glass, Red	1
Groundstone, Tool	5	Glass, Cobalt	4
Angular Shatter	10	Glass, Green	3
		Glass, Sun Colored Amethyst	34
		Glass, Milk	15
		Glass, Amber	11
		Glass, Aqua	52
		Glass, Clear	64
		Glass Marble	1
		Metal, Chain pin	1
		Metal, Gear	1
		Metal, Nut	1
		Metal, Unidentified	2
		Limestone Masonry	1
		Coal	2
		Clinker	2
Total	**209**	**Total**	**307**

Figure 3. Late Woodland Triangular Cluster point from site 12Js297 (Photo by Felicia Konrad, Ball State University).

Figure 4. Part of a Jack's Reef Pentagonal point diagnostic from site 12Js340 (Photo by Felicia Konrad, Ball State University).

Figure 5. Part of a Raddatz Side Notched point diagnostic from site 12Js340 (Photo by Felicia Konrad, Ball State University).

Figure 6. Late Archaic Brewerton Side Notched point from site 12Js286 (Photo by Felicia Konrad, Ball State University).

Figure 7. Ceramic insulator recovered from site 12Js290 (Photo by Felicia Konrad, Ball State University).

Figure 8. Blue glass marble recovered from site 12Js299 (Photo by Felicia Konrad, Ball State University).

Chert

Chert identification was conducted microscopically with a 57900-04 Boreal Zoom Stereo Microscope at 10x to 40x magnification and in comparison with hand samples and reference manuals (Cantin 2008) and was listed by geologic time period. Chert was then listed by which type it is most consistent with as described in Cantin (2008). If the artifact material displayed characteristics that were consistent with multiple chert types, all applicable types were listed in the identification.

The lithic artifacts for this survey were dominated by Mississippian cherts (67.2 %). Of the Mississippian assemblage an overwhelming majority was consistent with Attica chert (43.0 %). This overrepresentation of Mississippian chert, and Attica in particular, is likely a result of the predomination of Mississippian bedrock throughout western Indiana and eastern Illinois. Furthermore, the proximity of Attica chert specifically to Jasper County likely plays a large role in the presence of this material. As mentioned in the introduction, no natural chert outcrops exist in Jasper County; however, Attica outcrops about 40 kilometers south in Boone, Fountain, and Warren counties. The raw material of one of the recovered projectile points, a Raddatz Side Notched point (12Js340-01), was consistent with Attica chert. The second recovered projectile point of Mississippian chert, a Brewerton Side Notched point (12Js286-01), was consistent with Muldraugh chert. The third recovered projectile point of Mississippian chert, a Late Woodland Jack's Reef Pentagonal point (12Js340-02), was consistent with Burlington chert and is consistent with points used by Albee and other Late Woodland groups. Muldraugh chert is located in the southeastern portion of Indiana and Burlington chert is found in southwestern Illinois. This indicates that some resources in Jasper County, at least in the Late Archaic and Late Woodland periods, were being acquired from great distances, likely through trade. The remainder of the Mississippian chert assemblage was consistent with Burlington chert (17.8%), Blanding/Elwood-Joliet (14.8%) cherts, and Blanding chert (8.2%). These cherts come from central and western Illinois and are typically higher quality material than what is found in northwestern Indiana. Burlington chert in particular is exceptional material and was highly prized in prehistoric times. The distance to these materials indicates that trade would likely have been active at least at some point between northwestern Indiana and central/southwestern Illinois.

Silurian chert had the second greatest representation in this survey (20.4%). Of the Silurian material recovered, those consistent with Liston Creek comprised the overwhelming majority of the collection (85.4%). Liston Creek chert occurs as river outcrops to the southeast in Huntington, Wabash, and Miami counties approximately 75 kilometers away (Cantin 2008), making it one of the closest major chert sources. None of the projectile points recovered were made from Silurian chert. Though the sample size is not large, this may indicate that Silurian age chert, particularly that consistent with Liston Creek, was used primarily for non-point tool manufacture, or even expedient tool manufacture.

Pennsylvanian chert is the third greatest in abundance (1.0%) with specimens consistent with Holland and Flint Ridge chert forming the whole assemblage (n=2). There are few Pennsylvanian aged chert outcrops in the Indiana. Moreover, sources of these cherts in Indiana

are located exclusively in the southern half of the state, and other sources are found in the eastern part of Ohio. Holland chert outcrops far to the south in Dubois County and would have been a trade and/or specialty item.

The use of chert illustrates that prehistoric people of Jasper County were relying on local, easily obtained resources for about half of their lithic material (47.8%). It also indicates that reliance on local resources was supplemented substantially with exotic lithic materials from southern Indiana (Holland, Wyandotte, Indian Creek, etc.; see Macleod et al. 2015), as well as from central and southwestern Illinois (Burlington, Blanding, Elwood-Joliet). As these non-local materials have a comparable representation in all stages of lithic production, it is likely that they were procured as cobbles or cores, and used for routine production as opposed to extraordinary projects.

Collector Visit

A total of 431 diagnostic artifacts and tools were examined in the private collection. The volume of lithic materials only allowed for a coarse evaluation of material type and general artifact class. This led to a majority of the material types (55.22%) being classified as "unidentified" due to time constraints. The identified lithic materials collectively displayed a source breakdown comparable to the materials recovered from the survey. An overwhelming majority of identified cherts were of Mississippian age (33.41%, or ~76% of identifiable), approximately one tenth of chert in the collection (9.05%, or ~21% of identifiable) was Silurian in age, and around half of one percent (0.46%, or ~1% of identifiable) of the total material identified as Pennsylvanian. An additional 0.70 percent (~1.6% of identifiable) was classified as "Other" which consisted of shale and quartzite.

The artifact classes from examined materials are available in Table 2. The collector had his collection divided between display materials and general materials that were kept in bins and boxes. Due to time constraints, only the general collection was tabulated by artifact classes. Fifteen fluted/Paleoindian points were documented from this collection (3.48%). As this is typically an underrepresented period in Indiana, and particularly Jasper County, due to its age, general depth to material, as well as having the largest amount of geomorphic disturbance since production, these high numbers seem interesting and possibly anomalous. This may indicate a strong, as of yet, undocumented Paleoindian presence in Jasper, or possibly may be a result of collector bias. The varying material of these artifacts also indicates several distinct sources and lends support to the idea that there was a more prominent Paleoindian presence in Jasper County than has been previously documented. If a disproportionately large Paleoindian presence did exist in the county, it is likely the result of different geomorphic conditions allowing for more habitable land during that period and less in subsequent periods. This may provide insight into how the nature of the county and the marsh changed throughout time.

As for the other artifact classes in the general collection (Figure 9), side notched points (n=89) were the most common at 39.73 percent, possibly indicating a strong Middle Archaic

presence (Justice 1987). Corner notched points (n=55), which were used during multiple phases, were not surprisingly the second most represented group at 24.55 percent. Stemmed points (n=47), common among Late Archaic through Early Woodland cultures, such as Adena, were also well represented at 20.98 percent.

Table 2. Distribution of Artifact Classes within the General Collection.

General Artifact Class	No.	Percent of General Assemblage
Fluted/Paleoindian	15	6.70
Stemmed	47	20.98
Corner Notched	55	24.55
Side Notched	89	39.73
Base Notched	4	1.79
Drill	1	0.45
Unhafted	13	5.80
Total	**224**	

The preponderance of side notched points in the private collection compared to only one Middle Archaic site in SHAARD, in addition to the large number of stemmed points to the only three previously documented Early Woodland sites are both surprising findings. The proportion of side notched points is, however, roughly consistent with the results of our survey which documented one Middle Archaic site, accounting for 25% of the diagnostic prehistoric materials. These numbers, while important, should be viewed cautiously as there are a relatively low number of documented diagnostic prehistoric sites in Jasper County and as a result of this survey. This means that only coarse comparisons based on these samples is warranted. Potential collection bias is another reason for caution in comparing results; however, the results should at the very least stimulate interesting and provocative research questions in years to come. What we can clearly state unequivocally is that the "official" archaeological record is possibly a poor representative of the actual history of occupation in the county. In addition to the coarse classification, several other materials were documented, including what appeared to be additional drills, as well as possible burins, awls, prehistoric ceramics, and one historic gunflint.

The relationship between artifact classification and material type amongst the general collection (n=208) was also examined. Though there were limiting factors such as time, equipment, and most of the material classifications of the sample being "unidentified," there still appeared to be a distinct trend towards preference for local sources indicated by elevated levels of cherts consistent with Attica and Liston Creek. While exotic materials such as those consistent with Burlington and Wyandotte were present, they exhibited appreciably lower numbers.

A small prehistoric ceramic collection was also in the private collection. This included three dentate stamped sherds, multiple incised sherds, and one thick Early Woodland sherd (Figure 10). In addition to the points and pottery, the prehistoric collection also included several boxes of "complete" and grooved axes, a bannerstone, a partial birdstone, and several gorget fragments. The historic collection contained a ceramic stopper with stamped '+' on the top,

several 19th century pipes, a few probable Prosser ceramic buttons, historic bullets, historic metal including iron and copper, and various other historic fragments.

The collector was very interested in our survey and shared with us what information he could remember regarding the "best hunting grounds," which undoubtedly correspond to archaeological sites. He had good recollection of specific areas where he had collected, but except for a few cases, did not recall which artifacts were collected from which locations. The collection areas (parcels) were identified and documented during the visit using three separate media (see Macleod et al. 2015:Appendix H). Other cultural resources were documented verbally. The notes of this meeting documented approximate site locations using landmarks and maps as well as artifacts and features associated with those sites.

Figure 9. A portion of the private collection documented prior to examination.

Sites

Of the 112 archaeological sites identified in our 900 acre pedestrian survey, 59 had Unidentified Prehistoric components. The identified precontact components consisted of one Middle Archaic component, one Late Archaic component, and two Late Woodland components. Fifty-two sites had Historic components, dating from the early-19th century to present (Table 3; see Macleod et al. 2015).

The approximate categorization of collector materials stands in slight contrast to these and previous survey results. While the collector visit found inflated numbers of fluted/ Paleoindian points, this survey did not recover any evidence of Paleoindian occupation. The Middle Archaic, which is often characterized by side notched points, was represented in this survey in the form of a Raddatz point and was likely well represented in the private collection as well due to the large numbers of side notched points. Both the differences and similarities across artifact types indicate that further collector contact, as well as investigation into heavily collected areas, is recommended in Jasper County. We cannot continue to ignore the high volume and quality of data in private collections (e.g., Shott 2008) if we intend to document the full history of any region.

Figure 10. A sample of the prehistoric ceramics from the private collection.

The relatively low number of sites discovered as a result of this survey is tremendously telling. It indicates the degree to which the original wetlands of the area affected land use. The fact that sites were still identified at all, combined with the information gleaned from the collector visit, indicates that cultural resources in Jasper County are very much extant and can be interpreted as predominantly localized in nature. The recovery of diagnostic materials from all periods as a result of this survey, previous surveys, and private collectors demonstrates that Jasper County has been variously inhabited since the Paleoindian period. The geomorphic history of the area and the variable distribution of material by different periods implies that the habitable area has changed considerably throughout time, but at any one time has remained limited and discontinuous, thereby restricting the expanse and density of use. This directly reflects the varying levels of surface moisture. The ability to date occupation or use of an area to specific period is important as this is related to the state of the wetland and marsh conditions and, in turn, what portion of land was exposed and habitable throughout the temporal sequence. This limitation has tremendous implication for understanding period-specific habitation preferences in this region, as well as to the field of archaeological geology which, in contrast to geoarchaeology, uses archaeological information to inform geological questions and concerns. For example, the preponderance of Middle Archaic in the private collection examined and our survey (though n=1) may be related to the drying of the environment associated with the

Hypsithermal. The distribution of Middle Archaic sites and activity areas could help in reconstructing the Mid-Holocene fluctuations in the extent and structure of the hydric conditions.

Table 3. Site Components Recorded as a Result of Survey.

Component	No.	Comment
Unidentified Prehistoric	59	13 Multicomponent (11 with Historic), (1 with Middle Archaic, Late Woodland, Historic), and (1 with Historic, Late Woodland)
Early Archaic	0	
Middle Archaic	1	1 Multicomponent (1 with Historic, Late Woodland and Unidentified Prehistoric)
Late Archaic	1	0 Multicomponent
Early Woodland	0	
Middle Woodland	0	
Late Woodland/Late Prehistoric	2	2 Multicomponent (1 with Historic, Middle Archaic, and Unidentified Prehistoric) and (1with Historic, and Unidentified Prehistoric)
Historic	65	13 Multicomponent (11 with Unidentified Prehistoric), (1 with Middle Archaic, Late Woodland and Unidentified Prehistoric), and (1 with Unidentified Prehistoric and Late Woodland)

Prehistoric Sites. The frequency of diagnostic prehistoric components encountered in the project area as a result of survey was similar to what had already been identified in Jasper County. This includes higher representations of Late Archaic, and Late Woodland, but is in slight contrast to the relatively low representation of Middle Archaic. It is also in keeping with no items dating to the Paleoindian, Early Archaic, Early Woodland, or Middle Woodland. This agreement with previously recorded sites in Jasper County stands partially in contrast to the information gleaned from the collector visit particularly with respect to relatively high frequency of Paleoindian and Early Woodland materials. Two prehistoric scatters discovered as a result of this project (12Js279 and 12Js340) were recommended for further investigation.

Historic Sites. Sixty-five sites with historic components were discovered. These sites ranged from isolated finds to moderate historic scatters and were oftentimes multicomponent with Unidentified Prehistoric scatters (see Macleod et al. 2015). The historic components yielded the majority of the artifacts (n=307) recovered during the project. Though several moderately sized historic scatters were encountered during this survey, due to site size, density, and specific artifacts found, none appeared to have the potential to yield additional archaeological information beyond the Phase I level. Thus, no sites with historic components were considered to meet the NRHP criteria (Macleod et al. 2015).

Density

The project documented an average of one prehistoric site per 15 acres and one prehistoric artifact per 4.31 acres surveyed. The project documented an average of one historic site per 13.85 acres and one historic artifact per 2.93 acres surveyed. An average of one multicomponent site per 69.23 acres was documented.

Discussion

Cultural Chronology

This project has added considerably to the cultural chronology of the county. Fifty-nine Unidentified Prehistoric components were added along with two Archaic components (Middle Archaic and Late Archaic), two Woodland components (Late Woodland), and sixty-five Historic components (Table 4).

Table 4. Cultural Components Added as a Result of this Survey.

Cultural Period	Added	Previous	Total
Unidentified Prehistoric	**59**	**145**	**204**
Paleoindian (ca. 10,000 – 7500 B.C.)	**0**	**1**	**1**
Archaic	**2**	**20**	**22**
Unidentified Archaic	0	1	1
Early Archaic (ca. 8000 – 6000 B.C.)	0	7	7
Middle Archaic (ca. 6000 – 3500 B.C.)	1	1	2
Late Archaic (ca. 4000 – 700 B.C.)	1	10	11
Terminal Late Archaic	0	1	1
Woodland	**2**	**28**	**30**
Unidentified Woodland	0	12	12
Early Woodland (ca. 1000 – 200 B.C.)	0	3	3
Middle Woodland (ca. 200 B.C. – A.D. 600)	0	5	5
Late Woodland/Late Prehistoric (ca. A.D. 500 – 1650)	2	8	10
Mississippian	**0**	**4**	**4**
Unidentified Mississippian	0	1	1
Upper Mississippian	0	3	3
Protohistoric/Contact	**0**	**2**	**2**
Historic (post A.D. 1650)	**65**	**30**	**92**

Thirteen of the sites added were multicomponent sites. The multicomponent sites all had both Historic and Unidentified Prehistoric components. One of the multicomponent sites contained both Middle Archaic and Late Woodland components, and one other multicomponent site contained an additional Late Woodland component. All projectile point types recovered in this survey have been previously documented in Jasper County.

The known precontact settlement within southern Jasper County, as indicated by the SHAARD database with contributions by this survey, is dominated by Late Archaic and Late Woodland cultural periods, followed by Early Archaic, Middle Woodland, and Early Woodland cultural periods. Little information has been recovered for the Middle Archaic and Paleoindian cultural phases, though one Middle Archaic artifact was found as a result of this survey. These results when combined with previous research (Smith and Cochran 2014; Surface-Evans 2015) and the results of other research in the region may suggest a complicated geomorphic history, as a result of changes in the distribution of wetlands, that may have limited cultural materials to areas that would have been dry during the period of use.

Nonsystematic surveys have been conducted by private collectors. The information garnered from the collector visit this year has filled many important gaps in the cultural chronology of the region, particularly Paleoindian, Middle Archaic, and Early Woodland components. It has also served to document other periods and inform archaeologists and future investigators of where cultural materials may be concentrated. The paucity of materials and restricted distribution is suggestive of a pattern that will require diligent sampling of a diversity of geologies.

Landform Distribution

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 5, Table 6, and Table 7). 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.

Jasper County is predominantly comprised of till plain/moraine landforms. Five of the Survey Areas were completely on this landform. Floodplains are also present. The major waterways in Jasper County are the Kankakee River and the Iroquois River. Smaller waterways, exposed more formally with the draining of the wetlands, feed these larger bodies by crisscrossing the county leading to a high proportion of floodplain features in the area as well (Smallwood and Osterholz 1990:1-3). One survey area was located completely on floodplain, and one more was split between till plain/moraines and floodplains. These were located in the same large field along the Iroquois River. A total of 163.98 acres were surveyed in the floodplains of the Iroquois River. Like the upland features, the floodplain features offered relatively few artifacts and small site areas as compared to other counties. The one exception to this was Site 12Js340 which was a dense and distinct multicomponent site predominantly composed of lithic materials.

Though diagnostic artifacts were few, one of the sites that produced both Middle Archaic and Late Woodland diagnostics (12Js340) was located on floodplain soils. The other two sites with diagnostic Prehistoric artifacts, 12Js279 (Late Woodland) and 12Js286 (Late Archaic), were discovered on till plains/moraines. This may seem to indicate no landform preference. However

due to the small sample and the drastic change this county has undergone geomorphically, the propensity for landform habitation among prehistoric populations in this area is very difficult to determine. This survey of the southern portion of Jasper County is reasonably representative of a myriad of taphonomic, geomorphic, and pedogenic processes in the area and an adequate proportion of both floodplains and till plain/moraine features were surveyed. This, coupled with good visibility, field conditions, and indications that cultural materials from additional time periods are in fact present in the county (per our collector visit) may imply that cultural resources in the southern portion of Jasper County are extremely limited in dispersion and exposure.

Table 5. Projectile Point Site Numbers and Cultural Periods Per Landform.

Landform	Sites and Cultural Periods
Till Plain and Moraines	12Js279 (Late Woodland)
	12Js286 (Late Archaic)
Floodplains	12Js340 (Middle Archaic/Late Woodland)

Table 6. Site Densities and Distributions By Landform.

Landform	# of acres	# of sites	Density	Distribution
Till Plain/Moraines	736.03	99	1 site per 7.43 acres	Sites cover 3.29% of surface area
Floodplains	163.98	13	1 site per 12.61 acres	Sites cover 2.95% of surface area

Table 7. Number of Artifacts per Landform.

Landform	# of artifacts	% of artifacts recovered
Till Plain/Moraines	470	91.10
Floodplains	46	8.91

All of the sites in this survey were discovered on loamy texture soils. The majority of these (70.54%) were on loams soil complexes (Table 8). For this reason soil texture for these areas could not be precisely determined; however, the high degree of fine-scale variability in sediment may have a behaviorally meaningful implication. Overall poorly drained soils predominate at locations of the sites identified (Table 9). This is in keeping with the marshy nature of the county prehistorically and is also reflective of the predominant soil types in the survey areas. Due to the propensity for poorly drained soils in the area, the majority of surveyed soils were poorly drained. For this reason, identified sites may be skewed towards poorly drained soils as opposed to better draining soils regardless of preference.

Table 8. Soil Texture within Surveyed Areas.

Soil Texture	No. of Sites	Percentage of Total Sites
loam/complex	79	70.54
fine sandy loam	14	12.50
loamy sand	4	3.57
sandy loam	4	3.57
silty clay loam	4	3.57
clay loam	3	2.68
sandy loam/loamy sand	2	1.79
fine sandy loam/sandy loam	1	0.89
fine sandy loam/silty clay loam	1	0.89

Table 9. Drainage Classes of Site Soils.

Drainage Class	No.	Percentage of sites
well drained	3	2.68
moderately well drained	18	16.07
somewhat poorly drained	38	33.93
somewhat poorly to moderately well drained	2	1.79
Somewhat poorly to poorly drained	1	0.89
somewhat to very poorly drained	11	9.82
poorly to well drained	1	0.89
poorly drained	3	2.68
very poorly to moderately well drained	1	0.89
very poorly drained	34	30.36

Historic Settlement Patterns

The historic cultural context was present in all survey areas and was representative of the initial early 19th century settlement of the county through modern times (see Macleod et al. 2015). Mean dates were taken for each survey area by using artifacts that displayed a date range (Table 10). This excluded non-diagnostics and anything with unanchored parameters (i.e. pre-1940). Results indicate that the majority of survey areas were most likely active during the late 19th and early 20th centuries. This is corroborated by the mean historic date of the whole survey which was 1911. Both of these pieces of information are in keeping with the literature narrative concerning the draining of the county, which began in the 1850s and continued until 1917 (Smallwood and Osterholz 1990:1). This draining progressively opened up the county for farming during this period supporting that fact that most historic artifacts date to this time. All survey areas are within the Iroquois River drainage system; however, some survey areas were located directly along the river whereas some were located some distance away on upland features. The majority of large scale agriculture, which is associated with Euro-American settlement, began after the draining of the Grand Kankakee Marsh in the 1870s. Large scale

agriculture may have begun with predominantly upland features and spread shortly thereafter to lowland features immediately adjacent to waterways. This survey did not recover any materials that conclusively indicated interaction between Euro-American and Native American peoples.

Table 10. Survey Area Means Dates.

Survey Area	Mean Date
Survey Area 1	1894
Survey Area 2	1945
Survey Area 3	1920
Survey Area 4	1895
Survey Area 5	1915
Survey Area 6	1914
Survey Area 7	1894
All Survey	**1911**

Evidence of Early Settlement

Attempts were made to locate original historic habitations. Several survey areas were located directly along or adjacent to the Iroquois River in both Newton and Union Townships, where they are said to have been, and recovered nothing diagnostic of original settlement. This is further evidenced by the mean dates which are all much later than the original settlement date of 1830s.

Private Collection

The interest the collector expressed in our survey and the assistance that he provided in the form of both artifact information as well as identification of areas with high potential for cultural resource has helped tremendously in developing the culture history of Jasper County. Future investigations, particularly in areas with more discrete artifact locales such as Jasper County, would do well to use the previously acquired knowledge and materials accrued by local collectors. Our experience with the collector illustrates patterns found in many other places: collectors hold the vast majority (>90%) of the archaeological record and any examination of the past that ignores this resource is woefully incomplete (LaBelle 2003; Pitblado 2014; Shott 2008).

Public Outreach

On September 27, 2014, Ball State University's Applied Anthropology Laboratories took part in Mound State Park's annual Indiana Archaeology Month activities. There were numerous hands-on demonstrations and participant activities for visitors. Posters depicting the methods and results of several previous HPF grants were on display and this was used to discuss both the methodology and goals of the FY2014 Grant surveys in Jasper and Newton counties. Ball State archaeologists and students used this public event to speak with numerous local individuals,

fostering public interest and awareness in this HPF Grant survey. Approximately 150 members of the public attended this event at Mounds State Park, Anderson, Indiana.

In October 2014, an Open House was held in the Applied Anthropology Laboratories. The open house was to showcase current projects with student involvement, encourage additional student involvement, and to invite possible community and professional collaborators to view our work and in-process projects. Historic and prehistoric artifacts were displayed and explained to the public in order to demonstrate the diversity of knowledge necessary for archaeological investigations such as this. In addition, chert and lithic identification with hands-on demonstrations of the identification and cataloging processes were given to Open House attendees.

On April 27, 2015, a public presentation was given at the Newton County Government Center in Morocco, Indiana, by AAL Archaeologist Christine Thompson and Department of Anthropology graduate student Jamie Leeuwrik. This presentation was sponsored by the Newton County Historical Society. The 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. At least 60 people attended the presentation, which included a question and answer session, and a short discussion of Indiana archaeology laws. This presentation and project proceedings in general were also posted to the AAL's Facebook page and various other social media sites.

In all, seven landowners gave permission to survey their properties contributing thousands of acres of agricultural land available for survey. One amateur collector shared his collection with us for documentation so we could gain a better understanding of the cultural resources available in Jasper County. His affinity for the project and willingness to allow examination of his collection hint at a great potential for an alliance between the professional archaeological community and local collectors in Jasper County.

Conclusions and Recommendation

This project primarily targeted the Iroquois River drainage, including adjacent upland areas in the southern half of Jasper County, Indiana. The project area was selected due to the lack of known archaeological sites in the SHAARD database and the identification of Jasper County as a data deficient county. The goals of the project were to increase the site database, construct a more complete cultural chronology for the county, understand and refine both the settlement patterns, as well as the patterns of interaction between and among early Euro-American settlers and Native Americans. This article concentrated on the Prehistoric results of this project.

Jasper County displayed a dearth of artifacts as compared to comparable county surveys in Indiana. This is in keeping with the results of previous surveys conducted in and immediately surrounding Jasper County. It is very likely that the presence of the Grand Kankakee Marsh and

the generally expansive precontact wetlands in the area for most of the last 12,000 years heavily influenced the habitability of the area. The wetlands would have dramatically limited both livable land and shaped resource availability in the area. This constraint would have restricted the population and concentrated activities to select rises, uplands, and well drained features. The large-scale geomorphological change brought about by the historic draining of the wetlands brought in a relatively late Euro-American settlement, pushing the majority of the historic settlement dates to much later in the 19th century. This draining also allowed for investigation into areas that may have been exposed prehistorically. The results offer insights into both the habitation preferences of Prehistoric peoples and the dynamic nature of the extent and location of the Prehistoric wetlands.

The four diagnostic prehistoric artifacts recovered date from the Middle Archaic, Late Archaic, and Late Woodland periods. Though the amount of recovered prehistoric diagnostics from the survey is not enough to make generalizations regarding occupation habits, we may be able to use this information in order to identify the state of the wetlands during these periods. The presence of these materials shows that the area in which they were recovered was habitable at least during some seasons of those time periods and/or that the varied resources of the marsh were important and valued subsistence resources at that time. The types of sites and associated behaviors can help in the reconstruction of the history of the marsh. This means that comparable features/environments in this area will likely produce other cultural materials of similar or even newly documented types, leading to a large enough sample size to make generalizations about the habitation of the entire county over time. It is recommended that this technique be used in future surveys in order to promote recovery of diagnostic prehistoric materials.

Approximately 900 acres of agricultural land were surveyed during this project and 112 new archaeological sites were recorded. The survey recovered 516 artifacts consisting of 209 prehistoric artifacts (one per 4.32 acres) and 307 historic artifacts (one per 2.93 acres). One collector visit was conducted which resulted in an increase in potential site investigations, as well as documentation of underrepresented time periods. No human remains were discovered as a result of this grant project. The majority of the precontact sites were unidentified by cultural period, however three different prehistoric cultural periods were documented. Two sites, both lithic scatters, were recommended for further investigation and 110 sites were recommended as not eligible for listing on the Indiana Register of Historic Sites and Structures or the National Register of Historic Places.

Compared to previous large-scale surveys on the Tipton Till Plain (Cree et al. 1994; Smith et al. 2009), whose results show a greater occupation in upland areas, Jasper County was found to be similar in that upland features did display a slightly higher incidence of site discovery. However, as a few sites, including one very large and complex site, were also recorded on floodplains, these features should be examined with the same scrutiny as upland features in future investigations. Given the geomorphic history of the county, and limitations it would have imposed on inhabitants, it is likely that prehistoric remains will be discontinuous in distribution and concentrated in the areas that were exposed during the particular period. Due to this, further research into Jasper County's prehistoric past would be of great benefit for geologists as well as archaeologists.

Though limited, the results of this survey suggest that precontact populations were using Jasper County in different ways, as indicated by the difference in projectile points, and at different locations during different cultural time periods. An example of temporal land use differences is the disparity in location between the Middle Archaic/Late Woodland site located directly along the Iroquois River as compared to the upland nature of the sites containing Late Archaic and Late Woodland. As mentioned above, these disparities may give us insights into the how the wetlands changed over time and what areas may have offered habitable land. Examination of areas with comparable geological features to the locations of known culturally affiliated prehistoric sites may allow for a more complete picture of prehistoric Jasper County to be constructed.

Many factors could have influenced the project data, including the location of the surveyed properties (both in relation to the marsh and each other), whether the field was tilled recently or not, field conditions, the collection of fields by lithic enthusiasts, and even local weather patterns prior to field survey. Further research into prehistoric landform usage is recommended within Jasper County.

Jasper County would benefit from further archaeological investigations, especially those focusing on the procurement of diagnostic prehistoric materials, such as projectile points, and systematization of landform use prehistorically. Included in this should be further large scale pedestrian surveys to corroborate the findings in this report as well as identify potentially new areas of interest, particularly those indicated by local collectors. Also, and more importantly, this would include small-scale focused pedestrian surveys targeting areas of comparable geomorphic provenance to the locations of diagnostic prehistoric materials recovered in this survey, and previous survey, both formal and informal. This would include but not be limited to well drained, relatively flat, sand and silt loams on both upland and floodplain features. From a historical archaeology perspective, future surveys should again attempt to target areas with known historic structures and other historic occupations and areas of historic land use. Attempts were made during this grant project to more intensely survey these areas but were unsuccessful due in large part to lack of landowner permission. The one survey area with a documented historic structure showed no evidence of any structure having been present. The relatively low amount of recovered historic artifacts as compared to similar surveys in other Indiana counties, combined with the late dates of those artifacts, indicates that early habitation spread slowly for the first 50 years. Because of this, surveys interested in recovering materials from early historic habitations should concentrate on known structures and other historic occupations and areas of historic land use. Another important avenue of investigation that was utilized in this survey and that should be utilized in the future is the analysis and documentation of private projectile point collections from Jasper County. This can help garner further information concerning Jasper County's past.

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Report / Feature

FLOODPLAIN LANDFORMS AND THE AGE OF PREHISTORIC SITES IN THE BIG BEND OF THE OHIO RIVER, VANDERBURGH COUNTY, INDIANA

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Abstract

Systematic archaeological survey in a proposed transmission line corridor provided the opportunity to examine the relationship between floodplain landforms and the age of prehistoric sites in the "Big Bend" of the Ohio River near Evansville in Vanderburgh County, Indiana. Geomorphological studies indicate that low terraces were exposed beginning in the early Holocene and that floodplain ridges and swales developed continuously and rather rapidly through later prehistory. The distribution of archaeological sites from specific cultural periods roughly confirms the rates of channel migration developed from geomorphological data.

Introduction

The archaeology of the floodplain landscape in the "Big Bend" of the Ohio River, just southwest and downstream of Evansville in Vanderburgh County, Indiana, conforms to well-established geomorphological principles regarding stream channel migration. The Big Bend covers some 25 square miles of former bottomland forest which has been cleared and farmed for more than 200 years. The ridge-and-swale topography in the Big Bend is its most obvious landscape feature (Figure 1). A geological and geomorphological study of this section of the Ohio valley was undertaken 30 years ago (Fraser and Fishbaugh 1986), and the present study builds upon that work. The objective of the current work was to see how the sequence of river channel migration matched up with the ages of prehistoric sites located inside the Big Bend. A related inquiry involved determining the potential for any deeply buried prehistoric cultural deposits in the area.

Some 150 prehistoric sites have been reported within the Big Bend and are recorded in the online Indiana State Historic Architectural and Archaeological Research Database (SHAARD). Practically all of these sites are known through collector reports and interviews, and many have been confirmed by professional archaeologists, either through further collaboration with collectors or contract work that happened to intersect reported site locations. Information

contained in the site records is therefore of variable reliability in regard to temporal associations based on projectile point and pottery styles, although most of these identifications were made by professional archaeologists after viewing private collections. For the purposes of this study, temporal affiliations listed in the SHAARD database were taken at face value, except where inconsistencies (e.g., data transcription errors) appeared.

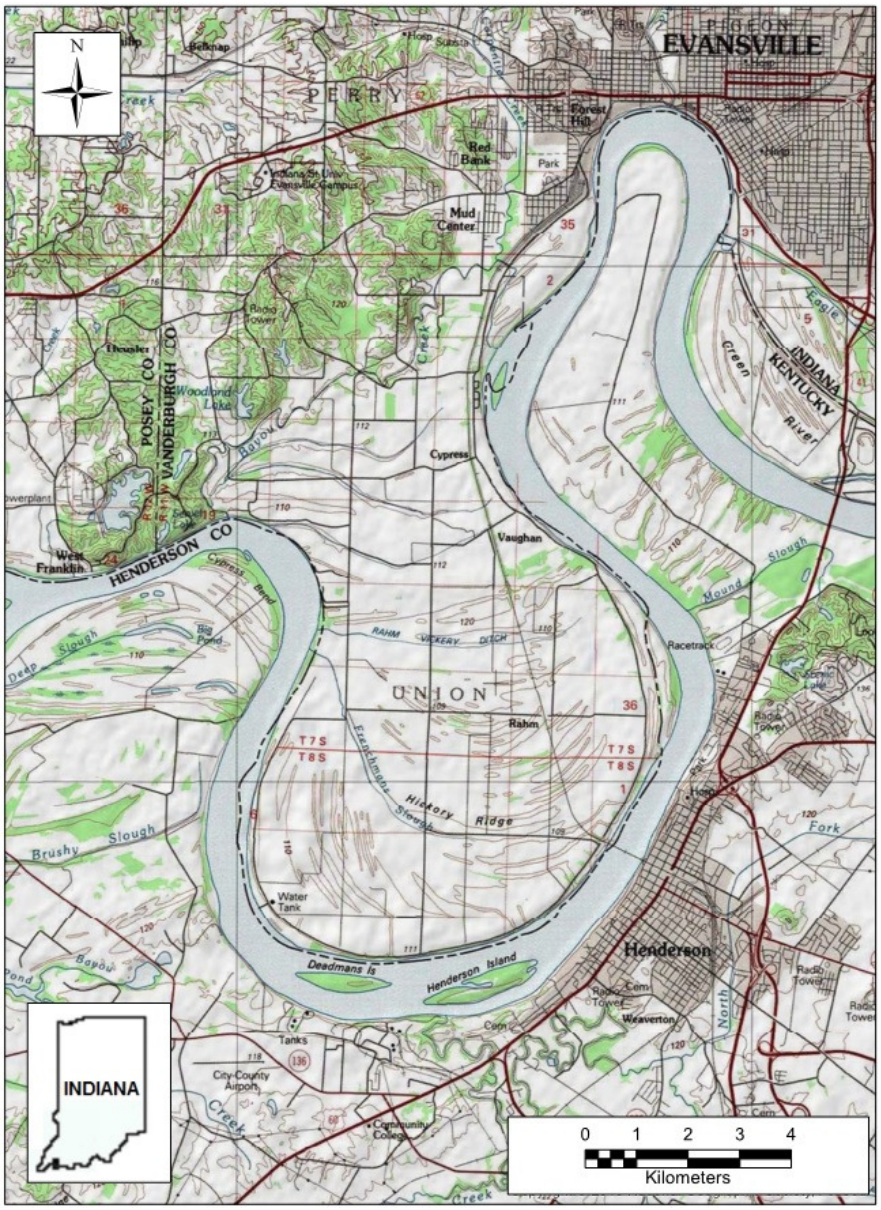

Figure 1. Location map of the Big Bend study area.

At least one cultural component has been assigned to each of 87 prehistoric sites in the Big Bend study area, and numerous sites were assigned to more than a single component. These sites and their component assignments are listed in Table 1. As expected, older cultural components number fewer than the more recent components. Four components are assigned to the Paleoindian Period, 13 are assigned to the Early Archaic, five to the Middle Archaic, 27 to the Late Archaic, 20 to the Early Woodland, 26 to the Middle Woodland, 23 to the Late Woodland, and 37 to the Mississippian Period. Again, these component assignments were taken directly from the SHAARD database, and have not been checked or investigated in detail.

Table 1. Reported Cultural Affiliations for Big Bend Prehistoric Sites.

Site Number	Paleo-indian	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Mississ-ippian
12Vg8							X	X
12Vg28			X	X			X	X
12Vg29				X	X	X	X	X
12Vg41						X		
12Vg42						X		
12Vg50	X	X		X	X			
12Vg66				X				
12Vg69					X			
12Vg70				X		X		
12Vg71						X	X	
12Vg74			X	X				
12Vg81				X	X			
12Vg82		X		X	X			X
12Vg84	X		X	X				
12Vg86								X
12Vg88						X		
12Vg92						X		
12Vg100							X	X
12Vg104						X		
12Vg122		X?	X?	X	X	X	X	X
12Vg123							X	X
12Vg124								X
12Vg286		X		X				
12Vg289	X							
12Vg290				X	X			
12Vg293		X						
12Vg294	X				X			

Site Number	Paleo-indian	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Mississ-ippian
12Vg304								X
12Vg305				X	X			
12Vg306		X			X	X		
12Vg311				X				
12Vg312		X?		X		X	X	
12Vg315				X				
12Vg320							X	X
12Vg324				X				
12Vg325							X	
12Vg328		X?		X	X			X
12Vg329				X		X		
12Vg330		X?		X	X		X	
12Vg333						X	X	X
12Vg334							X	X
12Vg335							X	X
12Vg340					X			
12Vg342		X						
12Vg390							X	X
12Vg391							X	X
12Vg393								X
12Vg394		X		X				
12Vg396			X	X				
12Vg397								X
12Vg398		X				X		
12Vg399								X
12Vg403								X
12Vg404								X
12Vg405								X
12Vg406				X		X		
12Vg407		X		X	X			X
12Vg408					X			
12Vg409					X			
12Vg410								X
12Vg411								X
12Vg413				X		X		
12Vg415								X
12Vg417								X
12Vg418				X			X	X
12Vg435						X?		

Site Number	Paleo-indian	Early Archaic	Middle Archaic	Late Archaic	Early Woodland	Middle Woodland	Late Woodland	Mississ-ippian
12Vg436						X		
12Vg437						X	X	X
12Vg439						X	X	
12Vg453						X		
12Vg456								X
12Vg459								X
12Vg460					X			
12Vg461						X		
12Vg462					X			
12Vg463								X
12Vg464					X			
12Vg467						X		
12Vg469							X	
12Vg474						X		X
12Vg476							X	X
12Vg477						X		
12Vg478								X
12Vg480					X			
12Vg481							X	X
12Vg482						X		
12Vg485				X			X	

Floodplain Geomorphology

The basic principles of floodplain geomorphology are firmly established, especially in relation to the formation of archaeological sites (Butzer 1971, 1976). The physics of water movement causes streams in low-gradient valleys to meander. Meandering streams scour away land on the outsides of meander bends, and stream channels shift accordingly. As channels shift, sediment is deposited on the insides of meander bends. These deposits are called point bars. Point bar deposits are bed-load deposits laid down on channel margins. On flat floodplains, point bars are typically low and indistinct because they get regularly inundated by floods and become buried in the alluvium that is deposited when floodwaters retreat. On convex floodplains, point bars can appear as relatively prominent ridges because natural levees tend to form on top of them.

Much of the ridge-and-swale topography along the Big Bend section of the Ohio River floodplain is evidently the result of channel shifts that stranded old point bars and segments of the natural levee. But mid-channel islands also developed out in the river and aggraded to the

elevation of the surrounding floodplain before channel shifts eventually melded them to the inside of the meander bend (Fraser 1986). Thus, some parts of the floodplain ridge-and-swale landscape are comprised of old islands rather than old stream bank or levee remnants. These can be distinguished to some extent (Fraser 1986:13-14). Old point bars are narrow–less than 240 m (800 ft) wide–and elongated. Former islands can be recognized as floodplain ridges that are more than 240 m wide and relatively short and flat-surfaced (Fraser 1986:13-14).

The Big Bend stretch of the Ohio River valley has characteristics intermediate between those of flat and convex floodplains. Specifically, it lacks cut-off meanders and oxbow lakes typical of convex floodplains. Also, the valley profile in this area is not convex. However, the floodplain does contain gathering streams and, to some extent, Bayou Creek flows as a yazoo-type stream parallel to the main axis of the valley. Also, while not particularly prominent, natural levees are present, as are long, narrow sloughs that serve as backswamps. Like flat floodplains, the entire valley bottom periodically receives deposits of flood-borne silts. This happened in April and May of 2011 when the Big Bend was completely inundated (Figure 2).

Figure 2. Satellite views of the Ohio River down-stream from Evansville, Indiana, captured by NASA's Landsat 5 Thematic Mapper, reproduced under allowable fair use described in the copyright terms of The Watchers (2016). Typical conditions on April 14, 2010 (top), and during flooding on May 3, 2011 (bottom).

Site Patterning in the Big Bend

In 2011, flooding extended all the way to the foot of the bluffs on both sides of the valley. As floodwaters receded, floodplain landscape features were sequentially exposed. Extending outward from the foot of the bluffs on the north side of the valley is a relatively high terrace. The surface of this high terrace is crisscrossed with the remnants of a braided stream network which suggests that the surface formed during periods of glacial meltwater discharge during the Pleistocene.

The pattern of reported sites in the Big Bend demonstrates that this surface was habitable during the Paleoindian Period (Figure 3). One of these sites produced a Clovis point; another reportedly produced an "unfluted Clovis" point base. Site 12Vg50 reportedly produced "Plano blades." All of these sites are multicomponent, even site 12Vg289 where side-notched points and a grooved axe were found, although the site form does not assign a cultural affiliation to these other items.

Figure 3. Reported Paleoindian site components (squares) and edge of the High Terrace in the Big Bend Study Area. [Editors' note: Site location information is not shown in this figure in the public version of this electronic document. Qualified professional archaeologists may contact the DHPA for access to this information for professional research purposes.]

Riverward of the high terrace is a second, slightly lower terrace. Previous geomorphological work demonstrated that this low terrace is underlain by Pleistocene-age valley train sands and gravels, and is capped by several meters of fine-grained, early Holocene alluvium (Fraser and Fishbaugh 1986). Considering the large proportion of silt and clay comprising that alluvium, the early Holocene depositional environment appears to have been a backswamp. Subsequent to the downcutting that formed the terrace and lowered the base level of the active floodplain to its modern elevation, the low terrace dried out and became suitable for human habitation.

Reported Early Archaic and Middle Archaic sites in the Big Bend are restricted to the two terraces, with the exception of two anomalous sites reported to the south (Figure 4). Site 12Vg407 reportedly contains an Early Archaic component based on the presence of "serrated points." Site 12Vg122 reportedly produced Early and Middle Archaic points of unspecified stylistic type. Both sites contain multiple later components, so it is entirely possible that later point types were mistaken for earlier ones. Given the characteristics of the floodplain ridges where these sites were reported, it seems unlikely that the sites are located on landforms that were once islands in the Ohio River paleochannel. The presence of Early and Middle Archaic components at these two sites needs to be confirmed, but that may not be possible since both reports are based on private collections that were examined at least 30 years ago and the current disposition of which are unknown.

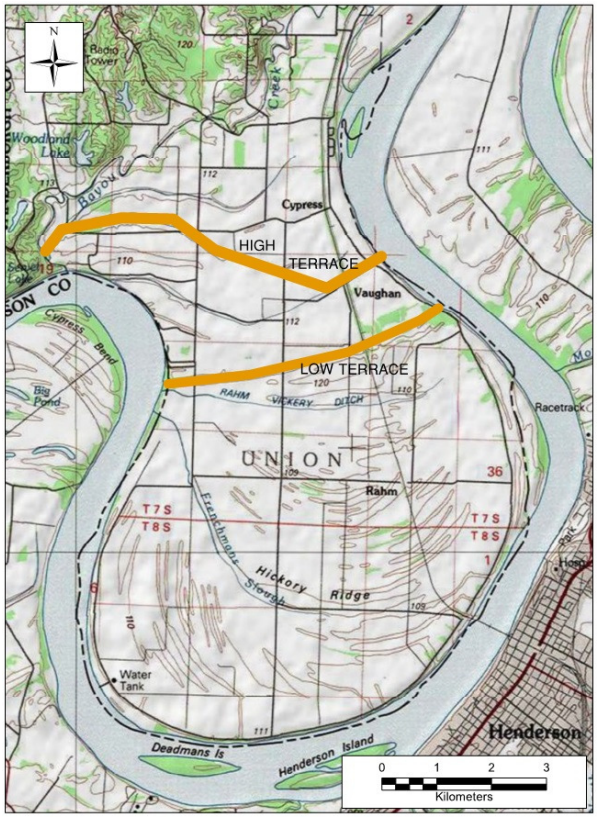

Figure 4. Reported Early Archaic and Middle Archaic site components (squares) and edges of the High and Low Terraces in the Big Bend Study Area. [Editors' note: Site location information is not shown in this figure in the public version of this electronic document. Qualified professional archaeologists may contact the DHPA for access to this information for professional research purposes.]

The lower terrace stands slightly above the ridge-and-swale terrain that fills the rest of the Big Bend. During floodwater recession in 2011, the swales became clearly visible, even though they have all been ditched to improve modern farm drainage. Through field observations made at that time, it was readily apparent that most flood-borne alluvial silt had been deposited in the swales, and that a relatively thin veneer of sediment had been deposited on the ridge tops. This observation has implications for the potential for deeply buried cultural deposits in this area.

Our recent work encountered buried prehistoric materials on floodplain ridge tops well below the plowzone at depths of 75 cm to just over a meter (Head et al. 2011). At site 12Vg595, augering recovered plain, grog-tempered sherds, dating to the Middle or Late Woodland Period, from a buried topsoil horizon at a depth of 103 to 116 cm below surface. At site 12Vg596, debitage was recovered from an auger core at a depth of 75 to 87 cm below surface. Historic-era materials were found below plowzone at two sites, but at much shallower depths of 45 to 70 cm below surface.

Two radiocarbon dates obtained from deep borings during previous geological investigations provide points by which a framework for dating channel movements can be anchored (Fraser and Fishbaugh 1986). The older of the two dates (Boring 8) is a solid Late Archaic date of 3,980 ± 75 B.P. (two sigma calibrated range between 2,855 and 2,213 B.C.). It was obtained from peat buried just above channel sands in a slough located in the northern part of the floodplain. The younger date (Boring 15) straddles the temporal boundary between Early and Middle Woodland. The radiocarbon date was 2,140 ± 100 B.P. (two sigma calibrated range between 395 B.C. and A.D. 50) and it was obtained from peat buried in a floodplain ridge. Peat in both locations must have developed immediately subsequent to a channel shift, before it could be covered by alluvium. Therefore, both assays date organic matter that collected on the inside bends of ancient Ohio River channels that were both positioned slightly to the south. The two radiocarbon dates can be used to predict the ages of cultural deposits on different sections of the ridge-and-swale landscape (Figure 5).

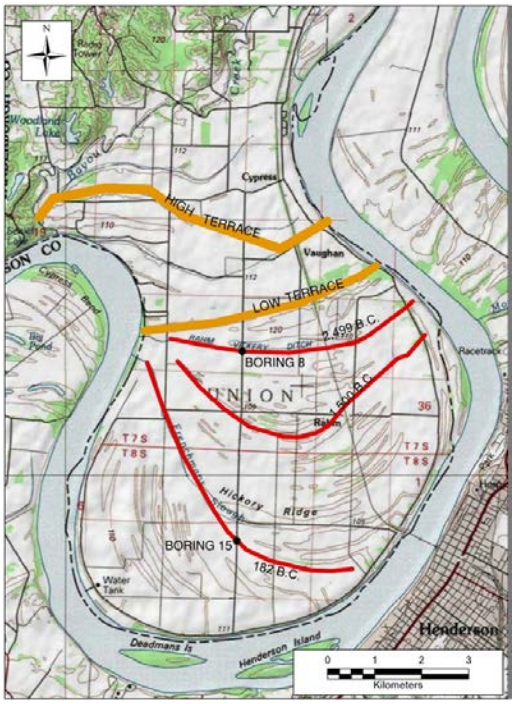

Figure 5. Reported Late Archaic site components (squares), edges of the High and Low Terraces, and older isochrones in the Big Bend Study Area. [Editors' note: Site location information is not shown in this figure in the public version of this electronic document. Qualified professional archaeologists may contact the DHPA for access to this information for professional research purposes.]

Detailed predictions of landform age can be developed if one is willing to assume constant rates of paleochannel shifting. The local rate of lateral shift in the Ohio River channel can be calculated based on the radiocarbon dates and old maps. Median dates for each of the two calibrated radiocarbon assays are 2,499 B.C. and 182 B.C. Maximum distance between the two radiocarbon-dated paleochannels is 4,460 meters. The Ohio River paleochannel moved 4,460 meters in 2,317 years, or at an average rate of 1.9 meters per year, between the locations of Borings 8 and 15.

The Kentucky border was defined as the low-water mark on the north bank of the Ohio River when it was surveyed in A.D. 1792 (Indiana Magazine of History 2011). Maximum distance between the 182 B.C. paleochannel and the A.D. 1792 boundary is 3,212 meters. The Ohio River paleochannel moved 3,212 meters in 1,974 years, or at an average rate of 1.6 meters per year between the location of Boring 15 and the Kentucky border.

These two rates of channel shifting are fairly comparable. This in turn suggests that the prehistoric Ohio River channel shifted at a more-or-less constant rate. The regular spacing of ridges and swales on the floodplain seems to confirm this. If migration rates can be considered reliable, then the available data can be used to back-calculate paleochannel positions at various stages of prehistory.

In the Evansville vicinity, the Late Archaic ended and the Terminal Late Archaic began around 1,500 B.C. (Head et al. 2011:35-36). Given the relative positions of the Boring 8 and Boring 15 radiocarbon dates, combined with a channel shift rate of 1.9 meters per year, the section riverward of this line marks an area in which no prehistoric sites of Late Archaic age or older should be located (Figure 5). With one exception, the ages of previously reported sites and our 2011 survey results support this hypothesis. The exception, site 12Vg29, is a multicomponent site strung out for 1.9 km (1.2 miles) along the crest of a ridge behind a slough. The site reportedly produced Late Archaic points of unspecified type. Because the site contains multiple later components, it is entirely possible that Woodland point types were mistaken for Late Archaic ones.

A similar line, or *isochrone*, can be determined for the end of the Terminal Late Archaic and the beginning of the Early Woodland at around 1,000 B.C. The landscape riverward of that line should contain no sites of Terminal Archaic age or older, and our 2011 survey results along with the previously reported site data supports that (Figure 5). Also, soil data from our auger cores in this vicinity largely had more homogenous brown colored silt and clays with poorly developed pedogenic characteristics, and that is typical of Late Holocene alluvium (Stafford 2004).

The isochrone defined by the floodplain swale in which the Boring 15 radiocarbon assay was obtained dates to 171 B.C. This is the approximate date for the end of the Early Woodland Period and the beginning of the Middle Woodland Period. No Early Woodland or older sites should be found riverward of that isochrone. Reported site components again support that hypothesis (Figure 6).

Given the relative positions of Boring 15 and the Kentucky border, combined with a channel shift rate of 1.6 meters per year, an isochrone can be traced which approximates the end of the Middle Woodland around A.D. 500. No sites of Middle Woodland age or older should be

located riverward of that line and only younger sites (Late Woodland or Mississippian) should be found in a riverward position. This indeed appears to be the case (Figures 7 and 8).

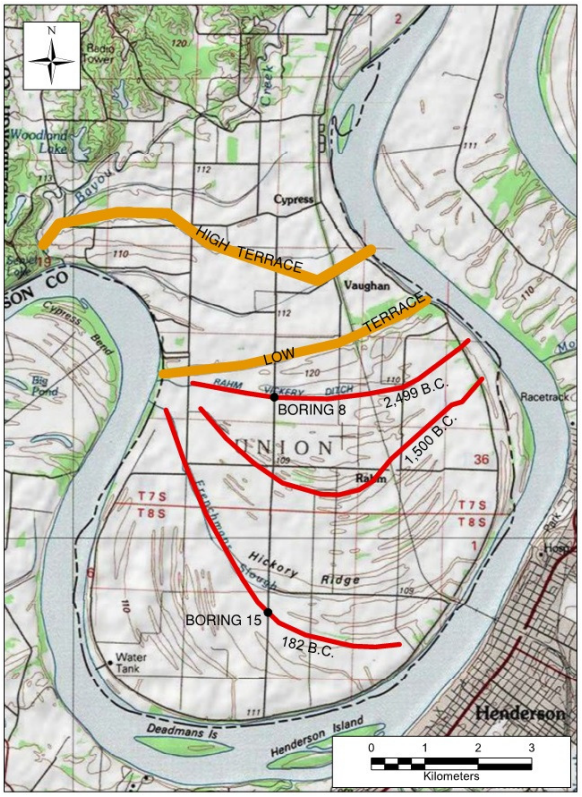

Figure 6. Reported Early Woodland site components (squares), edges of the High and Low Terraces, and older isochrones in the Big Bend Study Area. [Editors' note: Site location information is not shown in this figure in the public version of this electronic document. Qualified professional archaeologists may contact the DHPA for access to this information for professional research purposes.]

Locally, the Mississippian Period began around A.D. 1000, and another isochrone can be traced to depict that date (Figure 9). The section riverward of that line marks an area in which no prehistoric sites of Late Woodland age or older should be located (Figure 8). This is again supported by previously reported site data and our survey results. Soil data from our auger cores in this area also exhibited more sandy and stratified sediments, which is typical of very Late Holocene/Historic alluvium (Stafford 2004).

A complicating factor in the construction of isochrones is related to the development of mid-stream islands on the Ohio River channel. Because islands could have been habitable for hundreds of years before they became welded to much younger point bar formations, their presence has the potential to create disjunctions in the reconstruction of channel shift rates. For the purposes of the land-use predictions presented here, the geomorphological context of any anomalously older prehistoric sites must be closely examined to determine if the setting is part of a former mid-channel island. Some auger core results from the central floodplain ridges show that soil horizon development was variable among floodplain ridges. More advanced soil horizonation may be an indicator for the presence of welded islands. There are also three reported sites with anomalous Archaic components, and the artifacts from these sites need to be

closely reexamined if the collections can be found. However, all other prehistoric sites of known age in the Big Bend are positioned conformably with the calculated timing of channel shifts.

Figure 7. Reported Middle Woodland site components (squares), edges of the High and Low Terraces, and isochrones in the Big Bend Study Area. [Editors' note: Site location information is not shown in this figure in the public version of this electronic document. Qualified professional archaeologists may contact the DHPA for access to this information for professional research purposes.]

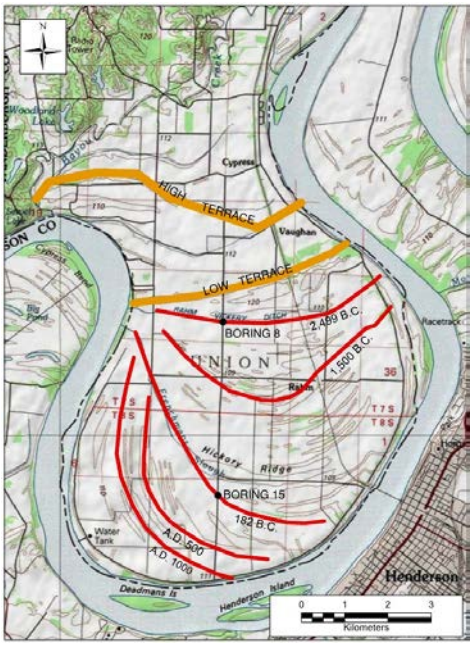

Figure 8. Reported Late Woodland site components (squares), edges of the High and Low Terraces, and isochrones in the Big Bend Study Area. [Editors' note: Site location information is not shown in this figure in the public version of this electronic document. Qualified professional archaeologists may contact the DHPA for access to this information for professional research purposes.]

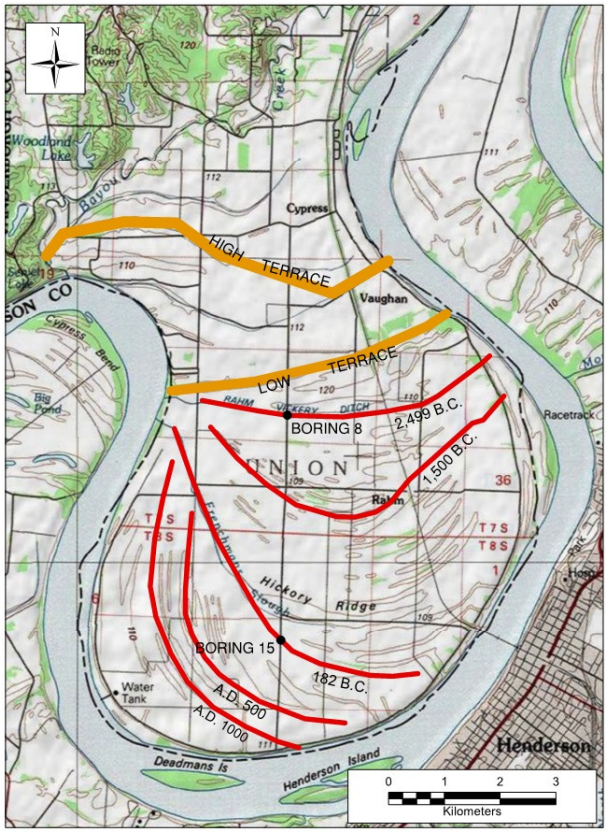

Figure 9. Reported Mississippian site components (squares), edges of the High and Low Terraces, and isochrones in the Big Bend Study Area. [Editors' note: Site location information is not shown in this figure in the public version of this electronic document. Qualified archaeologists may contact the DHPA for access to this information for professional research purposes.]

Summary

In general, the rate of channel migration in the Big Bend appears to have been fairly constant from Late Archaic times through the beginning of the historic period. The Ohio River channel migrated south toward Kentucky, reworking valley bottom sediments and destroying any prehistoric sites that might have been present on the south side of the river. The unidirectional channel shift created new land in its wake. That landscape became inhabited prehistorically and the patterning of dated sites confirms the ages of various sections of the ridge-and-swale topography in the Big Bend.

Unlike the landscapes found in some other Midwestern river valleys or even in other segments of the Ohio valley, there is little potential for prehistoric sites to be buried at extreme depth in the Big Bend. Deeply buried sites in the ridge-and-swale zone of the Big Bend are mostly covered by historic-era alluvium to depths of a meter or less. Prehistoric sites on the high terrace can date to as old as Paleoindian times. Sites on the low terrace date only as old as the Early Archaic Period. Sites of all ages on both terrace formations have received relatively little historic-era alluvium and are generally surface or near-surface cultural deposits.

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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.