UNIVERSITY OF GEORGIA
LABORATORY OF ARCHAEOLOGY SERIES
REPORT NUMBER 101

ATTRIBUTE AND SPATIAL ANALYSIS OF LITHICS AT HARDEN BRIDGE

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Athens

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A Research Project Submitted to the Graduate Faculty of the University of Georgia in Partial Fulfillment of the Requirements for the Degree

Master of Science

Athens, Georgia

2009

ACKNOWLEDGEMENTS

I am sincerely grateful to the numerous individuals who contributed to this research project. To my major professor Dr. Stephen A. Kowalewski and to the members of my reading committee, Dr. David J. Hally and Dr. J. Mark Williams, I owe a great deal of thanks. They have guided me towards the completion of this project by providing very constructive criticism as well as support. Additionally, their instruction inside the classroom has been instrumental to my current and future success and I have been shaped into a better archaeologist through my interaction with them.

I am also grateful for my excellent cohort, Mr. Ben Storey, Ms. Ellie Maclin, Ms. Kelli Guest, and Mr. Nathan Mountjoy. The atmosphere of cooperation and mutual growth fostered by everyone has been most influential and appreciated. I hope future cohorts continue this trend of support so that all can succeed as well as we have.

I would like to thank the Cultural Resource Management firms who provided me with gainful employment and invaluable opportunities to hone my skills as an archaeologist. In particular, Ms. Mary-Beth Reed, Dr. Joe W. Joseph and Dr. Hugh B. (Matt) Matternes, of New South Associates, deserve special recognition. Their trust in my abilities, both in the field and laboratory, gave me confidence and room to grow professionally.

Dr. Thomas Foster and Ms. Susan Fishman-Armstrong, from the Antonio J. Waring, Jr. Archaeological Laboratory, deserve special thanks for providing access to the Hardin Bridge collection. This project would not have been possible without their assistance.

Finally, my deepest appreciation goes to my family. They have always been supportive of my life plans, and I appreciate their moral support, guidance, and when necessary financial assistance. Their impact throughout my life has allowed me to achieve many goals that

otherwise would not have been realized. Dad, I wish you could be here to see what I have accomplished. I know you would be proud.

Any shortcomings or faults in this research project are the sole responsibility of the author and should not reflect unfavorably on those individuals who have contributed to its completion.

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Abstract

This report describes lithics recovered from Hardin Bridge (9BR34), a Middle Woodland period habitation and lithic workshop located in northwestern Georgia. Originally excavated and interpreted by New South Associates, Inc., the analysis and interpretation contained within complement and build on their solid archaeological foundation. Attribute and spatial analysis of lithics at Hardin Bridge indicates that activites involving lithic tool manufacture and lithic reduction can be identified in feature midden through a combination of size grade, complete and incomplete flake ratios, platform type, and relative thickness measurements. An attribute and functional analysis of projectile points at Hardin Bridge suggest that stemmed projectile points demonstrate a decline in size over time and were used as darts. Triangular projectile points exhibit variation through time and may have been used as arrows and darts during the Early and Middle Woodland period.

Chapter I. Introduction

This project will examine the Woodland period occupation of the Hardin Bridge site, (9BR34), a single component Cartersville period site located along the Etowah River in Bartow County, Georgia. Two areas of the site (Block 1 and 3) produced evidence for domestic activities and lithic tool manufacture. The results from Windham's excavation (Windham et al. 2008) are the focus of this paper. First, I will describe debitage, using objective methods, contained in cultural features located at an occupational area centered around a Woodland period house. Second, I will classify projectile points recovered from a lithic workshop according to a functional typology based on hafting element and metric attributes, and investigate their relationship in the stratigraphic record. The goals of this project are to identify areas of lithic reduction and tool manufacture in specific features, delineate variation in projectile point form and size over time, and shed light on potential use of the bow and arrow in the Middle Woodland period.

Hardin Bridge is located in the southeastern portion of Bartow County, Georgia, roughly five kilometers north of Euharlee and west of Gilliam Springs. Situated approximately 30 m east of Hardin Bridge Road, it sits on a terrace overlooking the Etowah River. Site 9BR34 measures approximately 270 by 200 m, and is demarcated by Sugar Valley Road to the north and the Etowah River to the south (Figure 1) (Pomfret 2005:15; Windham et al. 2008:1)

The Georgia Department of Transportation, prior to replacing the bridge across the Etowah River at Hardin Bridge Road, contracted with New South Associates, Inc., to conduct data recovery work from December 11, 2006 to March 6, 2007. This work concentrated on 12% of the site area located inside the Area of Potential Effect, and focused on two activity areas identified previously: a lithic workshop and a residence with potentially associated yard features (Windham et al. 2008:1-4).

Cultural components include an ephemeral Late Archaic occupation and major site use during the Early Middle Woodland period. Evidence indicates that the lithic workshop focused on production of chert bifaces from a local rock source. The high number and spatial clustering of artifacts suggests this workshop was utilized continuously until the site was abandoned. The residence is interpreted as either a 9x11-meter or 9x20-meter oval house, based on the spatial distribution of features (Figure 2, Structure 1 and 4) (Windham et al. 2008:4).

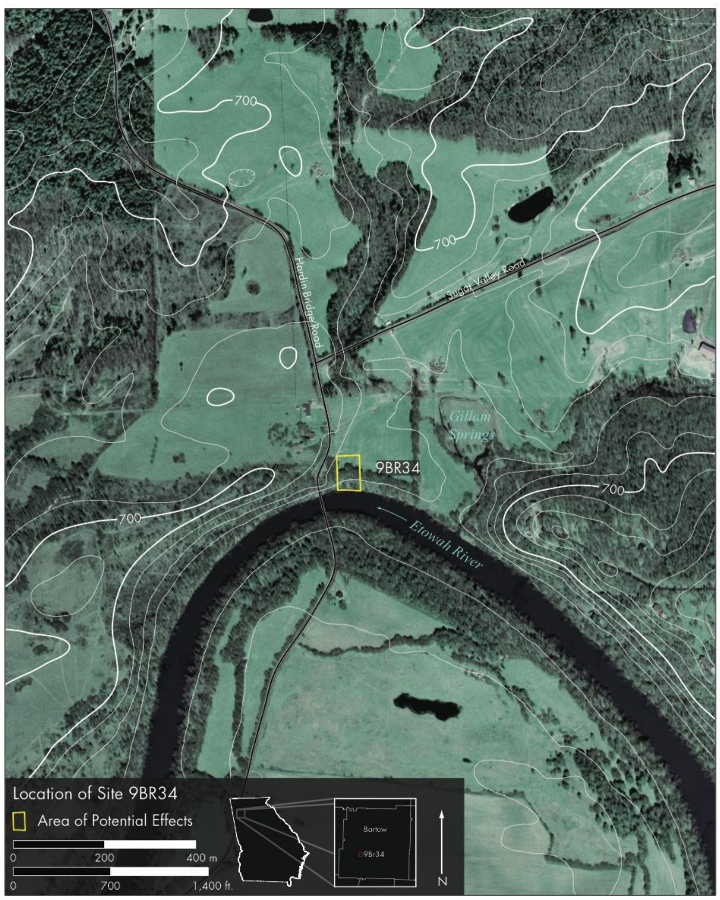

Figure 1. Location of Hardin Bridge in northwestern Georgia (from Windham et al. 2008:Figure 1.1).

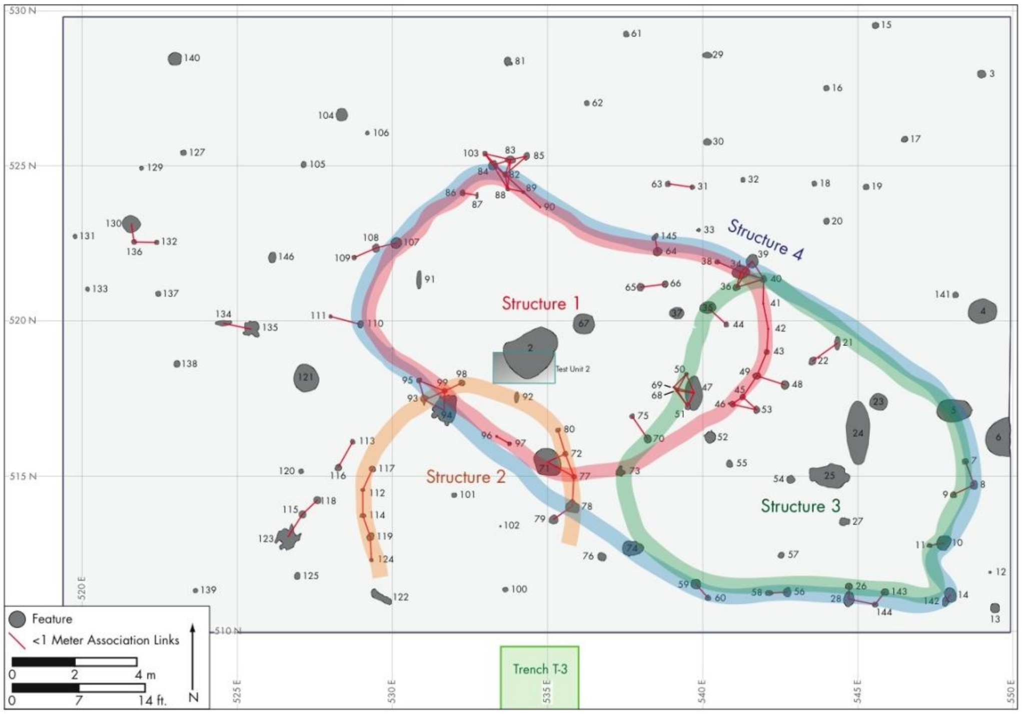

Figure 2. Block 1 structures based on feature proximity. Structures of interest are Structure 1 and Structure 4. (from Windham et al. 2008:Figure 11.1)

Chapter II. Environmental Context

Hardin Bridge is located in the Great Valley district of the Ridge and Valley province in northwestern Georgia (Figure 3). This province is characterized by parallel ridges and valleys that formed due to the folding, faulting, and uplift of Cambrian-age deposits. This province consists of all sedimentary formations located to the west and north of the Cartersville Fault (Lawton et al. 1976). The present form of the province is the result of late Paleozoic tectonic activity and subsequent erosion over the last 200 million years down to synclinal floors (Hodler and Schretter 1986). As a result, sandstone that once formed the valley floors has become elevated as surrounding rocks weathered away, creating the series of parallel ridges (Wharton 1978).

The Great Valley district is bounded to the east and south by the Cartersville Fault, and adjoins the Armuchee Ridges district to the west and north. This district extends in an arc to the south and west, averaging around 15 km wide at the Tennessee border and widening to about 26 km at its termination point. Great Valley soils lie on rocks from the Knox and Conasauga groups (Ledbetter et al. 2009:9-11; Wharton 1978). Elevation in the Great Valley district generally ranges from 215 to 245 m above sea level, with lower elevations found in the valleys, such as at Hardin Bridge (Clarke and Zisa 1976).

The chert resources at Hardin Bridge belong to the Knox group and are fine-grained and even-textured with uniform color generally of a dark bluish gray. Several varieties in the Knox group include Copper Ridge, Chepultepec, and Longview. These vary in color from white to black. Newala and Conasauga chert are also found in close association with Knox chert (Goad 1979). Chert from these formations was available in sufficient quantities for use by prehistoric populations and the Knox group was extensively utilized (Goad 1979; Ledbetter et al. 2009:16). A high quality Knox chert source is located approximately 50 m west of Hardin Bridge.

Hardin Bridge is located on a second terrace 20 m north of the Etowah River. The Etowah River begins in Dahlonega, Georgia, flows into Lake Allatoona, and then meanders west-southwest to join with the Coosa and Oostanaula rivers at Rome, Georgia. The first terrace typically floods during high waters and this probably occurred prehistorically as well. A second source of water, Gillian Spring, is located just east of Hardin Bridge (Windham et al. 2008:13-14).

Hardin Bridge is located in the northern boundary of the Warm Temperate Subtropical Zone. The climate is characterized by moderately warm, humid summers with cool to cold, short winters. Precipitation peaks in the winter and midsummer with lighter rains during other parts of the year. Severe storms are common. Severe droughts occur once every 10 to 15 years. The average annual rainfall is 115.6 cm. Based on area precipitation, the growing season lasts from April to October, approximately 200 days a year (Holder and Schretter 1986).

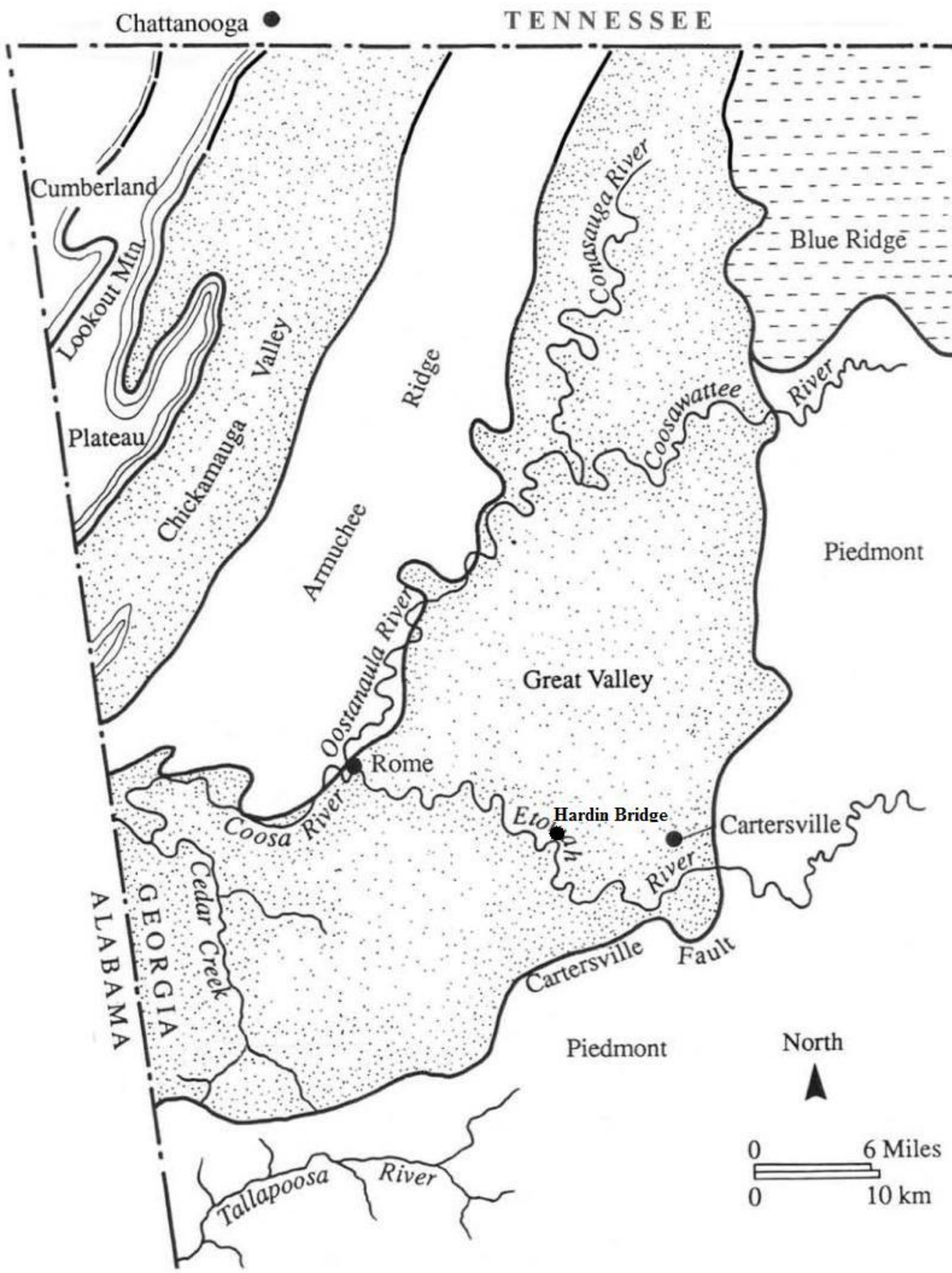

Figure 3. Physiographic provinces of northwestern Georgia showing the location of Hardin Bridge. (adapted from Ledbetter et al. 2009:29)

Chapter III. Cultural Context

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

Ledbetter et al. (2009) place the start of the Early Woodland period to the widespread use of pottery in the region and correspond to the beginning of the Early Woodland Kellogg phase (Ledbetter et al. 2009:245). Early Woodland occupations are thought to reflect relatively unchanged continuation of Late Archaic practices, except for the implementation of ceramic technology.

Subsistence activities included gathering and processing nuts, primarily acorn and hickory. Smaller quantities of black walnuts and hazelnuts were also consumed. With three possible exceptions, chenopod, sumpweed, maygrass, sunflower, and knotweed seeds do not exhibit evidence of domestication, and probably were not an integral part of northwestern Georgia Early Woodland diets (Ledbetter et al. 2009:270). Faunal analysis indicated that deer was the most significant species in the diet, followed by fish, shellfish, turtles, birds, turkeys, grouse, and other small to medium-sized mammals (Ledbetter et al. 2009:312).

Settlement patterns include major long term occupations and seasonal camps located on second terraces along rivers and tributary streams. Several recently excavated Early Woodland sites have produced large bell-shaped and silo-shaped pits probably used as subterranean storage. These disappear at the end of the Early Woodland period. Ledbetter et al. suggest large pottery vessels replaced these pits as a means of storage (Ledbetter et al. 2009:258-263).

Pottery motifs in northwestern Georgia are predominantly Dunlap Fabric Marked wares, followed by Cartersville Check Stamped and Simple Stamped wares. Ledbetter et al. (2009) describe several additional pottery types that have been found during the Early Woodland, suggesting a greater interaction at the periphery of the Kellogg phase heartland region with surrounding cultures in Alabama and Tennessee (Ledbetter et al. 2009:251-257).

Early Woodland projectile points in northwestern Georgia are highly varied in appearance. Generally speaking, smaller stemmed projectile points appear in the earliest Early Woodland contexts and predate the appearance of triangular projectile points, which become firmly established in the region between 600 and 500 B.C. (Ledbetter et al. 2009:248-250)

The Middle Woodland Period (200 B.C. to A.D. 650)

Espenshade (2008) locates the beginning of the Middle Woodland period at the time when Hopewellian motifs are first observed in northern Georgia and ends when Late Swift Creek and Napier ceramic motifs come into use. Two Middle Woodland technological traditions are currently recognized in northern Georgia, the Cartersville phase and the Swift Creek phase.

Subsistence activities included reliance on nut crops, and the earliest known intensive exploitation of cultigens such as maygrass, erect knotweed, goosefoot, little barley grass, squash, sumpweed, and sunflower (Gremillion 2002; 2004; Raymer and Bonhage-Freund 2000; Windham et al. 2008). Wood (1979) reported the recovery of maize at the Cane Island site, though it did not reach importance until the Late Woodland. Faunal analysis from the Leake site (Matternes et al. 2007) and the Brasstown Valley sites (Cable et al. 1997) identified white-tailed deer, turkey, rabbit, freshwater drum, turtle, generic large mammal, small mammal/bird, fish, raccoon, turtle, turkey, frog/toad, freshwater mussel, and river chub.

Settlements include large villages in floodplain or terrace settings along major rivers as well as single households, possibly occupied year-round (Espenshade 2008). Houses are either round or oval in shape, constructed of individually set posts (Cable et al. 1997) or pit houses

(Espenshade et al. 1998). Typically, there seems to have been a single base camp with a series of resource extraction camps surrounding it. These camps were occupied for most of the year and in some cases year-round (Cable et al. 1997).

Pottery motifs in the Middle Woodland period exhibit a sequence of Cartersville Check Stamped, Cartersville Simple Stamped, and Swift Creek Complicated Stamped types (Espenshade 2008). The relationship between Cartersville and Swift Creek ceramics is not well understood. Both decorative patterns are widespread in northwestern Georgia, and their geographical and chronological distributions overlap considerably. Generally speaking, Cartersville phase ceramics date to between ca. 300 B.C. and A.D. 500 and Swift Creek phase ceramics approximately date to between A.D. 1 and A.D. 700 (Benyshek and Wild 2003).

Triangular projectile points and small stemmed or weakly notched types first occurring in the Early Woodland continue to be prevalent in Middle Woodland contexts (Espenshade 2008). Middle Woodland projectile points lack a clear typological sequence in northern Georgia. Large triangular, "waisted" triangular, and stemmed varieties co-occur in Middle Woodland assemblages, and are found in context with Cartersville and Swift Creek components (Benyshek and Wild 2003).

Chapter IV. Archaeological Excavation at Hardin Bridge

During a walkover survey of the Etowah River terraces during a Works Progress Administration project, Wauchope initially identified Hardin Bridge as an Archaic lithic workstation with three potsherds (Wauchope 1966:233). Artifacts included triangular and stemmed projectile points, a Cartersville Check Stamped sherd, and a possible Mississippian or Late Swift Creek sherd (Windham et al. 2008:47).

Pomfret (2005) investigated Hardin Bridge through shovel testing, geophysical survey, and excavation units. The testing results indicated Hardin Bridge had intact features beneath the plow zone containing a dense assortment of artifacts. A large pit-like feature included Cartersville Check Stamped (n=228), Cartersville Simple Stamped (n=90), Dunlap Fabric Marked(n=2), fire cracked rock, a metate, a large nutting stone, slate tool fragments, groundstone fragments, and a Cartersville Simple Stamped tetrapod vessel base. A second test unit revealed a dense concentration of debitage (n=16,942) and 41 projectile points. Twenty-nine could be securely typed to Late Archaic and Early Woodland-like stemmed, Yadkin, and Mississippian, all in a stratified sequence. Pomfret concluded Hardin Bridge exhibited intact and spatially distinct activity areas consistent with domestic activities and lithic reduction.

Windham conducted further excavation at Hardin Bridge in advance of a GDOT bridge replacement project. Excavation centered on the previously identified domestic activity area (Block 1) and lithic workshop (Block 3) (Figure 4). Block 1 consists of a 20-x-30-m area centered on Pomfret's earlier excavation. She mechanically stripped the plow zone in order to identify cultural features. The plow zone measured approximately 30-cm in depth and other than feature fill, no intact midden deposits or occupational floors were encountered (Windham et al. 2008).

Based on morphological characteristics, Windham et al. (2008) identified four feature types: small basins, large basins, large pits, and small pits/postholes. Small basins are described as small and shallow features generally less than 40 cm in diameter, no more than 15 cm deep, with a rounded base. Large basins are described as large shallow features between 40 and 100 cm in diameter, no more than 30 cm deep and characterized by circular, angular, or irregular walls. Large pits are described as deep features greater than 50 cm in diameter, extending more than 45 cm in depth and exhibiting silo-, bell-, or cylinder-shaped walls with flat, concave, or tapering bases. Small pits/postholes are described as similar to small basins, though they extend between 15 and 50 cm in depth. These features were bisected, excavated in 10-cm levels, and a flotation sample acquired (Figure 5). Windham identified 48 cultural features in Block 1, and identified between one and four potential houses (Windham et al. 2008).

Block 3 was an 8-x-3-m grid placed in close proximity to the lithic workshop area identified by Pomfret. Windham excavated Block 3 with 1-x-1-m units, by 5- or 10-cm arbitrary levels, depending on the unit. Six strata were observed during excavation (Figure 6). Stratum I is a disturbed plow zone and ranged from 20-30 cm in thickness. Stratum II is a 5-cm thick flood deposit that capped the underlying intact A horizon. Stratum III is an intact, buried, unplowed A horizon. Stratum IV is a transition zone between Stratum III and V. It is a fine-grained layer with evidence for limited and localized intact cultural deposits. Stratum V is a fine sandy loam exhibiting a significant decrease in artifact density compared to earlier strata. Stratum VI is a culturally sterile layer primarily contained to the northern section of Block 3. The northern 3-x-

3-m area is highly disturbed and the southern 5-x-3-m area contains intact cultural deposits (Windham et al. 2008:212-213).

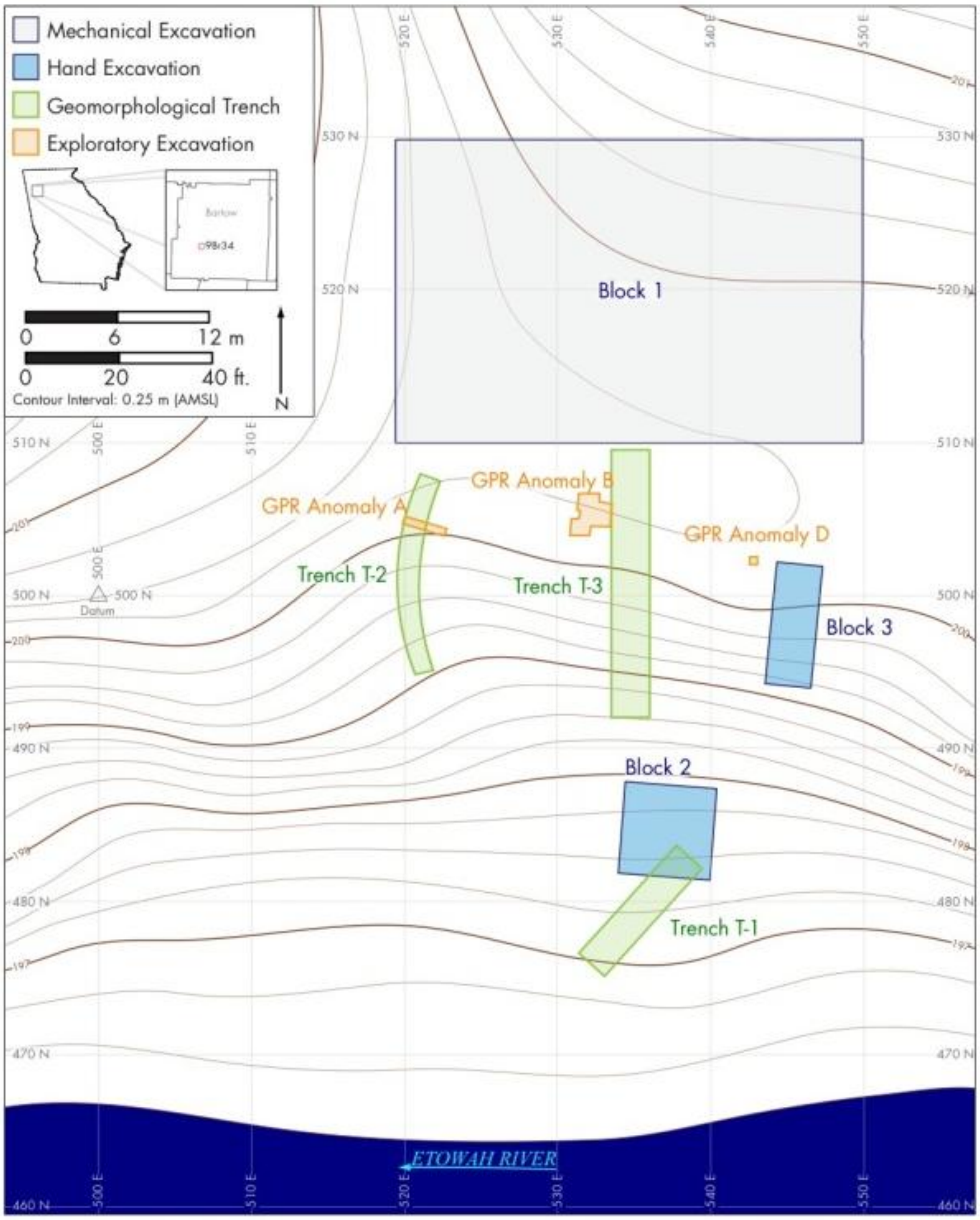

Figure 4. Block locations at Hardin Bridge. (from Windham et al. 2008:Figure 5.1)

Figure 5. Block 1 feature excavation. (from hardinbridgedig.com)

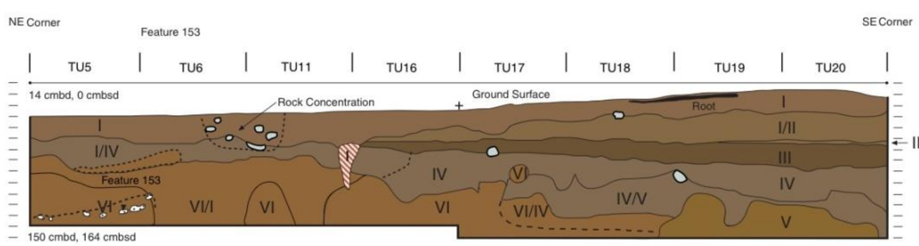

Figure 6. Block 3 east profile. (from Windham et al. 2008:Figure7.53)

Chapter V. Research Questions

Lithic analysis in northwestern Georgia typically consists of sorting artifacts by raw material and stage of reduction or tool production. Artifact assemblages are often analyzed following the lithic reductive model of Collins (1975) in which the processes of lithic manufacture and use are perceived as a series of five ordered stages: 1) acquisition of raw materials, 2) initial reduction, 3) primary flaking, 4) secondary flaking, and 5) use and/or recycling. Debitage is sorted into reduction categories consisting of early reduction flakes (primary and secondary decortication flakes), late reduction flakes (tertiary flakes and bifacial thinning flakes), shatter and core fragments. Flaked stone tools are assigned to functional categories based on general morphology, and cultural/temporal affiliation of diagnostic artifacts is determined through comparisons with published type descriptions.

Critiques of various debitage analysis methods include: observer subjectivity in cortex identification (Sullivan and Rozen 1985), lack of definition for flake classification categories (Daugherty et al. 1987; Draper and Lothson 1990; Sappington 1991), and inconsistency in interpretive results (Amick and Mauldin 1989; Ensor and Roemer 1989; Prentiss and Romanski 1989). These critiques underline the difficulties in using a single method of debitage analysis. A single set of characteristics may not be an accurate representation of tool production, and may not be applicable to contexts outside of the study area. This report explores the possibility of determining specific site activities from feature fill.

A similar critique involves the formal typological classification of projectile points. Archaeologists often disagree on what constitutes a particular type, as well as the assignment of particular specimens to types (Shott 1996:281). This may be due, in part, to the "nature of lithic technology, a reductive process, which makes the task of understanding artifact variability more difficult than in the case of ceramic production, a synthetic process." (Clay 1976:303).

The issue of formal typological classification and potential cultural affiliation is compounded in northwestern Georgia by spatially overlapping stemmed and triangular projectile point forms. While these forms are spatially differentiated by geographical region in North Carolina and demonstrate stratigraphic replacement of stemmed types by triangular types in the Early Woodland (Oliver 1985), northwestern Georgia lies in a region where these two types appear to be in use at the same time. This report concentrates on exploring the changes of these morphologically distinct projectile points at Hardin Bridge. Oliver (1985:208-209) suggests the appearance of triangular point manufacture coincides with the introduction of the bow and arrow in North Carolina. If this pattern exists elsewhere, the combination of triangular and stemmed projectile points at northwestern Georgia sites may be an indication of differential adoption of this technology by Woodland period people.

This paper considers the issues expressed above and explores the following research questions at Hardin Bridge: Were there different activities or different activity areas involving lithics? Can specialized activities be identified through a comparison of debitage attributes between features? Is there a relation between feature location, lithic activities, and suggested structures? What do the projectile points tell us about Woodland period chronology? Are there explanations for projectile point variation apart from formal typologies? These questions have broader regional significance because they have the potential to provide explanations for artifact patterning at contemporaneous sites. How these questions will be addressed is the subject of the next section.

Chapter VI. Methods

In order to better understand the relationship of lithics in an archaeological context, I used multiple classification techniques based on attribute analysis. Attribute analysis is an alternative to formal typological classification and is a method where "multiple dimensions of variability in general [lithic] classes and in all stone tools are described, measured, and used singly and in combination in diverse analytical operations" (Clay 1976:304). Attribute analysis operates under the assumption that lithic artifacts have measurable variation which reflect not only "the interaction between the artisan and his particular technological tradition, but in a much broader sense his interaction with the environment" (Clay 1976:304).

Block 1 Debitage Analysis

In order to ascertain if patterns of human behavior can be deduced from debitage, it is necessary to determine potential relationships between artifact types or attributes and their spatial distribution in and around features. There have been some promising results from related research projects. For example, a study of several flake samples from villages along the Knife River in North Dakota concluded that bifacial thinning debris was more often deposited within houses while core reduction debitage was more often located outside of known structures. Goulding theorized that this distribution was due to final stage tool production and routine resharpening and maintenance activities (Goulding 1980). Prentiss and Romanski (1989:94) found that biface production areas with high traffic increased the frequency of incomplete medial and distal flake fragments from 30% to 50%. This probably occurred due to trampling by inhabitants who repeatedly walked over the area. Rice (1987) analyzed differences in flake type between activity areas at La Cuidad, a large Hohokam site in central Arizona. His analysis concentrated on differentiating between central courtyard and peripheral areas. However, there is some mention of assemblage variation between inner- and outer-structure locations on the courtyard areas in terms of flake type and flake size. Rice determined that the inner-structure assemblage was dominated by shatter, followed by an equal amount of secondary and tertiary flakes. Additionally, over 80% of the assemblage measured less than 30 mm on a side. This pattern was attributed primarily to repeated floor sweeping within the structure.

Through an analysis of debitage attributes it may be possible to discern spatial artifact patterns indicative of activity or discard areas at Hardin Bridge. For instance, lithic manufacture or tool maintenance debitage may exhibit identifying characteristics that would allow me to determine if these activities occurred in conjunction with particular features. The attribute analysis will provide the information necessary to determine if there are quantifiable differences between feature debitage assemblages and their location in the prehistoric occupational area. If patterns for lithic debitage can differentiate activities based on feature fill, then these results would aid in identifying activity areas based on feature fill at other prehistoric sites in Georgia.

The flake attributes used in this analysis include debitage condition and termination, striking platform type, and flake size (following Andrefsky 2005). In general, complete flakes are classified as possessing feathered, hinged, or overshot terminations. Flake fragments are classified as proximal with a step termination, a medial fragment, or a distal fragment. This data set determines if there are differences in complete versus fragmentary flakes at feature locations. In features with different ratios of fragmentary flakes, lithic reduction stage can be determined. Striking platforms are classified based the following categories: cortical, flat, complex, and abraded. Early and middle stage reduction typically consists of cortical or flat platforms, while late stage reduction and maintenance encompass complex or abraded platforms. If different reduction activities occurred at or around specific feature types, it should be represented by differences in striking platform type. Flake size was determined by measuring the following attributes using sliding calipers, accurate to .1 mm: maximum flake length, flake width and thickness at the halfway point of maximum length. Early and middle stage reduction generally results in larger and thicker flakes. Specific details about each attribute type are now further defined.

Flake Termination. Flake termination is the condition or character of the distal end of detached pieces. Smooth terminations that gradually shear the flake from the objective piece are called feathered terminations. Flakes which snap or shatter during removal to form an almost right angle with the ventral surface are called step fractures. Distal ends that are rounded or sloped are called hinge fractures. Overshot terminations are characterized by bulbous distal ends. (Andrefsky 2005:87)

Flake Condition. Flake condition describes if the flake is complete or broken. Broken flakes are further defined as proximal, medial, and distal. Proximal fragments are all specimens that contain a striking platform. Medial fragments include all broken flake specimens that have no proximal end and a stepped distal end. Distal fragments do not have a striking platform and have distal ends that can be characterized as feathered, hinged, or overshot terminations. (Andrefsky 2005:88-89)

Striking Platform. Striking platform types are an indication of the objective piece from which the flake was removed. Cortical platforms are simply composed of an unmodified cortical surface. Flat striking platforms are recognized as smooth flat surfaces which have been impacted to remove a detached piece. Complex striking platforms are recognized by either a rounded surface or a surface composed of multiple flake scars. Abraded platforms are characterized by smoothed flatforms created by abrasion or rubbing. (Figure 7) (Andrefsky 2005:94-98)

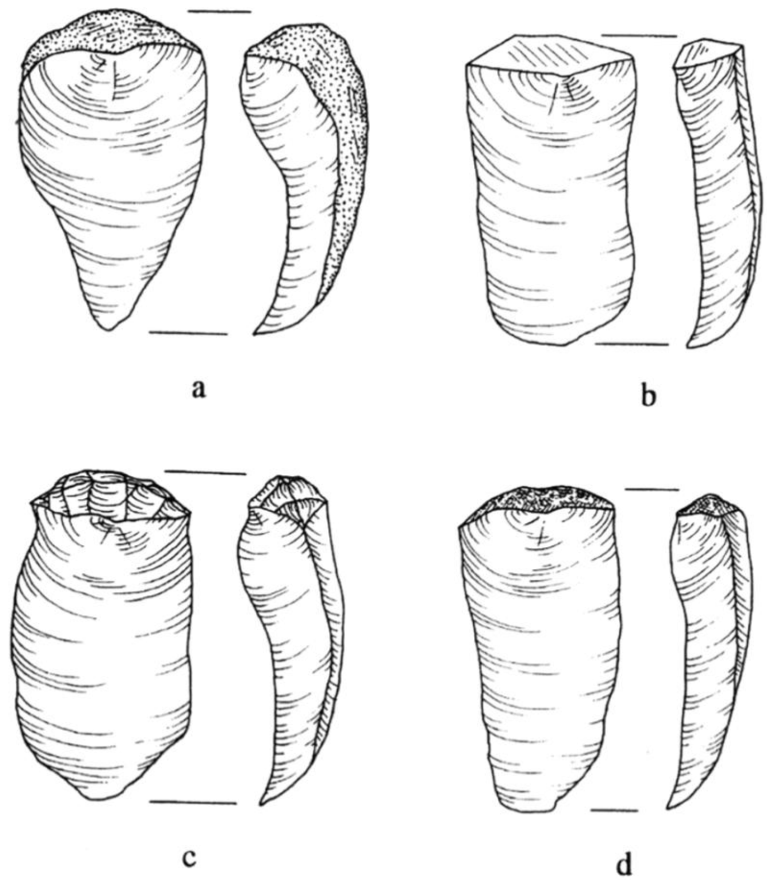

FIGURE 5.6 Schematic diagram showing four generalized flake striking platform types: (a) cortical striking platform; (b) flat striking platform; (c) complex striking platform; (d) abraded platform.

Figure 7. Striking platform illustrations. (from Andrefsky 2005:Figure 5.6)

Complete Flake Size. Maximal flake length is measured from the proximal end to the distal end of the flake along a line perpendicular to the striking platform. Flake width is measured as a straight line distance perpendicular to the flake length at the halfway point. Flake thickness is measured at the same location as flake width, but from the dorsal to the ventral side. (Andrefsky 2005:98-102)

Flake Size Class. Size class is measured by sifting the debitage through a series of nested screens of decreasing screen mesh sizes. The screen sizes used in this analysis correspond to one-inch, half-inch, quarter-inch, and eighth-inch.

If the spatial patterning of archaeological remains reflects the spatial patterning of past activities (Binford 1964), then the debitage attributes of our features should represent particular activities, provided that the feature fill is relatively unmixed. Because debitage is a refuse product of tool manufacture and maintenance, it can be considered representative of these activities. Disposal patterns typically fall into one of three categories: primary refuse, material discarded at its location of use; secondary refuse, material discarded at a location other than its creation; and defacto refuse, material entering the archaeological record through no direct behavioral action required for the first two categories (Schiffer 1972).

Several criteria went into the feature selection process in order to minimize bias. First, I limited the potential pool of features to those that were clearly identified as cultural and prehistoric. Second, only the flotation samples from each feature were classified. This negated the flake size bias that often occurs from features that have been screened with 1/4-inch hardware cloth. Third, I included only features with a debitage sample size greater than 30 specimens.

Several features contained several hundred to a thousand debitage pieces. For these features I took a stratified random sample which reduced N to between 50 and 100. A stratified sampling technique was necessary because the features had been curated by size grade. The results of this selection process are contained in Table 1.

Table 1. Selected Features in Block 1.

	Feature Type	Percent of Flotation Sample	Final Debitage Count
Feature 2	Large Pit	5%	102
Feature 4	Large Basin	100%	78
Feature 5	Large Basin	50%	47
Feature 6	Large Pit	25%	61
Feature 10	Large Basin	20%	75
Feature 14	Large Basin	100%	40
Feature 25	Large Pit	25%	72
Feature 27	Small Pit/Posthole	50%	63
Feature 67	Large Basin	100%	38
Feature 71	Large Basin	50%	80
Feature 74	Large Basin	100%	72
Feature 94	Large Basin	50%	72
Feature 121	Large Pit	50%	60

Block 3 Projectile Point Analysis

In order to ascertain if variation within the Hardin Bridge projectile point assemblage is based on expected patterns of change over time, an analysis based on hafting style, metric attributes, and spatial distribution within the archaeological record are necessary. Generally speaking, large stemmed Late Archaic projectile points are replaced by smaller stemmed and triangular projectile points in the Early Woodland period. Stemmed points are more prevalent in the first half of the Early Woodland period and are replaced by triangular points in the latter half. (Ledbetter et al. 2009). Sorting the projectile point assemblage into stemmed and triangular categories and recording metric attributes can potentially describe the relationship between these two styles in the stratigraphic record not always apparent with formal typological classes. Apart from the temporal adoption of hafting style, described above, these haft elements are more likely to retain inherent metric attributes not affected through resharpening activities (Andrefsky 2005:184).

Metric attributes are necessary to provide a foundation for the description of particular morphological features of individual projectile points, classified by hafting element, and to provide an objective basis for comparative analysis. The attributes used for this analysis include: projectile point length from the tip to the base, blade width from shoulder to shoulder for stemmed projectile points and across the base for triangular projectile points, neck width from neck edge to neck edge (Figure 8), and weight. Metric attributes are also necessary for functional classification. Early studies identified length, shoulder/base width, thickness, and neck width as important attributes (Thomas 1978), though more recently only shoulder/base width and thickness, or simply shoulder base/width has been shown to accurately determine projectile point functionality (Shott 1997). I measured these attributes with sliding calipers accurate to .1 mm. Weight was calculated to .1g.

Attribute name	Description From	To
BLL; blade length	Tip of biface	Tip of shoulder
NH; neck height	Neck	Base
HL; haft length	Top of haft element	Base
BLW; blade width	Shoulder	Shoulder
NW; neck width	Neck edge	Neck edge
BW; base width	Base edge	Base edge
SBC; shoulder to corner	Shoulder	Basal corner

Source: Descriptions adapted from Andrefsky (1986b:104).

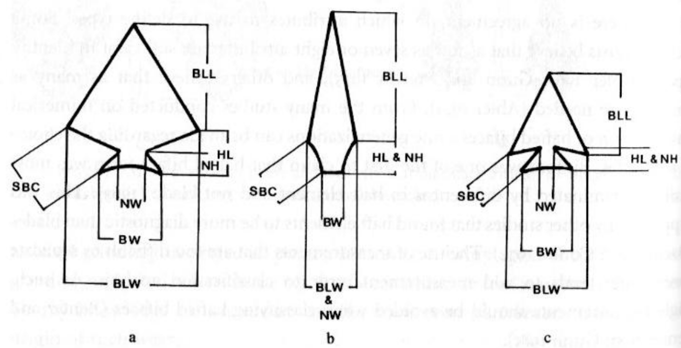

Figure 8. Projectile point measurement illustrations. (from Andrefsky 2005:Table7.6)

Metric attributes are also necessary for discussion about projectile point sequence as it appears in stratigraphic context. Based on the geomorphological investigations and the presence of a potentially intact Middle Woodland occupation surface, it is likely that the stratigraphic context has been preserved in many of the units. If that is the case, then projectile points located in vertical proximity to each other are closer in age than points that are widely separated. It should thus be possible to identify a stratigraphic order to the stylistic types, and determine if stylistic types are found in discrete and punctuated levels or if there is continuous stylistic variation over time. This, in turn, may provide further evidence for the use and adoption of projectile point styles at contemporaneous Woodland period sites in northwestern Georgia.

The initial projectile point analysis identified 19 previously published formal types based on morphological characteristics (Windham et al. 2008:359). To simplify the current analysis and minimize bias, the Hardin Bridge stemmed and triangular projectile points were grouped solely on hafting shape. This sample consists of 75 stemmed (Figure 9) and 43 triangular (Figure 10) projectile points.

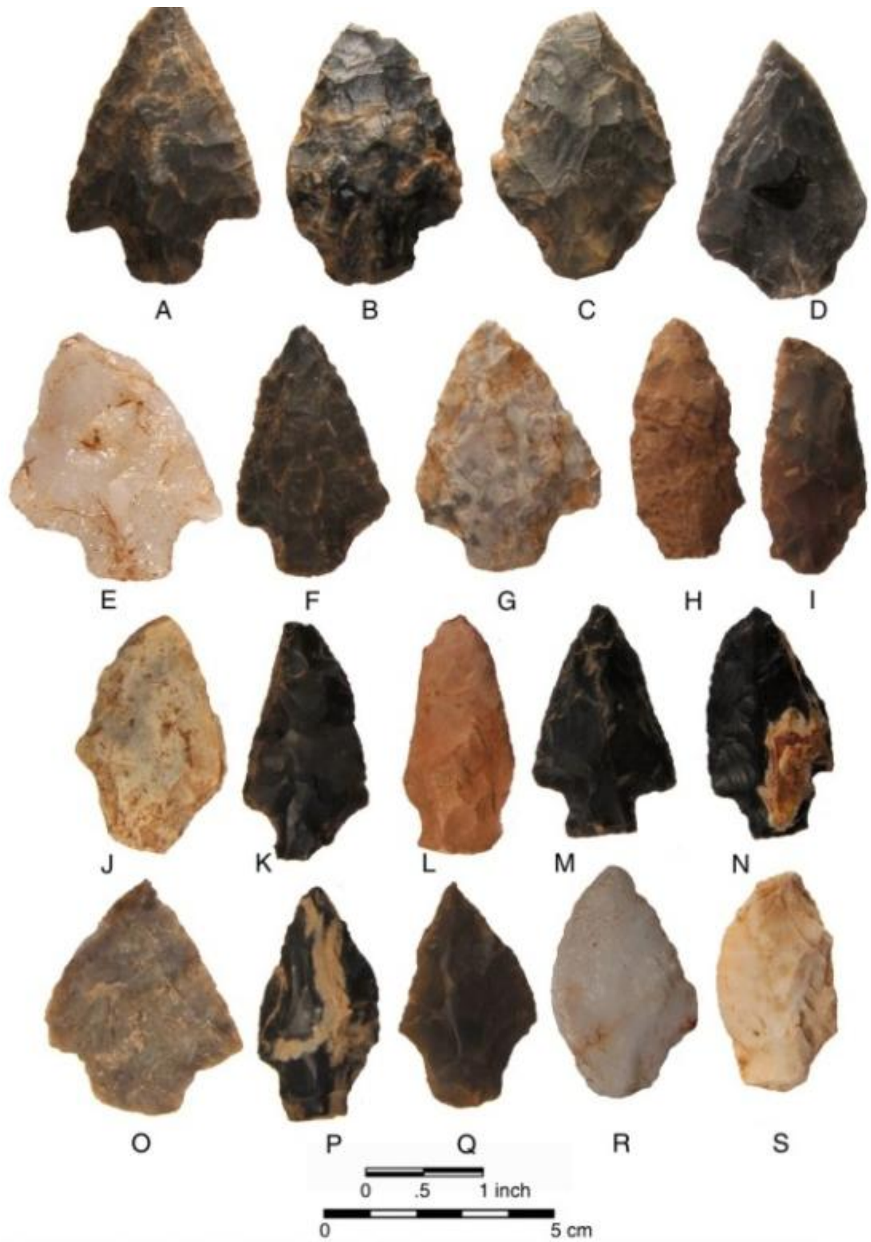

Figure 9. Selected sample of Hardin Bridge stemmed projectile points. (from Windham et al. 2008:Figure 9.53)

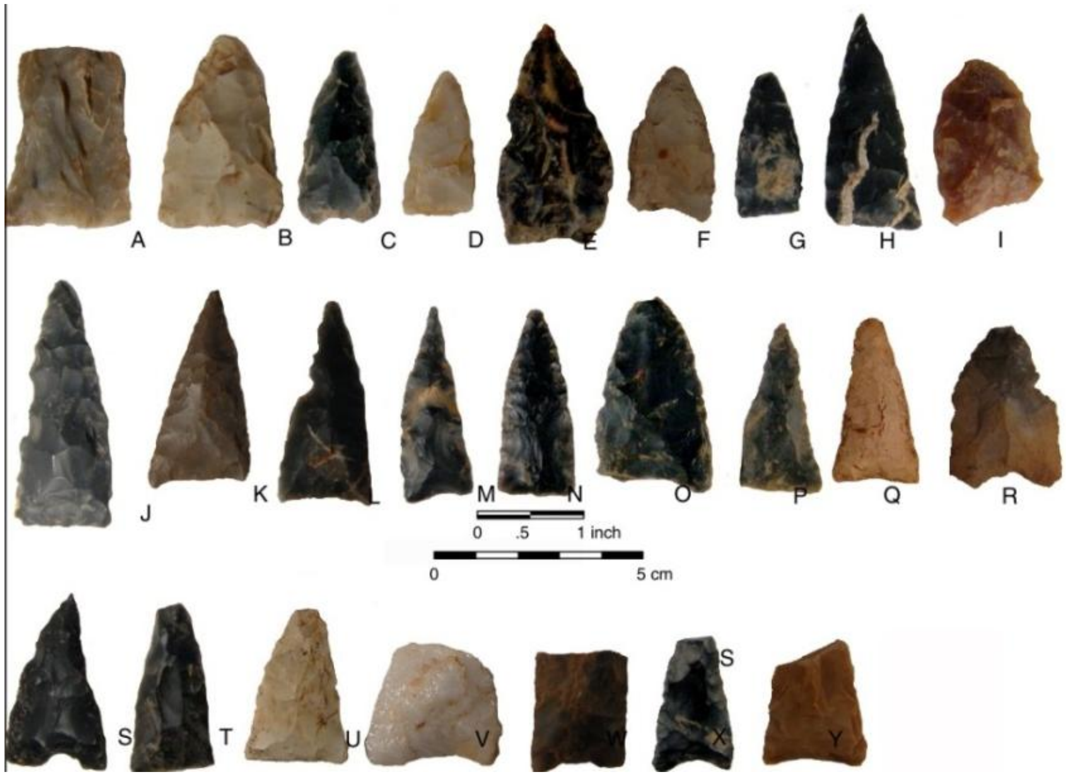

Figure 10. Selected sample of Hardin Bridge stemmed projectile points. (from Windham et al. 2008:Figure 9.55)

An additional restriction is based on the intact cultural stratigraphy of Block 3. In this 8-x-3-m block (Figure 11), the northern 3-x-3-m block exhibited a lack of integrity and all projectile points from these proveniences were excluded from further analysis. Additionally, four Mississippian triangulars were excluded. The southern 5-x-3-m section had intact stratigraphy and the projectile points are considered to have contextual significance.

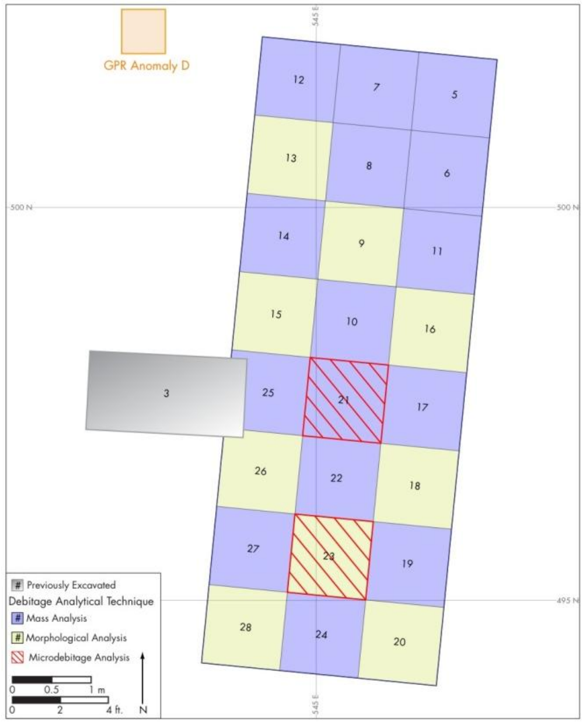

Figure 11. Block 3 unit orientation. (from Windham et al. 2008:Figure 5.2)

Chapter VII. Debitage Analysis, Block 1

Results

Prior to my classification and analysis of Hardin Bridge, Windham employed Ahler's (1989) flake aggregate analysis. Flake aggregate analysis consists of size-grading the debitage through a series of nested screens, and collecting quantitative data from the size-graded subsamples. Four screens, roughly corresponding to one-inch, half-inch, quarter-inch, and eighth-inch (labeled Grade 1 through Grade 4), partition the samples, and this was how the material was curated.

Because flintknapping is a reductive process, debitage produced in the early stages of lithic reduction will have relatively greater numbers in the large size classes and fewer numbers in smaller size classes, while debitage produced during late stage lithic reduction or tool maintenance will have few numbers in the larger size classes and greater numbers in the small size classes (Ahler 1989:89-90). If early stage lithic reduction activities occurred at Hardin Bridge, then larger debitage should be apparent from the size-grading process and debitage should be recovered from all size grades. Conversely, debitage from late stage reduction and tool maintenance will be rare in Grade 3 and larger, but will be common in Grade 4. The size of the available raw material may also influence the distribution of flakes by size class. The nearby quarry consisted of long linear tables of Knox chert ranging from a minimum of 7- to 10-cm in width. This would have an effect on maximum flake size but is large enough to accommodate debitage in the larger size classes.

Flake Size Class. The distribution of debitage by size class is remarkably similar between Knox and non-local chert sources (Table 2). Over 90% of the debitage is concentrated in the two smaller size categories, slightly weighted toward the smallest category, which suggests little or no early stage reduction. This is supported by the lack of cores. Windham et al. (2008:Table 7.28) recovered only one core in context, from Feature 121.

Table 2. Flake Count in Block 1 by Size and Material Type.

	Grade 1	Grade 2	Grade 3	Grade 4	Total
Knox Chert Count	2	33	172	212	419
Knox Chert %	0.5	7.9	41.1	50.6	60.7
Non-Local Chert Count	2	23	95	146	266
Non-Local Chert %	0.8	8.6	35.7	54.9	38.6
Quartz Count	1	0	3	1	5
Quartz %	20.0	0.0	60.0	20.0	0.7
Total by Grade	5	56	270	359	690
Total %	0.7	8.1	39.1	52.0	100.0

A supporting correlate to this determination came from Carr and Bradbury's (2001) experimental studies on lithic reduction. They demonstrated that debris from core reduction is typically over-represented in archaeological contexts. They found, on average, core reduction activities are represented 1.75 times more than biface reduction, and 2.25 times more than unifacial tool production. In conjunction with the lack of cores found with the debitage assemblage, the conclusion that little to no core reduction took place is supported by the lack of larger byproducts, which should be overrepresented according to Carr and Bradbury (2001). The relative paucity of larger size debitage suggests that mid- to late-stage lithic reduction produced most of the flakes.

A breakdown of grade size by feature did indicate some partitioning of activities (Table 3). Features 6 and 67 have the smallest percentage of Grade 4 debitage and Features 25, 5, and

74 have the largest. This distribution suggests that little tool maintenance occurred in conjunction with Features 6 and 67, and more with Features 5, 25, and 74.

Table 3. Flake Count in Block 1 by Feature.

	Grade 1	Grade 2	Grade 3	Grade 4
Feature 6 Count	1	5	42	13
Feature 6 %	1.64	8.2	68.9	21.3
Feature 67 Count	0	7	17	14
Feature 67 %	0	18.4	44.7	36.8
Feature 10 Count	1	9	32	33
Feature 10 %	1.33	12	42.7	44
Feature 121 Count	0	6	27	27
Feature 121 %	0	10	45	45
Feature 27 Count	1	0	34	28
Feature 27 %	1.61	0	53.2	45.2
Feature 94 Count	0	9	30	33
Feature 94 %	0	12.5	41.7	45.8
Feature 2 Count	1	13	37	51
Feature 2 %	0.98	12.7	36.7	50
Feature 4 Count	1	1	36	40
Feature 4 %	1.28	1.28	46.1	51.3
Feature 14 Count	0	3	18	21
Feature 14 %	0	2.5	45	52.5
Feature 71 Count	0	6	31	43
Feature 71 %	0	7.5	38.6	53.8
Feature 25 Count	0	6	21	45
Feature 25 %	0	8.33	29.2	62.5
Feature 5 Count	0	2	13	32
Feature 5 %	0	4.26	27.7	68
Feature 74 Count	0	4	16	52
Feature 74 %	0	6	22	72

The local high-quality Knox chert, while slightly favored over non-local chert, was not selected to the exclusion of other regionally available materials. Even though quartz is available from the Piedmont approximately 10 km away, it is not well represented. The chert materials from different origins occur with the same relative frequency. For the purposes of this paper, all chert was collapsed into a single category.

Sullinvan and Rozen Typology. Sullivan and Rozen (1985) established that the relative quantities of complete and incomplete flakes could indicate core reduction or tool production. Assemblages containing relatively large quantities of cores and complete flakes are the result of core reduction, and assemblages with large quantities of incomplete flakes are the result of tool production (Odell 2004:123). While core artifacts were absent from almost all studied contexts, the variability between complete and incomplete flakes may differ by feature. If a feature contains a greater ratio of complete to incomplete flakes, it would be an indication of early stage reduction, and a greater ratio of incomplete to complete flakes would indicate tool production. Every feature at Hardin Bridge contained a greater proportion of incomplete flakes (Table 4), suggesting that the flakes are representative of tool production. Early stage core reduction activities occurred at a location other than Block 1.

Table 4. Complete and Incomplete Flakes by Feature.

	Complete	%	Incomplete	%
Feature 27	14	25.5	41	74.5
Feature 4	17	26.1	48	73.8
Feature 14	9	27.3	24	72.7
Feature 74	11	28.9	27	71
Feature 71	19	29.7	45	70.3
Feature 5	12	30	28	70
Feature 2	27	30.7	61	69.3
Feature 25	20	31.7	43	68.3
Feature 6	16	35.6	28	62.2
Feature 121	17	37	29	63
Feature 67	12	38.7	20	61.3
Feature 94	23	39	37	61
Feature 10	26	40.6	38	59.4

Modified Sullivan and Rozen Typology. Prentiss (2001) conducted flintknapping experiments on flakes, bifaces, unprepared cores, and prepared cores using hard hammer, soft hammer, and pressure flaking techniques. He categorized the resulting debitage from each experiment into discrete size classes and objective flake type. His size classes include extra large (>64 cm^2), large (16-64 cm^2), medium (4-16 cm^2), and small (< 4 cm^2) (Prentiss 2001:Table 9.1). In terms comparable to the Hardin Bridge assemblage, the small category corresponds to all Grade 2 through Grade 4 flakes. Prentiss found that general pressure flaking and hard hammer percussion on a biface edge resulted in only a few medium-sized flakes and often only a distribution of small size class flake types. Medial/distal flakes were most often represented, followed by proximal flakes, and finally complete flakes.

As described earlier, over 90 percent of the Hardin Bridge assemblage falls into the smaller size categories. Hardin Bridge does indicate some slight variance from the values derived by Prentiss for flake type (Table 5). Hardin Bridge has a greater emphasis on complete flakes with a corresponding under-emphasis on proximal flakes. This may be due to the high number of flakes in the Hardin Bridge assemblage not typically recorded when only 1/4-inch screen is used. These flakes, due to their size, may not break as easily as other flakes, either due to the technique used to produce them, or to the lack of post-depositional processes contributing to breakage. If more archaeologists begin regularly collecting data on this size class, it will become necessary to update experimental data that can fill this current gap in an otherwise useful analysis technique.

Table 5. Distribution of Flakes by Objective Flake Type.

	Complete	%	Proximal	%	Medial\Distal	%
Feature 27	14	25.5	15	27.3	26	47.3
Feature 4	17	26.2	13	20.0	35	53.8
Feature 14	9	27.3	9	27.3	18	45.5
Feature 74	11	28.9	8	21.1	19	50.0
Feature 71	19	29.7	15	23.4	30	46.9
Feature 5	12	30.0	6	15.0	22	55.0
Feature 2	27	30.7	25	28.4	36	40.9
Feature 25	20	31.7	7	11.1	36	57.1
Feature 6	16	36.4	9	20.5	19	43.2
Feature 121	17	37.0	8	17.4	21	45.7
Feature 67	12	38.7	6	19.4	13	41.9
Feature 94	23	39.0	14	23.7	22	37.3
Feature 10	26	40.6	7	10.9	31	48.4

Flake Shatter Frequency. In conjunction with the ratio of complete to incomplete flakes, another useful comparison is the frequency between flakes and shatter (Whittaker and Kaldahl 2001:53). Shatter occurs with percussive flaking (often with a hammerstone). In contrast, pressure flaking is a technique employed in later stage lithic reduction when finer control over the material is required. Because of the care usually taken with pressure flaking, shatter constitutes a lower percentage of the debitage. Using data from archaeological contexts, Whittaker and Kaldahl (2001:Table 4.4) found a 13.9% percentage of shatter from pressure flaking and 22.1% from percussion.

The proportion of shatter to flakes varies from a low of 11% to a high of 28% (Table 6). This may indicate a mix of percussion and finer work. Notice, however, that the proportion of shatter is not correlated with the distribution of complete and incomplete flakes (Table 4). The four features with the smallest percentage of shatter as well as the four features with the largest percentage of shatter are randomly distributed. The expectation is that low proportions of shatter should also contain a smaller ratio of complete to incomplete flakes. Whittaker and Kaldahl's (2001) data is derived from archaeological contexts and does not take into account debitage smaller than 1/4-inch. These two factors may be the cause for the observed incompatibility between this method of debitage analysis and the other methods.

Table 6. Flakes and Shatter by Feature.

	Flake	%	Shatter	%
Feature 27	56	88.7	7	11.3
Feature 25	63	87.5	9	12.5
Feature 2	88	86.3	14	13.7
Feature 10	64	85.3	11	14.7
Feature 5	40	85.1	7	14.9
Feature 4	65	83.3	13	16.7
Feature 14	33	82.5	7	17.5
Feature 94	59	81.9	13	18.1
Feature 67	31	81.6	7	18.4
Feature 71	64	80	16	20
Feature 121	46	76.7	14	23.3
Feature 74	55	76	17	24
Feature 6	44	72.1	17	27.9

Striking Platform. Differences in the percentages of flake types are typically influenced by tool needs and raw-material availability (Kelly 1988:717-719). One of the more sensitive attributes of a flake is the striking platform, which retains some characteristics of the piece that the flake was struck from (Andrefsky 2005:94). Platform types are correlated with flintknapping technique and stage of lithic reduction. A higher percentage of cortical platforms indicates earlier stage reduction. Flat platforms are typically a result of detaching debitage from unidirectional cores or nonbifacial and expedient tools (Andrefsky 2005:95), though they can also be found on small flakes produced by tool maintenance activities. Abraded platforms represent significant investment in the final product by the flintknapper and are characteristic of formal tool production (Andrefsky 2005:97). Complex platforms represent biface manufacture or maintenance (Whittaker and Kaldahl 2001).

Cortical platforms are a minority in all features because the local Knox chert source consists of tabular slabs in bedrock, which rarely exhibits cortex. In all but two features, abraded and complex platforms make up between approximately 60 and 80 percent of all cases (Table 7). This indicates a concentration on biface manufacture, formal tool production, or maintenance activities. In only two cases, Features 27 and 67, do flat platforms make up most of the assemblage. I plotted length versus thickness of complete flat platform flakes in order to determine what type of activity may have caused their abundance in Features 27 and 67 (Figure 12). If the work were core reduction, flakes should be large in size. Conversely, if it is related to nonbifacial or expedient tool manufacture, they should be smaller in size. If both activities occurred, two distinct groupings on opposite ends of the spectrum should be apparent. In this assemblage, the flat platform flakes are quite small in both dimensions, with one exception. This indicates tool manufacture rather than core reduction.

Table 7. Distribution of Platform Types by Feature.

	Cortical	Flat	Abraded	Complex
Feature 27 Count	1	16	3	9
Feature 27 %	3.4	55.2	10.3	31.0
Feature 74 Count	1	7	4	7
Feature 74 %	5.3	36.8	21.1	36.8
Feature 67 Count	1	9	0	6
Feature 67 %	5.9	52.9	0.0	41.2
Feature 4 Count	1	9	6	13
Feature 4 %	3.3	30.0	20.0	46.7
Feature 14 Count	0	4	2	9
Feature 14 %	0.0	33.3	11.1	55.6
Feature 6 Count	2	7	2	14
Feature 6 %	8.0	28.0	8.0	56.0
Feature 94 Count	1	6	9	21
Feature 94 %	2.7	16.2	24.3	56.8
Feature 10 Count	1	10	3	19
Feature 10 %	3.0	30.3	9.1	57.6
Feature 121 Count	0	8	2	15
Feature 121 %	0.0	32.0	8.0	60.0
Feature 2 Count	2	7	10	33
Feature 2 %	3.8	13.5	19.2	63.5
Feature 71 Count	1	6	5	22
Feature 71 %	2.9	17.6	14.7	64.7
Feature 5 Count	0	6	0	12
Feature 5 %	0.0	33.3	0.0	66.7
Feature 25 Count	0	5	1	21
Feature 25 %	0.0	18.5	3.7	77.8

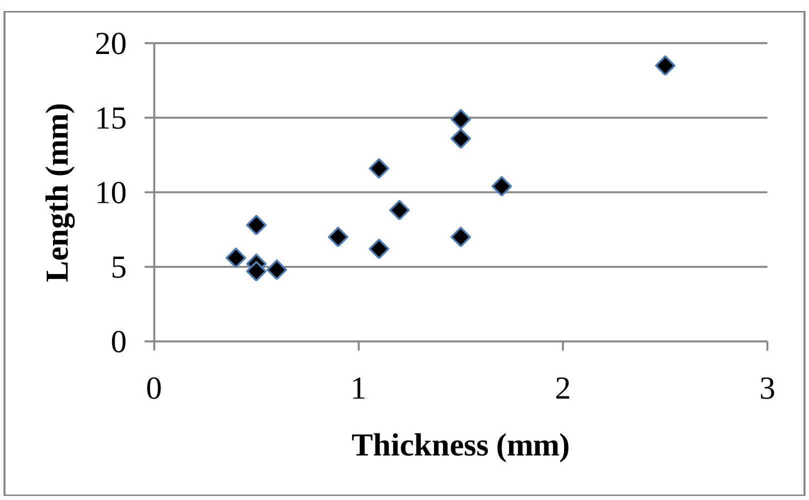

Figure 12. Length versus thickness for complete flat platform flakes.

Reduction Junctures. Pecora (2001) constructed a series of discrete lithic reduction models, called reduction junctures, to explore differences in debitage. Reduction junctures are defined as terminations or pauses in the reduction process, at which point the lithic material is transported away from one location and formed into a final tool form at another location (Pecora 2001:173). Pecora's categories, correlated with reduction juncture, include: Juncture 1, unaltered raw material; Juncture 2, prepared core; Juncture 3, prepared flake blank; Juncture 4, prepared biface blank; Juncture 5, prepared biface preform; and Juncture 6, serviceable tool (Pecora 2001:178). Each of these categories corresponds to a percentage of the total debitage produced from artifact manufacture, expressed as a size grade, and potential artifact density and diversity based on the identified manufacturing stage of each juncture (Table 8).

Table 8. Summary of Transportation Junctures

Juncture	Size Grade Expectations			Debris Density	Artifact Diversity
	Grade 2	Grade 3	Grade 4		
I	Moderate	High	Very High	High	High
II	Moderately low	High	Very High	Medium	High/limited
III	Low	Moderate	High	Moderately low	Moderate/limited
IV	None	Moderately low	Moderate	Low	Low/limited
V	None	Low	Moderately Low	Low	Very low
VI	None	Very Low	Low	Very Low	Extremely low

Source: Pecora 2001:Table 10.1, Table 10.2, Figure 10.2

While a few flakes at Hardin Bridge are from early-stage lithic reduction, this activity occurred rarely based on the relative frequency by size grade. According to the size grade distribution in Table 2, the manufacturing process began with Juncture III due to the low presence of Grade 2 debitage. The expectation is that stone tools at Hardin Bridge will have a moderate density, but limited diversity due to the use of flake blanks. The chipped stone artifact assemblage as identified by Windham et al. (2008) is illustrated in Table 9. Hardin Bridge does contain a moderate density of artifacts, with 85 artifacts spread throughout the analyzed features, though just a few features contain most of the artifacts. Artifact diversity is limited, 93% of formal tools are bifaces and projectile point/knives.

Table 9. Formal Tools found in Feature Contexts

	Graver	Biface - Stage 1	Biface - Stage 2	Biface - Stage 3	Core	Drill	Flake - Retouched	Projectile Point/Knife	Scraper	Total
Feature 2	-	11	15	6	-	-	-	17	-	49
Feature 4	-	-	1	-	-	-	-	-	-	1
Feature 5	-	-	-	-	-	-	-	1	1	2
Feature 6	-	-	4	2	-	1	-	2	-	9
Feature 10	-	-	-	-	-	-	-	-	-	-
Feature 14	-	-	-	-	-	-	-	-	-	-
Feature 25	-	1	4	-	-	-	1	6	-	12
Feature 27	-	-	-	-	-	-	-	-	-	-
Feature 67	-	-	-	-	-	-	-	1	-	1
Feature 71	-	2	-	-	-	1	-	3	-	6
Feature 74	-	-	-	-	-	-	-	1	-	1
Feature 94	-	1	-	-	-	-	-	-	-	1
Feature 121	1	-	-	-	1	-	-	1	-	3
Total	1	15	24	8	1	2	1	32	1	85

Andrefsky (1994:30) discusses three possible relationships between raw material availability and tool formality: 1) high quality and low abundance is associated with high tool formality; 2) high quality and high abundance leads to a range from high to low formality; and 3) low quality leads to low formality regardless of whether the material is plentiful or scarce. Hardin Bridge fits precisely into the second category. With readily available chert literally on the site and additional good quality regional sources, it is not surprising that the most tools are formal. What is interesting is the limited distribution of tools. With a ready supply of chert, one would expect to find a wide variety of formal and expedient tools. Instead, there is a concentration of tools in a single large pit (Feature 2) and in a second area of concentration on the eastern portion of the occupational area (Features 6 and 25).

Relative Thickness. The size of flakes in features can be an indication of lithic reduction stages. Because Hardin Bridge features consist of predominantly small flakes, thickness can differentiate between late-stage reduction and tool maintenance when the length and width of flakes is similar.. If the predominant activity was late-stage reduction, flakes will be thicker than if the activity were tool maintenance. To best determine flake thickness, I used Sullivan and Rozen's (1985) relative thickness measurement, which measures the variation in flake thickness by controlling for length and width ((length+width)/thickness). High values indicate that a flake is relatively thin compared to its length and width, and low values mean relatively thicker flakes. To facilitate a comparison between features, I reoriented the spread for each plot so that the median is set to zero (Drennan 1996:44), while preserving the spread of relative thickness values (Figure 13). This analysis is based on expected trajectories of flake size during lithic reduction activities, and as such should be considered an assumption. Independent verification through experimental assemblages is needed, though the reasoning behind a study of relative flake thickness in features is sound.

Three things are worth noting. First, with the exception of Feature 6, units with few formal tools exhibit a positive relative thickness spread, meaning that while few formal tools were present, flakes in those features tended to be relatively thin. Second, units with a wide spread of thin and thick flakes also had few formal tools. Third, the units with the most tools, again excepting Feature 6, exhibit a generally tight but equal spread of thick and thin values.

This trend of values implies that lithic reductive actions involving the fill of these tool-rich features were primarily late stage and tool maintenance, indicated by the relative equality of detached flake size. Earlier stage reduction would exhibit strong negative values because larger and thicker flakes would be present. Middle stage reduction is correlated with strong positive values for thickness. While flakes are still relatively large, they are significantly thinner. At the excavated part of Hardin Bridge, with no major evidence of early stage reduction, it would be impossible to achieve an even distribution in relative thickness from a combination of lithic reductive activities. Those features exhibiting a positive relative thickness may indicate a combination of middle and late stage reduction, mirroring a late transport juncture. These areas, outside of well-travelled areas or living spaces, would be a good place to finish shaping a tool, but the paucity of tools weakens a possible correlation between tool-rich features and those without tools.

Feature 6 is distinctive in that it contains a wide variety of formal tools, but also demonstrates a strong positive relative thickness trend. It is possible that Feature 6 is not associated with the habitation area but with an unexcavated activity area located nearby. This would explain both the inclusion of formal tools in Feature 6 and its evidence for middle stage reduction.

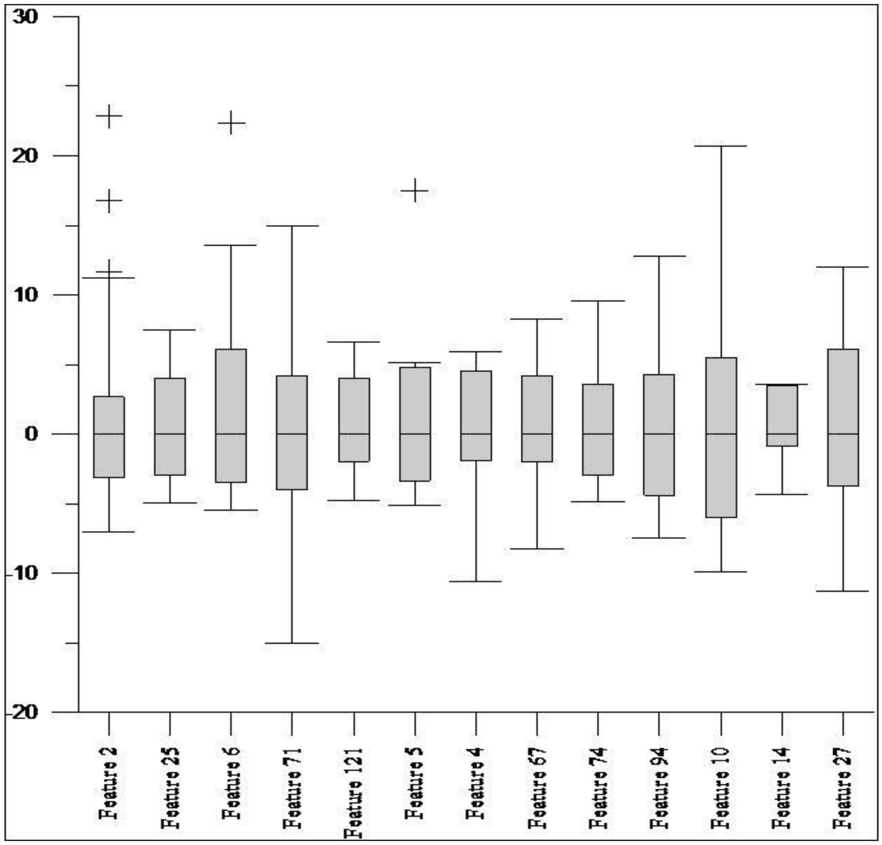

Figure 13. Relative thickness of flakes in features ordered by tool frequency.

Discussion

The excavation methods employed at Hardin Bridge concentrated on feature excavation and did not study site area around the features. This is problematic because it negates the ability to correlate feature refuse to specific activity areas. The Hardin Bridge archaeological record consists of refuse, but we do not directly know the location or proximity of the cause (e.g. lithic manufacture, house floor sweeping). We may assume that feature fill is secondary refuse. We might also assume that feature fill most likely to have come from nearby activities. Further features that demonstrate specialized activities should indicate fairly localized behavior. A second issue hampering spatial analysis is the lack of a discernable living surface, presumably lost during historic cultivation and erosion. Windham et al. (2008:421) estimate as much as 45-60 cm of soil has been removed by these processes.

Lithic investigations at other sites have validated these disposal patterns. Prentiss (2000) demonstrated primary disposal in a late prehistoric housepit floor at the Keatley Creek site in British Columbia. He concluded that tool edge retouch/resharpening debitage was consistently adjacent to hearths, biface reduction waste was also clustered around hearths and the western portion of the house, core reduction debris was uniformly scattered throughout, and bipolar reduction was restricted to two areas in the west and northeast sides of the house (Prentiss 2001:166). At the Saratown site, Ward (1985) noted secondary disposal from high concentrations of lithics in subterranean pits located inside or near houses as well as a significant decrease of these artifacts at non-feature locations.

Despite these limitations, Windham et al. proposed four possible structures at Hardin Bridge (Figure 14) (Windham et al. 2008:420-425). Structure 1 and Structure 4 were suggested as the most probable. The features associated with Structure 1 include Features 2, 67, 71, and

94. The features associated with Structure 4 include the ones listed for Structure 1 as well as Features 5, 10, 14, 25, 27, and 74. The features not associated with the interior of either structure are Features 4, 6, and 121.

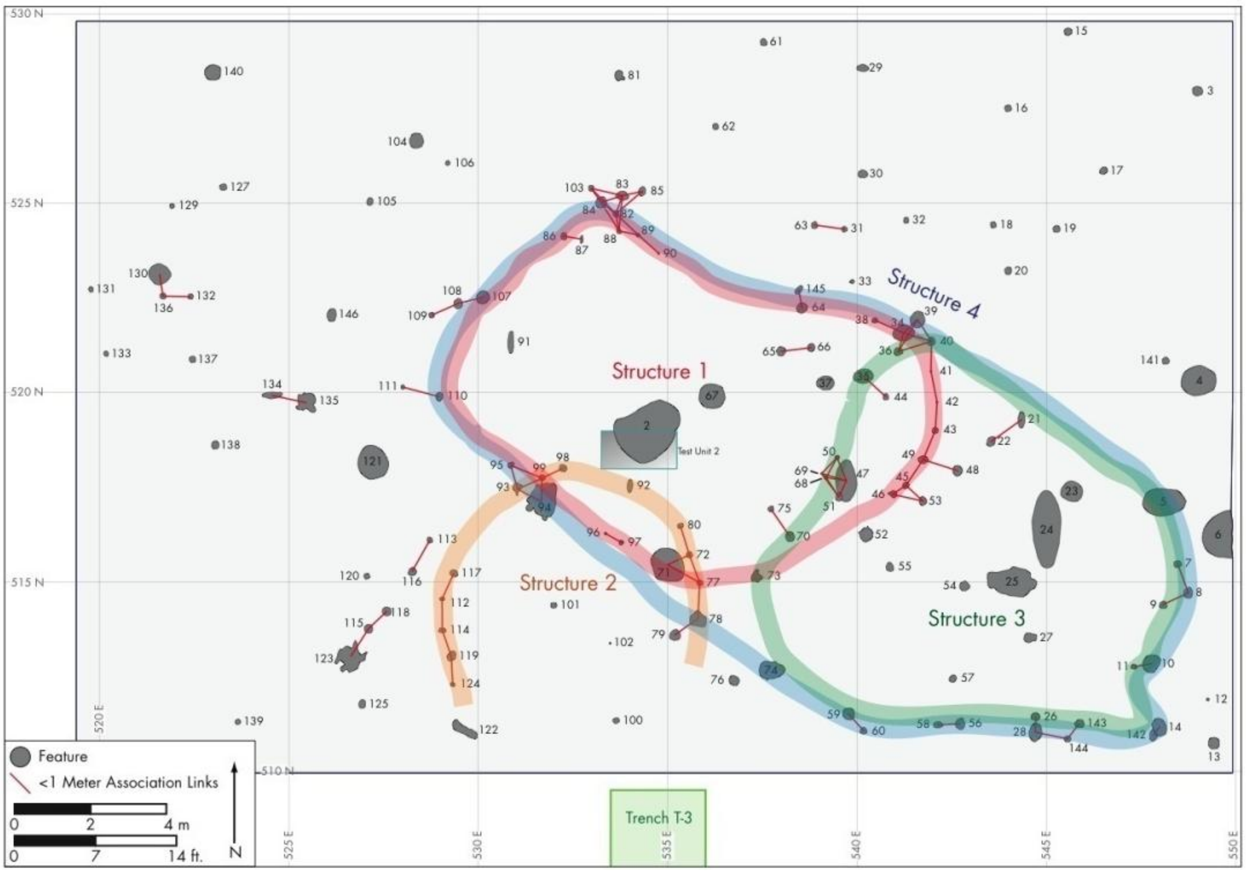

Figure 14. Suggested Woodland period houses at Hardin Bridge. (Source Windham et al. 2008:Figure 11.1)

A look at the distribution of Grade 4 debitage to Grade 3 debitage in Hardin Bridge features does discriminate between areas of tool production and tool maintenance. Features 5, 25, and 74 contain a high percentage of Grade 4 debitage, a marker for tool maintenance, and are located on the eastern and southern portion of the sites. These features are all contained in the proposed area of Structure 4, and are located beside the wall and in the central portion.

Conversely, Features 6 and 67 contain a high percentage of Grade 3 debitage, a marker for tool production, and are located on the eastern and central portion of the excavated area. Feature 67 is centrally located in the boundary for Structure 1, and Feature 6 is located outside any known structure. This distribution is evidence that while generalized tool production and maintenance activities occurred throughout the site, there are areas emphasizing one task or the other.

A second fruitful area of differentiation is the distribution of platform types. In all but two cases, platform types correspond to formal tool production as a general tool production strategy, regardless of spatial location. Feature 67, centrally located in Structure 1, and Feature 27, centrally located in Structure 4, contain an abundance of flat platforms and based on their size within the flake population, emphasize expedient tool production. An interesting correlate comes from a comparison of these features to the general breakdown of grade size. Both features tend towards fewer Grade 4 debitage, though the difference is more pronounced with Feature 27. Expedient tools by their nature are not modified to the degree that formal tools are, and byproducts from their manufacture will be larger than those corresponding to formal tools.

The final technique that successfully differentiates between types of site activities involves the use of relative thickness measurements on flakes. Because of the low occurrence of large flakes and early stage reduction, relative thickness measurements separated features that contained primarily later stage lithic reduction from tool maintenance. Evidence for tool maintenance is found in Features 2, 71, and 94, located centrally and on the periphery of Structure 1; and Features 10, 25, and 74, located centrally and on the periphery of Structure 4. Lithic reduction is associated with Feature 67, located in the center of Structure 1; and Features 5, 14 and 27, located centrally and on the periphery of Structure 4. Lithic reduction is also connected to Features 4, 6, and 121, located outside of identified structures on the eastern and western sides.

Based on the results, there are some discernable distribution patterns apparent at Hardin Bridge (Table 10). With the exception of Feature 5, tool maintenance activities and late stage lithic reduction suggested by flake size ratios are supported by relative thickness measurements. When a combination of activities is apparent, relative thickness measurements correspond to either lithic reduction or tool maintenance, which may indicate that relative thickness measurements present a finer degree of separation between these activities. For striking platforms, expedient tool manufacture is linked to lithic reduction, which is expected. Expedient tools typically exhibit less fine retouch and would generate far fewer flakes of a type consistent with formal tool production.

Table 10. Summary of Features

	Structure	Flake Size Ratio	Striking Platform	Relative Thickness
Feature 2	1 and 4	Combination	Biface Manufacture, Formal Tool Production, Maintenance Activities	Tool Maintenance
Feature 67	1 and 4	Late Stage Reduction	Expedient Tool Production	Lithic Reduction
Feature 71	1 and 4	Combination	Biface Manufacture, Formal Tool Production, Maintenance Activities	Tool Maintenance
Feature 94	1 and 4	Combination	Biface Manufacture, Formal Tool Production, Maintenance Activities	Tool Maintenance
Feature 5	4	Tool Maintenance	Biface Manufacture, Formal Tool Production, Maintenance Activities	Lithic Reduction
Feature 10	4	Combination	Biface Manufacture, Formal Tool Production, Maintenance Activities	Tool Maintenance
Feature 14	4	Combination	Biface Manufacture, Formal Tool Production, Maintenance Activities	Lithic Reduction
Feature 25	4	Tool Maintenance	Biface Manufacture, Formal Tool Production, Maintenance Activities	Tool Maintenance
Feature 27	4	Combination	Expedient Tool Production	Lithic Reduction
Feature 74	4	Tool Maintenance	Biface Manufacture, Formal Tool Production, Maintenance Activities	Tool Maintenance
Feature 4	None	Combination	Biface Manufacture, Formal Tool Production, Maintenance Activities	Lithic Reduction
Feature 6	None	Late Stage Reduction	Biface Manufacture, Formal Tool Production, Maintenance Activities	Lithic Reduction
Feature 121	None	Combination	Biface Manufacture, Formal Tool Production, Maintenance Activities	Lithic Reduction

Even though I cannot prove the contemporaneity of the features, their distribution in potential structures is interesting. Both structures have a pair of centrally located features that correspond to specific activities, tool maintenance and expedient tool manufacture. Features located on the periphery of Structure 1 also demonstrate tool maintenance while peripheral features in Structure 4 indicate a combination of lithic reduction and tool maintenance. Additionally, the three features located outside of either proposed structure present lithic reduction as a primary activity. The absence of a discernable house floor limits the significance of this distribution. Similar data from other sites on feature content and distribution may help answer questions about specific activities occurring in intra- and extra-mural contexts.

The tool production strategy at Hardin Bridge can be compared to previously excavated habitation and workshop sites of comparable time periods. These sites are the Pumpkin Pile site (Ledbetter 1992), the Rush site (Ledbetter and Wood 1990), and two workshops in Warren County, Georgia, and Carter County, Kentucky. (Ledbetter 1991a; 1991b). The two habitation sites are characterized by a very high percentage of late reduction flakes (>90%), while the workshop sites contain less than 60% late reduction flakes. Every feature at Hardin Bridge exhibited a percentage of late reduction flakes equal to the habitation sites, ruling out the possibility of workshop activity at any one particular feature. Several other complementary analysis methods confirmed the general identification of Hardin Bridge as conforming to regional expectations of a habitation area and exhibiting late stage reduction.

Parry and Kelly (1987) note that expedient technologies tend to occur near raw material sources or in settings where sedentary groups can maintain stockpiles of raw materials. Expedient tools are wasteful in terms of raw material used, though in some contexts conservation is not necessary where raw material is readily available (Parry and Kelly 1987:301-303). Hardin Bridge is located near a high quality chert outcrop that provided abundant raw material. However, based on the limited spatial distribution of flat platform flakes and the fact that only a single expedient tool was recovered in the analyzed features, the evidence suggests that although limited expedient tool manufacture occurred at Hardin Bridge, the occupants concentrated on formal tool production regardless of local chert abundance.

Two sites in the region offer a contrast in the variability of Woodland period tool utilization. The Rush site (Wood and Ledbetter 1990:145) is characterized by intensive biface production resulting in an abundance of waste flakes extensively utilized as expedient tools. Conversely, the Snake Creek sites (Benyshek and Wild 2003:382) exhibit formal biface manufacturing and maintenance, as opposed to the production of expedient tools. All three sites are primarily habitation areas, though neither of these examples is as close to a raw material source as Hardin Bridge. Andrefsky (1994) suggests that settlement configuration may not be the only factor in the organization of lithic production, but factors such as "differential transportation of materials, site function, variation in faunal exploitation, and differential attrition rates of various artifact types, may also play a role in the organization of specific technologies." (Andrefsky 1994:31).

Chapter VIII. Projectile Point Analysis, Block 3

Results

Two competing theories for identifying change in material culture are used by archaeologists to explain variation in projectile point size and form. The first is episodic change, in which a sequence is characterized by long periods of stasis broken up by occasional periods of rapid and major transformation. The second is continuous change, when the variation from one style to another should be more gradual through the stratigraphic record (Shott 1993:280-281). If episodic, one point style should dominate a block of the stratigraphic record to the exclusion of others. If continuous, there should be periods of overlap with gradual but linear trends. To determine if triangular and stemmed projectile points at Hardin Bridge represent episodic or continuous change, I graphed the distribution of morphologically distinct projectile points by level (Figure 15; Table 11). Stemmed points dominate the deeper sections and decline in frequency as depth decreases. Conversely, triangular points are in the minority in the deeper sections, but steadily increase in frequency as depth decreases. This pattern indicates a gradual adoption of triangular forms in conjunction with a decline in stemmed forms. While this distribution is affected by the plow zone in the upper 50 cm, intact strata was noted from all deposits deeper than 50 cm.

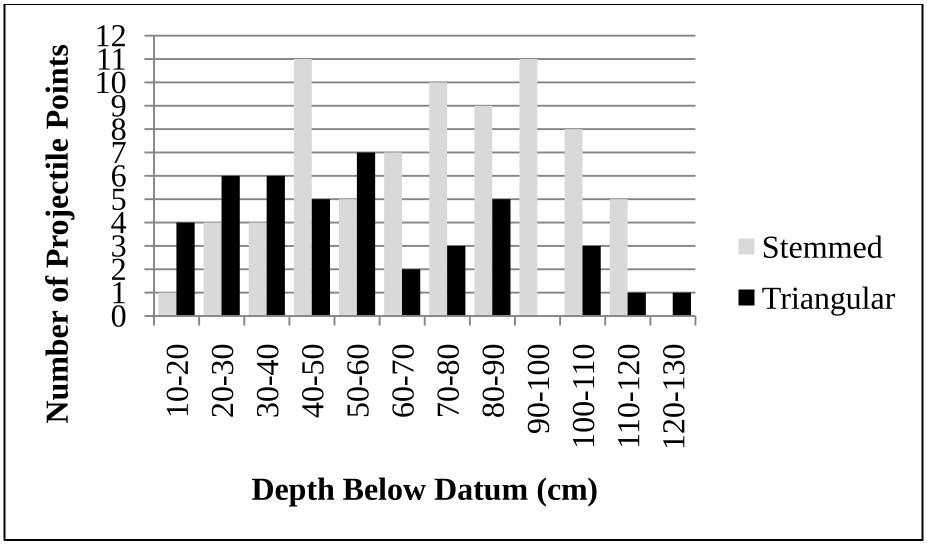

Figure 15. Distribution of projectile points by level.

Table 11. Projectile Point Count by Level.

Depth	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130
Stemmed	1	4	4	11	5	7	10	9	11	8	5	0
Triangular	4	6	6	5	7	2	3	5	0	3	1	1

To test the possibility of episodic change in each morphological class, I prepared histograms and descriptive statistics for applicable variables (Table 12). Stemmed point variables include neck width, shoulder thickness, weight, length, and shoulder width. Triangular point variables include base thickness, weight, length, and base width. If there are strong differences in projectile point morphology, it should be represented by strong multimodal distributions in the population. Conversely, weak differences will be represented by unimodal or weak multimodal distributions. Neck width and shoulder/base thickness are good discriminate indicators because these attributes are a reflection of shaft diameters (Corliss 1972; Hamilton

1972). Length and weight are important as well, but can be problematic because resharpening activites affect these two variables (Larralde 1990; Lorentzen 1989; Thomas 1981). Shoulder/base width has been demonstrated to be the most important variable in discriminant analysis because resharpening activities are unlikely to greatly modify these attributes (Shott 1993; Shott 1997; Thomas 1981).

Table 12. Metric Attributes of Stemmed and Triangular Projectile Points (mm).

	Minimum	Maximum	Mean	Standard Deviation
Stemmed				
Neck Width (n=75)	10.8	24.2	17.31	2.948
Shoulder Thickness (n=75)	6.4	13.4	9.507	1.43
Weight (g) (n=33)	5.3	27.3	15.35	5.462
Length (n=33)	31.3	70.2	50.76	8.8
Shoulder Width (n=75)	9	43.8	29.24	6.245
Triangular				
Base Thickness (n=43)	2.4	6.1	4.36	0.779
Weight (g) (n=20)	2.3	12.8	6.29	2.884
Length (n=20)	21.1	50.4	38.04	6.514
Base Width (n=43)	14.3	32.1	22.36	3.902

For stemmed projectile points at Hardin Bridge, neck width (Figure 16) shows a strong unimodal distribution and shoulder thickness (Figure 17) shows a weak multimodal distribution. Weight (Figure 18) and length (Figure 19) also indicate a weak multimodal distribution, but as indicated earlier, these attributes are problematic. Shoulder width (Figure 20) shows a strong unimodal distribution with one significant small outlier. Based on the three most significant variables, stemmed projectile points do not exhibit evidence for discrete categories or rapid episodic change, based on measurements alone.

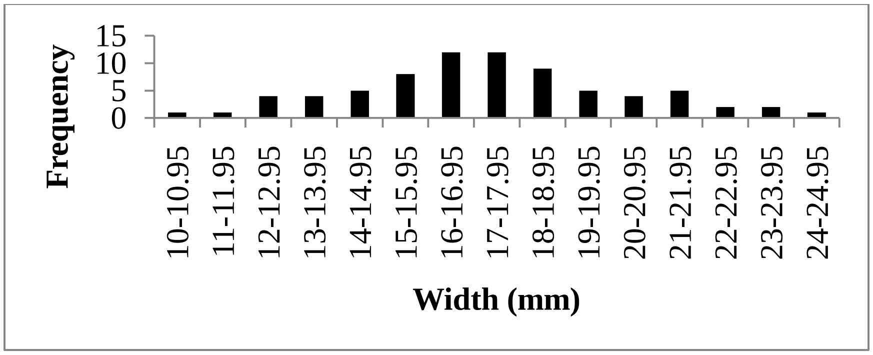

Figure 16. Stemmed projectile point frequency by neck width.

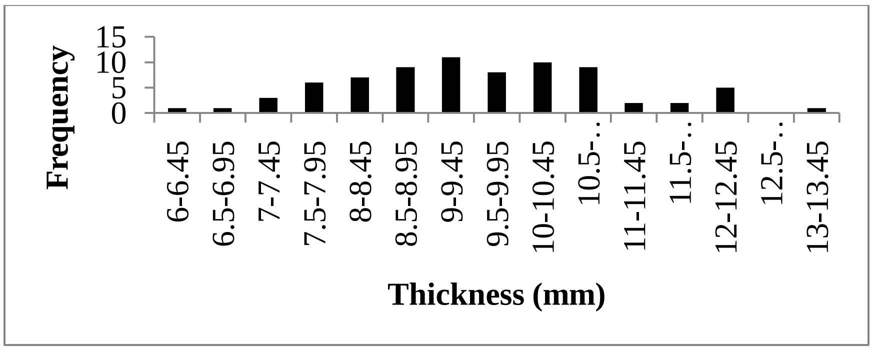

Figure 17. Stemmed projectile point frequency by shoulder thickness.

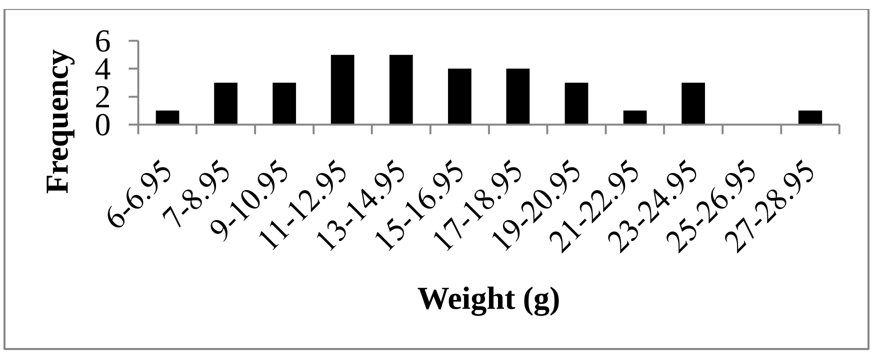

Figure 18. Stemmed projectile point frequency by weight.

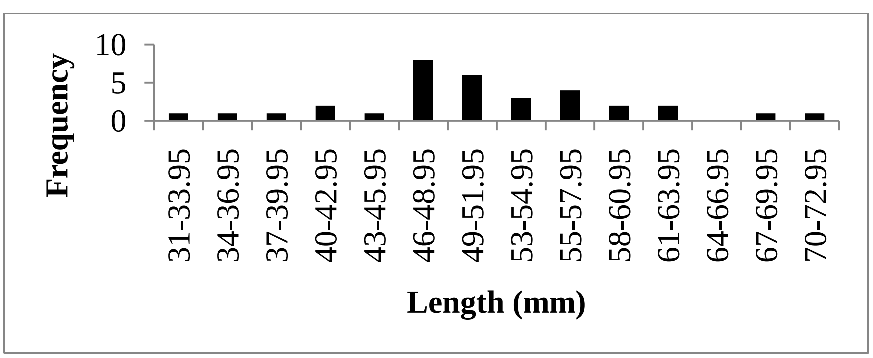

Figure 19. Stemmed projectile point frequency by length.

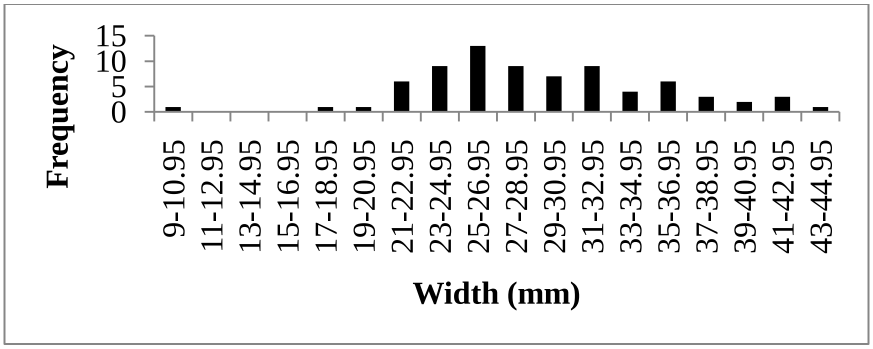

Figure 20. Stemmed projectile point frequency by shoulder width.

For triangular projectile points, base thickness (Figure 21) shows a strong unimodal distribution with a single outlier. Weight (Figure 22) and length (Figure 23) show a strong multimodal distribution and though these variables can be problematic, the distribution cannot be discounted as insignificant. Base width (Figure 24) shows a fairly strong unimodal distribution but two outliers do indicate possible weak bimodality. While the two more meaningful variables do not indicate strong evidence for discrete categories or episodic change, the distribution of weight and length is not as strongly supportive of that assertion when compared to the results for stemmed projectile points.

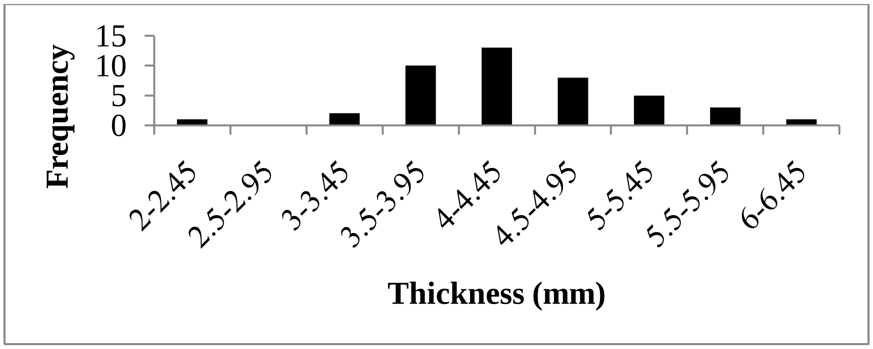

Figure 21. Triangular projectile point frequency by base thickness.

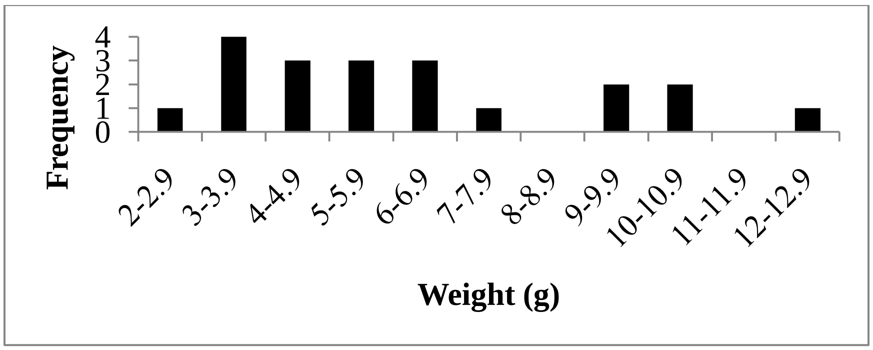

Figure 22. Triangular projectile point frequency by weight.

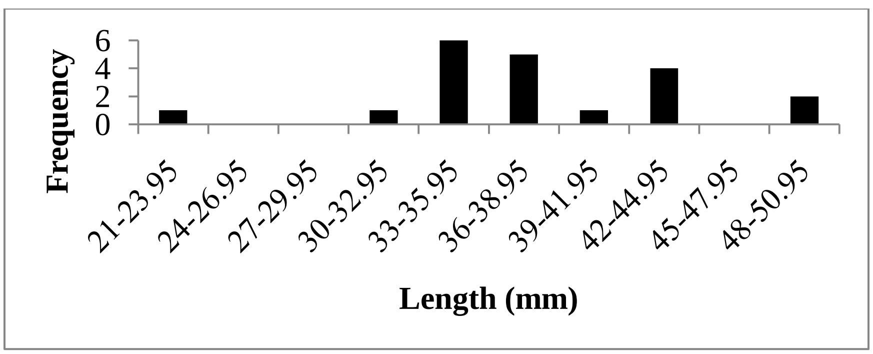

Figure 23. Triangular projectile point frequency by length.

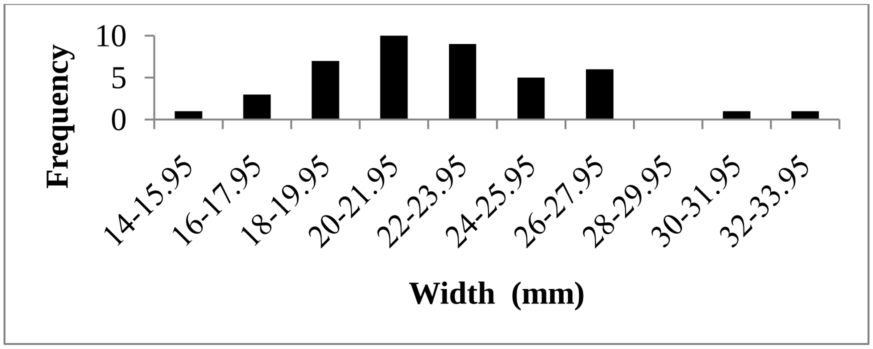

Figure 24. Triangular projectile point frequency by width.

A final test to determine if episodic or continuous change is apparent at Hardin Bridge consists of comparing thickness and shoulder/base width. These attributes, as mentioned earlier, are least likely to be modified by resharpening activities. Both demonstrate strong unimodal characteristics. Neck width was omitted due to the lack of neck attributes on triangular projectile points. It is possible that two or more discrete categories exist that are not obvious from the histograms. If projectile point morphology is primarily driven by episodic change, multiple identifiable clusters should be apparent. If change is gradual, each projectile point category will exhibit a single cluster. The Hardin Bridge data (Figure 25) exhibit single well defined clusters for triangular and stemmed projectile points, indicating continuous change.

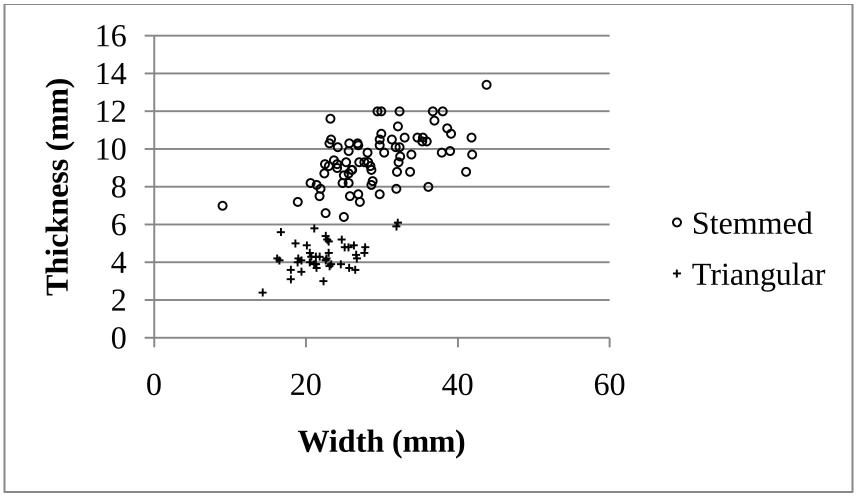

Figure 25. Cross-plot of thickness versus shoulder/base width.

There are two additional patterns in these distributions. First, stemmed and triangular projectile points show complete separation on the basis of thickness. Most stemmed projectile points range from approximately 6 to 12 mm in thickness and triangular projectile points range from approximately 3 to 6 mm. Second, most stemmed projectile points range from approximately 20 to 45 mm in width and triangular projectile points range from approximately 15 to 30 mm in width. A study of Late Woodland projectile points in the American Bottom determined that metric attributes show a chronological trend of declining values over time (Shott 1996). In undisturbed contexts, the stratigraphic relationship of artifacts can be used as a proxy for relative age. A particular level will be older than the one above and younger than the one below. Because shoulder/base width has the widest range of values at Hardin Bridge, I used it as the dependent variable. Stemmed projectile points (Figure 26) show a weak chronological relationship between width and depth while triangular projectile points (Figure 27) demonstrate no discernable pattern. It should be noted that each level represents only a small portion of the total projectile point assemblage, because each specific level contains fewer than 12 stemmed and 8 triangular projectile points (Table 11). The results are descriptive but cannot be considered statistically significant.

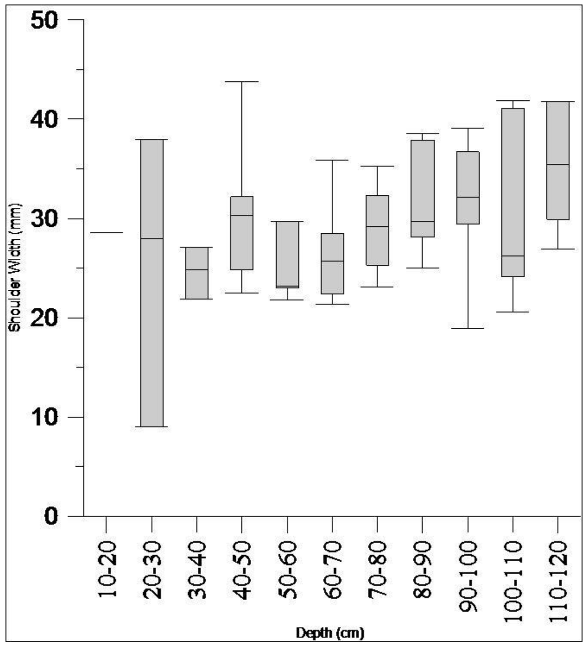

Figure 26. Shoulder width of stemmed projectile points by level.

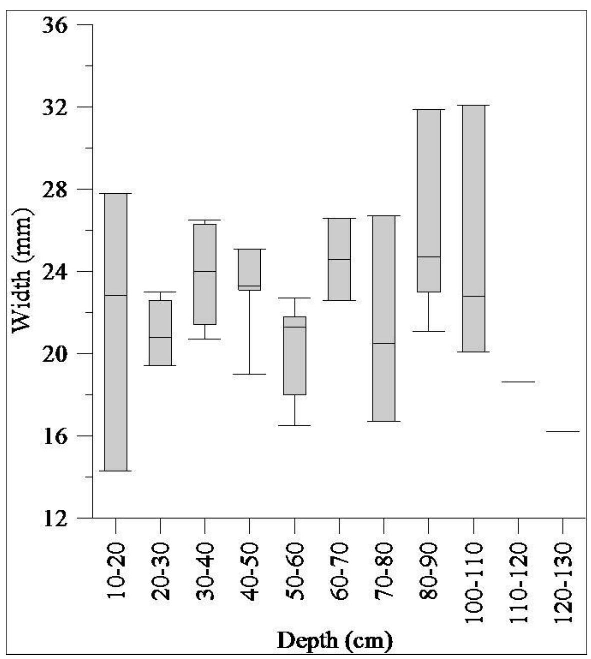

Figure 27. Base width of triangular projectile points by level.

Neither absolute dating nor ceramic chronology is helpful in explaining the variation observed in the triangular projectile point assemblage. Only a single C-14 sample was collected from a feature at 86 cm, yielding a date of 2000-1700 BP (Windham et al 2008:243-244). The ceramic assemblage is dominated by an even distribution of Cartersville Check and Simple Stamped sherds. A rare Dunlap Fabric Marked, Watts Bar, and Swift Creek Complicated Stamped assemblage was observed, but they comprise less than 10 artifacts total, and are located in contemporaneous levels with Cartersville type decorative sherds (Windham et al. 2008:289).

One possibility for this variation may be related to projectile point function. It is commonly accepted that the bow and arrow was adapted in the southeastern United States during the late Middle Woodland or early Late Woodland periods and can be identified by small, symmetrical, bifacial points (Blitz 1988; Christenson 1986; Lynott 1991; Thomas 1978). However, recent evidence has suggested that arrows may have been in use as early as the Late Archaic in the Mid-South (Bradbury 1997). The intermittent frequency of small points could suggest that this technology was in use in certain areas until ca. A.D. 700, when small triangular and stemmed points were widely adopted (Nassaney and Pyle 1999:244).

Archaeologists have long studied the metric attribute differences in projectile point dimensions between darts and arrows. For example, arrows are typically less than 10 mm in neck width and 5 mm in thickness, while darts are typically greater than 14 mm in neck width (Fawcett and Kornfeld 1980:72; Lorentzen 1989; Patterson 1985:82; Thomas 1978:469). Darts can exceed 30 mm in width and 6 mm in thickness (Spencer 1974).

However, several experimental studies have shown that arrows equipped with stone points as long as 5 cm are still effective, and that small points can serve as atlatl darts (Thomas 1978:461-462). Though considerable variation in projectile point size and form can be tolerated by arrows and darts (Cotterell and Kamminga 1990), the optimal properties for each differ enough that a change in the launching device should be reflected in the change of attributes. In order to better differentiate between point function, Thomas (1978) studied 132 arrows and ten darts, clearly identified as such because these specimens were still hafted, and conducted discriminant analysis based on length, width, thickness, and neck width. Shott (1997) added 29 additional dart points to Thomas' original sample, and modified Thomas' original classification equations to only include two variables (shoulder/base width and thickness) or a single variable (shoulder/base width). The classification function that returns the higher value indicates the projectile point functional group. When Shott resubstituted the original projectile point metrics into the functions, over 88% of the specimens were correctly identified. An additional independent test of 83 arrow points also demonstrated a success rate of over 97% (Shott 1997:94-95). A simple test of four Mississippian triangular projectile points from Hardin Bridge employing Shott's functions identified these as arrowheads.

The two-variable classification functions are

Dart: 1.42(shoulder/base width) + 2.16(thickness) -22.50

Arrow: .79(shoulder/base width) + 2.17(thickness) -10.60

The one-variable classification functions are

Dart: 1.40(shoulder/base width) - 16.85

Arrow: .89(shoulder/base width) - 7.22

The functional classifications for the Woodland point assemblage were calculated using both the two-variable and one-variable equations (Table 13). Seventy-three (97.3%) of 75 stemmed points were classified as dart points. Of the 43 triangular projectile points, 25 (58.1%) were classified as darts and 18 (41.9%) as arrows. Even taking into account Shott's 12% misclassification rate, at least 15 (29.9%) would be arrow points. The only discrepancy arose from a single stemmed projectile point at 90-100 cm, which may be misclassified as an arrow point by the 2-variable function. A second stemmed point is classified as an arrow, and is probably correctly identified. This projectile point can clearly been seen in Figure 24 as an extreme outlier, significantly less wide at the shoulder than other stemmed points.

Table 13. Tabulated Results for Stemmed and Triangular Projectile Points by Level using Shott's Functional Classification.

		Stemmed Projectile Points		Triangular Projectile Points	
Level (cm)		2-Variable	1-Variable	2-Variable	1-Variable
10-20	Dart	1	1	3	3
	Arrow	0	0	1	1
20-30	Dart	3	3	3	3
	Arrow	1	1	3	3
30-40	Dart	4	4	4	4
	Arrow	0	0	2	2
40-50	Dart	11	11	2	2
	Arrow	0	0	3	3
50-60	Dart	5	5	2	2
	Arrow	0	0	5	5
60-70	Dart	7	7	1	1
	Arrow	0	0	1	1
70-80	Dart	10	10	2	2
	Arrow	0	0	1	1
80-90	Dart	9	9	4	4
	Arrow	0	0	1	1
90-100	Dart	10	11	0	0
	Arrow	1	0	0	0
100-110	Dart	8	8	2	2
	Arrow	0	0	1	1
110-120	Dart	5	5	1	1
	Arrow	0	0	0	0
120-130	Dart	0	0	1	1
	Arrow	0	0	0	0
Total Count		75	75	43	43
	Dart	73	74	25	25
	Arrow	2	1	18	18
Total Percent					
	Dart	97.3	98.7	58.1	58.1
	Arrow	2.7	1.3	41.9	41.9

Based on the identification of two functional types in the triangular projectile point assemblage, descriptive statistics for each class were tabulated (Table 14). The two variables that best discriminate between the functional types are base width and weight. Base width for darts is greater than 21.1 mm and less than 23.1 mm for arrows. Weight for darts is greater than

5.3 g and less than 5.6 g for arrows. However, there is at least some overlap in all categories between darts and arrows. This may reflect misclassification by Shott's equations. An alternative possibility is this pattern demonstrates the adaptation of larger Woodland period darts into a smaller size more suitable for arrows, a gradual process of innovation through trial-and-error (Doolittle 1984:134).

Table 13. Metric Attributes of Triangular Projectile Points based on Functional Categories (mm).

	Minimum	Maximum	Mean	Standard Deviation
Dart				
Weight (g) (n=10)	5.3	12.8	8.51	2.373
Length (n=10)	34.4	50.4	41	5.962
Base Width (n=19)	21.1	32.1	25.64	2.912
Base Thickness (n=19)	3.6	6.1	4.77	0.732
Arrow				
Weight (g) (n=10)	2.3	5.6	4.07	0.988
Length (n=10	21.1	42.5	35.07	5.873
Base Width (n=24)	14.3	23.1	19.77	2.297
Base Thickness (n=24)	2.4	5.6	4.03	0.658

Discussion

The results from the attribute and functional analysis of Hardin Bridge projectile points are interesting for a number of reasons. The vertical distribution of stemmed and triangular projectile points demonstrates that these two morphologically distinct categories were in use at the same time over the course of the stratigraphic record. The distribution of attributes in each class suggests that metric changes were gradual and continuous over time as opposed to abrupt and episodic. Stemmed points are indicative of a continuation of projectile point style and usage from the Late Archaic. They exhibit a gradual decrease in size over time and functioned as dart points. Conversely, triangular points exhibit a wider range of variation by level and evidence suggests that at least some served as arrow points. If so, this would mean that triangular projectile points were used as darts and arrows at the same time, indicating that the bow and arrow was used in conjunction with atlatl/spear technology for longer than the currently accepted 200-300 year range (Nassaney and Pyle 1999:256). If other contemporaneous sites exhibit the same trend, then the adoption of the bow and arrow may have occurred earlier than the Late Woodland period.

To better understand the distribution of projectile point usage in northwestern Georgia, I studied four site reports containing Early and Middle Woodland period components and exhibiting morphologically similar point forms to Hardin Bridge. These are Brasstown Valley (Cable et al. 1997), the Snake Creek sites (Benyshek and Wild 2003), the Rush site (Wood and Ledbetter 1990), and the Pumpkin Pile site (Ledbetter 1992). Based on the respective author's classification of projectile points by period, only those that were clearly identified as belonging to the Woodland period were analyzed, and points exhibiting hafting morphology other than stemmed or triangular were also excluded. It should be noted that the projectile points for these sites were classified using regional formal typology, a method different than the one utilized in this paper. However, based on hafting characteristics, it is possible to compare generalized shapes. Only summary data for size was available, which restricted the ability to identify attributes by individual specimen and stratigraphic sequence.

This is not an attempt to correlate typological classes to projectile point functions. Formal typologies emphasize physical artifact properties in order to maximize variation between artifact classes while minimizing variation in them (Frankel 1988). These classes are then associated with chronological phases and become diagnostic of them. Functional classification concentrates on the variability in the assemblage without regard to formal typological affiliations (Clay 1976). The conversion of recorded attributes from these sites provides comparable data to Hardin Bridge, while preserving the original formal typological classes.

I classified the minimum, maximum, and mean shoulder/base width of each projectile point using Shott's one-variable function (Table 15). Because this function classifies projectile points as arrows or darts based on which equation returns the higher value, the arrow value was subtracted from the dart value to indicate which category it belonged to. A positive value indicates a dart, while a negative value indicates an arrow. Because the mean is the average of the measurements, a comparison of the mean to the minimum and maximum designates which functional type corresponds to at least 50% of the projectile points in the typological class. If all three values are either positive or negative, than every projectile point in the typological class exhibits the functional characteristics congruent of arrows or darts. The further a number is from zero, the more strongly it corresponds to its posited function. The further the mean is from zero, the greater the percentage of points within the formal typological category correspond to the functional category. For example, Swannanoa/Plott Stemmed points from Brasstown Valley have a minimum measurement of -.45, a maximum of 7.1, and a mean of 2.81. The negative minimum indicates that at least one point is classified as an arrow, but the positive mean and maximum indicate that at least 50% are classified as darts.

Table 14. Functional Classification of Woodland Stemmed and Triangular Projectile Points from Selected Northwestern Georgia Sites.

	Minimum	Maximum	Mean	Functional Classification
Brasstown Valley				
Gary Stemmed (n=2)	0.16	5.47	2.81	Dart
Otarre Stemmed (n=10)	2.05	7.30	4.60	Dart
Swannanoa/Plott Stemmed (n=27)	-0.45	7.10	2.81	Dart
Yadkin/Badin Triangular (n=73)	-1.98	12.30	3.22	Dart
The Snake Creek Sites				
Woodland Spike (n=15)	-7.08	0.15	-2.34	Arrow
Stemmed Spike (n=9)	-2.98	0.25	-1.28	Arrow
Large Stemmed (n=3)	7.45	8.77	8.13	Dart
Untyped Woodland Stemmed (n=18)	-0.29	9.52	4.68	Dart
Eared Yadkin Triangular (n=9)	-1.02	3.75	0.69	Dart
Yadkin Triangular (n=12)	-2.64	5.69	2.40	Dart
Untyped Woodland Triangular (n=36)	-1.55	4.88	1.56	Dart
The Rush Site				
Badin Triangular (n=33)	2.61	7.20	4.50	Dart
Nolichucky/Copena Triangular (n=49)	1.08	8.22	4.09	Dart
Copena Triangular (n=18)	5.16	10.77	6.43	Dart
McFarland Triangular (n=17)	-1.47	7.20	0.01	Dart
Yadkin Triangular (n=14)	0.57	4.14	2.10	Dart
Eared Yadkin Triangular (n=16)	-1.47	0.57	-0.60	Arrow
Untyped Large Triangular (n=25)	1.59	9.75	4.50	Dart
The Pumpkin Pile Site				
Coosa Stemmed (n=16)	-2.39	2.10	-0.76	Arrow
Woodland Spike (n=13)	-4.33	1.54	-1.98	Arrow
Copena Triangular (n=12)	-1.57	5.47	3.02	Dart
Greeneville Triangular (n=83)	-2.24	4.65	0.88	Dart
Yadkin Triangular (n=64)	-0.96	7.15	2.30	Dart
Eared Yadkin Triangular (n=142)	-3.31	5.01	-0.81	Arrow
The Hardin Bridge Site				
Stemmed (n=75)	-5.04	12.71	5.28	Dart
Triangular (n=43)	-2.34	6.74	1.77	Dart

Stemmed projectile points are strongly associated with darts. Triangular projectile points vary in the strength of dart or arrow association depending on formal type and site, though most cases favor dart classification. There are some exceptions. Woodland spikes, Coosa Stemmed, and Eared Yadkins (two of three cases) are better suited as arrows. Triangular categories present the possibility of a portion representing arrows, with the exception of the Rush site. The Rush site assemblage consists of all triangular projectile points, and demonstrates a strong emphasis on darts. In fact, Rush is distinctive in that five categories indicate an entire population of darts and one category greater than 50%.

Archaeologists have proposed that the adoption of the bow and arrow is related to an increase in efficiency over the dart and spear (Christenson 1986; Reidhead 1981), though it has been questioned if this was the only reason for its adoption (Blitz 1988). Limited ethnographic studies suggest an alternative (Churchill and Curren 1991). The use of spears in hunting generally concentrates on selected resources, sought relatively infrequently, and are typically large bodied animals that yield high returns for each foray. Conversely, the bow and arrow is used more often and on a wider variety of animals, but the yield is smaller per animal than with spears (Shott 1993). Therefore, the ratio of arrow points to non-arrow points may be an indication of preferred hunting practices, though the largest Woodland period game was deer, an animal successfully hunted with the bow and arrow. This hypothesis would require an analysis of faunal remains, to functional projectile point categories, but may explain in part why the sites demonstrate projectile point variation. Another related possibility could be the degree upon which people relied on cultivated plants for their dietary needs. If prehistoric people derived a greater portion of their subsistence needs from cultigens, then hunting might become a supplemental diet activity and concentrate on a wide range of small animals that provide less subsistence per animal, decreasing the need for dart and spear technology. If plant resources were unavailable or not heavily exploited, then the projectile point assemblage would reflect the emphasis on hunting activities. A comparison of projectile point function to archaeobotanical remains would shed further light upon this possibility.

In a recent publication about the Late Archaic to Early Woodland transition in northwestern Georgia, Ledbetter et al. (2009) discuss the transition of projectile point form at Early Woodland sites. Generally speaking, stemmed projectile points appear at sites that produce the earliest dates, though medium-sized triangular projectile points are recognized as the predominant type during this period (Ledbetter *et al.* 2009:248-250). Espenshade (2008:133) states that this pattern continues through the Middle Woodland period. A comparison of point styles (Table 16) from the comparative sites confirms the dominance of triangular projectile points. In fact, at the Rush and Pumpkin Pile sites, stemmed projectile points are either absent or make up less than 10% of the population. In contrast, Hardin Bridge contains a predominance of stemmed projectile points, an anomaly at odds with expectations for the Middle Woodland period.

Table 15. Frequency of Woodland Stemmed and Triangular Projectile Points from Selected Northwestern Georgia Sites.

	Stemmed	Triangular	Total
Brasstown Valley	39	73	112
	34.8%	65.2%	
Snake Creek Sites	45	57	102
	44.1%	55.9%	
Rush Site	0	172	172
	0.0%	100.0%	
Pumpkin Pile Site	29	301	330
	8.8%	91.2%	
Hardin Bridge Site	75	43	118
	63.6%	36.4%	

If viewed as a single continuous occupation, Hardin Bridge presents a picture that is somewhat at odds with the accepted continuum of projectile point styles in northwestern Georgia. However, if individuals used Hardin Bridge intermittently over time as a tool manufacturing location, the difference between stemmed and triangular projectile point frequency, the decrease in stemmed point size, and the lack of continuous change in triangular point size makes sense. This satisfies the assumption that stemmed projectile points represent functional uses (e.g. hunting, butchering, and skinning) carried over from the Late Archaic and the potential use of triangular projectile points as darts and arrows. Based on possible Woodland period hunting practices, triangular dart and arrow points would be mixed in the archaeological record without exhibiting a clearly defined transition from one functional type to the next. A contemporary regional site demonstrating the predominant use of projectile points as arrows would strengthen the functional classification inference that bow and arrow technology was in use during the Early and Middle Woodland period.

Chapter IX. Conclusions

An attribute and spatial analysis of the Hardin Bridge lithic assembage has produced evidence for a patterned distribution of artifacts indicative of past human activities. This evidence is complementary and supplementary to popular types of formal typological analysis and describes patterns that may not be visible otherwise.

On the basis of my investigation of the Hardin Bridge habitation area I can make the following statements: Little to no early stage lithic reduction activities contributed to feature fill. The lithic reductive activities fell into two categories, late stage lithic reduction\tool production and tool maintenance. These activities are suggested for the debitage concentration in feature fill. Based on debitage size, complete to incomplete flake ratios, and relative thickness measurements, it is possible to differentiate between feature fill that primarily contains debris from lithic reduction\tool production, tool maintenance, or a combination. Biface manufacture, formal tool production, and tool maintenance can be differentiated from expedient tool production through the ratio of flat platforms to complex/abraded platforms and relative thickness measurements. Inside the inferred structures, central features contain either primarily tool maintenance or expedient tool manufacturing debitage. Features located on the periphery of inferred structures contain either lithic reduction or tool maintenance debris. Features outside of structures reflect lithic reduction activities.

On the basis of my investigation of the Hardin Bridge lithic workshop area I can make the following statements: Stemmed projectile points are the majority of the assemblage, but triangular projectile points begin to replace them over time. Stemmed and triangular projectile point measurements do not indicate abrupt or episodic shape changes within each population. The size of stemmed projectile points steadily decreases over time, following an expected continuum of uninterrupted use from the Late Archaic period. Triangular projectile points do not exhibit a similar change in size over time. A functional classification of projectile points indicates that stemmed points were used almost exclusively as darts while triangular points were used as darts and arrows. The two attributes that best differentiate between triangular point function are weight and base width.

The limitations for the debitage analysis include limited sample size, inability to conclusively connect features contextually, and paucity of similar analysis data from other northwestern Georgia sites. Time restraints necessitated that only a random sample of debitage from each feature could be carefully analyzed. While there is evidence for at least one permanent structure, it is impossible to establish contemporaneity between features. It is possible that these features represent a long trajectory of repeat visits by prehistoric people. If this is the case, then the activities identified with each feature are still relevant, but cannot be regarded as representative of site activities from long term occupants.

The limitations for the projectile point analysis include sample size, lack of absolute dates, and the nature of reported projectile point data from regional sites. Because the attribute analysis is restricted to Hardin Bridge, the number of discrete data sets is likewise limited to the number of relevant projectile points in the assemblage. This assemblage was recovered from excavations totaling over 120 cm in depth and the number of projectile points per level is regrettably low. Likewise, the lack of absolute dates precludes the ability to discuss change over a specific period of time or anchor any observations in context with other dated sites.

This project is significant because demonstrates that an analysis based on artifact attributes is complementary to traditional typological and categorical analyses, and in some cases present data that may be masked by categorical methods. The debitage analysis identified specific flintknapping production terminations, expedient and formal tool production, activity areas, and periods of focused lithic endeavors in particular features. Recognizable patterns of past human behavior can be identified through attribute analysis and contribute to our understanding of human activities at habitation sites specifically in northwestern Georgia and in the region.

The projectile point analysis identified differences for variation between stemmed and triangular projectile points. A functional analysis of Hardin Bridge demonstrates that stemmed projectile points are consistently identified as dart points and triangular projectile points may have been differentially adapted for use as darts and arrows. If so, this provides evidence for the adoption of the bow and arrow in northwestern Georgia earlier than thought and has ramifications on our understanding of Woodland period technological innovation and subsistence patterns.

Finally, this project illustrates that new inferences can be made from curated Cultural Resource Management project data. Because archaeology is a dynamic process, theories and analytical techniques are created to answer newly formulated research questions. Cultural Resource Management projects offer a wealth of accessible information for scientific exploration without the need or expense of collecting data from new excavations. These data sets can be used to discern previously unobserved patterns of human behavior while preserving archaeological sites for future research.

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Appendix A. Triangular Projectile Points

Provenience	Level Depth	Unit	Formal Typology	Raw Material	Weight	Blade Length	Base Width	Basal Concavity	Base Thickness
409	40-45	20	Yadkin Triangular	Knox Chert	4.8		23.1	1.6	3.8
411	50-55	20	Unidentified Triangular	Knox Chert	4.3		22.7	0.6	4.2
415	20-30	24	Yadkin Triangular	Knox Chert	3.9	38.3	19.4	0	4.1
417	30-40	24	Yadkin Triangular	Knox Chert	6.9		21.4	2	3.7
422	50-60	24	Camp Creek	Knox Chert	3.5	33.6	16.5	0	4.1
422	50-60	24	Yadkin Triangular	Knox Chert	4.3	42.5	18	0	3.6
422	50-60	24	Unidentified Triangular	Quartz	5.1		21.3	1.5	4.3
446	80-90	24	Yadkin Triangular	Knox Chert	5.3	34.4	24.7	0.6	5.2
452	100-105	20	Yadkin Triangular	Knox Chert	5.5	37.4	20.1	0.9	4.9
456	100-110	24	Yadkin Triangular	Knox Chert	6.6	35.9	22.8	1.6	5.2
457	50-55	18	Camp Creek	Knox Chert	5.6	40.2	18.9	1.5	4
472	20-30	17	Unidentified Triangular	Knox Chert	11.7		22.6	1.5	4.1
475	30-40	17	Unidentified Triangular	Fort Payne Chert	5.4		25.7	1.2	3.7
475	30-40	17	Unidentified Triangular	Fort Payne Chert	7.3		26.5	2	3.6
484	85-90	28	Yadkin Triangular	Knox Chert	6.4		25.6	2.4	4.8
485	60-70	17	Unidentified Triangular	Knox Chert	7.6		22.6	2.5	5.4
494	30-40	27	Unidentified Triangular	Fort Payne Chert	2.3	21.1	22.3	1	3
514	15-20	26	Unidentified Triangular	Knox Chert	15.2		27.7	1.9	4.5
519	40-45	26	Yadkin Triangular	Knox Chert	6.9		24.6	0.9	3.9
525	25-30	15	Unidentified Triangular	Knox Chert	7.7		21.1	1.4	3.9
526	30-35	15	Camp Creek	Knox Chert	9	44	26.3	2	4.9
526	30-35	15	Yadkin Triangular	Knox Chert	8.8		20.7	1.4	4.3
536	75-80	26	Yadkin Triangular	Fort Payne Chert	4.8		20.5	1	4.5
590	50-60	10	Unidentified Triangular	Knox Chert	4		21.3	0.9	3.9
601	15-20	23	Camp Creek	Knox Chert	10.5	44	27.8	1.2	4.8
601	15-20	23	Greeneville	Knox Chert	3.3	32.1	14.3	0	2.4
601	15-20	23	Unidentified Triangular	Knox Chert	3.7		18	1.1	3.1
607	40-45	23	Yadkin Triangular	Fort Payne Chert	6.2	43.6	23.3	1.3	3.9
610	55-60	23	Unidentified Triangular	Knox Chert	6.2		21.8	1	4.3

627	80-85	16	Unidentified Triangular	Quartz	12.8	49	31.9	0	5.9
632	20-30	19	Yadkin Triangular	Knox Chert	3.8	37.3	19.4	1.1	3.5
638	70-80	19	Yadkin Triangular	Fort Payne Chert	6.8	36.6	26.7	3.7	4.2
639	80-90	19	Greeneville	Knox Chert	10.6	50.4	21.1	1.5	5.8
642	100-110	19	Unidentified Triangular	Quartz	9.5	34.5	32.1	0	6.1
654	40-50	25	Greeneville	Knox Chert	4.5	33.9	19	2.3	4.2
654	40-50	25	Unidentified Triangular	Knox Chert	3.6		25.1	0	4.8
686	120-125	20	Greeneville	Knox Chert	4.8		16.2	1	4.2
696	115-120	20	Yadkin Triangular	Knox Chert	3.8		18.6	2.4	5
939	80-85	20	Yadkin Eared	Knox Chert	7.8	37.6	23	3.2	5.1
1104	70-75	23	Yadkin Triangular	Knox Chert	4	34.3	16.7	1.9	5.6
1128	20-30	19	Unidentified Triangular	Knox Chert	3.4		20.5	0	4
1151	25-30	21	Yadkin Triangular	Knox Chert	7.5		23	0.8	4.5
1171	60-65	21	Greeneville	Knox Chert	7		26.6	0	4.4

Appendix B. Stemmed Projectile Points

Provenience	Level Depth	Unit	Formal Typology	Raw Material	Weight	Blade Length	Shoulder Width	Shoulder Thickness	Neck Width	Haft Length	Base Width	Shoulder to Corner	Haft Thickness
410	45-50	20	Savannah River	Knox Chert	13.3		33.7	8.8	21.4	7.1	16.5	13.2	6.3
415	20-30	24	Unidentified Stemmed	Knox Chert	8.1		9	7	17.9	9.4	7	14.2	6.2
435	30-40	24	Otarre Stemmed	Knox Chert	5.3	21.8	21.9	7.9	15.8	9.5	14.2	13.2	5.7
448	95-100	20	Unidentified Stemmed	Knox Chert	18.4		29.9	10.8	20.4	10.8	20.5	17.4	6.8
449	94	20	Elora	Knox Chert	13.5	40.5	31.8	10.1	15	8.8	15.3	16	7
451	45-50	18	Unidentified Stemmed	Knox Chert	11.2		24.8	8.2	18.9	8	11.2	11.1	5.9
453	105-110	20	Flint Creek	Knox Chert	18.9	59.8	24.1	9.2	15	13.4	15.8	13.3	7.2
456	100-110	24	Paris Island	Knox Chert	14.9	33.8	41.1	8.8	23.2	12.4	20.4	23.8	5.5
456	100-110	24	Unidentified Stemmed	Knox Chert	5.5		20.6	8.2	12.6	9.6	11.6	13	6.2
457	50-55	18	Unidentified Stemmed	Knox Chert	11.8		23	9.1	10.8	10.6	9.4	14.1	5.8
479	40-50	17	Swannanoa	Quartz	15.7	36.9	30.3	9.8	20.1	10.7	15.8	14.2	6
480	50-60	17	Otarre Stemmed	Knox Chert	10	34.1	29.7	7.6	12.1	8.2	10.1	15.4	4.9
480	50-60	17	Unidentified Stemmed	Knox Chert	6		21.8	7.5	14.3	9.1	13.6	10	5.3
486	90-95	28	Unidentified Stemmed	Fort Payne Chert	15.3		33	10.6	20.5	13.4	18.8	18.6	5.6
486	90-95	28	Unidentified Stemmed	Knox Chert	8.1	36.6	18.9	7.2	12.5	11	11.6	14.1	4.5
489	100-105	28	Unidentified Stemmed	Knox Chert	8.2		25.6	8.2	13.8	10.3	13.4	14.1	5.9
504	70-80	27	Otarre Stemmed	Knox Chert	13.6	34.6	35.3	10.4	17.1	11.9	14.4	17.2	5
504	70-80	27	Unidentified Stemmed	Knox Chert	8.4		25.3	9.3	16.5	8.9	16	13.8	4.7
507	90-100	27	Little Bear Creek	Knox Chert	12.6	46.3	25	8.6	15.7	11	14.6	14.3	5.5
509	75-85	17	Unidentified Stemmed	Knox Chert	12.3		32.3	12	22.6	10	18.8	18.9	9
516	25-30	26	Unidentified Stemmed	Knox Chert	8.5		28.2	9.3	14.2	8.6	12.6	13.4	5.9
517	30-35	26	Unidentified Stemmed	Knox Chert	9.6		25.6	8.7	16.7	8.5	15.5	12.5	6.7
526	30-35	15	Unidentified Stemmed	Knox Chert	12.2		24.1	9	15.5	8.3	15	9.4	5.9
530	45-50	15	Unidentified Stemmed	Knox Chert	3.5		22.6	6.6	14.7	9.5	12	11.6	4.1
536	75-80	26	Unidentified Stemmed	Quartz	9		26.1	8.9	16.8	7.8	16.1	15	7.2
538	85-90	26	Unidentified Stemmed	Knox Chert	23.1		36.9	11.5	17.3	13.6	18.1	18.2	8
539	90-95	26	Otarre Stemmed	Knox Chert	15	35.7	29.4	12	16.5	12	13	17.8	8.2
544	60-65	15	Unidentified Stemmed	Knox Chert	15.1		26.9	10.2	17.4	12.5	16.2	15.3	8.3
548	75-80	18	Unidentified Stemmed	Knox Chert	11.6		24.2	10.1	16	8.4	13.7	13.9	6.2
549	75-80	15	Swannanoa	Knox Chert	12.8	34.2	32.3	10.1	20.6	8.9	19.3	16.1	7
552	80-85	18	Flint Creek	Knox Chert	13.6	34.9	29.7	10.5	15	11.4	17.2	16.4	6.1
553	85-90	18	Unidentified Stemmed	Knox Chert	29.2		38.6	11.1	17.6	11.4	17.5	16.2	7.4
554	90-95	18	Elora	Knox Chert	24.7	46.6	39.1	10.8	23.4	11.5	16.2	21.5	9.4
559	95-100	18	Unidentified Knife	Knox Chert	24.9	57.1	36.7	12	21.2	12.3	20.7	18.5	7
571	80-90	22	Coosa	Knox Chert	7		25	6.4	14.4	9.6	11.5	15.3	4.3
572	90-100	22	Paris Island	Fort Payne Chert	20	44.4	39	9.9	18.8	10.7	17.5	17.4	7.2

591	60-70	10	Unidentified Stemmed	Knox Chert	18.1	37.7	35.9	10.4	21.5	8.8	18.6	16.9	7.5
619	40-45	23	Unidentified Stemmed	Fort Payne Chert	6.4		32.2	9.3	15.8	7.5	15.5	16.3	6.6
619	40-45	23	Small Savannah River	Knox Chert	7.5	25.7	25.8	7.5	18.5	8.3	19.4	11.7	4.6
619	40-45	23	Unidentified Stemmed	Knox Chert	13.7		22.5	9.2	13.3	8.3	8.4	13.3	5.1
619	40-45	23	Elora	Quartz	27.3	42.6	43.8	13.4	19.5	11.2	19.2	18.4	7.6
622	55-60	16	Bradley Spike	Fort Payne Chert	17.9	62.9	23.2	11.6	12.5	7.3	10.5	11.1	7.3
622	55-60	16	Woodland Spike	Knox Chert	17.3		23.3	10.5	17.7	8.1	14.5	11.3	8.5
623	60-65	23	Unidentified Stemmed	Knox Chert	7.6		21.4	8.1	11.8	6.8	11.4	10.1	4.6
632	20-30	19	Unidentified Stemmed	Knox Chert	20.7	38.5	38	12	16.5	12	4.7	16.6	7.3
633	30-40	19	Unidentified Stemmed	Knox Chert	7.6		27.1	7.2	14.3	9.5	12.3	14.8	4.4
636	60-70	19	Unidentified Stemmed	Quartz	8.9		28.5	9.1	18.6	11	18.3	15.1	6.9
639	80-90	19	Unidentified Stemmed	Knox Chert	10.1		26	8.9	16.3	9.5	15.1	15.5	6.9
642	100-110	19	Unidentified Stemmed	Knox Chert	11.9		25.6	9.9	18.8	13.5	16.4	14.5	6.9
643	80-85	23	Otarre Stemmed	Knox Chert	9.4	29.5	28.8	8.3	16.2	10.9	12.7	18.1	6.1
646	95-100	23	Unidentified Stemmed	Knox Chert	19.2		34.7	10.6	24.2	13.1	16.6	20.4	5.3
648	105-110	23	Paris Island	Fort Payne Chert	17.3	37.7	41.9	9.7	22.4	11.5	20.1	19.5	6.2
652	20-30	25	Unidentified Stemmed	Quartz	12.2		27.7	9.3	17.7	10.5	17	15.5	6.3
654	40-50	25	Unidentified Stemmed	Knox Chert	16.4		32	8.8	18.2	10.9	16.5	15.8	5.8
654	40-50	25	Otarre Stemmed	Knox Chert	12.4	41.2	27	9.3	13.1	9.1	12	13.9	5.3
658	60-70	25	Unidentified Stemmed	Fort Payne Chert	7.1	41.5	22.4	8.7	17.3	15.2	14.9	17.7	6.2
659	70-80	25	Unidentified Stemmed	Fort Payne Chert	11.3		28.6	8.9	18.1	12.5	16.5	18.3	6.9
659	70-80	25	Unidentified Stemmed	Knox Chert	18.3		29.7	10.2	19.4	11.4	18.5	12.8	6.5
660	80-90	25	Unidentified Stemmed	Knox Chert	9.5		28.1	9.8	17.4	11.1	17.4	13	7.4
661	90-100	25	Swannanoa	Knox Chert	14.3	36.7	32.1	11.2	19.4	13.9	14.7	20	7.5
693	110-115	20	Elora	Knox Chert	21.4	49.2	41.8	10.6	19.5	13.8	16.6	18.6	9.1
693	110-115	20	Paris Island	Knox Chert	23.2	48.2	35.4	10.6	21.8	12.3	19.6	17.4	7.8
693	110-115	20	Ledbetter	Quartz	18.9	50	29.9	12	16	12.7	11.5	24.7	7.6
699	110-120	24	Paris Island	Knox Chert	15.1	36.7	36.1	8	21.2	12.5	18.5	18.6	6.7
742	110	27	Paris Island	Knox Chert	15.4	43.5	32.4	9.6	17.9	10.6	13.5	14.6	6.8
914	10-20	24	Unidentified Stemmed	Knox Chert	15.7		28.6	8.1	18.4	10.4	17.2	15	6.4
932	75-80	20	Unidentified Stemmed	Knox Chert	11.3		23.1	10.3	15.9	11.8	13.3	12.4	7.3
985	105-110	28	Kiokee Creek	Knox Chert	12.3	37.4	26.8	10.3	13.9	14.8	12.9	17.3	7.3
1106	80-85	23	Unidentified Stemmed	Knox Chert	17.4		31.3	10.5	17.9	13.5	16.3	19.3	6.5
1167	40-45	21	Otarre Stemmed	Quartz	10.6	29.4	31.9	7.9	18.5	9.4	16.6	19.5	6.2
1171	60-65	21	Unidentified Stemmed	Knox Chert	9.2		23.7	9.4	16.3	9.2	17.1	13	5.6
1172	65-70	21	Unidentified Stemmed	Knox Chert	21		25.7	10.3	16.7	9.1	15.1	10	6.3
1174	75-80	21	Stanly	Knox Chert	12.1	40.2	33.9	9.7	17.1	8	18.2	14.3	4.7
1175	80-85	21	Elora	Knox Chert	20.9	46.7	37.9	9.8	19.6	9.7	15.5	20.1	7.5

1235	110-115	26	Unidentified Stemmed	Knox Chert	8.3		26.9	7.6	16.5	10.2	15.7	14.5	6

Appendix C. Debitage Measurements

Provenience	Feature	Grade Size	Material Type	Traditional Flake	Complete Flake	Termination Type	Striking Platform Width	Striking Platform Thickness	Striking Platform Type	Maximum Flake Length	Flake Width 1/4	Flake Width 1/2	Flake Width 3/4	Flake Thickness 1/4	Flake Thickness 1/2	Flake Thickness 3/4	Flake Thickness (Bulb)
758-4	2	3	Knox	Yes	Proximal	Step	4.8	1.4	Abraded								1.9
758-4	2	3	Brown(trans)	Yes	Yes	Feather	7.6	2.5	Abraded	11	13.1	11.2	7.9	2.5	1.9	1.6	3.2
758-5	2	4	Knox	Yes	Distal	Feather											
758-5	2	4	Knox	Yes	Medial												
758-5	2	4	White(trans)	Yes	Yes	Feather	1.7	0.4	Flat	6.5		3.9			0.7		0.4
771-2	2	2	Knox	Yes	Distal	Feather											1
771-2	2	2	Knox	Yes	Yes	Feather	4.2	1.2	Abraded	16.3	15.6	18.9	19.6	3.5	3.8	3.1	2.4
771-4	2	3	Knox	Shatter													
771-4	2	3	Knox	Shatter													
771-4	2	3	Knox	Yes	Medial												
771-4	2	3	Knox	Yes	Medial												
771-4	2	3	Mustard	Yes	Proximal	Step	6	1.7	Complex								2
771-4	2	3	Fort Payne	Yes	Proximal	Step	5.6	1.3	Complex								1.7
771-6	2	4	Fort Payne	Shatter													
771-6	2	4	Mustard	Yes	Distal	Feather											
771-6	2	4	Mustard	Yes	Distal	Feather											
771-6	2	4	Knox	Yes	Distal	Feather											
782-4	2	2	Knox	Shatter													
782-4	2	2	Knox	Yes	Distal	Feather											
782-7	2	3	Fort Payne	Yes	Medial												
782-7	2	3	Knox	Yes	Medial												
782-7	2	3	Knox	Yes	Yes	Feather	8	2.4	Cortical	7.9	8.4	8	7.3	1.8	1.2	1	2.5
782-7	2	3	Fort Payne	Yes	Yes	Feather	4.2	2.4	Flat	17.7	11.2	13	6	2.7	1.9	1.9	2.9
782-7	2	3	Mustard	Yes	Distal	Overshot											
782-7	2	3	Mustard	Yes	Medial												
782-9	2	4	Mustard	Yes	Yes	Feather	4.5	1.3	Complex	7.6		9.5			1.5		1.8
783-2	2	3	Knox	Yes	Yes	Feather	4.3	1.4	Flat	14.7	10.1	10.7	11.2	2	1.5	0.7	2.4
783-3	2	4	Knox	Yes	Distal	Feather											
783-3	2	4	Knox	Yes	Distal	Feather											
783-3	2	4	Mustard	Yes	Medial												
783-3	2	4	Mustard	Yes	Proximal	Step	3.2	1	Complex								1.2
784-2	2	2	Mustard	Yes	Proximal	Step	6.5	2.7	Abraded								4.3
784-4	2	3	Fort Payne	Shatter													
784-4	2	3	Knox	Yes	Distal	Feather											
784-4	2	3	Knox	Yes	Distal	Feather											
784-4	2	3	Quartz	Yes	Proximal	Step	5.3	1.7	Complex								1.3

Appendix C. Debitage Measurements

784-4	2	3	Knox	Yes	Distal	Feather											
784-4	2	3	Knox	Yes	Proximal	Step	5.4	1.3	Abraded								1.7
784-4	2	3	Knox	Yes	Proximal	Step	4.3	1.6	Complex								1.6
784-7	2	4	Mustard	Yes	Distal	Feather											
784-7	2	4	Mustard	Yes	Medial												
784-7	2	4	Mustard	Yes	Medial												
784-7	2	4	Mustard	Yes	Medial												
784-7	2	4	Knox	Yes	Medial												
784-7	2	4	Knox	Shatter													
784-7	2	4	Knox	Shatter													
784-7	2	4	Knox	Yes	Proximal	Step	1.7	0.8	Flat								1.3
784-7	2	4	Knox	Yes	Proximal	Step	3.2	1.2	Complex								1.4
784-7	2	4	Knox	Yes	Yes	Feather	2.1	0.5	Complex			4.6			0.6		0.9
790-4	2	2	Knox	Yes	Yes	Hinge	9.5	2.9	Complex	22.2	13.9	16	17.6	3.3	3.7	2.8	2.6
790-4	2	2	Mustard	Yes	Yes	Feather	3.6	1	Abraded	19.5	11.4	11.5	7.5	1.7	1.5	1	1.4
790-6	2	3	Knox	Yes	Medial												
790-6	2	3	Knox	Yes	Yes	Feather	3.7	0.8	Complex	13.9	9	12.3	12.2	1.1	1	0.9	1.1
790-8	2	4	Mustard	Shatter													
790-8	2	4	Knox	Shatter													
790-8	2	4	Fort Payne	Yes	Yes	Feather	4.1	1.2	Complex	7.6		4.9			0.4		1.1
790-8	2	4	Brown(trans)	Yes	Medial												
790-8	2	4	Mustard	Yes	Proximal	Step	1.4	0.6	Complex								0.7
790-8	2	4	Knox	Yes	Proximal	Step	2.9	1	Flat								0.9
790-8	2	4	Knox	Yes	Distal	Feather											
790-8	2	4	Knox	Yes	Yes	Feather	5.8	1.8	Flat	4.3		6.1			0.8		1
790-8	2	4	Knox	Yes	Yes	Feather	1.8	0.7	Complex	4.2		5.2			0.7		0.6
790-8	2	4	Brown(trans)	Yes	Yes	Feather	2.6	0.5	Complex	6.5		4.7			0.3		0.8
791-10	2	4	White(trans)	Yes	Distal	Feather											
791-10	2	4	Mustard	Yes	Medial												
791-10	2	4	Knox	Yes	Medial												
791-10	2	4	Fort Payne	Yes	Proximal	Step	2.8	1.2	Complex								0.8
791-10	2	4	Knox	Yes	Proximal	Step	2.5	0.9	Complex								1.2
791-10	2	4	Fort Payne	Yes	Proximal	Step	3.9	0.8	Complex								1.1
791-10	2	4	Mustard	Yes	Yes	Feather	3	1.3	Complex	7.5		6			1.8		1.4
791-10	2	4	Red	Yes	Yes	Feather	2.9	1.4	Complex	8.2		7.8			1.4		1.8
791-10	2	4	Knox	Yes	Yes	Feather	2.7	0.7	Complex	10.6		6.1			0.7		1.3
791-3	2	1	Knox	Yes	Yes	Feather	14.2	10	Complex	56.4	36.1	36.2	29	13.1	9.5	6.4	12.5
791-4	2	2	Mustard	Shatter													

Appendix C. Debitage Measurements

791-4	2	2	Knox	Yes	Distal	Feather											
791-4	2	2	Knox	Yes	Proximal	Step	5.7	1	Complex								2.1
791-6	2	3	Fort Payne	Yes	Proximal	Step	6.2	1.2	Abraded								1.4
791-6	2	3	Mustard	Yes	Distal	Feather											
791-8	2	3	Quartz	Shatter													
792-6	2	3	Knox	Yes	Proximal	Step	5.7	1.2	Complex								1.9
792-6	2	3	Brown(trans)	Shatter													
792-6	2	3	Olive	Shatter													
792-6	2	3	Fort Payne	Yes	Proximal	Step	5.7	1.3	Complex								1.2
792-7	2	3	Fort Payne	Yes	Medial												
792-8	2	4	Olive	Yes	Medial												
792-8	2	4	Knox	Yes	Proximal	Step	4.1	2.3	Complex								2.5
792-8	2	4	Knox	Yes	Yes	Feather	3.7	0.5	Flat			4.5			0.4		0.5
793-6	2	2	Mustard	Yes	Distal	Feather											
793-6	2	2	Knox	Yes	Yes	Feather	8.1	4.5	Complex	23.2	12.5	13.9	11.6	3.2	2.5	1.8	4.8
795-5	2	3	Knox	Yes	Yes	Feather	4.1	1.9	Complex	15.6	6.8	7	6.8	2.4	1.4	1.1	1.9
795-5	2	3	Fort Payne	Yes	Proximal	Step	6.2	2.8	Complex								3.7
795-5	2	3	White(trans)	Yes	Yes	Feather	11.9	6	Cortical	9.6	10.5	5.9	6.8	4.4	1.5	0.7	3.9
795-7	2	4	Knox	Shatter													
795-7	2	4	Knox	Yes	Proximal	Step	3.4	1.1	Complex								1.2
795-7	2	4	Knox	Yes	Yes	Feather	5.2	2.2	Complex	8.6		8.8			1.8		3
795-7	2	4	Knox	Yes	Proximal	Step	2.8	1	Complex								1
797-3	2	4	Knox	Yes	Yes	Feather	4	1.1	Complex	9.5		7.9			1.2		1.6
797-3	2	4	Knox	Yes	Yes	Feather	6.5	2.4	Abraded	10.1		8.8			1.1		2.3
798-2	2	2	Knox	Yes	Yes	Feather	4.9	1.2	Abraded	28.6	10.3	9.4	8.2	2.5	2.8	2	2
798-3	2	3	Knox	Yes	Distal	Feather											
798-3	2	3	Knox	Yes	Proximal	Step	4.5	1.3	Complex								1.4
798-6	2	4	Mustard	Yes	Proximal	Step	4.3	1.5	Abraded								1.3
750-1	4	1	Quartz	Yes	Yes	Feather	33.1	18	Cortical	36.3	31.3	14.7	9.5	8.6	15.5	9.5	8.7
750-2	4	2	Knox	Yes	Distal	Feather											
750-3	4	3	Knox	Shatter													
750-3	4	3	Knox	Shatter													
750-3	4	3	Knox	Yes	Medial												
750-3	4	3	Knox	Yes	Medial												
750-3	4	3	Knox	Yes	Medial												
750-3	4	3	Knox	Yes	Proximal	Step	7.7	2.1	Complex								3.5
750-3	4	3	Knox	Yes	Yes	Feather	4.1	1.4	Abraded	15.3	8.1	8.7	7.6	1.5	1.3	1	1.5
750-3	4	3	Knox	Yes	Yes	Feather	10.8	3.6	Complex	7.2	12.8	10.7	7.2	2	1.5	0.8	2.6

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750-3	4	3	Knox	Yes	Distal	Feather											
750-3	4	3	Knox	Yes	Distal	Feather											
750-3	4	3	Knox	Yes	Distal	Feather											
750-3	4	3	Knox	Yes	Distal	Feather											
750-3	4	3	Fort Payne	Shatter													
750-3	4	3	Fort Payne	Yes	Medial												
750-3	4	3	Fort Payne	Yes	Proximal	Step	6.5	1.5	Complex								2.2
750-3	4	3	Fort Payne	Yes	Proximal	Step	4.2	1.4	Flat								1.8
750-3	4	3	Mustard	Yes	Yes	Feather	5.4	2.2	Complex	8.3	13	11.9	8.3	1.3	1.1	0.9	2
750-3	4	3	Mustard	Yes	Distal	Feather											
750-3	4	3	Crème	Yes	Distal	Feather											
750-3	4	3	Pink	Shatter													
750-3	4	3	Mustard	Yes	Yes	Feather	6.1	2	Abraded	14.6	6	5	3.8	1.5	1.3	1	1.7
750-3	4	3	Mustard	Yes	Yes	Feather	8.7	3.3	Complex	11.3	9.9	10	9.2	2.4	1.7	1.3	3
750-4	4	4	Knox	Yes	Yes	Feather	3.2	1.2	Abraded	6.7		7.7			1		1.3
750-4	4	4	Knox	Yes	Distal	Feather											
750-4	4	4	Knox	Yes	Yes	Feather	5	0.9	Complex	8.4		6.6			1.1		1
750-4	4	4	Knox	Yes	Medial												
750-4	4	4	Knox	Yes	Proximal	Step	2	0.7	Complex								0.9
750-4	4	4	Knox	Yes	Yes	Feather	2.9	0.8	Flat	6		5.1			1.3		1
750-4	4	4	Knox	Yes	Distal	Feather											
750-4	4	4	Knox	Yes	Medial												
750-4	4	4	Knox	Yes	Medial												
750-4	4	4	Knox	Yes	Medial												
750-4	4	4	Knox	Yes	Proximal	Step	2.8	1.1									1.4
750-4	4	4	Fort Payne	Yes	Distal	Feather											
750-4	4	4	Fort Payne	Yes	Distal	Feather											
750-4	4	4	Fort Payne	Shatter													
750-4	4	4	Fort Payne	Shatter													
750-4	4	4	Pink	Shatter													
750-4	4	4	Pink	Shatter													
750-4	4	4	Pink	Yes	Medial												
750-4	4	4	Pink	Yes	Distal	Feather											
750-4	4	4	Crème	Shatter													
750-4	4	4	Grey	Yes	Distal	Feather											
750-4	4	4	Mustard	Shatter													
750-4	4	4	White(trans)	Yes	Distal	Feather											
750-4	4	4	White(trans)	Yes	Distal	Feather											

Appendix C. Debitage Measurements

750-4	4	4	Brown(trans)	Yes	Distal	Hinge											
751-1	4	3	Mustard	Shatter													
751-1	4	3	Mustard	Yes	Yes	Hinge	3	1.2	Flat	10.7	9.5	8.5	8.9	1.3	1.6	1.7	1.8
751-1	4	3	Knox	Shatter													
751-1	4	3	Knox	Shatter													
751-1	4	3	Knox	Yes	Yes	Feather	2.6	1	Abraded	13.1	7.1	8.3	3.6	1.8	1.1	0.6	1.1
751-1	4	3	Knox	Yes	Distal	Feather											
751-1	4	3	Knox	Yes	Yes	Overshot	6.1	1.2	Flat	15.3	10.6	10.6	7	3.2	3	2.7	3.1
751-1	4	3	Knox	Yes	Proximal	Step	4.5	1.8	Complex								1.8
751-1	4	3	Knox	Yes	Proximal	Step	6	3.7	Flat								3.8
751-1	4	3	Knox	Yes	Medial												
751-1	4	3	Knox	Yes	Medial												
751-1	4	3	Knox	Yes	Proximal	Step	4.1	1	Abraded								1.2
751-1	4	3	Knox	Yes	Proximal	Step	5.9	1.8	Complex								2.5
751-1	4	3	Knox	Yes	Proximal	Step	4.3	2.2	Flat								2.5
751-2	4	4	Knox	Yes	Yes	Feather	4.3	0.8	Complex	14.6		5.2			1		1.1
751-2	4	4	Knox	Yes	Distal	Feather											
751-2	4	4	Knox	Yes	Yes	Feather	6.1	2.1	Complex	6.4		6.5			0.7		1
751-2	4	4	Knox	Yes	Yes	Feather	6	1.2	Flat	6.6		7.3			1		1.1
751-2	4	4	Knox	Yes	Yes	Feather	8.8	2	Complex	10.3		6.9			1		1.6
751-2	4	4	Fort Payne	Yes	Yes	Feather	5	1.4	Flat	5.7		5.7			0.9		1.4
751-2	4	4	Brown(trans)	Yes	Medial												
751-2	4	4	Brown(trans)	Yes	Distal	Feather											
751-2	4	4	Knox	Yes	Proximal	Step	1.9	0.8	Complex								1
751-2	4	4	Knox	Yes	Medial												
751-2	4	4	Knox	Yes	Medial												
751-2	4	4	Fort Payne	Yes	Distal	Feather											
751-2	4	4	White(trans)	Yes	Proximal	Step	2	0.7	Flat								1.4
751-2	4	4	Brown(trans)	Yes	Distal	Feather											
751-2	4	4	Brown(trans)	Yes	Proximal	Step	5.8	1.5	Abraded								2
767-2	5	2	Knox	Yes	Proximal	Step	6.6	1.9	Complex								1.8
767-2	5	2	Fort Payne	Yes	Distal	Hinge											
767-3	5	3	Mustard	Shatter													
767-3	5	3	Mustard	Shatter													
767-3	5	3	Mustard	Shatter													
767-3	5	3	Knox	Yes	Medial												
767-3	5	3	Knox	Yes	Medial												
767-3	5	3	Knox	Yes	Medial												

767-3	5	3	Mustard	Yes	Medial												
767-3	5	3	Knox	Yes	Yes	Hinge	5.3	1.8	Complex	8.4	9.7	10.5	9.6	1.8	1.6	1.4	1.9
767-3	5	3	Knox	Yes	Yes	Feather	3.6	1.5	Flat	8.9	10.2	11.1	9.2	2.5	1.8	0.9	2.2
767-3	5	3	Knox	Yes	Yes	Hinge	5.5	1.8	Complex	16.7	7.4	8.8	8.9	1.2	1.3	1.1	1.9
767-3	5	3	Fort Payne	Yes	Distal	Feather											
767-3	5	3	Pink	Yes	Yes	Feather	6.3	2.3	Flat	7.5	10.5	10.9	11.1	1.6	1.6	1.1	1.5
767-3	5	3	Pink	Yes	Yes	Feather	7.9	2.7	Complex	16.7	5	4.7	5.1	2	1.4	1.3	2.5
767-4	5	4	Knox	Shatter													
767-4	5	4	Fort Payne	Shatter													
767-4	5	4	Knox	Yes	Proximal	Step	3.9	1.1	Complex								1.6
767-4	5	4	Knox	Yes	Distal	Feather											
767-4	5	4	Knox	Yes	Proximal	Step	1.8	0.8	Complex								1.8
767-4	5	4	Mustard	Yes	Proximal	Step	3.4	1.5	Flat								1.7
767-4	5	4	Mustard	Yes	Proximal	Step	3.5	0.8	Complex								0.8
767-4	5	4	Mustard	Yes	Proximal	Step	3	0.9	Complex								1
767-4	5	4	Knox	Yes	Medial												
767-4	5	4	Knox	Yes	Medial												
767-4	5	4	Knox	Yes	Medial												
767-4	5	4	Knox	Yes	Medial												
767-4	5	4	Knox	Yes	Medial												
767-4	5	4	Mustard	Yes	Medial												
767-4	5	4	Mustard	Yes	Medial												
767-4	5	4	Pink	Yes	Medial												
767-4	5	4	Knox	Yes	Distal	Feather											
767-4	5	4	Knox	Yes	Distal	Feather											
767-4	5	4	Knox	Yes	Distal	Feather											
767-4	5	4	Knox	Yes	Distal	Feather											
767-4	5	4	Pink	Yes	Distal	Feather											
767-4	5	4	Mustard	Yes	Distal	Feather											
767-4	5	4	Fort Payne	Yes	Distal	Feather											
767-4	5	4	Knox	Yes	Yes	Feather	4.2	1.3	Complex	12.5		7.5			1		1.2
767-4	5	4	Knox	Yes	Yes	Hinge	3.3	0.5	Complex	7.2		5			0.7		0.8
767-4	5	4	Knox	Yes	Yes	Feather	3	0.3	Complex	5.6		4.1			0.3		0.4
767-4	5	4	Knox	Yes	Yes	Feather	2.3	0.5	Flat	5.4		4.3			1		1
767-4	5	4	Knox	Yes	Yes	Feather	2.3	0.7	Flat	4.1		2.4			0.5		0.6
767-4	5	4	Mustard	Yes	Yes	Feather	2.9	0.4	Complex	6.4		4.6			0.7		0.4
767-4	5	4	Mustard	Yes	Yes	Feather	1.9	0.4	Flat	7		4.5			0.8		0.6
747-10	6	4	Knox	Yes	Proximal	Step	5.6	2.2	Cortical								1.9

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747-10	6	4	Mustard	Shatter													
747-10	6	4	Mustard	Yes	Medial												
747-11	6	4	Fort Payne	Yes	Distal	Feather											
747-11	6	4	Fort Payne	Yes	Yes	Feather	4.6	1.5	Complex	9.3		9.6			0.7		1.8
747-2	6	1	Fort Payne	Yes	Yes	Overshot	14.2	3.9	Complex	32.9	19.1	23.8	24.2	4.7	6.4	6.7	3.7
747-3	6	2	Mustard	Shatter													
747-4	6	2	Knox	Yes	Yes	Overshot	8	2.2	Complex	19.5	20	16.2	15.7	2.4	2.7	3	2.6
747-6	6	3	Knox	Shatter													
747-6	6	3	Mustard	Yes	Distal	Feather											
747-6	6	3	Fort Payne	Yes	Distal	Feather											
747-8	6	3	Red	Yes	Proximal	Step	4.4	0.9	Complex								1.5
747-9	6	3	Fort Payne	Shatter													
748-2	6	2	Knox	Yes	Medial												
748-2	6	2	Knox	Yes	Yes	Feather	5.6	2.3	Complex	24.7	12.8	13.1	12.6	4.1	3.8	3.3	4
748-3	6	3	Mustard	Shatter													
748-3	6	3	Mustard	Shatter													
748-3	6	3	Mustard	Shatter													
748-3	6	3	Mustard	Yes	Proximal	Step	5.1	1.4	Complex								2
748-3	6	3	Mustard	Yes	Proximal	Step	4.4	1.3	Complex								1.6
748-3	6	3	Knox	Yes	Yes	Feather	2.3	0.7	Complex	10.5	9.5	8.7	7.6	1.3	1	0.6	0.9
748-3	6	3	Knox	Yes	Medial												
748-3	6	3	Knox	Yes	Proximal	Step	3.3	2.2	Flat								2
765-1	6	2	Fort Payne	Shatter													
765-2	6	3	Olive	Shatter													
765-2	6	3	Olive	Yes	Distal	Feather											
765-2	6	3	Olive	Yes	Yes	Feather	5.5	1.5	Flat	8.6	12.4	12.2	10.3	3	2.6	2	2.4
765-2	6	3	Fort Payne	Shatter													
765-2	6	3	Fort Payne	Shatter													
765-2	6	3	Red	Shatter													
765-2	6	3	Red	Yes	Yes	Feather	6.8	3	Complex	11.4	8	10.1	9.5	1.8	1.1	0.7	2.4
765-2	6	3	Mustard	Shatter													
765-2	6	3	Mustard	Yes	Medial												
765-2	6	3	Mustard	Yes	Medial												
765-2	6	3	Mustard	Yes	Yes	Feather	3.3	0.8	Flat	11.9	8.3	10.4	12	1.8	1.7	0.9	1.6
765-2	6	3	Mustard	Yes	Medial												
765-2	6	3	Knox	Shatter													
765-2	6	3	Knox	Shatter													
765-2	6	3	Knox	Yes	Medial												

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765-2	6	3	Knox	Yes	Distal	Feather											
765-2	6	3	Knox	Yes	Distal	Feather											
765-2	6	3	Knox	Yes	Distal	Feather											
765-2	6	3	Knox	Yes	Distal	Feather											
765-2	6	3	Knox	Yes	Distal	Feather											
765-2	6	3	Knox	Yes	Proximal	Step	3.1	1.4	Complex								2
765-2	6	3	Knox	Yes	Proximal	Step	4.9	1.5	Complex								1.1
765-2	6	3	Knox	Yes	Proximal	Step	4.4	1.5	Abraded								3.1
765-2	6	3	Knox	Yes	Yes	Feather	14	6.3	Flat	15	14.5	13.2	8.4	5.1	3.3	2.4	5.3
765-2	6	3	Knox	Yes	Yes	Feather	4.7	1.7	Abraded	18.1	11.3	8.4	7.4	1.5	1.1	1	2.2
765-2	6	3	Knox	Yes	Yes	Feather	2.3	0.6	Flat	11	7.2	11.2	14.5	1	1.3	0.9	0.9
765-2	6	3	Knox	Yes	Yes	Feather	4	1.6	Cortical	16.7	12.2	10.4	7.7	2.6	2.5	2	2.7
765-2	6	3	Knox	Yes	Yes	Feather	3.8	1.1	Flat	17.2	8.8	8.7	8.9	2.4	1.9	1.6	2.4
765-2	6	3	Knox	Yes	Proximal	Step	7.7	2.2	Flat								2.1
765-3	6	4	Knox	Yes	Distal	Feather											
765-3	6	4	Knox	Yes	Distal	Feather											
765-3	6	4	Knox	Shatter													
765-3	6	4	Red	Shatter													
765-3	6	4	Knox	Yes	Medial												
765-3	6	4	Red	Yes	Yes	Feather	2.5	1.3	Complex	13.7		7.7			1.5		1.9
765-3	6	4	Knox	Yes	Yes	Feather	1.7	0.6	Complex	10.9		7			0.5		0.7
765-3	6	4	Knox	Yes	Yes	Feather	5	1.9	Complex	7.2		11			1.6		2
768-1	10	1	Knox	Yes	Yes	Feather	25.5	9	Flat	43.6	41	58.3	49.5	12.3	13	10.6	10.3
768-10	10	4	Knox	Shatter													
768-10	10	4	Knox	Shatter													
768-10	10	4	Fort Payne	Shatter													
768-10	10	4	Knox	Yes	Distal	Feather											
768-10	10	4	Knox	Yes	Yes	Feather	2.9	0.7	Complex	14.1		8			0.8		0.9
768-10	10	4	Knox	Yes	Yes	Feather	3.3	0.7	Complex	10.4		7.9			1.8		1
768-10	10	4	Clear(trans)	Yes	Yes	Feather	6.9	2.1	Flat	10.4		10.7			1.8		2.9
768-2	10	2	Knox	Yes	Distal	Feather											
768-2	10	2	Knox	Yes	Medial												
768-2	10	2	Fort Payne	Yes	Yes	Feather	8.9	3	Complex	19.9	11.1	12.3	15.3	4	3.4	3.9	3.6
768-4	10	2	Mustard	Yes	Yes	Hinge	5.6	2	Complex	22.7	13.2	14.2	16.5	2.7	3.2	3.7	3.2
768-7	10	3	Knox	Yes	Distal	Feather											
768-7	10	3	Knox	Yes	Distal	Feather											
768-7	10	3	Knox	Yes	Medial												
768-7	10	3	Knox	Yes	Yes	Feather	2.6	0.9	Flat	15.5	6.2	6.1	6.4	1.7	1.2	1	1.6

768-7	10	3	Knox	Yes	Yes	Feather	2.5	1	Complex	14.9	7.1	9	11.9	1.2	1	0.7	1
768-7	10	3	Knox	Yes	Yes	Feather	3.3	1.3	Complex	18.5	10	11.9	8.2	2	2.3	2.2	1.7
768-7	10	3	Knox	Yes	Yes	Feather	8.9	3.2	Flat	15.2	9.1	11	8.2	2.3	1.2	0.9	3.5
768-7	10	3	Mustard	Yes	Distal	Feather											
768-7	10	3	Mustard	Yes	Proximal	Step	4.4	0.9	Complex								
768-8	10	3	Fort Payne	Yes	Yes	Feather	4.8	1.9	Flat	18.5	14.6	12.5	12.1	2.7	2.5	2.2	2
768-8	10	3	Mustard	Yes	Proximal	Step	3.2	0.8	Abraded								1.3
768-9	10	3	Fort Payne	Yes	Medial												
769-1	10	2	Fort Payne	Shatter													
769-1	10	2	Mustard	Yes	Yes	Feather	6.2	2.1	Complex	22	10.9	14	12.4	2.7	2.2	1.9	1.9
769-1	10	2	Mustard	Yes	Yes	Feather	9	2.2	Complex	16.9	15.2	19	17.6	1.9	1.7	1.6	2.3
769-1	10	2	Knox	Yes	Yes	Hinge	5.1	1.9	Abraded	19.4	11.7	12.4	15.1	3.7	3.6	3.2	3.7
769-1	10	2	Knox	Yes	Yes	Feather	9.9	4	Complex	14.8	11.3	13.1	13.5	3.2	1.9	1.6	3.8
769-2	10	3	Knox	Shatter													
769-2	10	3	Knox	Shatter													
769-2	10	3	Knox	Shatter													
769-2	10	3	Mustard	Shatter													
769-2	10	3	Knox	Yes	Yes	Feather	7.4	1.3	Complex	14.6	9.4	8.1	7	1.3	1.1	0.9	1.6
769-2	10	3	Knox	Yes	Distal	Feather											
769-2	10	3	Knox	Yes	Yes	Feather	7.1	2	Flat	13.2	10	8.9	7.2	2.5	2.3	1.9	2.1
769-2	10	3	Knox	Yes	Medial												
769-2	10	3	Knox	Yes	Yes	Feather	5.5	1.7	Complex	7.8	8.3	8.7	8.9	0.7	0.6	0.4	1.6
769-2	10	3	Knox	Yes	Proximal	Step	4.5	2.8	Complex								2.7
769-2	10	3	Knox	Yes	Proximal	Step	5.5	2.3	Complex								2.7
769-2	10	3	Knox	Yes	Medial												
769-2	10	3	Red	Yes	Distal	Feather											
769-2	10	3	Mustard	Yes	Proximal	Step	6.4	1.9	Cortical								2.2
769-2	10	3	Mustard	Yes	Distal	Feather											
769-4	10	4	Fort Payne	Yes	Medial												
769-4	10	4	Mustard	Yes	Medial												
769-4	10	4	Mustard	Yes	Medial												
769-4	10	4	Knox	Yes	Medial												
769-4	10	4	Knox	Shatter													
769-4	10	4	Mustard	Shatter													
769-4	10	4	Mustard	Yes	Distal	Feather											
769-4	10	4	Mustard	Yes	Distal	Feather											
769-4	10	4	Mustard	Yes	Distal	Feather											
769-4	10	4	Mustard	Yes	Distal	Feather											

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769-4	10	4	Mustard	Yes	Distal	Feather											
769-4	10	4	Knox	Yes	Distal	Feather											
769-4	10	4	Knox	Yes	Distal	Feather											
769-4	10	4	Knox	Yes	Distal	Feather											
769-4	10	4	Knox	Yes	Distal	Feather											
769-4	10	4	Mustard	Yes	Proximal	Step	4	1.6	Flat								2.2
769-4	10	4	Knox	Yes	Proximal	Step	4.3	1.3	Flat								0.9
769-4	10	4	Clear(trans)	Yes	Yes	Feather	3.8	1.5	Complex	6.9		5.6			0.7		1.8
769-4	10	4	Knox	Yes	Yes	Feather	2.9	0.7	Complex	10.3		4.5			0.8		1.1
769-4	10	4	Knox	Yes	Yes	Feather	3	0.8	Complex	6.1		5.4			0.9		0.7
769-4	10	4	Knox	Yes	Yes	Feather	3.5	1	Abraded	13		6.2			0.5		1
769-4	10	4	Knox	Yes	Yes	Feather	2.6	0.4	Complex	6.9		4.2			0.3		0.5
769-4	10	4	Knox	Yes	Distal	Feather											
769-4	10	4	Knox	Yes	Yes	Feather	3	0.6	Complex	7.1		4			0.4		0.6
770-2	10	3	Mustard	Shatter													
770-2	10	3	Knox	Yes	Distal	Feather											
770-2	10	3	Knox	Yes	Distal	Feather											
770-2	10	3	Mustard	Yes	Medial												
770-2	10	3	Mustard	Yes	Yes	Feather	4.9	4.7	Flat	11	8	7.6	6.7	0.8	0.8	0.6	1.5
770-3	10	4	Knox	Yes	Medial												
770-3	10	4	Mustard	Yes	Yes	Feather	8.6	1.7	Flat	5.1		9			0.8		1.4
756-1	14	2	Knox	Yes	Distal	Feather											
756-2	14	3	Fort Payne	Yes	Yes	Feather	9.1	3.1	Complex	10.6	10.4	9.3	7.6	1.9	1.5	1.4	2.4
756-2	14	3	Fort Payne	Yes	Distal	Feather											
756-2	14	3	Fort Payne	Yes	Yes	Feather	2.4	1.5	Complex	8.9	6.9	8.5	5.3	1.5	1.4	1	1.3
756-2	14	3	Knox	Yes	Proximal	Step	8.8	3.2	Flat								3.1
756-2	14	3	Knox	Yes	Proximal	Step	3.8	2.5	Flat								1.9
756-2	14	3	Knox	Yes	Yes	Feather	3.1	1.5	Complex	10.5	7.9	10.1	9.5	3.2	2.3	1.5	2.4
756-2	14	3	Knox	Yes	Yes	Feather	6.8	1.8	Flat	10.8	7.1	7.7	7.7	1.1	1.1	1	1.7
756-2	14	3	Knox	Yes	Distal	Feather											
756-2	14	3	Knox	Yes	Distal	Feather											
756-2	14	3	Knox	Yes	Yes	Feather	4.2	1.2	Complex	16.2	5.1	6.4	5.5	2	2.2	1.5	1.4
756-2	14	3	Knox	Yes	Distal	Feather											
756-2	14	3	Knox	Yes	Medial												
756-2	14	3	Mustard	Shatter													
756-2	14	3	White(trans)	Shatter													
756-2	14	3	Mustard	Shatter													
756-2	14	3	Crème\Grey	Yes	Distal	Feather											

756-2	14	3	White(trans)	Yes	Proximal	Step	4.1	0.9	Complex								1.5
756-3	14	3	Quartz	Shatter													
756-4	14	4	Mustard	Yes	Proximal	Step	4.6	1.9	Complex								1.7
756-4	14	4	Mustard	Yes	Medial												
756-4	14	4	Mustard	Yes	Medial												
756-4	14	4	Fort Payne	Yes	Distal	Feather											
756-4	14	4	Fort Payne	Yes	Distal	Feather											
756-4	14	4	Fort Payne	Yes	Proximal	Step	3.4	0.8									1.4
756-4	14	4	Fort Payne	Yes	Yes	Feather	2	0.7	Flat	5.7		5.1			0.8		0.7
756-4	14	4	Knox	Shatter													
756-4	14	4	Knox	Shatter													
756-4	14	4	Knox	Shatter													
756-4	14	4	Knox	Yes	Medial												
756-4	14	4	Knox	Yes	Medial												
756-4	14	4	Knox	Yes	Distal												
756-4	14	4	Knox	Yes	Proximal	Step	3.9	1.1	Flat								1.1
756-4	14	4	Knox	Yes	Medial												
756-4	14	4	Knox	Yes	Proximal	Step	2.5	1	Abraded								2.3
756-4	14	4	Knox	Yes	Proximal	Step	1.6	1.2	Abraded								1.2
756-4	14	4	Knox	Yes	Proximal	Step	3.4	1	Complex								1.5
756-4	14	4	Knox	Yes	Yes	Feather	4	1.8	Complex	7.7		5.5			0.9		1.6
756-4	14	4	Knox	Yes	Yes	Feather	4.5	1.3	Complex	7		9.7			1.3		1.8
756-4	14	4	Knox	Yes	Yes	Feather	4	0.7	Flat	8.1		5.3			0.8		0.7
772-2	25	2	Mustard	Yes	Yes	Feather	5.5	1.4	Complex	23.4	16.4	26.9	15.8	4	3.4	2.2	3.2
772-3	25	3	Knox	Yes	Medial												
772-3	25	3	Mustard	Yes	Medial												
772-4	25	4	Knox	Shatter													
772-4	25	4	Mustard	Shatter													
772-4	25	4	Mustard	Shatter													
772-4	25	4	Mustard	Shatter													
772-4	25	4	Knox	Yes	Distal	Feather											
772-4	25	4	Knox	Yes	Distal	Feather											
772-4	25	4	Knox	Yes	Distal	Feather											
772-4	25	4	Mustard	Yes	Distal	Feather											
772-4	25	4	Mustard	Yes	Distal	Feather											
772-4	25	4	Brown(trans)	Yes	Distal	Feather											
772-4	25	4	Knox	Yes	Medial												
772-4	25	4	Mustard	Yes	Medial												

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772-4	25	4	Knox	Yes	Proximal	Step	4	1	Complex								1.3
772-4	25	4	Mustard	Yes	Proximal	Step	3.6	1	Complex								1.2
772-4	25	4	Mustard	Yes	Yes	Feather	2.8	0.6	Complex	8.2		4.3			0.8		0.7
772-4	25	4	Mustard	Yes	Yes	Feather	2.4	0.3	Flat	6.1		6.1			0.6		0.6
772-4	25	4	Mustard	Yes	Distal	Feather											
772-4	25	4	Mustard	Yes	Yes	Feather	2.7	0.5	Complex	9.1		3.5			1.1		0.8
772-4	25	4	Mustard	Yes	Yes	Feather	2	0.8	Complex	5.4		4.3			0.7		0.8
772-4	25	4	Knox	Yes	Yes	Feather	4.4	1.9	Complex	7.8		4.6			0.8		1.2
772-4	25	4	Knox	Yes	Yes	Feather	5.8	1.9	Complex	4.5		3.2			0.6		1.3
772-4	25	4	Knox	Yes	Yes	Feather	3.8	1.5	Complex	8.3		3			1.2		1.9
772-4	25	4	Red	Yes	Yes	Feather	2.6	0.8	Complex	6.2		5			0.6		0.9
772-6	25	4	Mustard	Yes	Yes	Feather	2.4	0.9	Complex	4.8		4			0.5		0.8
773-2	25	3	Mustard	Yes	Yes	Feather	2.4	0.6	Complex	8.1	6.9	7.4	5.7	1	1.4	1	0.9
773-4	25	4	Mustard	Yes	Proximal	Step	3	2	Complex								1.5
773-4	25	4	Mustard	Yes	Distal	Feather											
773-4	25	4	Knox	Yes	Proximal	Step	3.3	0.4	Flat								1
773-4	25	4	Knox	Shatter													
780-10	25	4	Fort Payne	Shatter													
780-3	25	2	Knox	Yes	Yes	Feather	11	2.8	Complex	25.4	16.5	21.8	27.2	3.4	2.5	2.1	5.6
780-3	25	2	Knox	Yes	Distal	Feather											
780-4	25	2	Knox	Yes	Distal	Feather											
780-6	25	3	Knox	Yes	Yes	Feather	3.6	2	Flat	13.3	6.2	8.5	6.6	1.7	1	0.8	2
780-6	25	3	Knox	Yes	Distal	Feather											
780-6	25	3	Knox	Yes	Yes	Feather	4.7	1.8	Complex	16.1	8.4	10.1	7	2.8	2.3	1.2	1.9
780-8	25	3	Fort Payne	Yes	Yes	Feather	3.5	1	Complex	11.2	7.9	10.3	11.5	1.4	1.2	0.8	1.1
780-8	25	3	Fort Payne	Yes	Distal												
780-8	25	3	Mustard	Yes	Yes	Hinge	5.7	1.4	Abraded	12.7	7.8	9.4	10.8	1.9	1.8	1.7	2
780-9	25	4	Knox	Yes	Distal	Feather											
780-9	25	4	Knox	Yes	Medial												
780-9	25	4	Knox	Yes	Medial												
780-9	25	4	Mustard	Yes	Proximal	Step	4.7	0.8	Complex								0.8
780-9	25	4	Knox	Yes	Distal	Feather											
781-1	25	2	Fort Payne	Yes	Distal	Feather											
781-1	25	2	Fort Payne	Yes	Distal	Feather											
781-2	25	3	Knox	Yes	Medial												
781-2	25	3	Knox	Shatter													
781-2	25	3	Mustard	Shatter													
781-2	25	3	Mustard	Shatter													

781-2	25	3	Fort Payne	Yes	Distal	Feather											
781-2	25	3	Knox	Yes	Distal	Feather											
781-2	25	3	Knox	Yes	Distal	Feather											
781-2	25	3	Knox	Yes	Distal	Overshot											
781-2	25	3	Knox	Yes	Yes	Feather	5.9	3.5	Complex	15.2	8.9	11.3	9.9	3.2	2.5	1.6	4.6
781-2	25	3	Knox	Yes	Yes	Feather	8.8	3.1	Complex	10.2	8	8.1	6.3	2.3	1.6	0.9	2.6
781-2	25	3	Knox	Yes	Distal	Feather											
781-2	25	3	Olive	Yes	Yes	Feather	5.9	2.2	Flat	13.9	6.4	6.3	5.8	1.3	1.1	0.8	2
781-3	25	4	Mustard	Yes	Medial												
781-3	25	4	Mustard	Yes	Medial												
781-3	25	4	Mustard	Yes	Medial												
781-3	25	4	Knox	Yes	Distal	Feather											
781-3	25	4	Knox	Yes	Distal	Feather											
781-3	25	4	Knox	Yes	Distal	Feather											
781-3	25	4	Mustard	Yes	Distal	Feather											
781-3	25	4	Crème	Yes	Distal	Feather											
781-3	25	4	Knox	Yes	Proximal	Step	4.2	1.6	Complex								1.4
781-3	25	4	Knox	Yes	Proximal	Step	2.3	1	Complex								1
781-3	25	4	Knox	Yes	Yes	Feather	2.3	0.4	Flat	10.7		4.6			1.4		0.6
785-3	27	1	Mustard	Yes	Yes	Hinge	45.7	20.5	Cortical	24.9	45.6	25.6	15.5	15	12	10.5	17.5
785-4	27	3	Knox	Shatter													
785-4	27	3	Knox	Shatter													
785-4	27	3	Knox	Shatter													
785-4	27	3	Fort Payne	Shatter													
785-4	27	3	Pink	Shatter													
785-4	27	3	White(trans)	Shatter													
785-4	27	3	White(trans)	Shatter													
785-4	27	3	Knox	Yes	Proximal	Step	4.7	1.7	Flat								1.7
785-4	27	3	Knox	Yes	Proximal	Step	1.4	3.4	Complex								2.9
785-4	27	3	Knox	Yes	Proximal	Step	7.4	2.2	Complex								2.5
785-4	27	3	Fort Payne	Yes	Proximal	Step	9.9	35	Complex								2.8
785-4	27	3	Fort Payne	Yes	Proximal	Step	3.6	0.9	Flat								1.2
785-4	27	3	Knox	Yes	Medial												
785-4	27	3	Knox	Yes	Medial												
785-4	27	3	Knox	Yes	Medial												
785-4	27	3	Crème	Yes	Medial												
785-4	27	3	White(trans)	Yes	Medial												
785-4	27	3	Fort Payne	Yes	Medial												

Appendix C. Debitage Measurements

785-4	27	3	Knox	Yes	Distal	Feather											
785-4	27	3	Knox	Yes	Distal	Feather											
785-4	27	3	Knox	Yes	Distal	Feather											
785-4	27	3	Pink	Yes	Proximal	Step	5.1	0.9	Abraded								1.1
785-4	27	3	Knox	Yes	Distal	Feather											
785-4	27	3	White(trans)	Yes	Distal	Feather											
785-4	27	3	Knox	Yes	Yes	Feather	2.6	0.7	Complex	10.5	7.8	10.3	11.3	1.2	1.2	1.1	1.1
785-4	27	3	Knox	Yes	Yes	Hinge	4.4	1.1	Flat	13.6	6.8	6.2	6.8	1.4	1.5	1.5	1.3
785-4	27	3	Knox	Yes	Proximal	Step	4.3	2	Flat								1.8
785-4	27	3	Knox	Yes	Proximal	Step	3.8	1.4	Complex								1.8
785-4	27	3	Knox	Yes	Yes	Feather	9.3	3.7	Flat	11.6	11.5	12.1	12.3	1.6	1.1	1	3.3
785-4	27	3	Knox	Yes	Proximal	Step	8.3	2.7	Abraded								2.3
785-4	27	3	Fort Payne	Yes	Yes	Feather	10.6	2.9	Flat	18.5	11.3	11	14.1	2.6	2.5	2.3	2.8
785-4	27	3	Mustard	Yes	Yes	Feather	8.7	1.4	Flat	10.4	14.3	12.8	8.7	2.6	1.7	1	2.7
785-5	27	3	Quartz	Yes	Medial												
785-6	27	4	Knox	Yes	Medial												
785-6	27	4	Knox	Yes	Medial												
785-6	27	4	Knox	Yes	Medial												
785-6	27	4	Mustard	Yes	Medial												
785-6	27	4	Mustard	Yes	Medial												
785-6	27	4	Knox	Yes	Medial												
785-6	27	4	White	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Distal	Feather											
785-6	27	4	Knox	Yes	Proximal	Step	6.2	1.9	Complex								2.1
785-6	27	4	Knox	Yes	Proximal	Step	2.9	1	Flat								0.8
785-6	27	4	Knox	Yes	Proximal	Step	5	0.9	Flat								0.9
785-6	27	4	Knox	Yes	Proximal	Step	5	1.8	Flat								2.1
785-6	27	4	Mustard	Yes	Proximal	Step	3.6	1.3	Flat								1.6
785-6	27	4	Knox	Yes	Yes	Feather	3.7	1.5	Flat	5.6		5.4			0.4		0.7
785-6	27	4	Knox	Yes	Proximal	Step	3.2	0.8	Flat								1.2
785-6	27	4	Knox	Yes	Yes	Feather	3.2	0.8	Complex	7.1		5.3			0.6		0.7
785-6	27	4	Knox	Yes	Yes	Feather	3.3	1.3	Flat	6.2		5.4			1.1		1.2

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785-6	27	4	Knox	Yes	Yes	Feather	5.9	1.2	Complex	7		5.4			0.6		0.9
785-6	27	4	Knox	Yes	Yes	Hinge	1.7	0.7	Flat	7		4.7			0.9		0.8
785-6	27	4	Knox	Yes	Yes	Feather	5.3	1.7	Abraded	7.4		4.6			0.5		1.4
785-6	27	4	Mustard	Yes	Yes	Hinge	4.2	1	Complex	6.6		8.4			1.3		1.6
785-6	27	4	Knox	Yes	Yes	Feather	5.2	0.7	Flat	7.8		4.1			0.5		0.5
766-2	67	2	Knox	Yes	Yes	Feather	9.3	1.7	Complex	19	13.2	14.6	13.7	2.9	2.6	1.8	2.5
766-2	67	2	Knox	Yes	Yes	Overshot	8	2.1	Complex	21.9	10.9	11.8	13.4	3.7	4.4	3.3	2.6
766-2	67	2	Knox	Yes	Distal	Feather											
766-2	67	2	Knox	Yes	Distal	Feather											
766-2	67	2	Mustard	Yes	Proximal	Step	8.2	2.9	Flat								3
766-2	67	2	Fort Payne	Yes	Distal	Feather											
766-2	67	2	Fort Payne	Yes	Distal	Overshot											
766-3	67	3	Crème	Shatter													
766-3	67	3	Crème	Shatter													
766-3	67	3	Crème	Shatter													
766-3	67	3	Fort Payne	Shatter													
766-3	67	3	Fort Payne	Yes	Medial												
766-3	67	3	Fort Payne	Yes	Yes	Feather	7.7	2.3	Flat	14.9	10.7	9.6	5.5	1.8	1.5	1.6	2.2
766-3	67	3	Mustard	Yes	Yes	Feather	9.9	2.8	Flat	8.8	6.3	7	6.1	1.2	1.2	1.1	1.4
766-3	67	3	Knox	Yes	Medial												
766-3	67	3	Knox	Yes	Distal	Feather											
766-3	67	3	Knox	Yes	Proximal	Step	3.8	1.1	Complex								1.6
766-3	67	3	Knox	Yes	Proximal	Step	4.3	1.9	Flat								1.9
766-3	67	3	Knox	Yes	Proximal	Step	5	2	Flat								2.5
766-3	67	3	Knox	Yes	Proximal	Step	3.4	1.1	s								2.1
766-3	67	3	Knox	Yes	Yes	Feather	10.9	3.3	Complex	15.7	7.6	8.3	8.1	1.6	1.7	1.6	2.3
766-3	67	3	Knox	Yes	Yes	Feather	5.1	2.5	Flat	7	7.8	1.8	10.1	1.7	1.5	1.2	2
766-3	67	3	Knox	Yes	Yes	Feather											
766-3	67	3	Knox	Yes	Medial												
766-4	67	4	Mustard	Shatter													
766-4	67	4	Knox	Shatter													
766-4	67	4	Mustard	Yes	Medial												
766-4	67	4	Mustard	Yes	Distal	Feather											
766-4	67	4	Knox	Yes	Distal	Feather											
766-4	67	4	Knox	Shatter													
766-4	67	4	Knox	Yes	Proximal	Step	4.5	0.9	Complex								1.3
766-4	67	4	Knox	Yes	Medial												
766-4	67	4	Fort Payne	Yes	Yes	Feather	3.7	0.9	Complex	8.2		4.7			0.9		1

Appendix C. Debitage Measurements

766-4	67	4	Brown(trans)	Yes	Yes	Feather	6.7	1.6	Flat	5.2		6			0.5		
766-4	67	4	Fort Payne	Yes	Yes	Feather	4.1	1.8	Cortical	5.5		9.1			1.2		1.6
766-4	67	4	Fort Payne	Yes	Yes	Feather	3.6	1.3	Flat	4.8		6.2			0.6		0.8
766-4	67	4	White(trans)	Yes	Distal	Feather											
766-4	67	4	White(trans)	Yes	Yes	Feather	3.6	0.7	Flat	4.7		5.2			0.5		0.5
752-2	71	2	Knox	Yes	Yes	Hinge	6.2	2.1	Complex	25.1	23.2	22	21.7	4.6	4.5	4	3.6
752-2	71	2	Knox	Yes	Distal	Overshot											
752-3	71	3	Knox	Shatter													
752-3	71	3	Knox	Shatter													
752-3	71	3	Knox	Shatter													
752-3	71	3	Mustard	Yes	Medial												
752-3	71	3	Knox	Yes	Medial												
752-3	71	3	Knox	Yes	Proximal	Step	5.4	2.7	Flat								2.7
752-3	71	3	Mustard	Yes	Proximal	Step	4.2	2.1	Complex								2.2
752-3	71	3	Knox	Yes	Yes	Feather	8.8	5.1	Complex	16.9	9.5	8.3	8.2	2.7	1.7	1.7	4.2
752-3	71	3	Knox	Yes	Yes	Feather	6.1	3.4	Complex	22.2	8.8	12.4	9.3	3	2.7	2.7	3.5
752-3	71	3	Mustard	Yes	Yes	Feather	4	0.6	Abraded	8.6	6	10.2	11.4	1.1	1.2	1.5	0.8
752-4	71	4	Knox	Shatter													
752-4	71	4	Mustard	Shatter													
752-4	71	4	White(trans)	Yes	Distal	Feather											
752-4	71	4	Knox	Yes	Medial												
752-4	71	4	Mustard	Yes	Medial												
752-4	71	4	Mustard	Yes	Medial												
752-4	71	4	Brown(trans)	Yes	Medial												
752-4	71	4	Knox	Yes	Distal	Feather											
752-4	71	4	Knox	Yes	Distal	Feather											
752-4	71	4	Knox	Yes	Proximal	Step	6.7	1.9	Complex								1.6
752-4	71	4	Knox	Yes	Proximal	Step	1.6	0.9	Flat								0.8
752-4	71	4	Knox	Yes	Yes	Step	1.7	0.5	Complex	5		4			0.6		0.5
752-4	71	4	Mustard	Yes	Proximal	Step	3.5	1.4	Complex								1
752-4	71	4	Knox	Yes	Yes	Feather	2.1	0.8	Complex	7.1		3.6			0.4		1
752-4	71	4	Knox	Yes	Yes	Feather	2.8	0.5	Complex	7.4		5.7			0.5		0.7
752-4	71	4	Knox	Yes	Distal	Feather											
752-4	71	4	Knox	Yes	Yes	Feather	2.2	0.9	Complex	8.3		4.2			1		1
752-4	71	4	Mustard	Yes	Yes	Feather	5.2	1.2	Complex	10.1		5.5			0.8		1.1
753-3	71	2	Knox	Shatter													
753-3	71	2	Knox	Yes	Proximal	Step	6	1.5	Abraded								4.1
753-3	71	2	Olive	Yes	Yes	Overshot	4.2	1.4	Complex	13	13.6	17.1	19.5	3.2	3.9	2.8	2.9

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753-3	71	2	Mustard	Shatter													
753-4	71	3	Quartz	Yes	Proximal	Step	8.5	2.4	Complex								2.6
753-5	71	3	Knox	Shatter													
753-5	71	3	Knox	Shatter													
753-5	71	3	Mustard	Shatter													
753-5	71	3	Mustard	Shatter													
753-5	71	3	Knox	Yes	Medial												
753-5	71	3	Knox	Shatter													
753-5	71	3	Knox	Shatter													
753-5	71	3	Knox	Yes	Medial												
753-5	71	3	Knox	Yes	Medial												
753-5	71	3	Knox	Yes	Medial												
753-5	71	3	Knox	Yes	Distal	Feather											
753-5	71	3	White(trans)	Yes	Distal	Feather											
753-5	71	3	White(trans)	Yes	Distal	Feather											
753-5	71	3	White(trans)	Yes	Yes	Overshot	3.6	0.9	Complex	10.9	7.8	13	10.2	1.9	2.3	2.8	1.7
753-5	71	3	Knox	Yes	Distal	Feather											
753-5	71	3	Knox	Yes	Yes	Feather	4.8	1.7	Complex	13.5	5	5.7	8.4	1.2	1	1	1.4
753-5	71	3	Knox	Yes	Yes	Feather	6	1.9	Complex	14.9	9.3	11.5	7.8	3.7	4.4	2.4	2.3
753-7	71	4	Knox	Shatter													
753-7	71	4	Knox	Shatter													
753-7	71	4	Knox	Shatter													
753-7	71	4	Knox	Yes	Medial												
753-7	71	4	Knox	Yes	Medial												
753-7	71	4	Knox	Yes	Medial												
753-7	71	4	Knox	Yes	Proximal	Step	5.8	2.5	Complex								2.3
753-7	71	4	Knox	Yes	Proximal	Step	2.2	0.9	Flat								1.1
753-7	71	4	Knox	Yes	Proximal	Step	3.3	1	Abraded								1.5
753-7	71	4	Knox	Yes	Proximal	Step	2.4	0.6	Flat								0.9
753-7	71	4	Knox	Yes	Distal	Feather											
753-7	71	4	Knox	Yes	Distal	Feather											
753-7	71	4	Mustard	Yes	Distal	Feather											
753-7	71	4	Mustard	Yes	Distal	Feather											
753-7	71	4	Mustard	Yes	Distal	Feather											
753-7	71	4	Brown(trans)	Yes	Distal	Feather											
753-7	71	4	Knox	Yes	Distal	Feather											
753-7	71	4	Knox	Yes	Yes	Feather	3.8	0.7	Complex	8.7		4.1			1.4		1
753-7	71	4	Knox	Yes	Yes	Feather	6.6	1.5	Cortical	4.3		6.4			0.8		1.3

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753-7	71	4	Knox	Yes	Proximal	Step	3	1.9	Complex								1.9
753-7	71	4	Knox	Yes	Yes	Feather	6.6	1.7	Abraded	6.2		7			1.2		1.8
753-7	71	4	Knox	Yes	Yes	Feather	9	1.9	Flat	7.1		8.4			0.9		1.6
753-7	71	4	Mustard	Yes	Yes	Feather	2.9	1	Complex	5.9		5.3			0.7		1
753-7	71	4	Mustard	Yes	Yes	Feather	12	1.9	Flat	4.2		11.3			1		1
753-7	71	4	White(trans)	Yes	Proximal	Step	5	1.4	Abraded								1.9
754-1	71	3	Knox	Yes	Distal	Feather											
754-1	71	3	Knox	Yes	Proximal	Step	4.6	1.7	Complex								1.8
754-1	71	3	Knox	Yes	Proximal	Step	7	1.7	Complex								1.9
804-1	74	2	Knox	Shatter													
804-1	74	2	Knox	Yes	Yes	Feather	5.7	1.6	Abraded	16.6	14.7	22.1	23.7	3.6	4.8	3.6	2.4
804-1	74	2	Fort Payne	Yes	Proximal	Step	11.4	3.1	Complex								3.4
804-2	74	3	Pink	Shatter													
804-3	74	3	Knox	Shatter													
804-3	74	3	Knox	Shatter													
804-3	74	3	Knox	Yes	Distal	Feather											
804-3	74	3	Knox	Yes	Distal	Feather											
804-3	74	3	Knox	Yes	Distal	Feather											
804-3	74	3	Mustard	Yes	Yes	Feather	6.4	2	Complex	10.7	7.4	8.2	10.3	2.4	1.7	1.5	2.1
804-3	74	3	Knox	Yes	Medial												
804-3	74	3	Fort Payne	Yes	Yes	Hinge	3.4	1.2	Cortical	13.2	10.1	12.7	10.7	2.6	2.6	2.1	1.8
804-3	74	3	Knox	Yes	Proximal	Step	8.5	2.7	Complex								2.9
804-3	74	3	Knox	Yes	Yes	Feather	2.9	1.1	Abraded	8.4	5	7.5	10.5	1	1.2	1.1	0.8
804-4	74	4	Knox	Yes	Medial												
804-4	74	4	Knox	Yes	Medial												
804-4	74	4	Knox	Yes	Medial												
804-4	74	4	Fort Payne	Yes	Medial												
804-4	74	4	White(trans)	Yes	Medial												
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Shatter													
804-4	74	4	Knox	Shatter													
804-4	74	4	Knox	Shatter													
804-4	74	4	Fort Payne	Shatter													

Appendix C. Debitage Measurements

804-4	74	4	White(trans)	Shatter													
804-4	74	4	Mustard	Shatter													
804-4	74	4	Mustard	Shatter													
804-4	74	4	Mustard	Shatter													
804-4	74	4	Knox	Yes	Proximal	Step	4	1.2	Abraded								1.5
804-4	74	4	Knox	Yes	Proximal	Step	3.2	2	Flat								1.8
804-4	74	4	Knox	Yes	Proximal	Step	2.8	0.8	Flat								0.6
804-4	74	4	Knox	Yes	Medial												
804-4	74	4	Fort Payne	Yes	Proximal	Step	1.6	0.4	Flat								0.3
804-4	74	4	Mustard	Yes	Proximal	Step	6	2.1	Flat								1.5
804-4	74	4	Mustard	Yes	Proximal	Step	5.3	1	Complex								1.2
804-4	74	4	Mustard	Yes	Medial												
804-4	74	4	Knox	Yes	Yes	Feather	2	0.7	Complex	10.2		4			1.1		0.8
804-4	74	4	Knox	Yes	Yes	Feather	2.9	0.7	Flat	9.8		3.7			0.6		0.7
804-4	74	4	Knox	Yes	Yes	Hinge	3.7	0.8	Flat	6.5		4.9			0.8		0.9
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Yes	Distal	Feather											
804-4	74	4	Knox	Yes	Yes	Hinge	4.2	2.4	Complex	12.3		9.4			1		1.9
804-4	74	4	Knox	Yes	Yes	Feather	2.2	0.9	Abraded	7.5		5.7			0.8		1
804-4	74	4	Mustard	Yes	Yes	Feather	3.5	0.6	Flat	9.6		8.3			1.5		0.8
804-4	74	4	Mustard	Yes	Yes	Feather	5.2	1.5	Complex	11.5		5.5			1.9		2.1
813-2	94	2	Knox	Shatter													
813-2	94	2	Knox	Yes	Yes	Feather	9.3	3.2	Complex	22.2	16.6	21.9	24.6	5.6	6.3	4.5	4.4
813-2	94	2	Red	Shatter													
813-2	94	2	Red	Yes	Proximal	Step	5	1.4	Complex								2.5
813-2	94	2	Fort Payne	Yes	Medial												
813-2	94	2	CPC	Yes	Yes	Feather	9.4	1.6	Abraded	23.5	21.7	16	12.2	2.6	2.9	2.1	2.8
813-3	94	3	Knox	Shatter													
813-3	94	3	Knox	Shatter													
813-3	94	3	Knox	Shatter													
813-3	94	3	Knox	Yes	Distal	Feather											
813-3	94	3	Knox	Yes	Medial												
813-3	94	3	Knox	Yes	Medial												
813-3	94	3	Knox	Yes	Medial												
813-3	94	3	Knox	Yes	Proximal	Step	8.9	2.1	Complex								2.2
813-3	94	3	Knox	Yes	Proximal	Step	5.5	1	Complex								2
813-3	94	3	Knox	Yes	Proximal	Step	6	1.7	Complex								1.4
813-3	94	3	Knox	Yes	Yes	Feather	3.7	1.2	Abraded	19.1	10	15.4	14.8	1.3	2	2.1	1.2

Appendix C. Debitage Measurements

813-3	94	3	Knox	Yes	Yes	Feather	5	1.2	Abraded	21.2	12	12.6	12	2	1.8	1.4	1.9
813-3	94	3	Knox	Yes	Yes	Feather	4.8	1.6	Abraded	22.2	8.2	10.1	10.6	3.5	2.4	2.3	3.2
813-3	94	3	Knox	Yes	Yes	Overshot	6.7	2.2	Complex	26.3	11.7	11.3	10.4	4	4.2	4.4	2.9
813-3	94	3	Knox	Yes	Yes	Feather	3.3	1.2	Abraded	14.3	10.4	8.7	9	2.9	2.4	2.5	1.7
813-3	94	3	Fort Payne	Yes	Distal	Feather											
813-3	94	3	Mustard	Yes	Proximal	Step	4.3	1.3	Abraded								2.9
813-3	94	3	Red	Yes	Proximal	Step	6.7	2.1	Complex								2.1
813-3	94	3	Mustard	Shatter													
813-3	94	3	Mustard	Shatter													
813-5	94	4	Mustard	Shatter													
813-5	94	4	Knox	Yes	Distal												
813-5	94	4	Mustard	Yes	Distal												
813-5	94	4	Knox	Yes	Medial												
813-5	94	4	Fort Payne	Yes	Medial												
813-5	94	4	Knox	Yes	Distal												
813-5	94	4	Knox	Yes	Proximal	Step	3.8	1	Complex								1.1
813-5	94	4	Knox	Yes	Proximal	Step	3.5	0.9	Complex								0.9
813-5	94	4	Knox	Yes	Proximal	Step	3.8	1.5	Complex								1.4
813-5	94	4	Mustard	Yes	Proximal	Step	2.7	0.7	Flat								1
813-5	94	4	Knox	Yes	Yes	Feather	3.4	1.2	Flat	9.1		5.6			0.7		1.3
813-5	94	4	Knox	Yes	Yes	Feather	4.4	2.1	Complex	11		6.1			1.7		2.2
813-5	94	4	Knox	Yes	Yes	Feather	2.3	0.9	Abraded	7.4		5.5			0.5		0.7
813-5	94	4	Mustard	Yes	Yes	Feather	4.2	3	Flat	6		6.3			1.4		1.9
814-2	94	2	Knox	Yes	Yes	Feather	9.5	4.1	Complex	19.5	18.4	16.1	15	2.4	1.6	1.5	5.3
814-2	94	2	Mustard	Yes	Yes	Feather	7.8	2.9	Complex	24	16.9	22	16.2	4.1	3.8	2	3.5
814-2	94	2	Mustard	Yes	Proximal	Step	5.7	1.7	Abraded								1.6
814-3	94	3	Knox	Shatter													
814-3	94	3	Knox	Yes	Yes	Feather	5.2	2.6	Complex	20.5	14.1	14.9	14.2	2.1	1.3	1.2	2.9
814-3	94	3	Knox	Yes	Yes	Feather	4.3	1.5	Complex	12.5	11.4	14.1	10.4	2.6	1.8	1.3	1.5
814-3	94	3	Knox	Yes	Proximal	Step	7	1.4	Cortical								1.5
814-3	94	3	Knox	Yes	Yes	Feather	2.7	0.9	Complex	9.9	9.3	8.9	6.6	1.3	1.3	1.2	1.1
814-3	94	3	Fort Payne	Yes	Yes	Feather	6.5	1.3	Complex	21.5	8.8	14.5	9.5	2.9	3.2	2.1	1.7
814-3	94	3	Brown(trans)	Yes	Medial												
814-3	94	3	Brown(trans)	Yes	Proximal	Step	7.3	2.5	Complex								2
814-3	94	3	Mustard	Yes	Distal												
814-3	94	3	Mustard	Yes	Yes	Feather	3.6	0.8	Abraded	12.2	6.8	8.3	8.9	1.7	2	1.3	0.9
814-4	94	4	Knox	Shatter													
814-4	94	4	Knox	Shatter													

Appendix C. Debitage Measurements

814-4	94	4	Knox	Shatter													
814-4	94	4	Mustard	Shatter													
814-4	94	4	Knox	Yes	Medial												
814-4	94	4	Olive	Yes	Medial												
814-4	94	4	Olive	Yes	Medial												
814-4	94	4	Olive	Yes	Medial												
814-4	94	4	Knox	Yes	Distal	Feather											
814-4	94	4	Mustard	Yes	Distal	Feather											
814-4	94	4	Knox	Yes	Distal	Feather											
814-4	94	4	Knox	Yes	Distal	Feather											
814-4	94	4	Mustard	Yes	Distal	Feather											
814-4	94	4	Mustard	Yes	Proximal	Step	2.8	1.2	Flat								0.6
814-4	94	4	Knox	Yes	Yes	Feather	2	0.8	Flat	14.2		6.7			0.8		0.7
814-4	94	4	Knox	Yes	Yes	Feather	3.4	1.1	Flat	4.7		6.3			1.2		1.6
814-4	94	4	Knox	Yes	Yes	Feather	3.5	1.1	Complex	7.9		3			0.7		0.6
814-4	94	4	Mustard	Yes	Yes	Feather	5.8	0.8	Complex	10.2		5.6			0.9		0.9
814-4	94	4	Mustard	Yes	Yes	Feather	4.1	1.1	Complex	6		4.8			0.7		1
759-2	121	2	Knox	Yes	Proximal	Step	9.4	2.3	Abraded								6
759-3	121	3	Knox	Yes	Yes	Hinge	7.5	2.6	Complex	17.7	8.6	8.5	9.1	3.2	3.2	2.9	3
759-3	121	3	Fort Payne	Yes	Yes	Feather	4.5	1.4	Complex	11.2	8.5	7.7	8.7	1.2	1.1	0.8	1.4
759-3	121	3	Mustard	Yes	Yes	Feather	2	0.9	Complex	10.6	4.8	6.2	4.5	1.5	1.6	1.4	1.5
759-3	121	3	Knox	Yes	Distal	Feather											
759-3	121	3	Knox	Yes	Proximal	Step	4.6	1.6	Complex								1.7
759-3	121	3	Knox	Shatter													
759-3	121	3	Knox	Yes	Medial												
759-3	121	3	Knox	Shatter													
759-3	121	3	Mustard	Shatter													
759-3	121	3	Fort Payne	Shatter													
759-4	121	4	Knox	Shatter													
759-4	121	4	Knox	Yes	Medial												
759-4	121	4	Knox	Yes	Proximal	Step	2.5	0.5	Complex								0.9
759-4	121	4	Knox	Yes	Yes	Feather	3.6	1.2	Complex	6.5		4.7			1.1		1.5
759-4	121	4	Knox	Yes	Yes	Feather	3.1	0.8	Complex	7.2		7			1.1		1.4
760-3	121	3	Knox	Shatter													
760-3	121	3	Knox	Shatter													
760-3	121	3	Knox	Yes	Distal	Feather											
760-5	121	4	Knox	Yes	Distal	Feather											
760-5	121	4	Knox	Yes	Distal	Feather											

Appendix C. Debitage Measurements

760-5	121	4	Knox	Yes	Distal	Feather											
760-5	121	4	Mustard	Yes	Distal	Feather											
760-5	121	4	Knox	Yes	Yes	Feather	2.7	0.8	Flat	10.1		5.5			0.8		0.8
760-5	121	4	Knox	Yes	Yes	Feather	2.7	0.8	Complex	8.2		4.4			0.8		1
760-5	121	4	Knox	Yes	Proximal	Step	1.8	0.7	Flat						0.8		
760-5	121	4	Mustard	Yes	Yes	Feather	3	0.8	Complex	5		5.7			0.9		1
762-2	121	2	Knox	Shatter													
762-2	121	2	Knox	Yes	Yes	Feather	18.5	6.3	Flat	25.3	15.3	12	16.4	4.4	4	3.7	5.5
762-2	121	2	Mustard	Yes	Yes	Feather	6.3	1.4	Abraded	19.4	14.2	23.2	23.4	3	3.3	1.5	1.8
762-3	121	2	Brown	Yes	Yes	Overshot	6.2	1.6	Complex	25.1	15.6	22.2	23	3.5	3.5	4.2	2.6
762-4	121	3	Red	Shatter													
762-4	121	3	Mustard	Shatter													
762-4	121	3	Fort Payne	Yes	Medial												
762-4	121	3	Knox	Yes	Distal	Feather											
762-5	121	4	Knox	Yes	Distal	Feather											
762-5	121	4	Fort Payne	Yes	Medial												
762-5	121	4	Fort Payne	Yes	Medial												
762-5	121	4	Mustard	Yes	Distal	Feather											
762-6	121	4	Quartz	Yes	Medial												
763-1	121	3	Red	Yes	Medial												
763-1	121	3	Mustard	Yes	Proximal	Step	15.5	5.2	Complex								5.6
763-1	121	3	Knox	Yes	Yes	Feather	8.6	3.2	Complex	19.2	17	19.2	20.4	4.5	3.5	2.4	3.8
763-1	121	3	Knox	Yes	Yes	Feather	4.9	1.4	Complex	14.1	9.9	12.5	13.5	2.2	1.7	1.4	1.8
763-1	121	3	Mustard	Yes	Yes	Feather	10	3.8	Flat	12.5	10.4	11.2	11.2	1.8	1.4	0.8	2.7
763-2	121	4	Mustard	Shatter													
763-2	121	4	Knox	Yes	Distal	Feather											
763-2	121	4	Knox	Yes	Proximal	Step	2.9	0.7	Flat								1.6
764-1	121	2	Knox	Shatter													
764-2	121	3	Knox	Shatter													
764-2	121	3	Knox	Yes	Distal	Feather											
764-2	121	3	Knox	Yes	Distal	Feather											
764-2	121	3	Knox	Yes	Yes	Feather	4.1	0.5	Complex	12	7.2	7.6	5.3	1.2	1.1	1.1	0.8
764-2	121	3	Brown(trans)	Yes	Yes	Feather	4.2	1	Flat	14.3	8.9	13.3	12.6	2.4	2.2	1.6	1.2
764-3	121	4	Mustard	Yes	Medial												
764-3	121	4	Mustard	Yes	Medial												
764-3	121	4	Knox	Shatter													
764-3	121	4	Red	Yes	Proximal	Step	1.6	0.4	Complex								0.6
764-3	121	4	Fort Payne	Yes	Yes	Feather	3.9	0.6	Flat	6.2		5.3			0.7		0.5

764-3	121	4	Knox	Yes	Proximal	Step	3.2	0.5	Flat	0.4