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15Md158: Excavations and Lithic Analysis of a Late Archaic/Early Woodland Lithic Workshop Site in Meade County, Kentucky.

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15MD158: EXCAVATIONS AND LITHIC ANALYSIS OF A LATE ARCHAIC/EARLY WOODLAND LITHIC WORKSHOP SITE IN MEADE COUNTY, KENTUCKY.

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ABSTRACT

This thesis describes archaeological investigations carried out at 15Md158, a prehistoric lithic workshop site in Meade County, Kentucky. Although there has been a wide range of diagnostic projectile points as well as some late radiocarbon dates recovered from the site had been identified as a mostly Late Archaic special purpose site where mostly late-stage lithic reduction took place. The goals of this project were to develop a more secure chronology for the site, document a change in the use of the site in order to relate it to changes in mobility patterns of those who utilized the site, and document if different areas of the site were used for different stages of the lithic reduction process. In order to answer these questions a series of five test units were excavated in the areas of the site that contained the greatest densities of lithic artifacts. The artifact assemblage that was collected was subjected to a production trajectory analysis that was used to look for vertical and horizontal patterning.

The artifact assemblage from 15Md158 was found to reflect a long production trajectory, meaning that the full range of the lithic reduction process took place at this site. This study was not successful in finding vertical or horizontal patterning in the artifact assemblage, although it was successful in developing a more secure chronology for the site. The investigation found that the site was most heavily utilized during the Late Archaic and Early Woodland periods. Furthermore, this study found that the site may be associated with a network of lithic manufacturing sites in the region that were used for the specialized manufacture of trade and ritual artifacts from Wyandotte, a blue-gray chert which was heavily traded during the time periods the periods that the site was utilized.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

15Md158 is a deep, stratified lithic manufacturing station containing a wide range of diagnostic projectile points; however, most date to the Late Archaic period. It is located on Fort Knox, Meade County, Kentucky (Figure 1.1). 15Md158 was originally identified by surveys conducted in 1979 by Nancy O'Malley that consisted mainly of a surface survey with minimal shovel testing (O'Malley 1979). These surveys also identified another site, 15Md160, which closely neighbors this site, and although recorded as separate sites it was noted that the two sites may overlap (O'Malley 1979). O'Malley's original description of 15Md158 was "a prehistoric lithic artifact and fire cracked rock scatter observable primarily in tank road cuts" (Jordan et al. 2011:60). This site was further described as measuring approximately 100 meters by 100 meters and situated on a ridge on the Ohio River floodplain (Jordan et al. 2011:60). Ninety-one lithic artifacts were originally recovered from 15Md158 which included a Madison projectile point which is diagnostic of the Late Woodland to Mississippian period in the Ohio River Valley. Based on this information O'Malley categorized the site as a prehistoric general manufacturing station with a Fort Ancient/Mississippian affiliation (Jordan et al. 2011:60).

O'Malley's original description of 15Md160 was "a prehistoric lithic artifact and fire cracked rock scatter" which encompassed 30 meters by 60 meters which is situated on the same landform as 15Md158 (Jordan et al. 2011:60). A total of 114 lithic artifacts were originally recovered from this site which included a Steuben Expanded Stemmed projectile point which

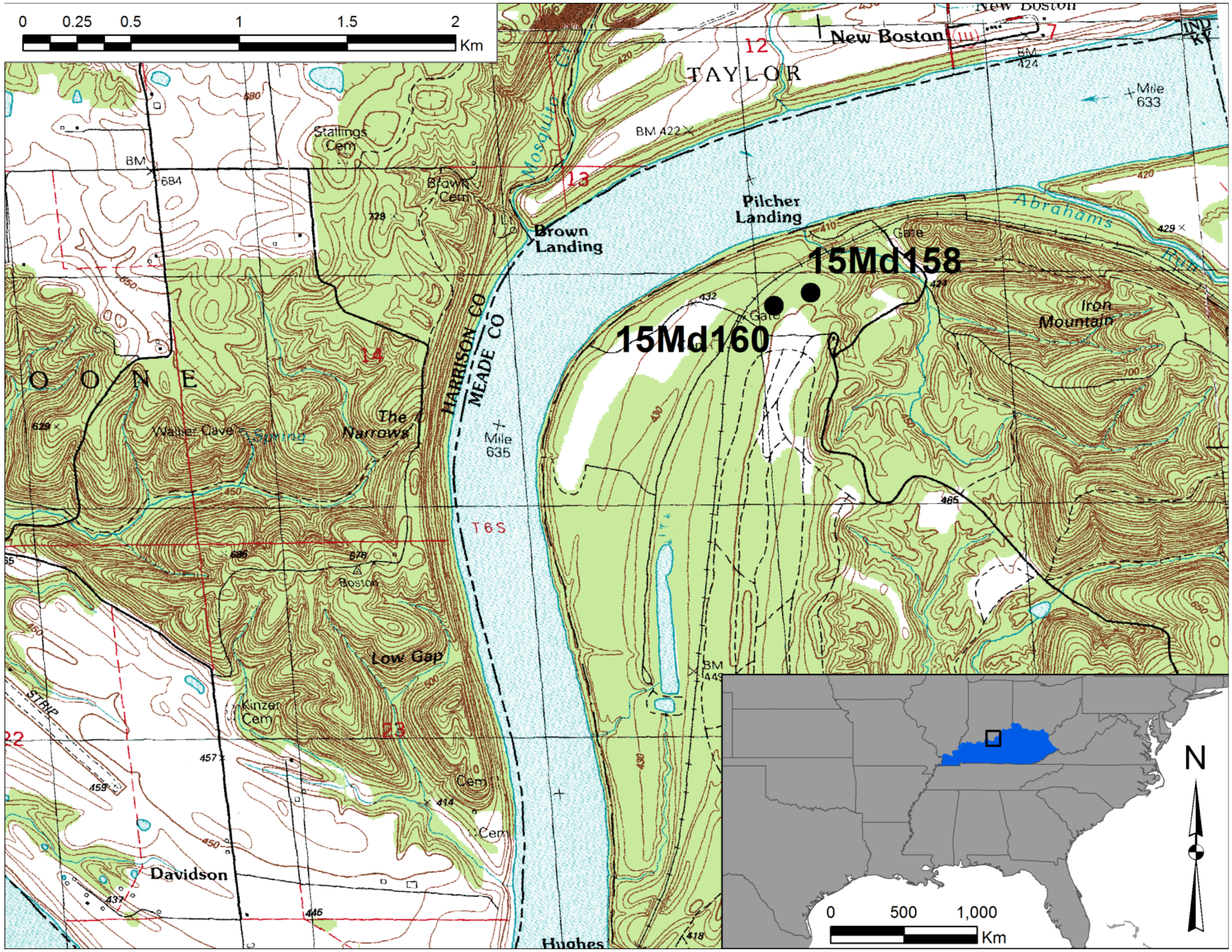

Figure 1.1. USGS topographic map showing the location of 15Md158 and 15Md160 on Fort Knox, Meade County, Kentucky.

dates from the terminal Middle Woodland to the early Late Woodland in the Ohio River Valley. Based on this information O'Malley categorized this site as a prehistoric general manufacturing station with an Early to Middle Woodland cultural affiliation (Jordan et al. 2011:61).

15Md158 and 15Md160 are situated atop the T2 terrace (Figure 1.1) and follows the trajectory of the Ohio River, which is approximately 300 meters to the north (Jordan et al. 2011:62). The sites are bounded to the east by a dramatic topographic descent to the T1 terrace and to the north by the Louisville and Nashville railroad which was constructed on an artificial rise between T1 and T2 (Jordan et al. 2011:62). Approximately 100 meters south and west of the sites are gravel military access roads. The terrace upon which the sites are situated has many topographic features such as depressed areas which tend to seasonally hold water and ridge-like sandy rises. According to Kentucky geological maps (Kentucky Geological Survey 2012) the landform on which the sites rest consists of older alluvium with a lithology consisting of sand, gravel and chert (Kentucky Geologic Survey 2012). The gravel found in this older alluvium is round to angular pebbles to small boulders of crystalline plutonic rocks, aphanitic igneous rocks, other crystalline rocks, limestone, quartz and quartzite, chert, and black shale (Kentucky Geologic Survey 2012). The bedrock geology of the surrounding areas consists of chert-rich Muldraugh Member, Harrodsburg, Salem, St. Louis, and St. Genevieve limestones (Kentucky Geologic Survey 2012). The soils found on the site include Lakin loamy fine sand and Huntington silt loam (United States Department of Agriculture 2012). Vegetation found at the sites consists of old-growth hardwoods and thick forest understory.

In 2008 and 2010 Brockington and Associates, led by field directors Michael Creswell and Jillian Jordan, returned to the sites to further investigate their eligibility status for inclusion on the National Register of Historic Places (NRHP). The first stage of this investigation was a

Phase I intensive survey that was conducted on both sites. The Phase I intensive survey consisted of relocating each site based on the previously recorded UTM coordinates from the 1979 identification of the sites. Subsequently a series of 50 x 50 centimeter shovel tests were excavated in cardinal directions across each site on a 10 meter grid. The remainder of each grid was completed by the excavation of standard 30 centimeter shovel test. The investigation of 15Md160 was the first to be undertaken, uncovering a moderate density of lithic debitage in what appeared to be mostly undisturbed context. A total of 309 non-diagnostic lithic artifacts were recovered from this site. The eastern extent of the site was identified and appeared to be bounded by a large ridge-like rise that extended roughly north to south.

After the completion of the investigation of 15Md160, 15Md158 was relocated with the datum being approximately 200 meters from that of 15Md160. A similar shovel test strategy was employed at this site. The investigation of this site recovered much more densely deposited lithic debitage in much deeper deposits than the previous site. A shovel test map of the Phase I intensive investigations are presented in Figure 1.2. A total of 4,960 lithic artifacts were recovered from this site which included one diagnostic Snyder-like projectile point base which is suggestive of the Middle Woodland period in the Ohio River Valley (Jordan et al. 2011:62). Along with the lithic artifacts two extremely small pottery sherds were also recovered. One possible feature was also exposed during the investigation of 15Md158 in the shovel test at grid location N500 E410. This feature was observed at approximately 40 centimeters below the ground surface and consisted of black, heavily burned sandy loam with charcoal inclusions that extended across the entire shovel test (Jordan et al. 2011:62). The western boundary of 15Md158 was found to be the same rise which bounded the eastern side of 15Md160, confirming that the two sites did indeed overlap.

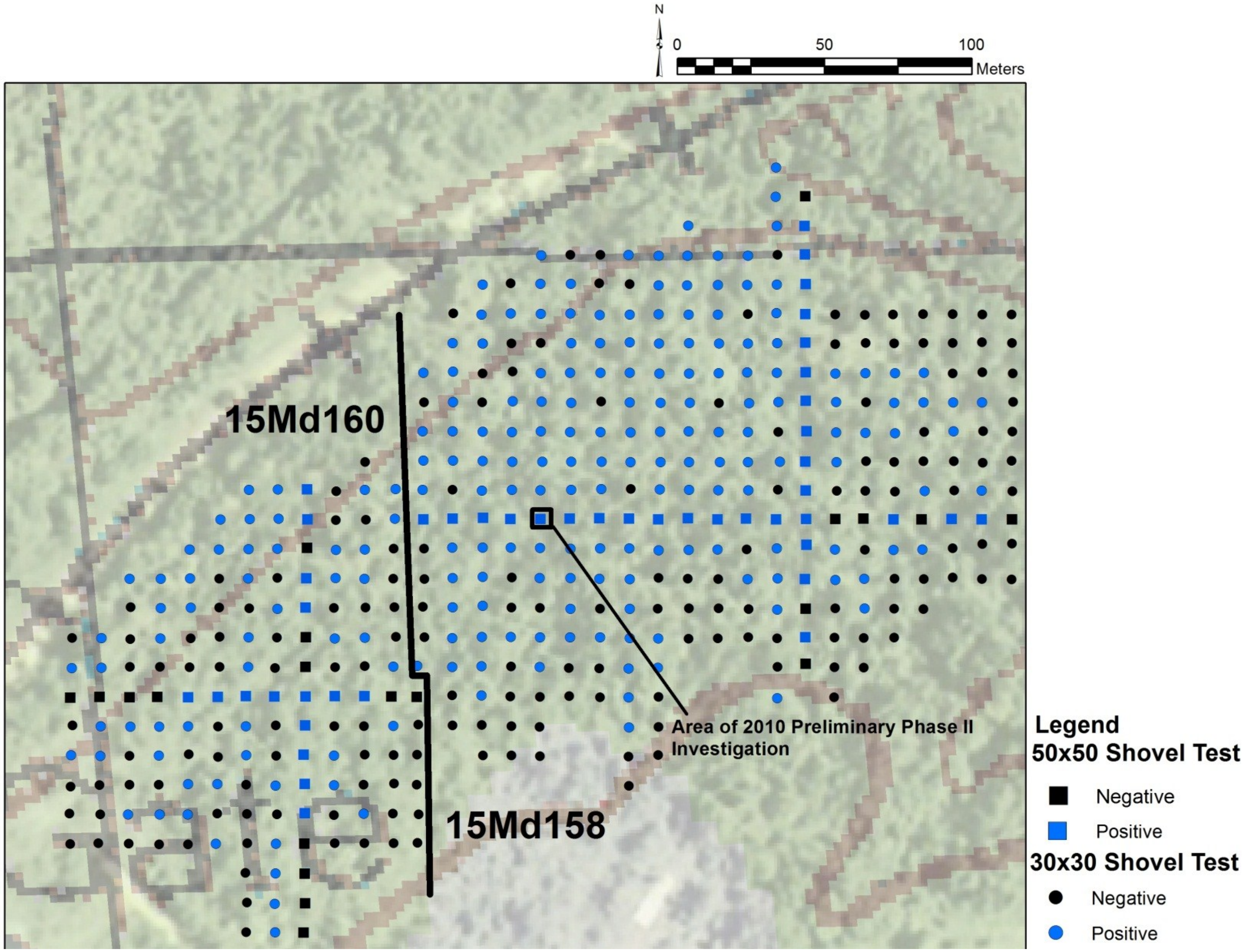

Figure 1.1. **USGS topographic map showing the location of 15Md158 and 15Md160 on Fort Knox, Meade County, Kentucky.**

These investigations determined that the site as a whole, including both 15Md158 and 15Md160, encompassed an area measuring 250 meter (North-South) by 320 meters (Jordan et al. 2011:62). Although the Brockington investigation found that the two sites overlapped and should probably be considered one site the Kentucky Heritage Council has not yet made a determination as to whether these sites should officially be considered one site. Therefore, these sites continue to be reported separately. The conclusion of the Brockington Phase I intensive investigation was that because 15Md158 appeared mostly undisturbed, contained heavy artifact densities, and contained a sub-surface features that this site was possibly eligible for inclusion on the NRHP (Jordan et al. 2011:62).

After determining that 15Md158 was possibly eligible for inclusion in the NRHP a preliminary Phase II excavation, led by Jillian Jordan, was conducted on the site. These excavations centered on and around the feature that was identified at grid location N500 E410 during the phase I intensive survey. In lieu of investigating the entire site, these excavations focused on understanding the nature of the feature and consisted of eight contiguous excavation units surrounding the feature (Jordan et al. 2011:67).

These investigations recovered a total of 2,953, mostly non-diagnostic lithic artifacts (Jordan et al. 2011:67). This included two diagnostic projectile points, a Delhi and Turkey Tail, which date to the Late Archaic period in the Ohio River Valley. Twenty possible features were also identified during these investigations (Jordan et al. 2011:79). Eight of these features, which appeared heavily disturbed by bioturbation and modern intrusions, were identified as possible postholes (Jordan et al. 2011:80). Two other features, which were separated by a modern intrusive trench feature, were identified as possible living surfaces consisting of compact soil and charcoal flecking. A charcoal sample was recovered from this feature which returned a conventional radiocarbon age of 290±40 B P. The calibrated calendrical date range returned from this sample was AD 1480 to 1660 (Jordan et al. 2011:80). Three other features were identified as possible hearth features. Two of these possible hearth features were identified at fairly shallow depths and exhibited disturbance from modern intrusions and natural bioturbation. The third possible hearth feature was found to be in better condition. It was described as bowl-shaped with charcoal flecks, however not heavily burned with a fair amount of fire-cracked rock at its base. The feature did not contain any artifacts except for a charcoal sample that returned a conventional radiocarbon age of 210±40 B P (Jordan et al. 2011:80). Three calibrated calendrical date ranges were returned from this sample: AD 1640 to 1690, AD 1730 to 1810, and AD 1920 to 1950(Jordan et al. 2011:80).

The chronometric dates for both the charcoal samples recovered from the preliminary Phase II excavations point toward a Late Fort Ancient utilization of the site. There have also been a wide range of diagnostic projectile points that suggest that the site's utilization occurred between the Late Archaic and Late Woodland periods. Figure 1.3 presents the locations on the site where the diagnostic artifacts and radiocarbon dates have been obtained. Despite these dates, Jordan et al. (2011:88) suggests that, due to the lack of ceramics recovered from the site as well as the recovery of projectile points dating to a much earlier utilization of the site, the bulk of the utilization most likely occurred during the Late Archaic.

Analysis of the materials recovered from these investigations have shown that the peoples utilizing this site made use of local chert for tool manufacture and production (Jordan et al. 2011:89). A total of 65 tools were recovered from both the Phase I intensive evaluations and Phase II excavations (Jordan et al. 2011:89).

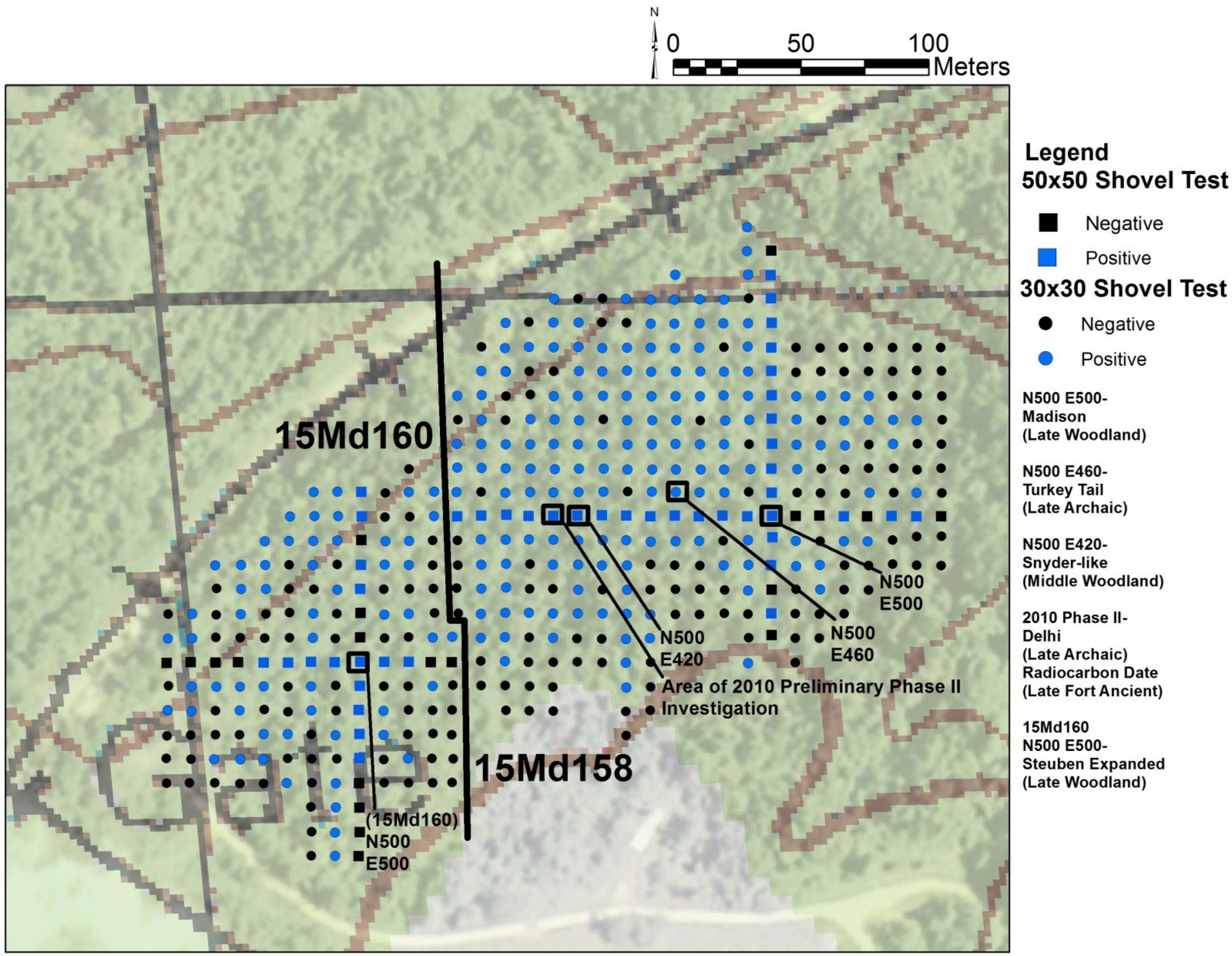

Figure 1.3. Shovel Test Map of the Phase I intensive investigations with the location of the diagnostic artifacts identified.

These included 35 utilized flakes, 23 bifaces, three hafted bifaces, three projectile points, one drill, and one preform (Jordan et al. 2011:89). The fragmentary condition in which most of these tools were found were interpreted as suggesting that these pieces were being brought in from elsewhere for the final stages of tool manufacture and preparation then taken off site for use. The fragmentary tools of this assemblage were believed to represent mistakes made during manufacture that were discarded on site. A total of 14 cores were recovered from 15Md158 with one being identified as a cobble core and the others remaining unidentified. The majority of these cores appeared to be multidirectional which suggests that the core was meant to become a tool. The cores that were recovered were likely discarded due to mistakes by the knapper or flaws in the raw material.

Analysis of the debitage in the assemblage further suggest that the site was used as a special purpose lithic manufacturing site with the majority of activity taking place at the site consisting of late-stage lithic reduction (Jordan et al. 2011:95). The late-stage determination was suggested because when the assemblage was subjected to size-grade analysis the ¼ inch category contained 78 percent of the debitage. Late-stage reduction activities at the site were further suggested because the overwhelming majority of the debitage consisted of tertiary flakes which point toward secondary shaping and bifacial thinning as the most frequent activities that took place at the site (Jordan et al. 2011:91). The skill of the knappers who utilized the site was also assessed by this analysis by recording the types of flake terminations that occurred in the assemblage. The vast majority of the flake terminations in the assemblage were found to be feather terminations indicating that the manufacturers of this assemblage were highly skilled knappers who made limited mistakes. This conclusion was further supported by the limited number of overshot terminations recorded in the assemblage. Overshot terminations indicate that repairs were being made to objective pieces, the lack of which indicates that there were highly skilled knappers utilizing the site (Jordan et al. 2011:91).

One other type of analysis conducted on the assemblage from 15Md158 consisted of applying a model adapted from Franklin and Navel (2011) which examines assemblage formation by comparing the size of the tool assemblage recovered from the site with the percent of late-stage debitage which was recovered (Jordan et al. 2011:92). This model relates this comparison to site type, of which it accounts for four types: residences, repeated logistical camps, manufacturing sites, and situational emergency camps. Residences, according to the model, have high frequencies of tools and tool fragments but low relative percentages of late-stage debitage; repeated logistical camps have high frequencies of tool and tool fragments and high percentages of late-stage debitage; manufacturing sites have low amounts of tools and tool fragments and low percentages of late-stage debitage; and situational emergency camps have low amounts of tools and tool fragments and high percentages of late-stage debitage. When this model was applied to the assemblage from 15Md158, which had a low amount of tools with a high percentage of late-stage debitage, it was found to fall within the situational emergency camp category (Jordan et al. 2011:93). This was interpreted to suggest that the site was accessed only during times requiring specific need for this location and therefore, may have only been utilized briefly at any given time. It was noted, however, that given the large size of the lithic assemblage that if the site was occupied rarely the site would have been utilized by a moderate-sized community during those times or that it was utilized multiple times over a long period of time.

With the information collected from this site thus far it is apparent that this site deserves further study in order to try and explain the importance of 15Md158 which is still not fully understood. The investigation conducted by Brockington and Associates at 15Md158 suggest that the site is a special purpose lithic manufacturing site used for late stage tool manufacture. This site type is suggested by the analysis of the artifact assemblage which consisted almost entirely of debitage, bifaces, and cores. Further evidence that this site was used specifically for the manufacture of tools is the lack of artifacts that are typically associated with habitation sites such as ground stone and bone tools, pottery, and faunal remains. If 15Md158 is a lithic workshop site with little or limited habitation, then it may be a procurement locality portion of a logistically organized settlement system that was utilized by the inhabitants of a nearby base camp. The disparity between the chronometric dates and the wide range of diagnostic projectile points is one issue that needs further investigation. Though, as suggested by the Brockington investigation the sparse occurrence of pottery at the site points to at least a Late Archaic utilization of the site. A majority of the projectile points that have been recovered from the site thus far also point toward the Late Archaic period.

This study looks to document different aspects of a Late Archaic lithic manufacturing site by further investigating 15Md158 and asking the question; does 15Md158 exhibit temporal changes in the use of the site, as well as changes in lithic procurement strategies for the site through time? This study assumes that a change in site usage would reflect changes in the mobility patterns of the peoples who utilized the site. This study will also look to better understand the nature of the site as a whole, as well as try to lock down a more concrete chronology for the site. In attempting to better understand the nature of the site this study will also look to identify if there are areas of differential use across the site. By answering these questions this study will help illuminate current models of Late Archaic settlement in the Ohio

Valley which view the inhabitants of the region as semi-sedentary, logistically organized collectors (Jefferies 2009:654).

II. LITERATURE REVIEW

The Archaic period through the Early Woodland period in Kentucky is a well-represented, yet poorly understood period in Kentucky prehistory because few sites have been investigated (Pollack 2008:214; Applegate 2008:364). In order to deal with the geographic distribution of the state's prehistoric archaeological resources Pollack (2008:12) has divided Kentucky into seven different management areas, based on landform divisions and major drainage systems. The Salt River management area, where 15Md158 is located, consists of 14 counties and is bounded by the Ohio River to the northwest, the Green River management area to the west and south, and the Bluegrass management area to the east (Pollack 2008:16). This area is environmentally diverse, including three different physiographic regions: the Mississippian Plateau, the Knobs, and the Bluegrass (Pollack 2008:16). In the Salt River management area there are 927 recorded Archaic period sites with 378 of those being identified as Late Archaic (Pollack 2008:214). Pollack (2008:252) notes that in the Salt River management area, Archaic special activity areas such as workshops are poorly represented. There are a total of 529 recorded Woodland components in the Salt River management area with over 41 percent of those being assigned to the Early Woodland period (Applegate 2008:428). Only two percent of all the Woodland sites in the Salt River area are recorded as special activity areas (Applegate 2008:428).

The Archaic

In general the Archaic period in North America consists of the period of time between 8,000-1,000 B.C. that was peopled by nomadic hunter-gatherers (Jefferies 2008a:193). The Archaic has been characterized as a stage of migratory hunting and gathering cultures extending into environmental conditions resembling those experienced today (Jefferies 2008a:195; Willey and Phillips 1958:107). Yet another characterization of the Archaic is a period inhabited by primarily hunters and fishers, who built crude habitations, used the atlatl for hunting, lacked cooking vessels, and did not practice horticulture (Jefferies 2008a:198; Webb and Haag 1940:109). The diagnostic artifacts that are typically associated with the Archaic period include stemmed chert projectile points, socketed antler or bone projectile points, deer ulna awls, and tubular shell beads (Ford and Willey 1941:333; Jefferies 2008a:194). Other items that are commonly associated with the Archaic period are expanded base chert drills, stemless and leaf-shaped chert knives, engraved bone pins with expanded heads, bannerstones, full-grooved axes, heavy groundstone woodworking tools, stone vessels, and bone and antler artifacts (Ford and Willey 1941:333; Jefferies 2008a:195).

In 1952 the Archaic period was separated into early and late subdivision based on changes in material culture (Griffin 1952:354-356; Jefferies 2008a:195). Griffin (1952:354-356; Jefferies 2008a:195) identified the Early Archaic as populated with organized bands that ranged over specific hunting territories and used tools such as the atlatl, traps, snares, and fish weirs. He also suggested that the Early Archaic peoples prepared plant foods using groundstone mortars and pestles (Griffin 1952:354-356; Jefferies 2008a:195). Griffin (1952:355-356; Jefferies 2008a:195) identified the Late Archaic, based on the introduction of polished stone implements such as grooved axes, atlatl weights, and tubular pipes into the archaeological record. He considered the Late Archaic to be a continuation of the Early Archaic tradition, with the addition of a long distance trade network, based on the fact that some of the Late Archaic artifacts were made from nonlocal raw materials (Griffin 1952:356; Jefferies 2008a:195).

Archaic in Kentucky

The Archaic period in Kentucky is seen as extending from ca. 8,000 to 1,000 B.C., and subdivided into early (8,000 to 6,000 B.C.), middle (6,000 to 3,000 B.C.), and late (3,000 to 1,000 B.C.) subperiods (Jefferies 2008a:202). These subdivisions are based on various technological, social, subsistence, and settlement criteria (Jefferies 2008a:202). There is some debate, however, about the lengths and temporal boundaries of these subperiods (Jefferies 2008a:202; Milner 2004; Stoltman 1978). The environment of Kentucky during the 7,000 years that encompass the Archaic is characterized by a slow and erratic transition at the end of the Ice Age (Jefferies 1996:39). Between 7,000 and 3,000 B.C., encompassing the end of the Early Archaic and the entire Middle Archaic, Kentucky along with the rest of the midcontinent experienced a warm and dry period called the Hypsithermal climatic interval (Brown and Vierra 1983:201; Jeffries 1996:39). The inhabitants of Kentucky during the Archaic period interacted with each other and other groups living across the Southeast and Midwest which led to the sharing of ideas, beliefs, and material goods between them (Jefferies 1996:71). This interaction can be seen in the similarity of artifacts across the regions (Jefferies 1996:71).

Early Archaic (8,000 to 6,000 B.C.)

The Paleoindian period began during a transition from the last Pleistocene glaciations that is known as the Early Holocene Interval (10,500 to 6,000 B.C.) (Muller 1986:50). As the glaciers retreated from North America, significant environmental changes began to take place. These changes began with drastic changes in vegetation across the continent. The Lower Mississippi Valley was transformed from a spruce forest to a cypress-gum forest, and along the Lower Ohio River Valley the mixed conifer and northern hardwood forest transformed to an oak-hickory forest (Jefferies 2008a:202; Muller 1986:50). The early part of this period also saw the extinction of Pleistocene megafauna such as the mastodon, mammoth, and giant sloth (Jefferies 2008a:202). These changes in the flora and fauna of the continent occurred because the climate of the Early Holocene Interval is characterized by an accelerated warming that transformed the Lower Ohio River Valley favorable for human habitation for the first time (Muller 1986:50). These new forests produced many diverse environments that supported more potential game animals and edible plant foods than the spruce and pine forests of the earlier period (Jefferies 2008a:202; Muller 1986:50). As these environmental changes took hold during the middle of the Early Holocene the Paleoindian hunters and gatherers that inhabited the continent underwent various technological, social, and economic changes, which is now known as the Early Archaic period (Jefferies 2008a:202).

It is believed, based on the absence of sites exhibiting long-term occupation and the broad distribution of corner and basal notched projectile points like Kirk and LeCroy types, that Early Archaic peoples, for the most part, continued the highly mobile lifestyle of their Paleoindian ancestors, exploiting relatively large hunting areas (Jefferies 2008a:203). It is suggested that Early Archaic groups used a “catch-as-catch-can” hunting strategy, not concentrating on any single species or habitat but hunted what was available (Muller 1986:57). Known Early Archaic sites, which are generally small and are characterized by an absence of middens, features, and burials, suggest that Early Archaic groups were small and probably consisted of related individuals (Jefferies 2008a:203). Most sites identified in Kentucky also suggest that they were not intensely occupied and were only temporary camps (Jefferies 1996:45). There is some variation in this pattern, however, in the mountains of southeastern Kentucky where Early Archaic sites have been identified with middens and features suggesting they were more intensely occupied for longer durations (Jefferies 1996:45).

The Early Archaic tool makers utilized a wide variety of chert and other resources (Jefferies 2008a:203). Most of the toolkit of the period corresponds to hunting activities and very few tools associated with plant food processing have been recovered from Early Archaic sites (Jefferies 1996:40). The lack of these tool types suggest that the Early Archaic peoples subsided mainly animal foods and plant foods that did not require a great deal of processing (Jeffries 1996:40). A high percentage of the chert recovered from Early Archaic sites are of nonlocal varieties, further suggesting that these groups here highly mobile and collected resources when they were identified (Jefferies 2008a:203). Tools recovered from Early Archaic sites show that they were used and rejuvenated for an extended time before they were eventually discarded (Jefferies 2008a:203). Diagnostic projectile point styles that are associated with the Early Archaic include: Kanawha, LeCroy, Kirk Stemmed/Serrated, MacCorkle, Kirk Corner Notched, Thebes, and St. Charles (Jeffries 1996:41; Justice 1987). Some important Early Archaic sites in and around Kentucky include St. Albans in West Virginia, Koster (Brown and Vierra 1983) in Illinois, Icehouse Bottom (Chapman 1977) in Tennessee, Swans Landing (12Hr304) (Smith 1987) in Indiana, and the Longworth-Gick (15Jf243) (Collins 1979) site in Kentucky (Jefferies 2008a:203).

Middle Archaic (6,000 to 3,000 B.C.)

A very warm and dry period known as the "Hypisthermal" or "Climatic Optimum" began across Kentucky starting at the end of the Early Archaic with the onset of the Middle Holocene Interval and extending through the Middle Archaic (Jefferies 1996:47; Muller 1986:50). Pollen samples recovered from the Old Field Swamp in southeastern Missouri show that during this period that major vegetation changes occurred that would have affected the animals and people that lived in the midcontinent (Jefferies 1996:47). These vegetation changes included grassland prairies extending well to the east, areas north of the Ohio River consisted of an oak savanna, and mixed hardwood forest were restricted to the Cumberland Plateau (Muller 1986:51).

The hunters and gatherers of the early Middle Archaic continued the highly mobile lifestyle of the Paleoindian and Early Archaic periods; however, as evidenced by the development of regional projectile point styles, they also began experiencing changes as cultures became increasingly regionalized (Cook 1976; Fowler 1959; Jefferies 2008a:203). Variation among these new regionalized cultures can be seen among their technological, settlement, subsistence, and social traits (Cook 1976; Fowler 1959; Jefferies 2008a:203). The regional differentiation in tools is due to their increased specialization that developed in order to exploit new resources in more localized areas or to more efficiently collect, process, and store their resources (Jefferies 2008a:208). Although the early part of this period is characterized by a continuation of the highly mobile lifestyle; as the period progressed there is evidence that these cultures were becoming less mobile in resource rich areas (Hensley 1994; Jefferies et. al. 2005; Jefferies 2008a:208). Unlike Early Archaic groups, which appeared to prefer sites located in upland areas, Middle Archaic groups appear to have no particular preference to location type as there are sites found in all environmental zones (Jefferies et al. 2005:16). For the late Middle

Archaic, however, as settlements were becoming more sedentary there does seem to be a close relationship between base camps and resource-rich wetland areas (Jefferies et al. 2005:16). By the late Middle Archaic period there is an increasing amount of sites containing deep middens, a high diversity of tool types, and burials which suggests this change in mobility to occupations lasting more long term (Bader and Granger 1989; Brown and Vierra 1983; Crothers and Bernbeck 2004; Janzen 1977; Jefferies et al. 2005; Jefferies 2008a:206).

The increasingly specialized Middle Archaic toolkit included many groundstone implements such as grooved axes, pitted cobbles, grinding stones (Jefferies 2008a:209). The regionalization of the toolkit can best be seen in the projectile point types of the period. For instance the projectile points commonly associated with the Middle Archaic in western Kentucky include Eva, Cypress Creek and Big Sandy; while in eastern and central Kentucky associated points include Morrow Mountain, Matanzas, and Big Sandy II (Jefferies 1996:47; Justice 1987). Other types found in the Middle Archaic toolkit are hafted chert bifaces, in the late Middle Archaic side notched bifaces, and other projectile point styles including Sykes, Godar, Stanly, and Faulkner (Fowler 1959; Jefferies 2008a:206, 208; Jefferies and Lynch 1983). The atlatl, a spear thrower which extended a hunter's range, was also introduced during the Middle Archaic (Jefferies 1996:48).

Late Archaic (3,000 to 1,000 B.C.)

The Late Archaic period began as the Middle Holocene was transitioning to the Late Holocene Interval (2,000 B.C. to present) marking an essentially modern climate and vegetation (Muller 1986:51). As the modern climate set in the oak and hickory forest of the southern uplands transitioned to pine due to the frequency of fires, and oak and hickory forests returned to the Lower Ohio River Valley as the grassland prairies retreated west (Muller 1986:51). As compared to the Middle Archaic, there is an increase in the amount of sites identified as Late Archaic (Jefferies 2008a:210). These Late Archaic sites, however, are more dispersed than seen in the Middle Archaic and their size and number suggest basic changes were occurring in these groups' social organization (Ahler 1984; Conaty 1985; Fowler 1959; Jefferies 1983; Jefferies 1996:54). These changes may be due to numerous factors including population increase, change in cultural organization, and adaptation to changing environmental conditions (Jefferies 2008a:210). The landscape use of the Late Archaic is seen as becoming increasingly reliant on interior wetlands (Jefferies et al. 2005:18). This may be due to the fact that the increasing population of the period required being located near resource-rich wetlands (Jefferies et al. 2005:18). The Late Archaic also sees a continuation and increase of the regional specialization that began in the Middle Archaic (Jefferies 2008a:209). These specializations continued to develop out of increasing dependence of locally available resources suggesting a more sedentary lifestyle during the Late Archaic (Jefferies 2008a:209). Though not completely sedentary, these cultures developed an annual settlement/subsistence cycle, moving seasonally within their areas to where the resources were most abundant at that time of year (Jefferies 2008a:210). It has been suggested that this settlement pattern was very logistical and camps were placed within range of diverse resource areas (Amick 1985:146).

The toolkit of the Late Archaic cultures were much more varied than that of the Middle Archaic, including flaked stone, groundstone, antler, and bone tools used for numerous specialized extractive, maintenance, and hunting task (Jefferies 2008a:210). This greater variation in tools is also seen in the Late Archaic assemblage collected from Meadowcroft Rockshelter in flaked stone tools and other tool types (Adavasio et al. 2001:155). It is suggested that this greater variation during the Late Archaic is due to a greater array of functional activities and techno-economic strategies involving the base camps of this period (Adavasio et al. 2001:155). Projectile points characteristic of the Late Archaic include large straight, expanding, and contracting stem points, and smaller stemmed and side notched types (Jefferies 2008a:210). Diagnostic projectile point types associated with the Late Archaic include: Motley, Merom-Trimble, Saratoga, Pickwick, Savannah River, Brewton Ear-Notched, and McWhinney (Jefferies 1996:41; Justice 1987).

Archaic Period Workshop Sites

Site 15Lo207 has been identified as an Early Archaic knapping area that is located in Logan County, in south-central Kentucky (Bradbury 2007:47). This site is situated on a flat portion of a low terrace overlooking Whippoorwill Creek, a tributary of the Red River (Bradbury 2007:47). The artifact assemblage of this site consisted of two Kirk Corner Notched projectile points, two other bifaces, biface fragments, unifaces, drills, and a large collection of lithic debitage (Bradbury 2007:49). The assemblage was produced from St. Genevieve chert which is found in gravel bars in the adjacent creek (Bradbury 2007:49). This assemblage was contained in both plowzone and sub-plowzone deposits (Bradbury 2007:49). Lithic analysis conducted on the assemblage suggests that the main activities conducted on the site were the production of middle and late stage bifaces from cores that were procured and initially reduced elsewhere (Bradbury 2007:62). The bifaces produced at the site were transported off-site for further reduction and use (Bradbury 2007:62). The small size of the site, lack of features and charcoal, and the low range of tool classes present suggest that the site was only used on a short-term basis for a specialized purpose (Bradbury 2007:63). Using Binford's terminology Bradbury (2007:63) interprets this site to be a field camp or location.

The Pierce and Fitzgerald sites are two Middle Archaic lithic workshops located in New Hampshire that appear to contain single-episode, single-component deposits (Howe 2000:1). The Pierce site is situated on a high terrace overlooking Silver Lake, in the central part of the state (Howe 2000:5). The artifact assemblage collected from this site consists of lithic debitage, cores, biface performs, bifaces, and finished tools (Howe 2000:5). Analysis of the assemblage shows that that intermediate and final stage lithic production was being undertaken at the site (Howe 2000:7). The Fitzgerald site is situated in a similar context to the Pierce site and a similar artifact assemblage was also collected (Howe 2000:16). The activities undertaken at this site are also seen to have consisted of intermediate and late stage lithic production (Howe 2000:16). The materials recovered from both of these sites appear to represent a single episode of tool-making, lasting probably no more than a day or two (Howe 2000:17). Analyses of the lithics recovered from these sites appear to show that the toolmakers at the site were not the same individuals that procured the raw materials (Howe 2000:32). This suggests that the labor tasks for these Middle Archaic groups were likely divided into two different activities: material procurement and tool making (Howe 2000:32). Another point of interests shown from the analyses of these assemblages is that they suggest point manufacture was the sole activity that took place at these workshops and that hafting and utilization of the finished projectile points were conducted elsewhere (Howe 2000:33).

The Topsy site (40Wy204) is a Late Archaic lithic manufacturing station that is located on a high narrow floodplain of the Buffalo River on the southwestern Highland Rim in Middle Tennessee (Amick 1985:134). The artifact assemblage recovered from this site, which was mostly contained in the plowzone, consisted mainly of lithic debitage and 52 diagnostic projectile points fabricated from local Fort Payne chert associated with the Late Archaic period (Amick 1985:134-135). Lithic analyses on the assemblage suggest that the main manufacturing activities that took placed on the site consisted of intermediate to late stage biface manufacture (Amick 1985:134). Analysis of lithic debris that was recovered from a gravel bar in the Buffalo River adjacent to the site suggests that this was where chert procurement and early stage biface production for the site took place (Amick 1985:134). Amick (1985:146) interprets this site as being a manufacturing station, that was exploiting the high quality Fort Payne chert available in the Buffalo River, where bifacial performs were being produced for export elsewhere, presumably the Nashville Basin. Due to these Late Archaic groups reliance on Fort Payne chert, which is sourced away from their known home base sites, which was reduced to preforms at the workshop site and transported elsewhere suggests procurement and manufacture of bifaces by a task group (Amick 1985:148).

Early Woodland (1,000-200 B.C.)

The Woodland period in the Southeast was a period of great change as the hunter-gatherer inhabitants of the area adapted new technologies that allowed them to become increasingly more sedentary which led to increased population densities. The Early Woodland across the southeast is marked by the first appearance of pottery in the archaeological record. The Early Woodland transitions into the Middle Woodland with the introduction of Hopewell artifacts into the archaeological record (Railey 1996:79). Across the state of Kentucky the beginning of the Early Woodland, as measured by the presence of pottery, varies by as much as 500 years as it first appears in eastern and central Kentucky as early as 1,000 B.C. and does not make it to western Kentucky until 500 B.C. (Applegate 2008:342; Railey 1996:81; Seeman 1986:564). The earliest pottery that has been found in the eastern and centrals parts of the state consist of a type known as Fayette Thick which are thick-walled sherds tempered with coarse grit and rocks that can have plain, cord-marked or fabric-impressed surface treatments (Railey 1996:81). These vessels share similarities with early northeast and Midwestern pottery in form and decoration (Railey 1996:81). Meanwhile, the earliest pottery that has been identified in western Kentucky is part of widespread southeastern pottery tradition which has conoidal or flowerpot-shaped vessels with narrow, flat bases and cord-marked, fabric-impressed, or cord-wrapped dowel impressions for surface treatments (Railey 1996:81).

The other material culture that is diagnostic of the Early Woodland in Kentucky consists of notched and stemmed projectile points such as Kramer, Wade, Savannah River, Gary/Cogswell, Turkeytail, Greeneville, Camp Creek, Buck Creek, and Nolichucky types (Railey 1996:81; Applegate 2008:343; Justice 1987). Another projectile point diagnostic of the period, the Adena Stemmed, is commonly found in the state after 500 B.C. (Railey 1996:81; Justice 1987). The Early Woodland period also sees a shift from the grooved axe to the ungrooved celt and a shift from chipped stone end scrapers to bone beamers (Applegate 2008:343). Some of the other ground stone artifacts found in Early Woodland contexts are consistent with those from the Late Archaic such as pestles and nutting stones, atlatl weights, hammerstones, abraders, gorgets, and tubular smoking pipes (Applegate 2008:343). Other Early Woodland artifact types include those made from bone and shell such as awls, flakers, reamers, handles, bowls, spoons, beads, and gorgets (Applegate 2008:343-344). The remains of Early Woodland subsistence show that a hunting and gathering pattern remained in effect for this period, however, it began to be supplemented by gardening (Railey 1996:84; Applegate 2008:344).

The settlement patterns at the beginning of the Early Woodland period are generally a continuation of that found in the Late Archaic, however, there is some variation found across Kentucky (Railey 1996:84). Like the Late Archaic, the beginning of this period sees large base camp sites along major river valleys which are evidenced by thick midden deposits (Railey 1996:84). In the Falls of the Ohio region of the Ohio Valley, on the western edge of the Bluegrass region, this pattern remained constant throughout the Early Woodland with many substantial base camp sites being identified. It is believed that in this region the population density remained relatively high from the Late Archaic through the Early Woodland (Railey 1996:86). Along the northern edge of the Bluegrass Region in the middle Ohio Valley, however, this pattern of large base camp sites began to dissipate as the inhabitants of the region began living in smaller, more dispersed settlements (Railey 1996:85). It is believed that this pattern of dispersal led to the first appearance of specialized ritual sites which were located away from settlements (Railey 1996:84; Seeman 1986). At the beginning of the period these ritual sites were isolated, nonmound mortuary sites which were marked by one or a few burials which often contained a few artifacts or large caches of artifacts (Railey 1996:84). The first appearance of earthen structures in the Early Woodland occurs around 500 to 400 B.C. (Railey 1996:84).

There are two cultural units that have been identified in the Early Woodland period of Kentucky including the Crab Orchard Tradition and the Adena culture. The Crab Orchard tradition spans the Early Woodland period and in Western Kentucky extends into the Middle Woodland (Railey 1996:85). Many of the Crab Orchard sites that have been identified are located in the Ohio Valley and consist of large, intensively occupied habitation sites in rich floodplain areas (Railey 1996:85; Applegate 2008:362). These sites appear to have been occupied for centuries as evidenced by the thick middens they contain (Railey 1996:85). Other site types that are associated with the Crab Orchard tradition include smaller, open habitation sites and rockshelter occupations (Applegate 2008:362). Projectile point types that are associated with Crab Orchard include Adena Stemmed, Turkey Tail, Saratoga, Dickson, Manker, Motley and Snyder (Railey 1996:85; Applegate 2008:362). The pottery types that are associated with Crab Orchard include Crab Orchard pottery, and pottery of the Alexander Series including pinched, incised, and puntated types (Railey 1996:85). Crab Orchard pottery includes cordmarked, fabric impressed, plain, cord-wrapped stick impressed, and decorated types (Applegate 2008:362).

The Adena culture extends from the Early Woodland through the Middle Woodland periods in Kentucky. The date range for Adena in Kentucky, based on chronometric dates from Adena earthworks, is between 500 B.C. and A.D. 250 (Railey 1996:91; Applegate 2008:352). Most of what is known of the Adena culture is known from their specialized ritual sites which were not where they resided. One of the reasons for this is an absence in large Adena village site which leads to the belief that Adena groups resided in small, dispersed settlements (Railey 1996:98). The Adena specialized ritual sites consists of various earthwork constructions such as conical mounds, and circular embankments (Applegate 2008:351). Another well-known trait of Adena is their mortuary practices which included log tombs, puddled clay basins, and bark-lined pits with extended burials, communal cremations, and redeposited or secondary individual cremations (Applegate 2008:351). These burials also included items such as burial furniture, red ochre, other artifacts (Applegate 2008:351). The lithic artifacts that are diagnostic of the Adena culture include reel-shaped and expanded-center bar gorgets, leaf-shaped and stemmed points (such as Cresap, Kramer, Robbins, and Adena Stemmed), tubular pipes, celts, and engraved and unengraved tablets (Railey 1996:96-97; Applegate 2008:351). The pottery that is diagnostic of the Adena culture includes Adena plain, Fayette Thick, Wright Check Stamped, and Montgomery Incised (Railey 1996:97; Applegate 2008:351). Some of the other artifact types common at Adena sites include objects manufactured from bone and shell such as awls, combs, flakers, handles, beads, spoons, and cut mandibles (Applegate 2008:351). Copper objects such as bracelets, beads, rings, pins, and head ornaments are also found on Adena sites (Applegate 2008:351).

Early Woodland Period Lithic Workshop Sites

There have been several Early Woodland period lithic workshop sites located in Harrison County, Indiana (Seeman 1975:55). These sites are located along topographic rises including point bars, natural levees and alleviated terraces which parallel the river course (Seeman 1975:50). These sites were observed as having several aspects in common with each other, one of which was that Wyandotte chert was the main raw material source that was utilized at all of these sites (Seeman 1975:55). Seeman (1975:55) considered this observation one of significance as the Late Middle and Late Archaic periods saw a reduction in the use of Wyandotte chert to make stone tools. Because of the increase in the use of Wyandotte chert that he observed in these Early Woodland site Seeman (1975:55) suggested that this could possibly serve as a horizon marker for the period in the area. Harrison County, Indiana is the location of the major source of Wyandotte chert though it can also be found in smaller amounts in Crawford County, Indiana and in Meade County, Kentucky (Morrow et. al. 1992:167 ; Seeman 1975:47; DeRegnaucourt 1998:109). Seeman (1975:55) believed that these sites represented workshops that were utilized after the chert had been gathered in the uplands as well as local drainage areas it was brought down to the Ohio River bottoms and worked into both blanks and finished artifacts. Seeman (1975:55) noted that the density of lithic artifacts at these sites was greatest at sites closest to the chert outcrops.

Seeman (1975:55) found little evidence to suggest that these sites were locations of any substantial habitation activity; the artifact assemblage from these sites consisted mostly of diagnostic Early Woodland artifacts, including Turkey Tail and Adena stemmed projectile points, and massive quantities of debitage and fire-cracked rock mostly manufactured form Wyandotte chert. The few other artifact types that were recovered by Seeman (1975:55-56) did not relate directly to workshop activities, however, did not exactly suggest permanent habitations either. These included gorgets with Adena-type drilling, stone tubular pipes, and a few occurrences of pottery with grit and chert tempering (Seeman 1975:56).

Wyandotte chert, a blue-gray high quality resource, was very important throughout prehistory and there is evidence that it was widely traded (Morrow et. al. 1992:166; Seeman 1976:47). According to Morrow et. al. (1992:168) the most notable use of blue-gray chert during the Late Archaic and Early Woodland was the manufacture of bifacially shaped cache "blade." The Turkey Tail projectile point is one such cache "blade" and are associated with Late Archaic-Early Woodland exchange and mortuary caches (Morrow et. al. 1992:166). The overwhelming use of Wyandotte chert to make Early Woodland artifacts such as Turkey Tail and Adena projectile points at these sites led Seeman (1975:55) to suggest that these sites were used for the specialized manufacturing of particular artifact classes for extra-regional distribution. Seeman (1975:56) further suggested that the occurrence of the ritual type artifacts such as the gorgets and stone pipes were further evidence for this theory. The chert-tempered pottery, which was also manufactured from Wyandotte chert, was also seen as significant and further evidence of the specialized use of this resource at these sites (Seeman 1975:56).

The Archaic in the Salt River Management Area/Falls of the Ohio Region

The Salt River management area has a total of 927 Archaic sites, the third largest in density in Kentucky, next to the Green River (1,440) and Bluegrass (923) management areas (Jefferies 2008a:214). Of the 927 Archaic sites in the Salt River Management area 187 are identified as Early Archaic, 202 as Middle Archaic, 378 as Late Archaic, and 160 listed as simply Archaic (Jefferies 2008a:214). A wide variety of site types were occupied by the inhabitants of the region during the Archaic period. Within the Salt River management area there are 583 open habitation sites without mounds, 2 open habitation with mounds, 5 rockshelters, 2 caves, 1 stone mound, 4 earth mounds, 4 workshops, 14 specialized activity sites, and 2 isolated finds (Jefferies 2008a:216). These sites within the Salt River management area are spread across a wide variety of different landform types including floodplains (251), terraces (106), hillsides (45), dissected uplands (122), and undissected uplands (63) (Jefferies 2008a:217). The data that has been collected from around the Salt River area show that in this region, throughout the Archaic period, cultural development occurred at a relatively slow and steady pace (Anslinger 2001:2). This development is seen as the result of increasingly efficient subsistence strategies, from high residential mobility in the Early Archaic, and transitioning during the Middle into the Late Archaic, to a more logistically organized foraging strategies (Anslinger 2001:2). Analysis of the stone tools recovered from sites in the area show a strong preference for local stone raw materials during the Archaic (Jefferies 2008b:31). The majority of the artifacts studied were manufactured from local Wyandotte (St. Genevieve), Muldraugh, or various Ohio River gravel cherts (Jefferies 2008b:31). Muldraugh chert can be found within the Salt River Management area in the Knobs region which lies south and east of the Falls of the Ohio River (Jefferies 2008b:31). Wyandotte (St. Genevieve) chert is sourced to the opposite side of the Ohio River in southern Indiana (Jefferies 2008b:31), and in Meade County, Kentucky (DeRegnaucourt 1998:109). The various Ohio River gravel cherts that complete the assemblages included in the study include St. Louis, Paoli, Boyle, and Brassfield which can be located on gravel bars in the Ohio River or from nearby tributaries (Jefferies 2008b:31).

Early Archaic sites in the Salt River management area are recognized by the presence of a variety of, typically well made from high quality cherts, notched projectile point types (Anslinger 2001:3). These points are usually found to have gone through many periods of resharpening and rejuvenation (Anslinger 2001:3). The typical projectile point type clusters found in the area that are associated with the Early Archaic include: Thebes, Kirk, Rice Lobed, LeCroy, and Stanley (Anslinger 2001:3; Justice 1987). The settlement pattern seen in the Early Archaic for the Salt River area is consistent with what is seen throughout the rest of the Midwest and Southeast (Anslinger 2001:4). The Early Archaic sites that have been identified in the area are typically small and are interpreted as being indicative of short-term occupation by small highly mobile groups who covered a large areas (Anslinger 2001:4). These sites generally lack any evidence of middens, pit features, burials, and plant food processing (Anslinger 2001:4). It is believed that these groups utilized a mobility strategy that involved fine-grain patch to patch movement through multiple drainage basins, procuring resources on an encounter basis (Anslinger 2001:4).

The Middle Archaic period in the Salt River area is under-represented compared to the other subperiods (Jefferies 2008a:248). In all less than 60 Middle Archaic sites have been recorded in the area (Anslinger 2001:5). Despite this fact the temporal limits for the Middle Archaic in the area have been refined to 7,950 to 4,950 B.P. (Anslinger 2001:5). Sites of the Middle Archaic that have been indentified, such as Rosenberger (15Jf18), Spadie (15Jf14), and Villier (15Jf10), are located along the Ohio River floodplain in deeply buried sandy point bar deposits; which might account for the subperiods under-representation (Jefferies 2008a:248). Another reason for the lack of identified Middle Archaic sites may be have to do with a long history of inconsistent classification (Anslinger 2001:5). There are two projectile point type clusters associated with Middle Archaic sites in the Salt River Area, Raddatz and Matanzas Cluster (Anslinger 2001:6; Justice 1987). The Middle Archaic sites in the area also contain a wide variety of other tool types as well including: groundstone artifacts such as wood working tools like adzes and axes, atlatl weights, mortar and pestles, and nutting stones; and in optimal preservation settings bone tools such as awls, antler projectile points, fish hooks, gouges, and bone pins with engraved geometric motifs (Anslinger 2001:5).

Throughout the Middle Archaic in the Salt River area a transition in settlement patterns can be seen from earlier sites appearing ephemeral, much like the Early Archaic, to later sites appearing more sedentary (Jefferies 1996:53). These later Middle Archaic sites such as Reid, Hornung, and Miller, are located in areas with easy access to at least two diverse habitats suggesting that these groups began selecting sites where they could live most of the year (Collins and Driskell 1979; Janzen 1977; Jefferies 1996:53). They are also relatively larger than earlier sites and include middens, pit features, diversified artifact assemblages, exotic materials, and burials (Anslinger 2001:5). A coarse-grained settlement pattern has been suggested for the Salt River area during the late Middle Archaic (Anslinger 2001:7). This strategy involves placement of a base-camp in a valley, which is where resource procurement would be staged and resources stored from excursions in the uplands and river areas (Anslinger 2001:7). This strategy places emphasis on resources near to the base-camp, which is why they chose residential areas close to diverse habitats (Anslinger 2001:7).

The temporal range for the Late Archaic in the Salt River area has been refined to 4,950 to 2,750 B.P. (Anslinger 2001:7). The Salt River area during the Late Archaic sees a large increase in the number of sites and components (Jefferies 2008a:250). There are many different Late Archaic site types in the area; however the most intensively occupied ones are located on floodplains, interior lowlands, and uplands (Jefferies 1996:64). The other Late Archaic site types that are found in the area include: rockshelters, small inland open sites, large riverine terrace sites, and riverine shell mounds (Granger 1988: 153). The Rosenberger, Spadie, and Villier sites noted for the Middle Archaic also contain numerous Late Archaic artifacts and features (Jefferies 2008a:250). The Rosenberger site boasts 400 features, 200 of which are burials, which are probably attributable to an intensive Late Archaic occupation (Collins and Driskell 1979:1026; Jefferies 2008a:250). Other features at the site include large and small circular pits, burned areas, debris scatters, and artifact caches (Collins and Driskell 1979:1026; Jefferies 1996:64). The burials identified at Rosenberger included associated grave goods such as bifaces, projectile points, bone fish hooks, atlatl parts, net weights, and grooved axes (Driskell 1979:773; Jefferies 1996:64). Diagnostic projectile points at Rosenberger that date to the Late Archaic included McWhinney, Merom-Trimble, Brewton, and many contracting stem types (Collins and Driskell 1979:1026; Jefferies 2008a:250). Also included in the assemblage were atlatl weights and grooved axes (Collins and Driskell 1979:1026; Jefferies 1996:64).

The Spadie site, based on the artifact assemblage which reflected a wide range of activities such as hunting, fishing, plant food processing, and stone tool manufacturing, is seen as a Late Archaic base camp site (Boisvert 1979; Jefferies 2008a:251). Late Archaic diagnostic projectile point types from this site include Lamoka and Brewerton (Boisvert 1979;Jefferies 2008a:251). Unlike the Spadie site, Villier, during the Late Archaic appears to have been a campsite that was occupied only seasonally or intermittently (Robinson and Smith 1979; Jefferies 1996:65).

A number of different settlement system patterns have been proposed for the Late Archaic of the Salt River Area. One settlement model which was provided by H.D. Winters in 1969 for the Riverton Culture in southwestern Ohio has been applied to this area (Anslinger 2001:9). This model suggest; based on site locations relative to resource zones, seasonality of fauna, and relative ratios of functional artifact classes, that there were a variety of shifting site types (Anslinger 2001:9; Winters 1969). The site types associated with this model include major bases and smaller, more specialized ancillary camps such as transient camps, hunting camps, gathering camps and bivouacs (Anslinger 2001:9; Muller 1986:70; Winters 1969). Another proposal was based on the resource potential of the area and suggests that Late Archaic groups utilized a semi-sedentary with wandering system (Anslinger 2001:8; Janzen 1977). This system, which did not incorporate seasonally shifting bases, proposed that central base camps were located at or near areas adjacent to two or more micro-environmental zones (Anslinger 2001:9; Janzen 1977). From this base camp task-specific groups would then exploit a wide range of resources by establishing small support sites (Anslinger 2001:9; Janzen 1977). A third proposed settlement model suggest seven different site types for the period differentiated by seasonal, task, and zonal resource utilization (Anslinger 2001:8; Munson 1980:678-680). The seven site types in this model include: summer shell middens, summer fishing camps, fall base camps, springsummer unknown camps, fall-winter hunting camps, fall-winter rock-shelter camps, and winter habitations (Anslinger 2001:8; Munson 1980:678-680).

The Lone Hill Phase (2,400-1,200 B.C.) has been defined for the Late/Terminal Archaic in the Salt River area (Granger 1988; Jefferies 2008a:248). This phase, like the Old Clarksville Phase of the late Middle Archaic, has been defined based on work done on sites KYANG (15Jf267), McNeely Lake (15Jf200), and Mill Creek Station (15Jf206) (Anslinger 2001:8; Granger 1988; Jefferies 2008a:248). A midden on the KYANG site was dated to the Lone Hill phase and contained 9 burials with fewer grave goods than the Old Clarksville Phase midden (Bader and Granger 1989; Jefferies 2008a:251). Diagnostic projectile points that are associated with the Lone Hill phase are typically stemmed types manufactured from high quality cherts using a reduction sequence which incorporates large bifacial performs (Anslinger 2001:8). These diagnostics include Rowlett/McWhinney, and other stemmed biface types (Granger 1988; Jefferies 2008a:251). Other artifacts that are typically recovered from Lone Hill Phase sites include: scrapers, drills, axes, atlatl weights and hooks, hammerstones, anvils, and ornaments (Granger 1988; Anslinger 2001:7).

Another possible phase for the Salt River area for the Late Archaic is based on a small number of sites which have contained points similar to ones marking the Maple Creek Phase of the southwestern Ohio which is recognized by Riverton style points and McWhinney Heavy Stemmed points (Anslinger 2001:9; Vickery 1980). This possible phase, which is not well defined, is represented by Riverton-like points in the Merom-Trimble cluster (Anslinger 2001:9; Vickery 1980). The Riverton lithic system, which lacks evidence for curation, is based on the expedient acquisition and reduction of tools (Anslinger 2001:9). The Wint site (12B95), which is in southeastern Indiana and is associated with this phase, contained what was identified as oval house structures with single post construction (Anslinger 2001:9).

The Early Woodland in the Salt River Management Area/Falls of the Ohio Region

The Salt River Management area has a total of 410 Woodland sites, the highest density of Woodland sites per square kilometer in the state of Kentucky (Applegate 2008:428). Forty-one percent of these date to the Early Woodland, also the highest percentage across the state (Applegate 2008:428). The majority of the sites identified as Woodland are characterized as open habitation without mounds and only two percent are characterized as rockshelters, earth mounds, and special activity areas (Applegate 2008:248). A large number of habitation sites have been recorded in the Fort Knox area based upon the occurrence of Adena and Turkey Tail projectile points, other expanding stemmed projectile points, or chert tempered ceramics such as 15Bu358, 15Hd229, and 15Md152 (Applegate 2008:427; O'Malley et. al. 1980).

Some of the earliest pottery identified in Kentucky was located in the Salt River area. The early pottery types that were located in the area included Chenaultt/Dexter and Arrowhead Farm types and were dated to 1606-802 B.C. (Applegate 2008:431; Mocas 1988). Some of the other Early Woodland pottery types found in the Salt River Area include types similar to the Crab Orchard series, Zorn Punctate, and Fayette Thick (Applegate 2008:431). The diagnostic projectile points that are common at Early Woodland Salt River area sites include Early Woodland Stemmed and Dickson Cluster types (Applegate 2008:431).

Research on Early Woodland lithic technologies in the Salt River area show that knappers of this period used a wide range of cherts which were locally available (Applegate 2008:433; Ray 2000). One of the most widely used cherts in the area was Muldraugh but Boyle, Harrodsburg, and Gilbert cherts were also commonly used, all of which are available in residual and alluvial sources like gravel bars (Applegate 2008:433; Ray 2000). This period also saw a rise in the use of non-local cherts such as St. Louis which points to growing socio-economic relations or trade networks beyond the local area (Applegate 2008:433; Ray 2000).

The only Woodland phase to be designated in the Salt River Management area is the Riverwood phase which comes from some of the earliest Early Woodland sites (Applegate 2008:431). The beginnings of this phase can actually be dated back to the Terminal Archaic with dates of around 1200 B.C. and extending to 300 B.C. (Applegate 2008:431). This phase has not been well defined in the archaeological literature but the artifacts that are usually associated with Riverwood include thick grit tempered pottery, and projectile point types including Adena Stemmed, Cogswell-like, and other stemmed points (Applegate 2008:431).

General Trends of the Archaic and Early Woodland Periods

The time period encompassing the periods of the Archaic and Early Woodland can be generally characterized as a time of gradual transition from highly mobile groups of hunters and gatherers to semi-sedentary groups of logistical collectors. The Early Archaic period is inhabited by hunters and gatherers who mostly continued the mobility patterns of the Paleoindians who came before them. These groups used a wide variety of raw materials to make stone tools which were highly curated and used for a long period of time. As the Middle Archaic period progresses groups of hunters and gatherers start to become more regionalized as they begin to adapt to their own particular environments. This regionalization is best seen in the different projectile point styles that develop in different areas. The toolkit of the Middle Archaic peoples also become increasingly varied with the addition of ground stone and bone tools. Throughout the Middle

Archaic these stone tools become increasingly made with more local raw materials which also suggest that these groups are procuring materials from the smaller areas to which they were adapting. Although the Middle Archaic peoples mostly continued the highly mobile lifestyles of their predecessors there is evidence for a more sedentary lifestyle in resource-rich areas; while in the Late Middle Archaic there begins to be a trend of base camp sites located in wetland areas. The Late Archaic period continues this trend of an increasing sedentary lifestyle with mostly permanent base camps being situated in areas with access to multiple environmental zones. Logistical collectors would then set out from these semi-sedentary base camp sites in order to collect and bring back raw materials from these different environmental zones. The toolkits of the Late Archaic peoples continue the trends of increasing regionalization and variety made from local raw materials. During the Early Woodland period there is continued use of base camp sites located near multiple environmental zones. The addition of new technologies during this period such as pottery and horticulture, however, suggest that these groups were more sedentary than those of the Late Archaic. During the Late Early Woodland there begins to be a trend of fewer large base camps sites and smaller, more dispersed settlements begin to appear. Like the Late Archaic toolkits, those of the Early Woodland are regionalized with much variation and manufactured mostly from local raw materials.

Expectations for 15Md158

In light of the materials that have been reviewed of the Late Archaic and Early Woodland periods there are certain expectations that should be met by 15Md158 as a site possibly associated with these time periods. Residential base camp sites of this period are known to contain a wide variety of artifacts and deep midden deposits and burials. None of these expectations have been met by this site according to the previous investigations which have been undertaken. Because of the fact that mainly lithic debitage and biface tools have been recovered from this site it has been classified as a lithic manufacturing site. Sites of this type during the Late Archaic and Early Woodland period are known to contain assemblages consisting mostly of intermediate to late stage biface manufacture. Furthermore, lithic manufacturing sites from these time periods tended to contain mostly local raw materials from which stone tools were made.

III. EXCAVATIONS

Excavation Methods

The purpose of this study is to evaluate aspects of a Late Archaic lithic workshop at 15Md158. This study will concentrate on the areas of the site with the highest concentration of lithic artifacts. Prior to the initiation of fieldwork an artifact density map (Figure 3.1) was created based on the Phase I intensive survey that was conducted by Brockington and Associates. This map identified that the Northwest quadrant of the site contained an extremely high concentration of lithics, with one shovel test excavation recovering more than 500 artifacts (Figure 3.1). Along with this area of densely deposited artifacts the map also revealed four other distinct areas across the site's Northwest quadrant that held similarly dense deposits of artifacts (Figure 3.1). The recovery depth for artifacts in these portions of the site was up to one and a half meters below the ground surface. The artifact density, depth of depositions, and the fact that the site is located in a depositional environment suggests the possibility of stratigraphical deposition in these areas of the site. This study will investigate the possibility of temporal changes in the site by examining the five locations of the site that were shown to contain extremely dense deposits of lithic artifacts. The temporal changes that this study will look for include changes in the use of the site through time, as well as changes in lithic procurement strategies for the site through time. This study will also look to better understand the nature of the site as a whole by examining the five areas of the site containing dense lithic deposits to see

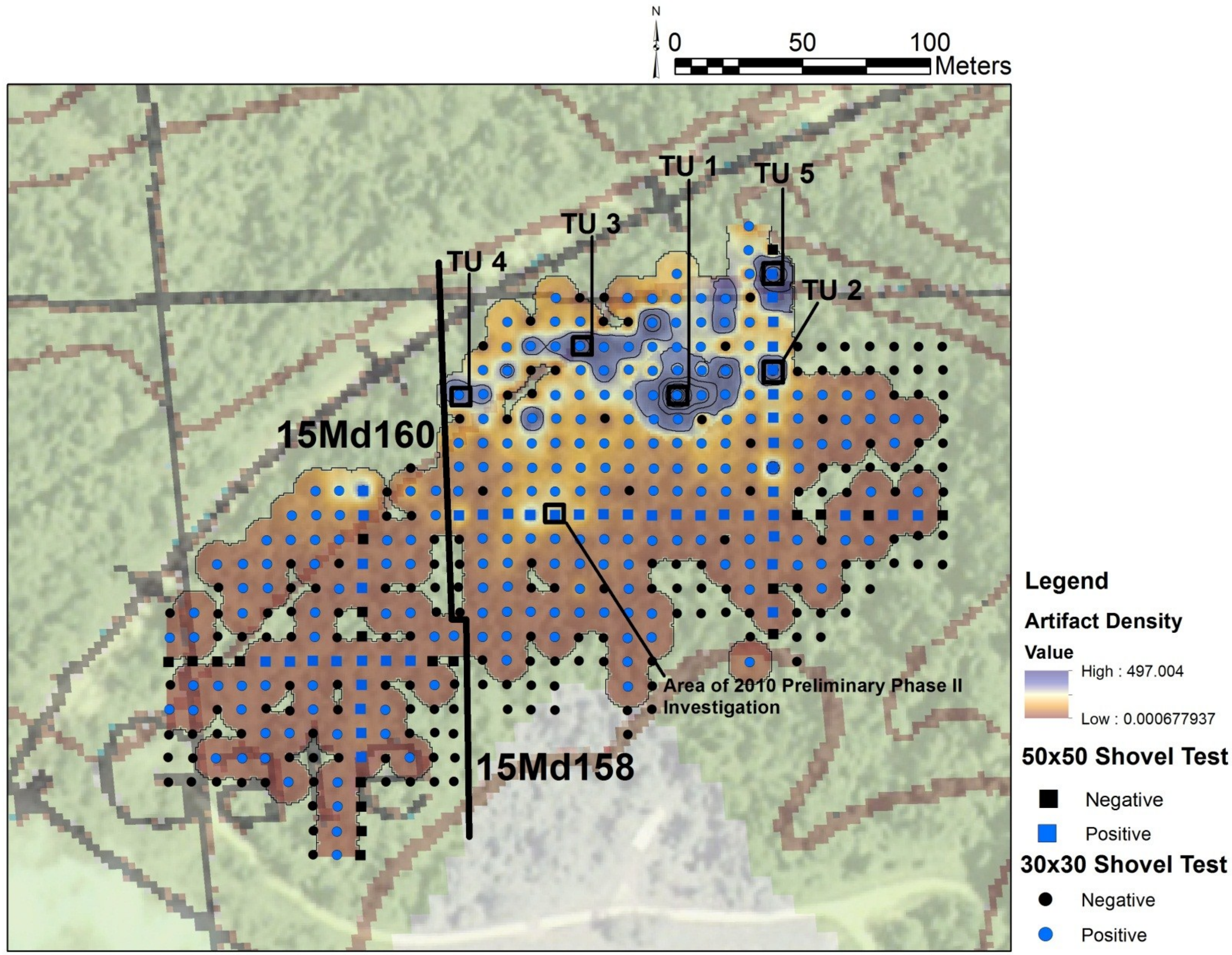

Figure 3.1. Artifact density map of 15Md158 and 15Md160 with location of excavated Test Units.

if they were used for different stages of the lithic reduction process; as well as try to lock down a more concrete chronology for the site.

These goals were met by excavating a series of test units at the five areas of the site's northwest quadrant, where the highest concentration of artifacts and the deepest deposits of the site were identified on the basis of the artifact density map (Figure 3.1). In the excavation of these five test units, close attention was paid to the stratigraphical sequence of the artifact assemblage. This was accomplished by excavating the test units in five centimeter arbitrary levels in order to allow for a tight control of the vertical distribution of the collected artifact assemblage. Five centimeter levels will make it possible to examine the vertical distribution of debitage in order to determine if different stages of the lithic reduction process can be identified that might suggests a change of use in the site through time. Furthermore, by excavating at five separate and distinct areas of the site it will be possible to examine the horizontal distribution of the lithic assemblage to determine if different stages of lithic reduction process can be identified that might suggest areas of differential use across the site.

Excavations for this project took place from June to September of 2011 and consisted of a series of five one by one meter test units positioned in the five aforementioned areas of the site in the northwest quadrant of 15Md158 (Figure 3.1). In beginning the excavation of each test unit the shovel test centered in one of the five areas designated for examination was relocated. Upon identification of the proper shovel test, the test units were arbitrarily situated adjacent to the previously excavated shovel tests according to which side of the shovel test appeared most suitable for excavation. Each of the five test units was also oriented in a north-south direction. A separate datum was set for each of the five test units and was placed ten centimeters above the ground surface at the highest corner of the test unit. Each test unit was then excavated in five centimeter arbitrary levels in order to better understand the sequence of the artifact assemblage in relation to the sites natural stratigraphy. All excavated soils were screened through ¼-inch hardware cloth, and all identified or suspected cultural materials were collected. Time and budget constraints restricted the use of any smaller scale sampling during this project. When archaeological features were identified during excavation, they were isolated from the remainder of the test unit, bisected when possible, and excavated in five-centimeter levels corresponding to the levels of the test unit as a whole in order to understand the nature of the feature. Excavation of each of the test units continued no less than 15 centimeters into identified sterile subsoil. Following the excavation of each unit, an auger test was excavated to ensure that no deeply buried cultural materials existed below the sterile base of the unit.

Excavation Results

In the following discussion of the results from the five test units each unit will be divided into the natural stratigraphy that was revealed during excavation in lieu of discussing each of the five centimeter levels individually. Individual discussion of each five centimeter level is deemed unnecessary as there were only slight to no changes in soil matrix and other inclusions from one arbitrary level to the next.

Test Unit 1

Test unit one was placed adjacent to the shovel test from the Phase I intensive investigation that contained the highest density of lithic artifacts at grid location N550 E460. The test unit was placed adjacent to the East side of the associated shovel test on a slight slope to the north-northwest. There was a small tree located in the central-south portion of the unit. The area surrounding the test unit also had several tall, old-growth hardwood trees as well as several smaller trees and other forest understory. The datum for this test unit was placed at the southwest corner ten centimeters above the ground surface. Test unit one was excavated from ten to 110 centimeters below datum and consisted of 19 five centimeter levels. Four distinct stratigraphic zones were revealed by the excavation of this test unit. This test unit contained one of the two features (Feature 1) that was identified during these excavations. Test Unit one contained a total of 2,991 artifacts which included six bifaces, two cores, 2,852 pieces of debitage (one which was utilized), 39 pieces of fire-cracked rock, and 92 whole, broken, and/or burned river cobbles. A photograph and profile drawings of Test Unit 1 are found in Figures 3.2, 3.3, 3.4, 3.5, and 3.6.

Figure 3.2. Test Unit 1 – Completed.

Figure 3.3. Test Unit 1 – North Profile.

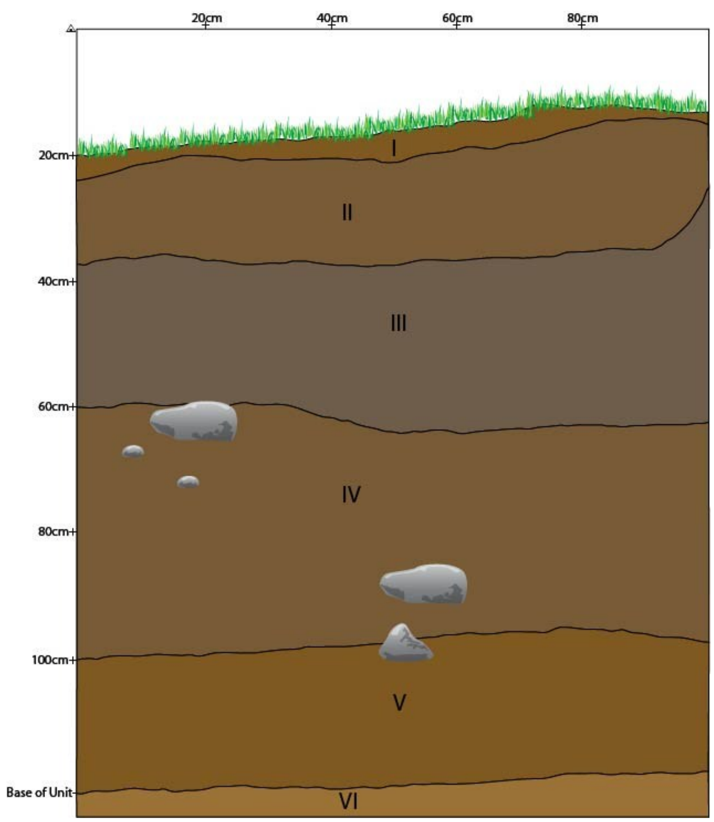

Figure 3.4. Test Unit 1 – North Profile Diagram (Key in Table 3.1).

Figure 3.5. Test Unit 1 – East Profile.

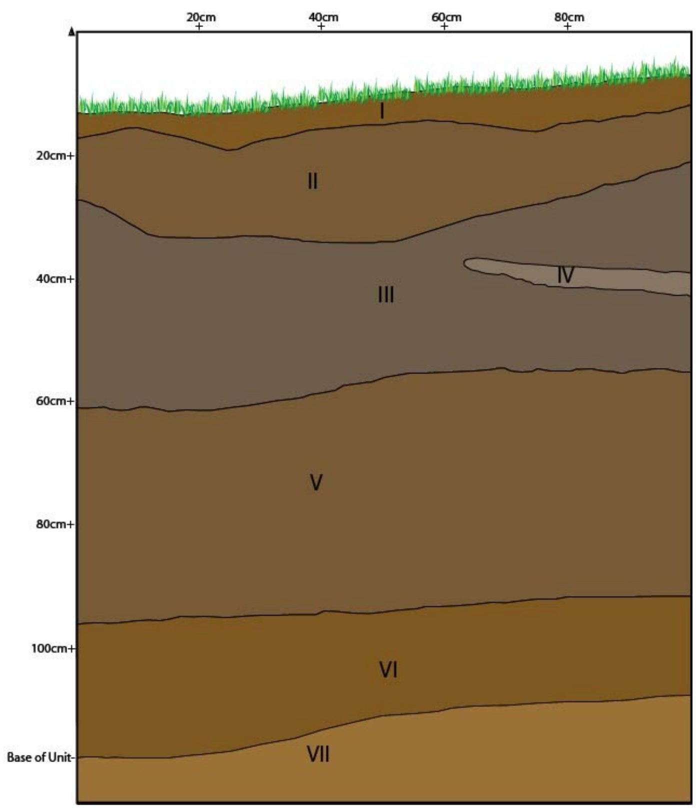

Figure 3.6. Test Unit 1 - East Profile Diagram (Key in Table 3.1).

Table 3.1. Key for Figures 3.4 and 3.6.

Figure 3.4	
I	Humic Layer - 10YR4/6 sandy loam with heavy root mat
II	10YR4/4 dark yellowish brown slightly mottled with 10YR4/6 dark yellowish brown sandy loam with moderate roots
III	10YR4/3 brown slightly mottled with a lighter color sand, slightly compact with moderate roots
IV	10YR4/4 dark yellowish brown with increased mottling with depth with 10YR4/6 dark yellowish brown sand, slightly compact
V	10YR4/6 dark yellowish brown sandy clay
VI	10YR5/6 yellowish brown sandy clay
Figure 3.6	
I	Humic layer - 10YR4/6 dark yellowish brown sandy loam with heavy root mat
II	10YR4/4 dark yellowish brown slightly mottled with 10YR4/6 dark yellowish brown sandy loam with moderate roots
III	10YR4/3 brown slightly mottled with a lighter color sand, slightly compact with moderate roots
IV	10YR5/2 grayish brown mottled with 10YR4/4 dark yellowish brown sand, slightly compact
V	10YR4/4 dark yellowish brown with increased mottling with depth with 10YR4/6 dark yellowish brown sand, slightly compact
VI	10YR4/6 dark yellowish brown sandy clay
VII	10YR5/6 yellowish brown sandy clay

Stratigraphic Zone I

Stratigraphic zone I consisted of the humic O soil horizon and the underlying A soil horizon and extended from ten to 25 centimeters below datum which included levels one through three. The humic layer of this test unit consisted of a 10YR4/6 dark yellowish brown sandy loam which contained a heavy root mat and a moderate amount of pebbles and other rocks. Underlying the humic layer, the A horizon was a 10YR4/4 dark yellowish brown slightly mottled with a 10YR4/6 dark yellowish brown sandy loam that contained a large amount of roots, pebbles, and other rocks. This zone contained a total of 225 artifacts which included one complete biface, three biface fragments, 209 pieces of lithic debitage, and 12 pieces of fire-cracked rock. The complete biface is a stemmed projectile point most closely resembling a

McWhinney Heavy Stemmed (Justice 1987:138) which dates to the Late Archaic period in the Ohio River Valley. One of the biface fragments includes a side-notched base which also resembles a McWhinney Heavy Stemmed or possibly a Trimble Side-Notched (Justice 1987:130) which is diagnostic of the Riverton culture of the Ohio River Valley which also dates to the Late Archaic. All four of the bifaces from this zone were manufactured from Wyandotte chert. The debitage collected from this zone consisted mostly of Wyandotte chert but also included Boyle chert, Harrodsburg chert, Muldraugh chert, Sonora chert, and unidentified cherts.

Stratigraphic Zone II

Stratigraphic zone II extended from 35 to 60 centimeters below datum which included levels four through eight. This zone consisted of a slightly compact sand that was a 10YR4/3 brown in color. This zone had a moderate amount of roots, a small amount of pebbles, and a small amount of whole, broken and/or burned river cobbles which increased with depth. This zone contained a total of 912 artifacts which included 902 pieces of debitage (one which was utilized), and ten pieces of fire-cracked rock. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Lost River, Muldraugh, Sonora, St. Louis Green, and unidentified cherts.

Stratigraphic Zone III

Stratigraphic Zone III extended from 60 to 100 centimeters below datum and included levels nine through 16. Like the previous zone this one also consisted of a slightly compact sand, however, at this depth it was a 10YR4/4 dark yellowish brown in color that with depth became increasingly mottled with 10YR4/6 dark yellowish brown. This zone contained fewer roots than the previous zones and contained a small amount of pebbles. This zone saw an increase in the amount of whole, broken, and/or burned river cobbles that was being observed during excavation. This increase appeared to be in association with an increase in the amount of debitage that was being collected. Due to this possible association between the cobbles, fire-cracked rock, and debitage a decision was made to also begin collecting these cobbles that were being uncovered.

Stratigraphic Zone III contained the first feature (Feature 1) that was identified during these excavations. Feature one consisted of a conglomeration of rocks, some which were heavily burned; cobbles, a Wyandotte chert core, and a large Preform 2 biface manufactured from Muldraugh chert. Feature one was located at the base of level 12 (70 centimeters below datum) in the northwest corner of Test Unit 1. No soil matrix change was identified in association with this feature, therefore no bisection of this feature took place and the artifacts were collected and isolated from the rest of the unit's artifacts. Thirty-seven pieces of debitage were also collected with this feature which consisted of Wyandotte, Harrodsburg, Muldraugh, and unidentified cherts.

In total Zone III contained a total of 1,834 artifacts which included one whole Preform 2 biface manufactured from Muldraugh chert, one biface fragment manufactured from Paoli chert, two cores of Wyandotte chert, 1,736 pieces of debitage, 17 pieces of fire-cracked rock, and 77 pieces of whole, broken, and/or burned river cobbles. The debitage that was collected from this zone consisted mostly of Wyandotte chert but also included Boyle, Harrodsburg, Lost River, Muldraugh, Sonora, St. Louis Green, and unidentified cherts.

Stratigraphic Zone IV

Stratigraphic Zone IV extended from 100 to 120 centimeters below datum and included levels 17 through 19. This zone consisted of a 10YR4/6 dark yellowish brown sandy clay that contained very few roots. The top of this zone contained a moderate amount of pebbles;

however these were reduced with depth. Only level 17 of this zone contained any artifacts while levels 18 and 19 were sterile. Level 17 contained six pieces of debitage which consisted of Wyandotte and Harrodsburg cherts.

At the sterile base of the unit, Level 19, an auger test was excavated to ensure that there were no deeply buried cultural materials. This test was excavated from 120 to 271 centimeters below datum. This test revealed a 10YR4/6 dark yellowish brown sandy clay with a few pebbles to a depth of 202 centimeters below datum. At this point the soil transitioned into a 10YR5/6 yellowish brown moist sand before returning into a 10YR4/6 dark yellowish brown sandy clay at the termination of the auger test. No cultural materials were uncovered by this auger test.

Test Unit 2

Test Unit two was placed approximately 5 centimeters north of the shovel test at grid location N560 E500. This location was on a ridge-like rise that runs northeast to Southwest. There was a large tree at the Southeast corner of this test unit as well as several smaller ones along with other forest understory. The datum for Test Unit two was set 10 centimeters above the Southeast corner. This test unit was excavated from 10 to 120 centimeters below datum and consisted of 20 arbitrary levels. Four distinct stratigraphic zones were revealed by the excavation of this test unit. The soils uncovered in Test Unit two consisted of loamy sand, which at times was a very fine loamy sand. Test Unit two contained a total of 2,483 artifacts which included eight bifaces, three cores, 2,205 pieces of debitage (two which were utilized), 71 pieces of fire-cracked rock, five pottery sherds, two pieces of calcined bone, and 195 pieces of whole, broken, and/or burned river cobbles. A photograph and profile drawings of Test Unit 2 are found in Figures 3.7, 3.8, 3.9, 3.10, and 3.11.

Figure 3.7. Test Unit 2 – Completed.

Figure 3.8. Test Unit 2 – North Profile.

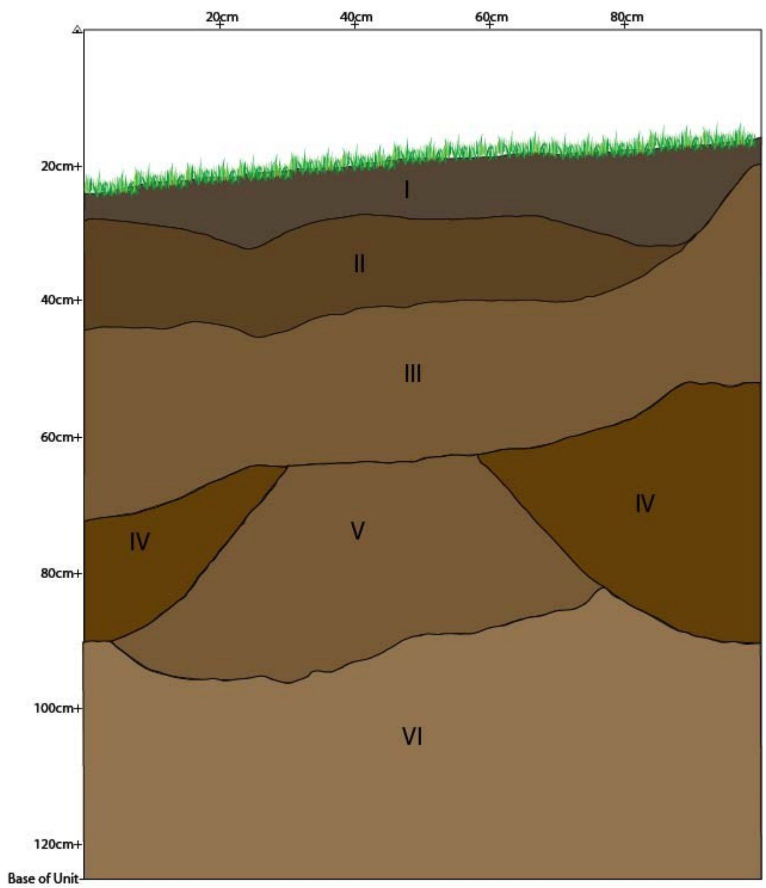

Figure 3.9. Test Unit 2 – North Profile Diagram (Key in Table 3.2).

Figure 3.10. Test Unit 2 – West Profile.

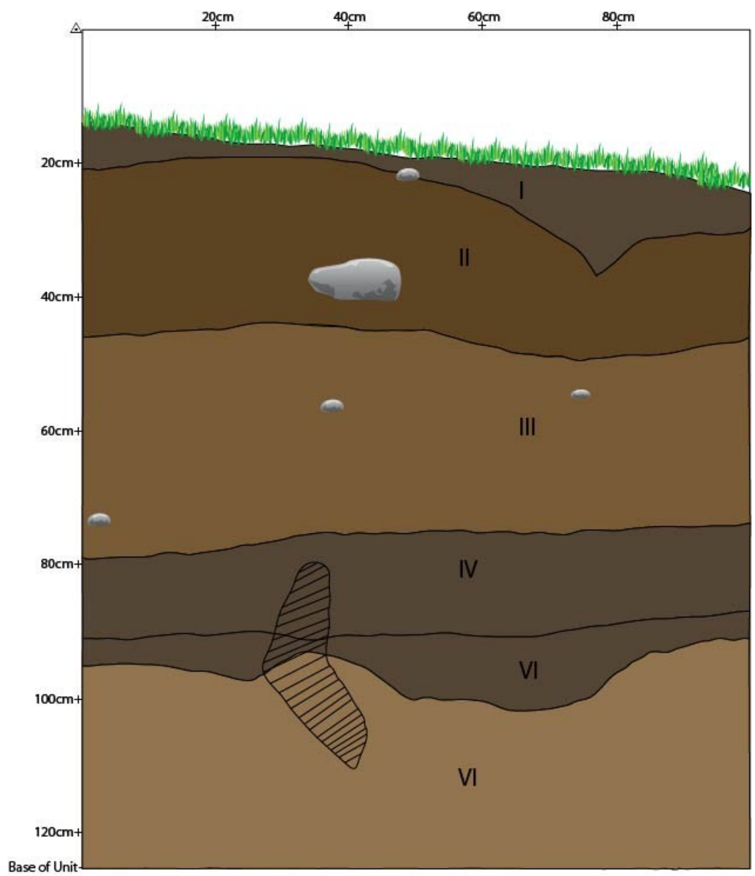

Figure 3.11. Test Unit 2 – West Profile Diagram (Key in Table 3.2).

Table 3.2. Key for Figures 3.9 and 3.11.

Figure 3.9. Test Unit 2 – North Profile Diagram	
I	Humic Layer - 10YR3/2 very dark grayish brown very fine sand with a heavy root mat
II	10YR3/3 dark brown slightly mottled with a lighter color very fine sand
III	10YR4/4 dark yellowish brown very fine sand
IV	10YR3/6 dark yellowish brown very fine sand
V	10YR4/4 dark yellowish brown slightly mottled with 10YR6/3 pale brown very fine sand
VI	10YR5/4 yellowish brown mottled with 10YR5/6 yellowish brown and 10YR6/3 pale brown clayey sand
Figure 3.11. Test Unit 2 – West Profile Diagram	
I	Humic Layer - 10YR3/2 very fine sand with a heavy root mat
II	10YR3/3 dark brown with slight mottling with lighter color very fine sand
III	10YR4/4 dark yellowish brown very fine sand
IV	10YR4/3 brown with slight mottling with lighter color very fine sand
V	10YR3/3 dark brown very fine sand
VI	Transition between V and VII
VII	10YR5/4 yellowish brown mottled with 10YR5/6 yellowish brown and 10YR6/3 pale brown clayey sand
cross-hatch	Large root disturbance

Stratigraphic Zone I

Stratigraphic zone I consisted of the humic O soil horizon and the underlying A soil horizon and extended from ten to 40 centimeters below datum which included levels one through four. The humic layer of this test unit consisted of a 10YR3/3 dark brown very fine loamy sand which contained a heavy root mat and a moderate amount of pebbles and other rocks. The A horizon was a 10YR3/3 dark brown slightly mottled with a lighter color very fine loamy sand that contained a large amount of roots, pebbles, and other rocks. This zone contained a total of 528 artifacts which included one biface blank, two cores, 406 pieces of lithic debitage, 14 pieces of fire-cracked rock, and 49 whole, broken, and/or burned river cobbles. This total also includes one small grit-tempered pottery sherd, which is a fragment with the interior side of the sherd missing. The exterior side is decorated with two parallel incised marks. The total also includes one small fragment of calcined bone. The biface blank was manufactured from Harrodsburg chert, while the two cores were of Muldraugh and Wyandotte cherts. The debitage from this zone was manufactured from Boyle, Harrodsburg, Muldraugh, Wyandotte, and unidentified cherts.

Stratigraphic Zone II

Stratigraphic zone II extended from 40 to 65 centimeters below datum which included levels five through nine. This zone consisted of a very fine loamy sand that was 10YR4/4 dark yellowish brown in color and had a moderate amount of roots and pebbles. Zone II contained a total of 914 artifacts which included four bifaces, 829 pieces of debitage (one which was utilized), 33 pieces of fire-cracked rock, and 45 pieces of whole, broken, and/or burned river cobbles. This total also includes three small sherds of pottery which were all grit-tempered with no evident surface treatment. The four bifaces that were collected from this zone included one fragment manufactured from Boyle chert, one complete biface manufactured from Wyandotte chert, one biface that is complete except for the base/stem that is manufactured from thermally altered Boyle chert, and one fragment which consists of a side-notched base that is manufactured from Wyandotte chert. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, Sonora, St. Louis Green, Paoli, and unidentified cherts.

Stratigraphic Zone III

Stratigraphic zone III extended from 65 to 95 centimeters below datum which included levels 10 through 15. This zone consisted of a very fine loamy sand which had a color that ranged from 10YR4/3 brown to 10YR4/4 dark yellowish brown at the top and transitioned to 10YR3/3 dark brown and 10YR3/6 dark yellowish brown near the bottom of the zone. This zone had a moderate amount of roots and pebbles. Zone II contained a total of 978 artifacts which included three bifaces, one core, 848 pieces of debitage, 21 pieces of fire-cracked rock, and 103 pieces of whole, broken, and/or burned river cobbles. This total also includes one grit-tempered pottery sherd which was possibly cord-marked and one small fragment of calcined bone. The three bifaces that were collected from this zone were all manufactured from Wyandotte chert and include one finished biface that is complete except for the point of the tip. This mostly complete biface is a stemmed projectile point most closely resembling an Adena Stemmed (Justice 1987:191) which is diagnostic of the Adena culture and dates to the Early Woodland period. The second biface that was collected from this zone is a fragment consisting of the base of a stemmed projectile point. This biface also most closely resembles an Adena Stemmed. The third biface from this zone is a large oval shaped scraper tool. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, Sonora, St. Louis Green, and unidentified cherts.

Stratigraphic Zone IV

Stratigraphic Zone IV extended from 95 to 120 centimeters below datum and included levels 16 through 20. This zone consisted of a 10YR5/4 yellowish brown clayey sand that was mottled with areas of 10YR5/6 yellowish brown and 10YR6/3 pale brown that contained very few roots. The top of this zone contained a moderate amount of pebbles; however these were reduced with depth. Only levels 16 and 17 of this zone contained any artifacts while levels 18 through 20 were sterile. Levels 16 and 17 contained 37 pieces of debitage which consisted of Boyle, Harrodsburg, Muldraugh, and Wyandotte cherts; as well 3 pieces of fire-cracked rock.

At the sterile base of the unit, Level 20, an auger test was excavated to ensure that there were no deeply buried cultural materials. This test was excavated from 120 to 272 centimeters below datum. This test revealed a 10YR4/6 dark yellowish brown sandy clay with a few pebbles to a depth of 174 centimeters below datum. At this point the soil transitioned into a 10YR4/4 dark yellowish brown moist sand before returning into a 10YR4/6 dark yellowish brown sandy clay at 236 centimeters below datum until the termination of the auger test. No cultural materials were uncovered by this auger test.

Test Unit 3

Test Unit three was placed approximately 10 centimeters northeast of the shovel test at grid location N570 E420. The unit is placed on a small rise, approximately 20 meters south of the edge of the terrace on which 15Md158 is situated. The area around the unit has several low spots where water collects. The vegetation around the unit consists of large hardwoods and forest understory. The datum for Test Unit three was set 10 centimeters above the Northeast corner. This test unit was excavated from 10 to 120 centimeters below datum and consisted of 20 arbitrary levels. Three distinct stratigraphic zones were revealed by the excavation of this test unit. This test unit contained the only other feature (Feature 2) that was identified during these excavations. This feature was a "lithic midden" that extended from the second stratigraphic zone through the third. Test Unit three contained a total of 4,552 artifacts which included six bifaces, three cores, 4,209 pieces of debitage (eight which were utilized), 90 pieces of fire-cracked rock, and 236 whole, broken, and/or burned river cobbles. A photograph and profile drawings of Test Unit 3 are found in Figures 3.12, 3.13, 3.14, 3.15 and 3.16

Figure 3.12. Test Unit 3 – Completed.

Figure 3.13. Test Unit 3 – South Profile.

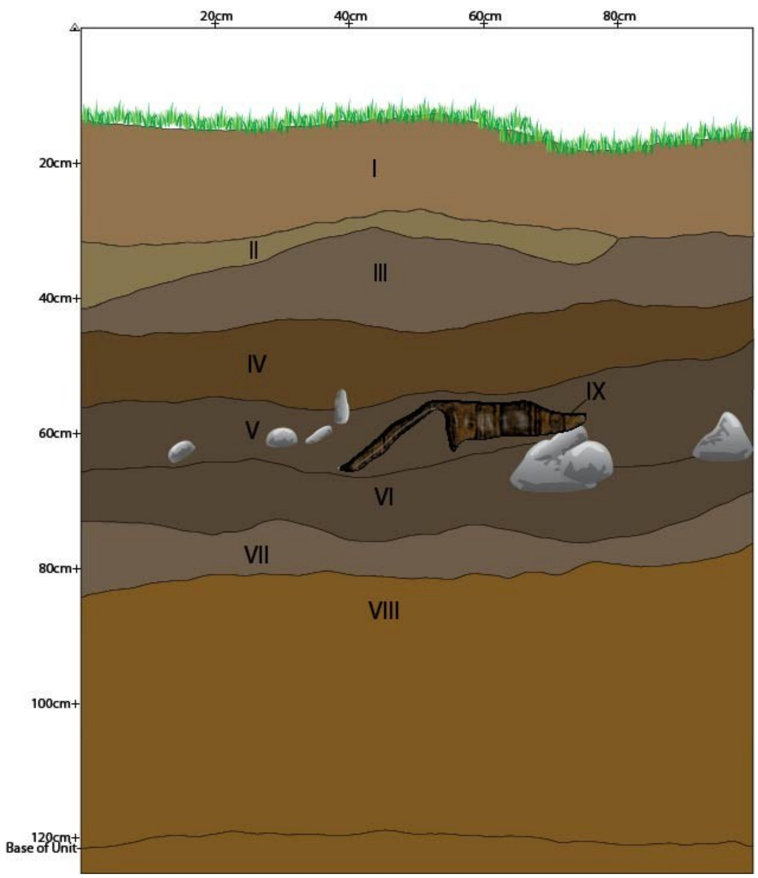

Figure 3.14. Test Unit 3 – South Profile Diagram (Key in Table 3.3).

Figure 3.15. Test Unit 3 – West Profile.

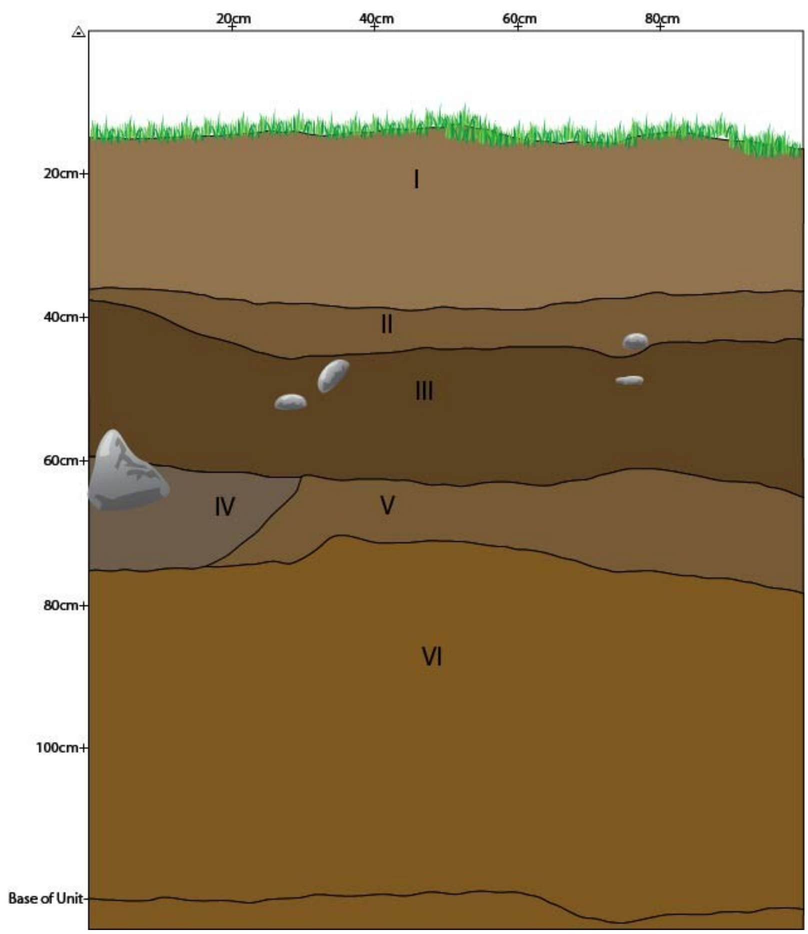

Figure 3.16. Test Unit 3 – West Profile Diagram (Key in Table 3.3).

Table 3.3. Key for Figures 3.14 and 3.16.

Figure 3.14. Test Unit 3 – South Profile Diagram	
I	Humic Layer - Between 10YR5/3 brown and 10YR5/4 yellowish brown silt loam with a little sand with heavy root mat
II	Same as I mottled with 10YR6/6 brownish yellow
III	10YR4/3 brown sandy silt loam with moderate roots
IV	Feature 2 - 10YR3/4 dark yellowish brown mottled with 10YR5/2 grayish brown compact sandy loam with a few charcoal flecks
V	Feature 2 - Between 10YR3/3 dark brown and 10YR3/4 dark yellowish brown compact sandy loam with thick lens of debitage and whole and broken cobbles
VI	10YR3/3 dark brown compact sandy loam with charcoal lens
VII	Feature 2 - Transition between V and VII, very mottled sandy loam with clay
VIII	10YR4/6 dark yellowish brown sandy clay
IX	Thick lens of debitage and cobbles
Figure 3.16. Test Unit 3 – West Profile Diagram	
I	Humic Layer - Between 10YR5/3 brown and 10YR5/4 yellowish brown silt loam with a little sand with heavy root mat
II	10YR4/4 dark yellowish brown slightly mottled with 10YR6/6 brownish yellow sandy loam
III	10YR3/4 dark yellowish brown mottled with 10YR5/2 grayish brown compact sandy loam with a few charcoal flecks
IV	Feature 2 - 10YR3/3 dark brown compact sandy loam with charcoal lens
V	Transition between III and VI
VI	10YR4/6 dark yellowish brown sandy clay

Stratigraphic Zone I

Stratigraphic zone I consisted of the humic O soil horizon and the underlying A soil horizon and extended from ten to 45 centimeters below datum which included levels one through five. The humic layer of this test unit consisted of a silt loam with a little sand that was between 10YR5/3 brown and 10YR5/4 yellowish brown in color which contained a heavy root mat and a moderate amount of pebbles and other rocks. The A horizon was a 10YR5/4 yellowish brown silt loam with sand that transitioned into a 10YR4/3 silt loam with sand at 30 centimeters below datum. This layer contained a large amount of roots, pebbles, and other rocks. This zone contained a total of 823 artifacts which included 778 pieces of lithic debitage (one which was utilized), 28 pieces of fire-cracked rock, and 17 whole, broken, and/or burned river cobbles. The debitage from this zone was manufactured mostly from Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, Sonora, and unidentified cherts.

Stratigraphic Zone II

Stratigraphic zone II extended from 45 to 75 centimeters below datum which included levels six through 11. This zone consisted of a compact sandy loam that was 10YR3/4 dark yellowish brown slightly mottled with 10YR5/2 grayish brown in color with a few charcoal specks and had a moderate amount of roots and pebbles. Levels six and seven of this zone saw an increase in artifact density compared to the previous levels of this unit. This increase, however, was minimal compared to the increase in artifact density that was seen in level eight; where Level seven contained 312 artifacts and Level eight contained 724 artifacts. The large artifact density that was seen in level eight continued through level 10 and it was noted that, by far, the majority of the artifacts from these levels were being recovered from the southern portion of the unit, particularly the southwest corner. No soil matrix change was observed in association with this increase in artifacts until the base of level 10/the top of level 11. At this point a darker soil matrix was observed in the southern portion of the unit that consisted of a compact sandy loam that was 10YR3/3 dark brown mottled with 10YR3/4 dark yellowish brown in color that contained charcoal stains and streaks. The base of level 10/top of level 11 contained a large amount of whole, broken, and/or burned river cobbles. At this point in the excavation of Test Unit two the southern portion of the unit was deemed Feature two.

Zone II contained a total of 567 artifacts which included one biface, one core, 502 pieces of debitage (two which were utilized), 26 pieces of fire-cracked rock, and 33 pieces of whole, broken, and/or burned river cobbles. This total, however, only includes the artifacts from levels six, seven, and 11. This is because the artifact totals from levels eight, nine, and ten, which were not excavated separately from Feature two, were added to the artifact totals for Feature two. These levels, which saw a large increase in artifact density, were not excavated separately, with the feature isolated, due to the fact that the soil matrix of these levels remained consistent throughout the unit. It was noted for all of these levels, however, that the majority of artifacts were being recovered from the southern portion of the unit. It was not until the analysis stage of this project that the decision was made to include the artifacts from these three un-separated levels to the Feature two artifacts due to the fact that the number of artifacts recovered from these levels were consistent with those recovered from the isolated portion of the feature and because of where the majority of these artifacts were recovered from.

The biface that was collected from this zone was a fragment which included the tip and was manufactured from an unidentified chert that was likely thermally altered. The core was manufactured from Wyandotte chert. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, Paoli, and unidentified cherts.

Feature 2

Feature two was first identified in stratigraphic zone II of Unit two and it extended from 50 to 85 centimeters below datum which included levels eight through 14. Only the northern portion of this feature was excavated as it appears to continue on past the southern wall of the test unit. Because the feature extended past the southern wall of the test unit, this was chosen as the bisection point of the feature. Levels eight through ten of the feature were not isolated during excavation because the soil matrix was consistent with the remainder of the test unit, however, are included as part of the feature due to their artifact density and because the majority of them were recovered from the southern half of the test unit, where the feature was located. Levels eight through ten, which were consistent with Stratigraphic zone II consisted of a compact sandy loam that was 10YR3/4 dark yellowish brown slightly mottled with 10YR5/2 grayish brown in color with a few charcoal specks and had a moderate amount of roots and pebbles. It was not until the base of level ten (Figure 3.18), at 60 centimeters below datum, that a soil matrix change was evident in the southern portion of the unit, at which point Feature two was officially designated. The southern portion of the base of Level ten consisted of a 10YR3/3 dark brown compact sandy loam with several areas of charcoal staining. Inside of this soil matrix change at the base of level ten was a large number of whole, broken, and/or burned river cobbles. These levels, eight through ten, contained a lens of artifacts that held an extremely large amount of debitage that was deposited so densely that it resembled a shell midden; hence this feature is being termed a "lithic midden." A large amount of whole, broken, and/or burned river cobbles was also associated with these levels.

Figure 3.17. Test Unit 3 – Level 9 – Feature 2.

Figure 3.18. Test Unit 3 – Level 10 – Feature 2.

Figure 3.19. Test Unit 3 – Level 11 – Feature 2.

Below level ten (Figure 3.19), at 65 to 70 centimeters below datum, was a charcoal lens with a 10YR3/3 dark brown compact sandy loam soil matrix that held a less dense amount of debitage than the previous levels. Three charcoal samples were extracted from this charcoal lens in hopes of obtaining a radiometric date for the feature. By the base of Level 12, at 70 centimeters below datum, the charcoal lens had ceased and the soil matrix of Feature two consisted of a 10YR4/2 dark grayish brown mottled with 10YR4/6 dark yellowish brown silt loam that was much less compact than the previous levels. Levels 13 and 14 of Feature two contained soils consistent with that found at the base of Level 12 with the only difference being that it became progressively smaller with depth. Within the first few centimeters of Level 15 no evidence of Feature 2 remained. In total Feature 2 contained a total of 3,104 artifacts which included five bifaces, two cores, 2,875 pieces of debitage (five which were utilized), 32 pieces of fire-cracked rock, and 190 whole, broken, and/or burned river cobbles. The five bifaces that were collected from this feature were all manufactured from Wyandotte chert and included four fragments including the tip and two other biface fragments. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, St. Louis Green, Paoli, and unidentified cherts.

Two of the three charcoal samples that were collected from Feature 2 were submitted for radiometric analysis. The samples were sent to Dr. Hong Wang of the Prairie Research Institute at the Illinois State Geological Survey which is operated by the University of Illinois at Urbana-Champaign. These samples were subjected to Accelerated Mass Spectrometry dating with one sample returning a ^{14}C yr BP date of 2450 ± 20 and the other sample returning a ^{14}C yr BP date of 2435 ± 20. These AMS dates were calibrated using CALIB 6.0 (Stuiver and Reimer 1993) and all calibrations are reported at the 2-Sigma range. The sample which returned a date of 2450 ± 20 ^{14}C yr BP was calibrated with three intercepts of BC 750-686, BC 667-640, and BC 594-411. The sample which returned a date of 2435 ± 20 ^{14}C yr BP was calibrated with three intercepts of BC 745-688, BC 664-647, and BC 552-407. These dates point toward an early

Early Woodland utilization of Feature 2. The AMS results from the two charcoal samples are presented in Table 3.4.

Table 3.4. Accelerated Mass Spectrometry Dating Results from Feature 2.

Sample Number	^{14}C yr BP	Calibrated Age 2-Sigma	Probability Distribution
3	2450 ± 20	BC 750-686 BC 667-640 BC 594-411	0.3 0.094 0.606
4	2435 ± 20	BC 745-688 BC 664-647 BC 552-407	0.201 0.045 0.754

Stratigraphic Zone III

Stratigraphic Zone III extended from 75 to 120 centimeters below datum and included levels 12 through 20. This zone consisted of a 10YR4/6 dark yellowish brown sandy clay that became progressively lighter with depth and contained very few roots. Only levels 12 through 17 of this zone contained any artifacts while levels 18 through 20 were sterile. Levels 12 through 17 contained 57 artifacts including 52 pieces of debitage which consisted of Boyle, Harrodsburg, Muldraugh, and Wyandotte cherts; as well as 4 pieces of fire-cracked rock and one cobble.

At the sterile base of the unit, Level 20, an auger test was excavated to ensure that there were no deeply buried cultural materials. This test was excavated from 120 to 237 centimeters below datum. This test revealed a 10YR5/6 yellowish brown mottled with 10YR5/2 grayish brown sandy clay with a few pebbles to a depth of 199 centimeters below datum. At this point the soil transitioned into a 10YR4/4 dark yellowish brown mottled with 10YR5/2 grayish brown sand clay. This soil remained the same in color but became progressively more clayey with depth until the termination of the auger test. No cultural materials were uncovered by this auger test.

Test Unit 4

Test Unit four was placed approximately 85 centimeters west of the shovel test at grid location N550 E370. The unit is placed on a ridge-like rise, reminiscent of the one upon which Test Unit two was placed. East of the rise is a large depression which retained some water. Approximately two meters west of the test unit is an old road that was cut into the rise and runs northeast to southwest, the same direction as the rise itself. North and West of the rise is a moderate drop-off that leads to a low drainage area. The vegetation around the unit consists of large hardwoods, forest understory, and many vines. The datum for Test Unit three was set 10 centimeters above the Northwest corner. This test unit was excavated from 10 to 90 centimeters below datum and consisted of 15 arbitrary levels. Three distinct stratigraphic zones were revealed by the excavation of this test unit. Test Unit four contained the least amount of artifacts of all five test units with a total of 903 which included one utilized core of Wyandotte chert, 638 pieces of debitage (three which were utilized), 34 pieces of fire-cracked rock, 230 whole, broken, and/or burned river cobbles, and one pottery sherd. A photograph and profile drawings of Test Unit 4 are found in Figures 3.20, 3.21, 3.22, 3.23 and 3.24.

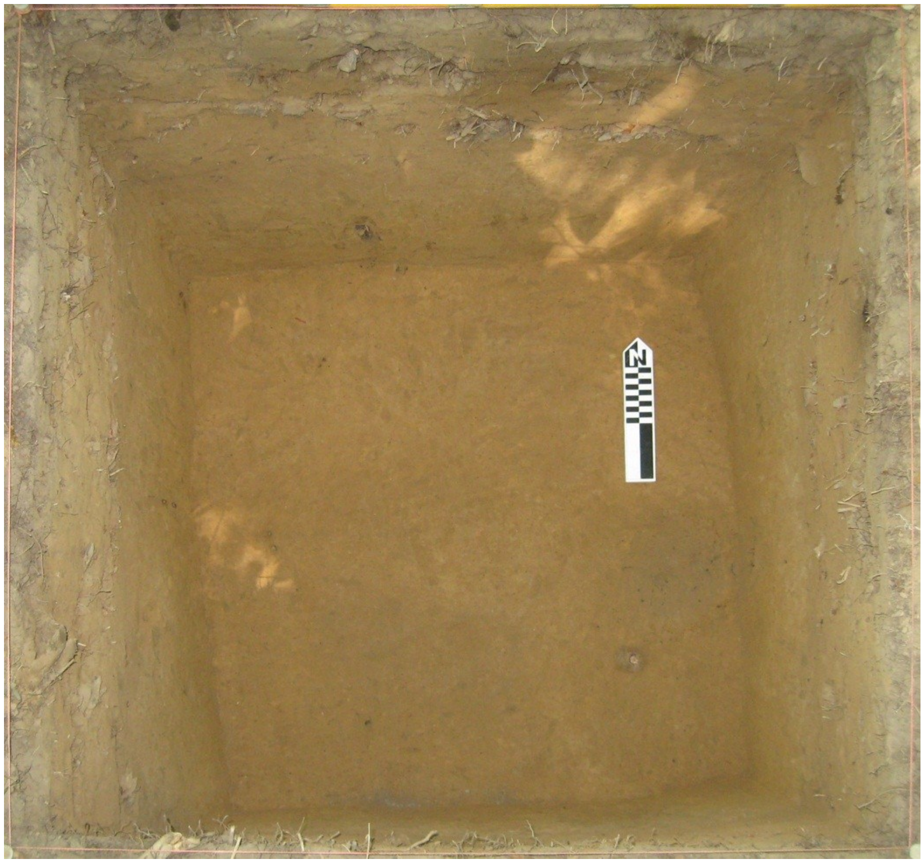

Figure 3.20. Test Unit 4 – Completed.

Figure 3.21. Test Unit 4 – South Profile.

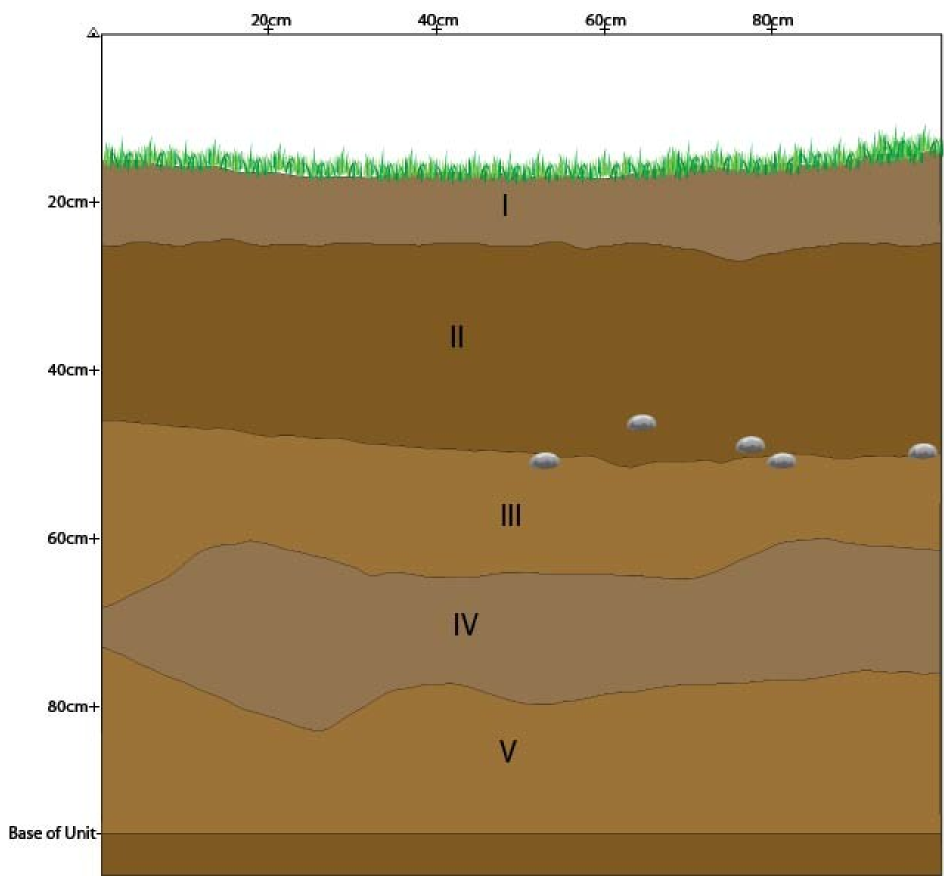

Figure 3.22. Test Unit 4 – South Profile Diagram (Key in Table 3.5).

Figure 3.23. Test Unit 4 – East Profile.

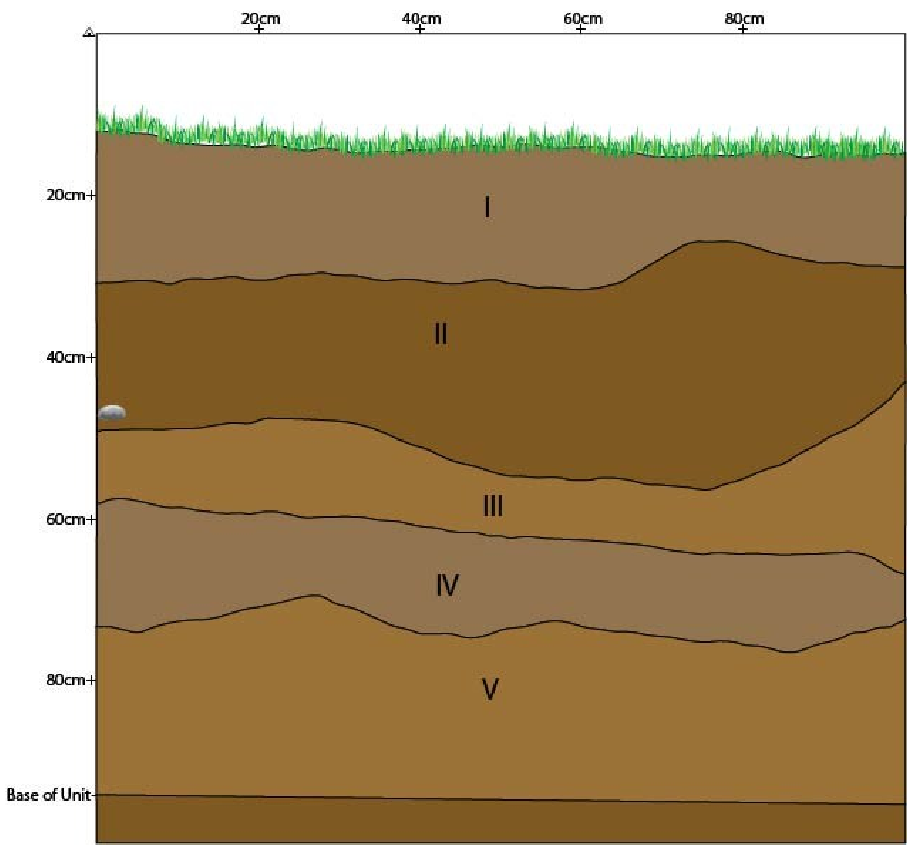

Figure 3.24. Test Unit 4 – East Profile Diagram (Key in Table 3.5).

Table 3.5. Key for Figures 3.22 and 3.24

Figure 3.22. Test Unit 4 – South Profile Diagram	
I	Humic Layer - 10YR5/4 yellowish brown very fine sandy loam with heavy root mat
II	10YR4/6 dark yellowish brown fine sandy loam with lots of roots
III	Between 10YR5/6 yellowish brown and 10YR4/6 dark yellowish brown fine sandy loam, compactness increasing with depth
IV	10YR5/4 yellowish brown mottled with 10YR4/6 dark yellowish brown and 10YR6/3 pale brown compact sandy loam
V	Between 10YR5/6 yellowish brown and 10YR4/6 dark yellowish brown slightly mottled with a lighter color compact sandy loam
Figure 3.24. Test Unit 4 – East Profile Diagram	
I	Humic Layer - 10YR5/4 yellowish brown very fine sandy loam with heavy root mat
II	10YR4/6 dark yellowish brown fine sandy loam with lots of roots
III	Between 10YR5/6 yellowish brown and 10YR4/6 dark yellowish brown fine sandy loam, compactness increasing with depth
IV	10YR5/4 yellowish brown mottled with 10YR4/6 dark yellowish brown and 10YR6/3 pale brown compact sandy loam
V	Between 10YR5/6 yellowish brown and 10YR4/6 dark yellowish brown slightly mottled with a lighter color compact sandy loam

Stratigraphic Zone I

Stratigraphic zone I consisted of the humic O soil horizon and the underlying A soil horizon and extended from ten to 45 centimeters below datum which included levels one through six. The humic layer of this test unit consisted of a very fine sandy loam that was 10YR5/4 yellowish brown in color which contained a heavy root mat and a moderate amount of pebbles and other rocks. The A horizon was a 10YR4/6 dark yellowish brown very fine sandy loam that contained a large amount of roots, pebbles, and other rocks. This zone contained a total of 427 artifacts which included one uniface fragment manufactured from Wyandotte chert, 367 pieces of lithic debitage (one which was utilized), 10 pieces of fire-cracked rock, and 48 whole, broken, and/or burned river cobbles. This total also includes one large debitage-tempered cord-marked pottery sherd. The debitage from this zone was manufactured mostly from Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, and unidentified cherts.

Stratigraphic Zone II

Stratigraphic zone II extended from 45 to 75 centimeters below datum which included levels seven through 12. The top of Zone II consisted of a fine sandy loam that was 10YR4/6 dark yellowish brown in color. At 50 centimeters below datum the soil became slightly lighter and was between 10YR5/6 yellowish brown and 10YR4/6 dark yellowish brown fine sandy loam that became more compact with depth. At between 60 and 65 centimeters the soil was a compact sandy loam that was 10YR5/4 yellowish brown mottled with 10YR4/6 dark yellowish brown and 10YR6/3 pale brown in color and contained a few tiny roots. Zone II contained a total of 478 artifacts which included one utilized core of Wyandotte chert, 271 pieces of debitage (two which were utilized), 24 pieces of fire-cracked rock, and 182 pieces of whole, broken, and/or burned river cobbles. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, and unidentified cherts.

Stratigraphic Zone III

Stratigraphic Zone III extended from 75 to 95 centimeters below datum and included levels 13 through 15. This zone consisted of between a 10YR5/6 yellowish brown and 10YR4/6 dark yellowish brown slightly mottled with a lighter color compact sandy loam that contained very few roots. No artifacts were recovered from this zone.

At the sterile base of the unit, Level 15, an auger test was excavated to ensure that there were no deeply buried cultural materials. This test was excavated from 95 to 220 centimeters below datum. This test revealed a 10YR4/6 dark yellowish brown sandy clay transitioning to a 10YR5/6 yellowish brown sand to a depth of 113 centimeters below datum. At this point the soil was a 10YR5/6 yellowish brown sand to a depth of 138 centimeters below datum. Below this depth the soil transitioned back to a sandy clay that was 10YR4/6 dark yellowish brown in color.

This soil became increasingly mottled with depth with a 10YR6/3 pale brown sandy clay until the termination of the auger test. No cultural materials were uncovered by this auger test.

Test Unit 5

Test Unit five was placed approximately 30 centimeters south of the shovel test at grid location N600 E500. The unit is placed approximately 10 meters south of the edge of the terrace on which 15Md158 is situated. Directly east of the test unit the ground slopes down to a small depression. The test unit itself is on a slight slope with the Southeast corner being the highest, and therefore, is the unit's datum at 10 centimeters above ground the ground surface. The vegetation around the unit consists of large hardwoods and forest understory. This test unit was excavated from 10 to 110 centimeters below datum and consisted of 19 arbitrary levels. Four distinct stratigraphic zones were revealed by the excavation of this test unit. Test Unit five contained a total of 2,734 artifacts which included four bifaces, two cores, 2,303 pieces of debitage (three which were utilized), 135 pieces of fire-cracked rock, and 289 whole, broken, and/or burned river cobbles. A photograph and profile drawings of Test Unit 5 are found in Figures 3.25, 3.26, 3.27, 3.28 and 3.29.

Figure 3.25. Test Unit 5 – Completed.

Figure 3.26. Test Unit 5 – North Profile.

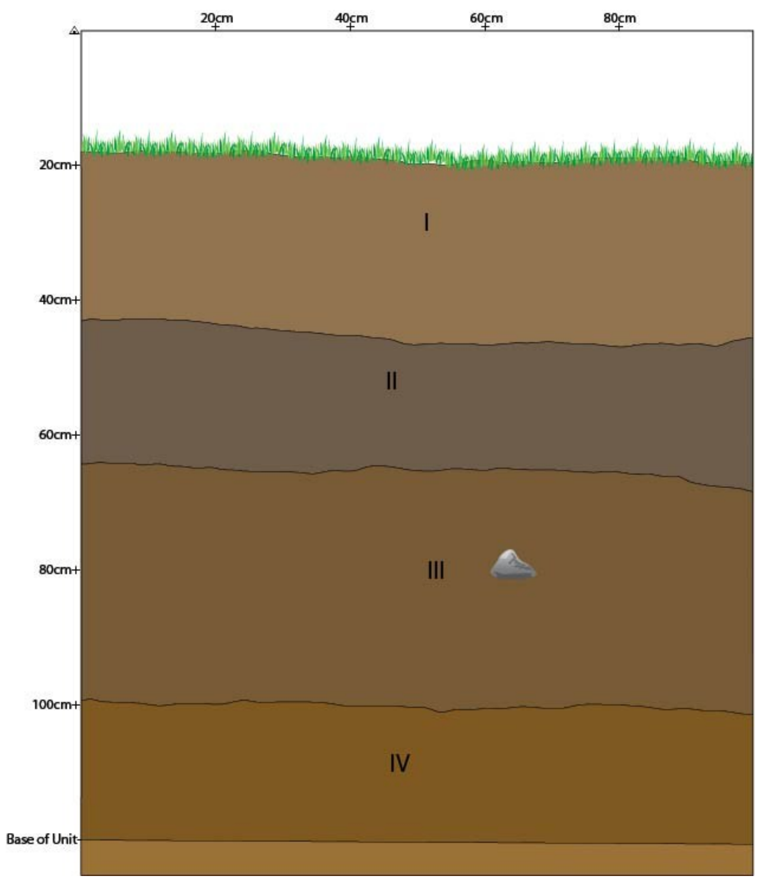

Figure 3.27. Test Unit 5 – North Profile Diagram.

Figure 3.28. Test Unit 5 – West Profile.

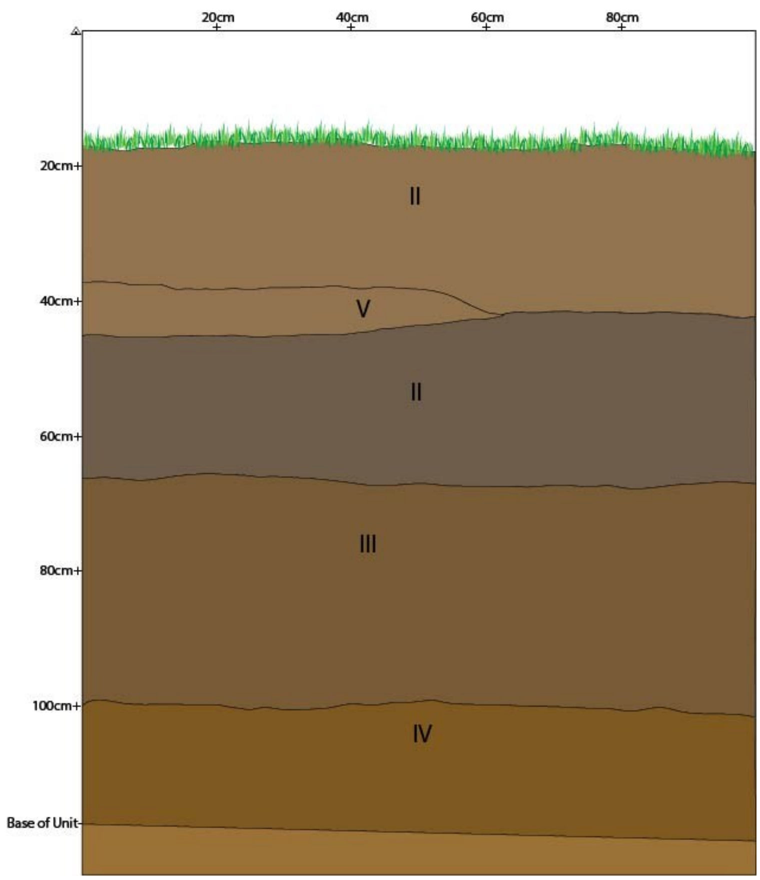

Figure 3.29. Test Unit 5 – West Profile Diagram.

Table 3.6. Key for Figures 3.27 and 3.29.

Figure 3.27	
I	Humic Layer - 10YR5/4 yellowish brown very fine sandy loam with heavy root mat
II	10YR4/3 brown slightly compact sandy loam with a few roots
III	10YR4/4 dark yellowish brown slightly mottled with a lighter color slightly compact sandy loam
IV	10YR4/6 dark yellowish brown compact sandy clay
Figure 3.29	
I	Humic Layer - 10YR5/4 yellowish brown very fine sandy loam with heavy root mat
II	10YR4/3 brown slightly compact sandy loam with a few roots
III	10YR4/4 dark yellowish brown slightly mottled with a lighter color slightly compact sandy loam
IV	10YR4/6 dark yellowish brown compact sandy clay
V	10YR5/4 yellowish brown slightly mottled with 10YR4/6 dark yellowish brown compact sandy loam

Stratigraphic Zone I

Stratigraphic zone I consisted of a thin humic O soil horizon and the underlying A soil horizon and extended from ten to 45 centimeters below datum which included levels one through five. This zone consisted of a 10YR5/4 yellowish brown sandy loam which contained a heavy root mat and a moderate amount of pebbles and other rocks. This zone contained a total of 623 artifacts which included one biface, 487 pieces of lithic debitage, 45 pieces of fire-cracked rock, and 90 whole, broken, and/or burned river cobbles. The biface is a fragment including the tip which is manufactured from St. Louis Green chert. The debitage collected from this zone consisted mostly of Wyandotte chert but also included Boyle chert, Harrodsburg chert, Muldraugh chert, Sonora chert, and unidentified cherts.

Stratigraphic Zone II

Stratigraphic zone II extended from 45 to 65 centimeters below datum which included levels six through nine. This zone consisted of a compact sandy loam that was a 10YR4/4 dark yellowish brown in color. This zone had a moderate amount of roots and pebbles. This zone contained a total of 750 artifacts which included two cores, 655 pieces of debitage (one which was utilized), 60 pieces of fire-cracked rock, and 33 whole, broken, and/or burned river cobbles. One of the cores was of Harrodsburg chert, while the other core consisted of Muldraugh chert. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, Sonora, and unidentified cherts.

Stratigraphic Zone III

Stratigraphic zone III extended from 65 to 100 centimeters below datum which included levels ten through 16. This zone consisted of a compact sandy loam that was a 10YR4/3 brown and slightly mottled with a lighter color. This zone had a moderate amount of roots and pebbles. This zone contained a total of 1,328 artifacts which included three bifaces, 1,133 pieces of debitage (two which were utilized), 28 pieces of fire-cracked rock, and 166 whole, broken, and/or burned river cobbles. Two of the bifaces were finished with one being manufactured from Wyandotte chert, while the other was a midsection fragment manufactured from Muldraugh chert. The third biface was a fragment with a tip that was manufactured from Wyandotte chert. The debitage consisted mainly of Wyandotte chert but also included Boyle, Harrodsburg, Muldraugh, and unidentified cherts.

Stratigraphic Zone IV

Stratigraphic zone IV extended from 100 to 110 centimeters below datum which included levels 17 through 19. This zone consisted of a compact sandy clay that was a 10YR4/6 dark yellowish brown in color. Only level 17 of this zone contained any artifacts while levels 18 and 19 were sterile. Level 17 contained 25 artifacts including 23 pieces of debitage which consisted mostly of Wyandotte chert but also included Boyle and Muldraugh chert; as well as 2 pieces of fire-cracked rock.

At the sterile base of the unit, Level 19, an auger test was excavated to ensure that there were no deeply buried cultural materials. This test was excavated from 110 to 267 centimeters below datum. This test revealed a 10YR5/6 yellowish brown sandy clay with a few pebbles to a depth of 132 centimeters below datum. At this point the soil transitioned into a 10YR4/6 dark yellowish brown very sandy clay to a depth of 213 centimeters below datum. Below 213 centimeters below datum the soil became a 10YR4/6 dark yellowish brown sand until 233 centimeters below datum where it began transitioning to a 7.5YR4/4 brown moist very sandy clay. At 257 centimeters below datum this soil began transitioning to a 10YR3/6 dark yellowish brown moist very sandy clay until the termination of the auger test. No cultural materials were uncovered by this auger test.

IV. ANALYSIS

Methods of Analysis

The analysis of the assemblage collected during the excavations for this project will employ a typology developed by Johnson and Morrow (Raspet 1979; Morrow 1984; Johnson and Raspet 1980; Johnson 1989). This typology was developed as a way to classify the by-products and debitage of biface manufacture in gravel based industries in Mississippi in a way that will allow the measurement of trajectory length in an assemblage (Morrow 1984:20). Trajectory length can be used to infer what stage of the lithic reduction process is represented by an assemblage. The trajectory length of an assemblage is measured as either long or short, with long trajectories exhibiting the full range of flake types produced during biface manufacture, while short trajectories exhibit either the early or late stage flakes (Johnson 1989:119-120). This typology will be suitable for the assemblage collected from 15Md158 as the peoples utilizing this site made use of mostly locally available cherts which by-and-large are sourced from nodules from residual and alluvial sources like gravel bars in local river and stream beds.

Trajectory length can also be used in assessing site type. Sites with long trajectory assemblages are inferred to be maintenance activity sites or base camp sites, whereas, assemblages representing short trajectories are likely to be short term extraction sites (Johnson 1989:120). The measurement of trajectory length can also lead to inferences about the mobility patterns of the peoples who utilized the site. Furthermore, as Johnson (1989:131) notes, using a production trajectory model allows the inclusion of data in the regional data base and each addition allows for a refinement of the model.

In this study trajectory length will be used in exploring chronological patterns in site utilization through time by dividing the vertical distribution into convenient segments in all five test units. In examining the vertical distribution of the collected artifact assemblage, the excavated five centimeter levels will be matched against the natural stratigraphy that was revealed during excavation in order to see if any patterns arise that can be used in determining how the site may have been used and if this changed during the use of the site. In addition to correlating the excavated levels with the natural stratigraphy the levels will be arbitrarily divided into thirds in another exploration of patterns in the vertical distribution of the assemblage. The distribution of the chert types recovered will also be examined to see if there were changes in lithic procurement strategies during the use of the site. The spatial distribution of the collected assemblage will also be examined in order to reveal if the five areas of the site that were investigated exhibit different trajectory lengths that will show if the different areas of the site were used for different steps of the lithic reduction process.

The Debitage Analysis

The typology used in this study uses a debitage and biface classification that was developed in conjunction with each other that is meant to track the placement of each artifact within the biface production trajectory (Johnson 1989:127). The flake classification uses a two dimensional paradigm which is a formal arrangement where classes are defined by the co-occurrence of different attributes (Johnson 1989:127; Johnson and Raspet 1980:4). The purpose of using a paradigm in archaeological analysis is that it allows simultaneous consideration of two or more attribute sets while forcing the archaeologist to provide explicit definitions of his types (Johnson and Raspet 1980:4). Furthermore, paradigms are an economical means of classification in that they do not require the recording of multiple attributes per artifact and only entail simple statistical analysis (Johnson and Raspet 1980:4).

This typology takes into account two attributes of debitage; the amount of cortex on the flake's dorsal surface and the morphology of the flake's striking platform (Johnson and Raspet 1980:4). The order and configuration of these two attribute sets, which consists of 12 categories (DB1 through DB12) that are defined by the crosscutting attributes of this classification, reflect the technological expectations of bifacial reduction (Johnson and Raspet 1980:4). The horizontal dimension of the paradigm classifies the debitage according to the amount of cortex on the flake's dorsal surface. The expectation of bifacial reduction is that the greater the amount of cortex on a flake the earlier in the reduction sequence that it was removed (Johnson 1989:127). The vertical dimension of the paradigm classifies the debitage according to the configuration of the striking platform. Flakes that have complex platforms are expected to have come from the late stages of the reduction sequence, while flakes with cortex on their platforms are expected to have been from the early stages of the reduction sequence (Johnson 1989:127). The categories of this typology are as follows: DB1, DB2, and DB3 all consists of flakes that are missing a striking platform and possess more than 75 percent dorsal surface cortex, less than 75 percent cortex, or no cortex, respectively; DB4, DB5, and DB6 consists of flakes that possess a cortex striking platform and have more than 75 percent cortex, less than 75 percent cortex, or not cortex, respectively; DB7, DB8, and DB9 consists of flakes that have two or fewer facets on their striking platforms and have more than 75 percent dorsal surface cortex, less than 75 percent cortex, or no cortex, respectively; DB10, DB11, and DB12 consists of flakes that have more than two facets on their striking platforms and have more than 75 percent dorsal surface cortex, less than 75 percent cortex, or no cortex, respectively. Morrow (1984:21) points out that it is important to note that not all of these flake types would be produced in any significant number within a reduction trajectory.

Once each piece of debitage was placed in its respective category a 4x3 contingency table was prepared for the dataset. The first three categories (DB1, DB2, DB3), which include flakes that are missing their striking platform, are not included in the calculation because it is not possible to place them within the reduction trajectory (Johnson 1989:127). The contingency table, which uses the chi-square statistic, is used because it can be e computed for any cross-cutting pair of variables (Thomas 1986:277), which in this case includes the amount of cortex and platform configuration. By using the formula $E_i = \frac{(Row\ Total)(Column\ Total)}{(Grand\ Total)}$ for each category of the table, an expected value is obtained that reflects the number of flakes which would occur in each category if dorsal cortex and platform configuration were independent variables (Johnson and Raspet 1980:4). This expected value may then be compared to the actual number of flakes in each category, or the observed value, and the relationship between the two is said to be positive if the observed value is greater than the expected value (Johnson and Raspet 1980:4). The expectation of the paradigm, if the assemblage reflected a long production trajectory, is positive loadings on the principle diagonal of the contingency table (DB4,DB8,DB12) and negative loadings in the remaining categories (Johnson and Raspet 1980:4). Morrow (1984:21-22) notes that an important consideration is that not all flakes produced during biface production will fall along the suggested positive diagonal pattern. An assemblage that reflected a short production trajectory would have positive loading in either the upper left corner for an early stage trajectory or the lower right corner for a late stage trajectory.

This calculation was performed in a multitude of subsets of the dataset in order to answer the questions of this study. The first calculation that was evaluated was to find the trajectory length for the site as a whole by using the entire flake assemblage that was collected from the five test units. The calculation was then evaluated for each test unit, then for each stratigraphic zone of each test unit, next each test unit was divided into thirds. Furthermore, the calculation was evaluated for the different chert types recovered from the five test units. The majority of the chert that was recovered consisted of Wyandotte chert. However, Boyle, Harrodsburg, Jeffersonville, Lost River, Muldraugh, Paoli, Sonora, St. Louis Green, and unidentified cherts were also recovered, albeit in much smaller amounts. In lieu of evaluating each chert type individually, as some types are only represented by very small amounts and also due to the large variance between the amount of Wyandotte chert and the amount of the other cherts, the calculation was evaluated for Wyandotte and also for the other cherts grouped together. This was done for the assemblage as a whole as well as for each individual test unit.

The results from the debitage contingency tabulations are presented in Tables 4.1, 4.2, and 4.3 where the dataset for the entire assemblage from the five test units is calculated, and in Tables 4.4, 4.5, 4.6, 4.7, and 4.8 for the data from the individual test units and their different natural and arbitrary sections. As seen in Table 4.1 the categories with positive loadings include DB4, DB5, DB9, and DB12 which is almost consistent with the expectation of the paradigm for long trajectory assemblages. The main difference being that instead of a positive loading in category DB8 the positive loading is to the right of the principle diagonal of the contingency table in category DB9. The strong positive loading in category DB9 is most probably a consequence of using this paradigm, which was designed for use on the small gravel cherts of Mississippi (Morrow 1984:20), on this assemblage which was manufactured mostly from large

Wyandotte chert nodules and other larger chert cobbles from the Ohio River and other local creeks and drainages. The attributes accounted for by this paradigm are based on the characteristics of small size and water-worn cortex (Morrow 1984:21). According to Morrow (1984:21) the small size of the gravels restricts the majority of the manufacturing processes to simple reduction of a single gravel. The differences between the raw material from which the typology is based on and the raw material of this assemblage is its large size and thicker cortex. The strong positive loading in category DB9 can most likely be attributed to the large size of the material being worked at 15Md158. This can also be said of the large number of flakes seen in category DB3. The other off-diagonal category with a positive loading is DB5. The positive loadings in category DB5 are most likely a consequence of the thicker cortex of the raw material from which this assemblage was manufactured. Therefore, after accounting for these differences between the raw materials from the typology's original assemblage and this assemblage, it appears that the debitage collected from the five test units reflects that a long production trajectory took place at this site. Although the assemblage did reflect a long production trajectory, with both early and late stage flakes represented, it did contain a larger proportion (84.27%) of late stage flakes (DB8-DB12) versus 15.73% early stage flakes (DB4-DB7). The larger proportion of late stage flakes represented in this assemblage could possibly be a result of the large size of the raw material from which they were produced.

The entire assemblage from the five test units was also divided between Wyandotte chert and other cherts then subjected to the contingency table calculations. This data is presented in Tables 2 and 3. As seen in Table 2 the positive loadings for the Wyandotte chert assemblage are in the categories DB4, DB5, DB9, and DB12. This is the same pattern that was reflected in the calculations for the dataset as a whole and as previously discussed suggests a long production trajectory for the Wyandotte chert assemblage from the five test units. The proportions of early versus late stage flakes for the Wyandotte assemblage are 15.21% early stage and 84.79% late stage. Table 3, the contingency table for the other chert assemblage, also shows positive loadings in categories DB4, DB5, DB9, and DB12 suggesting a long production trajectory for these as well. The proportions of early versus late stage flakes for the other chert assemblage are 17.91% early stage and 82.09% late stage.

Table 4.1. Contingency Table for the Entire Debitage Assemblage Collected from 15Md158.

DB1 O=459	**DB2** O=405	**DB3** O=8,281
DB4 O=210 E=39.59 +	**DB5** O=193 E=47.48 +	**DB6** O=27 E=342.93 -
DB7 O=50 E=149.89 -	**DB8** O=100 E=179.79 -	**DB9** O=1,478 E=1,298.35 +
DB10 O=21 E=91.52 -	**DB11** O=44 E=109.76 -	**DB12** O=929 E=792.72 +

Table 4.2. Contingency Table for the Entire Wyandotte Chert Debitage Assemblage.

DB1 O=317	**DB2** O=372	**DB3** O=6,509
DB4 O=150 E=27.97 +	**DB5** O=178 E=44.11 +	**DB6** O=26 E=281.92 -
DB7 O=33 E=101.05 -	**DB8** O=96 E=159.37 -	**DB9** O=1,150 E=1,018.57 +
DB10 O=18 E=71.98 -	**DB11** O=43 E=113.52 -	**DB12** O=850 E=725.50 +

Table 4.3. Contingency Table for the Entire Other Chert Debitage Assemblage.

DB1 O=141	**DB2** O=33	**DB3** O=1,775
DB4 O=58 E=11.37 +	**DB5** O=15 E=2.95 +	**DB6** O=2 E=60.87 -
DB7 O=16 E=53.20 -	**DB8** O=4 E=13.82 -	**DB9** O=330 E=285.36 +
DB10 O=3 E=12.58 -	**DB11** O=1 E=3.27 -	**DB12** O=79 E=67.31 +

The results from the contingency tables for the dataset from Test Unit 1 are presented in Table 4.4. When the assemblage for this test unit were calculated as a whole the contingency table revealed positive loadings in categories DB4, DB5, DB9, and DB12. This is the same pattern that was shown from the site as a whole and suggests a long production trajectory for the assemblage from this test unit. The proportions of early versus late stage flakes for this test unit are 12.59% early stage and 87.4% late stage. The pattern suggesting a long trajectory held in all subdivisions when the dataset for this test unit was divided between its natural stratigraphy and three arbitrary zones in order to look for vertical changes. The same pattern was also seen when calculations were made for the Wyandotte chert assemblage and the other chert assemblage. There were only slight variations in the proportions of early versus late stage flakes in these subdivisions when compared to the test unit as a whole.

The results from the contingency tables for the dataset from Test Unit 2 are presented in Table 4.5. When the assemblage for this test unit were calculated as a whole the contingency table revealed positive loadings in categories DB4, DB5, DB9, and DB12. This is the same pattern that was shown from the site as a whole and suggests a long production trajectory for the assemblage from this test unit. The proportions of early versus late stage flakes for this test unit are 16.67% early stage and 83.33% late stage. The pattern suggesting a long trajectory held in all subdivisions when the dataset for this test unit was divided between its natural stratigraphy and three arbitrary zones in order to look for vertical changes. The same pattern was also seen when calculations were made for the Wyandotte chert assemblage and the other chert assemblage. There were only slight variations in the proportions of early versus late stage flakes in these subdivisions when compared to the test unit as a whole.

The results from the contingency tables for the dataset from Test Unit 3 are presented in Table 4.6. When the assemblage for this test unit were calculated as a whole the contingency table revealed positive loadings in categories DB4, DB5, DB9, and DB12. This is the same pattern that was shown from the site as a whole and suggests a long production trajectory for the assemblage from this test unit. The proportions of early versus late stage flakes for this test unit are 12.59% early stage and 87.4% late stage. The pattern suggesting a long trajectory held in all subdivisions, including Feature 2, when the dataset for this test unit was divided between its natural stratigraphy, in order to look for vertical changes. The same pattern was also seen when calculations were made for the Wyandotte chert assemblage and the other chert assemblage. There were only slight variations in the proportions of early versus late stage flakes in these subdivisions when compared to the test unit as a whole.

The results from the contingency tables for the dataset from Test Unit 4 are presented in Table 4.7. When the assemblage for this test unit were calculated as a whole the contingency table revealed positive loadings in categories DB4, DB5, DB9, and DB12. This is the same pattern that was shown from the site as a whole and suggests a long production trajectory for the assemblage from this test unit. The proportions of early versus late stage flakes for this test unit are 14.9% early stage and 85.1% late stage. The pattern suggesting a long trajectory held in all subdivisions when the dataset for this test unit was divided between its natural stratigraphy and three arbitrary zones in order to look for vertical changes. The same pattern was also seen when calculations were made for the Wyandotte chert assemblage and the other chert assemblage. There were only slight variations in the proportions of early versus late stage flakes in these subdivisions when compared to the test unit as a whole.

The results from the contingency tables for the dataset from Test Unit 5 are presented in Table 4.8. When the assemblage for this test unit were calculated as a whole the contingency table revealed positive loadings in categories DB4, DB5, DB9, and DB12. This is the same pattern that was shown from the site as a whole and suggests a long production trajectory for the assemblage from this test unit. The proportions of early versus late stage flakes for this test unit are 15.01% early stage and 85.0% late stage. The pattern suggesting a long trajectory held in all subdivisions when the dataset for this test unit was divided between its natural stratigraphy and three arbitrary zones in order to look for vertical changes. The same pattern was also seen when calculations were made for the Wyandotte chert assemblage and the other chert assemblage. There were only slight variations in the proportions of early versus late stage flakes in these subdivisions when compared to the test unit as a whole.

Table 4.4. Debitage Contingency Table Calculations for Test Unit 1.

TU		1	2	3	4	5	6	7	8	9	10	11	12
1													
	O=	94	78	2,005	25	38	6	16	26	361	4	7	192
	E=				4.6	7.26	57.14	26.87	42.39	333.74	13.53	21.35	168.11
	Zone I												
	O=	6	6	162	0	2	0	1	1	14	1	2	14
	E=				0.11	0.28	1.6	0.91	2.28	12.8	0.97	2.43	13.6
	Zone II												
	O=	27	24	658	9	9	1	2	6	83	2	1	79
	E=				1.29	1.58	16.13	6.16	7.58	77.25	5.55	6.83	69.61
	Zone III												
	O=	61	47	1,181	16	27	5	13	19	263	1	4	99
	E=				3.22	5.37	39.41	19.8	32.99	242.2	6.98	11.63	85.39
	Top 1/3												
	O=	10	14	405	6	4	0	3	4	42	3	2	46
	E=				1.09	0.91	8	5.34	4.45	39.2	5.56	4.64	40.8
	Middle 1/3												
	O=	74	52	1,331	16	25	6	11	15	267	1	5	125
	E=				2.79	4.49	39.71	17.42	27.99	247.59	7.79	12.51	110.7
	Bottom 1/3												
	O=	10	12	269	3	9	0	2	7	52	0	0	21
	E=				0.64	2.04	9.32	3.24	10.38	47.37	1.12	3.57	16.31
	Wyandotte Chert												
	O=	64	72	1,556	16	36	5	11	26	282	3	7	175
	E=				3.05	7.01	46.94	17.06	39.23	262.7	9.89	22.75	152.35
	Other Chert												
	O=	29	5	446	7	2	1	5	0	79	1	0	17
	E=				1.16	0.18	8.66	9.75	1.5	72.75	2.09	0.32	15.59

Table 4.5. Debitage Contingency Table Calculations for Test Unit 2.

TU		1	2	3	4	5	6	7	8	9	10	11	12
2													
	O=	52	68	1,623	39	21	3	14	15	290	2	1	77
	E=				7.5	5.04	50.45	37.98	25.55	255.48	9.52	6.41	64.07
	Zone I												
	O=	12	12	336	17	3	0	3	1	69	0	0	7
	E=				4	0.8	15.2	14.6	2.92	55.48	1.4	0.28	5.32
	Zone II												
	O=	23	33	596	9	11	2	8	12	105	2	1	27
	E=				2.36	2.98	16.65	13.42	16.95	94.63	3.22	4.07	22.71
	Zone III												
	O=	17	20	642	13	7	1	3	2	105	0	0	38
	E=				1.99	1.12	17.89	10.41	5.86	93.73	3.6	2.02	32.38
	Top 1/3												
	O=	23	26	592	21	5	2	7	9	104	0	0	17
	E=				4.75	2.37	20.87	20.36	10.18	89.45	2.88	1.44	12.67
	Middle 1/3												
	O=	25	30	828	17	16	1	7	6	155	2	1	39
	E=				3.62	3.2	27.17	17.9	15.84	134.26	4.47	3.96	33.56
	Bottom 1/3												
	O=	4	9	180	1	0	0	0	0	27	0	0	20
	E=				0.02	0	0.98	0.56	0	26.44	0.42	0	19.58
	Wyandotte Chert												
	O=	33	59	1,228	27	19	2	8	14	208	2	1	67
	E=				5.1	4.69	38.21	24.45	22.47	183.07	7.44	6.84	55.72
	Other Chert												
	O=	19	9	395	12	2	1	6	1	82	0	0	10
	E=				2.37	0.39	12.24	14.05	2.34	72.6	1.58	0.26	8.16

Table 4.6. Debitage Contingency Table Calculations for Test Unit 3.

TU		1	2	3	4	5	6	7	8	9	10	11	12
3													
	O=	207	171	2,626	102	87	10	13	45	525	8	20	395
	E=				20.23	25	152.77	59.56	73.6	449.84	43.21	53.4	326.38
	Zone I												
	O=	36	35	539	14	15	1	3	4	83	0	2	46
	E=				3.03	3.75	23.21	9.11	11.25	69.64	4.86	6	37.14
	Zone II												
	O=	22	18	324	11	6	0	2	3	63	2	1	52
	E=				1.82	1.21	13.96	7.28	4.86	55.86	5.89	3.93	45.18
	Zone III												
	O=	1	0	36	1	1	0	0	0	9	0	0	4
	E=				0.13	0.13	1.73	0.6	0.6	7.8	0.27	0.27	3.47
	Feature 2												
	O=	148	118	1,727	76	65	9	8	38	370	6	17	293
	E=				15.31	20.41	114.28	42.45	56.6	316.95	32.24	43	240.76
	Wyandotte Chert												
	O=	140	164	2,174	74	82	10	11	43	437	6	20	367
	E=				14.39	22.92	128.69	42.55	67.8	380.64	34.06	54.27	304.67
	Other Chert												
	O=	67	7	452	28	5	0	2	2	88	2	0	28
	E=				6.81	1.49	24.7	18.99	4.15	68.85	6.19	1.35	22.45

Table 4.7. Debitage Contingency Table Calculations for Test Unit 4.

TU		1	2	3	4	5	6	7	8	9	10	11	12
4													
	O=	16	24	437	10	11	1	2	4	70	1	4	58
	E=				1.78	2.6	17.63	6.14	8.97	60.89	5.09	7.43	50.48
	Zone I												
	O=	7	17	267	3	7	0	1	2	33	0	0	30
	E=				0.53	1.18	8.29	1.89	4.26	29.84	1.58	3.55	24.87
	Zone II												
	O=	9	7	170	7	4	1	1	2	37	1	4	28
	E=				1.27	1.41	9.32	4.23	4.7	31.06	3.49	3.88	25.62
	Top 1/3												
	O=	7	12	178	2	5	0	0	2	19	0	0	17
	E=				0.31	1.09	5.6	0.93	3.27	16.8	0.75	2.64	13.6
	Middle 1/3												
	O=	7	7	204	5	3	0	1	1	33	1	1	30
	E=				0.75	0.53	6.72	3.27	2.33	29.4	2.99	2.13	26.88
	Bottom 1/3												
	O=	2	5	55	3	3	1	1	1	18	0	3	11
	E=				0.68	1.19	5.12	1.95	3.41	14.63	1.36	2.39	10.24
	Wyandotte Chert												
	O=	10	20	331	8	8	1	0	4	54	1	4	50
	E=				1.18	2.09	13.73	4.01	7.14	46.85	3.81	6.77	44.42
	Other Chert												
	O=	6	4	106	2	3	0	1	0	16	0	0	8
	E=				0.5	0.5	4	1.7	1.7	13.6	0.8	0.8	6.4

Table 4.8. Debitage Contingency Table Calculations for Test Unit 5.

TU		1	2	3	4	5	6	7	8	9	10	11	12
5													
	O=	90	64	1,596	34	36	8	5	10	235	6	12	207
	E=				6.35	8.18	63.47	20.34	26.22	203.43	18.31	23.6	183.09
	Zone I												
	O=	24	10	323	11	12	2	3	5	46	1	5	45
	E=				2.88	4.23	17.88	6.23	9.14	38.63	5.88	8.63	36.48
	Zone II												
	O=	28	20	471	8	7	2	1	2	63	2	1	50
	E=				1.37	1.25	14.37	5.34	4.85	55.81	4.29	3.9	44.82
	Zone III												
	O=	37	34	783	14	17	4	1	3	124	3	6	107
	E=				2.26	3.26	29.48	8.26	11.93	107.81	7.48	10.81	97.71
	Top 1/3												
	O=	29	11	414	12	12	2	3	5	50	1	5	49
	E=				2.99	4.11	18.89	6.68	9.18	42.14	6.33	8.7	39.96
	Middle 1/3												
	O=	46	43	853	18	16	4	1	5	127	4	6	115
	E=				2.95	3.47	31.58	10.33	12.13	110.53	9.71	11.4	103.88
	Bottom 1/3												
	O=	15	10	329	4	8	2	1	0	58	1	1	43
	E=				0.71	1.07	12.22	3	4.5	51.5	2.29	3.43	39.28
	Wyandotte Chert												
	O=	70	57	1,220	25	33	8	3	9	169	6	11	191
	E=				4.93	7.68	53.38	13.52	21.08	146.39	15.54	24.23	168.23
	Other Chert												
	O=	20	7	376	9	3	0	2	1	66	0	1	16
	E=				1.35	0.61	10.04	7.74	3.52	57.73	1.91	0.87	14.22

The Biface Analysis

The biface assemblage that was collected from these excavations was classified using a key that was designed in conjunction with the debitage paradigm. The key, consisting of four stages, arranges three attribute states in their presumed order in the production trajectory (Johnson 1989:124). The model upon which the key is based expects that the first stage in the biface production trajectory is to establish the bifacial edge, secondly the remaining cortex is removed, and the last step consists of straightening the bifacial edge (Johnson 1989:124). This key does not take into account haft modification because it has been shown to occur at varying points in the production trajectory (Johnson 1989:124). Figure 4.1 presents the biface key for the assemblage from 15Md158 as well as the counts for each biface stage.

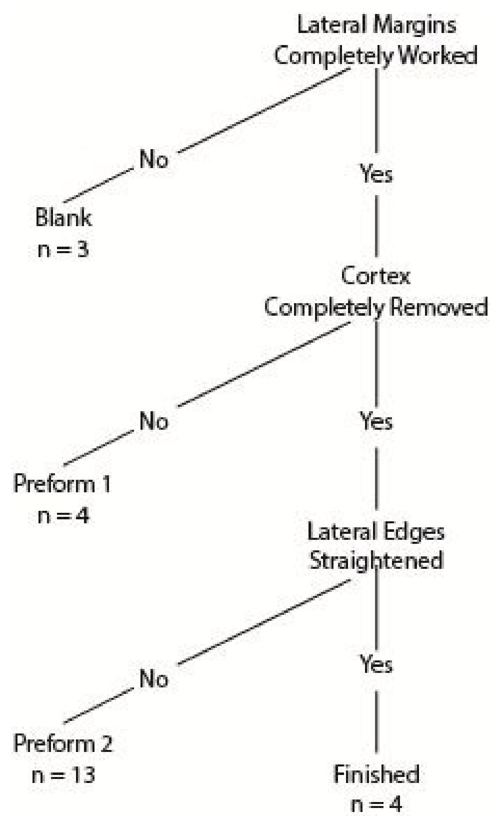

Figure 4.1. Biface Key for the 15Md158 Assemblage.

A total of 24 bifaces and one uniface fragment were collected from the five test units excavated at 15Md158. These bifaces included specimens which corresponded to all four stages accounted for in the biface key, however, the Preform 2 stage was the most represented. The representation of all four stages of the biface trajectory in this assemblage supports the analysis of the debitage that suggested that a long production trajectory occurred at 15Md158. The biface assemblage included three biface blanks, four Preform 1 bifaces, 13 Preform 2 bifaces, and four Finished Bifaces.

Only four of these bifaces were identifiable as a diagnostic projectile point type. These included three Preform 2 bifaces, all manufactured from Wyandotte chert, which were typed as a complete stemmed projectile point most closely resembling a McWhinney Heavy Stemmed (Justice 1987:138) which dates to the Late Archaic period in the Ohio River Valley; a fragment with a side-notched base which also resembles a McWhinney Heavy Stemmed or possibly a Trimble Side-Notched (Justice 1987:130) which is diagnostic of the Riverton culture of the Ohio River Valley which also dates to the Late Archaic; and a fragment consisting of the base of a stemmed projectile point which most closely resembles an Adena Stemmed (Justice 1987:191) which is diagnostic of the Adena culture and dates to the Early Woodland period. Only one finished biface was identifiable as a diagnostic type which also most closely resembled an Adena Stemmed and was also manufactured from Wyandotte chert. Two other bifaces which are not quite diagnostic but also points toward a Late Archaic or Early Woodland use of the site include a finished leaf-shaped biface which is complete except for the stem which was manufactured from thermally altered Boyle chert and a Preform 1 biface fragment that included a side-notched base that was manufactured from Wyandotte chert.

Bifaces were recovered from all five of the test units excavated for this project except for Test Unit 5. This test unit, however, did contain the only uniface fragment, manufactured from Wyandotte chert, which was recovered. Test Unit 1 contained a total of six bifaces which included two biface blanks and four Preform 2 bifaces. The two biface blanks were fragments which included the tip that were manufactured from Wyandotte and Paoli cherts. The Preform 2 bifaces from this test unit included the complete stemmed projectile point typed as a McWhinney Heavy Stemmed and the fragment with a side-notched base which was typed as either a McWhinney Heavy Stemmed or a Trimble Side-Notched. The other two Preform 2 bifaces from Test Unit 1 included a complete one manufactured from Muldraugh chert and a fragment manufactured from Wyandotte chert.

Test Unit 2 contained a total of eight bifaces which included one biface blank, three Preform 1 bifaces, two Preform 2 bifaces, and two finished bifaces. The one biface blank was manufactured from Harrodsburg chert. The three Preform 1 bifaces were all manufactured from Wyandotte chert. One of these bifaces was the fragment with the side-notched base while another one of the bifaces was a large oval-shaped scraper tool. The Preform 2 bifaces from Test Unit 2 included the projectile point fragment consisting of the base of an Adena Stemmed manufactured from Wyandotte chert and a fragment manufactured from Boyle chert. The finished bifaces from Test Unit 2 include one complete, except for the point, Adena Stemmed projectile point manufactured from Wyandotte chert and the leaf-shaped biface which is complete except for the stem which was manufactured from thermally altered Boyle chert.

Test Unit 3 contained a total of six bifaces which included one Preform 1 and five Preform 2 bifaces. The Preform 1 biface was a fragment with a tip manufactured from Wyandotte chert. The Preform 2 bifaces included three fragments with a tip, two manufactured from Wyandotte chert and one manufactured from an unidentified thermally altered chert; and two fragments manufactured from Wyandotte chert.

Test Unit 5 contained a total of four bifaces which included two Preform 2 bifaces and two finished bifaces. The Preform 2 bifaces were both fragments with tips and were manufactured from Wyandotte and St. Louis Green cherts. The finished bifaces included one which was complete except for the base manufactured from Wyandotte chert and one midsection fragment manufactured from Muldraugh chert. Table 9 presents the bifaces collected from 15Md158 with descriptions and measurements.

Table 4.9. Biface Assemblage Collected from 15Md158

Unit	Biface Type	Description	Chert Type	Length	Width	Thickness
1	Blank	Fragment with tip	Wyandotte		4.4cm	0.9cm
	Blank	Fragment with tip	Paoli		3.3cm	0.8cm
	Preform 2	Stemmed projectile point (McWhinney Heavy Stemmed (Justice 1987:138))	Wyandotte	3.5cm	1.4cm	1cm
	Preform 2	Fragment with side-notched base (McWhinney Heavy Stemmed or Trimble Side-Notched (Justice 1987:130))	Wyandotte			0.5cm
	Preform 2	Complete	Muldraugh	8.6cm	3.6cm	2.2cm
	Preform 2	Fragment	Wyandotte			
2	Blank	Complete	Harrodsburg	6.5cm	5.3cm	1.8cm
	Preform 1	Complete	Wyandotte	5.8cm	4.2cm	1.2cm
	Preform 1	Complete Large Scraper Tool	Wyandotte	9.9cm	5.9cm	1.2cm
	Preform 1	Fragment with side-notched base	Wyandotte			0.8cm
	Preform 2	Stemmed projectile point (Adena Stemmed (Justice 1987:191))	Wyandotte		1.9cm	0.7cm
	Preform 2	Fragment	Boyle			
	Finished	Leaf-Shaped, Complete except for stem	Boyle, Thermally Altered		4.1cm	1.1cm
	Finished	Stemmed projectile point (Adena Stemmed (Justice 1987:191))	Wyandotte	7.7cm	2.5cm	0.9cm
3	Preform 1	Fragment with tip	Wyandotte		4.1cm	1.2cm
	Preform 2	Fragment with tip	Unidentified chert, Thermally Altered			1.1cm
	Preform 2	Fragment with tip	Wyandotte		3.9cm	1.6cm
	Preform 2	Fragment with tip	Wyandotte		4.3cm	0.9cm
	Preform 2	Fragment	Wyandotte			
	Preform 2	Fragment	Wyandotte			
5	Preform 2	Fragment with tip	St. Louis Green		3.1cm	0.9cm
	Preform 2	Fragment with tip	Wyandotte		1.8cm	0.5cm
	Finished	Complete except for base	Wyandotte		2.8cm	1.0cm
	Finished	Midsection fragment	Muldraugh		2.0cm	0.7cm

V. INTERPRETATIONS AND CONCLUSIONS

The research conducted at 15Md158 focused on documenting different aspects of a Late Archaic/Early Woodland lithic manufacturing site. This research was begun by excavating a series of test units in the five areas of the site which were found to contain the highest density of lithic artifacts. The major focus of the analysis was the lithic material recovered from these excavations as this is the major artifact class which was recovered from the site. One main goal of this research was to develop a more secure chronology for the site on the basis of further diagnostic artifacts, chronometric dates, and by excavating in the areas of the site which contain the deepest deposits of artifacts in order to relate these to the natural stratigraphy of the site. The excavation of the test units was carried out in five centimeter levels. Thin levels were used in order to answer one of the major questions of this research which was to document a change in the use of the site through time and to relate these patterns to changes in the mobility patterns of those who utilized the site.

The lithic analysis used categories designed to measure production trajectory. The production trajectory length is a measure of the stages of the lithic reduction process which produced a given assemblage. Trajectory lengths are measured as either short or long; where a short trajectory reflects either early or late stage reduction, and a long trajectory reflects the full range of lithic reduction process. The typology that was employed to measure the trajectory length of the assemblage accounted for the amount of cortex on a flakes dorsal surface and the morphology of the striking platform in order to place each individual flake in the assemblage in one of twelve categories which corresponded to stages of the lithic reduction process. The bifaces in the assemblage were analyzed by placing them in one of four categories which also correspond to stages of the lithic reduction process. This project used trajectory length as a way to determine if different stages of the lithic reduction process could be detected in the vertical distribution of artifacts. Furthermore, trajectory length was used to measure the horizontal distribution of the lithic assemblage in order to document if the five areas of the site that were excavated were used for different stages of the lithic reduction process. The trajectory length of the different chert types that were collected were also measured in order to look for changes in lithic procurement strategies in both the vertical and horizontal distributions of the assemblage.

Site Chronology

One major focus of this project was to develop a more secure chronology for 15Md158 by the recovery of further diagnostic artifacts and ^{14}C chronometric dates. The diagnostic artifacts that have been recovered from 15Md158 prior to this project included a Madison projectile point dating to the Late Woodland to Mississippian period (Justice 1987:224), a Steuben Expanded Stemmed projectile point dating from the terminal Middle Woodland to the early Late Woodland (Justice 1987:208), a Snyder-like projectile point base suggestive of the Middle Woodland (Justice 1987:201), a Turkey-Tail projectile point dating to the Late Archaic Early Woodland transitional period (Justice 1987:178), and a Delhi projectile point dating to Terminal Archaic (Justice 1987:179). These previous finds are suggestive of a long period of use for 15Md158 extending from the Late Archaic to the Mississippian periods. Previous investigations of 15Md158 also recovered radiocarbon dates from two features which point toward a Late Fort Ancient/Late Mississippian utilization of the site. Although there are diagnostic artifacts and radiocarbon dates that point toward a late utilization of the site, the sparse amount of pottery recovered at the site as well as the recovery of two Late Archaic projectile points from these previous investigations, however, points toward a much earlier utilization of the site (Jordan et. al 2011:88).

This project recovered further diagnostic artifacts and chronometric dates from 15Md158 that appear to aid in the attempt to narrow down when the bulk of the site's utilization occurred. A total of four diagnostic projectile points were recovered from these excavations. These included a McWhinney Heavy Stemmed dating to the Late Archaic period (Justice 1987:138); another stemmed projectile point resembling either a McWhinney Heavy Stemmed or possibly a Trimble Side-Notched (Justice 1987:130) which also dates to the Late Archaic, and two Adena Stemmed projectile points which date to the Early Woodland period (Justice 1987:191). These excavations also recovered six pottery sherds which makes the amount recovered from the site thus far a total of eight. Five of these sherds were very small, thick, and grit tempered which seems consistent with the earliest occurrences of pottery in Early Woodland Kentucky which is known as Fayette Thick (Railey 1996:81). Four of these grit-tempered sherds had no evidence of surface treatment while the other was decorated with two parallel incised lines which is also consistent with Fayette Thick (Railey 1996:81). The sixth pottery sherd that was recovered from this project was a larger sherd which was chert tempered with a cord-marked surface treatment which is also diagnostic of the Early Woodland in the Ohio River Valley (Applegate 2008:427). The radiocarbon dates, which were recovered from Feature 2 of these excavations, also points toward an Early Woodland utilization of the site. Figure 5.1 presents the locations on the site where the diagnostic artifacts and radiocarbon dates have been obtained.

The diagnostic artifacts and chronometric dates recovered from this project suggest that the major utilization of the site occurred between the Late Archaic and Early Woodland periods.

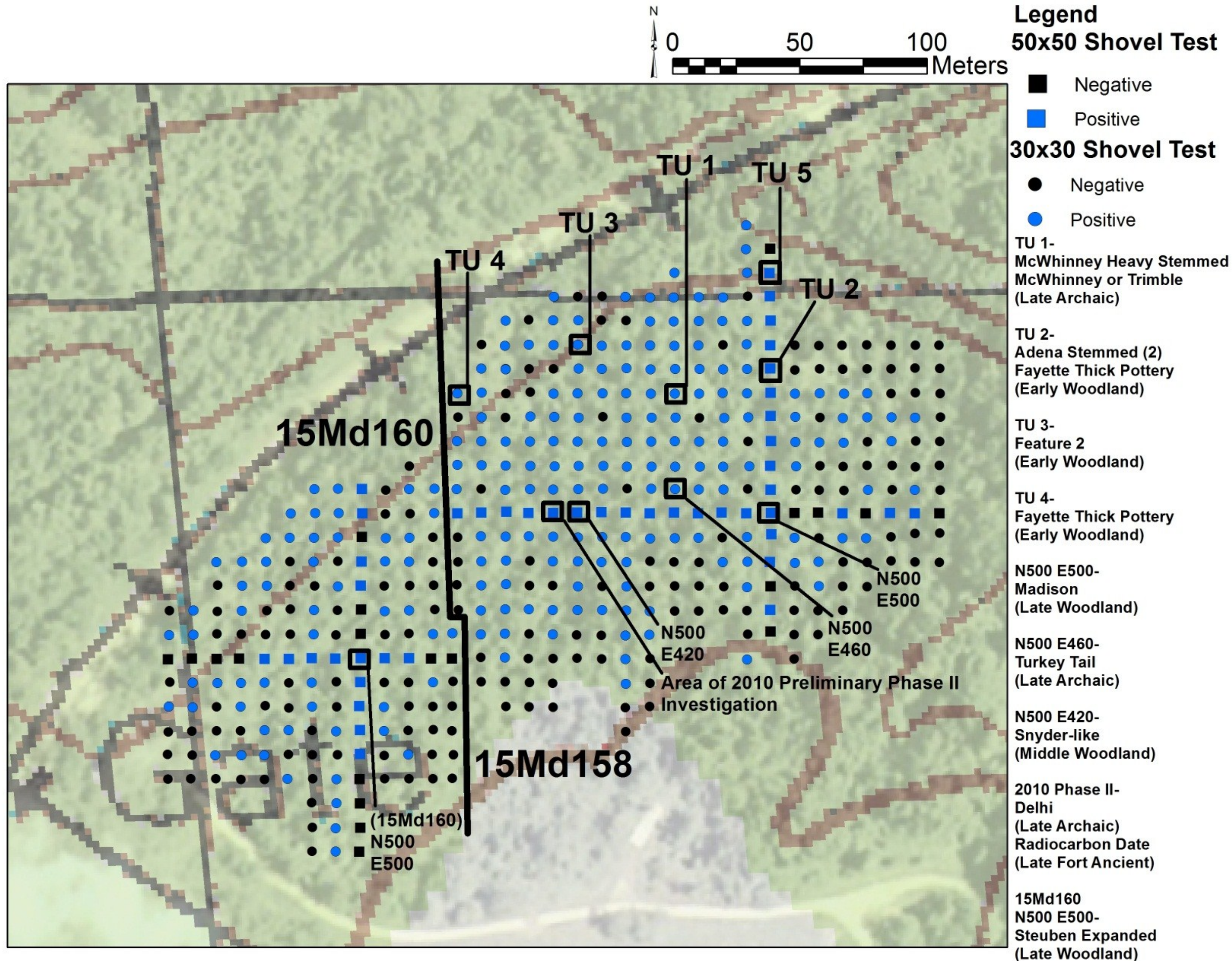

Figure 5.1. Shovel test map of the Phase I intensive investigations at 15Md158 and 15Md160 with the location of the diagnostic artifacts identified .

The fact that these excavations, which focused on the most heavily utilized areas of the site, only recovered diagnostic artifacts from such a relatively short period of time in contrast with previous findings also suggest that the transitional period between the Late Archaic and Early Woodland is when the site was most heavily utilized. Furthermore, a secure radiocarbon date from a heavily utilized feature, as well as other diagnostic artifacts from the Early Woodland period supports this as a period of heavy utilization. The densities of artifacts that were found in Feature 2 further suggest that the site saw heavy utilization, especially during the Early Woodland. Although there have been radiocarbon samples recovered from the site that date to the Late Fort Ancient period, the majority of the evidence recovered from this as well as previous investigations point toward the bulk of utilization for the site occurred beginning in the Late Archaic period and continuing on through the Early Woodland period and perhaps with less utilization occurring on into the Middle and Late Woodland. Furthermore, there is evidence that the site may be affiliated with the Riverton culture of the Late Archaic period as well as the Adena culture of the Early Woodland.

Variation in Site Use

A measure of the production trajectory length reflected by the artifact assemblage was calculated in order to answer one of the major questions asked by the study, was there a change in site usage that may reflect changes in mobility patterns. When the artifact assemblage was considered as a whole, it was found to reflect a long production trajectory. The full range of the lithic reduction process took place at the site. When the proportions of early versus late stage flakes were calculated there was a larger percentage of late stage flakes. However, this difference could be explained by the large size of the raw material worked at the site. After the production trajectory was calculated for the assemblage as a whole it was then calculated for the assemblage from each test unit, subsequently the assemblages from each test unit were subdivided using the unit's natural stratigraphy and arbitrary levels to see if there were changes reflected in the vertical distribution. Each of the artifact assemblages from the natural stratigraphic zones from all of the test units reflected a long production trajectory as did the arbitrary levels when each test unit was divided into thirds. Furthermore, when the proportions of early versus late stage flakes was calculated for these natural and arbitrary divisions the same pattern was found as that of the site as a whole. Therefore, it appears as though the site was utilized for the full range of the lithic reduction process and that it was used in this manner for the entire duration of its use.

Production trajectory was also measured for the different chert types to see if there were changes through time or if trajectory length differed by raw material. Wyandotte chert, by an overwhelming majority (79%), was the most common chert type recovered during these excavations. The other cherts that were recovered in lesser amounts include Boyle, Harrodsburg, Jeffersonville, Lost River, Muldraugh, Paoli, Sonora, St. Louis Green, and unidentified cherts. Because Wyandotte was by such a large majority of the chert that represented in the assemblage while none of the other cherts were well represented, the production trajectory analysis was conducted only on the Wyandotte chert assemblage versus the other cherts lumped together as an assemblage. The Wyandotte chert assemblage reflected a long production trajectory with patterns similar to the site as a whole. The other chert assemblage also reflected a long production trajectory with patterns similar to the site as a whole. Therefore, it appears as though there were no changes in lithic procurement strategies during the utilization of the site. Furthermore, it appears that there was no difference in use between Wyandotte chert and the other cherts collected in the assemblage.

The other question asked by this study was if the areas of the site that were examined exhibited evidence of differential use. This was answered by examining the production trajectory length of the assemblage from each test unit as a whole. Each of the assemblages from the from the five test units reflected long trajectories and each had similar proportions of early versus late stage flakes. Furthermore, there was no evidence that the different cherts were used differently at the five locations of the site. Therefore, it appears from the data obtained from the production trajectory analysis that each of the five areas of the site that were investigated were used for the entire lithic reduction process with no areas of differential use observed.

Discussion

One curious aspect of the results gathered from the production trajectory analysis was the lack of diversity in the contingency table calculations. Every way that the assemblage was divided in order to look for vertical patterning resulted in positive loadings in categories 4, 5, 9, and 12 meaning that it reflected a long trajectory. This may have been the result of post-depositional artifact mixing. Therefore, it is necessary to assess the likelihood of vertical movement at the site. The site is situated on a Pleistocene age terrace above the Ohio River. According to Brown (1997:36) Pleistocene terraces have remarkable preservation potential because during the Holocene, Pleistocene terraces frequently became flooded by overbank sediments producing sealed land surfaces. This is expressed on this landform in the fine sandy deposits which were identified during these excavations (especially on the sandy ridge on which Test Unit 2 was located) which are indicative of very low energy regimes like overbank flood plain deposits (Rapp and Hill 2006:64). The terrace as a whole consists of older alluvium with a lithology of sand, gravel and chert (Kentucky Geologic Survey 2012). The gravel found in this older alluvium is round to angular pebbles to small boulders of crystalline plutonic rocks, aphanitic igneous rocks, other crystalline rocks, limestone, quartz and quartzite, chert, and black shale (Kentucky Geologic Survey 2012). In fluvial setting, such as 15Md158, sands (especially those with larger gravels) indicate relatively high-energy floods or channel deposits which may suggest that the artifact assemblage may be in a secondary context (Rapp and Hill 2006:33). However, Rapp and Hill (2006:33) note that if soil development is evident, as was observed at 15Md158, then the artifacts may be in a primary context. This is because soil development is indicative of a stabilized landform which may mark locations of possible human occupation (Rapp and Hill 2006:38). One problem with well-developed soils like those found at 15Md158 is that they consist of Mollisols. Mollisols are dark, humus-rich soils which are found in grasslands and hardwood forests (Rapp and Hill 2006:42). Mollisols support heavy vegetation and extensive earthworm activity which causes mixing of artifacts and alters artifactual spatial patterning (Rapp and Hill 2006:42). Therefore, when examining the context of 15Md158, although the site is situated on an old and stable landform with well-developed soil horizons the artifact assemblage it is possible that it was affected by a certain level of mixing caused by extensive bioturbation that is prone in the soils that were identified at the site. This possible mixing may explain why no vertical patterning was observed in the production trajectory analysis conducted during this research.

Although artifact mixing may be one explanation for the lack of diversity found in the debitage analysis there is evidence that some areas of the site may yet hold some vertical integrity. One such area is Test Unit 3 where Feature 2 was located. This feature appeared completely undisturbed as the soil was very compact and stained. Furthermore, the artifacts which were recovered from Feature 2 were packed extremely tight in the soil matrix suggesting that little movement had occurred. Compact soil was also observed in Test Unit 5 suggesting that the artifacts in this test unit might also be in primary context. These areas of the site suggest that little artifact mixing has occurred in the assemblage and the lack of diversity found in the debitage analysis could possibly reflect that the site was merely used consistently for the entire time that it was utilized. The context of 15Md158 also explains the large amount of whole and broken river cobbles which were collected in association with the lithic assemblage. The lithology of the terrace consists of sands with pebble to boulder size gravels, therefore, the whole and broken river cobbles are most likely not culturally associated but are a natural feature of the landform.

Although the assemblage collected during this project from 15Md158 was most likely subject to bioturbation which caused artifact mixing and distorted any vertical patterning that may have existed, the production trajectory analysis conducted on the assemblage as a whole should not be affected by the artifact mixing. A long production trajectory for the site was suggested by both the debitage analysis and the biface analysis. The implications of a long production trajectory for this site is that, unlike the findings from previous investigations, this study shows that the full sequence of the lithic reduction process took place at this site. This, however, does not meet the expectations of the paradigm which was used in this research. A non-residential special activity area such as 15Md158 used by logistical collectors in a source area should contain a short, early-stage assemblage (Johnson 1989:120). This is because collectors use logistical expeditions to target and extract specific resources from source area sites where they prepare them for transport back to their residential base camp sites. The result is a short, early stage assemblage (Johnson 1989:120). The residential base camps of logistical collectors are expected to contain long production trajectories because tool needs can be anticipated and are prepared for at these sites (Johnson 1989:120).

The fact that 15Md158, which has not displayed any evidence of sustaining a long-term semi-sedentary settlement, contains an assemblage suggesting a long production trajectory in a resource rich area is perplexing. One reason for this situation may be the particular production trajectory typology which was used in this study. As previously discussed, the typology was designed to be used with the small river gravel cherts of Mississippi. The raw materials from which this assemblage was manufactured occurs in the form of large nodules and cobbles. The difference between the river gravel cherts of Mississippi and the cherts of the Ohio River valley are their size and cortex thickness. It was presumed by this study that these differences in raw material would not negatively affect the results obtained from using the paradigm on this assemblage. This may have not, in fact, been the case and the use of this particular production trajectory typology may be skewing the trajectory measurement to suggest more late stage production activity than was actually present.

Another possible explanation for the results which suggest a long production trajectory is that the residential base camps from which the logistical collectors set out from was at a relatively close distance to this site and therefore they took advantage of this chert rich area to fully manufacture their bifacial tools. According to Janzen (1977) the inhabitants of the Falls of the Ohio region during the Late Archaic located their residential base camps at or near areas where two or more micro-environmental zones came together. The location where 15Md158 is situated fits this description as it is close to a major water source as well as being close to upland areas directly east and south of the site. Because of the resource rich environment in which 15Md158 is situated, it seems possible that there may be a residential base camp site within a reasonably close distance to this site.

One further possibility to explain why 15Md158 does not fall within the expectations of the production trajectory paradigm that was used in this research may have to do with the fact that the majority of the artifacts that were recovered were manufactured from Wyandotte chert. Wyandotte chert is one of two main types of blue-gray chert which were widely exchanged during the Late Archaic and Middle Woodland periods (Morrow et. al. 1992:166; Seeman 1975:47). According to Morrow et. al. (1992:168) the most notable form in which blue-gray cherts occurred during the Late Archaic is the bifacially shaped “cache blade” such as the Adena and Turkey-tail points (both of which have been recovered from 15Md158) which are associated with Late Archaic-Early Woodland exchange and mortuary caches. Perhaps due to the specialized treatment of Wyandotte chert during the period in which 15Md158 was utilized, this material was subject to the full reduction sequence taking place at specialized sites such as this one. Another possible explanation is that if items for ritual and trade manufactured from Wyandotte chert were being made at this site and not tools meant to be utilized this might be why these activities might not have occurred at a residential base camp.

Wyandotte chert, as noted above, is a high quality blue-gray chert that was one of the most important lithic materials that were utilized in the prehistoric Midwest (Seeman 1975:47). This chert mainly outcrops in Harrison County, Indiana which is located directly across the Ohio River from 15Md158. However, it also outcrops in southeastern Crawford County, Indiana and in Meade County, Kentucky which is where 15Md158 is located (Morrow et. al. 1992:167; Seeman 1975:47; DeRegnaucourt 1998:109). Wyandotte chert is derived from the St. Genevieve and St. Louis limestone formations and outcrops in the form of large nodules found in the soil and also in river and stream beds (Morrow et. al. 1992:167; Seeman 1975:47-49; DeRegnaucourt 1998:109). Another major source for Wyandotte chert is Wyandotte Cave which is located in central Harrison County, Indiana (DeRegnaucourt 1998:109). Wyandotte chert nodules can range in size from several inches to about twelve inches in diameter (Seeman 1975:47). Quarry sites for Wyandotte chert that have been identified in Harrison County, Indiana consisted of shallow pits or trenches that were dug through soil to eroding strata of chert-bearing limestone (Seeman 1975:49). It is believed that these sites supplemented the collection of the chert from the ravines, rivers, and streams in which it tends to collect (Seeman 1975:49). The facts that this resource was easily accessible as well as its high quality are probable reasons for why it was such a favored raw material (Seeman 1975:49). The use of Wyandotte chert as a major lithic raw material can be traced back to the Late Paleoindian and Early Archaic periods. However, there was a dramatic decrease in its use during the Middle and Late Archaic periods (Seeman 1975:52). During the Early Woodland period Wyandotte chert once again became a major raw material source, so much so that in some areas it presence can serve as a horizon marker for the period (Seeman 1975:52)

There have been several Early Woodland period sites located in Harrison County, Indiana by Seeman (1975) that resemble 15Md158 in several ways, including its preference for Wyandotte chert. Like 15Md158 these sites were located along topographic rises along the Ohio River that parallel the river course (Seeman 1975:50). Seeman (1975:50) notes that this appears to be a dominant settlement pattern in the major river valleys of the Midwest and Middle South. As noted above, the heavy use of Wyandotte chert at these sites appears to be a horizon marker dating these sites to the Early Woodland period. Seeman (1975:55) also dated these sites to the Early Woodland because the most common artifact that was recovered from them were Adena "leaf-shaped" blades, many of which were rejects which were improperly thinned or broken during manufacture. Virtually all of the cache blades, including Turkey Tail and Adena points, from these sites were manufactured from Wyandotte chert (Seeman 1975:55). These sites were also like 15Md158 in that they contained massive amounts of debitage and fire-cracked rock, all manufactured mostly from Wyandotte chert (Seeman 1975:55). These sites, also like 15Md158, were noted to reflect mostly workshop activity with little evidence being recovered to suggest a true habitation site (Seeman 1975:55). Seeman (1975:55) surmised that once Wyandotte chert had been gathered from the uplands and surrounding drainage areas that it was brought down to the Ohio River bottoms and worked into both blanks and finished artifacts. Seeman (1975:55) further noted that the concentration and density of cultural material on these workshops was greatest at those sites closest to the outcrops.

According to Seeman (1975:55) there is a variety of evidence that supports the data from these sites that suggest a trend toward a more specialized utilization of Wyandotte chert from the Early to Middle Woodland. Seeman (1975:55) notes that the vast quantities of Early Woodland material from Wyandotte chert strongly suggests specialization in the area for the production of particular artifact classes made for extra-regional distribution. The other evidence from these sites that suggest a specialized utilization of Wyandotte chert was the recovery of several artifacts classes that did not relate directly to workshop activities, however, did not exactly suggest long term habitation (Seeman 1975:55). These included gorgets with Adena-type drilling, stone tubular pipes which could possibly be associated with the Adena mortuary complex (Seeman 1975:55-56). 15Md158 differs from these Harrison County sites in that no such artifacts have yet to be recovered from the site. These sites, however, like 15Md158, did contain small amounts of pottery (Seeman 1975:56). The pottery from these sites appears to be similar to that found at 15Md158. Seeman (1975:56) describes them as thick, poorly fabricated with mostly grit tempered with smaller amounts of chert tempered and grit and chert tempered that fall within the range of Marion or Fayette Thick. According to Seeman (1975:56) the use of chert tempering is significant as Wyandotte chert was the temper in eighteen of the nineteen flint tempered sherds. He believes that this again supports the position that Early Woodland groups that utilized these sites were part of a system which utilized Wyandotte chert in specialized ways (Seeman 1975:56).

Although Wyandotte chert was the most recovered chert type recovered from this project, making up 79 percent of the assemblage, there were several other types which were also collected. The other 21 percent of the assemblage was manufacture from Boyle, Harrodsburg, Jeffersonville, Muldraugh, Paoli, Sonora, St. Louis Green, and other unidentified cherts. Most of these cherts are also local to the area in which 15Md158 is located. Boyle chert outcrops in the inner Bluegrass areas of central Kentucky such as Boyle, Lincoln, and Garrard Counties (DeRegnaucourt 1998:134). Harrodsburg chert outcrops extensively in southern Indiana in counties such as Monroe, Lawrence, Jackson, and Brown (DeRegnaucourt 1998:114). Jeffersonville chert outcrops in the south-central Indiana counties of Floyd, Clark, Scott, Jefferson, Jennings and Decatur; and in the north-central Kentucky counties of Jefferson, Oldham, and Trimble (DeRegnaucourt 1998:118). Muldraugh chert outcrops in the south-central Indiana counties of Harrison, Floyd, and Crawford; and in the Kentucky counties of Jefferson and Knox (DeRegnaucourt 1998:150). Paoli chert outcrops in north-central Kentucky in the counties of Harrison, Robertson, Powell and Menifee counties (DeRegnaucourt 1998:154). Sonora chert outcrops in central Kentucky in Hardin and Hart Counties (DeRegnaucourt 1998:162). St. Louis Green chert outcrops in eastern Kentucky in Carter, Fleming, Bath, Nicholas, Rowan, Lewis, Powell, and Bracken counties.

According to Schlarb (personal communication, April 9, 2012) lithic assemblages along the Ohio River are prone to contain a wide variety of chert types that were used in the manufacture of stone tools. This is because all drainages in Kentucky eventually empty into the Ohio River, not to mention drainages from other states empting into it, which causes it to hold an extremely large variety of cherts in gravel bars throughout the river (Schlarb, personal communication, April 9, 2012). Because the Ohio River contains such large and diverse amounts of chert, Schlarb (personal communication, April 9, 2012) argues that the inhabitants of the Ohio River Valley took advantage of this rich chert source which explains the diverse assemblages that are collected in the region. Furthermore, Schlarb (personal communication, April 9, 2012) notes that this is also the most probable explanation for any occurrence of exotic cherts which occur in local assemblages.

Conclusions

This project was designed to look at different aspects of a Late Archaic lithic manufacturing site in the Ohio River Valley in order to enhance the understanding of the mobility patterns used by the prehistoric inhabitants of the region. The site chosen for this study was 15Md158, a large workshop site located on an Ohio River terrace on Fort Knox, Meade County, Kentucky. This study examined the vertical distribution of the artifact assemblage to look for a change of use in the site through time in both stages of lithic reduction and in lithic procurement strategies, and examined the horizontal distribution to see if the different areas of the site were used for different stages of the lithic reduction process. Another major goal of this project was to develop a more secure chronology for the site as well as to better understand the nature of the site.

These questions were confronted by using an artifact typology to analyze the collected assemblage that was meant to measure the production trajectory length that took place at the site. The production trajectory length of an assemblage is a measure of the stages of the lithic reduction process that took place to create the assemblage. It was found that a long production trajectory took place at 15Md158. There was no vertical or horizontal patterning identified in the assemblage to suggest changes in site use through time or across the site. Furthermore, the analysis did not find variations in the ways the different cherts were used at the site.

Although this study did not have any success in finding variations in site use, it did seem to successfully address the other major concerns of the site, its chronology and a better understanding of its nature. This study recovered further evidence that suggest that this site was most heavily utilized during the Late Archaic and even more extensively in the Early Woodland period. This is suggested by the recovery of several diagnostic projectile points and pottery, ^{14}C chronometric dates, and the key use of Wyandotte chert as the main raw material utilized at the site.

As a non-residential source area site this site, according to the paradigm that was used, should contain a short, early stage production trajectory. Several explanations were offered for this unexpected result. It maybe that the typology was unsuitable for the raw material or that the residential base camp of those who utilized the site was relatively close. However, because sites that appear very similar to 15Md158 are located nearby in Harrison County, Indiana, it appears that this site could possibly be part of a network of lithic manufacturing sites that were used to manufacture ritual and trade good lithics from Wyandotte chert. The long production trajectory at 15Md158 could be explained if this were the case because perhaps Wyandotte chert was subject to the full reduction sequence taking place at specialized sites such as this one. Perhaps items meant for ritual and trade were being manufactured at specialized sites whereas tools for utility were made at residential base camps.

The findings from this research that 15Md158 could possibly be part of a network of lithic manufacturing sites that were used for the specialized manufacturing of Wyandotte chert definitely adds some interesting aspects to what is known about the use of this site. In light of this possible association, further archaeological investigations of 15Md158 are certainly warranted. Further investigations should concentrate on excavating the remainder of Feature 2 in order to better understand its nature and possibly the stripping of larger areas of the site in order to look for additional features. By better understanding Feature 2 and identifying additional features it may be possible to find further association between this and the other Harrison County, Indiana Wyandotte chert manufacturing sites that will lead to further insights about the specialized treatment of this distinctive resource.

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