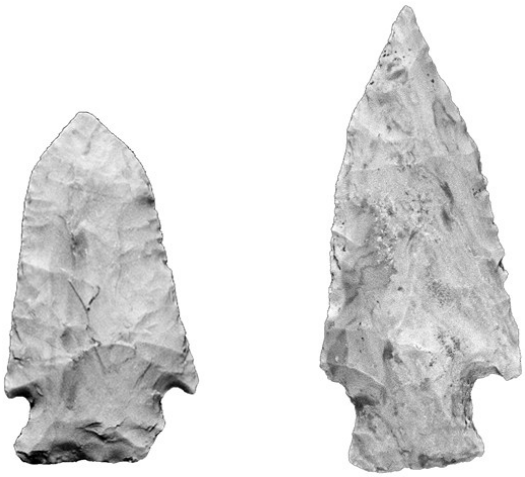
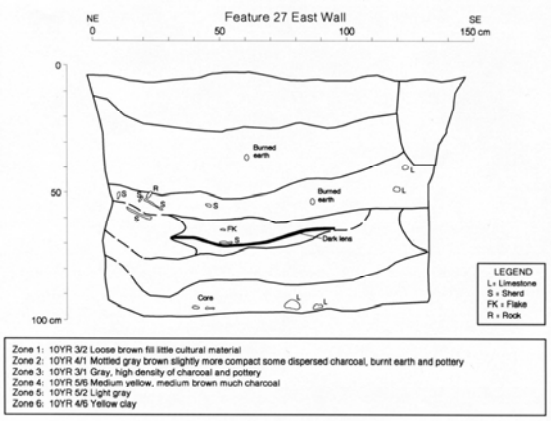
THE STAUFFER SITE, 23CO499:

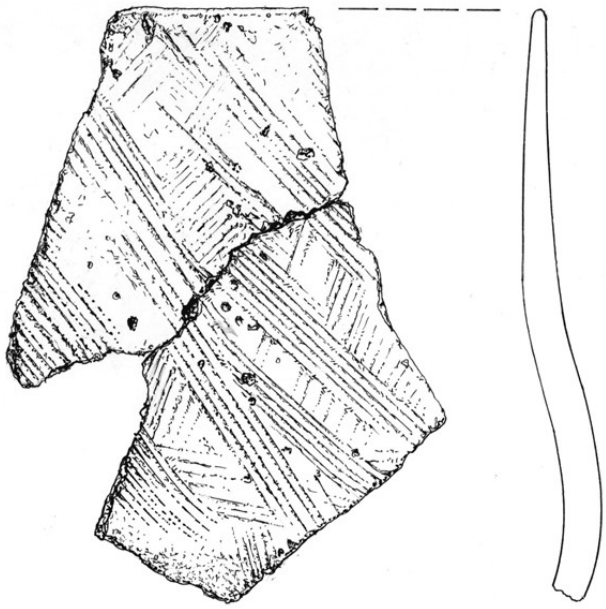
A Late Archaic campsite and Late Woodland residential site in Central Missouri

Robert J. Hoard
and
Aaron A. Anglen

with contributions by
John R. Bozell
Danielle Montague-Judd
Elizabeth J. Miksa
Terrell Martin
Michael C. Meinkoth and
Patti J. Wright







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Prepared by the Historic Preservation Section of
the Missouri Department of Transportation for
the Federal Highway Administration,
U.S. Department of Transportation

Report Authors
Robert J. Hoard
and
Aaron A. Anglen

with contributions by
John R. Bozell
Danielle Montague-Judd
Elizabeth J. Miksa
Terrell Martin
Michael C. Meinkoth and
Patti J. Wright

Principal Investigator
Robert J. Hoard

Pete Rahn, Director
Missouri Department of Transportation

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NOTE: While this report was released in 2008, the majority of it was written in 2000.

ABSTRACT

In early February, 1993, personnel from the Cultural Resources Section of the Missouri Department of Transportation (MoDOT) conducted an intensive Phase I cultural resources survey of the MODOT Job No. J5S0352 project corridor. The project was designed to replace Bridge No. S-410 and to realign approximately 2.25 km of Route 179 in western Cole County, Missouri. As a result of the survey, MODOT archaeologists documented four previously unrecorded sites (23CO496-23CO499), and Bridge No. S-410. An extensive testing program was initiated on threatened portions of sites 23CO497, 23CO498, and 23CO499. It was determined that the project would have no adverse effect on 23CO497 and 23CO498. However, because of the presence of intact features on 23CO499, a program was developed and carried out to mitigate the project's impact to the site.

MODOT conducted a Phase II testing program at the site during the summer of 1993, which revealed a high artifact density and features on the high terrace portion of the site, and a lower artifact density on the sloping areas of the site (Martin et al. 1994). Features identified during the Phase II investigation included a hearth or hearth dump and two trash-filled basin features. Artifacts recovered from the site include Late Woodland pottery and projectile points, a Late Archaic Etley projectile point, debitage, fire-cracked rock, and faunal remains.

In 1994, large-scale excavation of the site was conducted to mitigate the impact of highway construction through the center of the site. Hand excavation, followed by mechanical stripping of the site produced diagnostic artifacts from the Dalton through Late Woodland periods. The Late Woodland presence is by far most notable. Excavation revealed twenty nine features, including six hearths; five small shallow trash-filled basins; five deep, stratified pits; four earth ovens; four artifact concentrations; three post molds; and two features which are thought to represent dwellings. The hearths cannot be assigned to any chronological period at this time due to a lack of associated diagnostic materials. However, most of the other features appear to be associated with the Late Woodland component by the presence of diagnostic artifacts, and all of the stratified pit features are Late Woodland. Three radiocarbon assays—1,300±70, 1,260±80, and 990±60 B.P. (uncorrected)—all from pit features, are further evidence of the strength of the Late Woodland component at the site.

TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS i

ABSTRACT ii

LIST OF FIGURES iv

LIST OF TABLES vi

LIST OF APPENDICES vii

INTRODUCTION 1
With a contribution by Michael C. Meinkoth

ENVIRONMENTAL SETTING 30
By Terell Martin

INVESTIGATION PROCEDURES 36

SITE STRUCTURE 42

CERAMIC ANALYSIS 66
With a contribution by Danielle Montague-Judd and Elizabeth J. Miksa

LITHIC ANALYSIS 96

PALEOETHNOBOTANICAL ANALYSIS 125
By Patti Jo Wright

FAUNAL REMAINS 135
By J. R. Bozell

HUMAN REMAINS 163
By J. R. Bozell

CONCLUSIONS 164

REFERENCES CITED 166

FIGURES

Page

1. General Project Location 2
2. Location of Project and Cultural Resources 3
3. Boundaries of Boone Phase from Hoard 2000 16
4. Radiocarbon Dates from Boone Phase Sites 17
5. Boone phase sites from Hoard 2000 18
6. Mound types for Boone Phase from Hoard 2000 20
7. Boone Phase points from Hoard 2000 25
8. Distribution of Excavation Units, Scraped Areas, and Features 38
9. Feature 19 Plan View and Profiles 46
10 Plan View of Feature 19 at 35 Centimeters Below Surface 48
11. Plan View of Feature 19 at 40 Centimeters Below Surface 49
12. Feature 42 51
13. Profiles of Features 27 and 28 53
14. Profiles of Features 33 and 38 56
15. Profile of Features A and Plan and Profile Views of Feature 18 57
16. Plan View of Feature 23 60
17. Parts of a Ceramic Vessel 68
18. Decorated Sherds—Patterned Brushed, Brushed, and Incised 73
19. A Large Incised Sherd from Feature 27 75
20. Punctated and Incised Rims, and a Bowl Rim 76
21. Lip Decorations 78
22. Change in Ceramic Vessel Wall Thickness through Time. 83
23. Ratios of Temper, Matrix, and Void Space for All Sherds 89
24. Means and Ranges of Grain Size for All Sherds. 90
25. Cumulative Volume Percent Grain-Size Distribution for All Sherds 91
26. Possible Bird Figurines and Pipe Bowl. 93
27. Point Measurements 101
28. Early Projectile Points and Projectile Point Fragments. 102
29. Late Archaic Etley Projectile Points, Whole and Partial, from Features and Excavation Units 103
30. Late Archaic Etley Projectile Points, Whole and Partial, from the Northwest and Northwest II Scrapes. 104
31. Late Archaic Etley Projectile Points, Whole and Partial, from the Northeast Scrape. 105
32. Late Archaic Etley Projectile Points, Whole and Partial, from the Southeast Scrape. 106
33. Early, Middle, and Late Woodland Projectile Points. 107
34. Late Woodland Kings Corner Notched and Rice Side Notched Projectile Points. 108
35. Late Woodland Scallorn Projectile Points From Features at the Stauffer Site 109
36. Late Woodland Scallorn Projectile Points from Test Units, Excavation Units, and Scrapes. 110
37. Other Arrow Points. 111
38. Unidentified Projectile Points and Projectile Point Fragments 112
39. Core Raw Material Type by Feature. 116

40. Selected Drills, Microcore, Microdrills, and Gravers. 118
41. Ground Stone Celt, Pestle, and Hoe Fragments. 121
42. Bone Tools 138
43. Major Categories of Identified Unmodified Faunal Remains. 144
44. Bone Preservation Categories for Feature and Non-Feature Proveniences. 150
45. Recovery Strategies and Major Categories of Identified Faunal Remains. 151
46. Deer Bone Density Values Arrayed Against Minimal Animal Units (MAU). 152
47. Percentage of NISP for Major Provenience Categories. 153
48. NISP and MNI Faunal Richness Values for all Features. 153
49. MNI Values Organized by Environmental Zone. 156
50. Deer Food Utility Index (FUI) Values Arrayed Against Minimal Animal Units (MAU). 159
51. Observed Frequency (FO)/Expected Frequency (FE) Values for Major Deer Skeletal Portions. 159
52. Percent Fish NISP Arrayed Against Percent Deer NISP for 17 Late Woodland Faunas From Illinois and Missouri. 161

TABLES

Page

1. Dates From Central Missouri Late Woodland Sites 17
2. Comparison of Tree Citings in General Land Office Survey Notes by Resource Zones....33
3. Excavation Unit Dimensions.....39
4. Features Excavated.....44
5. Attributes of Structure Remains from Late Woodland Sites in West Central Illinois and Missouri. 64
6. Mean Estimated Orifice Diameter From Features A, 27, and 28. 69
7. Results of Experimental Brushing of Clay Test Tiles.....71
8. Synopsis of All Sherds Recovered From P III Excavation at the Stauffer Site 79
9. Attributes and Quantities of Rim Sherds 80
10. Decorated Sherds by Provenience 81
11. Mean Thickness of Sherds From Radiocarbon Dated Features.....82
12. Sample Inventory of Sherds Analyzed from the Stauffer Site.....84
13. Point-Count Parameters for Grain-Size Data.....85
14. Point-Count Parameters for Compositional Data. 86
15. Grain-Size Data for Point-Counted Stauffer Site Sherds.....87
16. Compositional Data for Point-Counted Stauffer Site Sherds. 88
17. Mean Grain Size and Standard Deviation, in Phi Units, for Each Sample.....91
18. Identifiable Cherts 96
19. Criteria Used for Chert Identification 97
20. Debitage and Flaked Stone Tools.....99
21. Projectile Point Types Recovered from Stauffer 100
22. Projectile Point Type Descriptions.....113
23. Non-Chert Stone Tools From the Stauffer Site.....119
24. Summary of identified vertebrate remains from the Stauffer site.....140
25. Modifications observed on faunal remains from the Stauffer site.....141
26. Summary of faunal remains from the Stauffer site organized by provenience.....143
27. Season of Death Estimation of Fish Remains from Four Features.....155
28. Deer Body Portion, Food Utility, and Bone Density Values for the Stauffer Site 157

APPENDICES

Page

1. Artifact Classification Guide used for the Analysis of Material from the Stauffer Site 191
2. Metric Dimensions of Whole Projectile Points from the Stauffer Site 194
3. Metric Dimensions of Projectile Point Fragments from the Stauffer Site. 198
4. Cores from Features. 202
5. Whole Bifacial Tools. 206
6. Biface Fragments. 207
7. Drills 210
8. Gravers 210
9. Scrapers 211
10. Unifaces 212
11. Amorphous Ground Stone 212
12 Grinding Slabs and Grinding Slab Fragments. 213
13. Manos 215
14. Hoes, Celts, Pestles 215
15. Abraders 215
16. Hematite 216
17. Hammer Stones 218
18. Nutting Stones 218
19. Tabulation of Charcoal Fragments. 219
20. Modified Bone 224

Chapter 1

INTRODUCTION

Site Description

Site 23CO499, the Stauffer site, is a multi-component site located in northwest Cole County, Missouri, approximately eight miles northwest of Jefferson City (Figures 1 and 2). Its legal description is the E½ SE¼ SW¼ and W½ SW¼ SE¼ of Section 10, Township 45 North, Range 13 West and it lies between the elevations of 580-620 feet above mean sea level. Site limits, which remain poorly defined due to the restricted nature of the MODOT investigations, are estimated to be 190 meters north-south by 100 meters east-west, or 19,000 square meters (Figure 2). The site is located on an upper T_2 stream terrace and south-facing slope overlooking the floodplain of Meadows Creek, a minor tributary of the Missouri River. The topography of the area is hilly, with the landscape becoming dissected and rugged near the Missouri River Valley, which lies one kilometer to the east. The closest useful and reliable water source is Meadows Creek, which drains into the Missouri River approximately 1.1 kilometers north of the Stauffer site. Meadows Creek drains an approximately 14 square kilometer area in the uplands to the southwest of the site.

History of Previous Investigations

In early February 1993, MoDOT Cultural Resources personnel conducted a Phase I cultural resources survey of the project corridor which was designed to replace Bridge No. S-410 and to realign approximately 2.25 km of Route 179. As a result of the survey, MODOT archaeologists documented four previously unrecorded sites (23CO496-23CO499). MODOT Design personnel were able to redesign the project so that the job would not impact site 23CO496, a light density lithic scatter. However, it was not possible to avoid the remaining sites, and Phase II testing program was carried out on threatened portions of sites 23CO497, 23CO498, and 23CO499—the Stauffer site. Site 23CO497 was a light lithic scatter of unknown cultural affiliation. Test excavations showed no evidence of intact deposits or features within the proposed construction area. Sites 23CO498 and 23CO499 both produced diagnostics from the Late Archaic and Late Woodland periods. Test excavations at 23CO498 revealed that its deposits were mixed and the probability of encountering features was judged to be low. MoDOT determined that the project would have no adverse effect on 23CO497 and 23CO498.

The 1993 Phase II testing program at the Stauffer site consisted of the hand-excavation of 13.5 square meters and 7.9 cubic meters of fill from a pair of two square meter units, eight one square meter units and one test unit that was one half of a square meter. Three of the test units were placed on the edge of the upper terrace scarp within the area where shovel test pits excavated during the initial Phase I survey produced a high density and diversity of cultural material. Station 481+00 served as the primary datum of 1000N/1000E. As a result of test excavations, three areas were designated as features (Features 1, 2/3, and 5). Artifacts recovered from testing include Late Woodland pottery and projectile points, a Late Archaic Etley projectile point and a similar point base, debitage, fire-cracked rock, and faunal remains. Artifacts were present in medium to high densities.

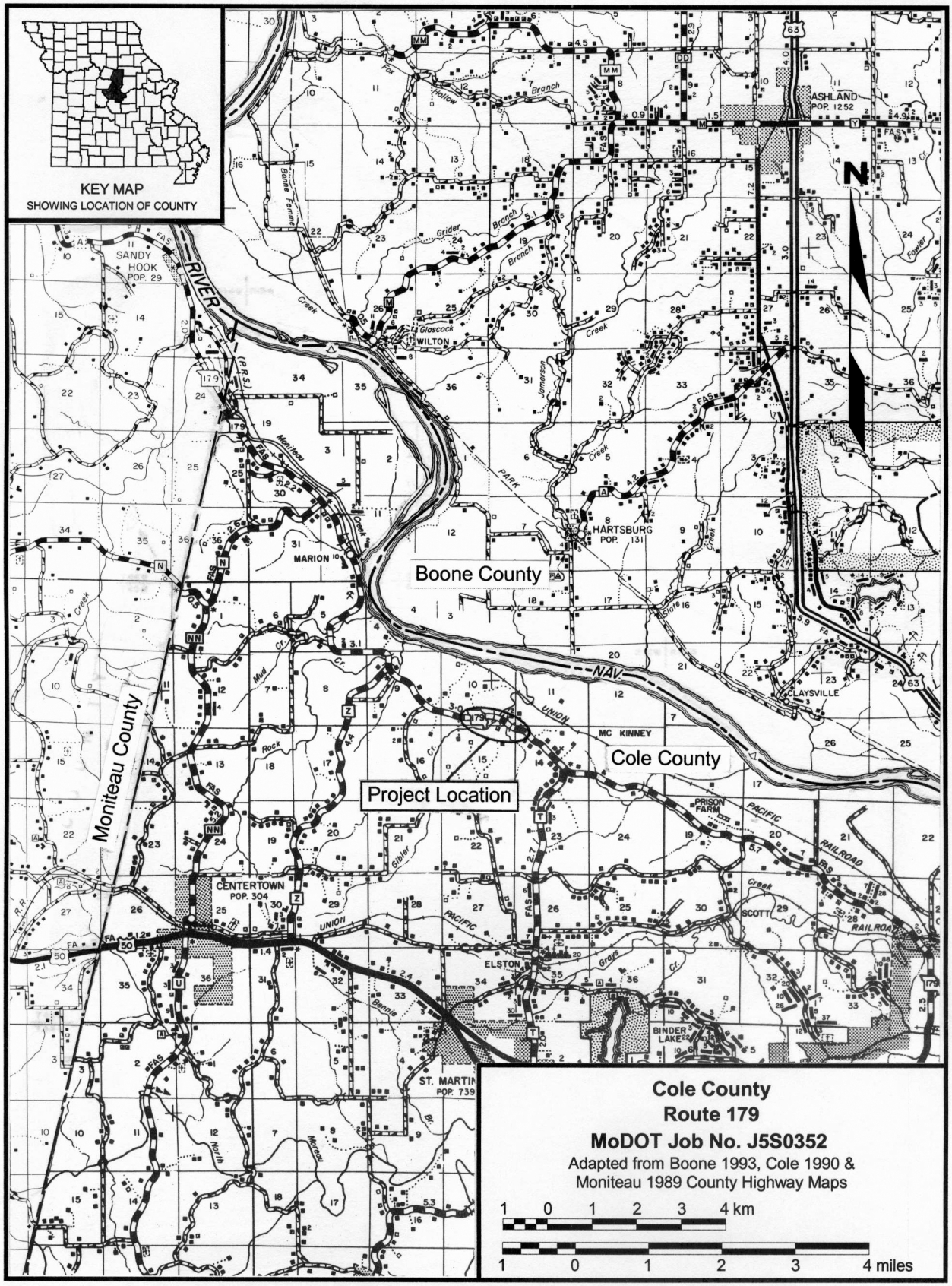


Figure 1. General Project Location (County Highway Map).

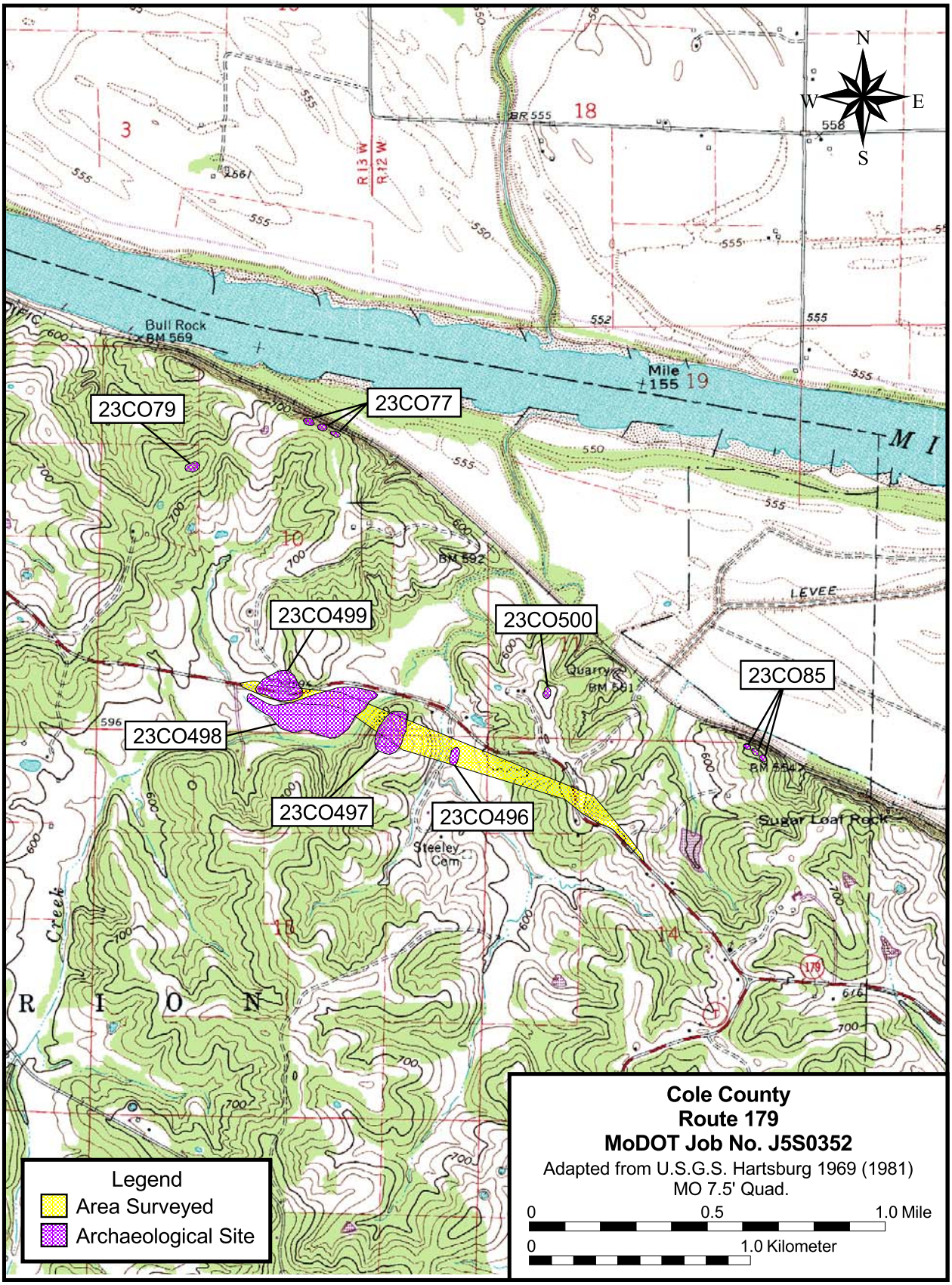


Figure 2. Location of Project and Cultural Resources, U.S.G.S. Topographic Map.

The highest artifact density and all features encountered during the Phase II investigation are on the high stream terrace. Artifact densities on the slope are much lower. Feature 1 is a remnant of a hearth or a hearth-dump, and appears to be associated with Late Woodland occupation based on the presence of ceramic body sherds in association with the feature. Features 2 and 3, originally interpreted as two superimposed basin features, were later interpreted as a compound basin feature and referred to as a single feature, Feature 2/3. Feature 4 was defined as a dense scattering of artifacts and bone across Test Unit 2. However, based on further consideration, it was decided that the scatter was part of a Late Woodland sheet-midden, and because its borders could not be clearly defined, its designation as a feature was dropped. A concentration of bone and artifacts was found in the third soil zone, described below, and is now interpreted as part of a Late Woodland sheet midden (Martin et al. 1994:47). Feature 5 was a shallow pit with a flat bottom and a vertical wall. It extended from 35 centimeters to 60 centimeters below surface. This feature included a light density of bone, ceramics, and lithic debitage. It lies under Feature 2/3 in Test Unit 2. As we note below, extensive excavation showed that Features 2/3 and 5 are all part of one large feature, Feature 19.

Artifact Assemblage

A total of 4,687 artifacts, weighing approximately 7.3 kilograms, was recovered from the 12 test units excavated on the Stauffer site during the 1993 MODOT investigations. Of this total, 2702 (5,798.6 grams) were lithic artifacts (debitage, biface and biface fragments, flake tools, and ground stone tools); 1,985 were ceramic artifacts; and 135 were faunal remains (57.0 grams).

Lithic debitage, the largest category of lithic artifacts recovered during testing, represents 90 percent by count and 85 percent by weight of the lithic assemblage. The assemblage represents all stages of lithic reduction, from the initial processing of the raw material to tool maintenance. Stone tools, including projectile points, bifaces, flake tools, and a uniface were recovered.

Three arrow points and six arrow point fragments were recovered during testing. One of the complete arrow points was classified as a Klunk or Koster side-notched point and the remaining two were classified as Scallorn points. Two of the arrow point fragments also can be classified as Scallorn points, but the rest were considered too fragmentary to accurately classify. All arrow point styles date to the Late Woodland period, and are common regional types (Justice 1987).

Nearly 2,000 ceramic artifacts were recovered during the Phase II investigations. The vast majority of ceramics were small, less than one half inch in their longest dimension. Martin et al. (1994) reported that the large sherd assemblage represents a mixture of tempering agents that has not been reported in the central Missouri area, including grog, fine and coarse ground limestone, and crushed dolomite, alone or in combination. A single red-filmed, grog-tempered sherd was reported.

Nine rim sherds were recovered during testing. Most were too small to identify vessel form. Those sherds that are large enough to determine vessel form represent the classic Late Woodland conical jar form. Lip form is represented by square, rounded, rolled, and folded lip treatments. No tool impressions, punctates or other decorations were noted on the rim sherds.

Large Scale Excavation and Data Recovery

In 1994, excavation of the site was conducted to mitigate the impact of highway construction through the center of the site. Hand excavation, followed by mechanical stripping of the site produced diagnostic artifacts from the Dalton through Late Woodland periods. The Late Woodland presence is by far most notable. Excavation revealed twenty nine features, including six hearths; five small shallow trash-filled basins; five deep, stratified pits; four earth ovens; four artifact concentrations; three post molds; and two features which may represent dwellings. The hearths cannot be assigned to any chronological period at this time due to a lack of associated diagnostic materials. However, most of the other features appear to be associated with the Late Woodland component via the presence of diagnostic artifacts, and all of the stratified pit features are Late Woodland.

Culture History In Central Missouri

By Michael C. Meinkoth and Robert J. Hoard

There is good evidence that people have been living in the central Missouri area for 12,000 years. Sites predating this time have been reported, but they are rare and usually are controversial. It is generally agreed that the human settlement of the New World occurred approximately 10,000 years B.C. Currently, there is no firm evidence indicating a human presence in Missouri prior to 9,200 B.C. The oldest known human remains from the state, recovered from Rodgers Shelter, have been radiocarbon dated to 8,500 B.C. (Wood et al. 1995:48).

Paleo-Indian Tradition (9500 to 7500 B.C.)

The oldest archaeological material in Missouri is associated with the Clovis Complex, “the first soundly documented cultural complex in the midcontinent” (Wood et al. 1995:48). This complex is readily identified by the presence of the Clovis point, which is a bifacially flaked stone tool, lanceolate in form, suitable for use as either a projectile point or a cutting tool. Characteristic of the form is the distinctive fluting found on both faces. Clovis points are perhaps best known for being recovered in association with the remains of extinct megafauna of the late Pleistocene, including mammoth, horse, long-horned bison, tapir, and camel in western North America and mastodon, caribou, and deer in the east. At the Kimmswick Site, south of St. Louis, two Clovis points and other lithic tools were found in association with mastodon remains. Although it has yet to be radiometrically assayed, the site is believed to date to approximately 9,000 B.C.

The Walters Site (23HD38), located on a ridge-top above the Missouri River valley about 17 miles southwest of the project area, is the only Paleo-Indian site in central Missouri that has been investigated to any extent. Lithic material recovered from the Walters Site includes fluted points similar to both western Clovis and Dalton forms, bifaces, end scrapers, retouched and utilized flake tools, cores, and hammer stones. The composition of the site collection does not lend itself to an easy temporal assignment. While they cautiously suggest that the Walters Site represents separate Clovis and Dalton occupations, Wood et al. (1995:50) leave open the possibility that it

may be a single component site that reflects the transition between the Clovis and Dalton complexes.

The Martens Site (23SL222) in Chesterfield is similarly located on a ridge top overlooking the Missouri River valley. Surface collections at the site have yielded dozens of Clovis points, end scrapers, side scrapers, utilized flakes, and other formal tools (Koldehoff et al. 1995:24). Excavations at the site during the summer of 1997 recovered additional Clovis materials, but the analysis is still underway (Toby Morrow, personal communication 1997).

Most Paleo-Indian sites are found on the edge of prairie uplands or on bluffs overlooking river floodplains. These locations would have provided the greatest diversity and number of subsistence resources. However, the limited amount of data available to researchers, attributable to a lack of excavated sites, does not allow detailed statements to be made about most aspects of Paleo-Indian life. While peoples of this time traditionally have been viewed as nomads whose livelihood depended upon large mammals, paleoenvironmental evidence from Missouri suggests that a hunting and gathering mode of subsistence may have been practiced (Reeder et al. 1983:52). Similarly, Wood et al. (1995:165) "find it difficult to believe" that Paleo-Indian populations would have fixed all their attention on large mammals. Instead, they feel that these groups were more flexible and opportunistic, and utilized a wide variety of plant and animal resources. Pollen analysis of lake sediment cores might shed more light on the availability of plant foods. A few flotation samples from known Paleo-Indian contexts have indicated reliance on smaller species as well as fruits and berries (Fulmer et al. 1995:16)

Dalton Period (8900 to 7900 B.C.)

The Dalton period represents a transition from a nomadic lifeway centered on big-game hunting to a subsistence strategy that featured hunting and foraging within a more restricted territory (Chapman 1983:38). The climate became warmer and drier after the end of the Pleistocene and this shift, combined with possible over-hunting by Paleo-Indian hunters, may have contributed to the extinction of most of the megafaunal species. Dalton peoples continued to diversify their resource base and to develop their technology, enabling them to procure various foods more effectively.

The Dalton complex is found throughout the central and southeastern United States, and sites of this period are numerous in Missouri. Notable Dalton components in the northern half of Missouri include those at Arnold Research Cave, Graham Cave, the Dalton Site, and the Pigeon Roost Creek Site at Cannon Reservoir (O'Brien & Warren 1982a:103-106). Graham Cave and Arnold Research Cave, located in Montgomery and Callaway counties, respectively, provide well-documented examples of a Dalton component (Wood et al.1995:51). Noteworthy components in Boone County include the White-Sims Site (south of Ashland), 23BO835, 23BO850, and 23BO851. The nature of Dalton sites—thin living surfaces and a paucity of features—is consistent with short-term occupation by small groups of hunters and gatherers (Wood et al. 1995:52). Many sites have been recorded on grassy uplands near small streams, but rock shelters and stream terraces have also seen Dalton occupation. In the central Salt River valley of northeastern Missouri, Dalton/Early Archaic period sites were found in a variety of

physiographic settings including uplands, bluff edges, and bottomland-terrace margins (Wood et al. 1995:166).

The Dalton projectile point is widely recognized as the hallmark artifact of the period. This point is a fluted, lanceolate form with a ground concave base and serrated edges. Use-wear analysis supports its use as a cutting and scraping tool. Other Dalton complex material includes woodworking tools (adzes, spoke shaves, scrapers) and hide working tools (small-eyed needles, bone awls, spurred flakes) (Wood et al. 1995:51-52). Snares, traps, and other perishable artifacts were undoubtedly used as well.

Subsistence activities appear to have focused on small game and edible plant resources. Hickory nuts and black walnuts were recovered at the Rodgers Shelter on the Pomme de Terre River. The importance of nuts, berries, and seeds is supported by the presence of ground stone implements (sandstone mortars and grinding slabs, pebble manos and rolling pestles, pebble hammer stones and cup stones) at many Dalton period sites (Wood et al.1995:52).

Early Archaic (7500 to 5000 B.C.)

Climatic and cultural trends that began during the Dalton period continued into the Early Archaic. The warming and drying trend associated with the Hypsithermal climatic episode peaked around 7000 B.P., nurturing a diverse array of ecological niches and floral and faunal resources. Subsistence activities expanded to exploit the increasing ecological diversity. Hunting and gathering continued to be important, with plant foods becoming more important and abundant. In addition, more emphasis began to be placed on fishing and collecting shellfish. Early Archaic people settled into a mobile foraging economy involving a three-part seasonal round of hunting and collecting within a relatively restricted territory. Social groups composed of one or two extended families (10-50 people) might hunt and collect together, using a semi-permanent camp as their base of operations.

Noteworthy Early Archaic components in central Missouri include those at the Dalton Site, Graham Cave, Arnold Research Cave, and the Pigeon Roost Creek Site at Cannon Reservoir. Of the Early Archaic sites investigated at Cannon Reservoir, 37.5 % were located on prairie uplands near small streams, 25 % on upland bluff edges, and 37.5 % on high bottomland terraces (Warren 1982:347).

This period is remarkable for a proliferation of chipped-stone tool forms, demonstrating the diversification of activities connected with obtaining food. The earlier fluted forms thought to be associated with thrusting weapons were gradually replaced by a variety of non-fluted, notched styles. Use-wear analysis indicates that many of these tools were utilized for cutting, sawing, or cleaving rather than as projectile points (Chapman 1975:127-128). Various forms of scrapers and drills were produced, often reworked from broken knives or projectile points. Other tool forms include choppers, antler-tip flakers, bone awls, grinding stones, mortars, adzes, and hammer stones. Point types associated with the Early Archaic include Graham Cave Notched, St. Charles Notched, Rice Lobed, and Agate Basin Lanceolate. It is believed that the atlatl, a spear-throwing device that added a great amount of force to a projectile, was developed during this time (Wood et al. 1995:52; Reeder et al. 1983:53).

Archaic people adjusted to the changing environment by maximizing their efficiency in exploiting the ecological niches it provided, leaving behind a variety of tool kits specifically adapted to the differing resources of streams, lakes, swamps, forests, and prairies (Chapman 1975:128). These assemblages reflect an increasing cultural-environmental integration and selective adaptation to the physical environment that would continue throughout the Archaic Period.

Middle Archaic (5000 to 3000 B.C.)

The cultural tradition of the Middle Archaic period people is best characterized as mobile hunter-gatherers (Warren and O'Brien 1982b:78). This period saw the maximum expansion of the prairies and grasslands versus the contracting forests as the Hypsithermal climatic episode peaked. Notable sites in north and central Missouri include Arnold Research Cave, Graham Cave, Pigeon Roost Creek, and the Feeler site (Reeder et al. 1983:54; Wood et al.1995:53). The archaeological record of the Middle Archaic period reveals multiseasonal base camps, permanent habitations, multiregional exchange networks, and specialized plant gathering. The Middle Woodland sites at Cannon Reservoir reflect a virtual abandonment of the prairie uplands in favor of high bottomland terraces and bluff bases, although a few sites remained in use on upland rims (Warren 1982:349-350). The few upland sites probably reflect continued collection of some seasonally available uplands resources, although most game species and residential sites aggregated in the bottomlands (Warren and O'Brien 1982c:392).

The continued proliferation of projectile point forms and worked-bone tools is attributed to tool specialization corresponding with the exploitation of different microenvironments. Characteristic chipped-stone tool forms developed in this period are the Jakie Stemmed and the Big Sandy Notched, some of which were reworked into scrapers (Chapman 1975:175). The ground stone assemblage also expanded with the addition of full-grooved axes, celts, pitted anvil stones, banner stones (atlatl weights), and plummets (fishing net weights). Fiber items such as sandals, bags, and cordage have been recovered from Middle Archaic deposits at Graham Cave and Arnold Research Cave (Chapman 1975:158-159; Wood et al. 1995:53). Recent AMS dating of shoes from Arnold Research cave show that they are as old as 7,500 years (Kuttruff, DeHart, and O'Brien 1998).

Interment practices became more formal and elaborate during the period. Human remains were sometimes laid to rest in a flexed position, covered with red ocher, or cremated. Grave offerings sometimes accompanied the individual (Wood et al. 1995:53).

Economic pressures engendered by environmental changes and gradual population rise were generally offset by increasingly efficient subsistence practices (Warren and O'Brien 1982a:92). Subsistence practices concentrated on local forest and riverine resources, with a broader spectrum of fauna being exploited. The presence of high-yield nuts and some wild seeds in paleobotanical assemblages suggests an increasing reliance on plant foods (Warren and O'Brien 1982b:78). Squash and gourds in the botanical assemblage may indicate the cultivation of both native and Mesoamerican plant species (Reeder et al. 1983:53).

Late Archaic (3000 to 1000 B.C.)

As the mid-Holocene dry period drew to a close, the cultural traditions in central Missouri continued to evolve toward sedentary hunting and gathering, achieving what has been termed primary forest efficiency through a combination of fortuitous environmental factors and technological innovations (Chapman 1980:2-6;Warren and O'Brien 1982b:78). At Cannon Reservoir, the numbers of Late Archaic sites and frequencies of diagnostic artifacts suggest steadily increasing population densities (Warren and O'Brien 1982b:78).

Although sites dating to this period have been found in a variety of physiographic contexts throughout central Missouri, often they consist of little more than a lithic scatter. Residential sites feature deep middens containing organic residue, charcoal, burned earth, and burned rock, as well as evidence of structures and storage pits. These sites seem to fall into two broad types: large upland warm-season villages and small winter encampments (Reeder et al. 1983:55). However, recent investigations at the Callaway Farms site (23CY227) presents evidence of at least six pit houses in the Missouri River flood plain (Harcourt and Meinkoth 1999, Joe Harl, Personal Communication 1999). These house pits are associated with Helton projectile points, and seven tightly clustered radiocarbon dates from the site range, within one sigma variation, from 2460 to 2730 B.P. (uncorrected) (Joe Harl, Personal Communication 2000). Further analysis of this site, currently being conducted by Harl, will surely provide new insights into the Late Archaic in Mid-Missouri. The projectile points at Callaway Farms are unusual for the region, in which it is more common to find lanceolate Sedalia or Titterington points. The Sedalia complex, centered in the Lamine locality, extended eastward through the project area and the Salt River watershed into western Illinois (Chapman 1975:219). Noteworthy Late Archaic Sedalia complex components in central Missouri include site 23BO76, the Geiger Site, and the Booth Site at Cannon Reservoir (Chapman 1975:203)

Deer and other mammals still were significant staples, but nuts, wild seeds, and fish increased in importance (Reeder et al. 1983:55). Native seed and plant remains from Late Archaic sites at Cannon Reservoir include black walnut, hickory, raspberry, blackberry, maygrass, hawthorn, *chenopodium*, acorn, ragweed, sumpweed, knotweed, and butternut (King 1982:203-206).

Late Archaic lithic assemblages reflect the increased use of vegetal products. These tools include the Clear Fork Gouge and the Sedalia Digger, as well as many grinding tools such as manos, pestles, and hammer stones that could have been used for pounding and grinding seeds, roots, and pulpy plants (Chapman 1975:184). Diagnostic chipped-stone tools in the Sedalia Complex assemblage include the Etley Stemmed, Sedalia Lanceolate, Stone Square Stemmed, and various dart points and drills.

Social status differentiation is indicated by the presence of grave goods in burial mounds (Chapman 1975:211-217; Reeder et al. 1983:55). Out of approximately 100 Late Archaic period burials in the Hatten I mound at Cannon Reservoir, fifteen contained artifacts and two contained definite caches of grave goods. Additionally, the combination of single, multiple, and cremated individuals within the same layer suggests that periodic burial ceremonies were held months or years apart, during which time the remains were held for final deposition (O'Brien and Warren 1982b:284).

Early Woodland (1000 to 200 B.C.)

The Early Woodland period in Missouri is enigmatic, and central Missouri is no exception. Well-documented sites with Black Sand or Marion thick ceramics are nearly non-existent. The Early Woodland period in Missouri has been characterized as a continuation and refinement of Late Archaic lifeways. It has been thought that Early Woodland sites are often difficult to distinguish from those of the Late Archaic due to regional variation in the acquisition of ceramic technology and the continued use of some Late Archaic lithic tool types. Typical lithic tool forms of the period include Gary Stemmed; Smith Basal Notched; Steuben Expanded Stemmed; Langtry Stemmed; and Stone Square Stemmed. Beginning around 550 B.C., Black Sand pottery was made with increasing frequency by some central Missouri populations. However, this trait was not universal, and distinguishing aceramic Early Woodland from Late Archaic components remains problematic.

A recent summary of Early Woodland sites in Missouri by Martin (1998) states that Early Woodland sites are more common than we think, but that they can be difficult to identify. Martin's study finds that unlike preceding Late Archaic sites, Early Woodland sites are small and are located almost exclusively in floodplains or on low stream terraces, a conclusion shared by O'Brien and Warren (1982b:79) for Early Woodland sites in the area of Cannon Reservoir. This location is subject to both scouring and deposition, increasing the odds of these sites being destroyed or hidden (Martin 1998:77). Martin also cites evidence that inhabitants of Early Woodland sites did not use local sources as readily as those of the Late Archaic, and that heat treatment was more commonly used (Martin 1998:76-77). Contracting stem points can be used to identify Early Woodland sites in the absence of pottery. Aceramic sites with these points are more common in secondary stream valleys, suggesting Early Woodland settlements in major river valleys with seasonal or short term use of the secondary stream valleys (Martin 1998:75). Subsistence appears to be focused on stream valleys, as evidenced by settlement patterns.

Middle Woodland (200 B.C. to A.D. 400)

Traditionally, the Middle Woodland period is characterized by the widespread use of pottery. This technological advance ushered in nearly a millennium of population growth and resource intensification. Middle Woodland Period pottery is generally tempered with grit or clay and is usually cord- or fabric-marked, with occasional punctation or incised decoration. The vessels are simple shapes with conical bases or jars with either flat bottoms or tetrapod bases.

Also during this period, an interregional exchange and communications network developed along the major rivers. These networks were widespread, and much of the trade was in exotic goods: marine shell and sharks teeth from the southern Atlantic and Gulf Coasts; copper, silver, and hematite from the Great Lakes; mica and steatite from the Appalachians; Knife River flint from North Dakota; and obsidian and grizzly bear teeth from the Rocky Mountains. The range and amount of exotic goods found depends on location, however. The quantity and quality of exotic material recovered in Missouri pales in comparison with that found in the Ohio or Illinois River valleys (Wood et al. 1995:168).

Site locations, according to Wood et al. (1995:169), evince a "continued down slope trend toward bottomland locations." Sites are found on the low floodplains of major streams and bluff-base sites are common. The number of sites on the terraces along minor streams is greater than for the Late Archaic period. Occupation types included large centers with mounds and dense middens, bluff-base villages along streams, seasonal or special-use sites in bottomlands, and bluff-top burial mounds (Wood et al. 1995:168). Villages were often situated at regular intervals where local streams met the river trade routes, functioning as nodal communities or redistribution centers for raw materials and manufactured goods.

Animal and mast resources remained important and there was an increase in the dietary contribution of native annuals. Though not dietary staples, starchy seeds from goosefoot, little barley, knotweed, and maygrass and oily seeds from sumpweed and sunflower probably served as important buffers in times of need (Wood et al. 1995:168-169).

In Central Missouri, Late Archaic and Late Woodland sites are the most common. Sites before Late Archaic are not common anywhere in the region. However, there seems to be a substantial gap between the Late Archaic and the Late Woodland that has yet to be explained. Early Woodland sites like those described in western Illinois are not common anywhere in Missouri, and sites with clearly diagnostic Middle Woodland ceramics are not common in central Missouri. Where Middle Woodland sites are present in the vicinity of the Stauffer site they typically are represented only by diagnostic points. Sites where these are found are not particularly common, and there are few sites that appear to constitute a major settlement. Oddly, Middle Woodland sites flourished on the western margin of the Boone phase region (Chapman 1980:27-47; Kay 1980) and had a notable presence in the St. Louis vicinity (cf. Chapman 1980:47-61; Lopinot 1991).

Middle Woodland sites are rare between the towns of Boonville and St. Louis. The Leonard Haslag collection from Osage County, documented by Klippel (1965:142), included only two rim sherds—one cross hatched, the other dentate stamped—that could be considered Middle Woodland. There are no other Middle Woodland artifacts from the collection. Five sherds and fourteen Snyders-like points are documented by McMillan (1963) from the central Gasconade area. Klippel (1965:142) concludes that any Middle Woodland presence along the Missouri River in central Missouri was not significant. He believes this is due to a lack of adequate agricultural land (Klippel 1965:149). The Missouri River floodplain is more constricted in central Missouri, and may have been prone to a higher degree of catastrophic floods. Still, these areas seemed more than adequate for Late Woodland people who were practicing horticulture, so a simple solution for the lack of Middle Woodland sites is still forthcoming. Sites of this time period may also be buried. The recent recovery of deeply buried Middle Woodland Havana Pottery and Snyders projectile points from the LC Meyer site (23CY563) is a significant discovery. The site is in the Missouri River floodplain near the outfall of the Middle River. Phase II investigations encountered a Late Woodland feature and artifacts (Harcourt and Meinkoth 1999), but mechanical data recovery found multiple features clearly associated with Middle Woodland artifacts at a depth of about a meter (Aaron Anglen, Personal Communication, 1999). Analysis of the site is currently underway.

Schmits et al. (1981:24-38) interpret 23BO406, a large debris scatter on the floodplain and valley wall of Mill Creek, as a Middle Woodland base camp. The site has a wide range of tool types including Snyders, Norton, and Langtry points and ground stone tools. The site covers over 7,900 m^2 and has four areas of artifact concentration, which may represent different residences or activity areas from a single occupation or repeated occupations. A Snyders or Mankers projectile point fragment was found at a nearby lithic procurement and processing site (23BO987) (Schmits et al. 1981:53-57).

Two probable Middle Woodland/early Late Woodland sites are reported in the Perche-Hinkson drainage just west of Columbia (Reeder et al. 1983). These sites—23BO970 and 23BO972—were year-round residential sites, located on low terraces close to aquatic, arboreal, terrestrial, and lithic resources. Diagnostics at the sites include Steuben, Scallorn, Gary, and Kings Corner Notched points and chert and quartzite- or quartzite-tempered sherds (Reeder et al. 1983:84-94, 132-138). Plant remains recovered from the sites indicate a riparian or floodplain forest nearby. Both sites produced knotweed, goosefoot, and maygrass as well as acorn, hazel nut, hickory, and walnut. While the artifact assemblages from these sites indicates Middle Woodland occupation, there appears to be no Hopewellian influence. In fact, holding aside the use of cultigens, the lifeway represented by the site is more similar to Archaic than Woodland (Reeder et al. 1983:230).

Three Renner cross-hatched rims, a type known from the Kansas City Hopewell center, were recovered from 23CP40 in western Cooper County along the Lamine River. Also, the presence of Chariton Plain is tentatively interpreted by Fox (1992a:14) to indicate a Terminal Middle Woodland occupation of the site, though he notes that this pottery type also is considered to be Late Woodland. Unfortunately, because deposits are mixed at this site, a Middle Woodland assemblage, if one exists, cannot be discerned.

Finally, Chapman (1980:52) interprets site 23CY30 as a way station for wandering Havana phase emissaries traveling between the Big Bend sites and the Havana center in Illinois (Chapman 1980:52, 56). The site is located on Cedar Creek near its mouth at the Missouri River. In the site form the site is reported as small and having a small number of sherds with cross-hatched rims. Attempts by one author (RJH) to relocate the site have not been successful. While Chapman's interpretation may be overwrought, if the site exists it would be the only site with Hopewell ceramics for many miles upstream or downstream on the Missouri River.

The ceramic assemblage at site 23CY352 includes a single sherd considered to be Middle Woodland. It is 5 mm thick, grit-tempered and has an incised line enclosing a stamped or fabric-impressed surface. Traver (1985:146) states that it is similar to a southeast Missouri Middle Woodland sherd illustrated by Chapman (1980:Figure 3, 32f).

Late Woodland (A.D. 400 to 1200)

Late Woodland sites are among the most common in central Missouri. They are characterized by small scatters of limestone-tempered pottery and small arrow points. Subsistence activities appear to have focused on a variety of dietary resources including mammals, fish, mussels, and wild and domesticated plants (Voigt 1986:198). Analyses of carbonized seed assemblages

indicate that Late Woodland groups relied upon oily seeded plants (sumpweed, sunflower), starchy seeded plants (goosefoot, knotweed, little barley, maygrass), and, to a lesser degree, maize (Voigt 1986:213).

Some sites appear to have served as year-round habitations, implying that Late Woodland groups may have lead a sedentary or semi-sedentary life (Voigt 1986:198-199). Two Late Woodland phases—the Maramec Spring phase (Reeder 2000) and the Boone phase (Hoard 2000)—are present in Cole County (Meinkoth et al. 2000). The Stauffer site falls within the boundaries of the Boone Phase.

The Boone Phase[1]. The Boone phase represents the presence of people who lived from ca. A.D. 450 to 1,200 in small, transient groups along the bottomlands of the Missouri River and its tributaries between the mouth of the Little Chariton River near Glasgow in Howard County and Auxvasse Creek in Callaway County. They lived by hunting deer, by fishing and collecting mussels, and by raising native domesticated plants as well as small amounts of maize. Fields may only have been used for a few seasons before being abandoned, explaining the relative scarcity of sites with deep storage pits. They took game using the bow and arrow, darts, and fishhooks, and cooked food in undecorated clay pots tempered with coarse limestone and in some cases small amounts of sand. They buried their dead in mounds of earth or earth and stone on prominent bluffs above drainages, and occasionally left ceramic pots, pipes, or ornaments with the deceased. Boone phase people persisted in a Late Woodland lifestyle while populations in surrounding regions took on Mississippian attributes such as intensive maize cultivation, hierarchical residential patterns, inter-regional trade of exotic goods, and increased social stratification.

The Boone phase arises from an area with an inconsequential Middle Woodland presence and, unlike neighboring areas, never is occupied by people that archaeologists would call Mississippian. There is no evidence of intensive maize cultivation or of strongly nucleated villages occupied by several generations. Yet the Late Woodland sites of the Boone phase are among the most common in central Missouri. Possibly the Late Woodland lifestyle of dependence on wild and cultivated native resources, searched out and raised in the floodplains and low terraces of drainages, was sufficiently different from the Middle Woodland and Mississippian patterns to be successful in central Missouri. The Scandic and Neo-Atlantic climatic episodes roughly correlate with the Boone phase as defined here. The Scandic episode (A.D. 270-690) was one of warming, culminating in the Neo-Atlantic (A.D. 690-1,100), a 400 year period of increased moisture (Wendland 1978:281). In the Great Plains, this was a period of cultural expansion for horticultural populations. Because Boone phase people depended on native domesticates that thrive in moist lowland areas and on aquatic faunal resources, this climate shift may have allowed for expansion into areas previously marginal for their particular subsistence regime. In turn, the desiccation of the Pacific episode (A.D. 1,00-1,550) may have required a shift in subsistence, and possibly gravitation toward Middle Mississippian centers in other areas, though this is speculative.

History of the Boone Phase. The Boone phase initially was described by Chapman (1948) as the Boone focus. His description of the focus was in essence a trait list based on earlier work by

[1]This discussion is derived largely from Hoard (2000)

Fowke (1910), Harrington (1938) and Berry et al. (1938). Originally thought to be indicative of the Early Woodland (Chapman 1948, 1952), later research identified it as a Late Woodland manifestation dating A.D. 400-900 (Chapman 1953:37-38, 1980:1, 78-137; Denny 1964). Traits for the focus came largely from descriptions and inventories of burial excavations. Chapman described the Boone focus as representing a semi-sedentary population of hunter-gatherers who also practiced limited horticulture, as evidenced by small village sites with rather thin deposits. These people made limestone-tempered pottery, stemmed or notched projectile points—it is interesting to note that arrow points are not specifically mentioned in Chapman's original description—and buried their dead in earthen or earthen and stone mounds. Pottery from the villages is tempered most commonly with coarse (1-7 mm) limestone grit, occasionally with sand. Mound burials are given as a central trait. Mound construction techniques are highly variable, with the majority being completely earthen but nearly half containing limestone slabs, pavements, or chambers.

In the decades that have followed, refinements were attempted, primarily in regional journal articles and graduate theses (Chapman 1952, 1953, 1980; Denny 1964, Klippel 1965, Marshall 1967). Denny's (1964) thesis offers the strongest assimilation of data, incorporating the results of excavations in the area by Gerard Fowke (1910) in the region between 1906 and 1907, materials from the extensive collections of Dr. Francis Stubbs, an avocational archaeologist, and from University of Missouri-Columbia excavations carried out in the 1950s and 1960s, most under the direction of Dr. Carl Chapman. A Moreau phase also has been proposed in the region (Upp 1953), and because the Boone and Moreau phases are so similar, one cannot be discussed without the other.

Moreau Focus. The Moreau focus is alive and well in widely cited works (such as Chapman 1980) and in CRM reports from the region. However, as noted earlier, many researchers have found it virtually indistinguishable from the Boone phase, so providing some information is relevant. Gregory Upp, a graduate student in Anthropology at the University of Missouri, conducted a study of fifty archaeological sites from a five county area in central Missouri collected by local avocational archaeologist Judge S. P. Dalton. As a result of this study, he described the Moreau focus, a Late Woodland occupation named for the Moreau River in Cole County. Indicators of the Moreau focus included limestone-tempered pottery; corner-notched, side-notched, or triangular arrow heads; larger corner-notched, side-notched, contracting-stemmed, lanceolate, and triangular dart points; ovoid knives, expanding-based drills, triangular adzes, elbow-shaped clay pipes, rubbed hematite, and small (5-30 acre) sites presumed to be villages based in part on the density of shell and other debris present. Moreau focus sites typically are on terraces in river valleys (Upp 1953:11-15).

The descriptive pottery types Moreau plain and Moreau cordmarked are associated with the Moreau focus. Moreau plain (Upp 1953:11-13) is tempered with moderate amounts of crushed limestone, occasionally including fossiliferous inclusions from the limestone or sand grains. Limestone temper particle size ranges from 0.5 to 3.0 mm in diameter, on average they are 1.0 to 1.5 mm in diameter. Average body wall thickness is 6 to 7 mm (Hermann 1953:58-60). For the plain variety, surfaces are smoothed, less so in the vessel interior, and exteriors sometimes are polished. For Moreau cordmarked the entire vessel surface bears impressions of a cord-wrapped paddle. These cordmarks are smoothed over. Decoration (other than the cordmarking) is not

noted for either variety. Rims are straight to slightly flared, lips are flat or, less commonly, rounded. Upp (1953:13) stated that plain vessels had rounded bases, shoulders, and body walls while the cordmarked vessels had conical bases and body walls that tapered from the base to a slight shoulder. Hermann (1953a:60) felt the only substantial difference between the cordmarked and plain varieties is their surface treatment.

Most recent discussion subsumes the Moreau focus into the Boone phase, or refers to it as a subphase (Chapman 1980:118; Denny 1964:145-150; Fox 1992a; Hoard 2000; Klippel 1965:131-133; Marshall 1967: 398, 403, 404; Wettstaed 1996). The matter became further complicated when Klippel (1965:123-126) pointed out geographic overlap between Moreau and Maramec phase artifacts. Descriptions of temper size consistently characterize Boone plain and cordmarked wares to have coarse (1-7 mm) temper particles. Descriptions of Moreau plain and cordmarked are more variable. Chapman (1980:288) simply lists crushed limestone, Denny (1964:96) specifies temper particle size of 1-7 mm, and Hermann (1953:58-60) specifies a temper particle size range of 0.5-3.0 mm, with an average size of 1-1.5 mm. Maramec phase wares, immediately to the south of the Moreau phase, have limestone temper particles that are fine (< 0.5 mm) (Chapman 1980:286). This is an important perspective, suggesting the area referred to as Moreau may be analogous to a clinal variant between two populations—Boone and Maramec—and sharing traits between them.

For Chapman, the Boone focus was centered in Boone County and included most contiguous counties along the Missouri River in central Missouri—Howard, Cooper, Moniteau, Cole, and Callaway, as well as areas of other adjoining counties (Figure 3). Denny (1964:150-153), is more specific on the geographic range of the phase. He tentatively proposes an eastern boundary at the Loutre River, based on the lack of Boone phase materials at the Graham Cave and Arnold Research Cave sites. More recently, Auxvasse Creek has been proposed as the eastern boundary (Hoard 2000:228).

Between the years of 1964 and 1980 the Boone phase was brought into general usage, primarily because of Denny's 1964 thesis and other theses and regional publications around that time period (Klippel 1965; Marshall 1967; Upp 1953). Chapman's (1980) second volume on the archaeology of Missouri served to solidify usage of the concept of the Boone phase.

A recent review of the literature on the Boone Phase by Hoard (2000) found twenty-three radiocarbon age determinations, 21 of which are adequately documented and acceptable. Using calibrated dates with two sigma variation, the date range from these sites is cal A.D. 414 to 1300 (Table 1, Figure 4). Most literature pointed to a concentration of sites near the Missouri River or along the lower reaches of its tributaries (Figure 5). Most sites were found in Boone, Cole, or Callaway counties. This probably is a function of proximity to larger towns with universities.

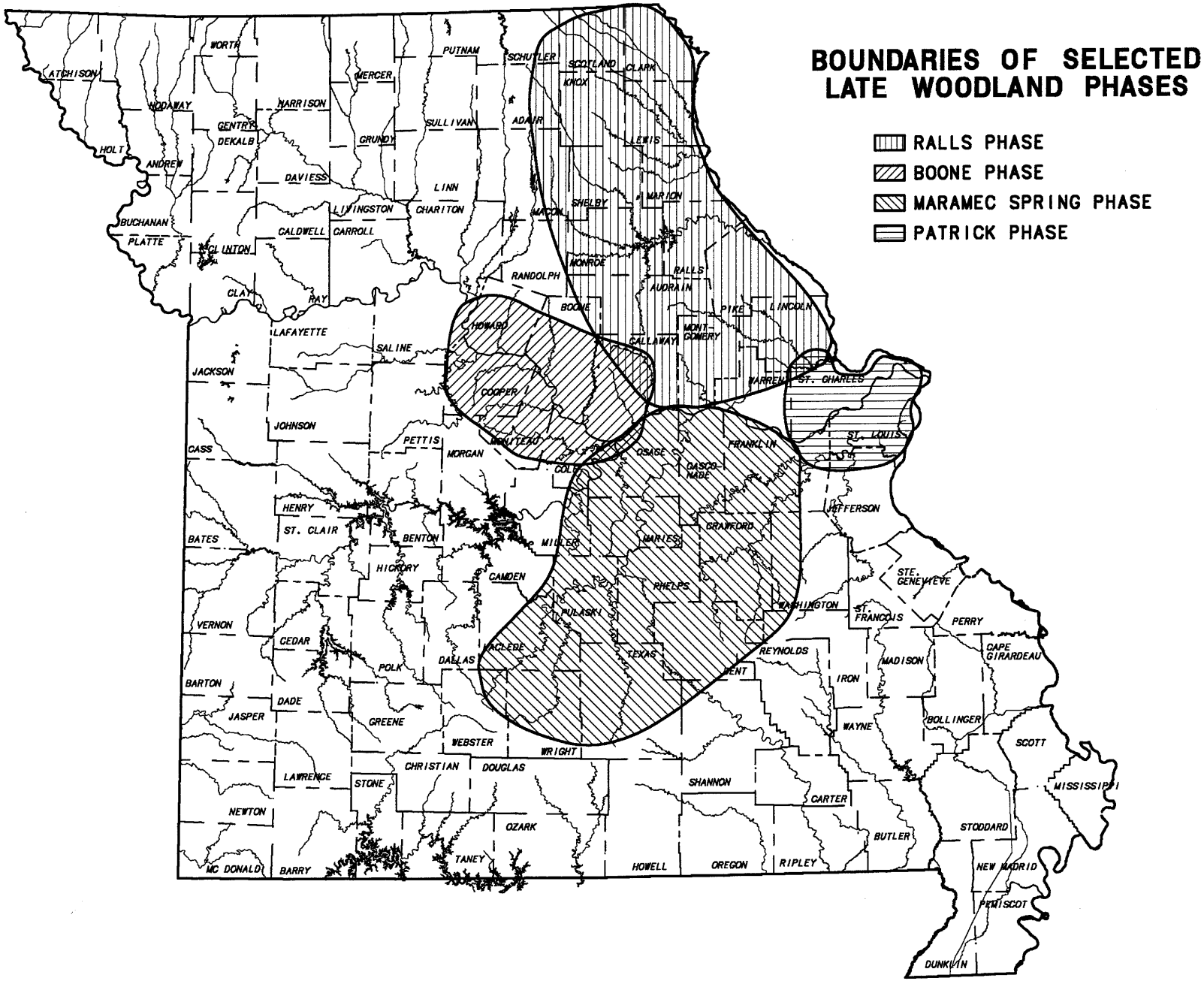


Figure 3. Boundaries of Boone Phase from Hoard 2000.

Table 1. Dates From Central Missouri Late Woodland Sites.

Site Number	Lab Number	Uncorrected Date (B.P.)	Corrected Date Range (1 Sigma)	Corrected Date Range (2 Sigma)	Citation
23CO156	DIC 880	1540 ± 55	441 (544) 603	414 (544) 642	Baker 1984:15
23CO156	DIC 879	910 ± 155	1034 (1162) 1216	1016 (1162) 1257	Baker 1984:15
23CO156	DIC 881	1230 ± 60	710 (786) 886	667 (786) 968	Baker 1984:15
23CY352	BETA-10349	1480 ± 140	427 (605) 672	256 (605) 873	Traver 1985:89
23CY352	BETA-10348	1120 ± 100	798 (922**) 1017	680 (922**) 1159	Traver 1985:90
23BO960	BETA-1922	1350 ± 150	595 (668) 872	415 (668) 1005	Markman et al. 1982:141-143
23BO960	BETA-1923	1130 ± 70	871 (922**) 997	727 (922**) 1026	Markman et al. 1982:141-143
23BO960	BETA-4490	360 ± 70	1448 (1576**) 1644	1430 (1576**) 1952	Markman et al. 1982:141-142
23CO499	BETA-79777	1330 ± 60	656 (676) 772	625 (676) 862	This report
23CO499	BETA-79776	1260 ± 80	671 (776) 883	645 (776) 973	This report
23CO499	BETA-97602	990 ± 60	1004 (1025) 1156	966 (1025)1205	This report
23BO969	BETA-4518	1250 ± 90	671 (779) 888	640 (779) 990	Reeder et al. 1983:166
23BO969	BETA-4519	1020 ± 70	978 (1017) 1150	888 (1017) 1178	Reeder et al. 1983:166
23CY499	BETA-?	1300 ± 70	622 (690) 786	633 (690) 889	Sturdevant 1990:83
23CY499	BETA-?	1190 ± 60	779 (881) 956	683 (881) 990	Sturdevant 1990:83
23BO950	BETA-2831	1110 ± 60	885 (967) 1005	785 (967) 1026	Schmits & Bailey 1983:22
23BO303	BETA-8534	1020 ± 70	978 (1017) 1150	888 (1017) 1178	Parisi 1985:456
23BO303	BETA-6999	920 ± 70	1025 (1112**) 1218	996 (1112**) 1277	Parisi 1985:456
23CY600	BETA-81037	990 ± 60	1004 (1025) 1156	966 (1025) 1205	Wettstaed 1996:15
23BO965	BETA-2562	970 ± 100	989 (1032) 1198	885 (1032) 1279	Wright 1981:180
23CY563	BETA-111171	900 ± 80	995 (1170) 1280	1030 (1170) 1235	Harcourt and Meinkoth, N.D.
23BO87	BETA-84308	1180 ± 60	785 (880) 960	695 (880) 995	Lubensky, PC
23BO86	BETA-84309	900 ± 80	1170 (1235) 1280	1030 (1235) 1300	Lubensky, PC

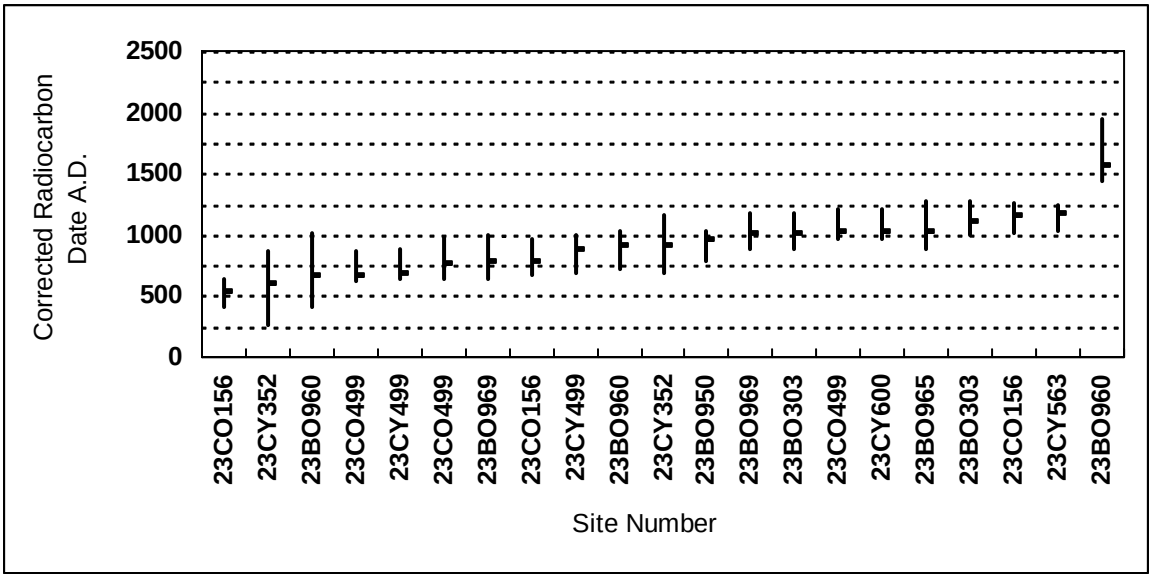


Figure 4. Calibrated Radiocarbon Dates from Central Missouri Late Woodland Sites with Two Sigma Date Range.

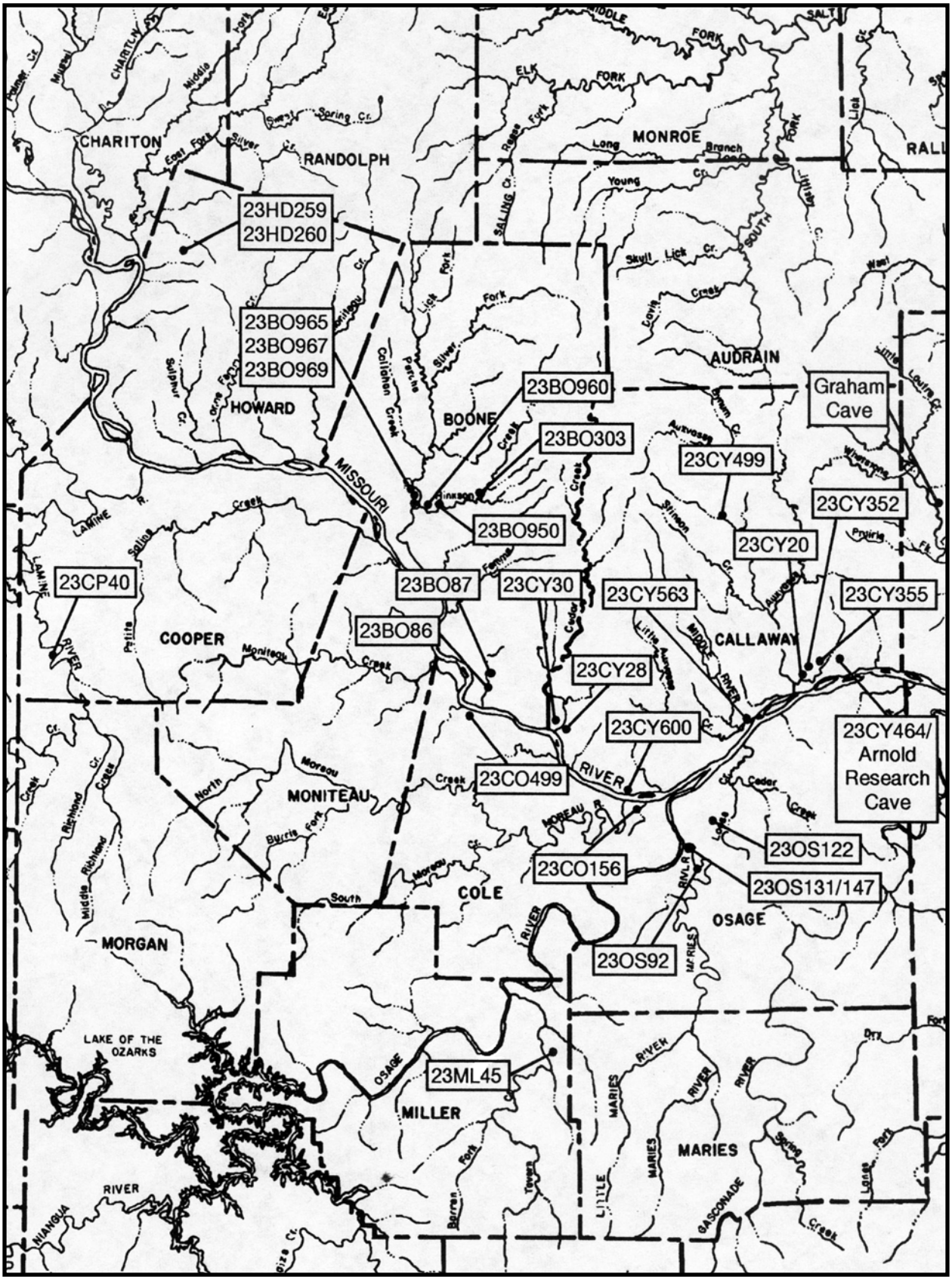


Figure 5. Boone Phase sites (Hoard 2000)

Mortuary Sites. Mortuary customs of the Boone phase have received the most attention, primarily because of the pioneering work of Fowke (1910), because of the high visibility of burial mounds, and because of the attraction of burial sites to professional and avocational archaeologists. Boone phase mortuary sites typically are mounds on bluffs overlooking major rivers. While some mounds are earthen, most contain some kind of internal stone structure: a pavement, chamber, or cairn (Figure 6). Subsurface pits occasionally are lined with bark or wood. Burials are described in many different positions, often several types present in a single mound. Cremations are a fairly common feature, and the occasional burial of an isolated skull is a hallmark trait. Burial goods are rare and never plentiful. They include small marine *Marginella* shells, freshwater *Anculosa* shells, conch shell columellas, small disk-shaped shell beads, perforated bones, cylindrical deer antler objects, hematite objects, and whole pots (Chapman 1980:112, Denny 1964:135, Fowke 1910). Pottery vessels are the most common burial goods, but grave goods generally are uncommon. Elbow pipes, typically made of clay but sometimes carved from limestone, are diagnostic of the Boone phase.

Late Woodland mounds have been documented throughout most of Missouri. Generally these mounds are on prominent landforms adjacent to permanent waterways. Recent mortuary behavior studies within the Central Mississippi River drainage have been approached with the concept that the occurrence of formal cemetery areas is associated with a population that has direct inherent interest to crucial and restricted resources (Saxe 1971; Goldstein 1980; Charles and Buikstra 1983). A formal cemetery has been defined as "a permanent, specialized, bounded area for the exclusive disposal of their dead" (Goldstein 1980:8). It may be deduced that the population interred their dead in these facilities were sedentary or semi-sedentary within a proscribed region and in competition with other groups for specific resource territories. As such, these cemeteries not only serve as mortuary features, but also as territorial markers. Residential sites such as 23BO86, 23BO960, 23BO303, 23CY352, 23CO499, and 23HD259 are found in close proximity to mounds, a pattern that is in keeping with this hypothesis.

The Mendenhall mound (23BO87) and the nearby habitation site 23BO86 serve as examples of paired mortuary and residential sites. Mendenhall mound held the remains of eleven individuals from a stone crypt and a bundle burial. The buried individuals ranged in age from 2-50 years, though none between the ages of 10-17 years are present (Yelton 1988:12). Human bone from one of the burials produced a radiocarbon date of cal A.D. 880 (Earl Lubensky, Personal Communication).

The nearby site 23BO86, situated on a low terrace of Jemerson Creek north of Hartsburg, is dominated by Late Woodland pottery and point styles, though a Smith basal notched point and a Mississippian triangular point also were found. The site contained a small trash-filled pit, four concentrations of burned limestone, a rock platform, and a supine burial with an associated small, cordmarked, limestone-tempered ceramic vessel. The skeletal remains are of a 45-50 year old male (Lubensky 1983a, 1983b, 1983c, 1984). This burial produced a radiocarbon date of cal A.D. 1235 (Earl Lubensky, Personal Communication). The calibrated dates from the two sites do not overlap at the two sigma range, so it is possible that they are not contemporaneous. It is equally plausible that a larger sample of radiocarbon dates from the two sites would give evidence they were occupied at the same time.

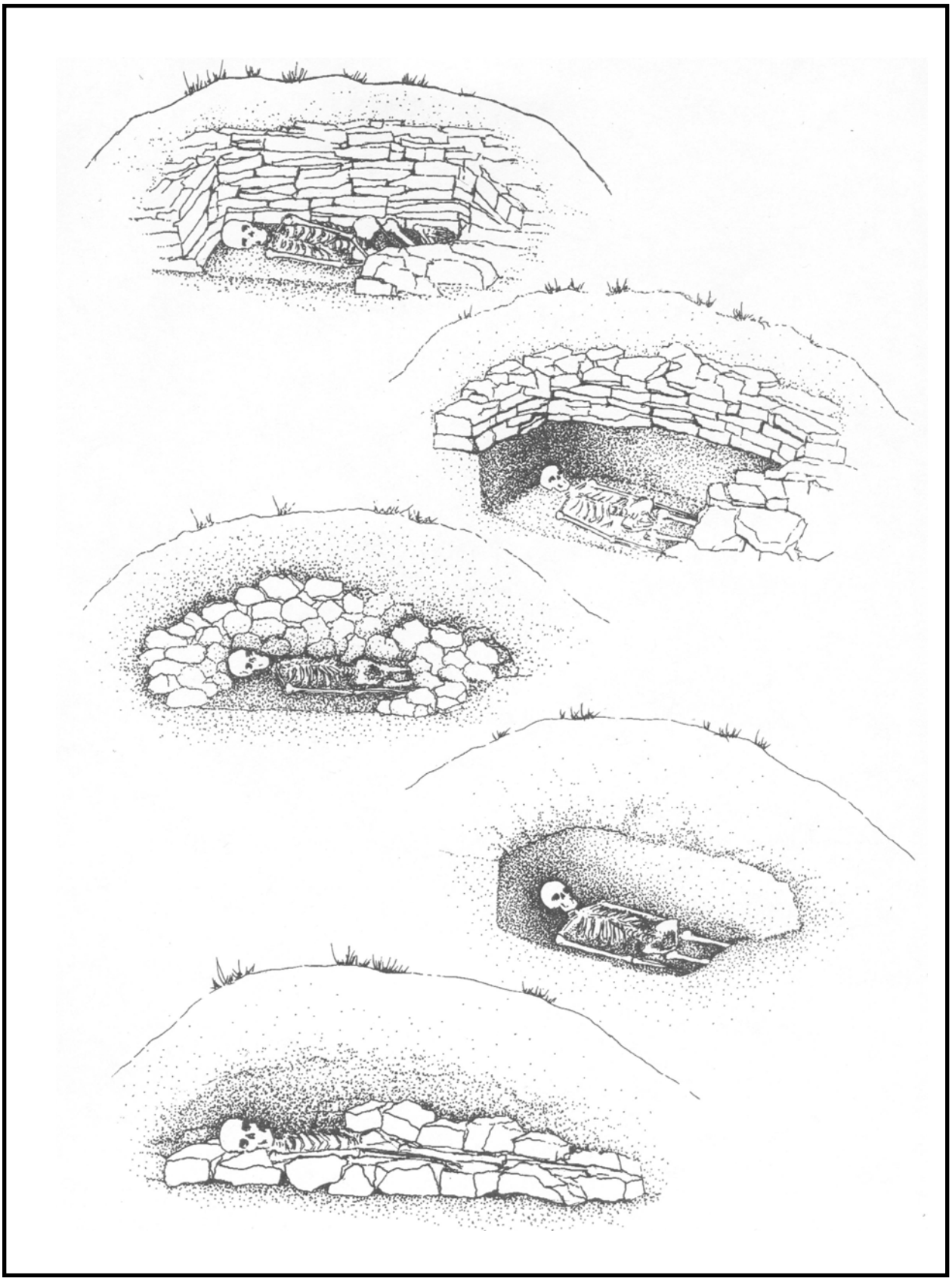


Figure 6. Mound types for Boone Phase from (Hoard 2000)

Broadcast burials and hearths associated with burial mounds are evidence that some individuals were cremated. This, and the presence of hematite processing with some burial structures and burial goods are indications of ritual activity, but offer little to increase our understanding of Late Woodland ideological systems in central Missouri other than to note their presence.

Schmits and Bailey (1983:117-118) suggest that Boone phase lineal descent groups used mounds over several generations. They also suggest that the amount of energy expenditure given to a particular individual may be indicative of that person's status, but note that little information of sex and age ratios has been carried out which is needed to evaluate this argument. Reeder et al. (1983:231) state that the status differentiation that began during the Late Archaic continues into the Late Woodland, possibly becoming more formalized as shown by complex mound burials with grave goods.

Much more attention was paid to mounds during early investigations in the area, and an abundance of descriptive information is available in Fowke's (1911) publication. Until a stronger chronology is developed for Boone phase attributes or until mounds have associated radiocarbon dates, it will be difficult to do more than speculate about temporal change in Boone phase burial patterns. Furthermore, bioarchaeology in the state as a whole has been neglected (Murray and Rose 1995:146-147). Sufficient analysis of skeletal material will be required before hypotheses about population structure, diet, disease, longevity, and status as represented in mortuary customs can be tested

Resource Acquisition and Residential Sites. Residential sites—villages and seasonal camps—and temporary camps have been poorly documented by earlier researchers in contrast to burial sites. Residential and camp sites are much less visible and require more effort to acquire diagnostic artifacts. Sites are reported to be small (< 1 ha) with a light density of artifacts. Some are mussel shell middens, though these unfortunately appear in site forms with poor documentation. Most non-mound sites are situated on low terraces. On these sites, ceramic vessel fragments are the best diagnostic artifacts.

Short term occupations—sites with material remains suggesting that they were used primarily for resource acquisition for less than a season—also typically are present in floodplain or low terrace settings, and less commonly on high terraces, uplands, ridges, or bluffs. Most long term occupations are on floodplains or low terraces. Short term occupations probably are underrepresented in the sample as they are less likely to contain diagnostic artifacts and thus are not recognized as belonging to a particular time period.

It is apparent that lowland settings were favored for long term residential sites, as well as for most resource acquisition activities. Given the numerous broad, wooded floodplains in the region and the apparent horticultural activity utilizing native plants and some tropical domesticates, lowland settings would be the most efficient choice.

Paleoethnobotanical Remains. It is well known that starchy native domesticates were widely used in Late Woodland times in Missouri, and that maize also was used (Voigt 1986). In some regions of the Midwest, maize became more important, possibly eclipsing the native domesticates in terminal Late Woodland times. The shift to maize production required more intensive agricultural practices, which in turn affected settlement patterns since maize requires

significant tending to survive and can be grown in upland areas. However, the production of maize in central Missouri never became a substantial contribution to subsistence.

Both floral and faunal remains provide information regarding seasonality of site occupation, preferred resources and habitats for their acquisition, and area of exploitation. This information is used to test the usefulness of subsistence models proposed by Styles (1981) and O'Brien (1987) for the Late Woodland period in the Midwest, which indicate that Late Woodland subsistence patterns become more localized with increasing human population.

Taxa recovered from Boone Phase sites include *Amaranth* (pigweed, tumbleweed), *Ambrosia* (ragweed), *Arisaema sp*. (Indian turnip), *Ammania sp.*, *Capsella sp.* (sheperd's purse), *Carex* (sedge), *Carya sp.* (hickory), *Chenopodium* (goosefoot), *Euphorbia* (spurge), *Graminae* (grass family), *Hypoxis hirsuta* (yellow star grass), *Iva annua* (sumpweed), *Julgans sp.* (walnut), *Nicotaina* spp. (tobacco), *Panicum sp.* (panic grass), *Phalarias caroliniana* (maygrass), *Polygonum sp.* (smartweed, knotweed); *Portulaca* (purslane), *Potamogeton* (pondweed), *Scirpus sp*. (bulrush), *Viola* (violet), and *Zea mays* (maize) (Hoard 2000, Parisi 1985:511-512, Reeder et al. 1983:150, 170). Many of these species are adapted to moist, open areas.

The presence of large storage pits containing starchy and oily native seeds as well as tropical cultigens suggest some level of importance for horticulture.

Fauna. Recovery of faunal remains is not common for Late Woodland sites in central Missouri, but the presence/absence data collected here indicates a pattern similar to that posited by Styles (1981) for the Late Woodland in the Lower Illinois River valley. Deer is particularly important, and deer elements are present in all sites where identifiable faunal elements were recovered and recorded. The remains of fish and mussels are nearly as common as those of deer, indicating a focus on aquatic resources.

Ceramics. A number of different ceramic types have been proposed for the Boone phase (Chapman 1980:276-277, 288-289, Denny 1964:72-76, 96-101). Denny describes nine types: Boone plain and cordmarked, Moreau plain and cordmarked, VP-1, VP-2, P-1, P-2 and P-3, based primarily on temper size and type and surface treatment. Of these, only Boone and Moreau have survived as commonly used types. These varieties are found in both burial and residential sites. Chapman (1980) also has described similar wares using roughly the same nomenclature, and Upp (1953) and Hermann discuss Moreau Plain and cordmarked wares, which, as was discussed earlier, has attributes similar to both Boone phase and Maramec phase pottery.

Typological constructs of Late Woodland ceramics in central Missouri typically are general and descriptive. The ceramic types commonly encountered in this region are Boone (plain and cordmarked), Moreau (plain and cordmarked) and Maramec (plain and cordmarked) (Chapman 1980:276, 286). Maramec wares are most common south of the Boone phase in the Ozark Highland and have fine (< 0.5 mm) limestone temper occasionally mixed with sand chert, grog, or larger limestone particles. Boone and Moreau wares are most common in central Missouri near the eastern half of the Missouri River Valley in Missouri, especially to the north. These wares have been described in various ways. Boone plain and cordmarked vessels area

characterized as having coarse (1-7 mm diameter) limestone temper particles. Crinoid fossils from the limestone temper in Boone phase wares can fall out of the exterior of sherds and leave an impression that appears to be a decoration. Mixtures of limestone and sand in the clay body are not unusual, it cannot easily be determined if this is intentional or the result of tempering sandy clay with limestone. Occasionally Boone phase vessels have brushed surfaces (Chapman 1980:276; Denny 1964:72). Decorations are rare. Where present, they are simple notches or slashes on the lip, or incised lines or punctations above the shoulder. Slips or fabric impressions are very rare.

Middle Woodland pottery is not common in central Missouri. Denny states that brushing, along with square-mouthed vessels, punctations, and conical-based vessels with constricted mouths are Hopewellian traits carried into the Late Woodland, and that these are most common early in the Boone phase (Denny 1964:158). Brushing is a trait Denny states is a carryover from earlier Hopewellian/Middle Woodland times (Denny 1964:158). One important feature of Middle Woodland pottery in the region is grit temper. Grit is defined here as crushed rock other than limestone, usually a metamorphic rock such as granite. Clay or clay and grit temper is in the Hopewellian rims sherds from 23CP40 (Fox 1992a:15), quartzite or quartzite and chert temper was used in Middle Woodland wares at 23BO970 and 23BO972 (Reeder et al. 1983:84-94). In Boone phase sites limestone temper has overwhelming dominance.

Grit-tempered wares never are common and tend to fall out relatively early in the Boone phase. Experiments with pottery replicating prehistoric wares shows that limestone-tempered wares are more difficult to fracture that their clay- or grit-tempered counterparts (Hoard 1992:81-119, Hoard et al. 1995, O'Brien et al. 1994). However, the use of limestone temper comes at some cost, as firing must be controlled to prevent the spalling associated with calcium carbonate rich tempering material such as limestone. But for this added effort, the potter is able to create a thinner, stronger vessel that conducts heat more efficiently. Braun (1983, 1987) has emphasized this is an important consideration for horticulturists using ceramic vessels to cook seeds. Therefore, limestone-tempered ceramic vessels are a technological adjustment to reliance on seeds for food. One interesting quandary remains. Coarse limestone-tempered wares are more likely to spall and are less fracture resistant than those tempered with fine limestone (Hoard 1992:81-119, Hoard et al. 1995, O'Brien et al. 1994). It is possible that temper size and distribution are a factor of available tempering material (Fox 1992a:16).

Some researchers report Late Woodland pottery tempered with a melange of materials—limestone, sand, chert, grog, quartzite, and pyrite (Duncan 1981:58-64; Reeder et al. 1983:163). Recent Missouri Department of Transportation excavations report similar pottery from a basin feature, probably a rock oven near the mouth of the Middle River (Harcourt and Meinkoth 1999:93-106). Duncan (1981) has referred to these sherds as Middle River Ware based on seven sherds collected near the mouth of the Osage River. While these wares are intriguing, in the 15 years since Duncan's thesis was produced only two other incidences of this type of pottery are known. It may be that a combination of temper in Boone phase ceramics is part of the normal variation within a type. Reeder et al. (1983:163) note a similar situation at 23BO969, a Late Woodland residential base in Boone County, Missouri. While these sherds contain quartzite, sand, chert, and fine pyrite, they are predominantly limestone-tempered and conform reasonably well with the description for the Boone/Moreau types (Reeder et al. 1983:166).

Sand-tempered wares occur as a minority in many sites throughout the range of the Boone phase. However, they are the majority ware in several sites east of Cedar Creek, the dividing line between Boone and Callaway counties and the eastern edge of the Boone phase. Duncan (1981:65-68) proposes the Cedar Creek Sand Tempered type to accommodate this concentration of sand-tempered ware. However, with the exception of the higher degree of decoration noted by Duncan, there seems no reason to refer to this pottery as anything different from the better-established types known as Graham Plain and Darnell cordmarked as described by Chapman (1980:280). While Denny (1964:150-151) places the eastern border of the Boone phase at the Loutre River in Montgomery County and at the mouth of the Gasconade, he emphasizes that this is tentative and arbitrary. The increased presence of sand-tempered pottery east of Auxvausse Creek in Callaway County suggests this drainage is a more accurate boundary (Hoard 2000).

Sherds with shell temper, typically mixed with sand or limestone, occur occasionally on Boone phase sites. Surprisingly, shell-tempered sherds from radiocarbon-dated features in the Boone phase area are early, but they also are rare, and most come from a feature at 23CO159 with a questionable date. Where shell-tempered wares occur, they typically are on late sites and near the Missouri River. Shell-tempered pottery, a hallmark of Mississippian sites, is generally rare in the area encompassed by the Boone phase. This is further evidence that while the Late Woodland of central Missouri extends into time period considered Mississippian in surrounding regions, Mississippian influence in the region was not strong.

Projectile points. Chipped stone artifacts include projectile point types typical of other Late Woodland phases in Missouri, specifically Scallorn, Rice Side Notched, Kings Corner Notched and Steuben Expanded Stemmed, the latter of which is considered a Middle Woodland to early Late Woodland form (Chapman 1980:115, Denny 1964:135, Justice 1987:208). Other types, such as Gary, Langtry, Mankers, and Snyders, which typically precede the Late Woodland, and Harrel, Reed Side Notched, and unnotched triangular points, typically considered Mississippian, are listed by Denny (1964:135) as Boone phase traits (Figure 7).

Langtry, Mankers, Snyders, Snyders Affinis, and Steuben points, while appearing in Late Woodland sites also are considered Middle Woodland or earlier points. Rice Side Notched and Kings Corner Notched dart points are primarily Late Woodland projectiles. The minute and irregular Scallorn, Koster, and Klunk points, all variations on a theme, are undoubtedly arrow tips and indisputably Late Woodland or later in temporal affiliation. Reed, Madison, and Cahokia triangular points, while considered Mississippian, are sometimes found on Late Woodland sites in central Missouri. With the exception of Snyders Affinis points, all of these are found with limestone tempered pottery in central Missouri.

The general trend for projectile points is a decrease in size throughout the Late Woodland. Snyders and Affinis Snyders are considered to be primarily Middle Woodland points, Langtry points are thought of as primarily Early Woodland types, though they are found at sites ranging from the Late Archaic to possibly early Mississippian times (Chapman 1980:309-310). It is possible that some or all of these sites are from the beginning of the Late Woodland sites (Schmits and Bailey 1985:543). Earlier Late Woodland sites in the region are dominated by Steuben, Ansell and Rice side notched points, though small numbers of Scallorn, King's corner notched and Snyders points are present. At 23BO303, late in the Late Woodland, small side

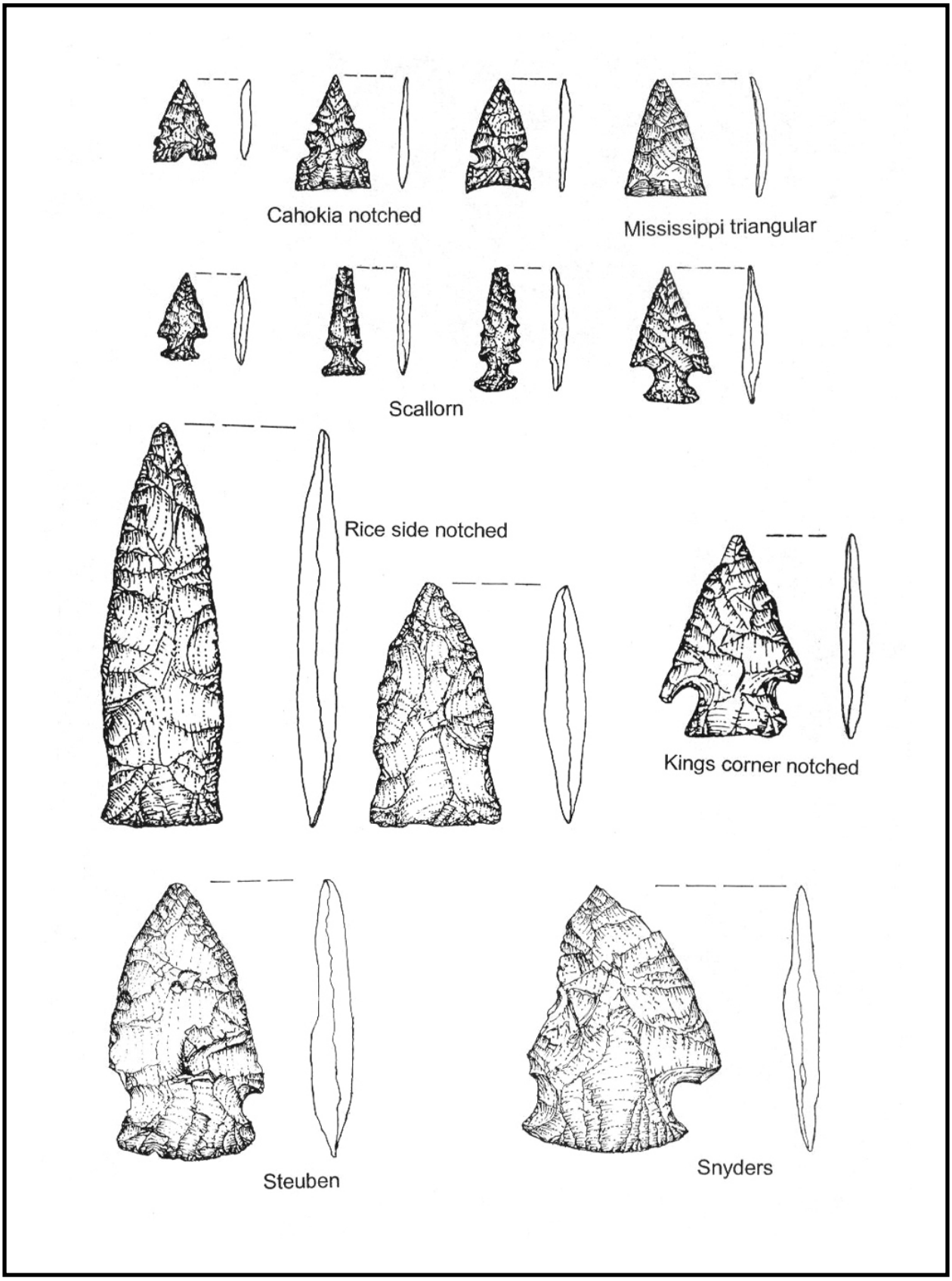


Figure 7. Boone Phase points from Hoard 2000.

notched arrow points are the dominant form. King's corner notched points have a uniform distribution through time. Heat treated chert, common early in the Late Woodland, is less frequent later in the period. Schmits and Bailey (1985:545) note that this also is the case at Emergent Mississippian sites of the western Illinois River Valley (Kelly et al. 1984), and that the most recent Late Woodland sites in central Missouri are contemporaneous with Emergent Mississippian sites (A.D. 800-1,000) of the American Bottom (Bareis and Porter 1984:12).

Scallorn and Rice Side Notched points are the most frequently found types on Boone phase sites. Scallorn points are found in radiocarbon dated features: Two at 23CO156 in Feature 2 (cal A.D. 544, a date of questionable utility) and Feature 7 (cal A.D. 786) and Feature 7, a hearth, at 23BO960 (cal A.D. 922). However, the early date for Scallorn points at 23CO156, if accepted, and the ubiquity of this type through the temporal range of the Boone phase indicate the use of the bow and arrow is in wide use at this time. Scallorn points are small, and intuitively seen as arrow tips. To our knowledge, none have been recovered hafted. But quantitative studies of points hafted to darts and arrows from archaeological and ethnographic collections support the notion that smaller points were used on arrows while larger points were used on darts (Shott 1997, Thomas 1978). Based on these studies, Shott (1997:98) states that points with a shoulder width of less than two centimeters have an 85% probability of being arrow points. Perhaps it is more interesting to consider that some large points may have been hafted to arrows, and some small points to darts. It may be that the equally ubiquitous Rice Side Notched points were used to tip arrows used for large game such as deer. It also is plausible that both darts and arrows were used throughout the Boone phase. Given these considerations and the ubiquity of the minute Scallorn point throughout the temporal range of the Boone phase, it is clear that the bow and arrow is not a Late Woodland invention, but a device that came into common use at that time.

Mississippian (A.D. 900–1540)

The Mississippian Period is often thought to represent the apex of prehistoric Native American society. Characteristic of this period are a complex settlement hierarchy, social differentiation with an emerging political elite, and the proliferation of maize horticulture. It has long been thought that maize cultivation was the basis of Mississippian economy. While maize was an undeniably important resource, recent research has suggested that the use of other, long-standing resources such as sunflower and sumpweed was still considerable. Deer, turkey, and squirrel were still being exploited at the previous levels, and reliance on aquatic resources was substantial (Reeder et al. 1983:56).

According to Reeder et al. (1983:57), "very few, if any, Mississippian materials have been identified in central Missouri." Chapman (1980:161) also noted the virtual absence of Mississippian sites north of the Missouri and west of the Mississippi River, although some Late Woodland ceramics and burials in the region appear to reflect some Mississippian influence. Thus, while some aspects of material culture were affected by the Mississippian tradition, the essence of Late Woodland society and organization remained intact. The Cannon Reservoir data tend to confirm the trend of gradual depopulation and marginal involvement in the Mississippian cultural tradition by the inhabitants of the northeast prairie region after 1000 A.D. (Warren 1982:341). Warren (1982:367-368) postulates that people voluntarily emigrated from the region in order to take advantage of increased economic opportunities in the thriving Mississippian

centers to the southeast, rather than being forced out of the region by climatic deterioration and population stress, as has been suggested.

Those who remained in north-central Missouri adapted to the drier climate by gradually increasing their reliance on hunting, fishing, and gathering at the expense of horticulture. Probably derived from Middle Mississippian period origins, the Oneota cultural tradition evolved between 1000 and 1350 A.D. in northern Missouri, Iowa, southern Wisconsin, and northern Illinois. The Oneota tradition in central Missouri was centered in the Big Bend region of the Missouri River valley near the mouths of the Grand and Chariton Rivers, particularly at the Utz site (23SA2) and associated sites in Saline, Carroll, Chariton and Howard Counties that were occupied well into the eighteenth century (Henning 1970). Oneota people ranged freely over a wide area, taking advantage of diverse ecological niches including tall grass prairie, upland forest, and floodplain forest ecotones and employing an adaptable, non-specialized economy. The most reliably diagnostic artifact of the Oneota cultural tradition is its pottery, which is generally shell-tempered, globular vessels with constricted orifices, rounded bottoms, and relatively simple punctation around the lip and upper body. The Oneota tradition has been tied ethnohistorically to several historic tribes, including the Winnebago, Ioway, Missouri, and possibly the Oto, Kansa, and Osage, all of whom spoke related Siouan dialects (Henning 1970:4). Ethnohistorical and archaeological evidence demonstrates that the Utz site and others in the vicinity were occupied by the Missouri and Little Osage tribes at least into the last quarter of the eighteenth century (Henning 1970:17).

Full blown Mississippian sites are not known in the vicinity of the Stauffer site. However, radiocarbon age determinations from nearby sites show that they were inhabited during the time that Mississippian cultures flourished in the Mississippi Valley. Some artifacts associated with Mississippian culture are present in central Missouri sites, these are discussed below.

Wastewater projects near Columbia have led to the recovery of Mississippian materials. On a Pleistocene terrace above Perche Creek are two sites with Late Woodland and Mississippian components, as indicated by their artifact assemblages. Sites 23BO967 and 23BO968 are interpreted as residential sites outside of the sphere of influence of more dominant contemporary Mississippian groups (Reeder et al. 1983:231-232). No faunal or floral remains were recovered. Also, 23BO989 is a multicomponent site west of Columbia on the floodplain and lower terrace of Mill creek. A single triangular point was recovered from this low density debris scatter, as were Late Archaic points (Schmits et al. 1981:57-63).

A small number of shell tempered sherds was found during Klippel's (1965:147) survey of the Lower Osage River valley, and, with the exception of a triangular "blade" (probably a point), no other Mississippian artifacts were recovered. The shell tempered sherds were identical to Maramec cord-marked with the exception of shell temper.

Excavations at the Neimans Creek site (23CY600) produced 35 shell-tempered sherds, plain and cord-marked, and 75% of the sherds contain both limestone and shell temper (Wettstaed 1996:18-19). The latter are said to be the equivalent of Moreau ware, with the exception of added shell temper. Wettstaed (1996:19) argues that this is evidence of contact with

contemporaneous Emergent Mississippian occupations at Cahokia. A radiocarbon date of cal A.D. 1025 comes from the single pit feature at this site.

The use of shell temper in pots that otherwise would be described as Maramec or Moreau wares suggests either that Late Woodland people in central Missouri were in contact with Mississippian people or that they had started to experiment with or use shell as a tempering agent independently. While the latter certainly is plausible, the close proximity of Mississippian populations increases the chances of the adoption of this trait, even if Mississippian culture as a whole was rejected.

Seven shell-tempered sherds were recovered by Klippel (1965:79-81) during his survey of the lower Osage River on sites 23OS92, 23OS122 and 23ML45. These were identical to Maramec cord-marked except for the tempering material (Klippel 1965:83). Unfortunately, no radiocarbon dates are associated with these sites.

On a Pleistocene terrace above Perche Creek are two sites with Late Woodland and Mississippian components, as indicated by their artifact assemblages. Sites 23BO967 and 23BO968 are interpreted as residential sites outside of the sphere of influence of more dominant contemporary Mississippian groups (Reeder et al. 1983:231-232). No faunal or floral remains were recovered.

The Protohistoric Era (A.D. 1300-1700)

This period of gradual transition into the historic times is represented by the presence of Oneota, a prairie-based tradition extending across the Midwest. Predominantly, the Oneota subsisted on horticulture of maize, but they also planted beans, squash, and goosefoot. Fishing, gathering, and hunting were also an integral part of their subsistence, each activity varying in intensity according to the seasons.

The Oneota tool kit included small, triangular projectile points and end scrapers along with gravers, drills, and side scrapers. Ground stone tools included shaft abraders, celts, metates, and manos. Bone tools consisted of bison scapula hoes, knives, and needles. Ceramics were made with crushed shell temper, and were decorated mostly on the lip, rim, and shoulder with straight lines, triangles, and chevrons (Wood et al. 1995:78-82). Oneota vessels exhibit wide strap handles instead of thin loop handles, which is more common with earlier Mississippian vessels. Oneota sites also indicate the presence of extensive trade networks prior to Euroamerican contact reaching into the northern Midwest and Western Plains (Milner et al. 1984:181-2).

The Oneota occupation of the Big Bend region continued well into the Late Prehistoric and Protohistoric periods. The best evidence comes from the Utz site and associated sites in Saline County. The Marquette map of 1673 shows the possible location of the Missouri village at the Utz site. Attacks from other eastern and northern tribes, particularly the Sauk and Fox, and the outbreak of measles dispersed the local indigenous population. The remaining population was assimilated with the Osage, Kansa and Ottoe groups (Henning 1970).

Historically, the Osage tribe claimed most of the area south of the Missouri River. The primary village of the Big Osage was in Vernon County within the upper reaches of the Osage River, but

two villages of the Little Osage are reported near St. Thomas in Cole County. Conflicts between native groups were widely reported in the late 18th and early 19th centuries. The presence of native groups posed a problem for the Euroamerican settlers. As a result of the Treaty of 1808, the Osage ceded the area from Fire Prairie to the Arkansas River in return for money and credit on consumer goods. The federal government moved the Delaware and Miami tribes into this area. In 1825, the Osage finally gave up all claims to lands in Missouri in return for $7,000 a year and land in Oklahoma. They were, however, allowed continued use of the area (Martin 1989).

The first significant event for this era was the De Soto Entrada of 1541-1542. While De Soto's route was south of Missouri, a number of distinctive artifacts (i.e. glass beads and bells) and diseases for which the aboriginal populations had no immunity were introduced into the Native American trade networks. When the French explorers, such as Marquette and Joliet in 1673, entered the Mississippi alluvial valley, the large villages observed by the De Soto Entrada were abandoned and the population appeared to be diminished and dispersed. This was apparently the result of epidemics and disruptions of their agricultural cycle, which may have resulted in famine (Dobyns 1983; Milner 1980).

CHAPTER 2

ENVIRONMENTAL SETTING

By Terrell Martin

The Stauffer site is situated in a diverse environmental setting between two major biotic and physiographic provinces. Shelford (1963) places the area in the Deciduous Forest-Temperate Grassland Contact. In this marginal contact area, the forest stands occur where primary stream drainages have dissected the prairies forming an oak-hickory/tall grass prairie ecotone in the marginal uplands.

The specific physiographic position of Cole County is at the junction of two major provinces of Missouri: the Ozark Plateau and the Dissected Till Plains (Fenneman 1938:613, 647-642). The project area occurs at the extreme southern limits of the undifferentiated Nebraskan and Kansas glacial drift (Branson 1944). The landscape in the vicinity of the site is characterized by narrow upland ridges, forested hill slopes the brief valleys.

Surface Geology

The surface geology of the immediate project area is associated with the Canadian Series of the Ordovician System, and the outcrops are principally of the Jefferson City formation. The formation consists predominantly of beds of dolomite containing chert nodules and occasional lenses of chert, sandstone, shale and orthoquartzite. The local Jefferson City Formation is comprised of medium to fine-grained dolomite that varies from a light gray to brown color. Bands of soft argillaceous dolomite called “cottonrock” are also present in this formation; this fine-grained dolomite has an earthy or clayey texture and is readily identified by it light weight.

The Jefferson City chert occurs abundantly in the project study area as residual float over ridge summits and along weathered hill slopes or occasionally as gravel on floodplain terraces. Redeposited chert nodules are a major component on the gravel bars that choke stream beds in the drainage. The fine-grained Jefferson City chert is characterized by gray and white bands or mottling, although various shades of tan, brown or blue may also be evident.

An exposure of the Mississippian system is also evident along a high ridge that occurs approximately 1.1 km west of site 23CO499 in the SE1/4 of Section 9, T445N, R12W. This exposure is comprised of chert bearing outcrops of tan and gray Burlington limestone. The nodular Burlington chert at this locus is generally of a light gray or tan material that has a moderate number of crinoids. Burlington chert typically can be differentiated from Jefferson City based on its uniform color and the presence crinoid fossils. Beginning about 5 km to the northwest of site 23CO499, Burlington chert and dolomite occurs abundantly as redeposited chert on the gravel bars in the Rock Creek drainage. Burlington chert is often the preferred source of knapping material for the prehistoric inhabitants of present-day Cole County (Martin 1997:7,18).

An additional chert-bearing formation of the Mississippian system evident in the study area vicinity is the Chouteau group. Evidence of the Chouteau limestone and chert begins about 8 km northwest of site 23CO499 in Section 5, T45N, R12W. The limestone is generally of a light gray material that weathers to a tan color. The associated chert from this area is typically a mottled light and dark gray that is lightly fossilerous. This chert tends to have a chalky consistency and contains many incipient fractures planes that tends to make it less suitable for knapping than the Jefferson City and Burlington material.

Ecological Communities

Cole County occurs in an ecotonal locality where the Ozark Highlands and glaciated till plains converge to reflect a complex mosaic of forests, prairies and transitional savannas. Specifically, the Stauffer site is situated near the junctions of two distinct ecological communities: the Missouri River bottomland forest and the upland oak-hickory forest. The characteristics of these two environmental zones will be examined to provide a basis for interpretation of the resource potentials for the prehistoric occupants of the Stauffer site. Since the biophysical setting of the region has changed significantly since European settlement, a reconstruction of the paleoenvironment is necessary to interpret prehistoric human behaviors.

The biophysical environment as defined by Clarke (1968) includes five subsystems: flora, fauna, geology, climate and the stress from cultural systems. He admits that, although the subsystems tend to integrate, certain variables are more essential to a culture than others. Floral cover has been recognized as a salient element since it is an indicator of the other systems and as well relates directly to the cultural process. Asch et al. (1972:1) note that the human population "has requirements that may be partially or almost completely met by plant resources". The human population would depend on plant resources for firewood and raw materials for artifacts as well as nutrition requirements.

Prehistoric subsistence behaviors may be defined at specific loci through the analysis of recovered micro-floral remains. For understanding the context of such activities and an interpretation of settlement behaviors on a "community" basis, a broader geographic floral model is of value. The original survey notes of the General Land Office (GLO), in particular, provide quantitative and qualitative data for the reconstruction of pre-European settlement vegetation (USLS 1816-1817).

An area within an approximate five-kilometer radius of the Stauffer site was defined as the catchment area for the floral reconstruction. The GLO survey notes for this project study area typically list the provenience of two witness trees at the corner sections and quarter sections of each section line. In addition, a single line tree is often recorded approximately one-half the distance between the quarter sections along section lines. The notes usually record the trunk diameter of the individual trees and the dominant undergrowth plant types.

The original GLO surveys of the project study area were conducted from December 10, 1816 to March 17, 1817. The records reveal that the pre-settlement vegetation within five kilometers of the site was dominated by soft hardwood forest in the Missouri River bottomland and scrub oak-hickory forest in the uplands, which includes hill slopes and secondary valleys. No prairies were reported in the original land surveyors notes within this area and the nearest prairie recorded in

the notes appear to be several kilometers to the south of project study area toward the present-day community of Russellville. This observation is consistent with the soil survey of Cole County, which shows the closest soils to site 23CO499 that were formed under prairie conditions are approximately 15 kilometers to the south (USDA 1997).

Two major environmental zones are defined for the project study based on topography, soil types and floral cover. These areas include the Missouri River softwood forest and the Oak-hickory forest; the latter is divided into the hardwood forest zones in the uplands, hill slopes and secondary valleys. Each is discussed below.

The Missouri River Floodplain Forest Resource Zone

The Missouri River bottomland begins approximately 1.1 kilometer to the northeast of the Stauffer site where the Meadow Creek valley opens into the Missouri River lowland. This floral zone, which covers about one-third of the site 23CO499 catchment area, is 550-550 feet above mean sea level and is subject to overflow from the Missouri River. The tree stands in this zone have been destroyed except for the shorelines of the Missouri River or its drainage ways. A modern survey tree survey indicates the selective timbering has effectively removed all evidence of hardwood species such as oak, hickory, hackberry and ash from these linear tree stands.

The Missouri River bottomland soils are highly varied, although dominant units include Carr very fine sandy loam, Haynie silt loam, Modale silt loam and Sarpy loamy fine sand (USDA 1997). These soils are usually finely textured, although they range from heavy clays to fine sands. Each is subject to occasional flooding.

The tree types noted during the original land surveys, conducted during late 1816 and early 1817, reflect a floral community in the Missouri Floodplain that is quite distinct from the marginal upland oak-hickory forests. The tree types most often reported in the Missouri bottoms are cottonwood, hackberry, elm and sycamore, which comprise 68.7.9% of the bearing and line tree citings (see Table 2). A notable change is also reported in the trunk diameter of cited trees (see Table 2). The average basal diameter of all tree types reported in the Missouri River bottomland is 32 centimeters and the trunk width for the oak-hickory forest trees is 32 centimeters. This represents a trunk width that is 35% greater for the lowland examples. It is notable that trees that offer large, harvestable nut crops (oak, walnut and especially hickory) are generally absent in the tree citings from this zone and comprise less than 10% of the samples. Briar, paw paw and rushes are reported as the dominant undergrowth vegetation in the Missouri River bottoms.

A general survey of the modern flora of the Missouri River Forest Zone indicates that trees have largely been cleared for agriculture although occasional linear remnants may be found along the Missouri River or its drainages. The dominant tree species are often the soft hardwoods. Silver maple and Eastern cottonwood, although also represented are American elm, sycamore, box elder, white mulberry and black willow. Hardwood trees such as oak, hickory, hackberry, ash and walnut are completely absent from many of these remnant stands.

Major changes in the setting of the floodplain forest zone since the original land survey include the course and width of the Missouri River. The present trunk channel of the river meanders in

the project catchment area only briefly touches the south valley wall. The original land surveyor notes report the river to flow along the south valley wall for much of the project area exclusive of the extreme east portion. The portion of the Missouri River channel in the study area presently varies from approximately 250 m to 500 m in width (source is the Hartsburg USGS 7.5' Quadrangle). The original land survey notes indicate that in 1816-1817 the river channel varied from about 600 m to more than 1000 m in width.

Fauna resources available would include many of the species associated with the upland resource zone as well as riverine resources such as numerous fish species and fresh water mussels. Species of waterfowl, which were economically significant during the early period of European settlement in the northern Ozarks include wild geese, duck, brant geese and swan (Schultz 1937:19).

Table 2. Comparison of Tree Citings in General Land Office Survey Notes by Resource Zones.

Missouri River Floodplain Resource Zone				Upland Forest Resource Zone			
Line/Bearing Tree	Number of tree citings	% of total trees	Mean diameter (cm)	Line/Bearing Tree	Number of tree citings	% of all trees	Mean diameter (cm)
Cottonwood	17	20.5	72	White Oak	114	41.5	33
Hackberry	14	16.9	26	Black/Bur Oak*	73	26.5	26
Sycamore	13	15.7	49	Hickory	20	7.3	27
Elm	13	15.7	46	Post Oak	17	6.1	18
White Oak	3	3.6	33	Red Oak	15	5.4.	45
Hickory	3	3.6	31	Elm	11	4	24
Mulberry	3	3.6	31	Ash	6	2.2	30
Ash	3	3.6	30	Maple	4	1.5	36
Basswood	3	3.6	25	Basswood	4	1.5	33
Locust	2	2.4	55	Walnut	3	1.1	18
Box Elder	2	2.4	41	Dogwood	3	1.1	14
Maple	2	2.4	38	Hackberry	2	0.7	40
Buckeye	2	2.4	23	Buckeye	2	0.7	15
Walnut	1	1.2	30	Pin Oak	1	0.4	40
Black Oak	1	1.2	28				
Paw paw	1	1.2	10				
Totals	83	100	43	Totals	275	100	32

*Survey notes refer to "B. Oak" and do not differentiate between black or bur oak.

Upland Forest Resource Zone

The upland forest zone includes the ridge tops, hill slopes and secondary valleys that occur in the dissected uplands of the study area. A similarity is noted between the tree and undergrowth plants of the upland ridges and hill slopes as well as the soil types. The secondary valley zone, which covers a very minimal portion of the catchment area, includes arboreal species that are included in both the Missouri River floodplain and the upland/hill slope zones. The soil types present in the secondary valleys largely represent the redeposition of the upland/hill slope soils

and are quite distinct from the Missouri River bottomland alluvium. The elevations in this zone range from 555 feet above sea level at the confluence of secondary creek into the Missouri River bottomland to 870 feet above sea level near the source of Meadow Creek in the extreme southwest part of the catchment area.

The land survey field notes indicate that oak-hickory (hardwood) forest covers the upland, hill slopes and secondary valleys of the project study area. A summary of the tree types in this hardwood vegetal zone within an approximate 5 kilometer radius of the Stauffer site indicate 80% of the tree species are of the genus *Quercus* (oak) as noted in Table 2. This includes 41.5% white oak and 26.5% in the black-bur oak affiliation. The next most recurrent tree type is the hickory (Carya) group which represent 7.3% of the field citations. A majority of the trees not of the genera Quercus or Carya are reported from the secondary valley sub-zone. These tree types include elm, basswood, maple, walnut, ash and buckeye. The dominant undergrowth vegetation in the oak-hickory timber is reported to be hazel, vines, briars and scrub oak.

A change in the oak-hickory forest composition is also noted for the southern portion of the project area in sections 26, 27 and 28 in T45N, R13W. The topography in this area tends to represent the more rolling portion of the upland forest zone. The hardwood forest cover remains dominated by oak and hickory species, although the survey notes show an increase in the reports of ash, elm and hackberry. The surveyor's notes also reflect an increase in the diameter of trees in this environment. The recorded trees in this area have an average trunk diameter of 38 centimeters compared to a average diameter of 31cm for the entire tree sample for the upland forest zone. The increase in tree trunk width further suggests this area to be distinct from the scrubby tree growth typical of the oak-hickory resource zone.

A general survey of the modern flora of the upland forest zone indicates that much of the hardwood forest has been cleared and replaced with secondary forests species. In the uplands and upper slopes, a wide variety of hardwood species were found to have replaced the pre-settlement tree cover, which was dominated by white oak, black oak and hickory. Although these three species are still evident in present-day tree stands, other well-represented hardwood types include sugar maple, red cedar, burr oak, chinkapin oak, post oak, red oak, hackberry and white ash. Black and mockernut hickory are also well-represented. The primary softwood trees that have encroached upon the uplands include American elm and persimmon.

The modern flora of the hill slope forest zone tends to include the same species noted in the upland communities, but many areas have almost completely taken over by encroaching red cedar or hackberry. Black walnut, honey locust and shingle oak are also present over the hill slopes. In the secondary valleys of the oak-hickory forest zone, a cover is evident which includes species typical of both the Missouri River bottomland and the upland/hill slope areas. Sycamore, black walnut, American elm and box elder are dominant tree types observed along the terraces of these small streams.

Soil units for the upland forest portion of the catchment area are quite varied. Along the upland ridges and upper hill slope, soils are predominantly Wrengart silt loam. Menfro silt loam is also evident, especially along the ridge tops that margin the Missouri River floodplain. Soils along the hill slopes tend to be more varied with Wrengart silt loam, Gateway gravelly silt loam,

Gateway-Gasconade complex and Menfro silt loam being the predominant units. Freeburg silt loam is also evident, especially along the lower slopes. The dominant soils that comprise the secondary floodplains include Freeburg and Dameron silt loams. Other soils that can be found in the secondary valleys include Jemerson, Nolin, Moniteau and Darwin silt loams. All of these lowland soil types are subject to occasional flooding.

Game animals that presently occur in the upland forest resource zone include white-tailed deer, wild turkey, quail, cottontail rabbit, fox and gray squirrel. Animals of economic significance during the period of European settlement in the northern Ozarks include beaver and bison while quail, prairie chicken, passenger pigeon and Carolina parakeet were also present in the upland and prairies (Schultz 1937:19). Bison were also native to the immediate vicinity as noted by William Clark in his early travels up the Missouri River (Twaites 1959:41). Early settlers in the vicinity reported "bears, wolves and panthers were so numerous that the raising of hogs and sheep was almost a matter of impossibility (National Historical Company 1884:161)".

Resource Potentials of the Environmental Zones

The Stauffer site is strategically located near the junction of two resource zones: the Missouri River floodplain and the oak-hickory forest. A paleoethnobotanical analysis of flotation sediments from the site by Wright (see Paleoethnobotanical Analysis section of this report) included 24,103 specimens or 291.47 grams of carbonized plant remains. The remains include wood, bark, nutshell, grass stem, fungal tissue and a possible squash rind. Nutshell comprises 376 fragments and was present, in generally small quantities, in 26 of the 33 site samples. The nutshells include hickory (*Carya*), walnut/bitternut (*Juglans*), black walnut (*Juglans nigra*) and oak (*Quercus*) with the analysis indicating that *Carya* was the favored nut source. The presence of nutshell remains suggests that the Late Woodland occupants at the Stauffer site were exploiting the upland/hill slope floral resources.

The wood/bark fragments identified in the botanical analysis include categories associated with the Missouri River Forest Resource zone such as sycamore (*Platanus occidentalis)* and cottonwood/willow (*Populus/Salix*). The samples are dominated, however, by the upland hardwoods of the *genera Quercus* and *Carya,* although ash (*Fraxinus*) is moderately represented.

The carbonized seeds recovered from in samples includes small starchy-seeded cultigens, oily-seeded domesticates, other grass seeds, economic noncultivated seeds and other seeds. These seed types can grow in a variety of settings, although many prefer a wet habitat.

CHAPTER 3

INVESTIGATION PROCEDURES

Phase III Excavation Techniques

Based on the scope of work for the Stauffer site, excavations focused on research questions raised by Phase II investigations and stated as research objectives in the scope of work. These include:

1. Determine the chronological placement of the component(s) present at the site, with a special attempt to isolate the Late Archaic component of the site;
2. If available, obtain samples of organic remains to be submitted for radiocarbon age determinations and incorporate these results with other assays from the region in order to more securely date the various occupations at the site and across the region;
3. Determine how prehistoric peoples used and organized space across the site. This includes identifying structures, features and discrete activity areas;
4. Determine the site's placement in a larger settlement system, and the season of occupation;
5. Reconstruct the paleoenvironment of the site area to provide a broader understanding of the context of the site;
6. Obtain a sample of artifacts from the site to document the content of the artifact assemblage and to produce data to be used in interpreting the various activities conducted at the site. In terms of lithic resources, questions center around the type of technologies that were employed at the site, lithic resource procurement, and the acquisition of exotic materials. Questions concerning ceramic artifacts include assemblage content, general cultural association, chronological placement, refinement of the regional classification system, and the presence or absence of exotic ceramic artifacts;
7. Obtain information concerning the subsistence practices and economies of the inhabitants of the site

More specific research goals involved settlement, subsistence, and ceramic analysis. At the time of the Phase II investigation it was not clear if the Stauffer site was a temporary camp or a residential base, though the presence of Feature 2/3 suggested the latter. Local residential sites such as 23BO969 (Reeder et al. 1983:150), the Feeler Site (23MS12) (Reeder 1982), and the Algoa site (23CO156, Baker 1984) produced refuse pits, paleoethnobotanical remains and faunal remains, and radiocarbon dates. The Stauffer site's setting, on a high, remnant Pleistocene terrace, is unusual for Late Woodland residential sites. This location raised questions as to whether the site would be similar to the riverine-oriented sites noted above or more similar to a site such as 23CY499, which Sturdevant (1990) interprets as an upland winter deer hunting camp.

We thought that the Stauffer site had a high likelihood of producing a good sample of paleoethnobotanical and faunal subsistence remains based on the recovery of bone and rich organic soil in Feature 2/3 during the Phase II investigation. Starchy and oily domesticates are commonly found in Late Woodland sites where proper recovery techniques are carried out

(Baker 1984, Voigt 1986). Maize also can be found in Late Woodland sites in central Missouri, though it is not always present nor is it present in large quantities when it is recovered in these contexts (Voigt 1986). Information on the use of plant foods at the Stauffer site is particularly useful in developing a clearer picture of subsistence for the Boone Phase, definitions of which until recently focused primarily on artifact trait lists (Chapman 1953:37-38, 1980:1, 78-137; Denny 1964, Hoard 2000).

Late Woodland sites in Missouri most often yield evidence of reliance on deer and fish (Harl 2000, Hoard 2000, Meinkoth 2000, Reeder 2000). Most Late Woodland residential sites in central Missouri are located in or near major flood plains (Hoard 2000) probably to take advantage of the rich, easily tilled alluvial soils. This location also is conducive for harvesting fish either from nearby rivers or from backwater areas resulting from floods filling paleochannels or from more recently abandoned river channel cut-offs. Deer could also be taken from flood plain and terrace settings and may have been a garden pest, happily eliminated by human consumption. The Stauffer site was expected to yield this same pattern, though again its high terrace setting was intriguing in terms of how this may have affected land use and resource harvest.

Ceramic analysis from the site has potential to clarify some of the ambiguity in the division of the Boone, Moreau, and Maramec phases (Baker 1984:38, 40, 94; Chapman 1980:276-277, 288-289; Denny 1964:72-76, 96-101; Fox 1992:16-18 Hermann 1953, Hoard 2000, Klippel 1965:128-129, 132; Reeder 2000, Upp 1953). All of these wares primarily are based on the size of limestone inclusions in the clay body, and most type descriptions are not explicit as to size sorting criteria required to determine the proper ware name. Complicating the matter is the claim of Martin et al. (1994:58), who reported a large range of variation in tempering materials used at the site, and who hinted of the possibility of exotic ceramics from further south and east.

To address these research areas, a combination of hand excavation and excavation using motorized equipment was used to collect data from the site. The location of test excavation units was determined by their location on the grid.

A total of 47 m^2 and 24.1 m^3 from 16 excavation units was hand excavated during data recovery at the Stauffer site (Table 3), followed by approximately 5,350 square meters of mechanical stripping. Hand excavation focused on several areas. First, 35 square meters was excavated on the edge of the terrace scarp, south of Route 179 (Figure 8). Excavation units were placed in the vicinity of test units one, two, and four from the Phase II testing program. This area yielded a high density and diversity of artifacts, as well as Features 2/3 and 5. Excavation units 17, 18, 23, 24, 25, 26, 27 and 28 were opened to the east and west of Test Unit two in order to completely recover Feature 2/3, and features 19, 20, 21, 22, and 23 were encountered in the process. Features 2/3 and 5 were later determined to be part of Feature 19.

Crews used standard, current techniques to hand excavate portions of the site. Where possible, excavation followed natural stratigraphy with individual levels, which did not exceed 10 centimeters in thickness, and when stratigraphy was not apparent, arbitrary levels no greater than 10 centimeters in thickness were used. In some instances, 5 centimeter levels were excavated to provide greater vertical control. All hand-excavated soil (including feature fill, but excluding soil

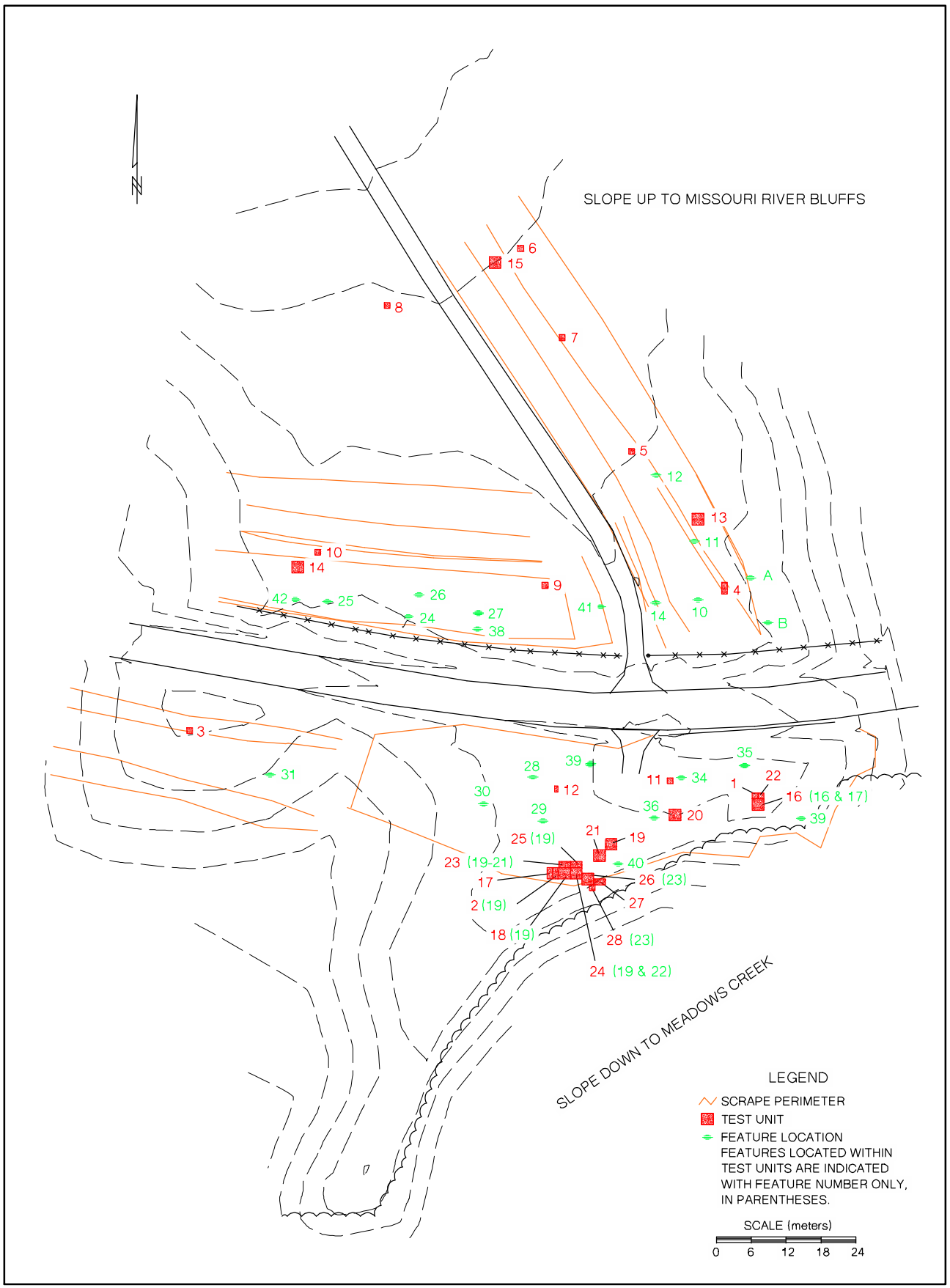


Figure 8. Distribution of Excavation Units, Scraped Areas, and Features.

samples taken for specialized floral and faunal analysis) was sifted through one-quarter inch hardware mesh.

Table 3. Excavation Unit Dimensions.

Excavation Unit Number	Area	Depth	Volume
13	2 X 2 meters	65 centimeters	2.6 cubic meters
14	2 X 2 meters	60 centimeters	2.4 cubic meters
15	2 X 2 meters	80 centimeters	3.2 cubic meters
16	2 X 2 meters	60 centimeters	2.4 cubic meters
17	1 X 2 meters	50 centimeters	1.0 cubic meters
18	2 X 2 meters	70 centimeters	2.8 cubic meters
19	1 X 1 meters	50 centimeters	0.5 cubic meters
20	2 X 2 meters	10 centimeters	0.4 cubic meters
21	2 X 2 meters	50 centimeters	2.0 cubic meters
22	1 X 1 meters	60 centimeters	0.6 cubic meters
23	1 X 2 meters	50 centimeters	1.0 cubic meters
24	2 X 2 meters	50 centimeters	2.0 cubic meters
25	1 X 2 meters	60 centimeters	1.2 cubic meters
26	2 X 2 meters	30 centimeters	1.3 cubic meters
27	1 X 2 meters	30 centimeters	0.6 cubic meters
28	1 X 1 meters	10 centimeters	0.1 cubic meters
16 Excavation Units	47 square meters		24.1 cubic meters

All identified features were mapped and described. Where possible, we took a minimum sample of 10 liters of fill from each feature for specialized paleoethnobotanical and zooarchaeological analysis. From larger pit features, we bisected the feature and excavated one half to the bottom. After recording the stratigraphic profile of the exposed feature, we excavated the remaining half by natural or cultural zones. When possible, soil samples were taken from each of these zones. Also, samples for radiocarbon dating and other specialized analysis were collected when they were encountered.

In total, 346 liters of flotation sediments were processed. Most samples had a volume of 10 liters, though some were smaller because a full 10 liters was not present in the sampling unit. For flotation processing, we used a modified SMAP system (Pearsall 1989:52-68). Specifically, we fitted a 55-gallon trash barrel with a showerhead near the bottom. A high-pressure water source connected to a heavy-duty garden hose is used to deliver water to the showerhead, which agitates the water in the barrel. A 35-gallon barrel, with its bottom removed and replaced with window screen and supporting half-inch mesh, is inserted in the larger barrel. The smaller barrel is suspended in the water above the showerhead. Samples were poured into the smaller barrel while the water is in motion and agitated by hand. The light fraction of the sample is suspended by the moving water and is siphoned off the top by an overflow chute, which drains into an attached bucket, the bottom of which is replaced with geological grade brass 0.5 mm mesh. Also, 0.25 mm brass mesh placed in a loop with a handle is used to remove any floating material,

and a siphon is passed over the heavy fraction to remove light but non-buoyant botanical material.

Most samples were poured into the device dry. Samples with high clay content were pretreated by soaking in water and sodium bicarbonate for an hour. The sodium bicarbonate acts as a deflocculant on the clay, releasing small, light particles of organic material. The light fraction was removed and placed in squares of white cotton broadcloth, which were labeled, tied, and left to dry. The samples were then submitted to Patti Wright, whose analysis is in chapter seven of this report.

We collected all field specimens by excavation unit, recording their depth, and other pertinent provenience information, all of which was clearly marked on the collection bags. Theresa Piazza, Trudi Bach, and Katie Gray analyzed the recovered materials and classified artifacts according to the standard MoDOT system, included as Appendix 1 of this report. Their analysis included the artifacts recovered from the light and heavy flotation fractions of soil samples.

All artifacts and other remains from this excavation are being curated at the joint MoDOT and Department of Natural Resource curation facility at Rock Bridge State Park.

After completion of the hand excavation, we used a motor grader and a track hoe to expose approximately 5,350 m^2 of the site. Soil was removed in small increments, approximately five centimeters at a time. As the machine removed soil layers, archaeologists inspected the ground surface and placed pin flags next to artifacts or areas suspected to be features. The latter were skim shoveled to determine if they were evidence of non-human bioturbation or the result of human activity and thus features of interest. We recorded the location of features, artifacts, soil layer changes, boundaries of scraped areas, and other items of interest using computerized surveying equipment operated by professional MoDOT surveyors. This method provides precise mapping of items of interest and thus an accurate reconstruction of the spatial relationship of artifacts and features at the site.

Heavy equipment proved to be an excellent means of opening up large portions of the site and exposing features. Pit and basin features appeared as dark stains in the lighter matrix, and concentrations of bone or artifacts were exposed with minimal damage. While the use of heavy equipment undoubtedly leads to the loss of exact provenience of some artifacts, it more than makes up for this loss by the exposure of large portions of a site with a small investment of time and labor relative to manual techniques.

Discussion

Every excavation unit contained pottery, and most had pottery in all levels or in all but the bottom level. In these cases the bottom level is either sterile or contains only small amounts of cultural material, none of it time diagnostic. This is important because a number of Archaic period projectile points were recovered at Stauffer. The ubiquitous presence of pottery in the excavation units is strong evidence that the Late Woodland component of the site is overwhelmingly dominant. This situation is true in the Phase II testing (Martin et al. 1994:55-60). A Late Archaic Etley point was recovered from soil zone 4a of Test Unit 6, but a small

piece of pottery was recovered in the same stratum. It is possible that the small pot sherd had moved into an Archaic stratum through human action or natural soil processes. Still, in the conclusion of the Phase II summary, Martin et al. (1994:60) state that no discrete Late Archaic context was identified. We share this conclusion.

In sum, our excavation strategy revealed that while there is an Archaic component at the site represented by projectile points, it cannot be recognized as being restricted to a distinct soil stratum. Also, of the twenty-nine features found, all had at least one pot sherd except Feature 34, a shallow basin from which there were no diagnostic artifacts and as such is not assigned to any specific component. With no features being clearly Archaic in age and only one shallow basin having the only possibility for being Archaic, we are left with little information to interpret the Archaic occupation. However, the presence of the Archaic component restricts the utility of the general collection and of those materials with provenience outside of excavation units or features. Unless these materials are diagnostic—pottery or a projectile point—it is impossible to affiliate these materials to a time period.

While some mixing between Archaic and Late Woodland components took place at the site, the vast majority of the diagnostic artifacts from the site—points and pottery—are Late Woodland in age. For this reason artifact analysis focused on hand excavated materials, with particular emphasis given to features. These contexts have a lower likelihood of having materials of the Archaic and Late Woodland components being mixed. Materials from these contexts have been treated with the assumption they they are from the Late Woodland component.

Chapter 4

SITE STRUCTURE

Site Stratigraphy and Structure

Four different soil zones were documented in the Phase II investigations of the Stauffer site (Martin et al. 1994:44-47): Zone 1, a five to 12 cm thick dark brown silty loam with many fine rootlets; Zone 2, a 15 to 20 cm thick brown to dark brown slightly clayey silt loam; Zone 3, a 10 to 15 cm thick dark yellowish brown clayey silt loam on the southern portion of the site and a 10 to 15 cm thick dark brown silty loam on the northern portion of the site; and Zone 4, the subsoil, comprised of two sub-zones, zones 4a and 4b. Zone 4a, or the B1 horizon, was a 15 to 20 cm thick yellowish brown clay loam with an angular to sub-angular structure and mottled magnesium nodules. Zone 4b, or the B2 horizon, was a yellowish brown loamy clay of undetermined depth, with a blocky structure and slight clay filming.

Zone 1 was interpreted as an AO (or organically enriched) horizon that is a late 19th to early 20th century erosional feature originating from the hill above the site. Zone 2 was seen as the historic plow zone, or Ap horizon, containing a high density of prehistoric artifacts. Zone 3 was described as a Late Woodland midden, a paleosol, and/or a living surface. Zone 3 was not found in all portions of the site, specifically, it was not found in Test Units 3 and 12. Features 1, 2, and 5 were found in this zone. Zone 4 is described as subsoil. As noted earlier, a Late Archaic Etley point was recovered from Test Unit 6 in soil zone 4a, suggesting the presence of a Late Archaic stratum. However, pottery was also found in this level. We do not know if the pottery is in place or was transported down to this level after deposition.

In preparation for large-scale excavation, MoDOT Geotechnical Liaison George Davis evaluated the soils at the Stauffer site as follows:

Ap: 0 to 2 cm: Very dark grayish-brown to grayish brown (10 YR 3/2 to 10 YR 4/2) silt loam; weak very fine granular structure, friable, many very fine roots; abrupt wavy boundary.

A: 2 to 5 cm: Brown (10 YR 4/3) silt loam; weak fine prismatic structure parting to weak fine subangular blocky; friable; common fine and very fine roots; clear wavy boundary.

2AE: 5 to 20 cm: Brown (10 YR 4/3 to 10 YR 5/3) silt loam with common fine prominent 7.5 YR 4/6 mottles; weak fine prismatic parting to weak fine subangular blocky structure; friable; few fine and very fine roots; common fine and very fine iron - manganese concretions; few very fine faint silt coats on faces of peds; gradual, wavy boundary.

2E: 20 to 38 cm: Dark yellowish brown (10 YR 4/4) silt loam with many very fine and few fine prominent 7.5 YR 4/6 mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; many prominent silt coats on faces of peds; few very fine roots; gradual smooth boundary.

2Bt1: 38 to 51 cm: Dark yellowish brown (10 YR 4/6) silty clay loam with many fine and very fine prominent 7.5 YR 4/6 mottles; moderate medium subangular blocky structure parting to fine subangular blocky; friable; few faint silt coats on faces of peds; many faint thin brown (10 YR 4/4) clay films on faces of peds; gradual smooth boundary

2Bt2: 51 to 75 cm: Dark yellowish brown (10 YR 4/6) silty clay loam to silty clay; weak fine prismatic parting to moderate fine subangular blocky structure; friable; common fine brown (10 YR 4/4) clay films on faces of peds and in pores.

Davis' first three zones—AP, A, and 2AE—correlate fairly well with zones defined by Martin et al. as 1 and 2, Davis' 2E corresponds to Martin et al.'s Zone 3, and Davis' 2Bt1 and 2Bt2 correspond to Martin et al.'s zones 4a and 4b.

Feature Descriptions

We excavated all features encountered at the Stauffer site. The location of features at the site is shown in Figure 8. Enumeration of features is not continuous. Features 1, 2/3, and 5 were established in the Phase II report, and Feature 4 was named but later dropped as non-cultural (Martin et al. 1994:47-51). We include Features 2/3 and 5 as part of Feature 19 later in this report. Feature numbers six through ten were never used. Features 13, 15, 16, 17, 29, 30, 32, and 37 were designated features in the heat of mechanical excavation, but later evaluation determined that they were either non-cultural phenomena, were unpatterned scatters of relatively insignificant cultural material, or were consolidated with other features. A large, isolated fragment of a Pleistocene mammal was originally designated Feature 15.

Each of the features is classified by type and described below in Table 4. Data on floral and faunal remains in the features are taken from the analysis by Wright and Bozell, respectively, which appear as Chapters Seven and Eight in this volume.

Description of pottery for the features is based on sherds that are larger than 6 mm. Sherds less than this size are, in almost all cases, of marginal value for analysis and thus are disregarded. Also excluded from analysis are sherds that are heavily eroded, in other words, are recognizable as sherd-shaped fired clay but which have had their fired surfaces removed by post-depositional processes.

Table 4. Features Excavated.

Feature Number	Description	Period	Feature Number	Description	Period
19	Structure Floor	LW	23	Earth Oven	
42	Structure Floor	LW	25	Earth Oven	
20	Post Mold	LW	31	Earth Oven	
21	Post Mold	LW	40	Earth Oven	
22	Post Mold	LW	1	Hearth	
27	Deep Pit	LW	14	Hearth	
28	Deep Pit	LW	24	Hearth	
33	Deep Pit	LW	26	Hearth	
38	Deep Pit	LW	39	Hearth	LW
A	Deep Pit	LW	41	Hearth	LW
18	Shallow Basin	LW	10	Artifact Concentration	LW
34	Shallow Basin	LW	11	Artifact Concentration	LW
35	Shallow Basin	LW	12	Artifact Concentration	LW
36	Shallow Basin	LW	43	Artifact Concentration	LW
B	Shallow Basin	LW			

Description of Feature Classes

Features at the Stauffer site are classified as follows:

Structure floors

Identifying structure floors in Missouri Late Woodland sites can be tricky. Those that have been identified are described as concentrations of artifacts and debris in areas ranging from two to seven meters in their longest dimension. Shape can vary between round, oval, square or rectangular. In some, but not all cases, hearths, storage pits, and/or post molds are present. Two features at Stauffer—19 and 42—are considered to be structure floors.

Post molds

Post molds are the stains left when a post, embedded in the ground, has disintegrated, leaving a stain that shadows its shape. These are circular to ovate in plan view, in cross section they are parallel-sided and have a flat or tapered end. They may have stone chinking supporting or stabilizing the post when it was in place. Features 20, 21, and 22 are post molds.

Deep pit features

These are storage pits, at least 50 centimeters deep, with generally vertical walls. All have more than one depositional zone. They range in width from 130 to 170 centimeters and range in depth

from 70 to 130 centimeters. In use they may have been lined with hides or mats to help protect the contents, and were covered. After use as storage pits, they typically were filled with trash, which is their most common condition in archaeological sites. There are four deep pit features at Stauffer: 27, 28, 33, 38, and A.

Shallow basin pits

Shallow basins are wider than they are deep. While these features often are enigmatic, the variety of remains recovered in them suggest that they often are used for short term tasks. For example, a person processing a deer hide or making stone tools might first dig a small basin and when their task is completed push the waste products into the basin and bury them. Shallow basin pits are identified by having a distinctive soil color or texture and often by a higher artifact concentration than surrounding areas. Features 18, 34, 35, 36, and B are shallow basin pits.

Earth ovens

Rock ovens and earth ovens are steam cooking devices. Heated stones are placed in a pit, or a fire is ignited in the pit and stones are laid on it. Wrapped food items are laid on the hot stones and then covered with another wrapping, then the earth excavated from the pit is used to cover the pit. After several hours, the food is excavated and removed. These features are identified by concentrations of heated rocks in or near a large shallow pit. Four features at Stauffer—23, 25, 31, and 40—are earth ovens.

Hearths

These are the remains of a small fire. Common artifacts include charcoal, heated stone, broken tool fragments, animal bone, burned earth, and occasionally nut shell or seed remains. There are six hearths at Stauffer (features 1, 14, 24, 26, 39, 41), making this feature type the most common at the site.

Artifact Concentrations

In some instances artifacts are concentrated relative to surrounding areas of the site. These concentrations are identified as features in that it is likely that they represent the material remains of a specific activity. Features 10, 11, 12, and 43 are artifact concentrations, most consisting almost exclusively of pottery.

Description of Features from the Stauffer Site

Structure Floors

Feature 19. Feature 19 was a large, ovate basin feature primarily within Excavation Units 18 and 24, but also present in EU 17, 23, and 25 (Figure 9). It ranged in depth from 25 to 60 cm below the surface and had exposed horizontal dimensions of approximately 3 by 4 meters. Because the southern portion of the feature was outside of right of way and could not be excavated, we cannot be certain of the feature's shape but the exposed portion suggests that it is

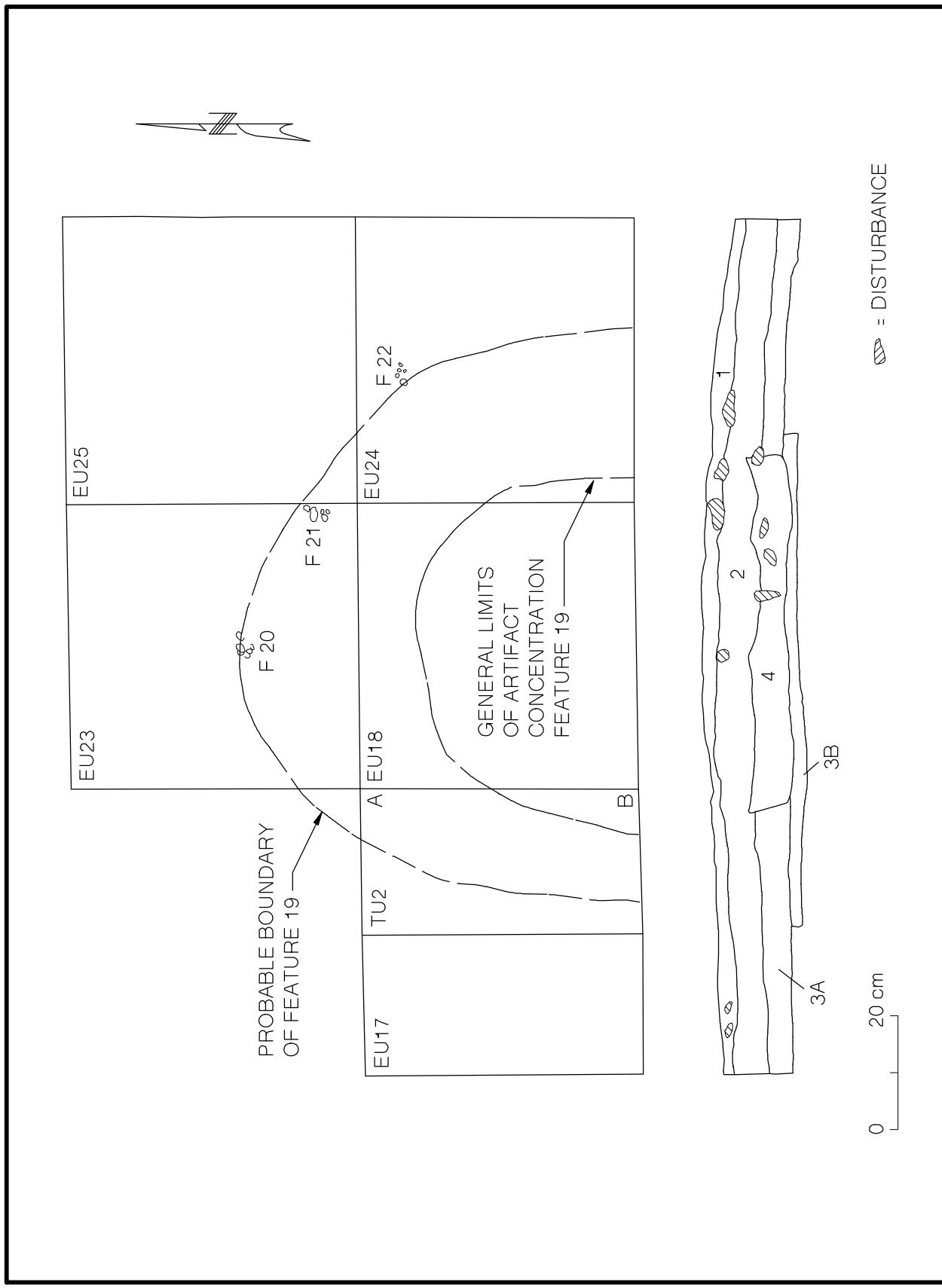


Figure 9. Feature 19 Plan View and Profile.

ovate and approximately 6 by 4 meters. The feature is defined by the presence of a dark brown silty loam, which contained charcoal, burned sandstone, non-human bone, chipped stone artifacts and pottery. The upper portion of the feature, roughly 20 to 35 cmbs, is represented by a dense scatter of cultural debris that extends over part or all of excavation units 17, 18, 23, 24, and 25, and over Test Unit 2 from the Phase II test excavations. At about 35 cmbs, the rounded basin pit became apparent, primarily in EU 18 but extending into the west edge of EU 24 and the east edge of TU 2. The pit became more apparent in the wall profile. It is approximately 30 cm deep and cuts through natural soil layers. The scatter of artifacts at the upper level of the basin, and the difficulty in seeing the basin in the upper levels, may be explained by disturbance from plowing.

Feature 19 in the Phase II Investigations. In the report on the Phase II excavations at this site, Martin et al. (1994:47-53) discuss features 2/3 and 5 within TU 2. Excavation of EUs 17 and 18, on either side of TU 2, reveals that these features are part of Feature 19. Feature 2/3 is the shallower deposit, probably disturbed by plowing, Feature 5 is the edge of the basin now known as part of Feature 19. Feature 2/3 initially was defined during Phase II testing as two superimposed basin pit features approximately 30 cm below surface in the center portion of Test Unit 2. In the Phase II report this feature is interpreted as a midden-filled, compound basin feature (Martin et al. 1994:47-51). The feature was first identified below the interface of the 2AE and 2E horizons and extended from approximately 30 cm to 45 cm below surface. The eastern half was approximately 10 cm deeper than the western half, creating a step-like cross-section. An undetermined amount of the feature extended outside the unit to the east and west. The feature had a slightly rounded-to-flat bottom, and gently outslanting walls and was filled with a mottled, dark brown slightly clayey silt loam. Material recovered from the basin included ceramics, lithic debitage, and bone. A seven liter flotation sample was analyzed, yielding wood and nut shell, but no seeds. Two turtle bones and one deer bone were recovered.

Feature 5 was located in the southeast corner of Test Unit 2 of the Phase II investigation (Martin et al. 1994:51-53). The feature was not defined until the mapping of the east wall of the unit, which had been taken down into the subsoil (2Bt1), or approximately 50 cm below surface. Only a small portion of the feature was identified within the test unit. In plan view, the feature measured 86 cm north-south and 40 cm east-west within the test unit and extended from 35 cm to 60 cm below surface. As the Test Unit 2 profile Figure 9 shows, it has a flat bottom and a vertical wall. There were two fill zones in the feature. The interior portion of the feature was a dark brown clayey silt loam, and the exterior portion of the feature was a dark brown loamy clay mottled slightly with the surrounding subsoil. Material from the pit feature included a light density of bone, ceramics, and lithic debitage. A gopher incisor and a deer femur fragment were recovered from this feature.

Feature 19 in the Data Recovery Effort. During the mitigation excavation units were opened around Test Unit 2 of the Phase II investigation to better understand the features found there, eventually leading to the definition of Feature 19. Detailed artifact distribution maps were made of EU 18, 23, 24, and 25 at 35 cmbs and 40 cmbs (Figures 10 & 11). At 35 cmbs, artifacts were relatively evenly distributed across EUs 18 and 23 and the west halves of EUs 24. At 40 cmbs, a distinct concentration of artifacts is apparent within the limits of the basin.

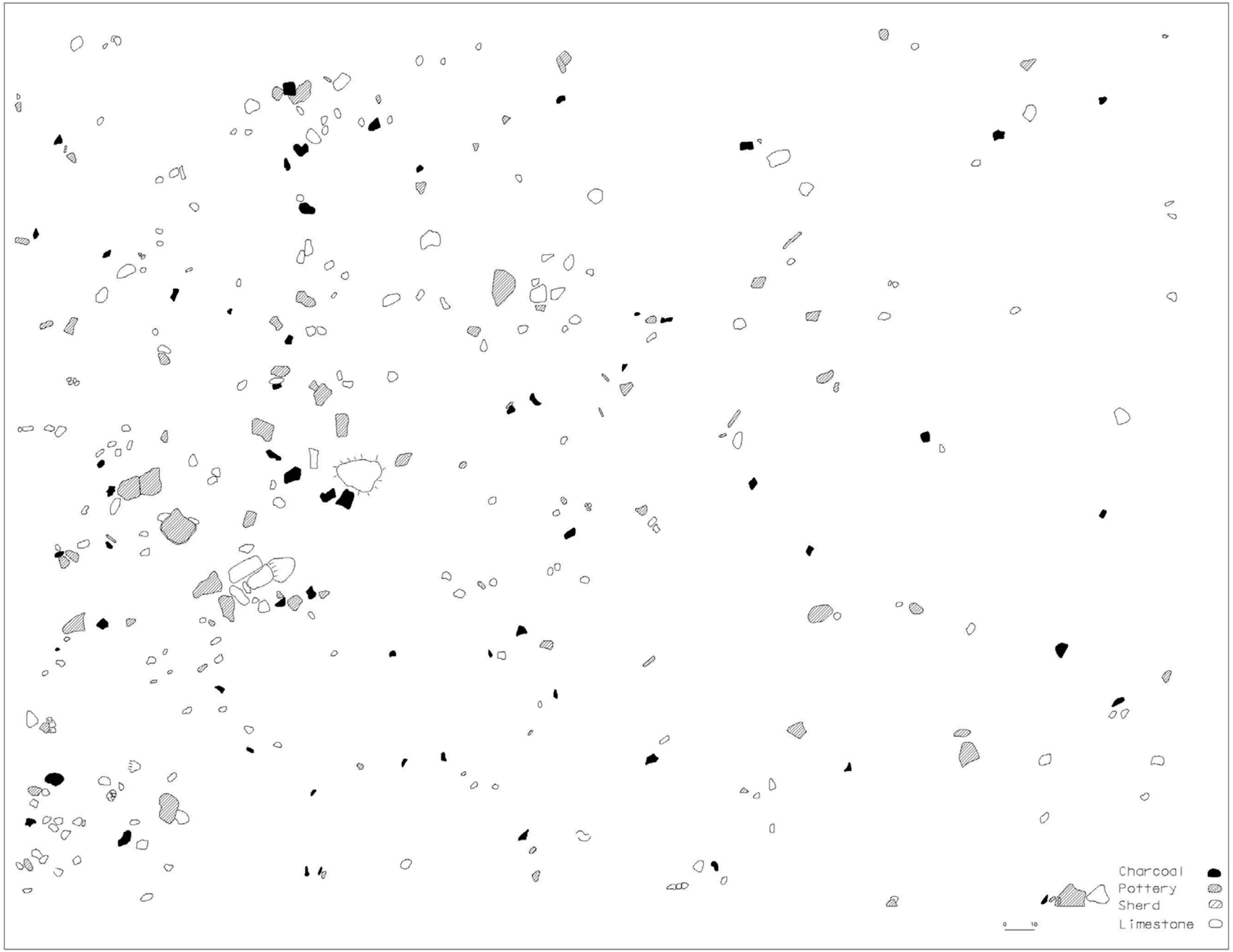


Figure 10. Plan View of Feature 19 at 35 Centimeters Below Surface.

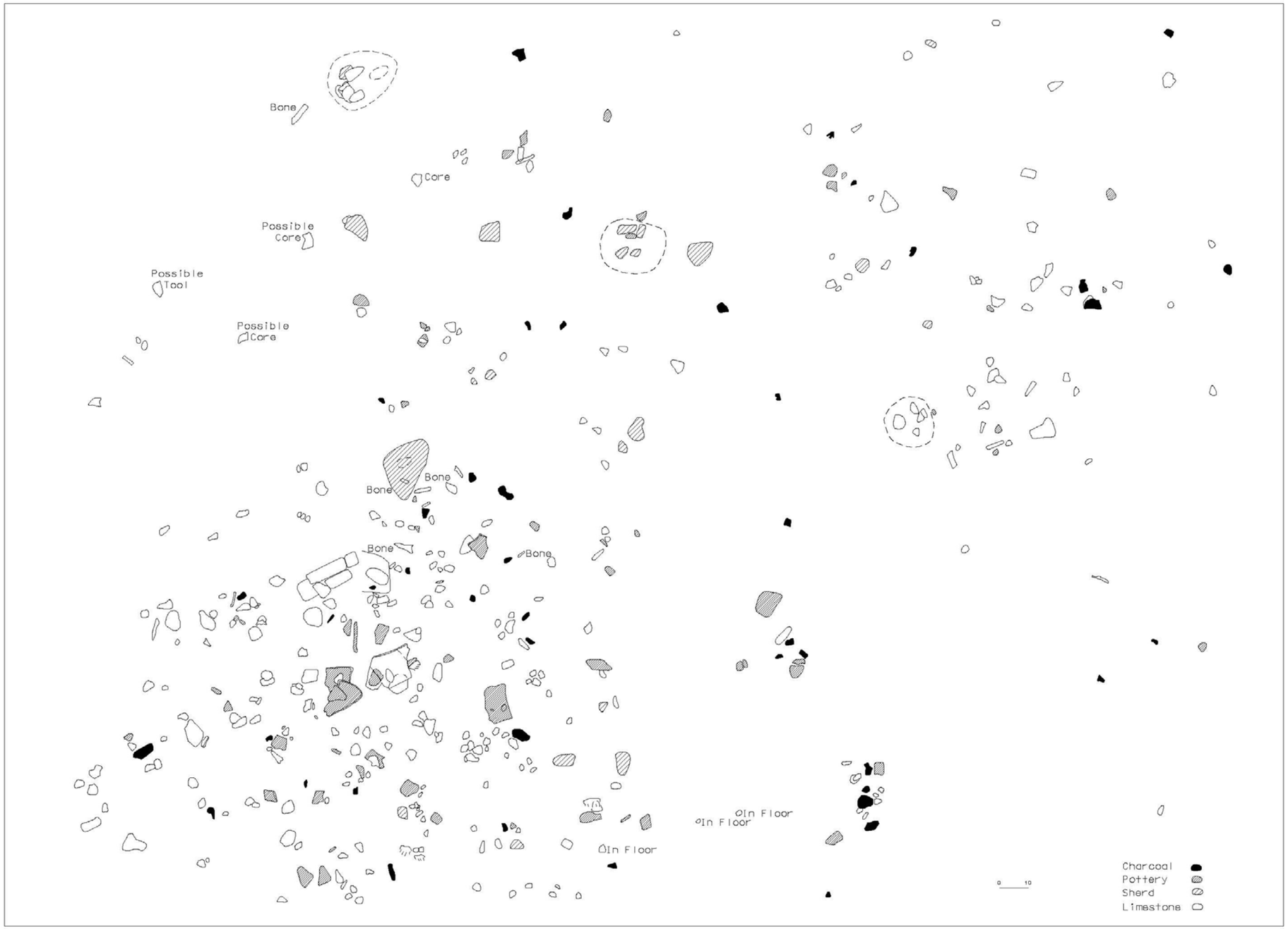


Figure 11. Plan View of Feature 19 at 40 Centimeters Below Surface.

All of the 738 pottery sherds from Feature 19, 43 of which are rims, are tempered with limestone except for one plain, untempered body sherd. Fourteen of the sherds are brushed, the rest are plain. Thirty liters of soil from this feature were processed by flotation. Wood charcoal, twenty seven walnut and hickory nut shell fragments, and two seeds—*Chenopodium* and *Phalaris caroliniana*—were recovered as was bone from rodents, rabbits, canids, deer, quail, turkey, turtles, snakes, and fish. Deer is by far the most common identifiable species represented. Worked bone recovered from the feature includes deer bone modified by the production of beads and metapodial awls, a grooved and snapped distal turkey tarsometatarsus which is long bone awl manufacturing debris, a punch, a shuttle fragment, a turtle shell bowl fragment, and striated and cut bone. Feature 19 had more modified bone than any other feature on the site, and had amounts similar to that found in features 27, 28, and A, all deep pit features. This suggests that bone tools were being manufactured and used in this location. Six pieces of ground stone were found in this feature.

Daub, while common nowhere on the site, is more prevalent in Feature 19. The daub recovered from Feature 19 totaled 489.9 g. Thirty four percent of the daub from Stauffer comes from levels 3 and 4 in Excavation Units 23, 24, and 25 and levels 3 through 6 in unit 18, which are within Feature 19. This is 59% of the daub from all features at the site. This supports that idea that Feature 19 is a house floor.

Three post molds, Features 20, 21, and 22, appear in EUs 23-25 and are 120 cm, 70 cm, and 100 cm, respectively, from the pit delineating Feature 19 at a depth of 35-40 cm (Figures 11 and 12). Also, an earth oven, Feature 23, is just down slope and within 2 m of the edge of Feature 19. These features are described in more detail below.

Because of its shape, the density and diversity of cultural remains, and the proximity of three post molds (Features 20, 21, and 22, described below), we believe that Feature 19 is the remains of a house floor.

Feature 42. Feature 42 is a distinctive shallow, oval shaped depression with a distinctive burned clay floor containing limestone, pottery and charcoal (Figure 12). The north edge of the feature was defined in a trench profile, other edges cannot be clearly defined. Its excavated dimensions are 1.8 by 1.65 meters, though we expect that the feature extended to the south and had a length of two to three meters. The burned earth, charcoal, pottery layer that rests upon the clay subsoil (mentioned above) may be evidence of a house floor. Only 6.0 g of daub was recovered from Feature 42. However, the entire floor of the feature is defined by a layer of compact burned earth, possibly the result of a structure fire. The floor of this feature is unusually clean and free of debris, as if it had been swept. Field crews skim shoveled out from the center of this feature to find its edge and to search for post molds. The edge of the compact burned floor gradually dissipated as skim shoveling moved away from the center. No post molds were found.

In the center of Feature 42 is an amorphous concentration of pottery, limestone, charcoal, and burned earth. The limestone and burned earth form a discontinuous but discernable zone approximately 15 cm below the surface. This area was found on top of the burned floor and was the first indication of Feature 42. It was designated Feature 37 during field work. In an attempt to find its limits, field crews excavated two perpendicular intersecting trenches through it,

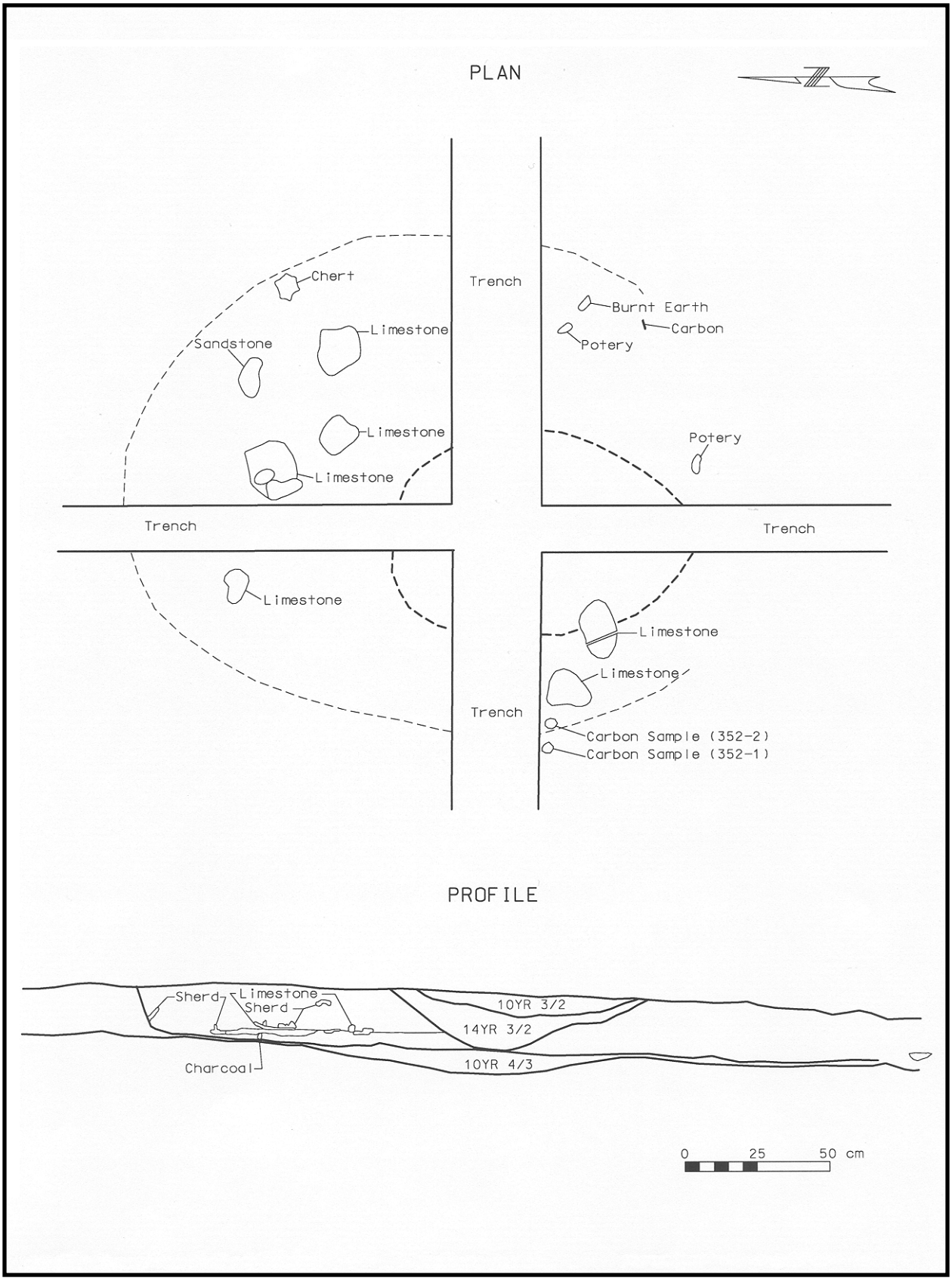


Figure 12. Feature 42.

defining Feature 42 in the process. The area initially designated Feature 37 is now believed to be a hearth in the structure floor. Its darker fill was more visible in higher levels as a result of plowing. Fill from this hearth includes debitage (63, 79.7 g), burned earth (85.6 g), a blade, a single ground stone fragment weighing 43 grams, a uniface, and miniscule amounts of bone (4.4 g) and shell (0.1 g), and a mud dauber's nest. There are 47 sherds from this area that are larger than the 6 mm analytical threshold, all limestone-tempered and plain surfaced except for a single brushed rim. Also included are two identifiable faunal elements, one from a deer, the other from a canid. Floral remains consist of a single Chenopodium seed, a walnut shell fragment, and wood charcoal.

The twenty liters of soil from Feature 42 that were processed by flotation recovered no seeds, less than three grams of charcoal, and no identifiable faunal remains. There are 89 sherds from this feature large enough to be analyzed, all limestone-tempered and plain surfaced except for two brushed body sherds. Other artifacts from Feature 42 include a biface fragment, bone fragments (2.3 g), burned earth (167.6 g) 255 pottery sherds (450.7 g), 6 grams of daub, debitage (12, 19.1 g), less than a gram of charcoal, and 6.7 kg of unmodified stone.

Post Molds

Features 20, 21 and 22. These three chinked-in post-molds were found in excavation units 23 and 24, all in an arc around Feature 19. They were all oval to crescent shaped with a diameter of 15-20cm. There was no stain apparent, but shape and isolation of these mostly limestone concentrations indicated their purpose. There was some debitage and pottery fragments associated with the limestone. They were at the same level of 20 cmbd and ran in a NW to SE line, each being a nearly equal distance of about 1m apart. Feature 20 contained two plain body sherds and a piece of ground stone weighing 430 grams, Feature 21 had one plain rim sherd and two pieces of ground stone weighing 360.5 grams, pottery was absent from Feature 22.

Deep Pit Features

Feature 27. Feature 27 was first noted as a stain exposed by the motor grader. This large pit had straight, slightly expanding sides and a flat base with somewhat rounded corners. Its mouth and base were circular in outline, the former having a diameter of about 1.45 m and the latter measuring about 1.25 m. The average depth of the pit was about 90 cm. It was excavated manually and displayed five stratigraphic zones (Figure 13). The loose brown fill of Zone A contained cores and assorted debitage, some of which was utilized/retouched. This zone also contained pottery, burned rock, and burned earth. Zone B was slightly more compact mottled gray and brown soil with dispersed charcoal, and contained an assortment of artifacts including ground stone fragments, a point fragment, debitage, burned earth, burned stone, and pottery. Artifact density was generally higher in this zone. Zone C fill was very dark gray with an increased density of cultural material, including several utilized/retouched flakes and biface fragments.

The profile of Feature 27 shows an area of light gray ash and charcoal fill between Zones C and D. When the wall was cleaned in preparation for excavating the east side, the ash zone was not clearly visible. This fill probably covered only a small part of the feature and was all but missing

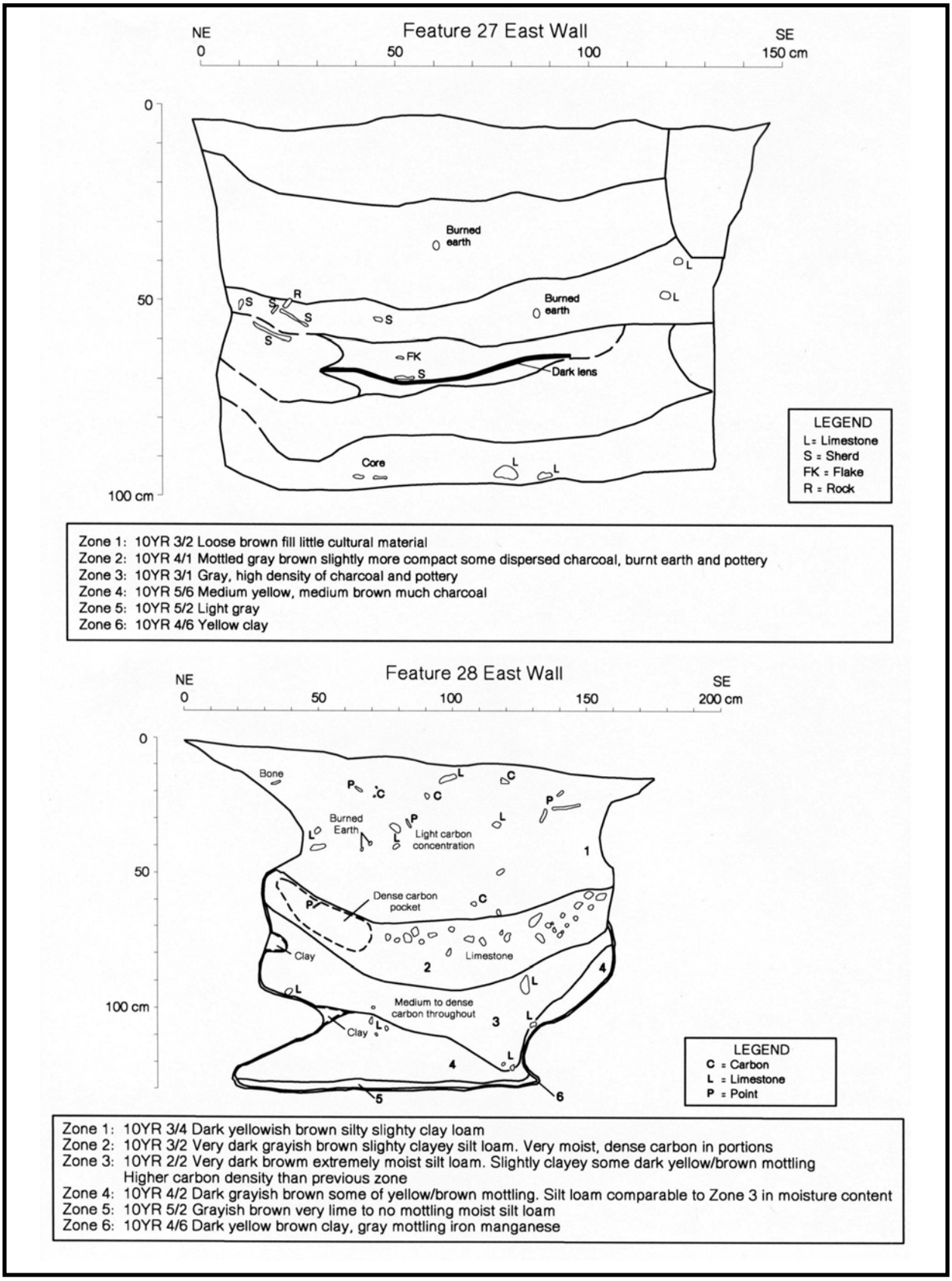


Figure 13. Profiles of Features 27 and 28.

from the east side. Because of this, the ash and charcoal fill between Zones C and D was not excavated as a unique zone.

The medium-yellow to medium-brown soil of Zone D showed an increase in charcoal, and pottery was still a significant part of the fill. There were several utilized/retouched flakes and a few cores. The presence of two Scallorn points in this zone dates this feature to the Late Woodland period. Zone E was characterized by light gray, compact, blocky soil containing pottery, biface fragments and several cores. The floor of the pit held a large fragment of deer scapula and showed an increase in limestone but not enough to be called a lining.

The vast quantity of pottery from Feature 27, totaling 1513 sherds, is representative of the site in general. There are 1,390 body sherds, the rest are rims. All of the sherds are limestone-tempered. The vast majority are plain, the rest are brushed. Despite the large number of sherds, only a few rims are decorated, and there are no decorated body sherds. Two of the rims are slashed and one is notched, one has a zigzag (rocker?) pattern, and one has a single incised line on the shoulder. Also recovered were five untempered pieces of clay which might be fragments of a strap or a bowl rim.

Fifty liters of soil from Feature 27 were processed by flotation to recover botanical remains. Botanical remains include over 120 g of wood and nut shell charcoal, 1015 seeds including *Chenopodium, Helianthus annuus, Hordeum pusillum, Iva annua, Panicum, Phalaris caroliniana* (n=690), and *Polygonum*. Faunal remains are dominated by deer but also include turtle, fish, gopher, and rabbit.

Charcoal from the east half of Zone D has a radiocarbon age of 1260±80 B.P. (Beta-79776, cal A.D.775, range, cal A.D.645 to 975).

Feature 28. This irregular, deep pit was first noted as an area of stained soil exposed by the motor grader. The opening of the pit was 1.70 m by 1.50 m. Once defined, the stain was bisected and the west half was excavated with all the fill being saved for floatation and water screening. The eastern half was then excavated by zones, with this fill also being bagged for processing. The base was irregularly shaped, with its width ranging from 65 to 120 cm. Maximum depth of the feature was 1.32 m. The fill of Feature 28 was noticeably moist.

Feature 28 had four distinct zones (Figure 13). Zone 1, from the exposed surface to a maximum of 69 cm below the exposed surface was a dark yellowish brown silty clay loam with a high concentration of burned rock, hematite, pottery, daub, bone, and charcoal. Zone 2 had a similar density of cultural material, but its matrix was a very dark grayish brown clayey silt loam with notable concentrations of cultural material and charcoal. Zone 2 was less dense than Zone 1. Zone 3 had more charcoal but less of other kinds of cultural material than the previous two zones. It was a very dark brown silt loam with dark yellowish brown mottling. Zone 4 was a grayish brown silt loam with little mottling and substantially less cultural material than the higher zones. A fragment of a mud dauber nest, ground hematite, and a clay tubular bead or pipe stem fragment were recovered from the west half of the feature.

Flotation was used to process fifty liters of soil for botanical remains. Wood and walnut and hickory nut shell charcoal from the feature totaled 53.7 grams. Plant seed types included *Chenopodium*, *Hordeum pusillum*, *Phalaris caroliniana*, and *Polygonum* and totaled 26. Bone remains are primarily from deer, but also are from elk, hawk, turkey, fish, and turtle.

A radiocarbon age determination of 1330±60 B.P. (Beta-79777, cal A.D.680; range, cal A.D.630 to 855) was made on charcoal from the east half of Zone 3.

Feature 33. Feature 33 is a pit, 0.7 meters deep and 1.6 meters in diameter at its top. It was discovered during the scraping of the southwestern portion of the site (Figure 14). A buried telephone cable went through the feature. Feature 33 had three distinct zones. The first zone was a dark yellowish brown silt loam with clay and a moderate amount of charcoal and cultural material including chipped stone debris, pottery, burned limestone, and bone. Zone 2 was very similar to Zone 1 but was lighter colored and had less cultural material and charcoal. The third zone was a grayish brown silt loam with less clay and more charcoal than previous zones. The feature contained one arrow point. All of the 201 pottery sherds recovered were plain and limestone-tempered except for four that were brushed. Only three identifiable faunal elements—two deer and one rabbit—and four seeds—two *Hordeum pusillum* and two *Phalaris caroliniana*—were recovered from this feature.

Feature 38. Feature 38 was a stratified pit feature, approximately 1.3 meters in diameter and 85 centimeters deep, with three fill zones. Figure 14 describes the fill zones in detail, but in general the feature fill is dark gray and brown, looser that surrounding soil and contains large amounts of pottery, charcoal, debitage and stone tools, and burned stone. Six arrow points and two larger points were found in Feature 38, and a mud dauber nest was recovered from soil zone B. One quail bone, one cottontail bone, and three deer bones were identified from this feature. Paleoethnobotanical remains recovered from flotation of 30 liters of soil produced wood charcoal, shells of walnut, hickory, and acorn. Seeds are strongly dominated by *Polygonum* but *Chenopodium*, *Helianthus*, *Hordeum pusillum*, *Iva*, *Phalaris caroliniana* and others are present.

A total of 1,204 pot sherds came from Feature 38. One brushed, grog-tempered sherd was recovered, 22 were limestone-tempered and brushed, 1 was a plain limestone-tempered sherd with an incised line on the shoulder, and the rest—1180—were plain limestone-tempered sherds, including three rims with tiny incisions and a possible bowl fragment.

Feature A. Feature A was first noted during construction on the north side of Route 179 and east of the driveway to the Stauffer house. It was a cylindrical, flat-bottomed pit feature. Its rough dimensions are 140 cm in diameter and 80 cm in depth. The west half of the feature was shoveled out and the fill saved (Cat. No. 360) revealing five cultural zones. The zones were then excavated as separate units and their fill was saved. These zones are shown in Figure 15.

Feature A yielded bone, charcoal, pottery (some decorated with patterned cord-marking, some reed punctated), 13 points and point fragments including very small Scallorn-like types, and a very small ceramic bird figurine from Zone 5.

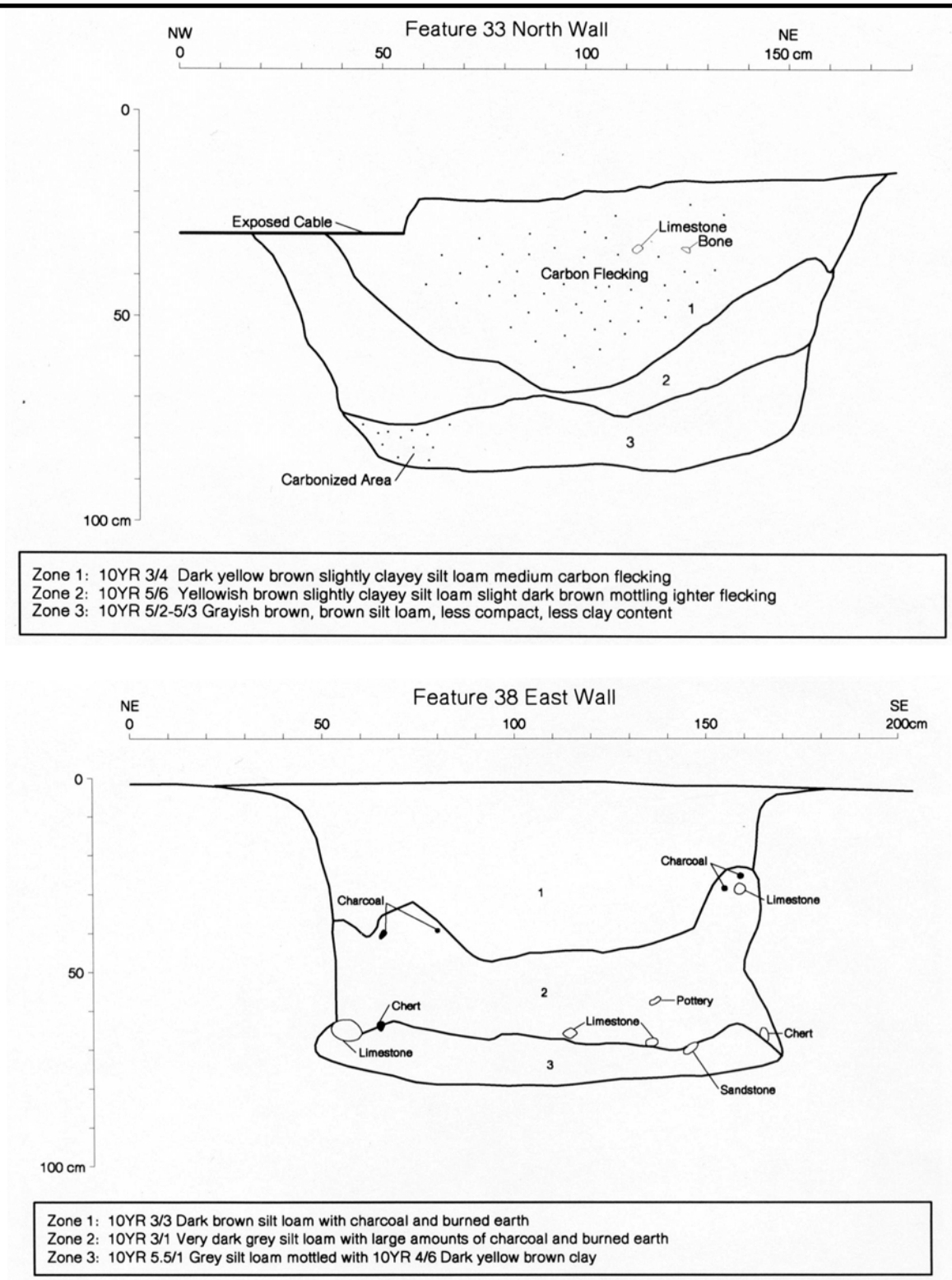
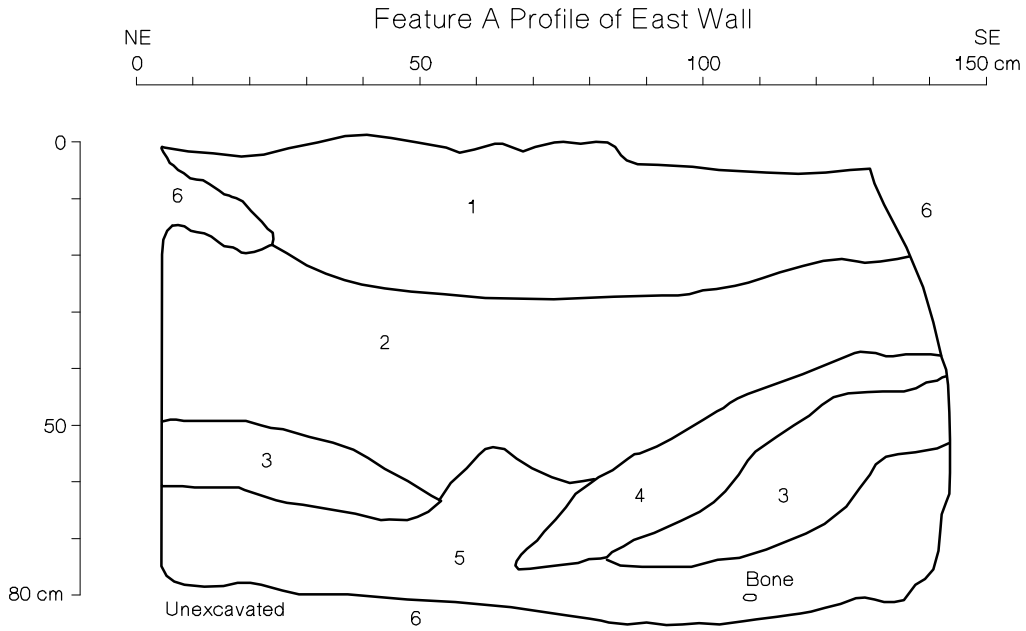
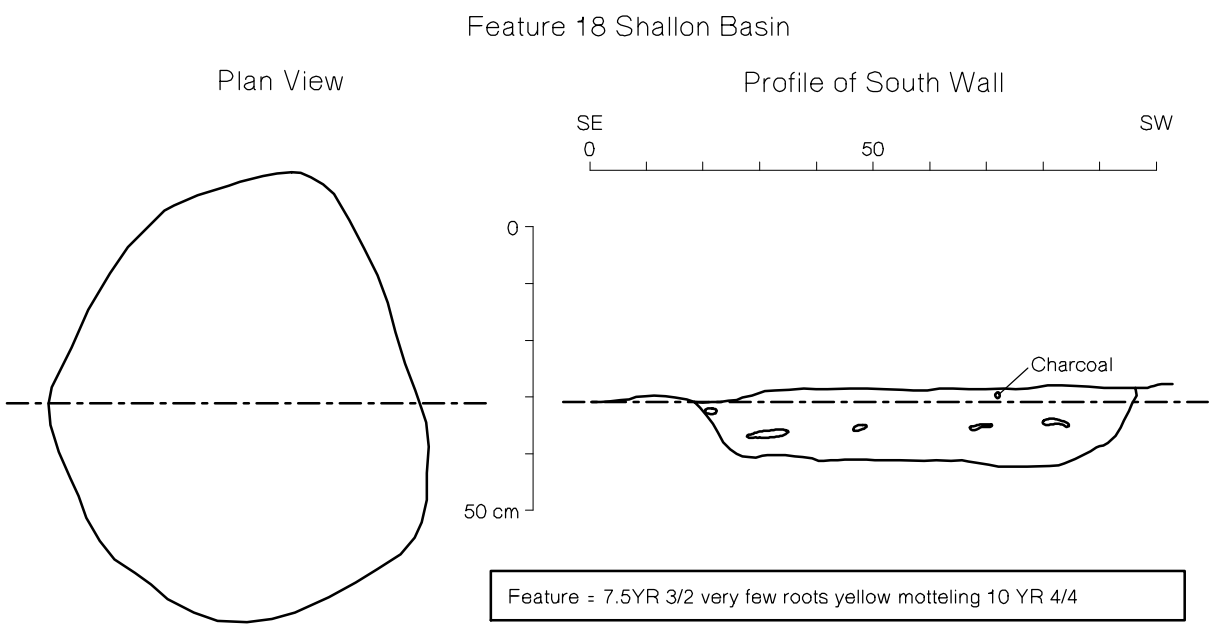


Figure 14. Profiles of Features 33 and 38.



Zone 1: Gray brown, clay loam, light scattered charcoal occasional pottery smears, some limestone
Zone 2: Mottled: Light brown, dark brown & gray, clay loam; high density of charcoal fragments (up to 2 cm) limestone clasts (reddened, decomposing, up to 8 cm) & pottery smears
Zone 3: A discontinuous horizon of light gray, mottled w/ light brown loamy soil. This horizon is homogeneous in texture, has little cultural material
Zone 4: Reddish brown, mottled w/light brown & gray loamy soil with moderate charcoal. In areas overlaid by Zone 5, but this is discontinuous
Zone 5: Gray sandy clay with moderate amount of large 2 cm charcoal
Zone 6: Material light brown clay mottled w/light gray & reddish brown



Feature = 7.5YR 3/2 very few roots yellow motteling 10 YR 4/4

Figure 15 . Profile of Features A and Plan and Profile Views of Feature18.

Analyzed pottery sherds from Feature A total 2407, all limestone-tempered. Of these, 2178 are plain, 2 are plain with crescent shaped stamping, probably made by holding a cut reed at an oblique angle and pressing it into the moist clay, 8 have brushing with a distinctive criss-cross pattern, and 220 are randomly brushed on their interior, exterior, or both. The patterned brushed sherds are unique to Feature A. One other sherd from Feature 19 shows a similar pattern, but it is not nearly as well executed.

Over 53 grams of wood, walnut and hickory nut shell charcoal were recovered from 50 liters of soil processed by flotation. Also recovered by flotation were 91 seeds including *Chenopodium*, *Phalaris caroliniana*, and *Polygonum*. Cucurbit rind is present. Faunal remains from Feature A are dominated by fish and deer but also include rabbit, canids, skunk, grouse or Prairie chicken, turkey, a perching bird, turtles, snakes and frogs.

A piece of charcoal from Zone 2 of Feature A has a radiocarbon age of 990±60 B.P. (Beta-97602, cal A.D.1025; range, cal A.D.970 to 1195). This is the most recent date from the Stauffer site.

Shallow Basin Pits

Feature 18. This shallow basin pit was roughly round and about 75 cm in diameter. The sides sloped inward and the base was flat with an average depth of 12 cm (Figure 15). The fill was dark brown silt loam containing charcoal flecks. Artifacts recovered included three plain, limestone-tempered sherds and lithic debitage, one of the latter showing signs of having been worked. Wood charcoal, but no seed or identifiable bone, was recovered from flotation processing fifteen liters of soil. Also, unlike the other shallow basin pits, Feature 18 contained no limestone.

Feature 34. This feature, found while scraping the southeastern portion of the site, may have been the bottom of a poorly defined pit. Feature 34 was distinguished by about four kilograms of dolomite, chert, and sandstone, under which was a light, fine loam that appeared to be feature fill. A large, flat slab of sandstone and a rounded hand-sized cobble were found in this feature. Neither showed signs of wear, but it appears that they were brought to the site to be used as a grinding slab and mano. Two cores and debitage also were recovered.

Feature 35. Feature 35 was a shallow basin, 90 centimeters in diameter and five centimeters deep. It was defined as a dark stain. No pottery or identifiable faunal or floral remains were recovered.

Feature 36. This shallow basin pit was roughly round with a diameter of approximately 110 centimeters. It appears that much of the feature was removed by mechanical scraping, with only the bottom five centimeters remaining for hand excavation. The remaining dark brown fill contained a biface fragment, small amounts of burned stone and bone, debitage, and charcoal. No pottery was found.

Feature B. This feature was discovered during construction. Half of it was excavated, and a plan and profile were drawn. The feature is poorly defined by a pit and a scatter of limestone.

Other than the limestone, artifacts from the feature include one small plain limestone-tempered sherd, three pieces of debitage, and minute fractions of bone and charcoal.

Earth Ovens

Feature 23. This shallow basin and limestone concentration is the remains of an earth oven that had been dug into the hillside in order to make it level (Figure 16). The feature was first identified by a large limestone concentration. Upon further excavation, at stain indicating the presence of a basin was revealed in the southwest corner of T.U. 26. One quarter of the basin was outside project right of way and for that reason was not excavated. The basin fill was a very dark brown silty loam that contained charcoal, bone, burned earth and pottery sherds. The basin is roughly round and approximately 150 cm in diameter. The associated limestone concentration outside the basin covers an area about 130 cm in diameter. Limestone in the bottom of the basin, and the concentration of limestone just outside it suggest its use as an earth oven. After cooking was completed, the stones were removed from the basin and set to the side and down hill from the basin.

There was over 47 kg of limestone in Feature 23. The feature also contained 178 limestone-tempered sherds, either plain or brushed. Eight of these are rims, though all of these may be from the same vessel. Flotation of ten liters of soil recovered wood and nut shell charcoal, as well as bone from a rodent, a canid, deer, snake, frog, and fish. Five deer antler fragments dominate the bone assemblage. Most of the bone is not burned. If meat was being cooked in this feature, it is more likely that it was boiled or steamed than roasted, consistent with the feature's use as an earth oven.

Feature 25. This feature was initially defined as a stain with burned limestone and pottery. Further excavation revealed a roughly round basin that was about 2 m in diameter and averaged 10 cm in depth. Burned limestone in the feature weighing 16.8 kg suggests its use as an earth oven. The dark brown loam fill contained bone, debitage, charcoal, and a pottery, including a rim sherd. Ninety-nine pottery sherds, all limestone-tempered and either plain or brushed were recovered. One of these is a vertical rim with a flat lip, the rest are body sherds. Flotation processing of ten liters of soil recovered less than a gram of wood and nut shell charcoal, but no seeds. A deer phalange is the sole identifiable bone.

Feature 31. Feature 31 is a concentration of limestone in a shallow pit defined by a dark stain in the dense clay matrix, which included about 5 kilograms of burned limestone. It is roughly ovate and is approximately 3 meters in length and 2 meters in width. In the southeastern part of the basin is a concentration of charcoal, over 75 kilograms of burned limestone, and 41 pottery sherds, some of them large. Feature 31 represents a shallow basin used as an earth oven and associated dump of the heated rock used for cooking. It is similar to Feature 23, another earth oven, in that its basin is on the edge of the slope leading to Meadows Creek and the heated stones that were used in the feature were dumped down slope from the basin. Unlike Feature 23, there are no food remains associated with Feature 31. While this may be a result of the feature serving a different function, it may also be a result of impact by plowing. Feature 31 is not on as steep a slope as Feature 23. Being on a slope, Feature 23 may have been protected from plowing whereas Feature 31 was not.

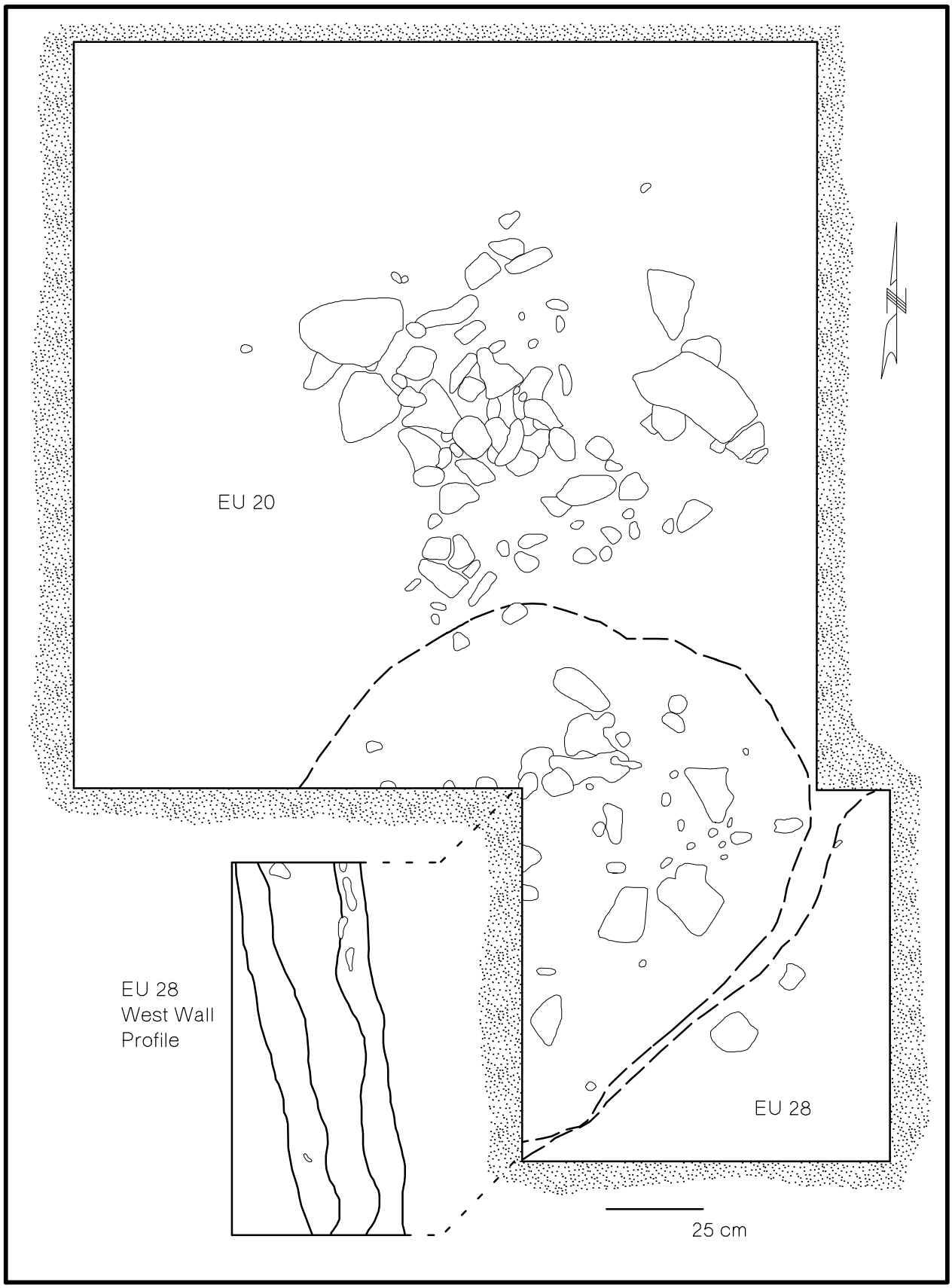


Figure 16. Plan View of Feature 23.

Feature 40. This feature was defined by an irregular, diffuse scatter of charcoal, limestone and pottery that is roughly 1.8 meters northeast to southwest and 1.5 meters northwest to southeast. In the center of this scatter is a concentration of cultural material dominated by larger pieces of limestone. The feature contained 43 pieces of debitage, over 23 kilograms of limestone and other rock, 14 limestone-tempered sherds, 12 of which are plain, the other two brushed, three utilized flakes, a biface fragment, a quail bone and a deer bone.

Hearths

Feature 1. Feature 1 consists of a pile of desiccated limestone and several ceramic sherds. Several pieces of limestone lie approximately 20 cm to the northeast of the main pile, and a uniface is located approximately 60 cm to the northeast of the pile. The main feature area measured approximately 30 cm north-south by 26 cm east-west. The feature represents a remnant of a hearth, and is associated with Late Woodland occupation based on the presence of ceramic body sherds in association with the feature.

Feature 14. This feature contained articulated bone, 50 grams of burned, desiccated limestone, pottery and flecks of charcoal. The concentration measured about 1 m by 0.5 m, defined by the limits of soil staining, the limestone, and an overall higher artifact density than the surrounding area. Unfortunately, the articulated bone found in Feature 14 was in poor condition and unidentifiable. The feature held four limestone-tempered sherds, including a rim and an incised body sherd. This feature is the remains some sort of cooking activity, possibly a hearth.

Feature 24. This limestone-lined hearth was found during mechanical scraping of the site. It is in a roughly round shallow basin pit. The pit is about 3 m by 2.5 m and has an average depth of 20 cm. Feature fill was fine silty soil with bits of charcoal and burned earth interspersed. The basin also contained 3.3 kg of burned limestone, nine plain, limestone-tempered body sherds and charcoal, with a large sherd being recovered from the center of the concentration. No identifiable bone or botanical remains were recovered from this feature.

Feature 26. This small rock hearth accompanied by a slight stain was roughly round with dimensions of 90 cm and 1 m. The brown to dark brown clay fill held burned limestone, five plain limestone-tempered body sherds, chert, limestone, and charcoal. The stain was not apparent in the feature profile.

Feature 39. This light scatter of limestone on the terrace slope of Meadows Creek contained 11 bits of debitage, 1 small sherd, 2 retouched flakes, 1.3 kg of limestone, 1 tiny bone fragment and a square-headed nail. It contained no pottery or plant remains, and very little charcoal. The feature is round and about a meter in diameter.

Feature 41. Feature 41 was a poorly defined ovate scatter of charcoal, burned earth, and burned rock measuring roughly 85 cm by 70 cm horizontally and 10 cm deep. Cultural material from the feature include 35 pieces of debitage, about 0.5 kilograms of rock, burned earth, unidentifiable bone, two cores, two utilized flakes, burned hematite, and 45 plain, limestone-tempered body sherds. The burned material suggests that this feature was a hearth.

Artifact Concentrations

Feature 10. This 40 by 40 cm concentration of 302 plain, limestone-tempered pottery sherds was uncovered by the grader on the northeastern portion of the site. It appeared to be a vessel that had been crushed or possibly collapsed. The western portion of the feature was run over by the grader and destroyed. Though the sherds were drawn and photographed, many were in such poor condition that they crumbled upon removal. Flotation processing of fifteen liters of soil recovered only three small wood charcoal fragments.

Feature 11. This pottery concentration consisted of eighty dark red limestone-tempered sherds that appeared to be a large portion of a vessel, though three of the sherds are described as cordmarked, six are designated as having a brushed interior, and the rest are plain, suggesting more than one vessel. There were a few reduction flakes found in the fill around the concentration. The sherds were very poorly preserved and for their protection were removed with matrix. Baking soda was later used to aid the removal of the matrix from the sherds, revealing various fragments including a rim portion. The remaining soil was screened through ¼" mesh.

Feature 12. Feature 12 was an artifact concentration in compact dark yellowish brown silty clay matrix. Artifacts included 2.5 kg of burned sandstone, limestone, and dolomite; a mano, a hammer stone and 310.1 g of chert artifacts including two flakes and a core fragment.

Feature 43. Feature 43 is a concentration of pottery encountered while mechanically excavating the southeast quadrant of the site. Cultural material from the feature consists of 61 sherds, 15 of which are brushed, the rest plain, all limestone-tempered; and one polished flake fragment.

Discussion of Features

Late Woodland Structure Floors in West Central Illinois and Missouri

As noted earlier, identification of Late Woodland structure floors is notoriously difficult in Missouri. At the Hayti site (23PM572) in Pemiscot county, southeast Missouri, eight large features were identified in the field, though upon analysis only five were left as candidates. These five are interpreted as features primarily based on their size and shape. Only one had post molds in association, none contained wall trenches or definite burned structures. Some burned earth was present but in low quantities, and it is not certain if this was daub. They range in size from 4 to 7 m in length and 2.5 to 7 m in width, and are round or oval in shape. They vary in depth from 28 to 110 cm. They contained Baytown and Mississippian sherds (Conner and Ray 1995:102-115).

Remains of eleven houses at the Hoecake site (23MI8) are among the best defined for the Late Woodland. They range from 3.2 to 4.4 m in length and 2 to 2.9 m in width. These all are clearly rectangular and well defined by exterior wall post molds, many tapered, and four had interior pits. All were semi-subterranean (Williams 1974:55-68).

In the American Bottom, Late Woodland houses are much more common, presumably because of the extensive excavations carried out there in preceding construction of an interstate highway. One clear structure is reported for the Rosewood phase (A.D.300 to A.D.450) (Kelly et al. 1984:109). It is oval shaped, with dimensions of 6.5 by 7.5 m. Only two Mund phase (A.D.450 to A.D.600) structures are known, both from the Mund site. One is oval shaped, 4 by 6 m, the other square, 6 m on a side (Kelly et al. 1984:116-117). Many Patrick phase (A.D.600 to A.D.700) structures have been excavated. These are distinctive keyhole shaped features that are found from the American Bottom east to Indiana. Twenty-two of these were found at the Range site (Kelly et al. 1984:123-125).

Four structures were recovered at the Cunningham site, on the edge of the American Bottom in Madison County, Illinois. These were shallow ovate or rectangular basins of post construction with mean dimensions of 2.6 meters in length, 2.28 meters in width, and 19 centimeters in depth. Three had interior hearths. Three radiocarbon dates place these structures in the Late Woodland period (Meinkoth, Hedman, and McElrath 1996:40).

Structures were present on the Dryocopus and Flycatcher sites in west central Missouri. At Dryocopus the four houses were roughly circular outlines of post molds, 3.8 to 5.5 m in diameter. At the Flycatcher site there were at least three houses with rough dimensions of 4.3 by 5.5 m. The arrangement of postmolds suggests square to oval shapes (Chapman 1980:83-85, O'Brien and Wood 1998:267-268). Ralls phase houses are found at the Ross site (23MN260). The houses are represented by D-shaped and rectangular stains surrounded by post molds and with larger interior post molds. The D-shaped house had maximum dimensions of 4 by 4.4 m, the dimensions of the more rectangular house were 3.7 by 4.9 m (Chapman 1980:130-131, O'Brien and Wood 1998:272). The Cooper site in Monroe County yielded a circular house floor that included a hearth, pits, and debris. Radiocarbon dates of 820±130 B.P. (cal A.D.1230, two sigma range 1040 to 1294) and 790±120 B.P. (cal A.D.1265, two sigma range 1160 to 1300) (no lab numbers given). Faunal remains indicate the site was used during the cooler seasons (O'Brien and Wood 1998:273).

Feature 6 of site 23CY499 on Crows Fork Creek in Callaway County, Missouri represents a possible house floor. Daub, a high density lithic debitage and tools, pottery, fire-cracked rock, and a large number of deer and unidentified bone fragments were recovered from a dark soil stain which covered an approximate 3 by 3 m area. No post molds were found near the stain. Feature 6 was found just below the plow zone, possibly obscuring less obvious components of the feature (Sturdevant 1990:59-64). Radiocarbon dates from Feature 3 of the site are 1190±60 B.P. (cal A.D.881, two sigma range A.D.683 to 990) and 1300±70 B.P. (cal A.D.690, two sigma range A.D.633 to 889) (Beta Analytic, no lab numbers reported). Sturdevant (1990:72) interprets the site as a winter habitation site based on the intensive use of deer to the exclusion of most other resources and the paucity of floral remains recovered by flotation.

Structure Remains at the Stauffer Site

We found the remains of two structures at the Stauffer site, Features 19 and 42. While structure remains can be difficult to identify, Feature 19 and 42 fit in well with the general pattern of known and suspected structures from regional sites. Feature 19, with its high density of daub

and burned earth and its associated post molds, is the most likely of the Stauffer features to be structure remains. Attributes of other Late Woodland structures from west central Illinois and Missouri are shown in Table 5.

Table 5. Attributes of Structure Remains from Late Woodland Sites in West Central Illinois and Missouri.

Site	Number of Structure Features	Structure Shape	Length In Meters	Width In Meters	Post Molds Present	Comments
Cunningham (IL)	4	Ovate to rectangular	2.6 (mean)	2.3 (mean)	No	Three had interior hearths
Hoecake (MO)	11	Rectangular	3.2 to 4.4	2.0 to 2.9	Yes	Structure floor is a shallow basin, interior storage pits
Hayti (MO)	5	Round or oval	4 to 7	2.5 to 7	In 1	Baytown and Mississippian sherds associated
Dryocopus (MO)	4	Circular	3.8 to 5.5 in diameter	3.8 to 5.5 in diameter	Yes	West central Missouri
Flycatcher (MO)	3	Square to oval	4.3 (mean)	5.5 (mean)	Yes	West central Missouri
Ross (MO)	2	One rect-angular, one D-shaped	3.7 to 4.0	4.4 to 4.9	Yes	Ralls Phase
23CY499 (MO)	1	Circular	3 (diameter)	3 (diameter)	No	Possible winter hunting camp
Stauffer F. 19	1	Oval	6.0	4.0	Yes	Not completely excavated, nearly 500 grams of daub
Stauffer F. 42	1	Oval	2.5 to 3.0 (estimated)	1.6	No	Not completely excavated, interior hearth, compact burned earth floor

Non-Structure Features at the Stauffer Site

If we accept Features 19 and 42 as structures, it leads to the conclusion that Stauffer is a residential site. Therefore, it is not surprising to find five deep pits for storage, five shallow basins where a variety of tasks could be carried out, four earth oven for moist cooking, and six hearths for cooking and other uses. All of these features, with the exception of Feature (X), have evidence of use during Late Woodland times by the presence of Late Woodland artifacts, radiocarbon dates, or both. A broad range of artifact types is found at the site, supporting the assertion of residential activity. The radiocarbon assays from deep pit features 27 (cal A.D.775; range, cal A.D.645 to 975) and 28 (cal A.D.680; range, cal A.D.630 to 855) are within one hundred years of each other and have date ranges that overlap well. They are considered to be coeval. The radiocarbon assay for deep pit Feature A (cal A.D.1025; range, cal A.D.970 to 1195) only slightly overlaps that of Feature 27 and does not intersect the range of Feature 28. It

represents a later occupation. More radiocarbon dates would be useful in attempting to reconstruct associated activity areas of the site. In particular, dates from the structure remains would be useful to see if they were occupied at the same time and to see if they are associated either with features 27 and 28 or with Feature A.

Chapter 5

CERAMIC ANALYSIS

Excavation at the Stauffer site produced 24,247 sherds weighing 51.9 kilograms. Of these, 803 were rims weighing 4.6 kilograms, and 23,444 were body sherds, weighing 47.3 kilograms. A total of 18,187 sherds weighing nearly 43 kilograms was analyzed from excavations at Stauffer. In general, the sherds are in good condition, and some sherds recovered from features are large, with axes as long as 10 cm. Detailed analysis of such a large assemblage is a daunting task. Our analysis was oriented toward collecting data, which could be used to address research questions posed for the Stauffer site. Sherds that passed through a 6 mm (approximately one quarter inch) screen were not analyzed because they were too small to be useful for identification of significant attributes. In back sight, half inch screen would have been preferable, as sherds below this size are of questionable analytical value. Also, heavily weathered or eroded sherds were not analyzed for similar reasons. Small and eroded sherds make up 25% by count and 18% by weight of the total assemblage.

Sherds were sorted into groups based on shared attributes. Attributes used for this analysis are described below. As an example, all limestone-tempered rim sherds with vertical orientation, a flat lip, a brushed exterior, and a smooth interior from any given provenience were grouped. Data on these groupings were entered into an automated database to allow sorting by any set of attributes. This allows cross-provenience analysis of different wares and stylistic types, and for investigation of patterns in distribution across the site and through time where radiocarbon age determinations are available. It also allows for general types and wares and their proportions at Stauffer to be related to other sites of similar age.

There are several intractable problems associated with this analysis. The most appropriate unit of ceramic analysis is the vessel, but no complete vessels were recovered despite the concerted effort to reconstruct vessels, particularly from features. Only the broken remnants of vessels—sherds—are available for analysis. A problem resulting from this is that it is not unusual for there to be enough stylistic variation within a vessel that its broken pieces could be sorted into several stylistic types. A single vessel may have a lip that is flattened in some areas and rounded elsewhere. It could have a smoothed neck, punctations on the shoulder, and brushing below the shoulder. Sherds representing different parts of this vessel could be classified into several groups. Fortunately, Late Woodland pottery assemblages show a remarkable consistency within and often between sites, and Stauffer is no exception. In fact, the Stauffer assemblage appears to be almost novel because of the stupefying homogeneity of its ceramics, in contrast to initial evaluations made by Martin et al. (1994:58-59).

Ceramic Vessel Attributes Used in the Analysis of the Stauffer Site Assemblage

Vessel Morphology

As noted earlier, no complete vessels were recovered from Stauffer, only broken sherds. All sherds were assigned a vessel position of either rim or body. A sherd is classified as a rim if it included part of the vessel lip, with the lip being defined as the edge of the mouth of the vessel

(Figure 17). Sherds with no evidence of the lip were classified as body sherds. Other morphological characteristics can sometimes be identified on sherds, such as the shoulder, neck, or base of a vessel. The shoulder is the broadest part of a vessel below the mouth. Vessels that do not have a constricted mouth lack a shoulder. A shoulder typically is more curved than other body sherds. The neck of a vessel lies between the constricted mouth and the shoulder, and on a sherd is identified by being incurved or having a sinuous curve. The base is the bottom of the vessel. It typically is thicker than the vessel wall, and a large base sherd will show a tapering in thickness from base to vessel wall. The last three morphological positions—shoulder, neck, and base—are more subjective and less rigorously defined than rim and body sherd. Because of this, these three terms are used as secondary morphological descriptions of some body sherds.

Rim Angle

Rim angle refers to the disposition of the portion of the vessel that forms the opening to the body of the vessel. Determining rim angle is relatively subjective unless there is a large portion of the vessel body attached to the rim. Best estimations of rim angles are placed in general, qualitative categories: Vertical rims, which are parallel to the vessel body; inslanting rims, which are angled in toward the vessel opening from the vessel body and flared, which refers to rims that curve inward and slant outward at the vessel opening (Figure 17).

Lip Shape

The edge of the vessel opening, or lip, varies in shape on Stauffer pots. Round lips are not pinched or angular, but have smooth edges. Flat rims are angular, the external surface is perpendicular to the rim walls. A beveled in lip is flattened on the inside edge of the vessel opening, a beveled out lip is the reverse. An irregular rim may vary between any or all of these shapes, and may also be tapered or pinched in areas (Figure 17).

Orifice Diameter

Vessel orifice diameter estimates were obtained from rim sherds from the three radiocarbon dated features (Features A, 27, and 28). We felt that this sample of 424 rim sherds (Feature A, N=251, Feature 27, N=116, Feature 28, N=57), more than 60% of all rim sherds recovered, would be most useful for comparative data because if significant variation were present it could be associated with change through time. Measures were taken by comparing rim curvature to a set of arcs of known diameter. Rims that were so small or irregular that the variance in their estimated orifice diameter ranged higher than ten centimeters were not used. This turned out to be the majority of the sample. Vessel orifices rarely are perfectly round, so error is estimated to be in the range of several centimeters, even for sherds that seemed to fit a particular arc fairly well. Because of this, all measurements were rounded to the nearest 5 centimeters, to reflect the level of inaccuracy inherent in this analysis. This data still allows for comparison of general orifice sizes through time.

Results. Of the 424 sherds available for this analysis from the three features, only 72 were large enough or regular enough in their arc to allow estimation of diameter. Still, data between the features is consistent enough to give confidence that a general understanding of orifice size has

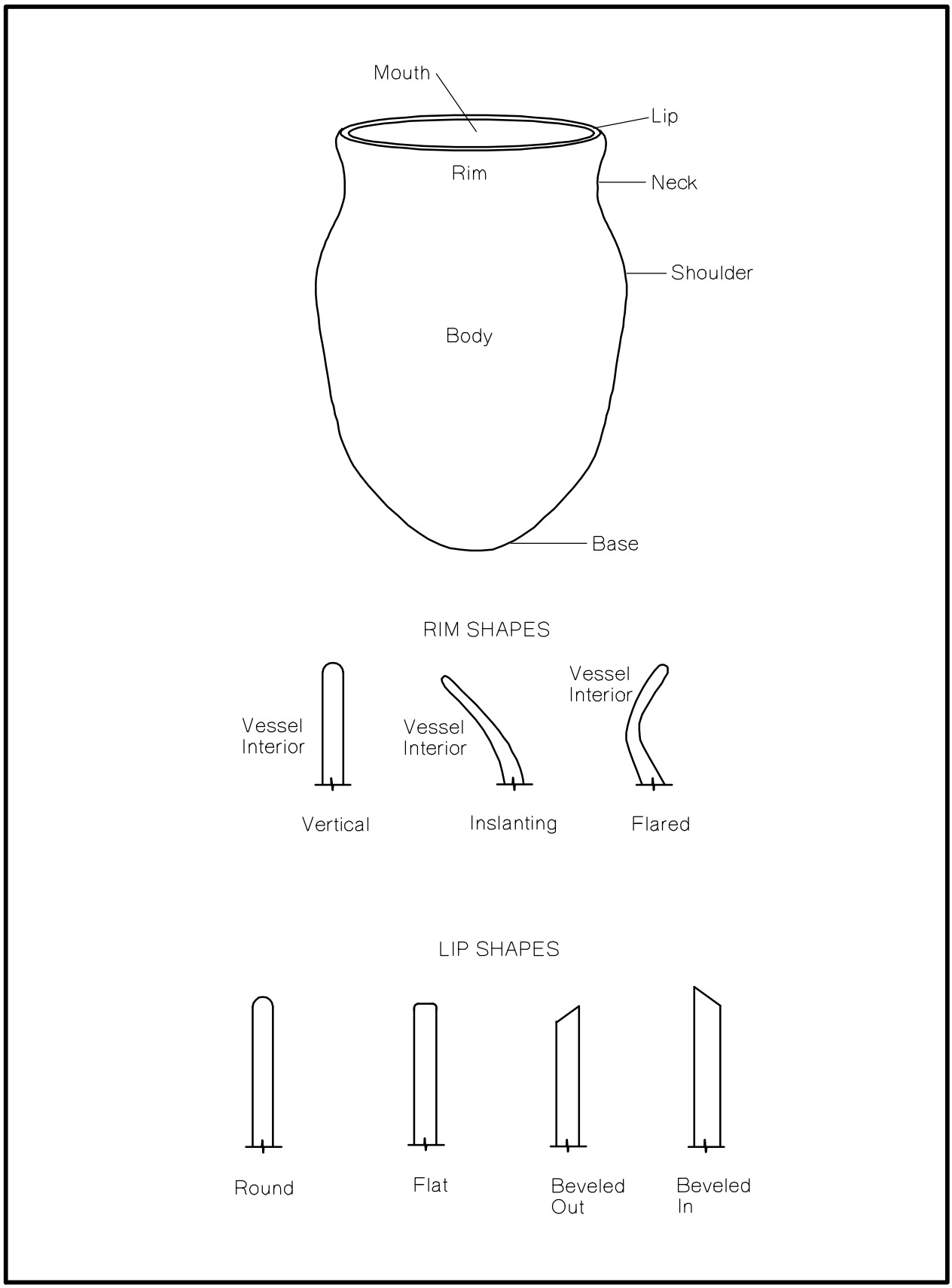


Figure 17. Parts of a Ceramic Vessel.

been gained. As can be seen in Table 6, there is a general similarity in estimated orifice size between the three features.

Table 6. Mean Estimated Orifice Diameter From Features A, 27, and 28.

	Feature A	Feature 27	Feature 28	All Sherds
No. Sherds Analyzed	37	24	11	72
Mean Diameter (cm)	24.3	25.2	19.5	23.9
Standard Deviation	13.7	11.7	10.5	12.7
Percent Under 30 cm	81%	75%	90%	81%

While vessel orifice diameter ranges between 10 and 60 centimeters in Feature A and 10 and 50 centimeters in Features 27 and 28, most are under 30 centimeters, and 43% of all vessels are 15 centimeters in diameter or less. Still, a vessel with a diameter of 20-30 centimeters is a respectable size, and could easily serve to cook a meal for an extended family or store a significant amount of food. (how does this compare with other sites?) Because most rims from Stauffer are vertical and because no strongly curved shoulders are present, it can be assumed that the rim diameters are a fair reflection of maximum vessel width, as the shoulder is the broadest part of the vessel.

Temper

Prudence Rice, in her seminal 1987 volume *Pottery Analysis: A Sourcebook* defines the term temper when used as a noun as " . . .a material—mineral or organic, but usually nonplastic—added to a clay to improve its working, drying, or firing properties . . ." (Rice 1987:483). She also notes that this is a term that is rarely rigorously defined and often abused (Rice 1987:406). On the surface, defining temper is easy—materials added to the clay to make it better in some way. Most people would think of sand or crushed granite as typical temper materials. But other materials such as saltwater, other types of clays, ash, and so on may be added to improve the properties of clay. Technically, these also would be considered temper. To further complicate matters, it may be difficult to know if non-clay materials in a vessel's clay body were intentionally added or were contaminants in the clay deposit that was used. It may be clay deposits with specific non-clay materials were chosen preferentially, a sort of premixed clay body.

Still, most investigators recognize materials other than clay in prehistoric vessel walls and often use these to define different classes of pottery. For this investigation, the term temper is defined as nonplastic inclusions believed to have been added to the clay to enhance its properties during the forming or use of a vessel.

Temper was identified using the unaided eye or occasionally with a magnifying glass. Considering Martin et al.'s (1994:58-59) earlier analysis of Stauffer site ceramics which found a

variety of temper materials and combinations of these, it was anticipated that two or three temper components may need to be identified in many sherds. However, the current analysis found that in nearly all cases only a single temper type was present in any particular sherd. Small amounts of sand are present in nearly all sherds, but this is considered to be a natural inclusion in the clay source used to make pots, so a sherd with a little sand and a lot of ground limestone is classified as limestone tempered. Only sherds that have an unusually large amount of sand and have a distinctive gritty texture are classified as sand tempered. A list of temper materials found in the Stauffer assemblage follows.

Limestone. Limestone temper is visible in sherds as white granules, or sometimes only as the presence of irregular, roughly round voids where carbonate limestone has dissolved. In central Missouri, limestone temper may contain fossil crinoid sections and small angular pieces of chert, both found within local limestone.

Sand. Sand temper is small (less than 2 mm) rounded rock particles, the result of decomposing rock. It is nearly impossible to be certain if sand was intentionally added by the potter or if it was a component of the clay that was chosen. For this analysis, a sherd is classified as sand-tempered only when the volume of sand in the clay body of a given sherd is substantially higher that the average sherd on the site. Almost all sherds from Stauffer contain some quantity of very fine sand, visible at 20 X magnification. Only 25 sherds are classified as sand tempered.

Grog. Grog is most commonly used to describe fired clay particles or pot sherds ground and added to unfired clay to serve as temper. However, crushed, dried, unfired clay particles also can perform as temper and are difficult to distinguish from fired grog. Indurated clay is a cumbersome phrase that describes hard clay fragments, both fired and unfired. We have chosen the term grog for its ease of use and wide recognition. Only four sherds from the site are clearly grog tempered.

No Temper. Nine sherds had no visible temper and were identified as such. These untempered sherds were soft, chalky, and poorly formed. They may have been a child's attempt at pottery or a potter's quick attempt to test the clay properties.

Surface Treatment

All but the most crude pots receive some kind of surface treatment to give the finished product a desired texture. Examples of these surface treatments are listed below. Surface treatment is defined as the techniques used to create a surface texture of a large portion of a vessel. Generally the techniques used involved broad strokes in application. It is not uncommon for a vessel to have more than one kind of surface treatment, or for different surface treatments to be applied to the interior and exterior of the vessel. Surface treatment is described separately from body decoration, which covers a smaller area of the vessel surface and is more carefully executed.

Plain. Smoothed is a synonym for plain as it is used here, the term plain has been chosen for its wide use. However, a plain vessel is one whose surface has been intentionally modified to hide construction marks and nicks and to produce a smooth texture. Plain surfaces are defined by their lack of bumps, pits, and striations. No burnished sherds were found in the Stauffer

assemblage. Burnishing is the process of rubbing the vessel wall when leather hard to produce a shiny surface. This shiny surface is often distinguished from plain surfaces when describing pottery.

Cord-marked. A cord-marked vessel surface is one that has been repeatedly struck while still moist with a paddle wrapped with cord to produce a textured surface. Impressions of the twisted cord often are evident on the vessel surface. While cord-marking may have been used solely for the sake of appearance, the rough texture also allows for a better grip on the vessel. The thermal properties of a cord-marked surface are not simple or straightforward, but experimentation is beginning to shed light on how different surface textures effect technical performance (Schiffer et al. 1994). Also, it is possible that the process that results in cord-marking may just be a way of paddling without having the paddle stick to the surface.

Brushed. The vast majority of Stauffer pottery is plain, but brushing is the next most common surface treatment (Figure 18). Brushing is not, to our knowledge, well defined in the archaeological literature, although there are exceptions (Morgan 1985:206-208, Rice 1987:104). Brushing also can be confused for similar processes such as scraping and combing. Intuitively, the process of brushing involves wiping a bundle of pliable material such as grass stems across the surface of the pliable surface of a recently built pot. This process would be expected to leave shallow, parallel, linear impressions of irregular width and spacing on the surface. Combing is a similar process, but a harder implement with more regular spacing, such as a notched piece of wood, bone or stone, is dragged over the wet clay surface (Rice 1987:140). Scraping is a process used to thin a pot using a hard implement to scrape clay off of a leather hard vessel (Rice 1987:137). This process leaves an impression similar to brushing and combing. However, these processes are difficult to distinguish, and with no other evidence than what we think the result of brushing, combing, or scraping should look like, we cannot make determinations of surfaces treatment with any confidence.

To better understand what processes might result in what we initially interpreted as brushing, one of the authors (RJH) made a series of test tiles. These test tiles received different surface treatments as described in Table 7.

Table 7. Results of Experimental Brushing of Clay Test Tiles.

Tool used for Surface Treatment	Condition of Clay tile	Resemblance to “Brushed” Sherds From Stauffer
Smoothed with hand	Wet	Somewhat, striations faint
Grass brush	Wet	Yes
Grass brush	Leather Hard	Yes
Fine sisal brush	Wet	Somewhat, striations faint
Fine sisal brush	Leather Hard	No, leaves no striations
Wad of green grass	Wet	Yes
Wad of soft leather	Wet	Yes
Scraped with mussel shell	Leather Hard	No, striations wide, temper particles pulled

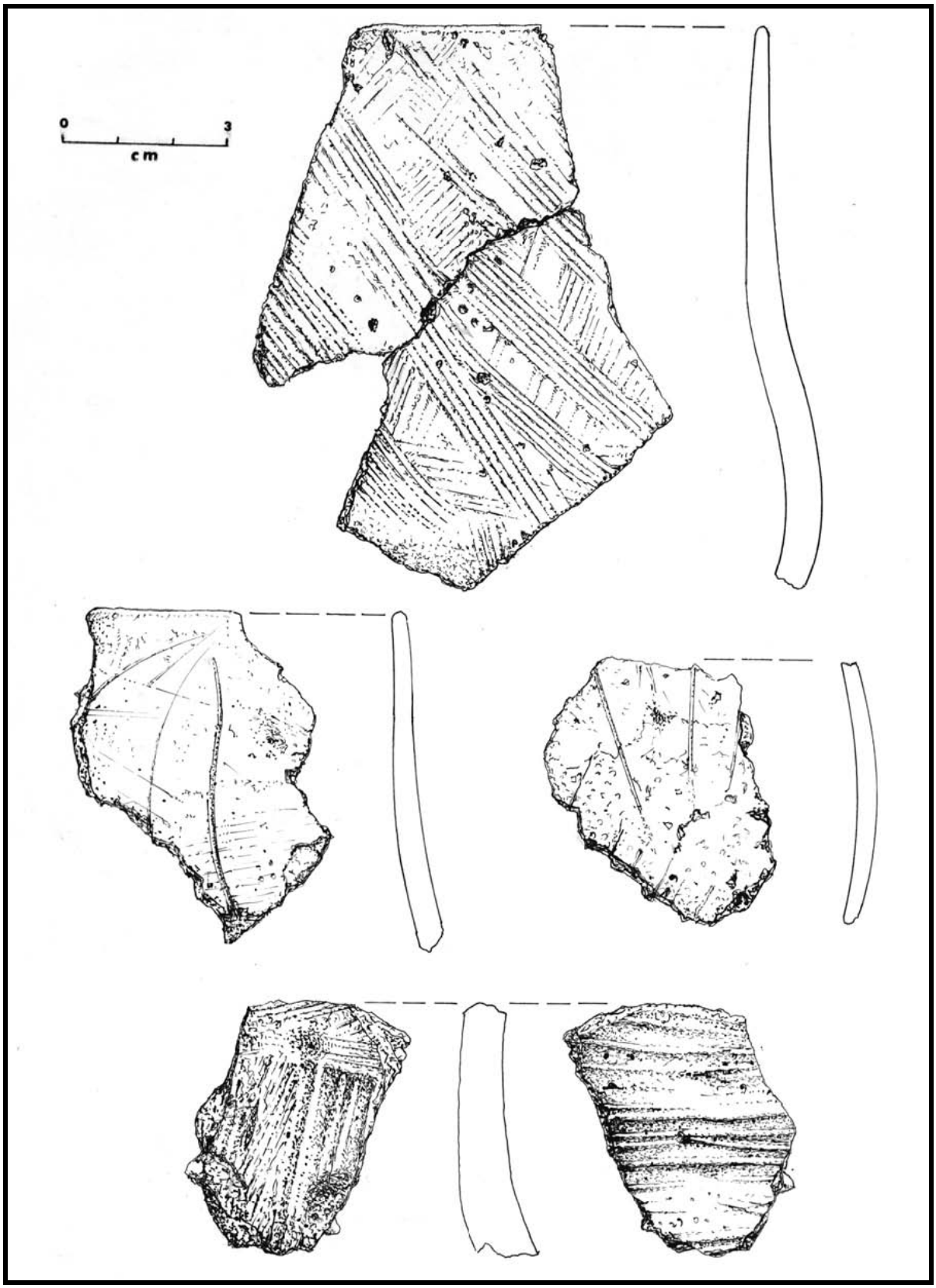


Figure 18. Decorated Sherds – Patterned Brushed, Brushed, and Incised.

The grass brush was made by taking a wad of grass stems, binding then with cord, and cutting them even at the bottom. The sisal brush was commercially produced and had groups of fine sisal strands that were bound and cut even at the end. These brushes, along with the unmodified mussel shell and the wad of grass, were used to finish the surface of the clay tiles. The test tiles were left to dry and then fired in an open wood fire. After letting the fire burn for 15 minutes, it was smothered with dirt, resulting in fire clouding on the test tiles and producing hues ranging from red, caused by oxidation, to black, caused by reduction. The tiles were excavated after five hours and allowed to cool. They are fully fired and make a dull ringing sound when struck against each other.

From this analysis, it is apparent if a wet clay surface is brushed with a bundle of fresh green grass stems cut even at the end, it can create the surface treatment we intuitively perceive as "brushed." However, a wad of green grass or soft leather wiped over a wet surface has the same effect. Given this, we do not speculate that a brushed surface treatment has any strong implications, either functionally or stylistically, for the role a ceramic vessel served when in use. But since this surface treatment is apparent on the Stauffer sherd collection the term brushed is included as an attribute, similar to cord-marking, that may be useful in inter- and intra-site ceramic analysis.

Because brushed sherds are ubiquitous though not common at Stauffer, we are compelled to clearly define our use of the term brushed in our pottery analysis. For the Stauffer analysis, we characterize a sherd as being brushed if it has three or more lines that may be irregular in width and spacing, parallel or roughly parallel, within one centimeter. Even though these marks may be made with a wad or grass and probably by other means as well, we retain the term brushed because it already is widely used in the literature and connotes the general surface markings we see in the Stauffer assemblage.

Patterned brushing. Eight sherds in the Stauffer assemblage had brushing that formed a distinctive geometric pattern on the shoulder of the vessel (Figure 19). This pattern was distinctive enough to be noted separately. It is likely that all of these sherds came from a single vessel.

Body Decoration

Body decoration is defined as embellishment of the vessel beyond those procedures used to form it and finish its surface (Rice 1987:144). While decoration may cover the entire vessel surface, it most often is done only on a restricted area. Decoration can involve incising, scraping, cutting, adding strips of clay, painting, applying slips, and a variety of other techniques described by Rice (1987:144-152). Body decoration is extremely rare on Stauffer sherds. Types of decoration on Stauffer sherds are illustrated in figures 25-28. The few decorative techniques used are described below.

Incised. Incised pottery is decorated by creating lines on the vessel surface with a sharp object before the vessel is completely dry or fired (Figure 20). Modification by a sharp object on dry or fired vessels is often referred to as engraving, a technique not seen at Stauffer.

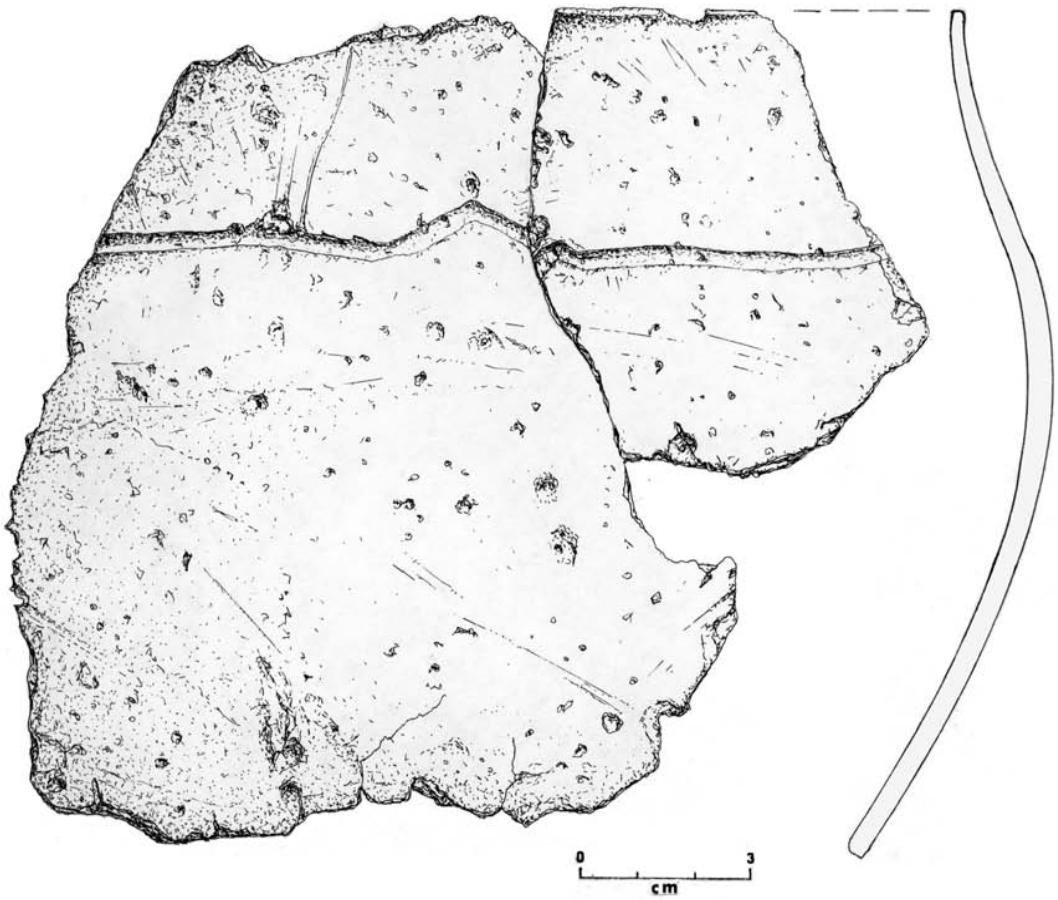


Figure 19. A Large Incised Sherd from Feature 27.

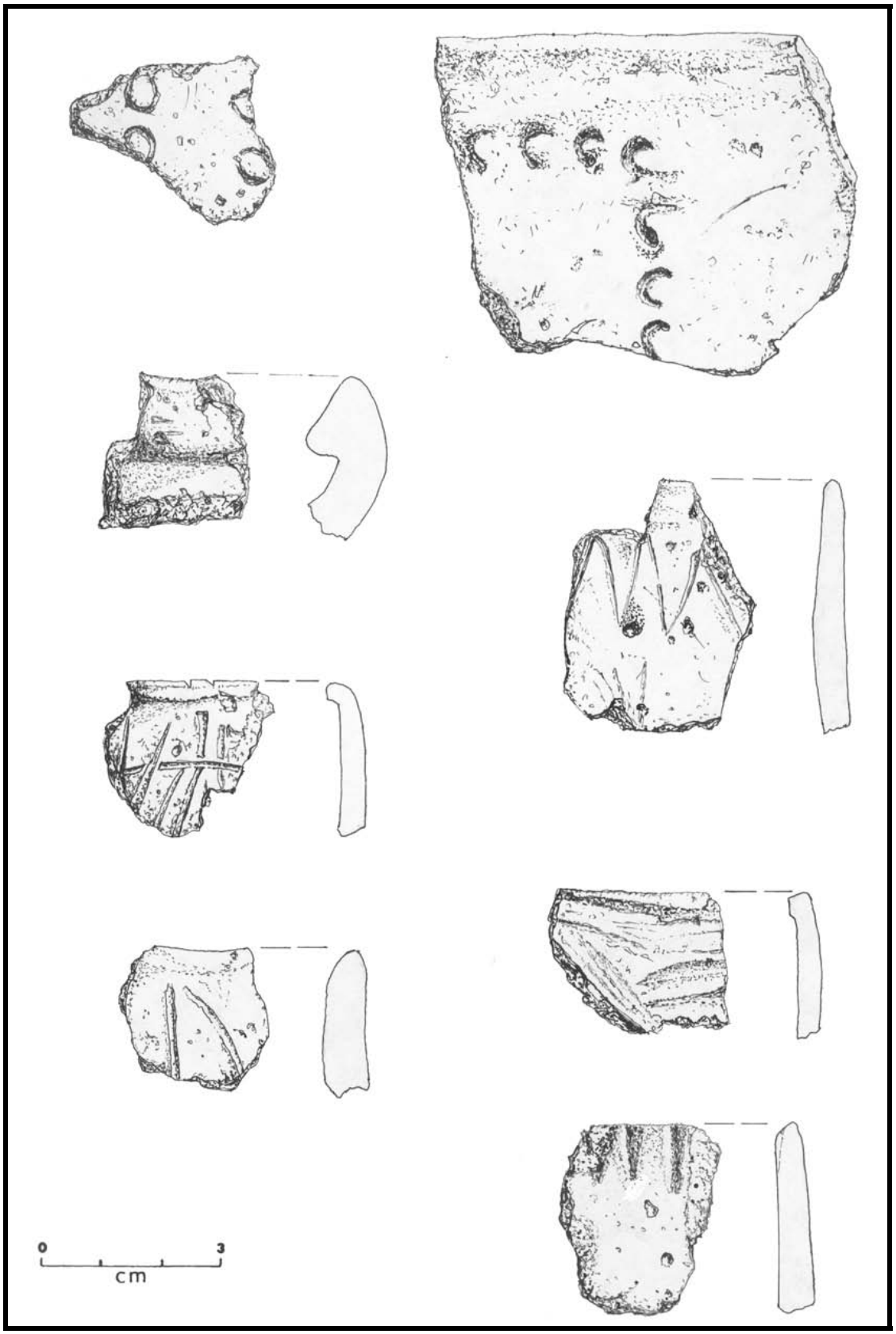


Figure 20. Punctated and Incised Rims, and a Bowl Rim.

Red slipped. Slips are clays and/or other minerals that are suspended in water and applied to the entire vessel before firing. They most often are pigmented and provide a consistent surface color to the vessel. They often produce increased luster. Red colored slips are most common in the Midwest. Highly oxidized areas of a pot can easily be mistaken for red slip.

Reed punctated. Punctation is carried out by repeatedly impressing the end of a cylindrical tool (such as a cut reed) into the moist clay surface. These individual designs typically are placed in rows or placed on a restricted area on the vessel, such as the shoulder. Two Stauffer sherds have the impression of a hollowed cylinder, probably a reed, that was pressed into the wet clay at an oblique angle, so that not all of the cylinder leaves an impression (see Figure 20). The result is a crescent-shaped impression.

Some Stauffer sherds appear to have other round impressions made by the end of a cylinder. Upon closer inspection it is obvious that what looks like round punctations is the remaining cavity of crinoid fossils from the Burlington formation limestone temper that have dissolved (see Figure 19)

Lip Decoration

Lip decoration can be nearly as variable as body decoration. Only three types of lip decoration are noted at Stauffer.

Notched. A lip that has a space cut from it from exterior to interior. Stauffer has three notched specimens (Figure 24). One is a vertical rim with a flat lip from Excavation Unit 14 with a square notch, 8 mm wide and 5 mm deep cut into it. The other, from zone B of Feature 28, appears to have been sliced diagonally from the top of the lip to a depth of 7 mm. The third is a similar sherd from zone D of Feature 27 (Figure 21).

Stick impressed. A lip that has had the side of a cylindrical object pushed into it. The two sherds with stick impressions had the decoration on the exterior edge of the lip. One sherd from Feature 23 had impressions perpendicular to the lip, the other from Feature 27 had a diagonal impression (Figure 21).

Slashed. A lip that has a short incision. Seven sherds in the assemblage are decorated this way, six are from Feature 38 and probably are from a single vessel. The slashes are thin, shallow incisions about 2 mm long and spaced about 1 mm apart on the exterior side of the vessel lip. Slashes on the other sherd, from Feature 27 are similar but extend from the top of the lip to the exterior (Figure 21).

The classes resulting from this analysis are representative of general stylistic and functional attributes of the assemblage at the site.

General Summary of Stauffer Site Ceramics

In general, pottery sherds from the Stauffer site are made from a clay body containing very fine sand. The orange to brick red color of most sherds indicates an oxidizing atmosphere, though

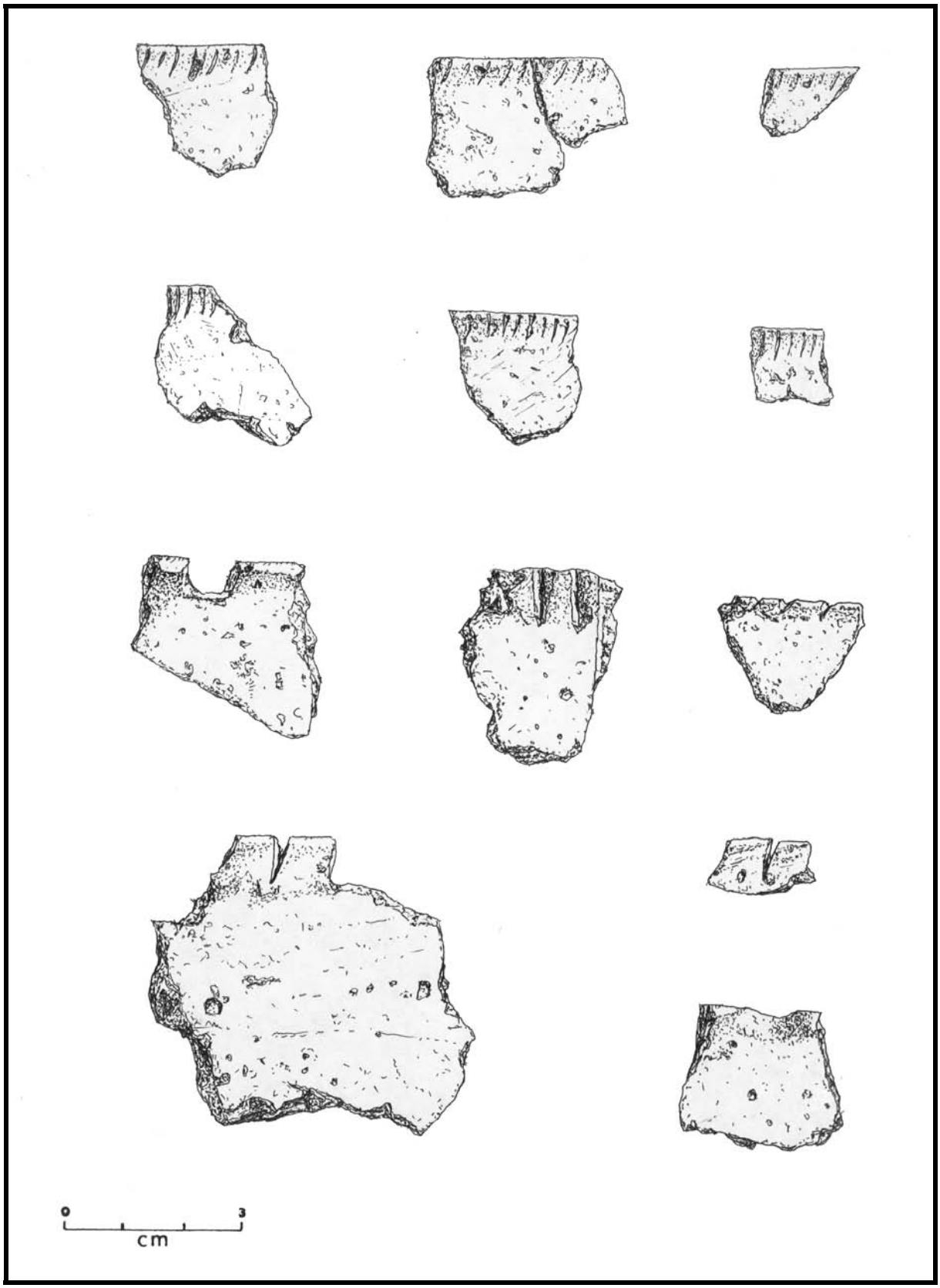


Figure 21. Lip Decorations.

fire clouding and incomplete firing produces areas of gray or black. To the eye, the vast majority of sherds appear to be tempered with finely ground limestone. Temper particles generally are small, less than 1 mm in diameter, and often less than 0.5 mm. Temper volume is not consistent—some sherds have a large amount of temper, other have little. The size of the temper particles makes them more similar to Maramec ware as defined by Chapman (1980:286) and less similar to Boone phase wares (Chapman 1980:276), which have temper particles in the size range of 1-7 mm. However, temper size is rarely analyzed in a rigorous fashion, and the temper particle size differences between wares the Boone, Moreau, and Maramec phases (themselves problematic constructs) may be more impressionistic than real.

Thin section analysis of a small number of sherds raises some important questions about sherds we think of and refer to as limestone-tempered. It could be that Late Woodland potters in Missouri are using (choosing?) clays containing limestone sand, and that regional geological or fluvial characteristics are responsible for the differences archeologists use to separate Boone wares from Maramec wares. Evaluation of central Missouri clay sources and thin section analysis of a larger sample of sherds will be useful in addressing these questions.

As noted earlier, a total of 18,187 sherds weighing 42,737.9 g (42.7 kg) was recovered from the Stauffer site (Table 8). This includes 692 rim sherds weighing almost five kilograms. Plain, limestone tempered sherds total 17,404 and weigh 36,787.5 g: 95.8% by count and 86.1% by weight of all sherds. The second most common vessel surface treatment is brushing, followed by cord-marking and the application of red slip, which are so uncommon they can almost be dismissed. Sherds with brushing—exterior, interior, or both—are less than four percent of total by count and less than thirteen percent by weight. Less than one percent are cord-marked, slipped, or have patterned brushing. Less than one percent of all sherds have a temper other than limestone or have any kind of decoration.

While no complete vessels have been reconstructed, larger sherds suggest that most Stauffer vessels have a round or slightly conical, thickened base, globular or relatively straight sides leading to a weak shoulder, and a neck and rim that is vertical or flares out slightly (see Figure 17). The curvature of some rims suggests a bowl form exists as well.

There are 47 different rim types, based on different configurations of the dimensions of surface treatment, rim angle, lip shape, lip decoration, body decoration, and temper type (Table 9). But prehistoric pots are irregular and inconsistent, even within a vessel. Thus the lip of one sherd may be flat and another, from the same pot, may have a round lip. This brings the previous statement—that there are 47 “types”—into question. Still, this approach shows the range of variation present in the rim assemblage.

Stepping back from these 47 types, it is plain to see that there really is very little variation in the assemblage. For example, of the 686 rims, 607 or eighty-eight percent are from plain surfaced limestone-tempered vessels. Another 70 (ten percent) are from limestone-tempered vessels that have brushing, either inside, outside, or both. Plain limestone-tempered rims that are vertical number 498, or 73 per cent, so it is safe to say that most of the vessels from Stauffer are plain, limestone-tempered vessels with vertical rims. Feature 27, with a corrected date of A.D.775, produced a thick, rounded rim, illustrated in Figure 20, which may be from a bowl.

Table 8. Synopsis of All Sherds Recovered From P III Excavation at the Stauffer Site

	Count	Percent of Count	Weight	Percent of Weight
Total sherds analyzed	18,187	100	42,737.9	100
Temper				
Limestone	18,149	99.8	42,423.1	99.3
Sand	25	<1	246.3	<1
Grog	4	<1	37.3	<1
No Temper	9	<1	31.2	<1
Surface Treatment				
Plain	17,439	95.9	37,053.5	86.7
Brushed Exterior and Interior	258	1.4	3,262.7	7.6
Brushed Exterior	371	2.0	1,018.7	2.4
Brushed Interior	105	<1	1,114.5	2.6
Patterned Brushing Exterior	8	<1	258.5	<1
Cordmarked Exterior	6	<1	30.0	<1
Body Decoration				
No Decoration	18,171	99.9	42,461.5	99.4
Incised	11	<1	219.9	<1
Reed Impressed	2	<1	35.0	<1
Red-Slipped Exterior	3	<1	21.5	<1
Lip Decoration				
No Decoration	18,175	99.9	42,694.1	99.8
Notched Rim	3	<1	22.2	<1
Slashed Rim	7	<1	13.3	<1
Stick Impressed	2	<1	8.3	<1

Rim sherds that include the neck and shoulder show that the shoulder angle is greater than 90 degrees, indicating that the common vessel type is an elongated jar, rather than a globular form. This vessel shape is typical for Late Woodland sites in Central Missouri.

Twenty-nine of the thirty-five decorated sherds are from features, and decorated sherds occur only in nine general provenience classes: Features A (N=9), 14 (N=1), 23 (N=1), 27 (N=6), 28 (N=5), and 38 (N=7); and excavation Units 14 (N=1), 17 (N=4), and 21 (N=1) (Table 10). Nearly all of the decorated sherds from Stauffer are shown in Figures 18-21. Eight sherds from Feature A have a well-executed and distinctive pattern of cross-hatched brushing. It may be that all sherds of this type recovered at Stauffer are from a single vessel. Chapman (1980:119-121) notes the presence of similar patterned cordmarking on sand tempered Graham Plain ware from the Graham Cave and Arnold Research Cave sites (see illustration, Chapman 1980:119). Chapman's assessment of the pottery is that it is more like that of the terminal Middle Woodland in the Big Bend area than it is like wares of the Boone phase. The Stauffer sherds suggest

otherwise, particularly since these sherds are from Feature A, with its corrected radiocarbon date of A.D.1025.

Table 9. Attributes and Quantities of Rim Sherds

Count	Weight	Surface Treatment	Body Decoration	Lip Decoration	Rim Angle	Lip Shape	Temper
1	29.8	Plain	Reed impressed	None	Flared	Irregular	Limestone
2	25.2	Plain	Incised	None	Vertical	Round	Limestone
2	156.3	Plain	Incised	None	Vertical	Flat	Limestone
1	4.5	Plain	Incised	None	Vertical	Irregular	Limestone
2	4.4	Plain	Incised	None	Flared	Round	Limestone
1	4.2	Plain	Red-Slipped	None	Vertical	Round	Limestone
1	0.8	Plain	Red-Slipped	None	Vertical	Flat	Limestone
1	3.9	Plain	None	Stick impressed	Vertical	Round	Limestone
6	11.5	Plain	None	Slashed	Vertical	Round	Limestone
1	1.8	Plain	None	Slashed	Flared	Flat	Limestone
2	17.6	Plain	None	Notched	Flared	Round	Limestone
249	938.3	Plain	None	None	Vertical	Round	Limestone
192	1130.1	Plain	None	None	Vertical	Flat	Limestone
21	100.1	Plain	None	None	Vertical	Beveled out	Limestone
4	8.6	Plain	None	None	Vertical	Beveled in	Limestone
18	335.6	Plain	None	None	Vertical	Irregular	Limestone
1	1.4	Plain	None	None	Vertical	Irregular	Limestone
21	81.7	Plain	None	None	Flared	Round	Limestone
36	412.9	Plain	None	None	Flared	Flat	Limestone
1	13.1	Plain	None	None	Flared	Beveled out	Limestone
13	12.7	Plain	None	None	Inslanting	Round	Limestone
18	20.7	Plain	None	None	Inslanting	Flat	Limestone
1	1.2	Plain	None	None	Inslanting	Irregular	Limestone
2	1.1	Plain	None	None	Inslanting	Irregular	Limestone
3	2.9	Plain	None	None	Inslanting	Beveled out	Limestone
1	4.4	Brushed Interior	None	Stick impressed	Vertical	Irregular	Limestone
1	4.6	Brushed Interior	None	Notched	Vertical	Flat	Limestone
12	78.4	Brushed Exterior	None	None	Vertical	Round	Limestone
1	1.2	Brushed Exterior	None	None	Vertical	Flat	Limestone
3	46.1	Brushed Exterior	None	None	Vertical	Beveled out	Limestone
1	0.4	Brushed Exterior	None	None	Inslanting	Round	Limestone
7	64.6	Brushed Interior	None	None	Vertical	Round	Limestone
7	278.6	Brushed Interior	None	None	Vertical	Flat	Limestone
2	31.7	Brushed Interior	None	None	Vertical	Beveled out	Limestone
1	47.7	Brushed Interior	None	None	Vertical	Irregular	Limestone
1	1.1	Brushed Interior	None	None	Flared	Round	Limestone
10	107.3	Brushed Int/Ext	None	None	Vertical	Round	Limestone
15	657.6	Brushed Int/Ext	None	None	Vertical	Flat	Limestone
1	23.7	Brushed Int/Ext	None	None	Vertical	Irregular	Limestone
1	14.2	Brushed Int/Ext	None	None	Flared	Flat	Limestone
1	1.5	Cordmarked Ext	None	None	Vertical	Flat	Limestone
5	220.2	Patterned Brushing	None	None	Vertical	Irregular	Limestone
1	16.3	Patterned Brushing	None	None	Flared	Round	Limestone
2	7.5	Plain	None	None	Vertical	Round	None
1	9.6	Plain	None	None	Incurved	Irregular	None
5	10.8	Plain	None	None	Inslanting	Irregular	None
679	4947.9						

Three sherds are red slipped, and because this category is easily confused with reactions to firing conditions it is difficult to say with confidence that red slipped wares occur at the site at all. Body decorations such as incisions (N=11, Figures 18 and 19) and reed impressions (N=2, Figure 20) are extremely rare; as are lip decorations such as slashes (N=7), stick impressions (N=2), and notching (N=3) (Figure 21). While body decoration is not typical for Late Woodland sites, it was surprising to see the lack of lip decoration in the assemblage.

The small sample of decorated sherds does not allow for many conclusions to be drawn on temporal stylistic change. Four incised sherds and one red slipped sherd are from Feature 28, with a corrected radiocarbon date of A.D.680. Feature 27, with a corrected date of A.D.775, produced two incised sherds, one rim with tiny diagonal lip notches, one pinched rim and two slashed rims. The most interesting and visible decorations come from sherds from Feature A, dated to A.D.1025. This feature contained the patterned brushed body sherds and two sherds with lines of reed impressions.

Table 10. Decorated Sherds by Provenience

Feature	Excavation Unit	Count	Zone	Surface Treatment	Body Decoration	Rim Decoration
A		1	3	Plain	Reed Impressed	None
A		1		Plain	Reed Impressed	None
14		1		Brushed Exterior	Incised	None
23	28	1		Brushed Interior	None	Stick Impressed
27		1		Plain	Incised	None
27		1		Plain	Incised	None
27		2	b	Plain	None	Notched
27		1		Plain	None	Stick Impressed
27		1	b	Plain	None	Slashed
28		1		Plain	Incised	None
28		1		Plain	Incised	None
28		2		Plain	Incised	None
28		1	2	Brushed Int/Ext	Red-Slipped Exterior	None
38		1	b	Plain	Incised	None
38		2		Plain	None	Slashed
38		2	b	Plain	None	Slashed
38		2	c	Plain	None	Slashed
	14	1	4	Brushed Interior	None	Notched
	17	1	2	Plain	Incised	None
	17	1	3	Plain	Incised	None
	17	1	2	Plain	Red-Slipped Int/Ext	None
	17	1	2	Plain	Red-Slipped Exterior	None
	21	1	4	Plain	Incised	None
Totals		26	320.2			

Sherd Thickness

Braun's (1983, 1985, 1987) seminal work on ceramic vessel wall thickness from western Illinois sites has demonstrated that ceramic technology responds to changing selective environments. A general trend for pottery is that vessel wall thickness decreases as vessels are used more frequently as cooking vessels for cultivated seeds. The trend is not linear, but its curves reflect the results of ceramic technological changes that need to balance sometimes conflicting elements such as thermal conductivity, resistance to thermal stress, resistance to impact, the ability to

resist extension of established cracks, and a paste composition that would facilitate the need for large vessels (Hoard et al. 1995). Since Braun's studies, similar investigations have been carried out on Missouri ceramics, showing the trend seen in western Illinois also applies to areas of Missouri (Hoard 1992, O'Brien and Hoard 1996, O'Brien et al. 1994, O'Brien and Wood 1998).

Methods. The methods used to measure change in vessel wall thickness through time generally follow those used by Braun (1983, 1985, 1987). For the Stauffer site, only sherds from radiocarbon dated features (Feature 27, 28, and A) were selected, allowing for temporal control. There is nothing to indicate that artifacts from multiple components are represented in any of these features. All temporally diagnostic artifacts in these features correlate with the associated Late Woodland radiocarbon dates. All radiocarbon dates have standard deviations ranging between 60 and 80 years.

Only body sherds were used for the analysis, as base and rim sherds would be expected to be thicker and thinner, respectively, and more variable than body sherds. Sherds which passed through a 2.5 cm (1 inch) sieve were rejected as a sampling procedure, and to ensure that sherds were large enough for accurate and nonredundant measurements. Even using this, the number of sherds included in the study was 251 from Feature A, 103 from Feature 27, and 71 from Feature 28, well above Braun's minimum criterion of 25 sherds per feature. Four measures of thickness were taken from four opposing edges of each sherd using digital calipers with accuracy to 0.1 mm. Care was taken to avoid areas of decoration or damaged surfaces when taking measures. Eight sherds, whose set of four measurements had a standard deviation of one or greater, were removed from the analysis because of the concern that these may not accurately represent average vessel wall thickness. The results of this analysis are shown in Table 11.

Table 11. Mean Thickness of Sherds From Radiocarbon Dated Features.

	Mean Thickness	SD	Corrected Radiocarbon Date	Analyzed Sherds
Feature A	7.22	1.32	A.D.1025	n=251
Feature 27	7.11	1.13	A.D.775	n=103
Feature 28	6.77	1.28	A.D.680	n=71

Figure 22 shows how the thickness of Stauffer sherds compares with other analyzed sherds from Missouri (Data from Hoard 1992) and with the trend calculated by Braun (1983, 1985, 1987; O'Brien and Hoard 1996:127-131) for sherds from western Illinois. The data from Stauffer reiterates the general trend determined by other studies—that vessel walls are made thinner through time. It also provides more data for sites older than A.D.600, and shows the trend to be more one of a switch than a transition. Specifically, it appears that between A.D.200 and A.D.400, potters in Missouri drastically reduced the thickness of their pottery, by as much as 40%. It shows that the sherds at Stauffer are generally thicker than contemporaneous sherds from Feature 76 (mean thickness 5.4 millimeters) at the Burkemper site in east central Missouri and features 5 (mean thickness 6.6 millimeters) and 10 (mean thickness 5.8 millimeters) from site 23BO969 in central Missouri (Hoard 1992:68; O'Brien and Hoard 1996:127-131).

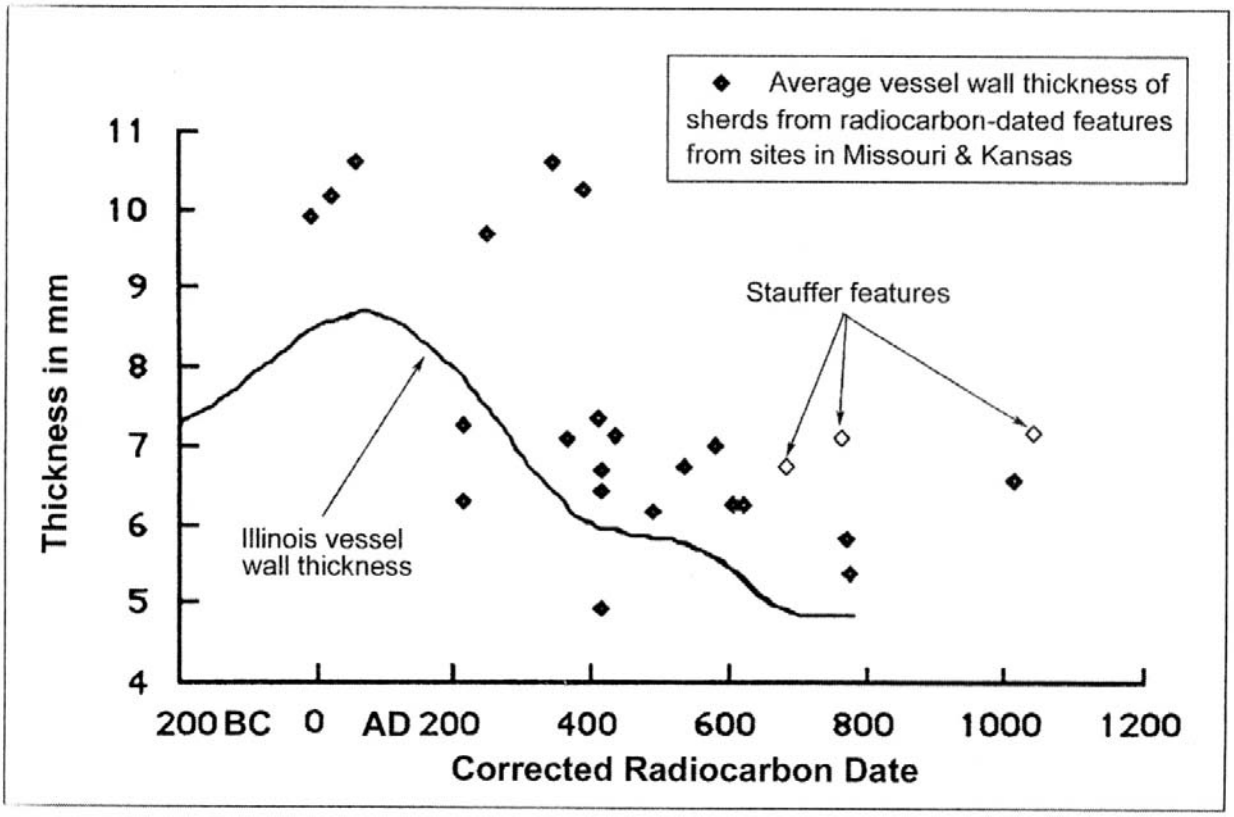


Figure 22. Change in Ceramic Vessel Wall Thickness through Time

Thin Section Analysis of Stauffer Pottery

by Danielle Montague-Judd and Elizabeth J. Miksa

Previous discussion of ceramics pointed out that the primary Late Woodland limestone tempered wares in central Missouri—Boone, Moreau, and Maramec Springs—were described in part by their temper size. Because temper size for these wares has not been quantified we carried out analysis of thin sections of twelve sherds from Stauffer. Of these twelve sherds, three are sand-tempered sherds from feature 28. The other sherds are limestone tempered, three each from features 27, 28, and A, all of which are radiocarbon-dated.

Methods

Sherds were cut parallel to the vessel wall, ground smooth, attached to a glass slide, and ground to a thickness of 30 microns. These were viewed using binocular and polarizing microscope.

Grain-Size and Compositional Analysis of Potsherds from the Stauffer Site

Objective. Seventeen potsherds from the Stauffer site, 23CO499, Cole County, Missouri, were submitted to Desert Archaeology, Inc. The goals of this study were to analyze the sherds for grain size and composition. These sherds represent two previously designated temper types: (1)

limestone and (2) sand. Two questions were investigated: What is the distribution of grain sizes among the sherds? What is the composition of the sand-tempered sherds?

Methods. The twelve largest and flattest sherds were selected for thin section analysis from the seventeen submitted (Table 12). Sherds chosen for the analysis were trimmed, stained for identification of potassium and calcium feldspar, and cut and ground into standard thin sections (about 30 mm by 20 mm by 30 microns thick).

Table 12. Sample inventory of sherds analyzed from the Stauffer site, 23CO499.

Sample No.*	Feature	MoDOT Catalog No.	Grain-size Count	Compositional Count
27-1	27	1652	X	
27-2	27	1652	X	
27-3	27	1652	X	
28-1	28	1823	X	
28-2	28	344	X	
28-4	28	1823	X	
A-2	A	365	X	
A-3	A	360	X	
A-5	A	360	X	
28-S-1	28	1823	X	X
28-S-2	28	1823	X	X
28-S-3	28	1823	X	X

*Note: An "S" in the sample number field denotes a clastic sand-tempered sherd; all other sherds were designated as limestone-tempered.

Point counting was used to obtain data on the relative volume of the components of interest, in this case grain size and composition. A point count is performed by placing a grid over the thin section and counting the component of interest at each grid point intersection. The grid is imposed by using a mechanical point-counting stage that moves the slide incrementally. The analyst chooses the grid increments so that two conditions are met: the grid is wider than the largest grain in the sample (Van der Plas and Tobi 1965), and the grid is spaced to cover as much of the slide as possible (Friedman 1958). For this study, the distance between grid point intersections on each traverse ranged from 0.33 to 0.66 mm, and the vertical distance between transects was 1.33 mm.

Grain size point counts were performed on all 12 sherds, up to 400 points per thin section. The point count parameters for grain size followed the phi scale (Table 13), a categorical scale in which each size class represents particles twice as large as the previous size class (Boggs 1987). The term "sand" is used here to designate particles that have a grain size between 0.0625 and 2 mm. The term "sand" can also have a genetic connotation that refers to sand-sized clastic

sediment. A clastic sediment is one that forms through water or wind transport and deposition of weathered bedrock. Sand can be composed of single mineral crystals or small rock fragments (lithic grains), and can be of uniform or mixed composition (Miksa and Heidke 1995). Since "sand" is used here as a grain-size term, the group of three sand-tempered sherds is referred to in this report as clastic sand-tempered sherds in order to distinguish them more fully from the limestone-tempered sherds, some of which contain coarse sand-sized grains of limestone.

Table 13. Point-count parameters for grain-size data.

Parameter	Grain Size, Phi	Description
Silt	4	Measured grain length < 0.0625 millimeters (mm)
Very fine sand	3	0.0625 mm ≤ measured grain length < 0.125 mm
Fine sand	2	0.125 mm ≤ measured grain length < 0.250 mm
Medium sand	1	0.250 mm ≤ measured grain length < 0.50 mm
Coarse sand	0	0.50 mm ≤ measured grain length < 1.0 mm
Very coarse sand	-1	1.0 mm ≤ measured grain length < 2.0 mm
Granule	-2	Measured grain length >= 2.0 mm
Matrix	n/a	Counted when cross-hair intersected matrix
Voids	n/a	Counted when cross-hair intersects void space in the sherd

The analysis reported here used seven size categories: silt (smallest), five different sand sizes, and granule (largest) (Table 13). Each of the grains counted was measured with the stage micrometer and then counted in the appropriate size category. For example, a grain that measured 0.50 mm long was counted as a coarse sand-sized grain (0 phi). Composition of the grains and matrix was noted qualitatively.

Compositional point counts were performed on the three clastic sand-tempered sherds, up to 400 points per thin section. Point count parameters for composition included all major rock and mineral types, after Lombard (1987; Table 14 this report). The Gazzi-Dickinson point-counting technique (Dickinson 1970; Ingersoll et al. 1984) was used in order to account for possible variations in grain size or textural maturity of the clastic sand-tempered sherds. In this technique, all grains sand-sized or larger are counted as individual minerals, even if they are part of a larger aggregate grain (e.g., individual, sand-sized crystals of quartz or feldspar in a granite grain would be counted as quartz and feldspar, respectively). On the other hand, silt- or clay- sized mineral grains that form part of a larger aggregate grain are counted as the particular kind of rock fragment (e.g., a felsic volcanic grain composed of silt-sized quartz and feldspar crystals would be counted as a felsic volcanic grain).

Table 14. Point-count parameters for compositional data. Each parameter represents a mineral or rock type or group of similar minerals or rock types. Parameters listed in italics were not encountered in the clastic sand-tempered sherds in this dataset. Parameters after Lombard (1987).

Monocrystalline mineral grains			
QTZ	Quartz	PX	Augite
KSPAR	Potassium feldspar	AMPH	Hornblende or oxyhornblende
MICR	Microcline	OLIV	Olivine group minerals
PLAG	Plagioclase feldspar, $\leq$ 10% altered	OPAQ	Undifferentiated opaque minerals
PLAGAL	Plagioclase feldspar, 10-90% altered	EPID	Epidote
PLAGGN	Plagioclase feldspar, $\geq$ 90% altered	SPHENE	Sphene
MUSC	Muscovite mica	GAR	Garnet
BIOT	Biotite mica	CACO	Undifferentiated carbonate minerals
CHLOR	Chlorite group minerals		
Fine-grained rock fragments[1]			
Volcanic		Sedimentary	
LVF	Felsic volcanic rock	LSS	Siltstones
LVFB	Biotite-bearing felsic volcanic rock	LSCH	Chert
LVI	Intermediate volcanic rock such as latite,	LSCA	Carbonate andesite or quartz-andesite
LVM	Mafic volcanic rock such as basalt or trachyte	LSA	Shales, slates, and mudstones
LVV	Glassy volcanic rock; pyroclastic or vitrophyric rock	GROG	Sherd temper fragments
LVH	Hypabyssal (shallow igneous) rocks		
Metamorphic			
LMVF	Metamorphosed felsic volcanic rock	LMSS	Metamorphosed siltstone
LMA	Metamorphic aggregates such as metasediments	LMAMPH	Amphibolite
LMT	Finer grained schists and gneisses	LMF	Foliated quartz aggregates
LMTP	Phyllite	LMM	Microgranular quartz aggregates
Other grain types			
UNKN	Unknown. Grains are assigned to this category if they are indeterminate, unidentified, or if they occur only rarely.		

[1]Rock fragments made up of sand-sized grains (such as granite) are counted as the single minerals of which they are composed; i.e., a quartz grain in a granite is counted as quartz, etc.

Results and Interpretation

Composition and Matrix, Limestone-Tempered Sherds. Qualitative analysis of the limestone-tempered sherd composition indicated that the most common component was silt-sized monocrystalline quartz, with coarse sand to granule-sized polycrystalline quartz, silt to medium-sand-sized opaque grains (probably iron oxides) and silt to medium-sand-sized altered biotites also present. Other grains rarely seen included plagioclase, muscovite, caliche, sedimentary rock

fragments, and possibly volcanic rock fragments. A few crinoid columnal fragments and other possible fossil fragments (e.g., a bivalve fragment) were observed during binocular and polarizing microscope analysis of several of the limestone-tempered sherds (samples 27-1, 27-3, 28-4, A-3, A-5). The fossil fragments are composed of polycrystalline quartz and have been recrystallized or replaced from their original carbonate composition. Large carbonate grains were common in five samples (28-1, 28-2, A-2, A-3, A-5). Carbonate was not observed in the other four samples (27-1, 27-2, 27-3, 28-4).

In samples without carbonate grains, large voids were common. It is possible that carbonate grains might have been plucked out of the sherd during thin-sectioning. But, it is more likely that polycrystalline quartz or another matrix type filled some of those voids, because those types of materials were observed along the void boundaries whereas carbonate was not. Large voids were particularly noted for samples 27-1 and 28-4; sample 28-4 in particular had the fewest coarse grains of the limestone-tempered samples (Table 15). These four samples could represent a separate ceramic type, as they are not actually limestone-tempered but contain polycrystalline quartz grains that appear to have been carbonate originally (particularly the crinoid fragments, which are always originally carbonate). Thus there are two compositional groups in the "limestone-tempered" sherds: those with polycrystalline quartz grains but no carbonate, and those with coarse carbonate grains.

Table 15. Grain-size data for point-counted Stauffer site sherds.

Sample No.	Total	Silt	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Very Coarse Sand	Granule	Matrix	Voids
27-1	201	92	24	18	17	9	41	0	1039	540
27-2	315	136	43	30	57	23	24	2	1095	414
27-3	184	99	24	19	10	7	14	11	1111	514
28-1	321	75	32	42	61	51	55	5	1236	276
28-2	201	45	24	18	30	28	40	16	626	94
28-4	176	96	44	25	5	6	0	0	1128	412
A-2	341	120	25	33	49	36	41	37	1377	196
A-3	421	142	35	46	54	57	84	0	1098	142
A-5	400	115	42	35	67	64	49	28	804	236
28-S-1	400	155	63	61	43	19	34	25	643	89
28-S-2	400	172	66	61	61	16	24	0	568	80
28-S-3	400	171	79	56	56	19	19	0	413	32

At least two different matrix types were observed during binocular and polarizing microscope analysis of the "limestone-tempered" sherds. The main matrix type is translucent to almost opaque, light-brown to orange-red clay with very small mica flakes (perhaps sericite). The secondary matrix type occurs either as infrequent lumps or as streaks within the main matrix. This secondary matrix is light tan in color and usually contains silt-sized grains of monocrystalline quartz.

It is difficult to tell based on this analysis alone whether the carbonate grains represent a sedimentary deposit of limestone sand, or crushed limestone. Carbonate grains in these samples often have rounded edges. Some grains have stair-step edges (at about 30 and 60 degrees) possibly representing breakage along cleavage planes. However, none of these grains displayed

frayed edges that might suggest crushing. There were also very few carbonate grains smaller than coarse sand size. One might expect abundant, small carbonate grains with crushing because carbonate is a relatively soft mineral (cf. Miksa 1999 for mica sand vs. crushed mica). Overall, the evidence suggests that the carbonate grains represent a non-indurated (loose) sedimentary source rather than a disaggregated rock source.

Composition and Matrix, Clastic Sand-Tempered Sherds. The clastic sand-tempered sherds are also dominated by silt-sized grains (see Table 15), but contain a different group of mineral and rock grain types. Monocrystalline quartz is also the dominant grain in these sherds, but the grains are larger than those in the "limestone-tempered" sherds and range from silt to granule in size. Other grain types present include potassium and calcium feldspars, opaque grains (probably iron oxides), metamorphic lithic grains, and rare felsic volcanic grains (Table 16). The overall mineralogy of this suite of grains suggests a granitic sand source. Textural features of the grains also suggest this interpretation: several quartz/potassium feldspar/plagioclase aggregate grains were observed in thin section, as were myrmekitic textures (intergrown quartz and feldspars, common in intrusive igneous rocks such as granite). Most grains have clear, sharp boundaries and sand-sized quartz grains have subrounded-rounded edges, suggesting a clastic origin for the grains.

Table 16. Compositional data for point-counted Stauffer site sherds.

Sample	Total	Matrix	Voids	Unknown
28-S-1	228	481	69	1
28-S-2	266	539	51	2
28-S-3	234	485	32	1

Monocrystalline grains:

Sample	Qtz	Kspar	Micr	Plag	Plagal	Plaggn	Biot	Opaq	Epid
28-S-1	154	17	4	9	8	1	0	15	0
28-S-2	185	16	0	17	13	1	3	15	0
28-S-3	160	15	1	17	11	0	3	14	1

Rock fragments:

Sample	Lvf	Lvv	Lvh	Lma
28-S-1	1	2	0	16
28-S-2	1	1	0	12
28-S-3	0	0	2	9

The two matrix types seen in the "limestone-tempered" sherds were observed in the clastic sand-tempered sherds, but the secondary matrix type was much rarer in the clastic sand-tempered sherds than in the "limestone-tempered" sherds. The silt-sized fraction of grains also differed in composition between the "limestone"- and clastic sand-tempered sherds. Monocrystalline quartz was abundant and opaque minerals common in the "limestone-tempered" group, whereas monocrystalline quartz was abundant and opaque minerals, plagioclase feldspar, and potassium feldspar were common in the clastic sand-tempered group.

Grain Size, All Samples. The number of silt- or sand-sized grains varied considerably among samples, and more often than not the ideal count of 400 points was not reached (see Tables 15 and 16) because of the low proportion of silt- or sand- sized grains in the sherds. The nine "limestone-tempered" sherds all contained less than 30 percent silt- or sand-sized grains (Figure 23). In some cases, silt- or sand-sized particles were very sparse, making up less than 15 percent of the volume counted (samples 27-3 and 28-4). In general, the percent void space decreased as percent temper (silt- or sand-sized grains) increased. The three clastic sand-tempered sherds contained the most temper and least void space of all of the samples analyzed.

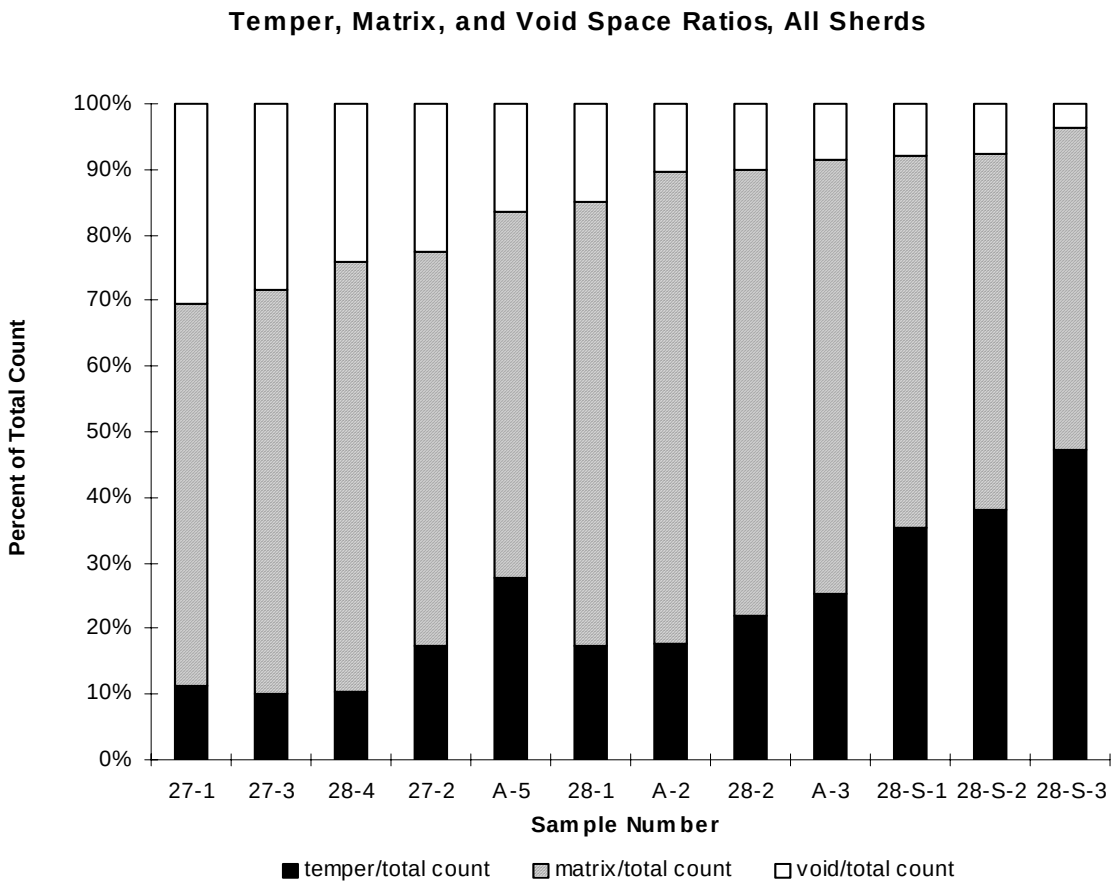
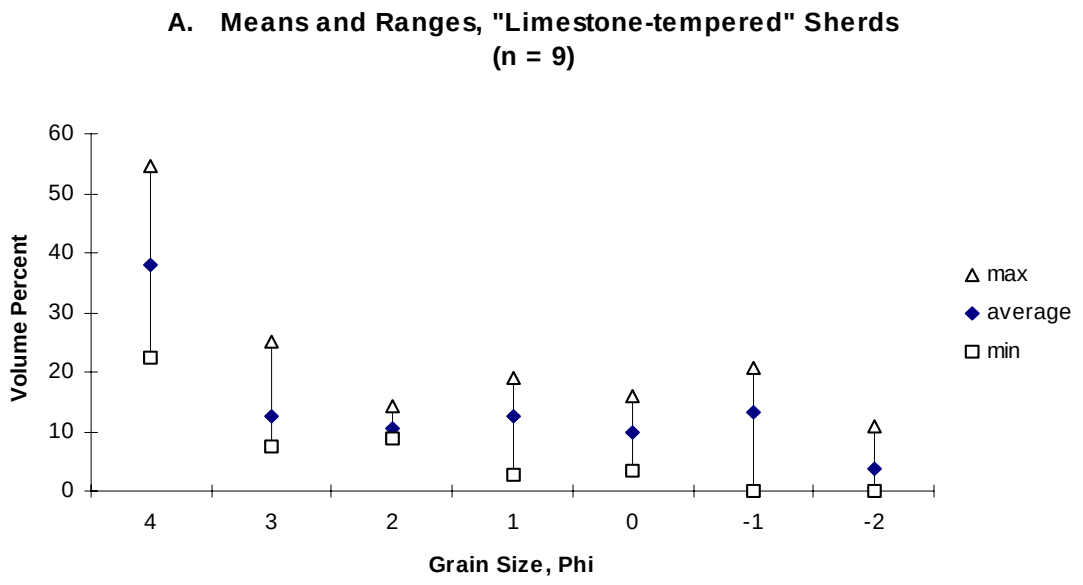


Figure 23. Ratios of Temper, Matrix, and Void Space for All Sherds. An “S” denotes a clastic Sand-Tempered Sherd.

Because of the small percentages of silt and sand-sized grains in the "limestone-tempered" sherds, the possibility remains that these sherds were not tempered at all, but rather that the grains represent naturally occurring particles in the clays used to make the paste. It is also possible that the silt and fine sand-sized grains occurred naturally in the clay, while the carbonate and polycrystalline quartz grains were added to the paste. These grains are the only coarser grains present.

The nine "limestone-tempered" sherds showed more variation in grain-size distribution than the three clastic sand-tempered sherds (Figures 24 and 25). Mean grain size ranged from 2.1 phi (fine sand) to 4.6 phi (silt-sized grains) for the "limestone-tempered" sherds, and from 3.3 to 3.8

phi (very fine sand) for the clastic sand-tempered sherds (Table 17). No distinct groups of sherds are apparent from the grain-size distributions, with the possible exception being the sherds containing carbonate grains. These sherds consistently plotted higher in the coarse fractions (phi -2 to 1) and lower in the fine fractions (phi 2 to 4) on the cumulative volume graph (Figure 25, samples 28-1, 28-2, A-2, A-3, A-5). For all sherds, the grain size distributions are dominated by silt-sized grains.



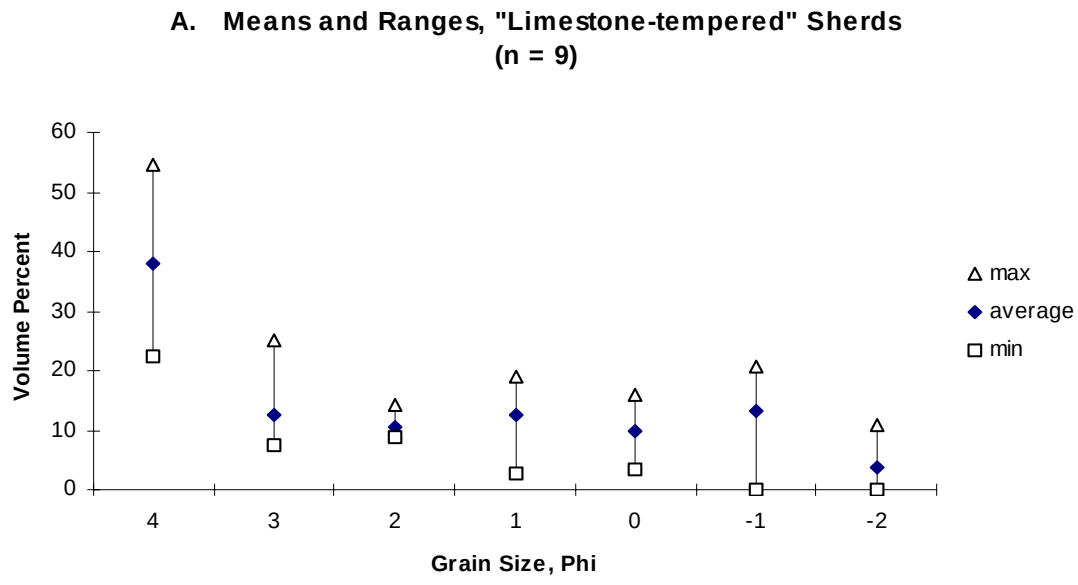


Figure 24. Means and Ranges of Grain Size for All Sherds. A) “Limestone-tempered Sherd. B) Clastic Sand-tempered Sherds. Note the Dominance of Small Grain Sizes (4 phi equals silt-sized grains) in both groups of sherds.

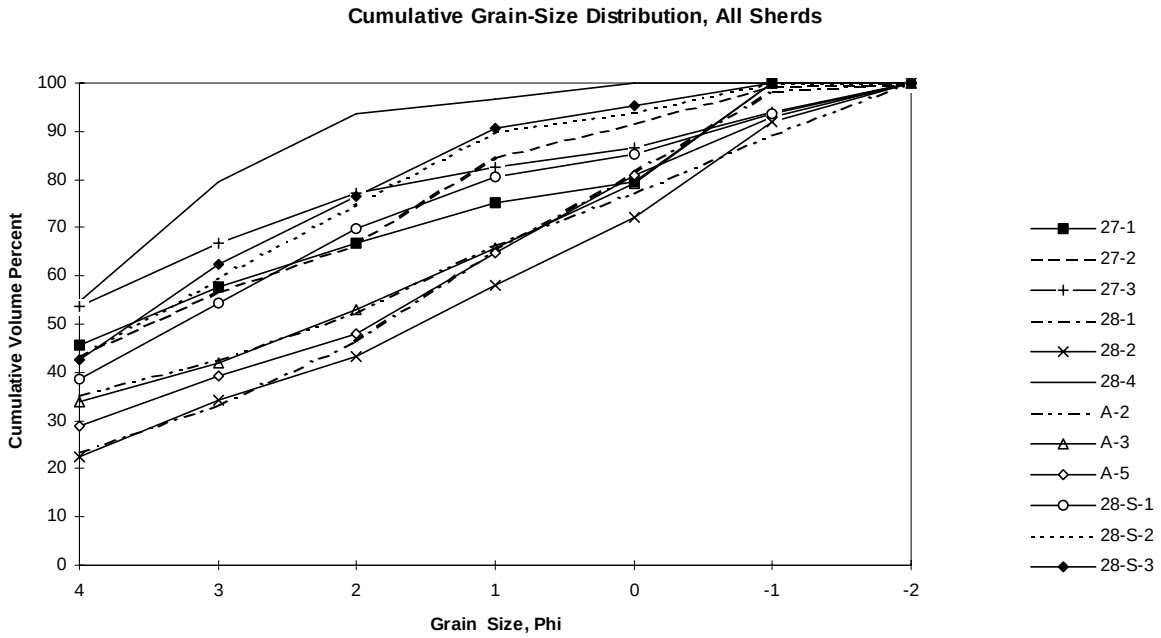


Figure 25. Cumulative Volume Percent Grain-Size Distribution for All Sherds. An "S" denotes a clastic Sand-Tempered Sherd.

Table 17. Mean grain size and standard deviation, in phi units, for each sample.

Sample No.	Mean (phi units*)	Standard deviation (phi units*)
27-1	3.44	0.26
27-2	3.57	0.24
27-3	3.92	0.26
28-1	2.33	0.24
28-2	2.10	0.25
28-4	4.56	0.17
A-2	2.66	0.28
A-3	2.74	0.26
A-5	2.48	0.26
28-S-1	3.31	0.25
28-S-2	3.76	0.22
28-S-3	3.82	0.21

*Note: Statistics were calculated using the following formulas, where f = frequency of a particular size class in percent, m = the midpoint of the size class, and n = 100 (Boggs 1987: 116).

Summary

Silt-sized monocrystalline quartz was the most common grain type and size in the nine "limestone-tempered" sherds. The "limestone-tempered" sherds can be divided into two groups: those containing medium to granule-sized carbonate grains and polycrystalline quartz grains (samples 28-1, 28-2, A-2, A-3, A-5), and those containing medium to granule-sized polycrystalline quartz that may have replaced carbonate (samples 27-1, 27-2, 27-3, and 28-4), and did in fact replace carbonate in those grains containing crinoid fragments. These two groups of sherds might represent different temper provenances or ceramic types or might reflect heterogeneity within one ceramic type.

Silt-sized, monocrystalline quartz dominated the "limestone-tempered" sherds, whereas silt- to sand-sized monocrystalline quartz dominated clastic sand-tempered sherds, with plagioclase and potassium feldspars common. A granitic sand source is likely for the clastic sand-tempered sherds.

The presence of two distinct matrix types suggests the mixing of at least two different clays, especially for the "limestone-tempered" sherds. The low percentage of temper to matrix and voids, as well as the dominance of silt-sized particles and the low percentage of coarser particles, leaves open the possibility that no temper was added to the "limestone-tempered" sherds.

Grain size analysis of sherds from the Stauffer site showed a dominance of silt-sized grains and no distinct groups based on grain-size distributions. "Limestone-tempered" sherds containing coarse carbonate grains (phi -2 to 1) form a semi-distinct group based on grain size.

Nonvessel Ceramics

We recovered two bird figurines—one from Feature A, the other from Excavation Unit 17 (see Figure 15). Similar artifacts are uncommon in the Midwest. A bird figurine was recovered from the Mund component of the Mund site (Fortier, Finney, and Lacampagne 1983:205-207). The Mund figurine is curved into as U shaped with the head and tail at the top of the U. It is small, two centimeters by one and a half centimeters, and made of untempered clay. Also recovered was a pipe bowl fragment from (context), shown in Figure 26.

While the function of the pipe is clear, we can only speculate about the bird figurines. They may have been toys, possibly even made by children. Until we have a larger collection of these and find some pattern in their contexts, their function will remain difficult to understand.

Ceramics Summary

Typological constructs of Late Woodland ceramics in central Missouri typically are general and descriptive. The two ceramic types commonly encountered in this region are Boone (plain and cordmarked) and Maramec (plain and cordmarked) (Chapman 1980:276, 286). Boone phase ceramics (sometimes referred to as Moreau, but see discussion in O'Brien and Wood 1998:241) are found primarily north of the Missouri and are said to have coarse (1-7 mm diameter) limestone temper, Maramec wares are said to have fine (< 0.5 mm) limestone temper

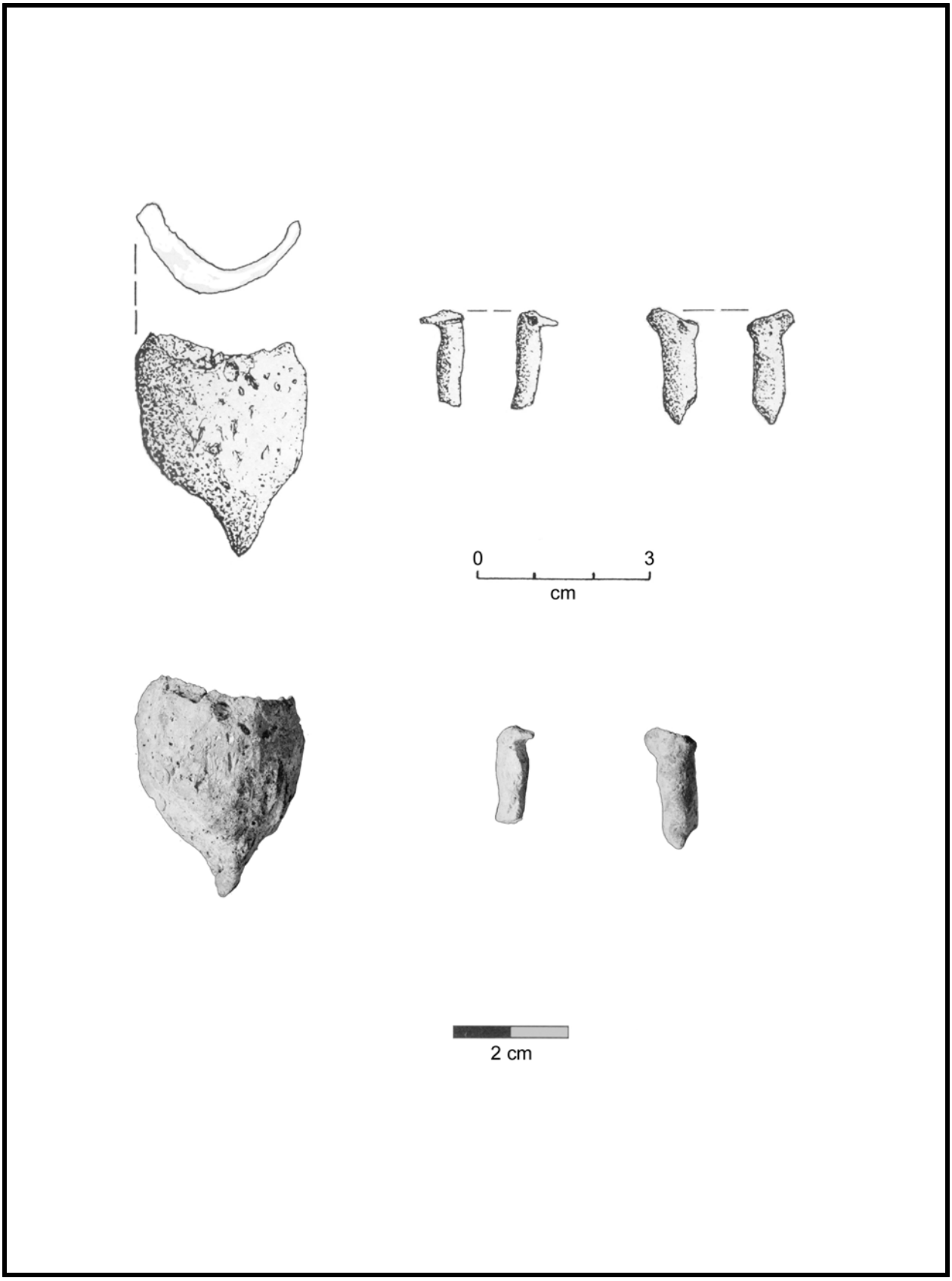


Figure 26. Possible Bird Figurines and Pipe Bowl.

occasionally mixed with sand chert, grog, or larger limestone particles. Occasionally Boone phase vessels have brushed surfaces (Chapman 1980:276; Denny 1964:72), a trait Denny states is a carryover from earlier Hopewellian/Middle Woodland times (Denny 1964:158). Denny also states that brushing, along with square-mouthed vessels, punctations, and conical-based vessels with constricted mouths are Hopewellian traits carried into the Late Woodland, and that these are most common early in the Boone phase (Denny 1964:158). Boone wares are most common near the eastern half of the Missouri River Valley in Missouri, especially to the north, while Maramec wares are primarily in the Ozark Highlands south of the Missouri.

In reality, there is probably considerable overlap between these two wares, both geographically and compositionally (Baker 1984:38, 40, 94). If we intend to pursue the utility of the differences between these wares, more rigorous analytical techniques need to be applied to determine if there is a significant difference in limestone temper size between the wares or to analyze the variant tempers that may co-occur with limestone temper. Reeder et al. (1983:163-166) notes that at 23BO969, a Late Woodland residential base in central Missouri, most sherds are limestone tempered and fit the description for Boone phase pottery. Other sherds from the site contain quartzite, sand, chert, and fine pyrite. At the Algoa site, pottery referred to as Moreau (plain and cordmarked) is tempered predominantly with fossiliferous limestone, but also contains sandstone and gastropod shell; pottery referred to as Maramec Ware is tempered with limestone particles 0.2-0.4 mm in diameter (Baker 1984:91, 92). A larger sample allowing analysis of vessel form and decorative attributes would be useful in determining affiliations of the predominantly limestone-tempered wares at 23CO499 with other sites in the region.
Thin section analysis of a small sample of Stauffer sherds provides several valuable insights. First, “limestone temper” is only a general characterization, albeit a useful one. It is apparent that sedimentary rock from the Burlington Formation is included in the clay used to make pots in many central Missouri sites. The presence of crinoid fossils serves as a marker for the Burlington Formation. But the crinoids and other sedimentary rock particles may not be carbonate but polycrystalline quartz. What we often refer to as limestone and assume to be predominantly carbonate rock is actually more complex, possibly effecting consideration of the role of limestone and other carbonates in prehistoric pottery (Hoard 1992, Hoard et al. 1995).

Second, the lack of crushing on the sedimentary rock fragments seen in thin sections suggests that either an unconsolidated source of sedimentary rock was used or that a clay source containing limestone sand was used. This would explain the surprisingly low level of carbonate fragments in the “limestone-tempered” sherds. If unconsolidated sources are being used, much of the carbonate may have dissolved, leaving the more durable polycrystalline quartz. Obviously, this may vary between sites or even vessels. This finding raises the possibility that the difference between coarse-tempered Boone phase pottery and fine-tempered Maramec Spring phase pottery is not how the clay and temper are prepared but what source is available for clay or unconsolidated limestone. Possibly Boone phase wares are made with Mississippian-age Burlington Formation deposits, and Maramec Spring is made with particles from the Ordovician-age limestone that dominates south of the Missouri River. More attention will need to be paid to this issue to see if it is true, and thin section analysis of Maramec wares would be useful in testing this.

Third, the sand-tempered sherds are shown to be just that—sand-tempered, not rock that was crushed to be used as temper. It still cannot be determined if sand was added to clay or if the clay body had sand in it and was chosen for use as a "pre-tempered" clay body. It is important to note that the sand-tempered ware is distinguishable from the limestone-tempered ware. Students of the Late Woodland in Missouri should continue to follow questions as to whether a sand- or limestone-tempered clay body is a technological or stylistic choice, in the sense of these terms as used by Dunnell (1978).

Whether or not a person decides to distinguish (or not) between the various limestone tempered pottery types found in central Missouri, one thing is clear—limestone temper dominates. Other tempers, notably sand, are present, but only in small amounts. East of Auxvasse creek in Callaway County temper shifts to sand, and the types Graham Plain or Graham cordmarked best apply.

Chapter 6

LITHIC ANALYSIS

Available Materials

As noted in Chapter Two, the Jefferson City Formation dominates in the vicinity of the Stauffer site. This formation provides stone for both chipped and ground stone tools. Nodules of good quality Jefferson City chert are common in the dolomite outcrops of this formation, along hill slopes, and in stream channels. Occasional lenses of sandstone, shale and orthoquartzite provide raw material for more durable cutting tools and for ground stone tools. Bands of soft argillaceous dolomite called "cottonrock" are also present in this formation; this fine-grained dolomite has an earthy or clayey texture and is readily identified by its light weight.

Approximately 1.1 km west of the Stauffer site is an exposure of chert bearing Burlington limestone. Burlington chert from this formation is available in the nearby Rock Creek drainage. Outcrops of Chouteau limestone and chert are about 8 km northwest of Stauffer. Chert from the Choteau Formation tends to be less suitable for knapping than the Jefferson City and Burlington material.

Chert Identification

Five types of chert were identified in the Stauffer assemblage (Table 18). We attempted to identify chert sources on several tool classes. Chert identification can be tricky, color and texture are not sufficient criteria to separate many sources (Hoard et al. 1992, 1993). In the case of the Stauffer site assemblage, the Jefferson City and Burlington chert types can be indistinguishable to the naked eye. While Burlington chert tends to be white, it also can be gray, blue, or tan or streaked with these colors. In turn, Jefferson City chert tends to be off white and streaked with gray, often in concentric rings, but it may be solid white. We used the presence of crinoid or bryozoan fossils as indicators of Burlington chert, and the presence of oolites to classify Jefferson City cherts (Luedtke 1992, Ray 1994). Keokuk chert was identified by abundant fragments of fossils, and Maynes Creek was known by the absence of fossils (Morrow 1984). Roubidoux quartzite consists of cemented sand grains easily visible under low magnification (Ray 1984) (Table 19).

Table 18. Identifiable Cherts.

Chert Type	Formation	Age	Reference
Jefferson City	Jefferson City	Ordovician	Ray 1984
Burlington	Burlington	Mississippian	Luedtke 1992
Roubidoux Quartzite	Roubidoux	Ordovician	Ray 1984
Keokuk	Keokuk	Mississippian	Morrow 1984
Maynes Creek	Hampton	Mississippian	Morrow 1984

Table 19. Criteria Used for Chert Identification.

Chert type	Objective Criteria	Subjective Criteria
Jefferson City	Presence of oolites, absence of fossils	Waxy texture, dominant streaking or mottling, particularly gray and white, tends to be translucent
Burlington	Presence of bryozoans or crinoids, absence of oolites	Usually grainy texture, predominantly white, tends to be opaque
Roubidoux quartzite	Silica cemented sand grains	Noticeably grainy texture
Keokuk	Abundant fossils fragments	Dull luster, medium to fine texture
Maynes creek	Absence of fossils	Grainy texture

Jefferson City Chert

Jefferson City chert is the most common material for flaked chert artifacts at Stauffer. It is variable in color, occurring in light to dark shades of gray, blue, brown, white, purple, or pink (Ray 1984:233-234). There are three varieties of Jefferson City chert—oolitic, banded, and mottled. The oolitic variety contains sand centered, concentrically-banded, or unstructured oolites ranging from 0.5 to 0.75 millimeters in diameter. The banded variety typically comes from nodules and thus bands frequently are concentric. Often bands of white alternate with gray, blue, brown, black, or purple. Mottled Jefferson City chert typically originates in irregular nodules. In this variety, multiple colors appear in a streaked and swirled pattern, or in disturbed bands. Jefferson City chert is distinguished from similar types of Burlington chert by the absence of fossils. It occurs in round, elliptical or irregular nodules, in seams, or in lenticular beds. Its texture varies from fine and glassy to coarse, and it may have many incipient fractures.

Burlington Chert

Burlington chert is well known and well documented in the Central Midwest (Fortier et al. 1989; Fortier, Maher, and Williams 1991:527-537; Luedtke 1992; Rick 1978; Tankersley 1989). Burlington chert occurs in lenses and nodules up to 20 cm in diameter in Mississippian system Burlington limestone, which is exposed in many parts of western Illinois and northeast Missouri (Luedtke 1992:128), as well as in east central and southwestern Missouri and in southeastern Iowa (Tankersley 1989:276). Burlington chert typically is light colored, predominantly white (10YR 8/1-1.5) or light gray (10YR 7/2). A less common variety is mottled yellowish-brown (10YR 5/4) (Fortier, Maher, and Williams 1991, Rick 1978:22). Luedtke (1992:128) notes it can be tan, darker gray, or black, though the dark gray and black varieties may be the result of weathering (Rick 1978:22). While typically homogeneous in color, it can be mottled, streaked, concentrically banded, or, rarely, horizontally banded (Luedtke 1992:128), though Ray (1984:243) argues that banding is very rare. Burlington chert is fine- to medium-grained, exhibiting a dull to glossy luster. Crinoid, bryozoan, or brachiopod fossils often are present (Morrow 1984:102). In the American Bottom, a low density of small fossil fragments is noted

in the white variety, and in some cases no fossils are visible in the gray variety (Fortier et al. 1989:615).

Experimental work by Rick (1978) demonstrated that Burlington chert takes on pink or red hues when heat treated (Rick 1978:22-23). Some heat treated Burlington chert artifacts from Stauffer are blood red. Rick (1978:23), citing Purdy and Brooks (1971), states that reddening occurs after heat treatment in cherts with more than 11 ppm of iron. Luedtke (1992:68) suggests that dispersed iron in the chert will not be visible, but that heating transforms the iron to hematite, causing a visible color change. Compositional data has been derived for 101 samples of Burlington chert from the Lower Illinois River Valley using neutron activation analysis (Luedtke 1992:128). The mean iron value for Burlington chert is 144.7 ppm (sd 142.2, range 19.6-933.8 ppm). Burlington chert also becomes more lustrous with heat treatment, a property that has been quantified by Rick (1978:25, 57). Given this information, it is reasonable to assume that heat treated Burlington chert could be identified with sufficient accuracy.

Roubidoux Quartzite

Roubidoux quartzite is in fact an orthoquartzite, as it has not been metamorphosed (Ray 1984:230-233). It varies in color from white through tan, light yellow, and gray, though weathered surfaces are rusty brown. It is composed of well cemented fine to medium sand grains, which gives it a grainy texture. Still, fine-grained Roubidoux quartzite has good knapping qualities. It is found in beds, seams, and discontinuous lenses in the Roubidoux Formation.

Maynes Creek Cherts

More common in Iowa than in Missouri, there are several varieties of this Mississippian-aged chert (Morrow 1984:101). Only the Maynes Creek Cream chert was found at Stauffer. Morrow describes this type as being light gray to cream in color and having medium-coarse to medium fine texture and a dull luster. It is moderately translucent.

Keokuk Chert

Keokuk chert originates in extreme southeastern Iowa (Morrow 1984:102. Its color ranges from light gray or blue gray to tan or cream. It contains abundant fossil fragments, has a dull luster, and has a medium to fine texture. A pink or reddish tint and satiny luster is produced by heat treatment.

Chert Tool Assemblage

Overview

Debitage (decortication, reduction, thinning, utilized, and broken flakes, shatter, and blades) equal 43,969 items weighing over 140 kilograms. Of these, 8726 pieces of debitage weighing over 31 kilograms are thermally altered and 108 weighing 349.9 grams have polish on them. We did not carry out rigorous identification and quantification of chert types for debitage. However, general observation shows that, with the exception of a single hematite flake, all other debitage is

chert, and virtually all of it appears to be local in origin. The count and weight of debitage and chipped stone tool types, along with some basic characteristics, are presented in Table 20. Specific tool types are analyzed in more detail below.

Table 20. Debitage and Flaked Stone Tools.

Artifact class	Count	Weight
Debitage		
All	43,969	140.2 kilograms
Thermally altered	8,726	31.4 kilograms
Polished	108	349.9 grams
Blades		
All	97	303.5 grams
Thermally Altered	14	25.3 grams
Polished	1	0.4 grams
Decortication Flake		
All	1398	5.2 kilograms
Thermally altered	279	733.5 grams
Polished	-	-
Cores, core fragments		
All	1,744	131.4 kilograms
Thermally altered	33	2.3 kilograms
Polished	1	44.0 grams
Utilized Flakes		
All	1034	11.7 kilograms
Undifferentiated bifaces and biface fragments		
All	724	16.6 kilograms
Thermally altered	62	1.1 kilograms
Polished	4	204.2 grams
Projectile points and fragments		
All	203	
Thermally altered		
Drills		
All	19	109.7 grams
Thermally altered	1	0.8 grams
Gravers		
All	22	333.1 grams
Unifaces		
All	30	727.9 grams
Thermally altered	2	116.6 grams
Scrapers		
All	30	551.0 grams
Thermally altered	4	19.9 grams
Spoke shaves		
All	3	66.5 grams

Discussion of Flaked Stone Tools

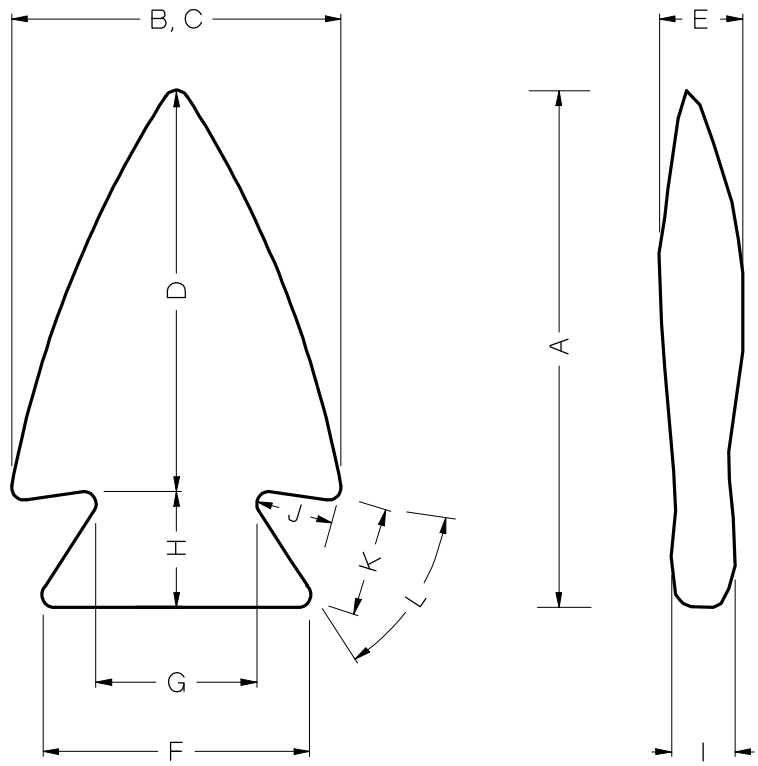
Projectile points

We recovered 203 chipped stone tools identifiable as projectile points or preforms from Stauffer. Several metric attributes were recorded for each projectile point and projectile point fragment. These measurements followed the procedure established by Fortier (1996:66-68) for the Marge site. Measurements taken are shown in Figure 27, and the metric and non-metric data are presented in Appendices 2 and 3. Where possible, points also are identified using descriptive types. Descriptive types are vague at best, but still serve to convey a general shape, size, and time period. We are unabashedly general in our type identification of points, choosing to be lumpers instead of splitters, and presenting photographs and measurements of all identifiable points and point fragment for those who wish to carry out more detailed analysis. Photos of all identified points are shown in Figures 28-38, as are some to which we could not assign a type name. Points too fragmented to identify to type are not shown.

Of the points and point fragments we recovered, we identify 12 types (Table 21) ranging in time from the Dalton period through Late Woodland. Eighty-three points are of types considered to be from the Dalton or Archaic periods, 120 are from the Woodland periods. Sixty-two points are not identifiable as named types, but we contend that among these points hafted to arrows can be distinguished from those mounted on spears or darts, an issue discussed further below. Because of this we have distinguished small, unidentifiable arrow points that do not fit type descriptions from larger unidentifiable points.

Table 21. Projectile Point Types Recovered from Stauffer.

Archaic			**Woodland**		
Period	**Type**	**N**	**Period**	**Type**	**N**
Dalton	Dalton	1	Early Woodland	Gary	2
Early/Middle Archaic	Rice Lobed	1	Early Woodland	Motley	2
Middle Archaic	Side Notched	5	Middle Woodland	Snyders	3
Late Archaic	Etley	36	Middle Woodland	Steuben Expanded Stemmed	4
	Non-ID Dart/Spear	40	Late Woodland	Miniature Snyders	2
			Late Woodland	Rice Side Notched	6
			Late Woodland	Kings Corner Notched	2
			Late Woodland	Scallorn	74
			Late Woodland	Madison	2
			Late Woodland?	Non-ID Arrow	23
Totals		**83**			**120**



A: maximum length
B: maximum width
C: shoulder width
D: blade length
E: blade thickness
F: base width

G: neck width
H: stem length
I: stem thickness
J: notch depth
K: notch width
L: notch angle

Figure 27. Point Measurements.

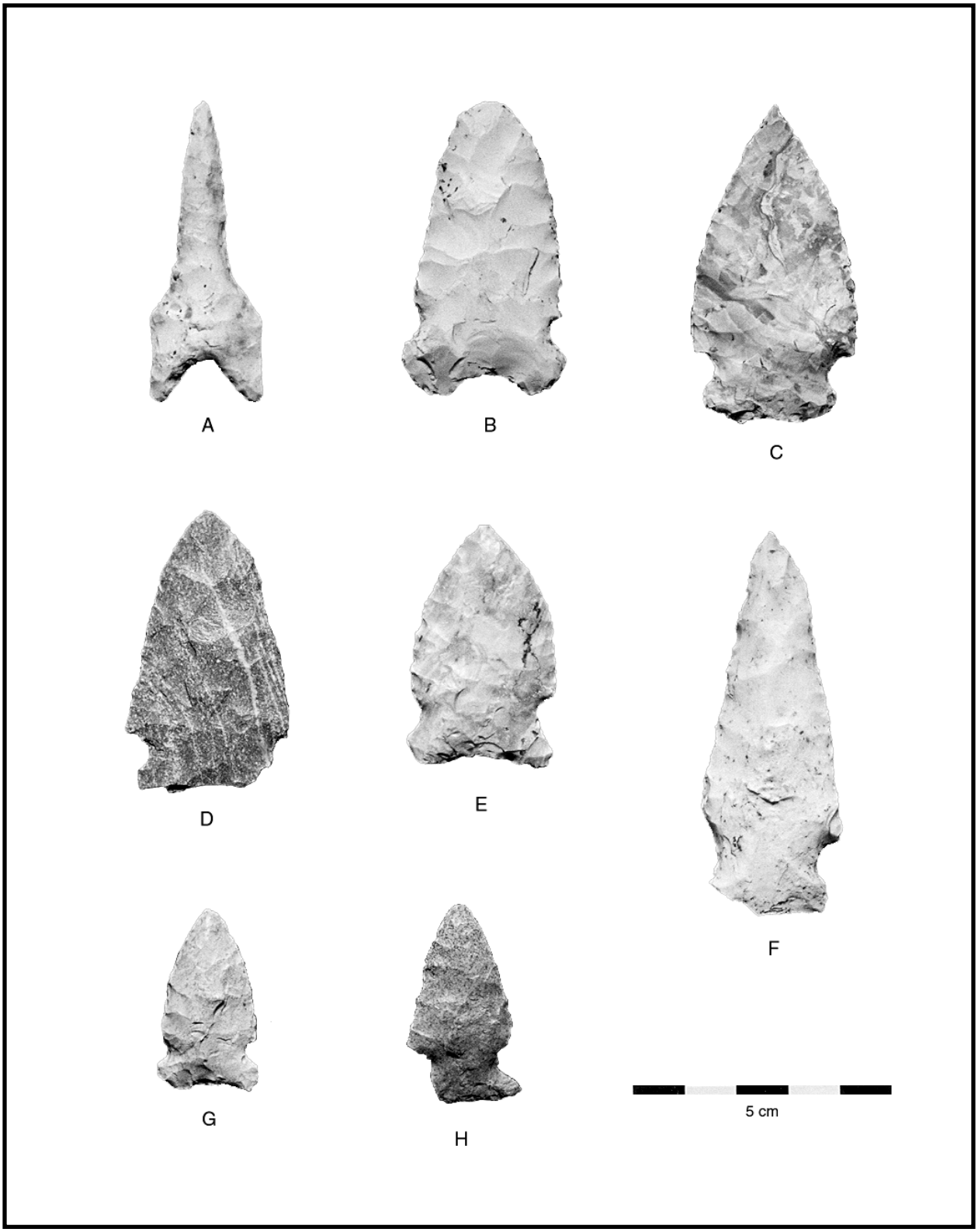


Figure 28. Early Projectile Points and Projectile Point Fragments. Dalton point reworked into a drill: A) 1392, Northeast scrape; Rice Lobed: B) 338-30, Southeast scrape; Big Sandy: C) 1965, Southeast scrape; D) 2064, Southeast scrape, E) 230-280, Northwest Scrape; F) 248-1, EU 19; G) 231-491, Northeast scrape; Matanza: H) 338-23, Southeast scrape.

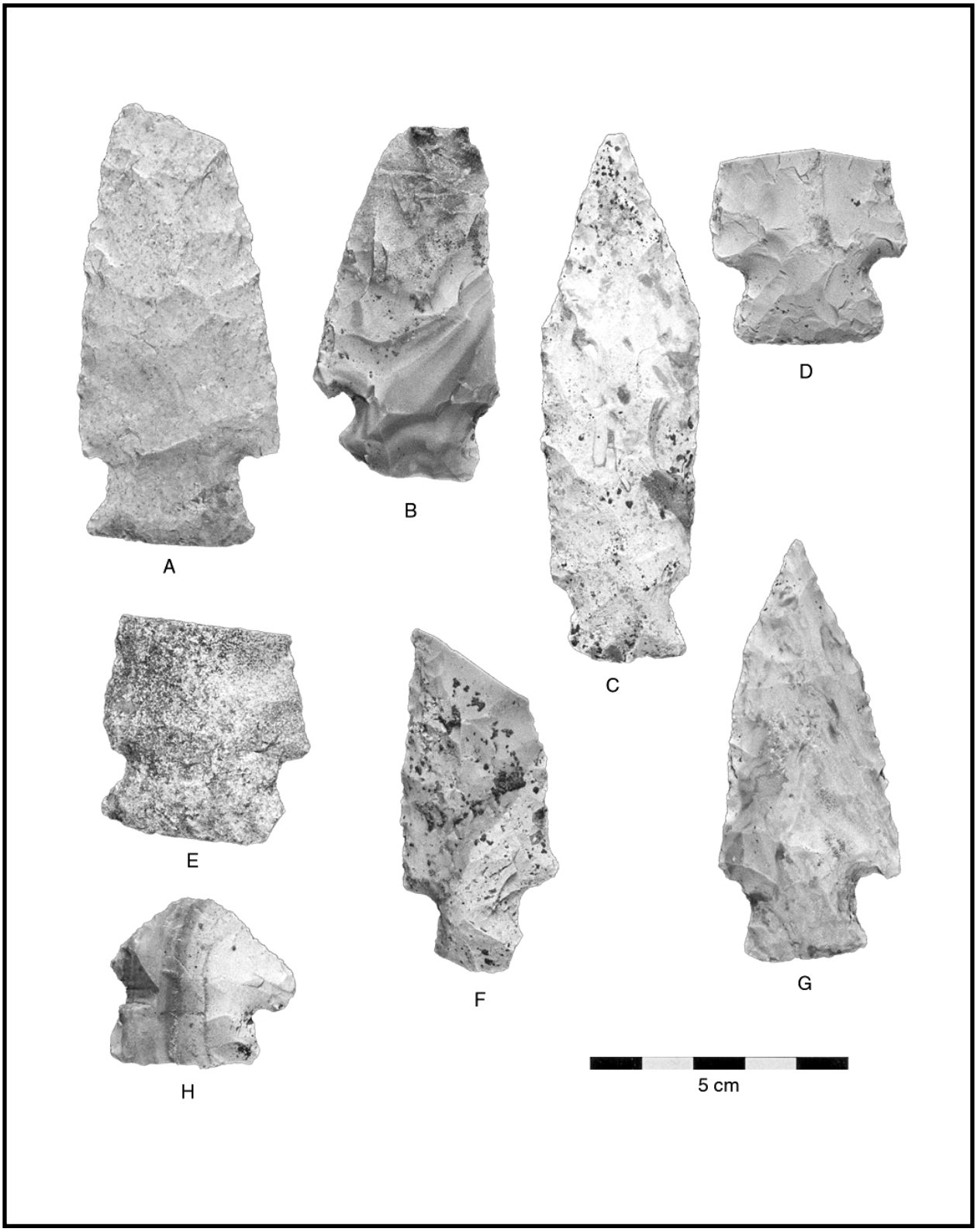


Figure 29. Late Archaic Etley Projectile Points, Whole and Partial, from Features and Excavation Units. A) 1652-2, Feature 27; B) 360-7, Feature A; C) 48-1, Test Unit 6, level 5; D) 87-5, Test Unit 11, level 4; E) 222-1, EU 14, level 5; F) 234-1, EU 16, level 5; G) 337-108, Southwest rise; H) 368-5, from under driveway.

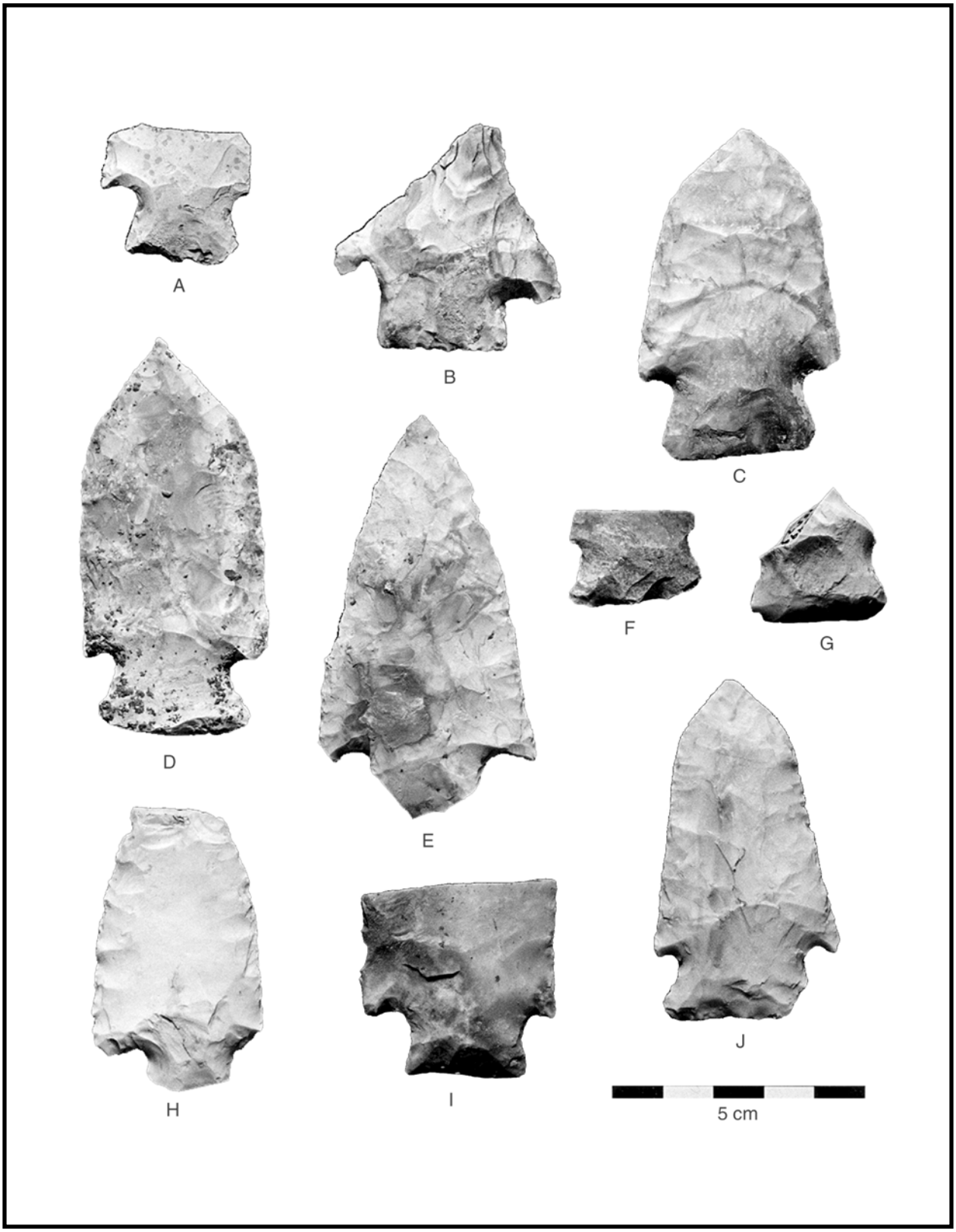


Figure 30. Late Archaic Etley Projectile Points, Whole and Partial, from the Northwest and Northwest II Scrapes. Northwest Scrape: A) 230-4; B) 230-273; C) 230-278; D) 621; E) 633; Northwest Scrape II : F) 1550, G) 1557; H) 1566; I) 1574; J) 1656.

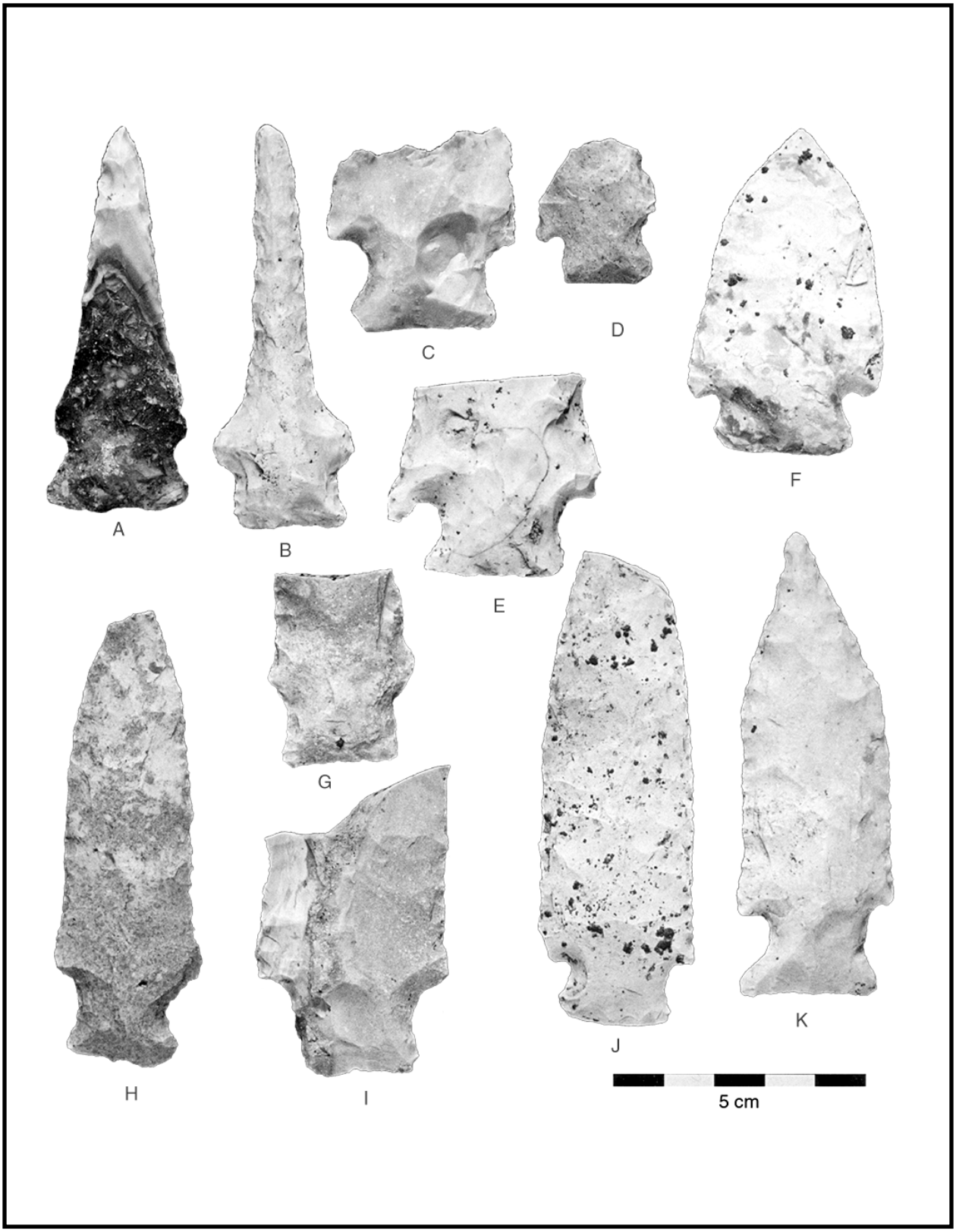


Figure 31. Late Archaic Etley Projectile Points, Whole and Partial, from the Northeast Scrape. Reworked into drills: A) 946; B) 1069; Not reworked: C) 1144; D) 1039; E) 1155; F) 1273; G) 1370; H) 231-294; I) 1258; J) 231-292; K) 231-293.

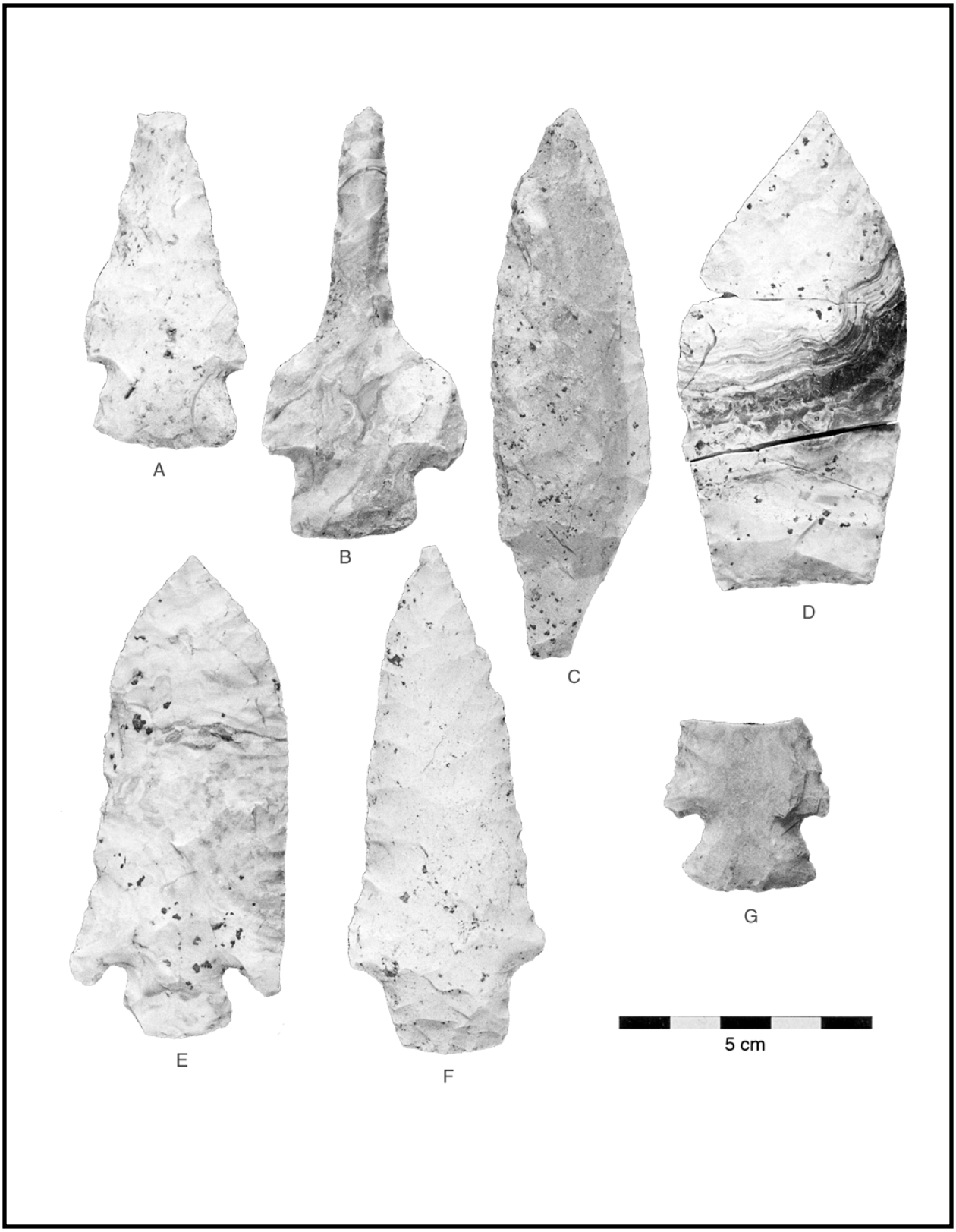


Figure 32. Late Archaic Etley Projectile Points, Whole and Partial, from the Southeast Scrape. Reworked: A) 2021; B) 338-31; C) 2045; Preform: D) 2057; Not Reworked E) 338-24; F) 338-22; G) 2049.

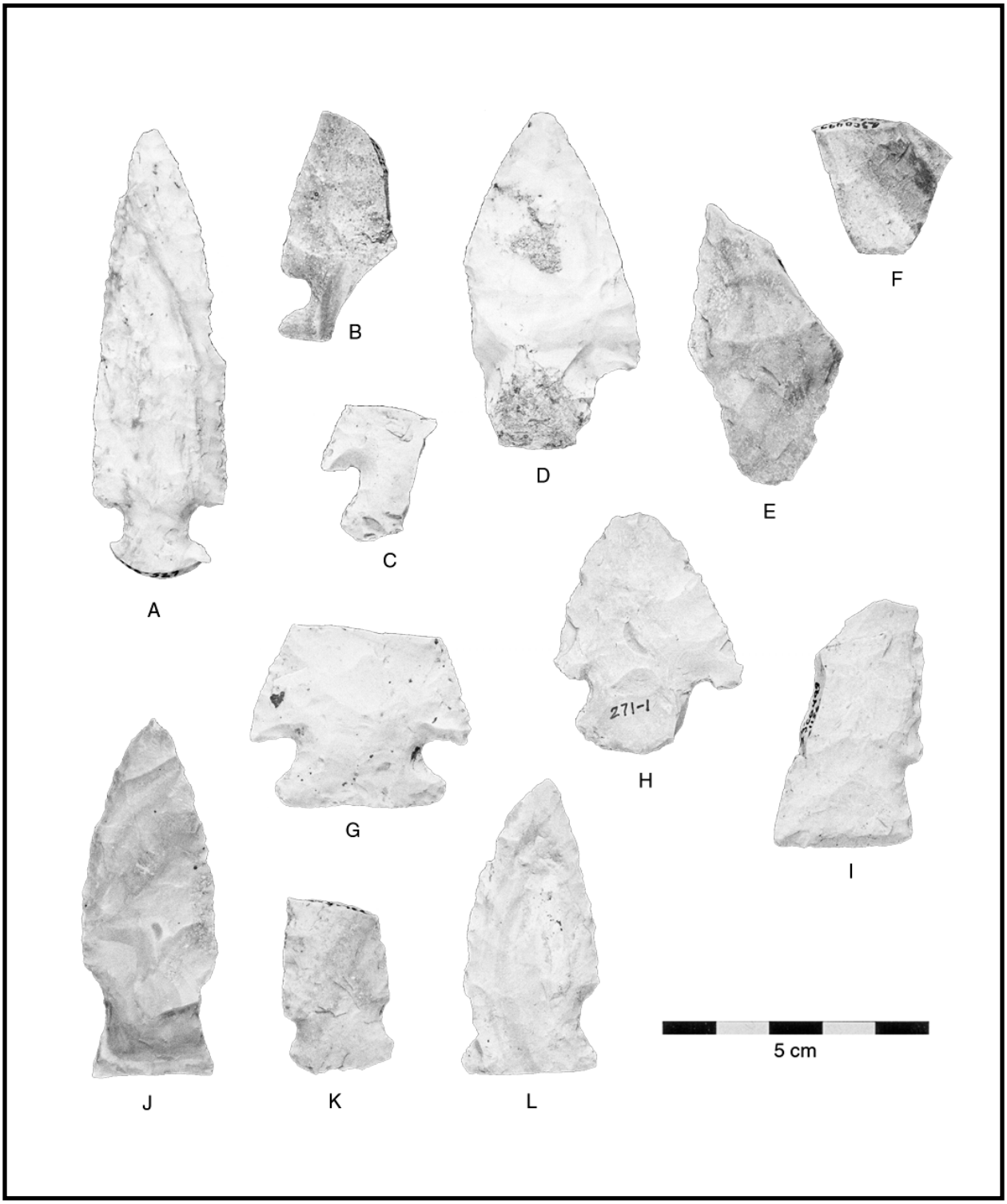


Figure 33. Early, Middle, and Late Woodland Projectile Points. Motley: A) 336-529, Northwest scrape II; B) 231-228, Northeast scrape; C) 336-559, Northwest scrape II; Gary contracting stemmed: D) 231-298, Northeast scrape; E) 2077, Southeast scrape; Non-Identifiable contracting stemmed: F) 336-520, Northwest scrape II; Snyders: G) 368-4, from under driveway; H) 271-1, EU 25, level 2; Steuben expanding stemmed: I) 1156, Northeast scrape; J) 230-1, Northeast scrape; K) 336-528, Northwest scrape II; L) 355-3, Feature 38.

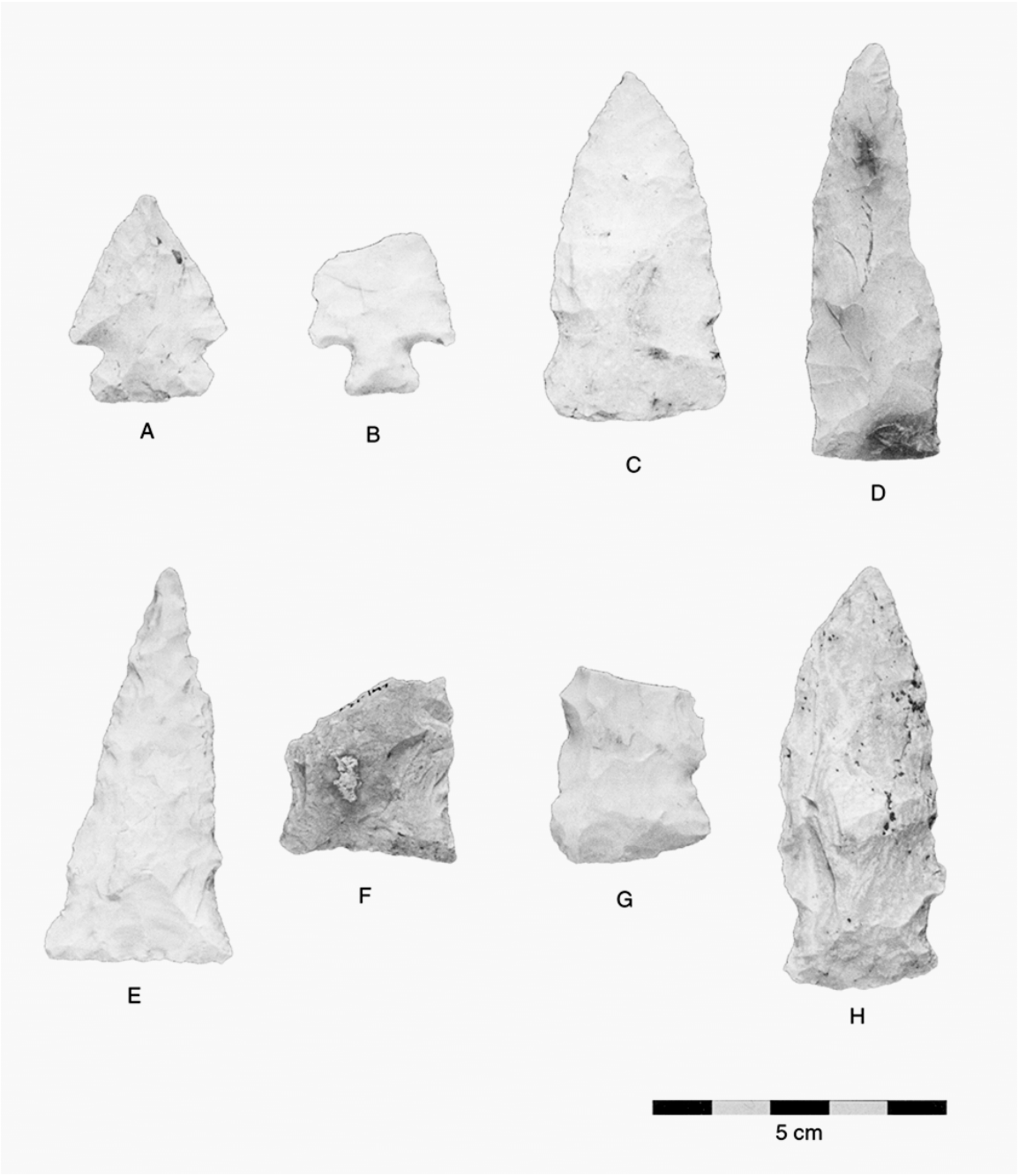


Figure 34. Late Woodland Kings Corner Notched and Rice Side Notched Projectile Points. Kings corner notched: A) 360-6, Feature A; B) 338-28, Southeast scrape; Rice side notched: C) 264-1, EU 24, level 1; D) 1951, Southeast scrape; E) 1848, Southeast scrape; 231-147, Northeast scrape; F) 533, Northwest scrape; G) 231-386, Northeast scrape.

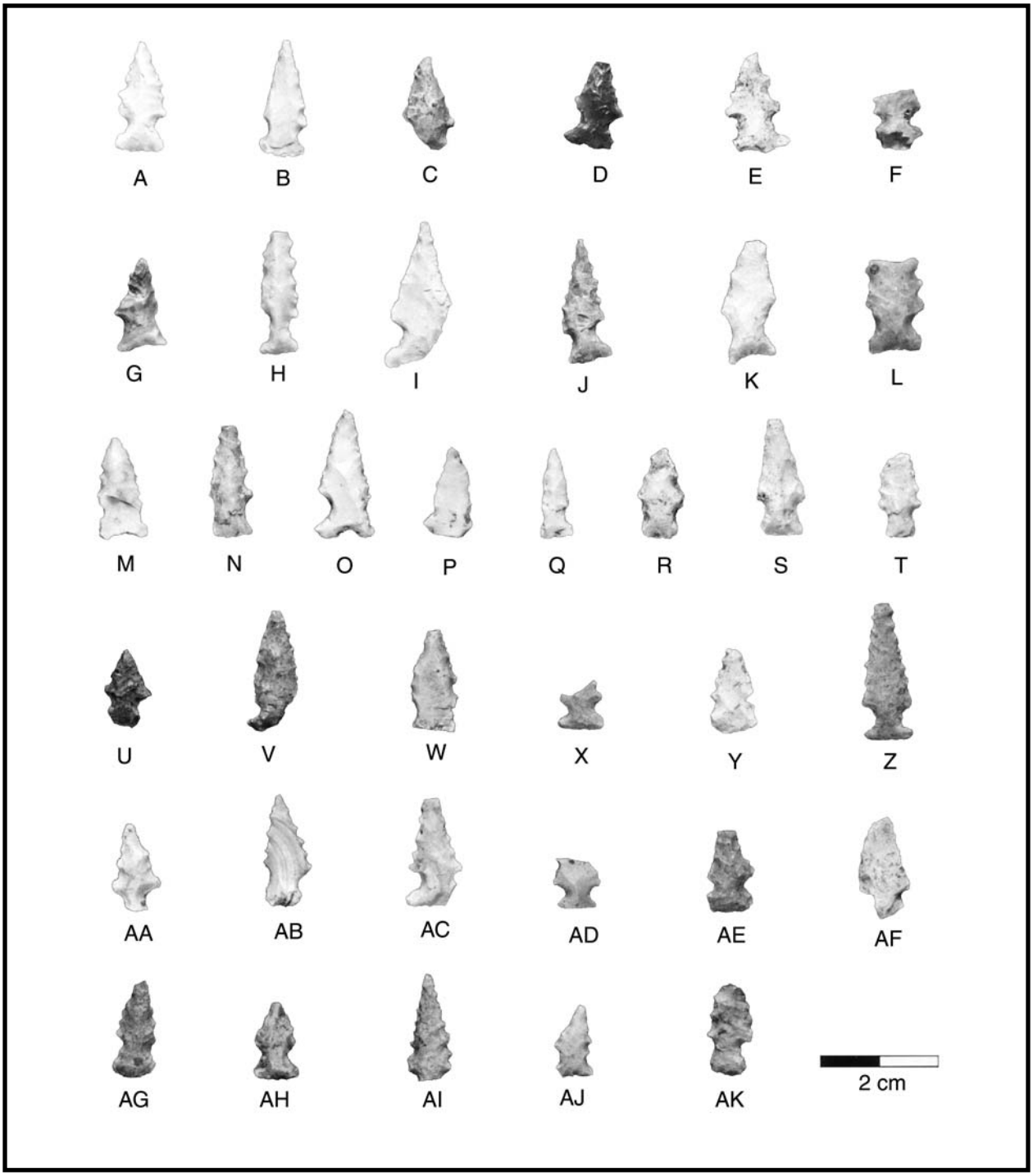


Figure 35. Late Woodland Scallorn Projectile Points from Features at the Stauffer Site. Feature 19, EU 18: A) 245-4, level 2; B) 245-5, level 2; C) 245-7, level 2; D) 247-2, level 3a; E) 247-3, level 3a; Feature 19, EU 23: F) 288-1, level 4; Feature 19, EU 24: G) 268-2, level 3a; H) 273-1, level 3b; I) 273-3, level 3b; J) 291-1, level 4b; K) 291-2, level 4b; Feature 19, EU 25: L) 287-1, level 4; Feature 23: M) 315-2; Feature 25: N) 1633-1 O) 1633-2; P) 1633-3; Q) 1633-4; Feature 27: R) 342-11; S) 342-12; T) 1652-3; Feature 28: U) 347-1; V) 347-2; W) 348-2; X) 1823-56 Feature 33: Y) 357-1; Z) 1973-1; Feature 38: AA) 355-7; AB) 355-8; AC) 355-9; AD) 356-10; AE) 356-11; AF) 2506-5; Feature A: AG) 360-3; AH) 360-4; AI) 361-1; AJ) 362-6; AK) 362-7.

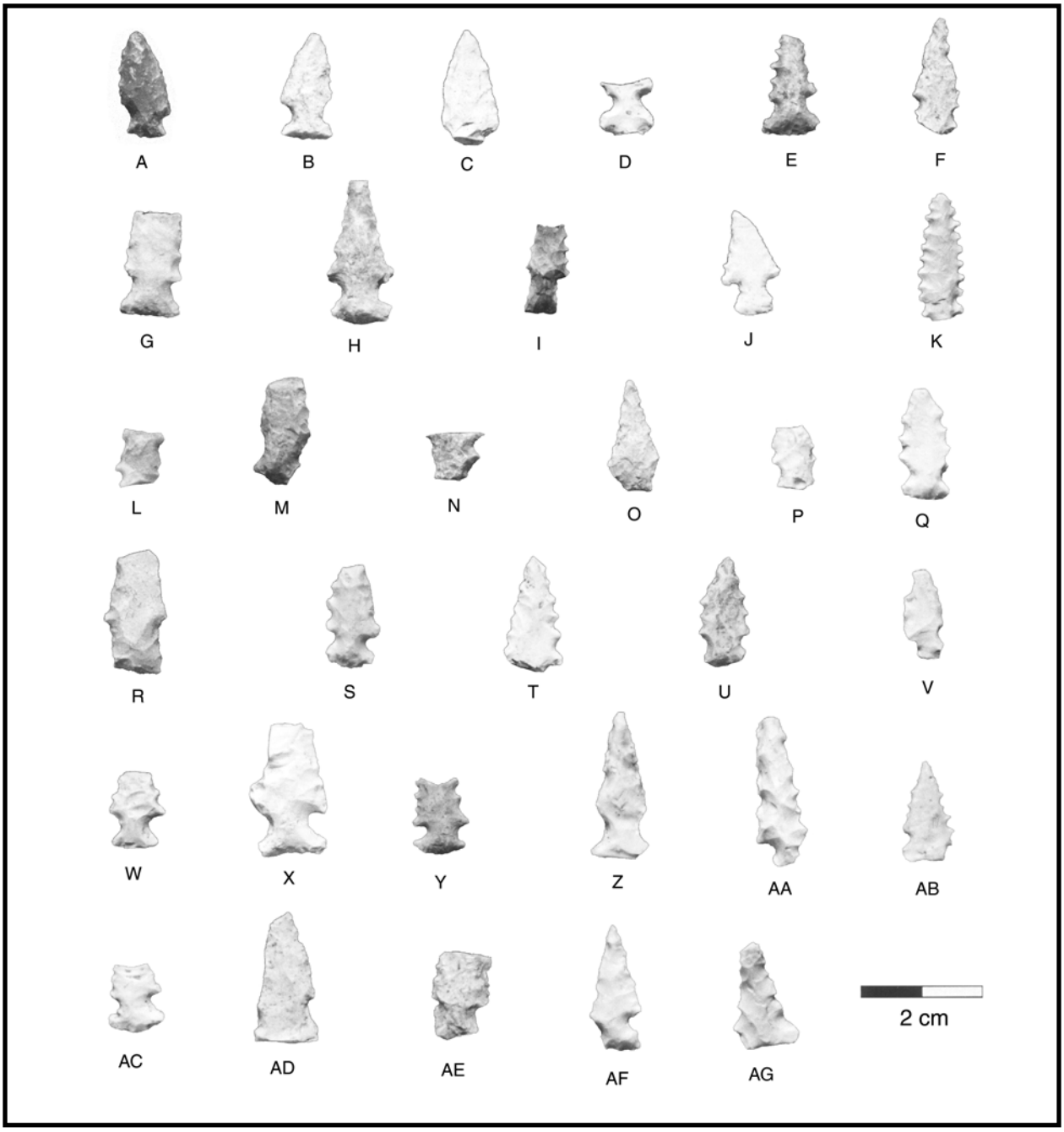


Figure 36. Late Woodland Scallorn Projectile Points from Test Units, Excavation Units, and Scrapes. Test Unit 2: A) 2-3, level 1; B) 4-1, level 2; C) 4-2, level 2; Test Unit Ten: D) 72-1, level 2; Excavation Unit 13: E) 200-1, level 1; F) 203-1, level 2; G) 206-3, level 3; H) 208-2, level 4; Excavation Unit 14: I) 219-2, level 3; Excavation Unit 16: J) 225-4, level 2; K) 226-1, level 3; L) 226-7, level 3; Excavation Unit 17: M) 243-1, level 2; Excavation Unit 19: N) 240-2, level 1; Excavation Unit 21: O) 286-3, level 4; Excavation Unit 22: P) 228-2, level 2; Q) 229-1, level 3; Excavation Unit 24: R) 266-3, level 2; Excavation Unit 26: S) 307-2, level 2; Northwest scrape: T) 230-2; U) 230-256; V) 230-275; W) 230-276; Northeast scrape: X) 231-490; Y) 963; Z) 1163: Southwest rise scrape: AA) 337-102; AB) 337-104; AC) 337-107; Southeast scrape: AD) 338-25; AE) 338-26; AF) 338-27; AG) 1800.

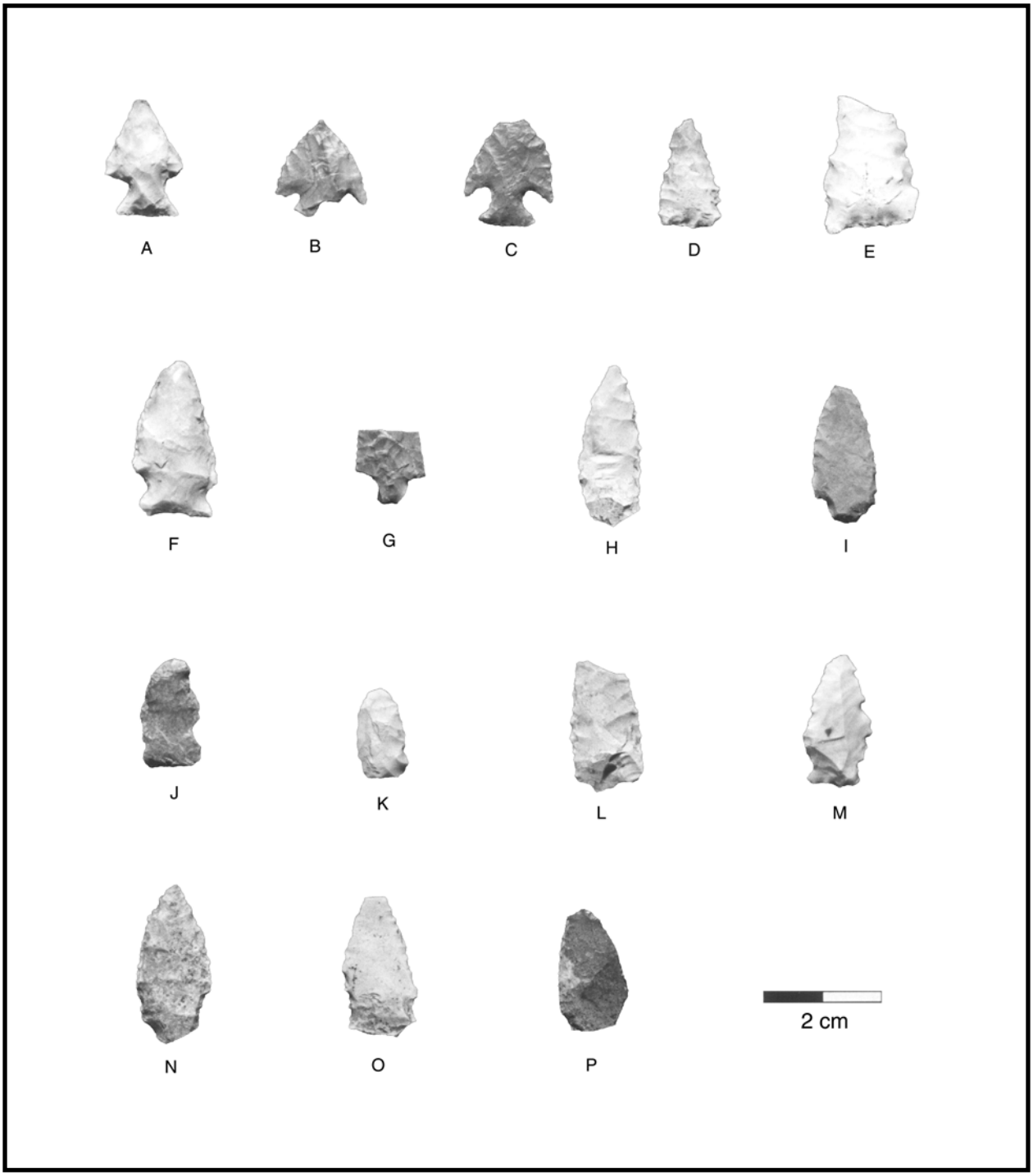


Figure 37. Other Arrow Points. Scallorn/Kings corner notched: A) 1823-76, Feature 28; Miniature Snyders-like: B) 296-101, Excavation Unit 27, level 1; C) 360-5, Feature A; Madison: D) 208-4, Excavation Unit 13, level 4; E) 338-190, Southeast scrape; Arrow points not identified by type: F) 50-1,Test Unit 7, level 1; G) 336-546, Northwest scrape II; H) 245-1, Excavation Unit 18, level 2; I) 244-4, Excavation Unit 19, level 2; J) 306-3, Excavation Unit 24, level 5; K) 287-3, Excavation Unit 25, level 4; L) 360-11, Feature A; M) 337-103, Southwest rise scrape; N) 337-109, Southwest rise scrape; O) 337-181, Southwest rise scrape; P) 230-257, Northwest scrape.

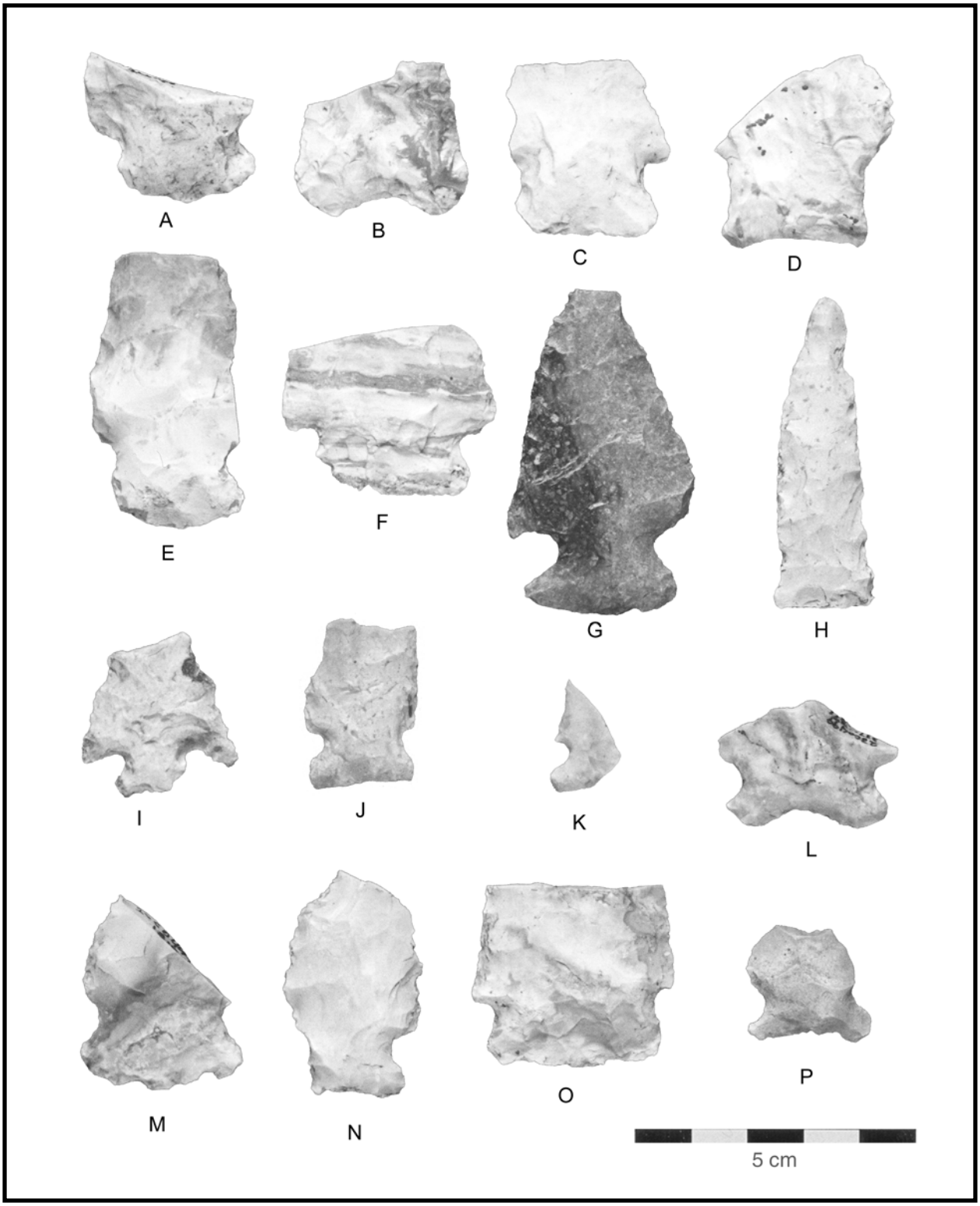


Figure 38. Unidentified Projectile Points and Projectile Point Fragments. Excavation Unit 24: A) 266-4, level 2; B) 291-211, level 4b (Feature 19); Feature 27: C) 343-11; Northwest scrape: D) 230-3; E) 230-274; F) 549; G) 550; Northwest scrape II: H) 336-566; I) 1559; J) 2504; Southwest rise scrape: K) 337-106; L) 337-371; Southeast scrape: M) 1815; N) 2018; O) 2078; Under driveway: P) 369-10.

Five medium-sized points have shallow side notches and concave bases. These are similar to types such as Matanzas, Big Sandy, Raddatz (Morrow 1984:59), Jakie stemmed (Morrow 1984:40, O'Brien and Wood 1998:132) and Ensor, but are not a good fit in any commonly used Midwestern type. The side-notching suggests a Middle Archaic affiliation (Chapman 1975:158, O'Brien and Wood 1998:133), so we simply call them Middle Archaic side-notched points. Also, two very small, well-made arrow points look like miniature Snyders points, and we refer to them as such. Since one occurs in Feature A with a corrected radiocarbon date of A.D.1025, we will assume these two small points are Late Woodland in age.

Point Types

Very general descriptions of the point types used in this report are shown in Table 22. Readers are encouraged to consult the original sources for fuller descriptions.

Table 22. Projectile Point Type Descriptions.

Period	Type	Description	References
Dalton	Dalton	Carefully made lanceolate or pentagonal, blade serrated or not, indented base that is thin and has ground edges	Chapman 1975:285-286, Justice 1987: 40-42, Morrow 1984:26-27, O'Brien and Wood 1998:73
Early to Middle Archaic	Rice Lobed	Triangular point with wide corner notches producing rounded basal ears, a notched or concave base, prominent, often barbed shoulders	Chapman 1975:254, Justice 1987:51-53, O'Brien and Wood 1998:129-130
Middle Archaic	Matanza Side Notched	Small point with shallow side notches placed low, straight base most common	Justice 1987:119-121, Morrow 1984:65
	Side Notched	A variety of shallow side-notched points came into use during the Middle Archaic. Some Stauffer points have shallow side notches, small ears, and concave bases that suggest a Middle Archaic affiliation	Chapman 1975:158, O'Brien and Wood 1998:133
Late Archaic	Etley	Large, elongated blades with a short haft ranging from straight stemmed to corner notched. Blade edges are an elongated S-shape often, but not always, terminating in barbed shoulders	Chapman 1975:246-247, Justice 1987:146-149, Morrow 1984:47, O'Brien and Wood 1998:144-146
Early Woodland	Gary Contracting Stemmed	Wide, triangular blades with squared or slightly rounded shoulders, a contracting stem with a round or straight end. Justice places these in the Dickson cluster.	Chapman 1980:308, Justice 1987:189-193, O'Brien and Wood 1998:172-174
	Motley	Slender, elongated blade, straight or slightly convex, sometimes serrated, deep corned notches, narrow neck, expanding base that is rounded to notched	Bell 1958:62, Chapman 1980:307-308, O'Brien and Wood 1998:176-177
Middle Woodland	Snyders	Thin, broad-bladed corner notched points, notches sometimes are widest at the interior, shoulders are barbed, necks wide, bases flat or rounded, often reworked	Chapman 1980:312, Justice 1987:201-204, Morrow 1984:71-72, O'Brien and Wood 1998:177-178
Middle to Late Woodland	Steuben Expanded Stemmed	Triangular, excurvate blades with upward curved corner notches resulting in an expanding stem with a straight or rounded edge	Chapman 1980:313, Justice 1987:208-211, Morrow 984:42, O'Brien and Wood 1998:179
Late Woodland	Rice Side Notched	Triangular with wide, shallow side notches. The base is straight or slightly concave and is the widest part of the point	Chapman 1980:311-312, O'Brien and Wood 1998:234-235

	Kings Corner Notched	Triangular blade, barbed shoulders, corner notched, base straight to concave	Chapman 1980:309, O'Brien and Wood 1998:233-234
	Scallorn	Small (often less than 4 cm in length), broad to narrow, corner notched or expanding stemmed points often serrated with barbed shoulders	Chapman 1980:312, Justice 1987:220-224, O'Brien and Wood 1998:235-236
	Madison	Triangular, straight or concave base which is the widest part of the point, flaking poor to excellent	Justice 1987:224-227, O'Brien and Wood 1998:237-238

Several of the measured attributes in appendices 2 and 3 are not used in the current analysis, but are presented to provide information for researchers with specific interests and data needs. We found several attributes to be significant, particularly the shoulder width and stem width.

Scallorn points are small, and intuitively seen as arrow tips. There are 16 small arrow points that do not fit the Scallorn category well, but are either small arrow points or blanks that were intended to be made into Scallorn points (Figure 37). To our knowledge, none have been recovered hafted, but quantitative studies of points hafted to darts and arrows from archaeological and ethnographic collections support the notion that smaller points were used on arrows while larger points were used on darts (Shott 1997, Thomas 1978). Based on these studies, Shott (1997:98) states that points with a shoulder width of less than two centimeters have an 85% probability of being arrow points. While it is not hard to imagine that the ubiquitous Scallorn point was used to tip an arrow, a quantitative threshold is useful for researchers working on the problem of the nature and timing of the arrival of bow and arrow technology in central North America (Nassaney and Pyle 1999 and others). Our data for shoulder width from Stauffer points shows that Scallorn points are the overwhelming majority type with a shoulder measure less than two centimeters. Importantly, above that threshold most points are of a different type, suggesting that Scallorn points as a type truly are separated as early arrow tips.

Scallorn points are described by Justice as small corner notched or expanding stemmed arrowheads (Justice 1987:220). Justice states that barbed shoulders are characteristic for the type, but that wider corner notched, square shouldered specimens are included. Blade width varies from slender to broad, the base typically is straight. Serrated Scallorn points often are referred to as Sequoyah points. Basically, nearly any small point that is small and corner notched can be called a Scallorn. Several specimens are little more than retouched flakes or are flaked only on one face similar to points documented in East-central Missouri by Curry, O'Brien and Trimble (1985:178-181). In their paradigmatic classification scheme, all of these points are less than 38 mm long and are notched. Specific attributes led to the delineation of two classes and seven subclasses, all falling within the descriptive type Scallorn and all[2] from Late Woodland contexts.

One hundred one points were complete enough to be considered whole or nearly whole. Assuming that Shott's threshold for arrow points—a shoulder width not exceeding two centimeters—is correct, the whole points were sorted by shoulder width (Appendices 2 and 3).

[2]Two points were from a pit feature with Middle Woodland pottery and an uncorrected radiocarbon date of A.D. 0±140 (TX-3748) but Curry, O'Brien, and Trimble suggest they are intrusive. However, it is interesting to consider the possibility that these are early arrow tips.

Of the 63 points with shoulder width less than two centimeters, 48 or 76% are Scallorn points. No point classified as Scallorn had a shoulder width exceeding two centimeters, and none exceeded three centimeters in total length. (only one arrow point does—the biggest one)

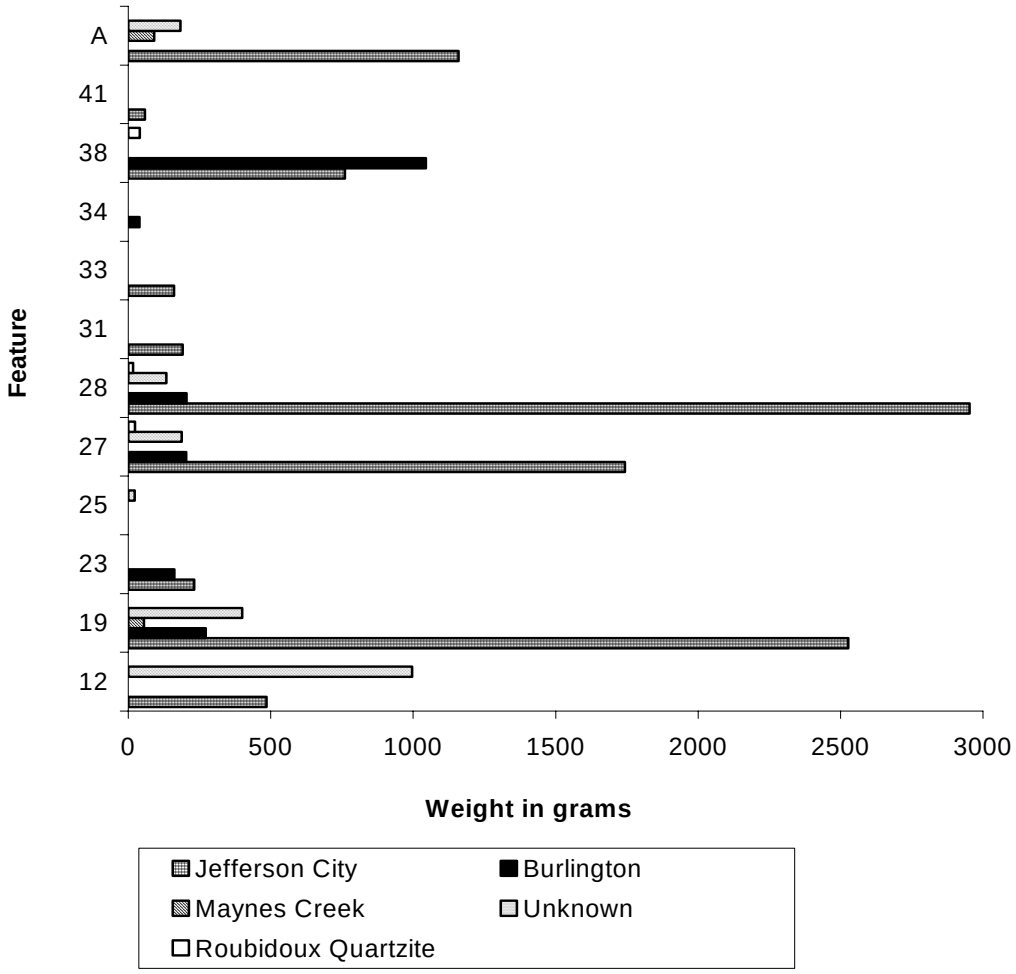
This raises some questions about the larger points on the site. Certainly the Etley, Dalton, Matanza, Rice lobed, and some of the side-notched points indicate earlier Archaic components, and in fact projectile points appear to be the only solid manifestation of a non-Late Woodland presence at the site. Other point types such as Rice Side Notched, Kings Corner Notched, and Steuben Expanded stemmed are known to have lasted into Late Woodland times and thus probably were being made and used along with the Scallorn points. Rice Side Notched points, which are nearly as common as the smaller Scallorn points on some Boone phase sites, may have been used to tip arrows used for large game such as deer. It is noteworthy that in Thomas' study some large points are hafted to arrows, and some small points to darts. It also is plausible that both darts and arrows were used throughout the Boone phase. Given these considerations and the ubiquity of the minute Scallorn point throughout the temporal range of the Boone phase, it is clear that the bow and arrow is not a Late Woodland invention, but a device that came into common use at that time.

Cores

A total of 1744 cores weighing 131 kilograms was recovered from the site. The category of cores includes tested pieces of raw material, exhausted cores, and core fragments. We identified the core material for cores recovered from features (Figure 43). Raw material data show that locally available Jefferson City chert was by far the most commonly used material, followed by Burlington chert, also a local chert. Maynes Creek chert and Roubidoux quartzite are both minority types. Roubidoux chert can be acquired as close as ten kilometers from the site, but Maynes Creek chert is exotic, with the closest source area in southeast Iowa. All cores are listed in Appendix 4.

For the most part cores from Stauffer are amorphous. They do not show systematic or unidirectional flaking as might be found on a conical blade core. Instead, the flaking pattern is random, a result of the flint knapper turning the core and striking it in whatever area has potential to produce a useful flake. One microcore, recovered from the northeast scrape, is an exception to this (Figure 39).

Figure 39. Core Raw Material Type by Feature.



Non-Projectile Point Bifaces

Undifferentiated bifaces, in other words, stone tools that are bifacially worked but are not shaped into a recognizable tool type such as a gouge or a hoe formed tools, total 724, weighing 16.6 kilograms. Of these, 62, weighing just over a kilogram, are thermally altered and four, weighing 204 grams, have polish. Most artifacts in this class are fragments of larger artifacts with bifacial working. Some probably are the tips or mid-sections of projectile points. We took measurements of thickness, length, and width only on whole bifaces from excavation units and features (Appendix 5). Measurements of fragments were not taken because the fragments are random and therefore are not comparable (Appendix 6). Bifaces outside of features and excavation units cannot be assigned cultural affiliation, so these were not measured either.

Most non-point bifaces are longer than they are wide and proportionally thicker than most points. They often are rounded or pointed at one or both ends, are not well made, and appear to be tools made on the spot for a specific task and then discarded. While no systematic analysis or wear was undertaken, most generalized bifaces show little use.

Drills

Nineteen drills, including two reworked from projectile points, were recovered from Stauffer (Appendix 7). Three are shown in Figure 40, (A-C, see Figures 31 and 32 for points reworked into drills). These could have been used on stone, wood, or shell. Also, a microcore and six microliths, all less than three centimeters long, are shown in Figure 42 (B-C). Microliths could have been used for the same purposes as larger drills, though evidence from Arkansas and Illinois suggests that these typically were used to work shell in Late Woodland and Emergent Mississippian times (see Hoard 1995:29-32, for a summary).

Gravers

Gravers are chipped stone tools, typically amorphous with the exception of having a slender, pointed projection. They presumably were used to engrave wood, bone, or other durable materials. Twenty two gravers came from the Stauffer site, two are shown in Figure 40 (D-E). Appendix 8 has a complete listing of recovered gravers.

Chisels

Six thick, slender bifaces with steep end edges were found at Stauffer. The narrow, steep working edge on one or, more commonly, both ends suggest that these tools were used to cut or gouge wood or other hard materials. Some specimens have battering on one end, suggesting they were used as chisels.

Specialized Knives

Two knives deviate from the typical symmetrical biface form found throughout the site. One (Figure 40G) is D-shaped and thin, the other appears to be backed. Both of these tools are thin and could have served as hand held knives.

Bifacial Gouges

Eight bifacially worked tools have outlines and cross sections that are roughly triangular (Figure 40F). The base of this triangle is either unifacially flaked or flaked at a steep angle. Tools of this type often are referred to as gouges. Use wear and experimental work show that they were effective in woodworking. A brief summary article by Seelen (1997) shows that they could be hafted in several ways and could be used to plane wood or to fell trees. While these tools are identified with the Archaic time period, there is no reason that they could not also be found in Woodland component. Given the variation in shape and size of this tool class, it is possible that they also served as wedges for splitting or other tasks that requires a study, flat cutting edge.

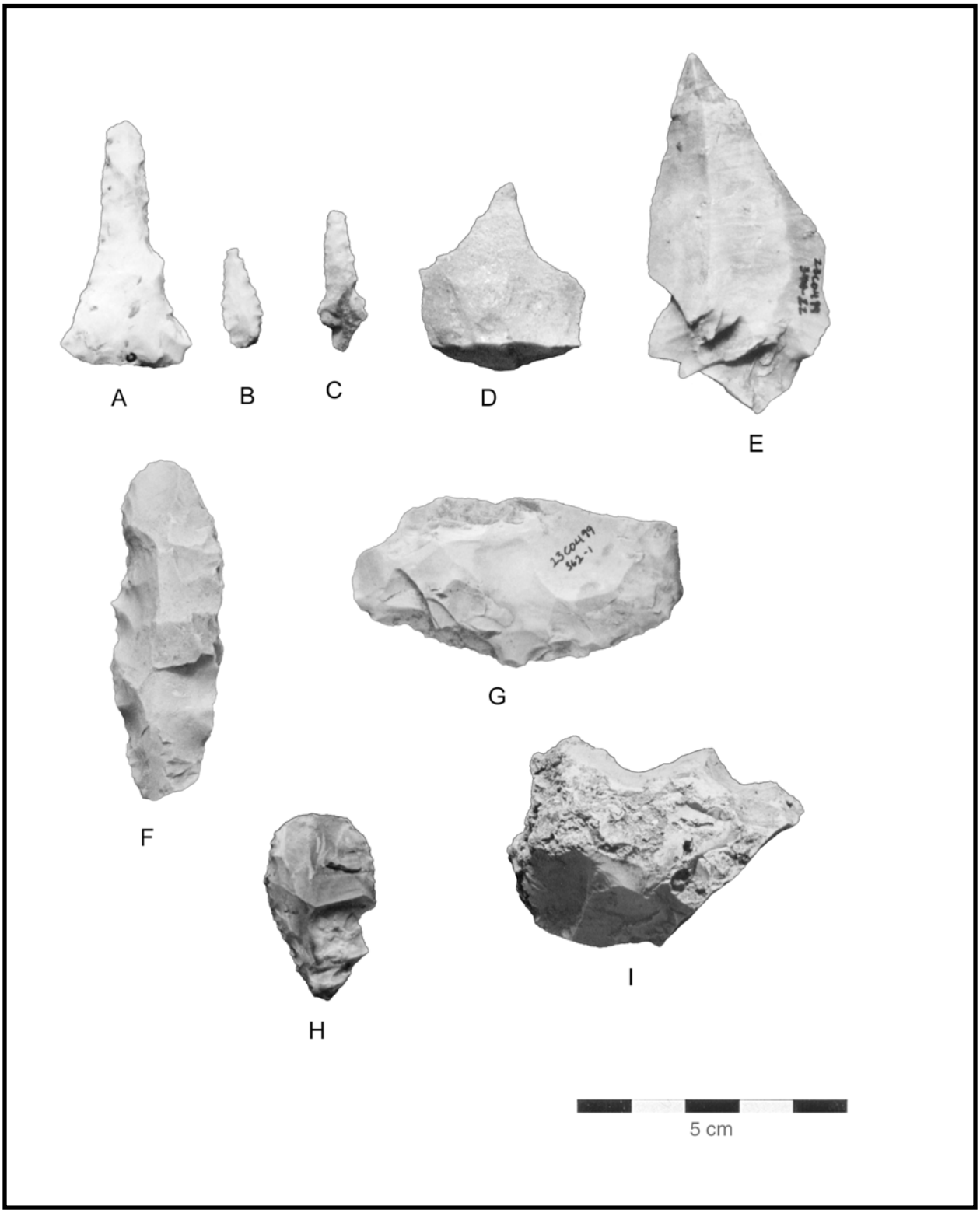


Figure 40. Selected Drill, Microdills, Gravers, Gouge, Knife, Scrapers, and Spokespave. Drill: A) 1823-75, Feature 28; Microdrills: B) 1823-77, Feature 28; C) 355-4, Feature 28; Gravers: D) 1652-4, Feature 27; E) 344-22, Feature 28; Gouges: Feature 19, Excavation Unit 18, Level 5: F) 321-6; Knife: Backed Knife, Feature A: G) 362-1; Scrapers: H)1652-5, Feature 27; Spokeshave: I) 1823-45, Feature 28.

Polished Digging Tool

One large, thin biface made of Burlington chert has polish that suggests it was used as a digging tool (Figure 41C). It is not clear if we recovered the whole tool or if it is a fragment. Still, it is large and could have been used successfully held in the hand or hafted.

Unifacially Worked Tools

Spoke shaves are tools with a semicircular notch made by unifacial flaking. Two of the three spoke shaves from Stauffer are shown in Figure 40I. Spoke shaves could be used to fashion and smooth dowels, including arrow or dart shafts.

Scrapers are common at the Stauffer site. Many unifacially flaked tools are considered to have been scrapers. Tools or tool fragments are identified as scrapers if they have one edge with steep (between about 75 and 90 degree angle) unifacial flaking. At Stauffer these tools typically are irregular in shape but some have a relatively thick, steep, rounded or straight scraping end and an opposite end, which is tapered. Small unifaces shaped like this often are called thumbnail scrapers. An example of the thirty scrapers recovered from Stauffer is shown in Figure 40H, data on all scrapers is presented in Appendix 9.

One triangular, unifacially worked tool is similar in morphology to the gouges discussed earlier. This unifacial tool most likely functioned as a gouge. Finally, a large, irregular stream rolled chert cobble was flaked on one edge to form a heavy-duty chopping tool. All unifacially flaked tools are listed in Appendix 10.

Ground or Pecked Stone Tool Assemblage

Nonchert Stone Tools

We recovered 162 stone tools shaped by grinding, pecking, or battering. These include grinding slabs, manos, abraders, nutting stones, hammer stones, celts, a pestle fragment, and part of a limestone hoe (Table 23). Data from these artifact classes are shown in Appendices 11 through 18.

Table 23. Non-Chert Stone Tools From the Stauffer Site

Tool Type	Count	Weight	Comments
General Ground Stone	22	4,684.4	
Grinding Slab or Fragment	81	13,850.4	Includes 1 grinding slab/nutting stone
Mano	18	5,817.9	Includes 1 mano/nutting stone/hammer stone
Abrader	7	1,543.2	Includes 1 nutting stone/abrader
Nutting Stone	9	5,032.9	Includes 2 combination tools
Hammer Stone	19	6,209.1	Includes 3 combination tools
Celts Fragments	4	160.1	
Pestle Fragment	1	180.9	
Limestone Hoe Fragment	1	94.8	
Totals	162	37,573.7	

Ground Stone

General ground stone. Ground stone tools are notoriously difficult to identify. Many pieces of stone have edges or surfaces that have been ground or shaped, the challenge is to determine if the grinding was done by humans or by natural processes. Some knowledge of the fracturing and erosional properties of specific stone types and an understanding of local and regional erosional forces helps to separate cultural from non-cultural stone modification. Some pieces of stone found at Stauffer have evidence of being ground but are not identifiable as specific tool types (Appendix 11).

Grinding slabs. Much of the ground stone consists of fragments of sandstone grinding slabs (Appendix 12). These fragments typically have one side, which is ground flat or two parallel sides (a top and a bottom) ground flat. All but six of the grinding slabs and grinding slab fragments we found were sandstone, 3 were limestone or dolomite and three were made from igneous glacial till. Grinding slabs were used primarily to process hard foods. One medium sized grinding slab was stained red, probably from grinding hematite. They may have been used to grind other materials as well.

Manos. Rounded stones, about fist size, with one side ground down or two parallel sides—a top and bottom—ground is classified as a mano. Manos are the hand held stones (mano means hand in Spanish) used in conjunction with grinding slabs to mill or pulverize materials. Eighteen manos were found at Stauffer, eleven of these were glacial till cobbles, three were chert cobbles, three were sandstone, and one was made of limestone (Appendix 13). One also functioned as both a nutting stone and a hammer stone, another was pitted like a nutting stone.

Celt and Pestle Fragments. Four fragments of ground, polished tools were recovered from the site. Because of their size, material, high level of finishing and polish, and the curve shown on the polished faces, we classify these as celt fragments (Appendix 14). One celt fragment was recovered from Feature 27 (Figure 41A). It is a flake of dark green, partially metamorphosed basalt with very obvious polish on the platform and ventral surfaces. This flake may have been produced through use or resulted from the impact of a plow. The other three celt fragments come from the southeastern part of the site that was scraped. One piece is a blocky fragment of porphyritic andesite with polish on one face. We also recovered two larger celt fragments, also made of porphyritic andesite. One is a bit fragment, the other a poll fragment. The distal end of a pestle also was found while scraping the southeastern area of the site. It is made of porphyritic andesite and was pecked to shape. Both partially metamorphosed basalt and porphyritic andesite are found in glacial till in the Midwest, and both are preferred material for ground and polished tools in northern Missouri and Iowa.

Limestone Hoes. One fragment of a limestone hoe was recovered from the northwest scrape (Figure 41F). While not common, similar tools have been found at Late Woodland and Emergent Mississippian sites in the American Bottom of Illinois (Finney and Bentz 1988:163-164; Fortier, Finney, and Lacampagne 1983:274; Kelly et al. 1984:109; Kelly, Ozuk and Williams 1990:200, McElrath and Finney 1987:157). A broken limestone hoe from the Range site was 11.8+ centimeters long, 7.6 cm wide, and 2.8 cm thick (Kelly, Ozuk, and Williams

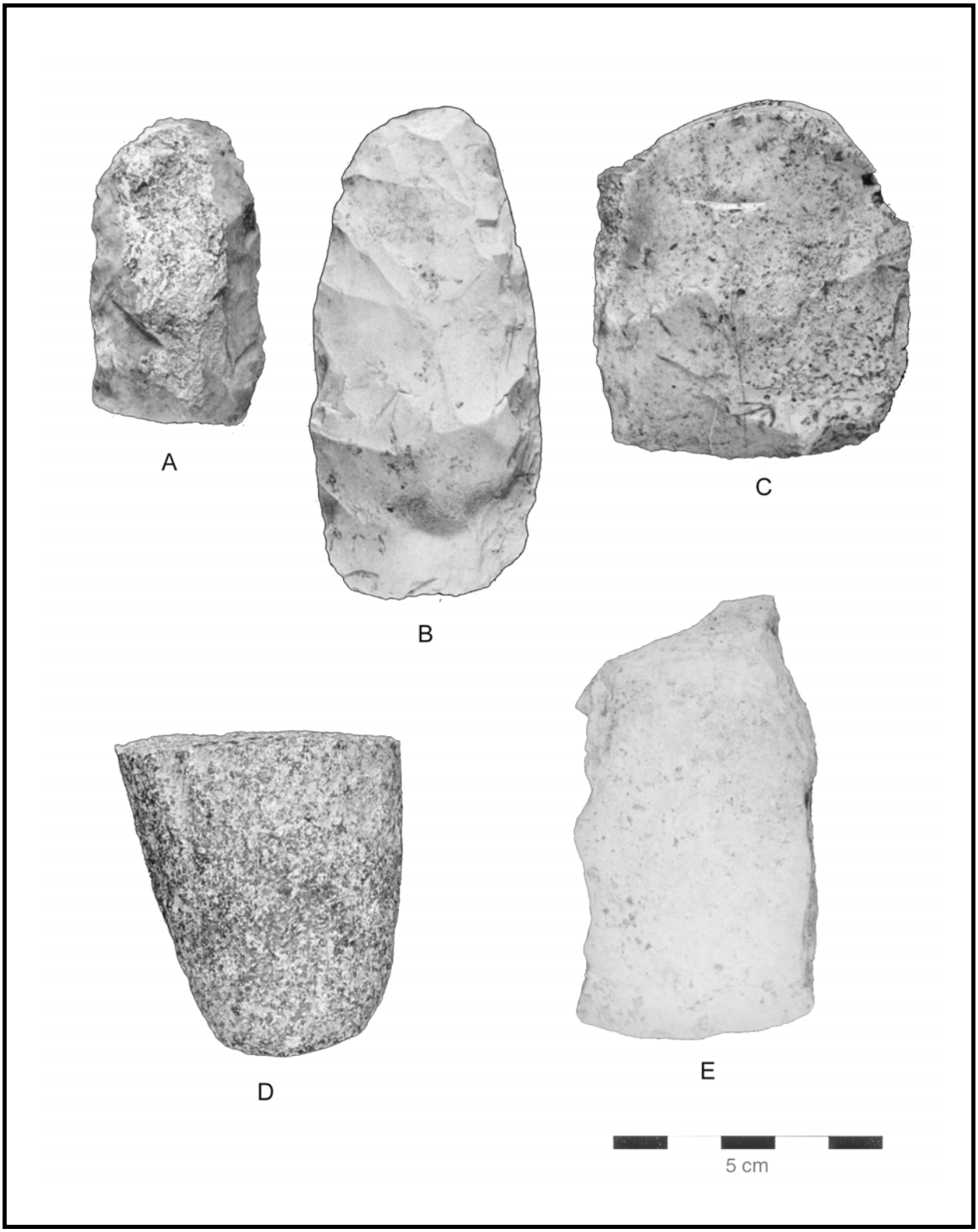


Figure 41. Bifacially Worked Gouges, Ground Stone Celt, and Hoe Fragment from the Stauffer Site. Gouges: Feature 27: A) 343-1; Feature 28: B) 1823-4; Polished digging tool; Southeast scrape; C) 2024; Ground Stone Celt: D) 1820, Southeast scrape; Limestone Hoe: F) 577, Northwest scrape.

1990:200). Measurements taken from a figure of a limestone hoe from the Columbia Quarry site shows it is about 30 cm long, 12 cm wide, and that it has a rounded bit and a pointed poll (Finney and Bentz 1998:164). Illustrations of the Mund site hoes show that they range from about 16 to 26 centimeters in length and about 7 to 10 centimeters in width (Fortier, Finney, and Lacampagne 1983:281-282).

Abraders. Seven abraders were found at Stauffer, one was also a nutting stone (Appendix 15). Four of these were of sandstone, the rest were of an undetermined material. Abraders could have been used to smooth arrow or spear shafts, to shape or sharpen ground stone tools, or to prepare the surface of stone to be chipped.

Ground Hematite. Seven pieces of ground hematite were recovered from Stauffer (Appendix 16). These pieces are among the nearly three kilograms of hematite recovered from the site. The presence of hematite is often interpreted by archaeologists as evidence of pigment processing, although it was also used by ancient and historic peoples as internal and external medicines, food or wood preservatives, insect repellents, and tanning for hides (Erlandson, Robertson, and Descantes 1999:517).

Battered Stone. Two types of tools are identified by having battering marks. These are hammer stones, which are used to batter other objects, and nutting stones, which were used as anvils.

Hammer Stones. Hammer stones are identified by battering marks. Most hammer stones are fist sized or smaller, and eight of the 19 recovered from Stauffer are round chert cobbles (Appendix 17). The remaining ones are either glacial till cobbles or are of an unidentified material. Three tools identified as manos had sufficient battering along the edges to also be classified as hammer stones. Of these, one also was used as an anvil or nutting stone. Hammer stones could have been used for flint knapping, driving stakes, cracking large bone, or any number of similar applications. Appendix 11 has a complete listing of recovered gravers

Nutting Stones. We called an artifact a nutting stone if it had a small pecked depression, approximately three or four centimeters in diameter. Most of the tools we classified as nutting stones are fist sized rounded, flat cobbles with the pecked depression in the middle of one or both flat sides. Of the nine we found, three were of sandstone, two were chert cobbles, and four were of glacial till (Appendix 18). Two of them also served as a mano and another as a grinding slab.

The limestone hoe from the northwest scrape and the polished chert hoe from the southeast scrape probably were used for digging pits or to clear and till fields. As shown later in this report, several plant food species were recovered from the site and in all likelihood cultivated by the Stauffer inhabitants.

Discussion of the Stone Tool Assemblage

Archaic Component

The only tools we can identify with certainty as Archaic are the diagnostic projectile points we recovered. The 82 Archaic points from the site suggests a significant presence at that site during

that time period. But considering that the date range of these points represents a time span of about 9,000 years, their density is quite low. In contrast, the 120 Woodland points (109 of which are Late Woodland), deposited within less than one thousand years, are indicative of a much higher level of occupation at the site. Also, no unambiguous Archaic features are present at Stauffer. While it is possible that a large amount of the debitage from the site, including the utilized debitage, dates to the Archaic, there is no way to confirm this.

The Archaic points recovered from the site are similar to those found at other sites in central Missouri. One point identified tentatively as a Big Sandy point was made of Keokuk chert from southern Iowa. Other than that point, the Archaic points are made of local material or material of unknown origin.

Late Woodland Component

A series of maps in Appendices 19 shows distribution of different artifact classes from scraped areas of the site. For the most part, there is little or no patterning to artifacts, with the exception of pottery and fire-cracked rock, which are concentrated under the driveway area.

The wide range of stone tools from the Late Woodland component at Stauffer reflects the diverse activities that took place there. These include hunting (projectile points), butchering (biface knives), hide processing (scrapers), wood working (adze or wedge, spoke shave, abraders), food preparation (grinding slabs, manos, nutting stones), and tool manufacturing (hammer stones, cores, debitage).

Both arrow and dart points diagnostic of the Late Woodland are present. While arrow points clearly dominate, points that could have fitted to spears or dart also are present suggesting spears or darts were still being used or that Late Woodland hunters at Stauffer sometimes tipped their arrow with large points.

The limestone hoe from the northwest scrape and the polished chert hoe from the southeast scrape probably were used for digging pits or to clear and till fields. As shown later in this report, several plant food species were recovered from the site and in all likelihood cultivated by the Stauffer inhabitants.

Gouges, chisels, celts, and large bifaces could have been used to fell and dress trees for drying racks, wall and roof supports, and other uses. Abraders and drills would be useful for lighter woodworking tasks such as making tool handles, bowls, and projectile shafts.

Debitage and cores indicate all stages of chipped stone tool production took place on the site. The number of cores relative to debitage and chipped stone tools suggest most initial processing took place off the site. Jefferson City chert, the most common local variety, has the strongest representation. Less than one per cent of the chert at the site is exotic, and none of that is from any further than southern Iowa.

Ground stone from the site gives evidence that seed and nut processing took place there, as well as grinding pigments, notably hematite. The presence of large, well-worn grinding slabs, some weighing over a kilogram, support the notion that Stauffer is a long term occupation.

Chapter 7

PALEOETHNOBOTANICAL ANALYSIS

By Patti Jo Wright

A total of 346 liters of soil from the Late Woodland component at Stauffer was processed using a flotation technique. Specifics of this processing are presented in Chapter Three. The dry light fraction samples were sent to Dr. Patti Wright for identification and evaluation. To facilitate analysis, the dried samples were size-sorted with U.S.A. Standard Testing Sieves Nos. 10 and 35. Three fractions (viz., ≥2.0 mm, ≥0.5 mm, and <0.5 mm) were obtained per sample. Botanical remains from the ≥2.0 mm subfractions were sorted under a 10.5-45X binocular microscope according to debris classes (e.g., wood, nutshell, and the like). Counts and weights for each category were recorded. As most seeds are typically found in the smaller fractions, the ≥0.5 mm and <0.5 mm subfractions were carefully scanned to obtain a complete seed inventory. Separate counts were obtained for whole seeds as well as seed fragments, and MNI (minimal number of individual) counts per taxonomic category were estimated. Nonseed remains absent in the respective ≥2.0 mm fractions but observed during scanning of the ≥0.5 mm and <0.5 mm fractions were identified and recorded on a presence/absence basis. Comparative collections, keys, and manuals (e.g., Martin and Barkley 1961, Panshin and de Zeeuw 1980; and Steyermark 1981) were utilized for taxonomic determinations.

The Analysis

In total, 346 liters of flotation sediments were processed. Well over half that amount or 259 liters were derived from 10 pit features (Feature #2, 18, 19, 27, 28, 33, 35, 37, 38, and A). One 10-liter sample was collected from a hearth (Feature #25), and two 10-liter samples were collected from hearth "dumps" (Feature #23 and B). A nearly complete vessel (Feature #10) was discovered during excavation, and 15 liters of sediments collected from in and around that vessel were also processed as a flotation sample. Other contexts that were sampled include two 10-liter samples derived from house fill (Feature #42), and a total of 22 liters of midden collected from Test Unit 2 and grid coordinate J5S0352. All contexts are datable to the Late Woodland Boone Phase.

≥2.0 mm Assemblage

A total of 24,103 specimens or 291.47 grams of carbonized plant remains were sorted from the ≥2.0 mm Boone Phase fractions. This assemblage contains several kinds of carbonized plant remains including wood, bark, nutshell, grass stem, fungal tissue, and a possible squash rind. Sample-by-sample tabulations of these charcoal fragments are presented in Appendix 19. Carbonized wood and bark overwhelming dominate the ≥2.0 mm carbonized plant assemblage. Combined these remains consist of 23,724 fragments whose weight equals 284.68g. The amount and a perfect ubiquity index for wood charcoal (i.e., 100%) suggests frequent exploitation of wood.

Classification of wood into taxa was performed on a less intensive scale than for the other plant remains. Subsamples, numbering up to a 20 fragments per flotation sample were analyzed for taxonomic identification. In total, 133 fragments (20.71 g) were examined. In most instances, identification to a species-level was not attempted. In general, paleoethnobotanists do not try to distinguish among species of *Quercus* (oak). The finest taxonomic distinctions that are ordinarily made are at the subgenus level. Members of the subgenus *Erythrobalanus* or red oak taxonomic group include black oak, black jack oak, pin oak, and red oak. Members of the subgenus *Leucobalanus* or white oak taxonomic group include bur oak, post oak, swamp white oak, and white oak. Species-level distinctions among *Carya* (hickory) are also difficult and specimens are generally subsorted into two sections: *Apocarya* or pecan hickory, which includes pecan and bitternut hickory, and *Eucarya* or true hickory which includes kingnut, mockernut, shagbark, and pignut hickories. Those specimens too eroded or too fragmented to identify to a taxon were assigned to groups based on their pore structure (i.e., ring porous, diffuse porous, and semi-ring porous) when possible. If this level of classification proved impossible, the specimens were recorded as "unidentified."

Adhering to these standards, at least, 15 taxonomic categories are represented in the Boone Phase assemblage (Appendix 19). These categories include *Carya* (hickory), Apocarya (pecan hickory group), Eucarya (true hickory group), *Celtis/Ulmus* (hackberry/elm, *Fraxinus* (ash), *Gleditsia/Gymnocladus* (honey locust/Kentucky coffee tree), *Juglans (*walnut), *Platanus occidentalis* (sycamore), *Populus/Salix* (cottonwood/willow), *Quercus* (oak), *Erythrobalanus* (red oak group), and *Leucobalanus* (white oak group). Various members of *Quercus* and *Carya* dominate the assemblage. *Fraxinus* is moderately represented, while the remaining taxa occur infrequently and in smaller quantities.

The Stauffer site is situated on a terrace within the Meadows Creek valley. From that location, it would have been feasible to collect wood from a continuum of forest habitats ranging from the mesic banks of the adjacent stream to the more xeric hillcrest. The mixture of species represented in the $\geq$2.0 mm assemblage suggest that all of these settings were potentially exploited with emphasis perhaps on the mixed hardwood forests of the valley wall and floor. Furthermore, the occasional occurrence of fungal tissues and rotted wood fragments indicate the collection of dead, decaying wood from the forest floors.
Nutshell comprises 376 fragments or 6.77 grams that, in turn, account for only about 2% of the $\geq$2 mm assemblage by count and by weight. Although occurring in generally small quantities, nutshell is present in 26 of the 33 Boone Phase samples. This relatively high ubiquity index suggests that nut resources were used frequently enough for their by-products to be deposited in a number of locations and diversity of contexts. The nut:wood ratio for Stauffer is .02:1 by both count and weight. While this ratio is low, it is not unheard of for late prehistoric assemblages.

For the American Bottom in Illinois, Johannessen (1984) has found that nut:wood ratios tend to decline with time. For late prehistoric assemblages, she attributes the relatively low ratios to an increased emphasis on cultivated plant foods at the expense of naturally occurring resources. Several nut taxa are represented at Stauffer. The remains include the shell of *Carya* (hickory), *Juglans* (walnut and/or butternut), *Juglans nigra* (black walnut), and *Quercus* (oak). Shell fragments too small or too eroded to distinguish between the genera *Carya* and *Juglans* were assigned to the family, Juglandaceae. By count and weight, Juglandaceae and *Carya* are the

most well represented categories. Given the likelihood that most of the Juglandaceae remains are probably derived from species of *Carya*, hickory appears to predominate among the nut taxa. *Quercus*, *Juglans*, and *Juglans nigra* exhibit much more meager numbers. The lower quantities of the thin-shelled taxa, like *Quercus*, may reflect a preservation bias and possibly underrepresent relative dietary significance (Lopinot 1984). *Juglans* and *J. nigra* may also be underrepresented as the shell of this taxon readily fragment and are subject to loss during the flotation process (Wright in prep). Ubiquity indices were calculated to help offset any fragmentation biases. For Juglandaceae, *Carya*, *Juglans*, *Juglans nigra*, and *Que*rcus, these indices are 85%, 51%, 3%, 9%, and 9%, respectively. These indices further suggest that *Carya* was the favored nut resource.

The presence of grass stem and cucurbit rind is noted for the Boone Phase assemblage. The presence of grass stem in the Feature 27 sample may represent the by-product of the consumption of grass grains or the use of grass for thatching, starting fires, or lining storage pits. A single, possible cucurbit rind is noted for Feature A. This remain may reflect the cultivation of squash, the tending of a camp follower, or the collection of the "weedy pepo gourd" from wild stands. King (1985) among others have speculated that some archaeological rind could be that of the wild buffalo gourd (*Cucurbita foetidissima*). Wild stands of *C. pepo* also occur in this region. This plant frequents moist floodplains but also tends to colonize such disturbed habitats as railroads. The debate on the significance of archaeological squash rind continues (see D.L. Asch 1984); no longer is such rind considered unequivocal evidence for the presence of a tropical cultigen. Regardless of its growth history, the importance of the squash shell as a utilitarian item may have exceeded the plant's significance as a food source (King 1985).

Carbonized Seed Assemblage

Small seeds are present in 64% of the sampled proveniences. They tend to occur in pit feature contexts. No carbonized seeds were noted for the hearths, hearth dumps, midden samples, house samples, or associated with the vessel. For the Stauffer assemblage, the average seed density ranges from 0 to 45.5 seeds per one liter of fill with an average of four seeds per one liter of fill. The seemingly small density is not that unusual and compares with coeval assemblages in the Illinois and Mississippi River valleys (O'Brien and Pulliam 1996: Table 6.10).

Of the 1243 seeds recovered, 1208 were identified, representing at least 15 taxa. In addition to charred seeds, a number of uncarbonized specimens were observed during scanning. Brief notes were made as to their type and frequencies. Because there is no good evidence indicating that conditions are favorable for the preservation of ancient uncarbonized plant materials at Stauffer, these seeds are assumed to be recent contaminants and will not be included in this analysis. For purposes of further discussion, the carbonized seeds have been subjectively grouped into economic categories. These categories include small starchy seeds that possible represent cultigens, oily-seeded domesticates, other grass seeds, economic noncultivated seeds, and other seeds.

Small Starchy-Seeded Cultigens. Starchy seeds comprise the largest category of identifiable seeds and includes the remains of *Chenopodium berlandieri* (goosefoot genus), *Polygonum erectum* (erect knotweed), two species of grass, *Hordeum pusillum* (little barley) and *Phalaris*

caroliniana (maygrass). *Phalaris caroliniana,* with an MNI of 768, is the most well represented of the small starchy seeds. Because of its occurrence in archaeological assemblages outside of its presumed natural range, D.L. Asch and N.B. Asch (1985a:362) have suggest that *P. caroliniana* was cultivated. According to Steyermark (1963:188) the plant thrives in well-drained environments and can survive on nutritionally poor soils. The seeds ripen and would be ready for harvest in May or June. Crites and Terry (1984) have assessed the nutritional composition of this grain and indicate that the seeds yield ca. 430 calories per 100g. They provide nutrition primarily in the form of carbohydrates but are also protein rich.

The seeds, actually caryopses, are small, and according to a sample measured by King (1982) average 1.8 - 2.3 mm in length. The lengths and widths of 187 whole caryopses for the Stauffer Site were measured. Lengths range from 1.3 to 1.7 mm with an average of 1.5 mm and a standard deviation of 0.09 mm. While these lengths appear small compared to the King sample that was derived from the Cannon Reservoir area, they are consistent with the measurements obtained from the Late Woodland Patrick Phase (A.D.600-800) caryopses at the Bridgeton Site (23SL442), St. Louis County, Missouri (Wright 1986:51). Widths of the Stauffer caryopses range from 0.8 to 1.4 mm with an average of 1.0 mm and a standard deviation of 0.11 mm. By comparison, the width data are identical to those obtained from the Late Woodland Bridgeton assemblage.

Polygonum erectum or what is more commonly known as erect knotweed is the second most well represented small starchy seed. An MNI of 124 was estimated for this species. While the plant can be found across much of the Midwest, it does not tend to occur in abundance. It is the ubiquity *P. erectum* in archaeological assemblages of the Woodland and Mississippian periods that has led to its status as a cultigen (D.L. Asch and N.B. Asch 1985a:186). The plant prefers a disturbed, alluvial setting (Steyermark 1963:586). It flowers and fruits throughout the summer and into early fall with its fruiting interrupted by periods of hot, dry weather (D.L. Asch and N.B. Asch 1985a:186). It produces an achene that is high in carbohydrate but is also a good source of protein and fiber (D.L. Asch and N.B. Asch 1985b).

Both the achenes and kernels (i.e., the pericarp is lacking) of *P. erectum* occur within the Stauffer assemblage. For the whole achenes (N=29), lengths range from 2.1 to 3.0 mm with a mean of 2.5 mm and a standard deviation of .23. Respective widths range from 1.0 to 2.1 mm with a mean of 1.6 mm and standard deviation of .27. For whole kernels (N=46), lengths range from 1.5 to 2.2 mm with a mean of 1.9 mm and a standard deviation of .19. Respective widths range from 1.1 to 2.0 mm with a mean of 1.5 mm and a standard deviation of .23. The seeds are dimorphic and Steyermark (1963:586) indicates a length of 2.5 mm or 3-3.5 mm for noncarbonized achenes. Given shrinkage during carbonization, the Stauffer assemblage is consistent with his data. At the Bridgeton site (Wright 1986: 59), only eight specimens were recovered from Late Woodland Patrick Phase contexts. There, the lengths and widths of *P. erectum* kernels averaged 2.1 mm and 1.5 mm, respectively.

It should be noted that 32 specimens are recorded as simply as *Polygonum*. These specimens consist of biconvex and very small, trigonal forms. No attempt was made to assign them to a species level. These additional *Polygonum* seeds may represent intrusions, collection of wild

stands, or companion plants that germinated and were allow to grow and eventually harvested with the other small starchy seeds.

Hordeum pusillum (little barley), although less well represented by number (MNI=32) occurs in 9 of the 33 samples. Its ubiquity index of 27% is similar to that of *P. erectum* (24%) but much lower than that of *P. caroliniana* (52%). At this point, it would be easy to say that *P. caroliniana* seems to be the preferred starchy seed. However, differences in quantities and ubiquity indices are difficult to interpret. Factors, such as differential processing, play a major role in the likelihood of a remain becoming carbonized, hence, preserved in an archaeological context. *H. pusillum* is common across the Midwest and tends to favor disturbed bottomland habitats (Steyermark 1983:133). D.L. Asch and N.B. Asch (1985b:370) report that this plant germinates in the fall, may remain green through the winter, and can also germinate in the spring. Data on the nutritive value of *H. pusillum* caryopses are not available.

Lengths and widths also were obtained for the *H. pusillum* caryopses. Of 21 measured specimens, the lengths range from 2.2 to 3.1 mm with an average length of 2.6 mm and a standard deviation of 0.24 mm. Widths range from 1.0 to 1.8 mm with an average width of 1.3 mm and a standard deviation of 0.20 mm. These data are consistent with mean lengths and widths obtained by Hunter (1992:157) for Late Woodland assemblages in Missouri and Illinois. They are also consistent with the sample measured by Wright (1986:59) for the Late Woodland occupation at Bridgeton and with the sample measured by Pulliam (O'Brien and Pulliam 1996:186) for the Late Woodland assemblage derived from the Burkemper Site, Lincoln County, Missouri.

In total, a minimum of 178 *Chenopodium* seeds are represented. Diameters were obtained for a subsample of 116 perisperms with intact embryos. No attempt was made to measure perisperms lacking embryos. The diameters range from 1.0 to 1.8 mm with a mean of 1.4 mm and a standard deviation of .16 mm. Of the perisperm with intact embryos, 67 had diameters of 1.5 mm or greater. These specimens, given their size, were assigned to the species, *berlandieri*. The smaller specimens may represent other species or premature seeds of *berlandieri*, hence, they were only classified to a genus level.

Today, stands of *C. berlandieri* are sporadic and rarely dense. Modern collections made by N.B Asch and D.L. Asch (1980:158) indicate that this species is restricted to open, sandy banks of larger streams. The fruits of *C. berlandieri* mature in the fall with optimum harvests occurring in October and November (O'Brien and Pulliam 1996:197). Like the other starchy seeds, *C. berlandieri* primarily provides nutrition in the form of carbohydrates but is also a good source of protein and fiber (D.L. Asch and N.B. Asch 1985b).

Smith (1985a and b) indicates that enough evidence exists to assign some assemblages of *C. berlandieri* to the category of domesticated plants. Such a designation is based upon the presence of 1) a reduced thickness of the testa, 2) an essentially smooth testa, 3) a truncated margin, and 4) a more prominent beak. Given these criteria, it is difficult to assess the status of the Stauffer assemblage. For one, no testa exist. The perisperm with attached embryos do not readily exhibit truncated margins nor prominent beaks. It is possible that the assemblage at

Stauffer is a result of cultivation but doubtful that the seeds represent the domesticated form, *C. berlandieri* spp. *jonesianum.*

Oily-Seeded Domesticates. This category is comprised of at least 25 specimens of *Iva annua* or what is more commonly known as sumpweed or marsh elder. *I. annua* prefers a disturbed, wet habitat, and can be found growing along streams, sloughs, ponds, and the like. It fruits would be available to harvest in late summer and early fall. Although the remains of *I. annua* frequently occur in prehistoric assemblages, it is usually represent by meager quantities. For example, here the remains only constitute about 2% of the identified seeds. One or two percentage points are typical (D.L. Asch and N.B. Asch 1978). The minor amounts do not necessary reflect minor usage. Rather the processing of these seeds (e.g. cold pressed to extract the oils) may not afford much opportunity for thermal exposure.

For whole achenes (N=14), lengths range from 3.5 to 5.1 mm with a mean of 4.3 mm and a standard deviation of .49. Respective widths range from 2.0 to 3.7 mm with a mean of 2.7 mm and a standard deviation of .43. N.B. Asch and D.L. Asch (1978:322) report a mean length no greater than 3.0 mm for modern populations. Yarnell (1978:297) reports that initial pre-domesticated achene dimensions for archaeological specimens are about 3.0 X 2.0 mm. He goes on to suggest means of 3.5 X 2.2 mm (L x W) for plants watered and fertilized. The Stauffer achenes, uncorrected for any shrinkage due to carbonization, are larger than achenes derived from wild or merely tended plants. However, the dimensions of the Stauffer achenes are somewhat smaller that reported by Yarnell (1976:Table 2) for Middle to early Late Woodland assemblages. Furthermore, the Stauffer remains are similar in dimension to the Late Woodland achenes reported for nearby site 23BO964 (Voigt 1983:Table I.8). All data considered, it would appear that the Stauffer remains represent plants in early, but not initial stages of domestication.

The remains of *Helianthus annuus* (sunflower) are also represented in the Stauffer assemblage. Three partial and one whole kernel are derived from Feature 27. The whole kernel measures 6.5 X 3.0 mm. In order to correct for carbonization, Yarnell (1978:296) recommends increasing the length of the kernel by 35% and the width by at least 45%. This Stauffer samples then measures 8.8 X 4.4 mm. This product is intermediate between modern ruderals and modern domesticates (Yarnell 1978:291). The dimensions of this single specimen are consistent with other Middle to early Late Woodland specimens measured by Yarnell (1978:Table 1).

Other Grass Seeds. Grass caryopses, while they may be considered a small starchy seed and a possible food source, are herein grouped separately, because they could also reflect the technological use of grass stems or incidental inclusions. The grasses represented include *Panicum* and one yet unidentified specimen that is recorded as belonging to the Poaceae family.

At Stauffer, *Panicum* or panic grass is found in 7 out of the 33 samples. Its MNI is estimated at 25 specimens. *Panicum* forms the largest genus of North American grasses, with at least 150 species represented in the United States alone (Gould 1973:278). These grasses can be found flowering and fruiting throughout virtually the entire growing season. Steyermark (1981:206-230) indicates that 44 species are represented in Missouri.

N. Asch and D. Asch (1985a:157) have examined the ethnobotanical history of *Panicum* with respect to Native American populations. They did not find any documentation of Panicum used as a food source for eastern North American groups. In contrast, a high incidence of such exploitation by southwestern groups is reported by Yavansky (1936).

The frequencies of occurrences of *Panicum* in the paleoethnobotanical assemblages of the Midwest varies. N.B. Asch and D.L. Asch (1985a:157) report that 39 grains of Poaceae "Type 6L"/Panicum sp. were recovered from Feature 1 of the Hill Creek Homestead site, a Mississippian village in the lower Illinois Valley. The majority of these grains remained enclosed within the lemma and palea of the fertile floret. Also recovered from Feature 1 were numerous grass stems. The association of the grass seeds and stem fragments led N.B. Asch and D.L. Asch to conclude that the charred grains represented by-products of some technological use of grass stems.

Lopinot (1983:Table 40) identified 3,401 grains of Poaceae "Type 6L" for the Late Woodland component of the Bridges site of south-central Illinois. An additional 17 grains were sorted from samples of Mississippian features. Based on the abundance of this grass grain, Lopinot speculated on its usage as a food source. The inclusion of *Panicum* seed in fecal specimens retrieved from Salts Cave, Kentucky, also supports the suggestion that this grain was eaten aboriginally (Yarnell 1974:Table 7).

Economic Noncultivated Seeds. Economic noncultivated seeds include remains of *Rhus* (sumac) and *Vitis* (grape). Two specimens of *Rhus* were identified from two different pit features. An isolated finds of *Vitis* occurred in Feature 27. The remains of these fleshy fruits indicate their used in supplementing a diet that seems to be based on cultivated plants.

Other Seeds. The category of "other seeds" includes specimens of *Euphorbia, Galium, Ipomeae* and one seed identifiable only to the family level of Compositae. The economic significance of such weedy taxa is dubious, and their presence may merely reflect natural seed dispersion. Lastly, portions of 35 seeds too fragmented and eroded to identify are recorded.

Plant Exploitation Patterns at the Stauffer and Neighboring Sites

In sum, the Boone Phase occupants of the Stauffer site appear to have relied upon immediately available wood for fuel. The carbonized plant remains from the Stauffer site reflect the substantial role of cultivation in the economy of the Late Woodland culture. The principal grain crops appears to have been *Phalaris caroliniana, Hordeum pusillum,* and the pseudocereals, *Chenopodium berlandieri* and *Polygonum erectum*. *Iva annua* and *Helianthus annuus* achenes provided an oil seed crop. A diet based on these cultivated plants was supplemented by the harvesting of such wild fruits as *Rhus* and *Vitis* and of nuts such as *Carya, Quercus, Juglans,* and *Juglans nigra*. A single rind fragment suggests the use of squash or a wild pepo-like gourd probably for utilitarian purposes. The residents of Stauffer appear to have relied upon immediately available wood for fuel. Because any number of the plants represented could have been stored, any attempt at discerning seasonality is highly speculative based on the carbonized plant assemblage.

For comparison, contemporary data sets from Cole and adjacent counties are treated. For the Late Woodland component at the Algoa Site (23CO156), Baker (1984) analyzed the remains from four pit features. Although several C-14 assays were run, the most reliable date is cal A.D. 786±60. For Boone County, Parisi (1985) reports on the analysis of remains from Feature 3, a possible hearth dump or roasting pit, at 23BO303. Dates from this site include cal A.D. 1017±70 and 1112±70. Voigt (1983) analyzed the remains from 14 samples derived from seven features at 23BO969. This multiseasonal occupation yielded dates of cal A.D.779±90 and 1017±70. And Schmits et al. (1983) report on the carbonized macrobotanical materials derived from the mitigation of the Hinkson Creek Site (23BO950). Here, a date of cal A.D.960±60 was obtained. For Callaway County, Traver (1985) reports on carbonized materials derived from four features, two excavation units, and shovel probes at 23CY352. Dates of cal A.D.605±140 and 922±100 were recorded.

Because of different styles in reporting, comparisons among the assemblages prove difficult. For example, most of the reports neglect to mention flotation sample size, making it impossible to determine densities. Furthermore, field screened and/or hand collected samples are sometimes include in the analysis, and, in turn, pose a significant size bias. In the event the size of such items as wood or nutshell is identified, the $\geq$2.0 mm remains are quantified by only counts. Given that the samples analyzed by the various authors were recovered by different sampling strategies, processed by different techniques, identification attempt at different levels, and a variety of quantitative techniques were used, only a very general review can be made.
For 23BO950, wood is not mentioned in the report (Schmits et al. 1983). This absence is also true for 23CY352 (Travers 1985) and 23BO303 (Parisi 1985). Where wood taxa are reported (e.g., Voigt 1983 and Baker 1984), the pattern of exploiting locally available trees, as suggested for the Stauffer site, occurs.

The shell of nuts is reported for all the sites. At 23BO950 and at 23CY352 only *Carya* (hickory) is reported and very few fragments are noted. At 23CO156, 73 fragments of shell were recovered. Most of the fragments were assigned to the genus *Carya*, although *Juglans nigra* (black walnut), *Corylus americana* (hazelnut), and *Quercus* (acorns) also occur. These same species are represented 23BO969. What is unusual about this assemblage is the relatively high number of remains reported for *Quercus*. Of the 221 remains recovered, 165 or over half were assigned to the genus, *Quercus*. This high occurrence could reflect an abundance of acorns in the vicinity of the site, a preference towards acorn by the occupants, or a bias in sampling. Given the variation in how the authors quantified wood and nutshell, if any attempt is made at all, it is impossible to compare nut:wood ratios and thereby assess relative nut use. Yet, it is clear that nut resources continue to play some role in the subsistence strategies of the Late Woodland peoples in central Missouri. There is also ample evidence for the continued collection of fruits, grains, and the like from wild stands.

The carbonized seed assemblage at 23CY356 (Travers 1985), 23BO950 (Schmits et al. 1983), and 23BO303 (Parisi 1985) are quite different in terms of species represented. The starchy seed annuals (e.g. *Chenopodium berlandieri, Polygonum erectum, Hordeum pusillum,* and *Phalaris caroliniana*) are conspicuously absent. Instead, such wild taxa as *Capsella* (shepherd's purse), *Ammania* (ammannia), and *Portulaca oleracea* (purslane) dominate the assemblages. With the exception of *P. oleracea*, such seeds are rarely, if ever, reported from archaeological contexts.

Curiously, Steyermark (1983:742-743) indicates that *Capsella* is a native of Europe that has been introduced and naturalized through North America. *Ammannia*, particularly the species, *coccinea*, is found throughout Missouri and tends to occur along the muddy margins of waterways. Like the Stauffer assemblage, the starchy seeded annuals dominate the seed assemblages from 23CO156 and 23BO969. At 23CO156, *Phalaris caroliniana* is the most commonly occurring small starchy seed (Baker 1984). At 23BO969, this species is poorly represented, and it is *Polygonum erectum* and *Chenopodium* (no species given) that were most frequently recovered (Voigt 1983).

Evidence of *Zea mays* was not present within the Stauffer assemblage. If one looks further east to St. Louis County and the American Bottom of Illinois, traces of *Z. mays* have been reported for late Late Woodland contexts (ca. A.D. 600 - 800; Johannessen 1984; Wright 1986). At the time of these findings, the rather meager remains (a fragment here or there) were considered intrusive by the authors. *Z. mays* had not been firmly dated prior to A.D. 800 or what in those areas is referred to as the Emergent Mississippian Period. Beginning at A.D. 800, maize is rather a sudden, common constituent of archaeological assemblages. By A.D. 1000 or the beginning of the Mississippian Period, the remains are even more abundant with this abundance being interpreted as a shift to floodplain agriculture. Even with the advent of "maize agriculture," the starchy seed complex of *Chenopodium berlandieri*, *Polygonum erectum*, *Phalaris caroliniana*, and *Hordeum pusillum* continue to play a significant role in the diet of the Mississippian peoples. Since Johannessen (1984) and Wright (1986), maize remains have been securely dated to earlier periods. At the Holding Site, a Hopewell community in the American Bottom, several cupules, kernels, cob fragments, and an embryo were recovered. Two accelerator mass spectrometry (AMS) dates obtained from these samples establish the presence of *Z. mays* in the Mississippi Valley between 170 B.C. and A.D. 60 (Riley et al. 1994). The relative contribution to the human diet is still open to question.

For the central Missouri sites reviewed herein, *Z. mays* has been reported for 23C0156 (Baker 1985), 23BO969 (Voigt 1983), and 23BO950 (Schmits et al. 1983). At 23BO950, five "seed" fragments were recovered from feature contexts (Schmits 1983:101). This site is dated to A.D.960±60. Given what is now known in the mid-Mississippi Valley, the amounts of *Z. mays* are relatively small. However, details about recovery (e.g., flotation sample size and processing strategies) are lacking.

At 23CO156, 159 fragments of *Z. mays* were recovered (Baker 1984:Table I-1). The majority of the remains (75%) were recovered from a single pit. A qualitatively and quantitatively unspecified amount of charcoal derived from this feature was assayed. A date of cal A.D. 786±60 was obtained. Put into a larger, regional context, the finding of *Z. mays* at this date would not be unusual. Given that *Z. mays* was present in three of the four features analyzed, it appears to be a dietary staple. Interestingly, the presence, also in significant quantities, of members of the starchy seed complex is also documented for these features. This pattern of subsistence fits well with what has been described for the period A.D.800 -1000 in the mid Mississippi Valley.

At 23BO969, a single cupule was recovered from Feature 10 (Voigt 1983). This feature has been dated to A.D. 779±90. Similar to the situation at Stauffer, the human diet appears to be focused

on members of the starchy seed complex. Could it be that occupations at Stauffer and 23BO969 lie in time just prior to the inclusion of *Z. mays* as a dietary staple, whereas at 23CO156, the threshold has been crossed? To better assess plant food strategies in central Missouri, more data is needed. A more systematic collection and reporting of carbonized plant assemblages would greatly aid in interpretation.

Chapter 8

FAUNAL REMAINS

by John R. Bozell

Introduction

This chapter considers unmodified and modified faunal remains retrieved during archeological investigations at the Stauffer site. Stauffer is a multi-component Archaic through Late Woodland deposit. The site covers over 20,000 square meters situated between 550 and 600 feet MSL on a terrace at the confluence of an unnamed drainage and Meadows Creek about one mile south of the Missouri River. The sample was retrieved during 1994 data recovery in response to reconstruction of Route 179 in Cole County, Missouri. The Missouri Department of Transportation conducted the investigation under the overall direction of Archeology Field Director, Dr. Robert Hoard. Aaron Anglen supervised the field effort.

The 1994 field work investigated the central portion of the site focusing on tracts slated for construction impact. Stauffer is vertically and horizontally complex with varying degrees of integrity and archeological density across the deposit. A combination of hand dug isolated excavation units and blocks as well as mechanical topsoil removal encountered 29 features including hearths, deep and shallow storage/refuse pits and post molds. Much of the fill was ¼ inch dry-screened but various proveniences were systematically 1/16 inch water-screened and flotation processed.

Most features and recovered materials relate to a Late Woodland (Boone phase) residential base camp dating between A.D.650 and 800. Preliminary impression of the occupation is that it was of relatively long duration and high intensity (R. Hoard: personal communication). Although a small portion of the faunal remains may be affiliated with limited non-Boone phase use of the site area, none could be definitively associated with these other episodes. Therefore, the sample apparently relates to the Late Woodland occupation and it is treated as a single analytic unit. The main portion of this chapter is a descriptive characterization of the collection. General comparisons with select regional faunas are however offered as are comments regarding subsistence activity, seasonality, distribution and sample origin/modification.

Laboratory Procedures

MODOT staff had washed, processed and cataloged the sample prior to submission. Provenience and recovery information and catalog numbers labeled each storage container. Upon receipt, each bag or vial was examined and the contents sorted into modified, unmodified identifiable and unidentifiable fractions. The modified and unmodified identifiable portions were further sorted by artifact category and taxonomic group. Several post-excavation fractured specimens were glued but other stabilization measures were not taken.

An unmodified specimen was considered identifiable if the element, side and portion could be determined and assigned to a taxonomic grouping at the family level or below. Taxonomic and element identifications were made through comparison with modern collections curated by the Nebraska State Historical Society, the University of Nebraska State Museum and the National Park Service (Midwest Archeological Center), all in Lincoln, Nebraska. Variables recorded for each identified item include: catalog number, provenience, taxon, element, portion and aspect. Comments regarding recovery type, preservation condition, cut marks, burning, rodent gnawing, carnivore chewing and immaturity were coded. These data were placed in a computerized database (Microsoft Access) using a coding format designed by Falk et al. (1979) for use with Great Plains and Midwestern archeological faunas.

The identified portion was quantified using the number of identified specimens (NISP) and minimum number of individuals (MNI) for each taxon (Grayson 1984; Lyman 1994). MNI values were generated using the standard method of determining the element, side and portion that occurs in the greatest frequency for a given taxon. MNI values were tabulated for the assemblage as a single unit because temporally or functionally meaningful analytic units have not been defined. Relative age was also taken into consideration. All sorting and identifications were completed by the author. The sample was retabulated along a variety of additional dimensions for the discussion portion of the chapter. Methods used in these analyses are described in the discussion.

Results

The unmodified, identified sample includes 591 bone fragments assigned to 38 taxonomic groupings. The modified portion consists of thirty specimens organized into eleven categories. The collection was recovered from 15 features, 8 excavation units not associated with features and four mechanical scrape areas. The sample is generally well preserved although cracking and abrasion are relatively common as a result of several processes—particularly marrow extraction, butchering, decay and gnawing. Taxa identified are present in part as a result of subsistence activities although the actions of animals and other natural processes are responsible for the presence of some bone, particularly small mammals, amphibians and reptiles. Modified specimens and all identified food remains are inventoried in various database printouts on file with the author and at the MODOT.

Modified Remains

Thirty specimens have been intentionally modified into tools, ornaments or are manufacturing debris from artifact manufacture. The sample is organized into eleven traditionally recognized Great Plains and Midwestern tool categories (see for example Falk et al. 1980 and Fox 1992). This assemblage is limited in both diversity and quantity but is consistent with a variety of other samples recovered from Late Woodland and Mississippian components throughout Missouri and Illinois. The modified sample is inventoried with measurements and brief descriptions in Appendix 20 and considered in more detail below. Bone tools are illustrated in Figure 42.

Deer Ulna Awl. *Sample*: 1 specimen (catalog number 360-2)

Description: This artifact was recovered from Feature A and is a complete awl manufactured by removing the diaphysis and distal portion of a deer ulna and sharpening the remainder to a sharp point. Cuts and striations are evident along the margins of the semi-lunar notch and the entire specimen is polished. The working tip is heavily polished with numerous striations. These artifacts are common awl forms recovered from Late Woodland and Mississippian components throughout Missouri and Illinois (Parmalee et al. 1972:51; Kelly 1987:386; Fox 1992:18 and Bozell 1993:116). They were used for hide working.

Metapodial Awl Debris. *Sample*: 5 specimens (catalog numbers 293, 360-2, 368, 1652)
Description: Awls manufactured from deer metapodials are a standard bone artifact type from lower Missouri valley late prehistoric occupations (see Fox 1992:18 for example). Most were manufactured by scoring the lower diaphysis and snapping away the distal end and then splitting the diaphysis longitudinally and sharpening several independent shafts to sharp points. Although finished awls of this type were not recovered from Stauffer, five examples of manufacturing debris were. These were collected from Features 19, A, 27 and under the drive area. One snapped distal end and four grooved diaphysis segments comprise the sample. The diaphysis fragments represent the process of quartering the metapodials for preparation of multiple awls.

Splinter Awl. *Sample*: 2 specimens (catalog numbers 348-5, 360, 1823)
Description: Three splinter awls were retrieved—one from Feature A and the other two from Feature 28. The Feature A item is a mid-section from an unidentified bird long bone exhibiting heavy striations and grinding across the surface. The Feature 28 specimens are tapered, polished, sharp tips made from unidentified mammal or bird long bone. See Kelly (1987:389) for illustration of similar Late Woodland examples from the American Bottom.

Fishhook. *Sample*: 1 specimen (catalog number 1651)
Description: A single fractured fishhook was found during excavation of Feature 24. The specimen is about one-third of the original hook fabricated by cutting and grinding a mammal, or more likely a bird bone, into a "J" shape. The Central Plains (Bozell and Ludwickson 1997) and Midwest produce similar hooks but never in abundance. A Late Woodland fishhook was recovered from Boone County, Missouri, north of Stauffer (Parisi 1985:504). Sites in the American Bottom also yield fishhooks (Kelly 1987:378).

Punch. *Sample*: 1 specimen (catalog number 258)
Description: Feature 19 produced an item believed to be a punch or shuttle fragment. The specimen is a compact mammal bone that has been cut, ground and tapered to a rather blunt working end. Polish and striations are evident on the blunt tip. Punches may have been used in weaving (Winters 1969:57).

Bead Manufacturing Debris. *Sample*: 3 specimens (catalog numbers 321, 347, 1652)
Description: Three items associated with ornamental bead manufacture were recovered from Features 19, 27 and 28. All are grooved and snapped bird or small mammal long bone diaphyses and exhibit varying degrees of striating and polish. The Feature 27 object is burned. The manufacture of cut long bone beads extends far back into the Archaic tradition and by the late prehistoric period such ornaments were relatively common.

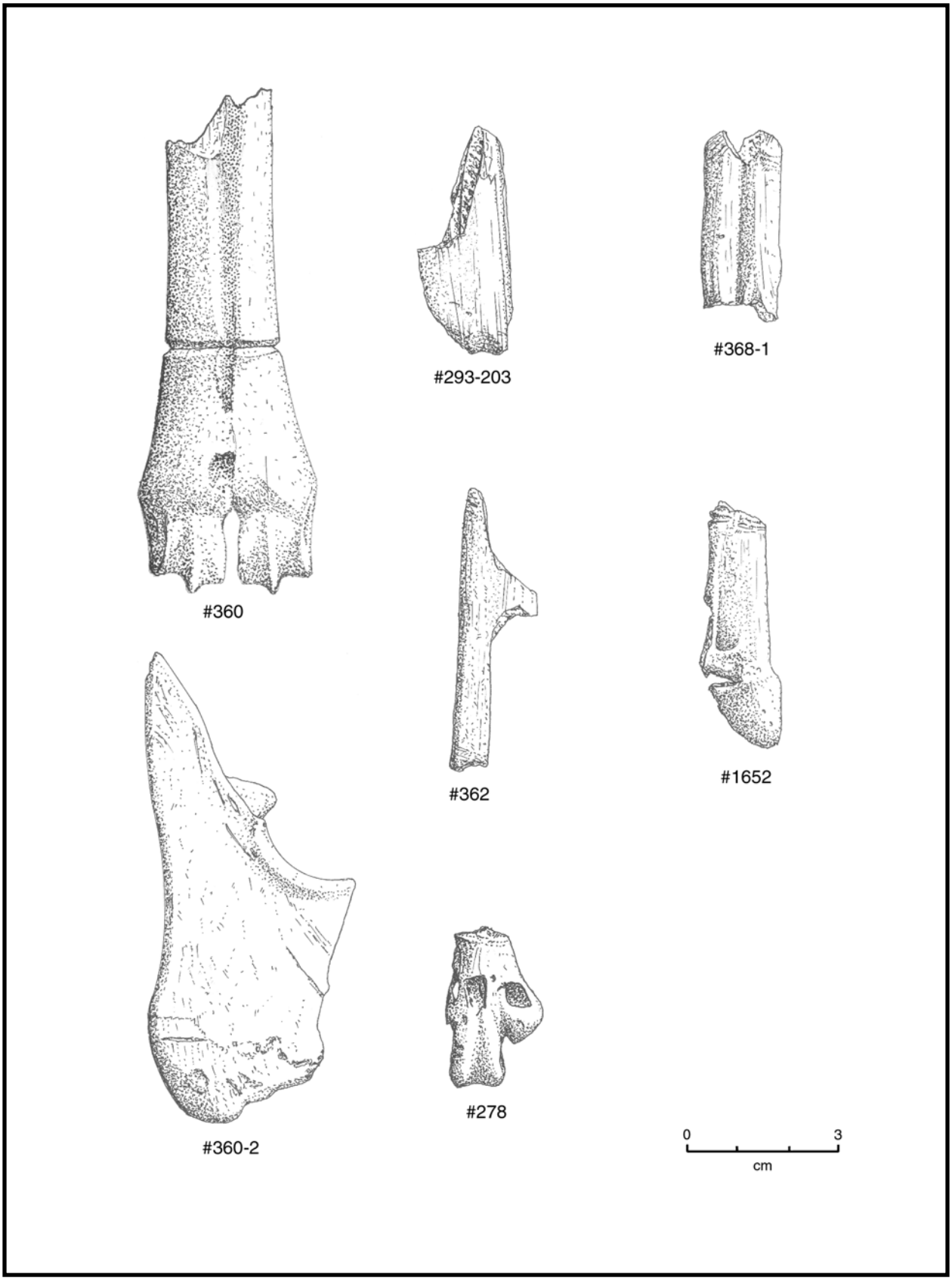


Figure 42. Bone Tools.

Expedient Tool. *Sample*: 1 specimen (catalog number 251)
Description: Test Unit 17 yielded what appears to be an expedient bone tool. The object is a deer or elk long bone splinter with occasional and slight polish along several margins. Expedient tools reflect non-patterned items that were briefly used for specific tasks and discarded.

Cut Turkey Bone. *Sample*: 3 specimens (catalog numbers 278, 362, 1652)
Description: The Stauffer assemblage includes three cut turkey bones. One is a cut and polished long bone shaft recovered from Feature A that most likely is a splinter awl segment. An object from Feature 19 is a grooved and snapped distal tarsometatarsus. This specimen also may be manufacturing debris from turkey long bone awl fabrication. The final artifact was retrieved during excavation of Feature 27 and is a grooved and snapped distal tibiotarsus. Turkey long bone awls and other implements are recovered rather frequently from Late Woodland sites in the Midwest. Parmalee et al. (1972:34-35) discusses and illustrates Late Woodland items similar to the Stauffer objects.

Cut Turtle Bone. *Sample*: 2 specimens (catalog numbers 323, 344)
Description: A turtle plastron fragment from Feature 19 and a carapace portion from Feature 28 exhibit parallel and closely spaced cut marks and striations. The carapace is typical of Late Woodland items identified as bowls. The striations result from removing the rib and vertebral connections and smoothing the interior for use. The plastron function is unclear.

Scored Mammal Bone. *Sample*: 1 specimen (catalog number 18)
Description: This Feature 4 object is a compact piece of heavily burned large mammal bone with three deep parallel cuts. The scores are much wider and deeper than those left by routine butchering however the function of the object is uncertain.

Cut/Striated Bone. *Sample*: 10 specimens (catalog numbers 298, 311, 319, 320, 344, 348, 362, 1652-2, 2079)
Description: These ten modified but otherwise unidentified bone fragments originated in Features A, 19, 27, 28, and 40. Eight are mammal and five of those are burned. One is a burned bird bone and the final item is also burned by could not be assigned to class. This sample is considered modified on the basis of varying degrees of polish, grooving and striations evident on bone surfaces. Many appear to be manufacturing debris.

Unmodified Remains

A general descriptive and distributional treatment of the food refuse follows. Logical family or order level taxonomic groups organize the descriptions that include sample character, distribution and previously documented Late Woodland archeological occurrence in central and eastern Missouri, the lower Illinois River basin and the American Bottom. Geographic range comments are based on syntheses by Pflieger (1971) for fish, Anderson (1965) for reptiles, Peterson (1947) for birds and Schwartz and Schwartz (1981) for mammals.
A complete inventory of unmodified identified remains is on file at MODOT. Table 24 is a summary of identified taxa by NISP and MNI for the entire sample. Table 25 presents a summary of various natural and cultural alterations to the bones and Table 26 divides the sample by provenience based on NISP.

Table 24. Summary of Identified Vertebrate Remains from the Stauffer Site.

TAXON	NISP	% of Total	MNI	% of Total
Lepisosteus sp. (gar)	4	0.7	1	1.6
Cyprinidae (minnow)	1	0.2	1	1.6
Catostomidae (sucker)	45	7.6	2	3.1
Carpoides sp. (carpsucker)	6	1.0	3	4.6
Moxostoma sp. (redhorse)	6	1.0	1	1.6
Catostomus commersoni (white sucker)	2	0.3	1	1.6
Ictalurus melas/natalis (bullhead)	19	3.2	3	4.6
Ictalurus punctatus (channel catfish)	3	0.5	2	3.1
Centrarachidae (sunfish/bass)	32	5.4	5	7.8
Micropterus salmoides (large mouth bass)	4	0.7	2	3.1
Lepomis cyanellus/humilis/megalotis (sunfish)	14	2.4	6	9.3
Pomoxis nigromaculatus/annularis (crappie)	2	0.3	1	1.6
Percidae (perch)	1	0.2	1	1.6
Aplodinotus grunniens (drum)	2	0.3	1	1.6
Bufonidae (toad)	3	0.5	1	1.6
Ranidae (frog)	2	0.3	1	1.6
Testudines (turtle)	54	9.1	1	1.6
Emydinae (box/water turtle)	2	0.3	1	1.6
Terrapene sp. (box turtle)	6	1.0	1	1.6
Terrapene carolina (3-toed box turtle)	2	0.3	1	1.6
Terrapene ornata (ornate box turtle)	4	0.7	1	1.6
Graptemys sp. (map turtle)	1	0.2	1	1.6
Colubridae (non-venomous snake)	33	5.6	1	1.6
Buteo sp. (hawk)	2	0.3	1	1.6
Tetraonidae (grouse/prairie chicken)	1	0.2	1	1.6
Colinus virginianus (bob-white quail)	3	0.5	1	1.6
Meleagris gallapavo (turkey)	13	2.2	2	3.1
Passeriformes (perching bird)	2	0.3	2	3.1
Scalopus aquaticus (eastern mole)	2	0.3	1	1.6
TAXON	NISP	% of Total	MNI	% of Total
Sylvilagus floridanus (eastern cotton- tail)	21	3.5	3	4.6
Geomys bursarius (plains pocket gopher)	15	2.5	3	4.6
Microtus sp. (vole)	2	0.3	1	1.6
Canis sp. (dog/coyote)	10	1.7	1	1.6
Mephitis mephitis (striped skunk)	2	0.3	1	1.6
Equus caballus (horse)	1	0.2	1	1.6
Cervus elaphus (wapiti)	2	0.3	1	1.6
Odocoileus virgnianus (white-tailed deer)	265	44.8	5	7.8
Bos taurus (cattle)	2	0.3	1	1.9
TOTAL	591			
	100.0	64	100.0	

Table 25. Modifications Observed on Faunal Remains from the Stauffer Site.

TAXON	Cut Marks	Burning	Rodent Gnawing	Carnivore Gnawing	Immature
Lepisosteus sp. (gar)	0	0	0	0	0
Cyprinidae (minnow)	0	0	0	0	0
Catostomidae (sucker)	0	14	0	1	0
Carpoides sp. (carpsucker)	0	0	0	0	0
Moxostoma sp. (redhorse)	0	0	0	0	0
Catostomus commersoni (white sucker)	1	0	0	0	0
Ictalurus melas/natalis (bullhead)	0	11	0	0	0
Ictalurus punctatus (channel catfish)	0	1	0	0	0
Centrarachidae (sunfish/bass)	0	4	0	0	0
Micropterus salmoides (large mouth bass)	0	0	0	0	0
Lepomis cyanellus/humilis/megalotis (sunfish)	0	0	0	0	0
Pomoxis nigromaculatus/annularis (crappie)	0	0	0	0	0
Percidae (perch)	0	0	0	0	0
Aplodinotus grunniens (drum)	0	1	0	0	0
Bufonidae (toad)	0	0	0	0	0
Ranidae (frog)	0	0	0	0	0
Testudines (turtle)	7	38	0	1	0
Emydinae (box/water turtle)	0	0	0	0	0
Terrapene sp. (box turtle)	2	3	1	0	0
Terrapene carolina (3-toed box turtle)	0	0	0	0	0
Terrapene ornata (ornate box turtle)	0	0	0	0	0
Graptemys sp. (map turtle)	0	0	0	0	0
Colubridae (non-venomous snake)	0	1	0	0	0
Buteo sp. (hawk)	0	0	0	0	0
Tetraonidae (grouse/prairie chicken)	0	0	0	0	0

TAXON	Cut Marks	Burning	Rodent Gnawing	Carnivore Gnawing	Immature
Colinus virginianus (bob-white quail)	0	2	0	0	0
Meleagris gallapavo (turkey)	3	8	0	6	0
Passeriformes (perching bird)	0	0	0	0	0
Scalopus aquaticus (eastern mole)	0	0	0	0	0
Sylvilagus floridanus (eastern cotton-tail)	0	10	0	0	1
Geomys bursarius (plains pocket gopher)	0	0	0	0	3
Microtus sp. (vole)	0	0	0	0	0
Canis sp. (dog/coyote)	0	2	0	0	1
Mephitis mephitis (striped skunk)	0	2	0	0	0
Equus caballus (horse)	0	0	1	1	1
Cervus elaphus (wapiti)	0	0	0	0	0
Odocoileus virgnianus (white-tailed deer)	42	76	35	110	34
Bos taurus (cattle)	0	0	0	2	2
TOTAL	55	173	37	121	42

Table 26. Summary of Faunal Remains from the Stauffer Site Organized by Provenience.

	02	04	05	19	23	25	27	28	33	37	38	40	41	A	B	NE	NW	SE	DRI	02	16	17	21	23	24	25	26
Lepisosteus sp. (gar)	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyprinidae (minnow)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Catostomidae (sucker)	0	0	0	5	0	0	0	5	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0
Carpoides sp. (carpsucker)	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0
Moxostoma sp. (redhorse)	0	0	0	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Catostomus commersoni (white sucker)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Ictalurus melas/natalis (bullhead)	0	0	0	3	0	0	3	1	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0
Ictalurus punctatus (channel catfish)	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Centrarachidae (sunfish/bass)	0	0	0	7	3	0	1	0	0	0	0	0	0	20	0	1	0	0	0	0	0	0	0	0	0	0	0
Micropterus salmoides (large mouth bass)	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepomis cyanellus/humilis/ megalotis (sunfish)	0	0	0	1	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0
Pomoxis nigromaculatus/annularis (crappie)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Percidae (perch)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aplodinotus grunniens (drum)	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Bufonidae (toad)	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranidae (frog)	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Testudines (turtle)	2	0	0	3	0	0	1	44	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	1	0
Emydinae (box/water turtle)	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Terrapene sp. (box turtle)	0	0	0	2	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0
Terrapene carolina (3-toed box turtle)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Terrapene ornata (ornate box turtle)	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
Graptemys sp.(map turtle)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colubridae (non-venomous snake)	0	0	0	30	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Buteo sp.	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetraonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Colinus virginianus (bob-white quail)	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meleagris gallapavo (turkey)	0	0	0	2	0	0	0	1	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	1	0	0	0
Passeriformes (perching bird)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Scalopus aquaticus (eastern mole)	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sylvilagus floridanus (eastern cottontail)	0	0	0	3	0	0	1	12	1	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0
Geomys bursarius (plains pocket gopher)	0	0	1	1	0	0	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtus sp. (vole)	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canis sp. (dog/coyote)	0	0	0	3	2	0	0	1	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Mephitis mephitis (striped skunk)	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Equus caballus (horse)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Cervus elaphus (wapiti)	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Odocoileus virgnianus (white-tailed deer)	1	1	1	29	9	1	18	23	2	1	3	1	1	127	0	14	0	1	1	2	4	7	1	2	10	3	2
Bos taurus (cattle)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
TOTAL	3	1	2	95	18	1	25	115	3	2	5	2	1	258	1	16	3	4	1	2	4	8	1	3	10	5	2

Based on percentage of NISP, deer dominates the Stauffer unmodified vertebrate sample (45%). Fish remains comprise about 24% and turtle bones about 12%. Small mammal, snake, bird, frog, and toad each contribute less than 10% to the sample (Figure 43).

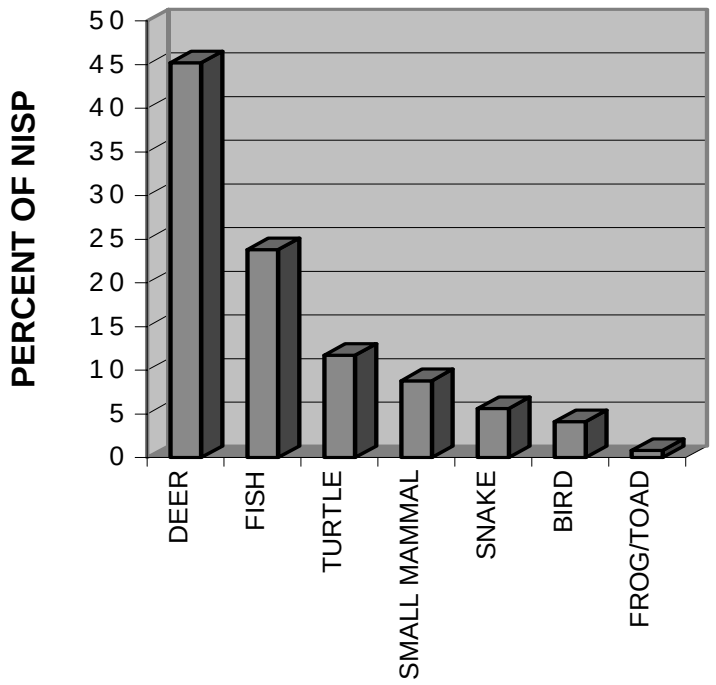


Figure 43. Major Categories of Identified Unmodified Faunal Remains.

Lepisosteidae (gars). Four non-specific gar elements were recovered—three from Feature 28 and one from Feature 19. The sample includes three scales and a single cranial element representing 0.7% of the combined Stauffer NISP. Gars inhabiting the project area: include: *L. platostomus* (shortnose gar) and *L. osseus* (longnose gar). It is unlikely they inhabit Meadows Creek but certainly were available in the nearby Missouri River. Late Woodland sites throughout Missouri and Illinois frequently produce gar bones but rarely are they abundant. Typically they comprise far less than 10% of combined NISP for any given sample (Cross 1983:340; Styles and Purdue 1996:161).

Cyprinidae (minnows). A single minnow element was retrieved from Feature A, constituting 0.2% of the sample. Over 20 species of minnows and shiners inhabit rivers, lakes and streams within a 20 mile radius of Stauffer preventing specific identification without extensive reference collections. Minnows nearly always occur in small numbers in Late Woodland sites in central Missouri (Olinger 1976:43; Bozell and Warren 1982:177) and were probably taken fortuitously during large scale netting or seining operations.

Catostomidae (suckers). Fifty-nine bones (MNI=7) representing the sucker family were recovered. The majority originated within Feature A and a few were collected from Features 19 and 28. The sucker sample comprises 10% of the total site NISP. Suckers are better represented in the collection than any other fish family. About 76% of the sucker remains could only be

allocated to the family due the fragmentary nature of the remains. Taxa that could be more specifically identified include: *Carpoides* sp. (carpsucker), *Moxostoma* sp. (redhorse), and *Catostomus commersoni* (white sucker). Thirteen species of sucker inhabit waters a short distance from Stauffer.

Catostomids commonly dominate Late Woodland archeofaunas in Illinois (Parmalee at al. 1972:15; Kelly and Cross 1988:305) and particularly in Missouri (Olinger 1976:43; Bozell and Warren 1982:177; Baker 1984:83; and Reeder 1988:83). Suckers can be harvested in larger streams, the Missouri River and floodplain lakes. Fourteen sucker bones are burned, one bears cut marks and another has been gnawed by carnivores.

Ictaluridae (catfish). The catfish sample consists of 22 elements (MNI=5) retrieved from Features A, 19, 27, and 28. These make up about 4% of the Stauffer NISP and about 15% of the identified fish remains. Most remains are assigned as either *Ictalurus melas* (black bullhead) / *I. natalis* (yellow bullhead), although three elements are clearly *I. punctatus* (channel catfish) based on size and skeletal morphology. Twelve elements are burned. Catfish are consistently well represented in regional Late Woodland sites and occasionally dominate fish remains—particularly in the American Bottom (Cross 1983:340 and Kelly 1987:368).

Centrarchidae (sunfish/bass). Fifty-two bones (MNI=14) representing the sunfish/bass family comprise the sample (8.8% of the total NISP). They were recovered from Features 19, 23, 27 and A in addition to a single element from the northeast scrape area. Most are from Feature A. Taxa represented include: non-specific sunfish/bass (32 elements), large mouth bass (4 elements), non-specific sunfish (14 elements) and crappie (2 elements). Eleven members of this family can be taken in streams, rivers and lakes of central and eastern Missouri. Centrarchids are a common component of regional Late Woodland faunas (Bozell and Warren 1982:177 and Styles and Purdue 1996:161). Four elements are burned.

Percidae (perches). Feature 28 produced a non-specific perch element. Percids occurring in central Missouri waters include *Stizostedion* (walleye/sauger), *Perca flavescens* (yellow perch), and at least twelve species of darters (*Percina/Etheostoma*). The Stauffer element compares most favorably with *Perca* although a positive identification could not be made. Percids typically are reported from Missouri and Illinois Late Woodland sites but never are they abundant.

Sciaenidae (drum). Two *Aplodinotus grunniens* (freshwater drum) elements were recovered—one from Feature 28 and one from Feature A. One is burned. The presence of this large fish suggests procurement operations in the Missouri River not just Meadows Creek or other smaller tributaries. Drum are typically a component of Missouri and Illinois Late Woodland faunas and occasionally they are abundant (Olinger 1976:43; Cross 1983:340; Kelly 1987:368; Styles and Purdue 1996:161).

Anurans (frogs and toads). Three Bufonidae (toad) and two Ranidae (frog) elements were retrieved. The toad remains originated in Feature A and the frog bones from Feature 23. Combined they represent less than 1% of the total site NISP. They do not exhibit evidence of human utilization and probably occur naturally in the deposit.

Testudines (turtles). Turtle elements (NISP=69) comprise over 11% of the Stauffer fauna. Six taxonomic categories are identified including: non-specific turtle, Emydidae (box or water turtle), *Terrapene* sp. (box turtle), *T. carolina* (3-toed box turtle), *T. ornata* (ornate box turtle) and *Graptemys* sp. (map turtle). Non-specific turtle bones consist entirely of small plastron and carapace fragments and make up nearly 80% of the turtle sample. Turtle remains were discovered across the site including Features 2, 19, 27, 28, A, B, the northwest scrape area, and Tests 17 and 25. Cut marks, burning, and animal gnawing are common. Turtles were a consistent yet minor component of the Late Woodland diet in Missouri and Illinois (Parmalee et al. 1972:25; Bozell and Warren 1982:179; Baker 1984:89). Their shells were used for bowls and rattles.

Serpentes (snakes). The snake sample consists of 33 vertebrae assigned to the family Colubridae (non-venomous snake). Over 20 species occur in central Missouri. The bulk of the sample was recovered from Feature 19 with several elements attributed to Features 23 and A. Although one element is burned, the use of snakes as a source of food has not been well established. Snake bones occur often in fine-screened Late Woodland faunal samples throughout the region.

Accipitridae (hawks). Feature 28 yielded two hawk bones. Both appear to be from a member of the genus *Buteo* sp. of which there are about five species inhabiting Missouri. The most common is *B. jamaicensis* (red-tailed hawk). Hawk remains are very rarely found in Woodland archeological contexts in Missouri and Illinois (Olinger 1976:43; Bozell and Warren 1982:179), and their occurrence may relate more to decorative use of feathers and skins than to food.

Tetraonidae/Phasianidae (grouse/quail). Upland bird remains from Stauffer include a single non-specific Tetraonidae (grouse/prairie chicken) element from Feature A and three *Colinus virginianus* (bob-white quail) bones. The quail remains were discovered in Features 19, 38, and 40 and two are burned suggesting subsistence use. Upland birds have never been documented as an important portion of the Late Woodland regional diet. Their remains do however occur more frequently in central and eastern Missouri than in the Mississippi valley proper (Olinger 1976:44; Bozell and Warren 1982:179; Baker 1984:88; and Reeder 1988:83).

Meleagrididae (turkey). Thirteen turkey bones (MNI=2) are included in the Stauffer sample (2.2% of NISP) representing the highest proportion of bird remains from the site. Nine elements were found in Feature A, two in Feature 19 and one in Feature 28. A test unit produced one element. Three elements bear butchering or skinning marks and eight are burned. Several additional turkey elements are bone artifacts. Turkey is consistently one of the most frequently represented birds in regional Late Woodland faunas. This is particularly true for components located out of the Mississippi valley proper (Parmalee et al. 1972:31; Olinger 1976:44; Bozell and Warren 1982:179; Reeder 1988:83; and Styles and Purdue 1996:159). American Bottom samples typically indicate more emphasis waterfowl exploitation.

Passeriformes (perching birds). Two perching bird bones were recovered from Feature A. Neither bears evidence of cultural modification and they may be present in the site as a result of natural processes. Several dozen species of passerines inhabit central Missouri and specific identification of the Stauffer bones was not attempted.

Scalopidae (moles). An eastern mole (*Scalopus aquaticus*) cranium was recovered from Feature 28 and a mandible from Feature 19. Neither bears evidence of cultural modification and they likely represent natural intrusions into the archeological deposit. Eastern mole remains typically occur in fine screen late prehistoric samples from Missouri and Illinois although usually in rather low numbers (Parmalee et al. 1972:38; Olinger 1976:44; Bozell and Warren 1982:181).

Leporidae (rabbits). Twenty-one *Sylvilagus floridanus* (eastern cottontail) bones are included in the Stauffer sample comprising 3.5% of the identified elements. A minimum of three individuals is represented. Ten elements are burned. Over one-half of the rabbit bones originated within Feature 28 but remains were also discovered in Features 19, 27, 33, 38, A, and in one test unit. Cottontails are nearly ubiquitous in regional Late Woodland contexts and often are one of the more significant second line mammalian meat sources along with squirrels and small carnivores (Parmalee et al. 1972:38; Bozell and Warren 1982:181; and Styles and Purdue 1996:160).

Rodentia (rodents). Two rodent taxa are included in the Stauffer collection. *Geomys bursarius* (plains pocket gopher) is the better represented with 15 elements (MNI=3) recovered from Features 5, 9, 27 and 28. Gophers occur with some regularity from Late Woodland archeological sites in the study region (Olinger 1976:44; Bozell and Warren 1982:181; and Cross 1983:323). The use of gophers as a food source is problematical. Although direct evidence of cultural utilization is absent on this sample, Satorius-Fox (1982:61) and Falk and Semken (1990:164) argued gophers were utilized as a back-up food source during the late prehistoric period.

The other rodent remains recovered from Stauffer are identified as *Microtus* sp. (vole). One element was recovered from Feature 23 and another from Feature 28. These elements compare well with *M. ochrogaster* (prairie vole) however they could not be confidently separated from two other species inhabiting the region—*M. pennsylvanicus* (meadow vole) and *M. pinetorum* (woodland vole). The vole specimens may reflect natural intrusion in the deposits.

Carnivora (carnivores). Twelve Stauffer bones are carnivore elements. Ten (1.7% of NISP) are *Canis* sp. (dog/coyote) and two (0.3% of NISP) are *Mephitis mephitis* (striped skunk). Features 28 and A produced the skunk specimens and Features A, 19, 23, 28 and 37 yielded canid materials. Both skunk bones and two of the canid bones are burned suggesting subsistence use. Carnivores may also have been procured for fur and skins. Canid remains cannot be specifically identified as either coyote or domestic dog in the absence of relatively complete cranial material of which there is none from Stauffer. The Stauffer material however is not large enough to indicate the presence of wolf. Domestic dog and coyote remains are both documented in regional Late Woodland contexts (Parmalee et al. 1972:43; Bozell and Warren 1982:181; Kelly 1987:374; Reeder 1988:83; and Styles and Purdue 1996:159). Late Woodland dog burials occur in the American Bottom (Kelley 1987:61-365) and the lower Illinois River valley (Parmalee et al. 1972:47).

Equidae (horse). A modern horse bone was found in the southeast scrape area. The specimen is a complete tibia from an immature animal. The element was gnawed by carnivores and rodents and exhibits characteristics of significant weathering. This element is related to recent local farming.

Artiodactyla (even-toed hoofed mammals). This category is dominated *Odocoileus virginianus* (white-tailed deer) remains but also includes two *Bos taurus* (cattle) elements and two *Cervus elaphus* (wapiti [or elk]) bones. The cattle bones are from an immature animal and have been gnawed by carnivores. Like the horse bone, the cattle material was discovered during scraping in the southeast area and relates to Euroamerican settlement and agriculture. The wapiti sample consists of two cervical vertebra fragments, probably from a single element, discovered during excavation of Feature 28. Wapiti remains rarely occur from Missouri Late Woodland sites (Bozell and Warren 1982:181; Parisi 1985:507 and Reeder 1988:83). Wapiti occur even less frequently in western Illinois Woodland deposits. Although once statewide in distribution, wapiti were extirpated from central Missouri by the 1830s.

Deer represent the largest fraction of identified bones (44.8% of NISP). The collection includes 265 elements representing a MNI of 5. All excavated features and test units at Stauffer produced deer remains. The sample exhibits a number of cultural and natural modifications including: cut marks (42), burning (76), rodent gnawing (35) and carnivore gnawing (110). Thirty-four specimens are from immature animals.

Deer are ubiquitous in Missouri and Illinois archeological assemblages and in many cases reflect the major portion of recovered subsistence remains (Parmalee et al. 1972:48-50; Reeder 1988:83; Kelly and Cross 1984:224-226). There is no reason to suspect that the vast majority of deer remains are present for any reason other than Native American subsistence activity.

Isolated Large Bone. A very large bone fragment was found during construction. The bone was in poor condition and appropriately was removed in its matrix. Robert Warren, of the Illinois State Museum, stated in correspondence dated September 4, 1997 that the bone was identifiable only as large mammal, but that from the size it could be mammoth, mastodon, ground sloth, or an animal of similar size. It is not presumed here that this bone, probably of Pleistocene age, is associated with the cultural material at Stauffer. The oldest identifiable material from the Stauffer site is a Dalton point reworked into a drill, which was recovered from the northeast scraped area of the site.

Analysis and Discussion

The Stauffer sample is not sufficiently large to justify extended treatment of paleoecology or vertebrate resource use. The excavated test units and features really only encompass a small fraction of the total site area and offering substantive conclusions would be premature. Although the deposits are predominately Late Woodland in origin, the precise chronological character is unknown. Indeed, it is uncertain if the excavated features and test units reflect multiple limited occupation episodes of short duration or a sustained habitation spanning decades or centuries. Also, the deposits contain earlier episodes of occupation and a few of the faunal remains may relate to these. Nevertheless, the Stauffer vertebrate sample was well recovered with systematic fine-screen sampling and is certainly one of the largest animal bone samples from a Late Woodland site in central Missouri. In fact, it may be the largest and most diverse Boone phase sample reported to date. Accordingly, several topics warrant further comment such as within-site variability, seasonality, subsistence practices and sample origin.

Sample Origin and Bias

The vertebrate sample accumulated as a result of several cultural and natural processes. Cut marks and burning noted on many identified deer elements indicate this species was the primary target of subsistence pursuits throughout the site's history. Most deer bone present in the deposit is a direct result of hunting, carcass butchering, food preparation, food consumption and refuse discard. Quite a few deer bones bear evidence of chewing by carnivores (41.5%) and gnawing by rodents (13.2%). Certainly gnawing rodents and canids had an impact on the overall condition and location of discarded deer bone. However they were probably not responsible for initial introduction of a significant portion of the deer remains into the deposit. Virtually the entire deer sample is fractured and splintered. Much of this damage does not bear evidence of carnivore activity but rather appears to stem from butchering, marrow extraction and perhaps even bone grease manufacture.

Stauffer residents regularly and intentionally procured fish. Fish remains were recovered across the site and frequently in relative abundance. All fish remains are presumed to be present as a result of subsistence pursuits. In general, the Stauffer fish sample consists of relatively small-bodied individuals suggesting they were taken using nets or seines in Meadows Creek. Hooking and spearing would have resulted in an increased frequency of larger-bodied fish.

Most small mammal, turtle and larger avian remains are present as a result of secondary subsistence activities. These forms were taken when encountered on an opportunistic basis and in all probability do not reflect intentional organized hunting efforts. Their occurrence in the Stauffer deposit results from butchering, food consumption and trash disposal.

Limited evidence of cultural utilization was observed for frog, toad, snakes, perching bird and micromammal remains. These forms either died naturally on the site or were transported by carnivores and raptors. Although the remains of these animals occur in Midwestern archeofaunas, they are generally interpreted as reflecting natural deaths.

Most archeological faunal assemblages result from a number of natural and cultural processes that partially define sample character. Recovery strategies also impact sample content. These factors need to minimally be recognized, if not controlled for, in any meaningful subsistence study. The following comments address: 1) preservation character and excavation context correlation, 2) recovery strategy and 3) bone density as a survival factor.

Each identified element was preservation rated as poor, fair or good. Figure 44 provides a summary of these data by two major context categories—feature and non-feature. Remains present in features are more likely to have been rapidly buried (and preserved better) than those from general excavation units. The latter context likely contains refuse left on the ground and exposed to a variety of environmental agents detrimental to lasting preservation. About 40% of the non-feature remains are rated as poor as opposed to only 6% for the feature contexts. The percentage of feature specimens rated "good" is about twice that of non-feature remains. The conclusion which can be readily drawn from this observation is that the non-feature sample has a disproportionately high number of poorly preserved elements when compared to the feature samples. In fact, the non-feature preservation is so poor in some circumstances that it is safe to

assume some portion of bones originally deposited on surface middens have completely decayed—particularly thin fragile elements. Thus the samples from features should be considered to more realistically reflect the original frequencies and proportions of deposited bone. The non-feature samples probably contain only a portion of elements originally introduced into the archeological record. Specific interpretations from non-feature bones should be made with caution.

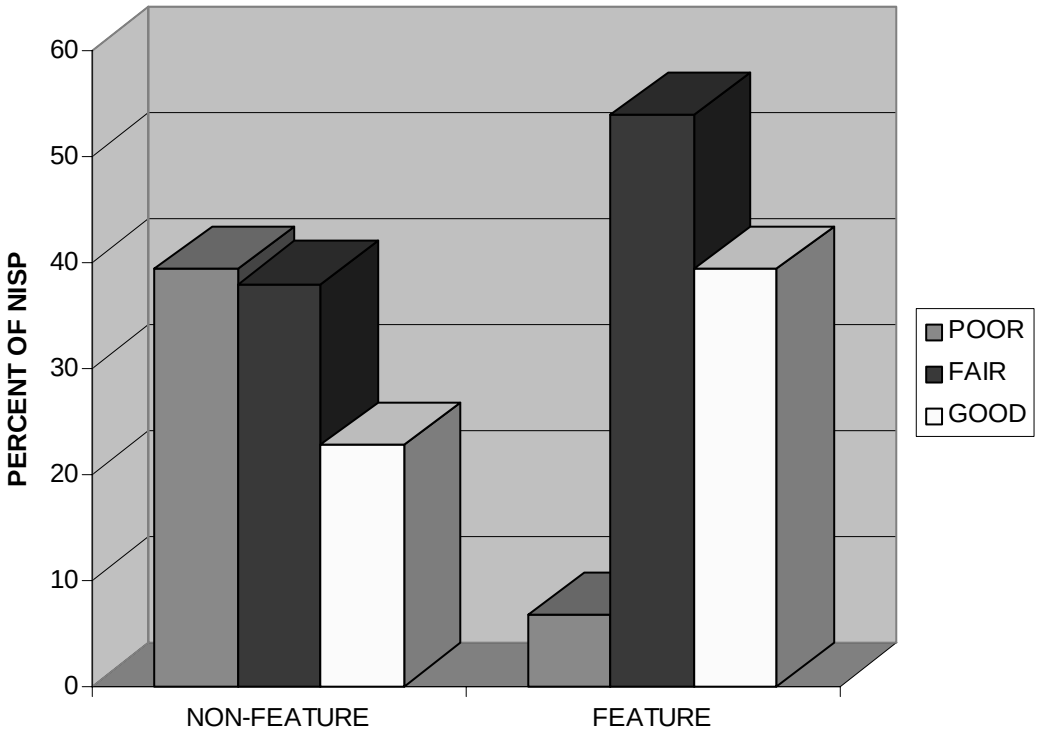


Figure 44. Bone Preservation Categories for Feature and Non-Feature Proveniences.

Recovery strategies have also impinged upon the character of the identified sample (Figure 45). Predictably, smaller-bodied taxa and small elements are better represented in 1/16 inch screen and flotation samples. Only about 10% of deer remains result from these fine screen operations while between 30 and 50% of fish, turtles and small mammals were picked from fine screen residue. The net result is that, sample wide, the frequency of larger taxa and elements is more reflective of the original sample population than are fish, turtles and small mammals. Fine-screen sampling was designed and carried out systematically during the Stauffer investigation however so various taxa proportions could be normalized.

The final bias factor considered here involves differential of bone density for the deer sample. Lyman (1994:246-247) calculated average bone mineral densities for deer elements. Denser elements have a greater chance of surviving a broad spectrum of natural and cultural processes than do thinner more porous bones. Figure 46 is a scatter plot of Lyman's bone density values against Stauffer site deer Minimal Animal Units (MAU). MAU is the minimum number of a particular element divided by the number of times that element occurs in the deer skeleton

(Binford 1978; Lyman 1994:51). It is a normalized index of element representation for a particular sample. Figure 54 does illustrate a loose trend defined by denser elements posting higher MAU values. A Spearman's Rho correlation test was performed on the sample and the result is *rs* =.55, *p*=.0012. The Spearman test evaluates the probability that there is **no** correlation between the variables. This low probability value (*p)* suggests there indeed is a correlation between MAU and bone density. The Stauffer sample is biased against more porous elements in favor of dense bones. The extent of this bias is unknown.

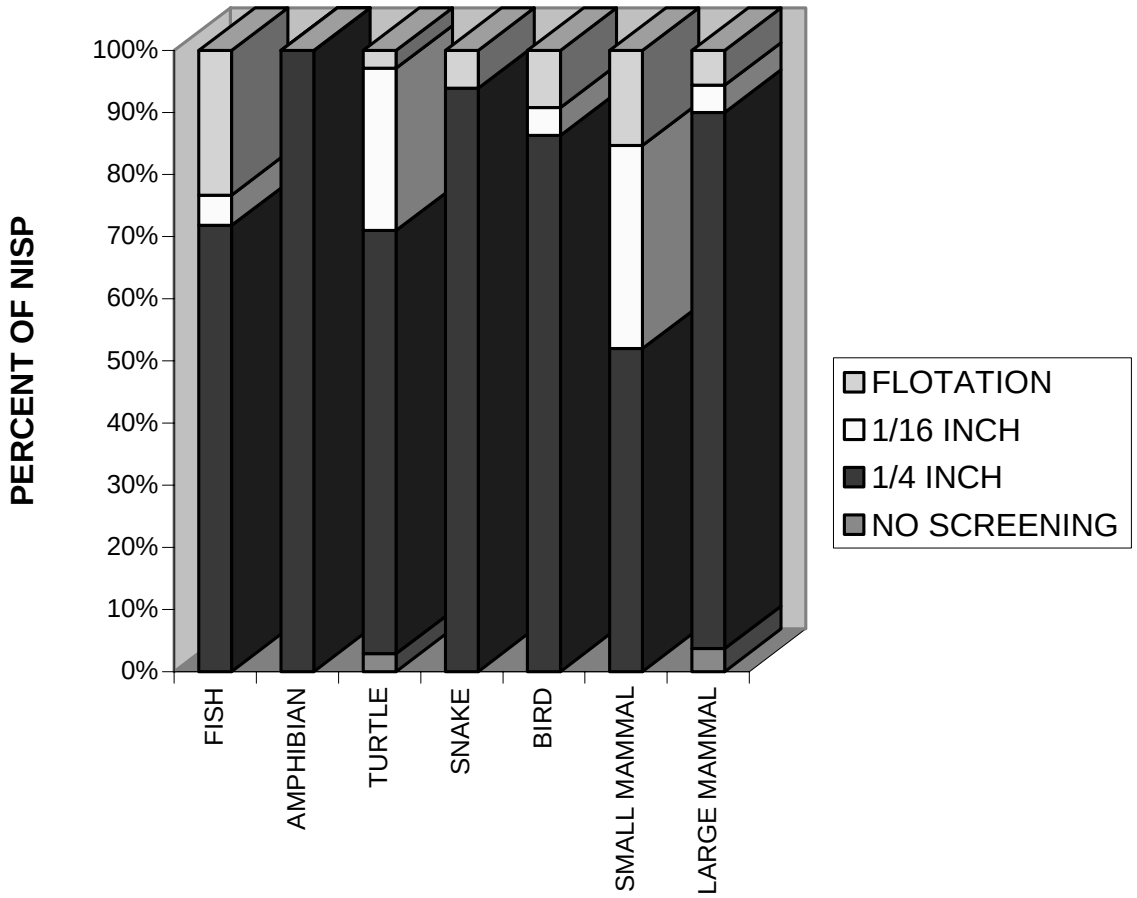


Figure 45. Recovery Strategies and Major Categories of Identified Faunal Remains.

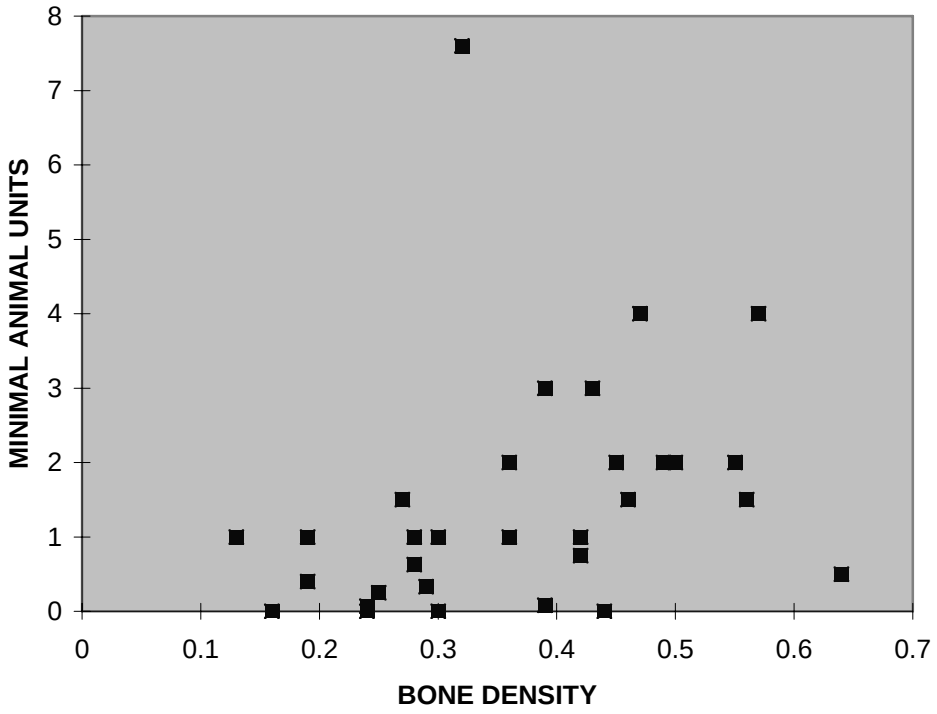


Figure 46. Deer Bone Density Values Arrayed Against Minimal Animal Units (MAU).

Taxonomic Richness, Diversity and Distribution

The sample was quantified along several spatial and quantitative dimensions in search of significant variability. Table 26 provides NISP values for all taxa from each provenience. Figure 47 collapses the NISP data into seven broad categories: fish, bird, turtle, snake, small mammal and deer. Overall the sample is rich and diverse with 591 elements representing 38 taxa. Richness refers to the number of specimens or minimum number of individuals. Diversity is a quantitative measure of the relative abundance of taxa within a sample. It is calculated using a scaled value of the Shannon Index expressed as H'/H'max (Pielou 1977; Kintigh 1989:22). The lowest possible diversity vale is 0.00, which occurs if all elements were from a single species. The highest diversity value is 1.00, which would occur if all species were equally represented. The Stauffer diversity value is .62 for NISP and .94 for MNI.

Stauffer occupants relied extensively on deer consumption. When calculated by NISP, deer represent nearly 45% of the identified samples from all excavation units and features. When remains suspected to be unrelated to subsistence pursuits are removed, the deer fraction increases to over 60%. Edible meat weights were not calculated in this study but had they been, deer would certainly contribute over 95% of the animal protein from the site. Non-deer subsistence animals (fish, migratory birds, small mammals and turtles) were recovered across the site but except for fish represent under 10% of the NISP. Fish comprise about 25% of the NISP. Late Woodland populations in the lower Meadows Creek area were evidently squarely focused on deer and fish procurement. Other forms were taken opportunistically and provided limited variety to the meat fraction of the diet.

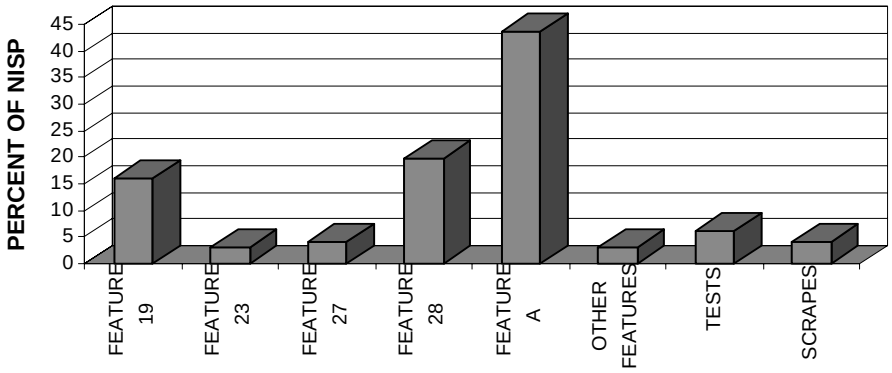


Figure 47. Percentage of NISP for Major Provenience Categories.

Figure 48 illustrates the distribution of fauna by provenience. Features 19, 28 and A produced over 75% of the remains. These three features not only have the highest NISP values but also the highest MNI figures. Features 23 and 27 also yielded relatively large samples. The remaining features, tests, and scrape areas produced slightly over 10% of the bone. Spatially this distribution suggests the southern and eastern portions of the site contain the richest deposits of vertebrate remains.

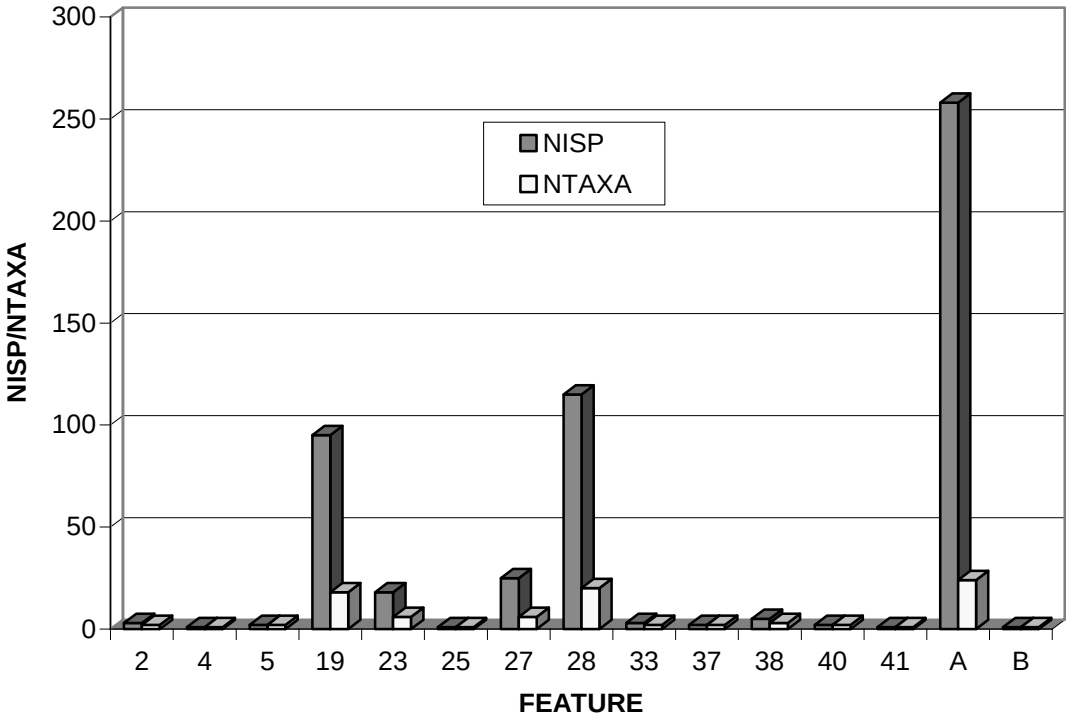


Figure 48. NISP and MNI Faunal Richness Values for All Features.

Seasonality

Season of occupation evidence is limited. Most taxa present are available for capture throughout the year although fish and turtles have traditionally been assumed to have limited winter availability (Bozell and Warren 1982:188). Bone remains with directly observable seasonal characteristics are restricted to a limited number of fish vertebrae and scales.
Fish continue to grow throughout their life but development stops or slows in the winter and accelerates during the warmer months. Select skeletal elements display distinctive annuli or growth rings representing these episodes. Vertebrae and scales have proven particularly useful for seasonal death assessment. For extended discussion of fish vertebral and scale growth rings and interpretation see: Casteel (1976); Peterson (1980); Rojo (1987) and Koch (1995). Fish growth begins in the spring and a wide annual band forms on vertebrae and scales through late fall. When growth halts or decreases, a thin, usually darker, band develops from late fall through early spring. By observing the character of the outermost ring, season of death estimation can be made. A number of interpretive pitfalls have been identified for this type of analysis largely revolving around the occurrence of "false annuli" formed during illness, spawning or other times of non-fatal stress. Accordingly, the Stauffer results should be viewed quite cautiously.
Over 100 fish vertebrae and scales were recovered. Each was examined microscopically for presence of annual growth structures. Annuli were observed on most specimens although over 75% had suffered varying degrees of erosion and chipping along their outer margin, preventing season of death estimation. Nineteen specimens displayed sufficient outer growth rings to arrive at a season of death estimation (Table 27). These include specimens from Feature A (n=12), Feature 19 (n=4), Feature 23 (n=2) and Feature 27 (n=1).

The results do not cluster particularly tightly and at first glance suggest fish were captured throughout the year. The Stauffer radiocarbon dates straddle the Scandic and Neo-Atlantic climatic episodes. Both are believed to have been warmer than today. Even presently, central Missouri winters are frequently mild enough to prevent significant freezing of streams. The conditions during these warmer episodes may have been favorable for fishing throughout the year. Rostlund's extensive treatment of American Indian fishing in North America eludes several times to winter fishing (Rostlund 1952:96-137). Although the Stauffer annuli results are splayed throughout the year, the seasonal span that *all* specimens have in common is from about May to December. This period is consistent with warm season Late Woodland occupations hypothesized by Bozell and Warren (1982) for the Salt River area of northeast Missouri.

Seasonally sensitive young deer mandibles were not recovered and only one antler fragment of seasonal importance is present in the collection. Feature 23 produced the antler and it is attached to the cranium showing no signs of shedding onset. Missouri deer begin to develop antlers in May and retain them until about January (Schwartz and Schwartz 1981:337). This specimen is consistent with the fish seasonal data of spring through fall procurement.

The tempting suggestion that Stauffer represents a warm season occupation(s) is speculative. All we really know is that some fish were caught during the warm season as was a single deer. The archeological record is mute with respect to other deer and fish as well as remaining taxa. It is more appropriate to simply state that Stauffer was *minimally* inhabited during the warm months of the year.

Table 27. Season of Death Estimation of Fish Remains from Four Features.

Feature	Cat. No.	Taxon	Element	**SPRING**	**SUMMER**	**FALL**	**WINTER**
A	360	Catostomidae	scale				
A	360	Catostomidae	vertebra				
A	360	Catostomidae	vertebra				
A	360	Catostomidae	vertebra				
A	360	Catostomidae	vertebra				
A	360	Catostomidae	vertebra				
A	362	Centrarchidae	scale				
A	362	Ictaluridae	vertebra				
A	365	Catostomidae	vertebra				
A	365	Catostomidae	vertebra				
A	365	Catostomidae	vertebra				
A	365	Ictaluridae	vertebra				
19	311	Centrarchidae	scale				
19	311	Centrarchidae	scale				
19	319	Catostomidae	scale				
19	321	Catostomidae	scale				
23	325	Centrarchidae	vertebra				
23	327	Centrarchidae	vertebra				
27	1652	Ictaluridae	vertebra				

Habitats Exploited

Specific habitats exploited by Stauffer hunters were estimated to gain a more complete perspective on Late Woodland animal procurement in the project area. Habitat calculations are reflected as the percentage of MNI for each of five major environmental categories: aquatic, riparian, forest and forest edge, grassland and widespread (Figure 49). MNI is used as opposed to NISP because the amount of time spent searching for game in a particular area is not necessarily reflective of the animal's size. A person might spend as much time catching a fish as killing a deer.

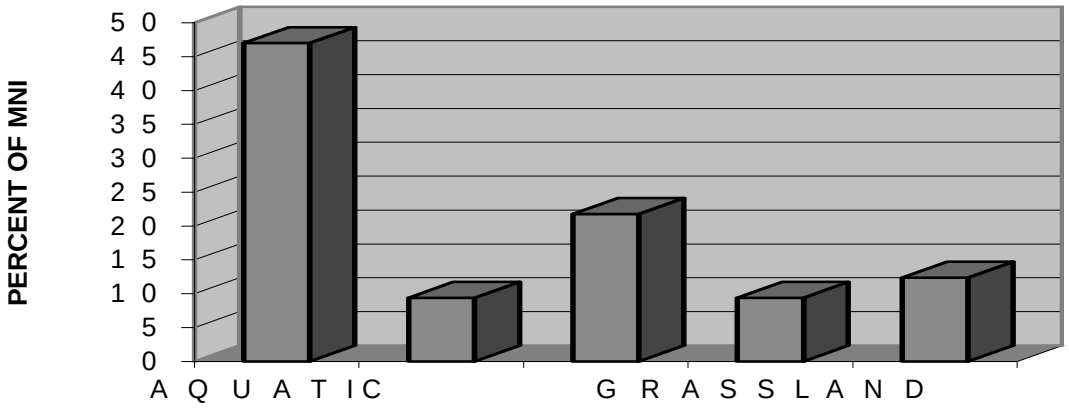


Figure 49. MNI Values Organized by Environmental Zone.

Over half of the sample MNI reflects aquatic or streamside habitats. Fish and some turtles contribute this portion. Most fish could have been taken in Meadows Creek *or* the nearby Missouri River although several of the larger fish such as gar may have been available *only* in the Missouri. Slightly over 20% of the fauna was taken in forested or forest edge settings. Deer make the greatest contribution to this fraction with the addition of turkey and some smaller mammals. A few species were probably captured in the upland prairies above the Meadows Creek valley or other valleys. Taxa encountered in these settings include, in part, wapiti and grouse. Finally, several forms have widespread distributions and are available for capture anywhere in the general area.

Stauffer residents evidently relied extensively on local resource readily available on or adjacent to the Meadows Creek and Missouri River floodplains. The emphasis was on small fish and other riverine species as well as deer encountered on the floodplain and forested terraces and bluffs surrounding the valley. Extensive use of the somewhat further away upland prairie is not evident. Had these regions been regularly exploited, the proportion of wapiti, grouse, coyote and other mammals should have been greater. Regular utilization of the Missouri valley proper would likely have produced higher frequencies of migratory waterfowl and large-bodied fish.

Deer Butchering, Portions Represented and Taphonomy

The deer sample is farther considered along several cultural and natural analytic dimensions. A tremendous amount of research has been undertaken in the past 20 years to explain the nature and internal variability of large mammal vertebrate assemblages. As these taphonomic efforts accelerate, it is becoming increasingly evident that the natural processes of decay and carnivore ravaging play an active role in the archeological expression of vertebrate samples. Sorting these processes from culturally derived behavior such as carcass reduction, meat transport and food preparation and discard is difficult. Lyman's (1994) comprehensive monograph on the subject contains nearly all information required for taphonomic consideration of the Stauffer. In addition to Lyman's efforts, the most impressive research forcing consideration of specific skeletal utility and transportation models is the ethnoarcheological work of Binford (1978, 1981) among the Nunamuit Eskimo.

Table 28 provides a variety of specific deer element indices utilized for clearer understanding of cultural and natural pathways resulting in the archeological character of vertebrate samples. The table lists deer elements and related taphonomic indices. These values include NISP, MAU, MNE (minimum number of a particular element), FUI (the nutritional value of each element category) and DEN (the structural bone density of elements as a function of preservation likelihood).

Table 28. Deer Body Portion, Food Utility, and Bone Density Values for the Stauffer Site.

PORTION	NISP	MNE	MAU	FUI	DEN
Mandible	20	8	4.0	1600	.57
Atlas	1	1	1.0	524	.13
Axis	0	0	0.0	524	.16
Other Cervical	4	2	0.4	1905	.19
Thoracic	3	1	.07	2433	.24
Lumbar	3	2	.33	1706	.29
Pelvis	7	3	1.5	2531	.27
Sacrum	1	1	1.0	2128	.19
Rib	62	20	.76	2650	.32
Scapula	6	2	1.0	2295	.36
Proximal Humerus	0	0	0.0	2295	.24
Distal Humerus	7	6	3.0	1891	.39
Proximal Radius	2	2	1.0	1323	.42
Distal Radius	6	6	3.0	1039	.43
Proximal Ulna	0	0	0.0	1424	.30
Distal Ulna	0	0	0.0	1039	.44

PORTION	NISP	MNE	MAU	FUI	DEN
Carpals	1	1	.08	653	.39
Proximal Metacarpal	3	3	1.5	461	.56
Distal Metacarpal	4	4	2.0	364	.49
Proximal Femur	6	4	2.0	5139	.36
Distal Femur	3	2	1.0	5139	.28
Proximal Tibia	3	2	1.0	3225	.30
Distal Tibia	5	4	2.0	2267	.50
Tibial Tarsal	10	8	4.0	1424	.47
Fibular Tarsal	1	1	0.5	1424	.64
Central + 4th Tarsal	4	4	2.0	1424	.45
Proximal Metatarsal	6	4	2.0	1003	.55
Distal Metatarsal	3	3	1.5	792	.46
1st Phalange	9	6	0.75	443	.42
2nd Phalange	7	5	0.63	443	.28
3rd Phalange	2	2	0.25	443	.25

Figure 50 arrays the relationship between deer MAU and FUI. This plot illustrates values approximating how well a specific deer element is represented (MAU) in relation to its nutritional (protein, grease, marrow) value (FUI). The Stauffer scatter is the type that most closely resembles what Binford (1978) terms an "unbiased strategy"—characterized by a low proportion of low utility items and an increasingly higher proportion of high utility portions. Such as a profile is typically interpreted as likely reflecting a village or base camp. The faunal debris in such cases includes portions returned to camps/villages from hunting expeditions and subjected to secondary butchering and food preparation. Typically a hunting camp or kill site would reflect a higher proportion of low utility portions such as by-products of carcass dismemberment and primary butchering. Low utility items are discarded and left at such kills and camps and the higher utility items are transported to more permanent habitation sites and thus removed from the archeological record of the camp/kill. It is important to recall that the Stauffer deer sample is partially a product of differential bone density.

Lyman (1991, 1994) argued that Binford's utility and transport models may be too simplistic by failing to account for the natural agents of destruction—particularly gnawing carnivores and decay. Analyses of large mammal carnivore ravaging (Blumenschine 1986) suggest the elements first and most completely consumed and damaged are the upper hindquarters, lower back and rib cage. These are indeed elements with rather high FUI values and poorly represented at Stauffer (Figure 51). Given the high degree of carnivore activity evident on this assemblage, these skeletal portions may be artificially deflated. If so, the Figure 58 profiles may have appeared somewhat different.

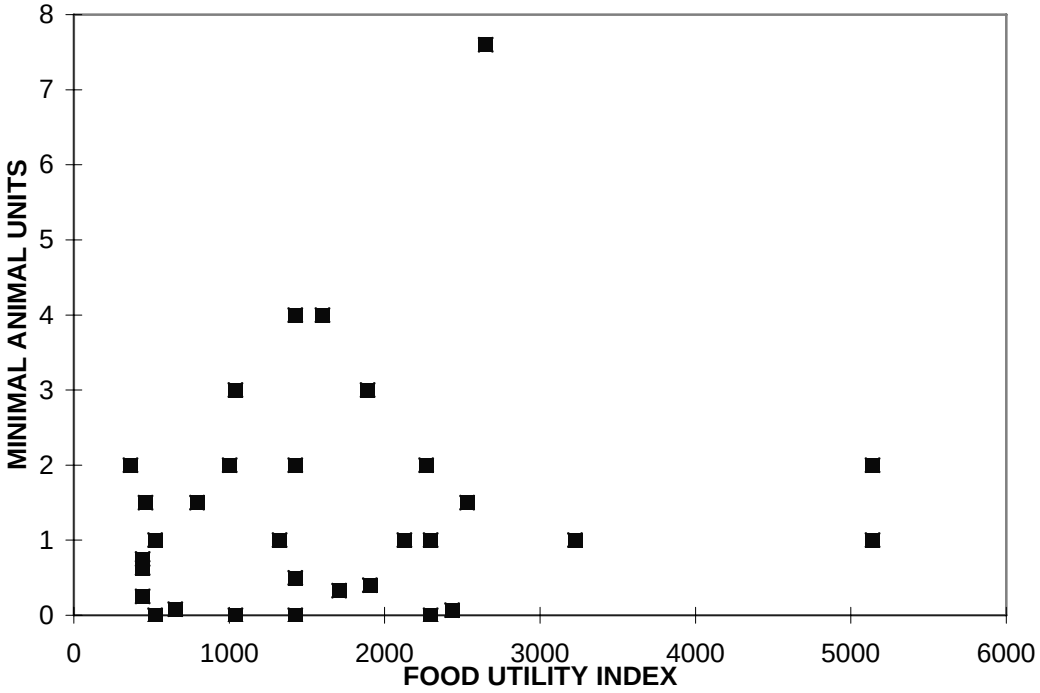


Figure 50. Deer Food Utility Index (FUI) Values Arrayed Against Minimal Animal Units (MAU).

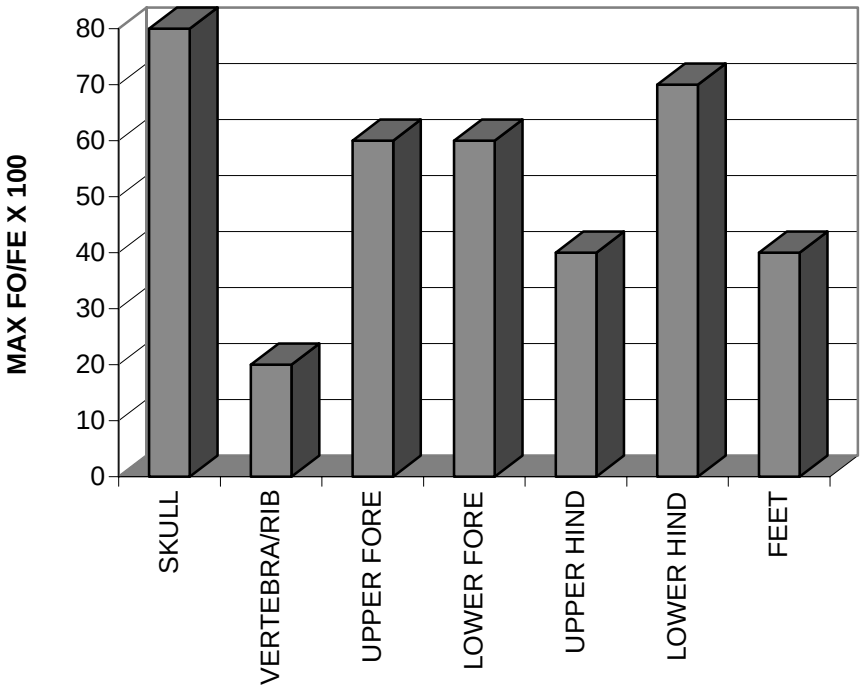


Figure 51. Observed Frequency (FO)/Expected Frequency (FE) Values for Major Deer Skeletal Portions.

This author and others (Bozell and Ludwickson 1988; Bozell and Rogers 1989; Bozell 1993; Roper 1994; Koch 1995; and Styles and Purdue 1996) have performed MAU/FUI analyses of Central Plains and Midwest archeofaunas recovered from sites with known functions—such as processing camps or semi-sedentary/sedentary habitations. The habitation results consistently demonstrate a profile similar to Stauffer. The kill sites on the other hand produced profiles of low utility items being well represented and high utility portions poorly represented.

The actions of carnivore feeding and structural decay certainly affected the condition and content of the Stauffer deer bone sample. However the other *known-function* camps and habitations noted above would also have been subjected to similar processes but functionally distinct MAU/FUI signatures remain. There is no reason to suspect taphonomic processes affected the Stauffer sample to such an extent that the interpretation of the site as reflecting a village or base camp is entirely erroneous.

Regional Perspectives

What may ultimately become one of the more useful aspects of the Stauffer program is understanding how the site corresponds to other late prehistoric components in the general region. The major component at Stauffer is Late Woodland in attribution and dates between A.D. 650 and 800. Broadly contemporaneous vertebrate samples useful in placing Stauffer in regional and temporal perspective include those from the American Bottom (Kelly and Cross 1984); the lower Illinois River valley and other Mississippi valley lower tributaries (Parmalee et al. 1972; Styles 1981; Styles and Purdue 1996); the Salt River valley (Bozell and Warren 1982); and various central Missouri contexts (Olinger 1976; Baker 1984; Parisi 1985; and Reeder 1988). The Stauffer sample minimally represents a warm season residence although occupation during other seasons certainly can not be ruled out. Deer (45%) and fish/turtle (35%) dominate the remains with low frequencies of small mammals, bird and elk. The vast majority of vertebrates were probably captured within several miles of the site area. Figure 60 arrays percentage of NISP for deer against fish for Stauffer and sixteen other Late Woodland samples from Missouri and Illinois. Fish and deer consistently accounts for the majority of variation in regional late prehistoric samples and they normally correlate inversely (Bozell and Warren 1982:182; Kelly and Cross 1984:224-225). Figure 52 imposes three geographic site clusters: the American Bottom, the lower reaches of major Mississippi valley tributaries, and sites in central Missouri and the Salt River valley.

The American Bottom samples and to a slightly lesser extent, the lower Mississippi tributary collections display a profile very heavily dependent upon fishing. In these localities, fish comprise between 50 and 85% of the NISP with deer normally providing less than 20% of the NISP. These values reflect an increasing shift toward “localization” in resource procurement characterized by intensive harvesting of riverine and riparian species readily available in close proximity to stream valley villages. During much of the preceding Archaic and the Early and Middle Woodland periods, subsistence focus had more typically been on deer available in forested bluffs and upland forest/grassland ecotones. The Late Woodland localization phenomenon was originally identified and considered by Styles (1981) during her study of lower Illinois River valley archeofaunas. The phenomenon has been repeatedly identified and

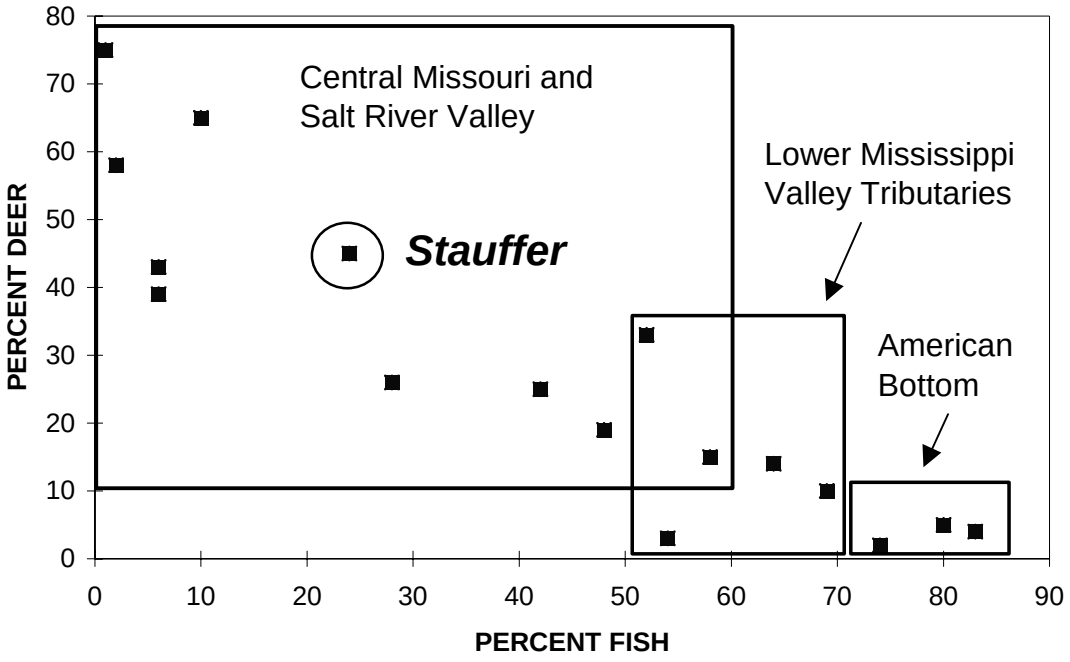


Figure 52. Percent Fish NISP Arrayed Against Percent Deer NISP for 17 Late Woodland Faunas from Illinois and Missouri.

reconsidered elsewhere in the general study area (Bozell and Warren 1982; Kelly and Cross 1984 and O'Brien 1996:9-14).

The forces behind this subsistence shift are not altogether apparent but population growth and pressures on local deer populations are often cited. However, O'Brien (1987; 1996) correctly has pointed out that concrete evidence for significant population growth has not been identified. He offered a counter suggestion that increased sophistication of plant resource exploitation and domestication on the part of Middle Woodland and early Late Woodland populations made increased long term riverine settlement more economically feasible with intensive procurement of floodplain fauna a consequence of that.

Returning to Figure 52, the faunal procurement pattern in operation at Stauffer and other Late Woodland components in central Missouri and the Salt River valley are somewhat different from that apparent in and adjacent to the Mississippi valley proper. These components to the west show significantly more diversity. Some retained a heavy emphasis on deer procurement with fish making only a marginal contribution to the diet. Others like Stauffer display a more diverse procurement pattern with fish, deer, and a variety of other forms all taken on a regular basis. These data suggest that whatever influences or pressures affecting Late Woodland groups to the

west may not have been as strong as those controlling contemporary life in the Mississippi valley proper. Evidently Late Woodland populations in central Missouri had not grown to the point that deer populations were being adversely affected. Alternately, these people were not as intensively focused on "tethered" residence in stream valleys with intensive plant exploitation/domestication and associated focus on riverine procurement.

Summary

The food refuse portion of the Stauffer site fauna consists of 591 elements representing 35 taxonomic groupings. White-tailed deer and a variety of fish dominate the assemblage. Second line resources include: turtles, turkey, small mammals and elk. The modified fraction is small and composed of 30 specimens representing eleven functional and decorative artifact categories. A portion of the fauna was naturally introduced into the archeological deposits. This is particularly true of snakes, frogs, toads, perching birds and some of the small mammal remains. These small animals either died naturally in the site area or were carried in by local raptors and carnivores. The overall sample character is also somewhat dependent upon depositional environment (feature versus non-feature) and recovery strategy.

The deer sample is dominated by skeletal portions of moderate to high nutritional utility. This pattern is typical of village or base camp sites not specialized kill sites or hunting camps. The skeletal portion profile however is partially conditioned by varying degrees of bone structural density and the actions of feeding carnivores.

Late Woodland people lived at the Stauffer site minimally during the warmer months of the year—May through January. Direct seasonal information is limited however and site use during other seasons certainly cannot be ruled out.

Stauffer site hunters evidently concentrated their efforts near the site. Most species could have been killed within local Meadows Creek riparian setting and immediately adjacent bluffs and terraces. Occasional use of the Missouri River and upland prairies is also suggested by the sample.

The modified bone sample is rather sparse. Bone tools and ornaments are limited to several examples of beads, awls, expedient butchering tools and manufacturing debris. The sparse modified bone sample lends further support to the overall impression of Stauffer representing a residential base camp, not a permanent densely populated village.

Placement of the Stauffer sample in regional context suggests Late Woodland populations away from Mississippi valley proper settings (such as the American Bottom) practiced a more diverse subsistence strategy and likely were somewhat more mobile than contemporary groups to the east.

Chapter 9

HUMAN REMAINS

by John R. Bozell

Six human teeth were recovered from the Stauffer site (23CO499) during excavations conducted in 1994, all from Features A and 28. Both of these features are deep refuse pits. Of the four teeth from Feature 28, three are adult, and one appears to be from a subadult, based on wear. Two teeth were recovered from Feature A. One is a child's deciduous tooth, the other a well-worn adult tooth. Two long bone shafts from the site are suspected to be human, but both are missing articular ends and are badly gnawed by rodents. One is from Feature 28 (which also contained human teeth), the other is from excavation unit 24. After the completion of extensive hand excavation, approximately 90% of this site was scraped with a grader under the observation of archaeologists. There was no evidence of in place human burials anywhere within the site area in MoDOT right of way.

Chapter 10

CONCLUSIONS

Investigations at the Stauffer site have served to confirm many notions about the Late Woodland occupation of central Missouri. While many sites from this time period have been recorded, few have had the level of excavation and analysis as the Stauffer site. Analysis of the faunal remains in particular fill a significant gap, and the information on plant use and pottery supplement previous investigations.

The general pattern for Late Woodland occupations in Missouri is one of relatively small groups of transient horticulturalists occupying flood plains and first terraces of larger drainages. They cultivated native plants and, to a much lesser degree, maize. Evidence of structures is rare and typically evidence of these is more suspected than certain. However, the presence of storage pits and structures shows a commitment to locations not often seen in early times in central Missouri, with rare exceptions. Whether larger Late Woodland sites are the result of short occupations—two to three years—or result from repeated seasonal occupations is still open to debate (Hoard 2000, Schmits 1983, 1985; Sturdevant 1990). Corrected radiocarbon dates of A.D. 676, 776, and 1025 reflect a long range of occupation if the more recent date is not an aberration. I suspect that it is not, because Feature A, which produced this date, has more decorated pottery and smaller points, suggesting an assemblage slightly different than those seen at the two other dated features. The first two dates overlap significantly at one sigma variation, the two later dates overlap slightly at two sigma. I do not argue that the site was occupied for hundreds of years, but it is certainly possible that it was occupied several times over a period of several hundred years. Still, it is clear that Stauffer was occupied at least during the late spring, summer, and fall, times when seeds could be planted, tended, and harvested. This supports the argument that the Stauffer site represents a horticultural occupation.

Pottery from the site is remarkably consistent and fits in well with current expectations of what Late Woodland pottery in central Missouri should look like. It is unfortunate that we were unable to reconstruct vessels, as evidence on the shape and size of vessels would be useful in determining their function with more certainty. Analysis of vessel wall thickness shows that Stauffer ceramics follow the well-established trend of building thin vessels that are strong and efficient in transferring heat. These vessel characteristics support the assertion that much of the pottery at the site was used for cooking, and that its design is the result of generations of selective development.

Despite the plainness and homogeneity of the ceramic assemblages, two unresolved issues are fueled by the analysis conducted at Stauffer. First, where does this pottery fall into a classification scheme? Geographically it is well within the boundaries of the Boone phase (Denny 1964, Hoard 2000), but is near the boundaries of the Maramec Spring phase (Marshall 1958, 1965; McMillan 1963, 1965; Reeder 2000), and the poorly defined limits of Moreau pottery. While phase affiliation uses many variables, geographic location and pottery characteristics are they primary determinants. The pitfalls of the various type descriptions of Boone, Moreau, and Maramec Spring pottery have been discussed elsewhere (Hoard 2000, Fox 1992:16-18, O'Brien and Wood 1998:241), and it is clear that either more rigorous definitions of

these wares needs to be developed, that they should be discarded altogether, or subsumed under one type as some have recently proposed (Fox 1992:18; O'Brien and Wood 1998:241).

The second issue revolves around tempering. The small sample of sherd thin sections analyzed gives evidence that clay containing limestone sand may have been used to make pots at Stauffer. This goes against the conventional wisdom that prehistoric potters in the region crushed limestone to add to their clay. It may be that the apparent (though poorly quantified) difference in limestone inclusions between Boone, Moreau, and Maramec wares is a function of limestone particle size in regional clay deposits. Could the higher energy flow of Ozark streams produce clays with more, finer sedimentary rock particles and that the slower streams of the Ozark border region produce clay deposits with larger pieces of sedimentary rock? Could the different types of limestone in these areas be responsible for the particle size difference? The resolution of these issues remains to be seen, but thin section analysis of Maramec wares would be useful in testing this. Still, it appears that clay containing limestone was intentionally selected, as the proportion of sherds containing significant amounts of quartz sand is very low.

Jefferson City chert, the most common local variety, has the strongest representation. Less than one per cent of the chert at the site is exotic, and none of that is from any further than southern Iowa. The number of cores relative to debitage and chipped stone tools suggest most initial processing took place off the site. The broad diversity of stone tools from the Late Woodland component at Stauffer reflects the range of activities that took place there, including hunting, meat processing, hide preparation, wood working, cooking, and tool manufacturing. Both arrow and dart points diagnostic of the Late Woodland are present. Small arrow points dominate the assemblage, but points that could have tipped spears or darts are present as well. Digging tools, such as a limestone hoe and a polished chert hoe could have been used to clear and till fields or dig pits. Gouges, chisels, celts, abraders, drills, and large bifaces could have been used for a variety of woodworking tasks. Ground stone from the site gives evidence that seed and nut processing took place there, as well as grinding pigments, notably hematite. The presence of large, well-worn grinding slabs, some weighing over a kilogram, were likely used to process wild and cultivated plant foods.

The location of the site—a terrace above a major tributary stream—fits well with setting expected for Late Archaic and Late Woodland occupations. A series of burial mounds within a kilometer of the site and overlooking the Missouri River reiterates a Late Woodland pattern of having residential sites separate from but near to burial areas.

The absence of maize at Stauffer is not surprising. About half of the Late Woodland sites in central Missouri that have used flotation for recovery of seeds show no evidence of maize. This, and the lack of evidence for social stratification, show that Stauffer is typical of central Missouri sites in having no indications of the adoption of a Mississippian way of life.

In the end, Stauffer is a prime example of a central Missouri site. It has the classic pairing of Late Archaic and Late Woodland components in a predictable setting. The Late Woodland component is emblematic of the "good gray cultures" that fall between more spectacular Middle Woodland and Mississippian manifestations. To ignore these rather modest groups as insignificant would be like ignoring the relative quiet of periods like the 1950s in the United States. The calm between storms gives us a chance to see how a society carries on its business in the absence of dramatic social disruption. It provides a baseline against which other times can be compared.

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APPENDIX 1.
Artifact Classification Guide Used for the Analysis of Material from the Stauffer Site.

Debitage

Flake. All flakes must exhibit at least one of the following traits; bulb of force, striking platform, ripples, fissures, dorsal flake scars.

Decortication flakes. Flakes that have cortex on the dorsal side. On some flakes, cortex is also visible on the ventral side. These may or may not have a bulb of force.

Thinning flake. Must have ventral lip, a narrow platform, a diffuse bulb of force and dorsal flake scars. They may be small and thin with a faceted striking platform and a curve along the longitudinal axis.

Blades. Must be twice as long as they are wide, with parallel or nearly parallel edges, and dorsal flake scars running parallel to the lateral edges. These may or may not have a bulb of force.

Interior flakes. Flakes without cortex that do not fit the criteria for thinning flakes or blades. They must have a bulb of force, a striking platform and a dorsal ridge (or ridges). They may be variable in shape.

Broken flakes. flake fragment without cortex that is so incomplete that it cannot fit into any other category.

Shatter. Blocky or angular pieces of chert or other flakeable material lacking the attributes of flakes or flake scars.

Ceramics

Morphology. Rims are pottery fragments from the orifice of the vessel with a finished edge (some pieces, such as handles, lugs, effigies may also have finished edges, these should be placed in the blank space in the morphology category). Body sherds have no finished edge, and are broken on all edges.

Exterior treatment. Includes plain, not plain, or eroded. A plain exterior treatment is defined as one that is smoothed. Not plain includes surface treatments such as cordmarking, smoothed-over cordmarking, slipped, punctated, brushed, incised, noded, fabric impressed, and burnished, among others. Eroded refers to sherds on which the exterior and/or interior surface (in relation to the pot from which it came) is missing.

Other Material

Unmodified stone. Stone with no apparent or intentional modification by humans. While these stones may have been used in hearths, or as weights, supports, etc., they often have no detectable indication of their use. They are listed by stone type, thermal alteration (T/A) may be listed when readily identifiable, as in the case of fire-cracked rock or stone with potlid fractures. At the discretion of the archaeologist, these may be weighed, recorded, and discarded. If the unmodified rock is to be saved, stone types will be separated, weighed, and bagged by stone type, though each bagged type can simply be labeled by the type and included in a larger bag, containing the other unmodified stone type bags, which has the full labeling and tag.

Burned earth. Amorphous lumps of fired clay

Daub. Amorphous lumps of fired clay with impressions of wattle (sticks, brush)

Mud dauber nests. Not an artifact, but often indicative of a structure or storage pit. May be fired and thus well preserved when a structure burns.

Artifacts Listed by Description

Note: an almost infinite number of other artifacts could be included here such as bone hoes and awls, figurines, lip plugs, Busycon columnellas, copper fragments, stone or ceramic discoidals, bannerstones, etc. If it's an artifact that should be given special attention, put it here. Also, radiocarbon samples should be listed here.

Some standard descriptions:

Cores and Core Fragments. A piece of chert or other flakeable stone with one or more flake scars, indicating the removal of flakes, and in a pattern that does not suggest creation of a useable edge. Most cores are amorphous and exhibit multi-directional flake scars

Bifaces and Biface Fragments. An artifact that has been bifacially flaked (having flakes scars on the dorsal and ventral side that meet to form a sharp working edge) in an apparent attempt to thin and/or shape the object. This is in contrast to a core, on which flaking is done to produce useable flakes, and in contrast to retouched flakes, which maintain most of the morphological characteristics of the flake. More specific forms may be listed in the category such as drills, preforms, etc.
Example: Biface/drill

Points and Point Fragments. flaked, symmetrical, pointed tool, typically bifacially worked but occasionally unifacially worked. Oftentimes a provision for hafting (notching, grinding) is made at the proximate end of the tool. Additional description (side notched, lanceolate) may be added, as may type, when identifiable. If only a fragment is present, the portion should be noted (base, lateral, medial), as should evidence of reworking.
Example: Point/side notched base

Groundstone Artifacts. Stone which has been modified by grinding, pecking, and/or battering. This class includes hammerstones, pitted stones, manos, and metates to name a few. Example for listing on catalog sheet:
Groundstone/metate

Utilized/retouched materials. Some classes of flaked stone artifacts, such as flakes, cores, and shatter, are slightly retouched or show evidence of being used (multiple step fractures). Flaking or edge damage may be bifacial or unifacial. In the case of retouched materials, these do not exhibit a degree of flaking that would place them in a category of a defined formal tool such as biface, drill, graver, etc.; i.e., the flake maintains most of its morphological attributes. Some examples of utilized/retouched artifacts are Utilized/retouched flake, Utilized/retouched shatter, Utilized/retouched core, etc

APPENDIX 2. Metric Dimensions of Whole Projectile Points from the Stauffer Site.

Catalog Number	Location	Feature	Zone, Level, Half	Material	TA	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
1633-4	NW Scrape	25		B	N	4.7	3.6	14.9	5.5	10.3	2.4	4.8	2.3	5.5	0.5	0.1	2.7	3.3	90	110	0.2	Scallorn
273-1	EU 24	19	3b	B	N	6.3	2.9	20.5	6.4	13.8	4.0	6.5	2.5	6.4	1.1	1.2	4.4	7.0	60	60	0.5	Scallorn
362-6		A	2 (E Half)	?	?	6.3	4.5	12.1	6.3	7.6	2.1	4.2	2.0	6.2	0.7	0.3	3.9	2.5	80	70	0.2	Scallorn
230-275	NW Scrape			?	?	6.6	3.8	14.5	6.6	10.7	1.9	4.1	1.8	4.5	0.8	ND	2.2	2.3	ND	80	0.2	Scallorn
360-3		A	W Half	?	?	6.6	4.7	16.5	7.2	9.6	3.3	5.8	3.0	7.2	0.3	0.7	3.3	4.5	80	80	0.4	Scallorn
360-4		A	W Half	?	Y	6.9	4.2	13.2	7.6	7.9	2.9	5.6	2.4	7.6	0.8	1.4	5.1	4.0	80	50	0.3	Scallorn
268-2	EU 24	19	3a	JC	N	7.0	5.3	15.9	8.0	9.4	3.3	5.8	2.6	8.0	0.7	0.8	5.7	6.0	90	70	0.3	Scallorn
315-2	EU 26	23	2	?	?	7.1	6.0	17.1	8.2	12.5	3.3	4.5	2.3	8.2	0.8	0.5	2.5	3.2	70	60	0.5	Scallorn
291-1	EU 24	19	4b	JC	N	7.2	4.1	20.6	7.4	13.6	3.7	5.5	3.0	7.4	0.7	1.3	4.5	4.9	70	70	0.5	Scallorn
1652-3	NW Scrape	27		?	?	7.2	4.3	14.3	7.2	9.2	2.8	4.8	2.3	5.1	0.7	0.7	4.6	4.6	80	80	0.3	Scallorn
357-1		33	1 (N Half)	?	?	7.3	5.5	14.3	8.0	8.9	2.5	6.6	2.7	8.0	0.9	0.3	2.9	2.7	120	110	0.3	Scallorn
347-2		28	2 (E Half)	?	?	7.4	3.8	20.5	7.4	14.9	2.7	5.0	2.2	4.0	0.2	1.3	2.7	3.5	120	60	0.4	Scallorn
1633-1	NW Scrape	25		?	?	7.4	5.2	18.9	7.4	13.1	3.8	5.6	3.5	6.7	0.3	0.6	4.9	5.2	100	80	0.5	Scallorn
203-1	EU 13		2	B	?	7.4	5.8	18.6	7.4	12.9	2.3	4.7	1.9	7.0	0.2	0.6	2.3	3.1	50	60	0.3	Scallorn
245-5	EU 18	19	2	B	N	7.5	5.2	19.3	7.6	13.8	2.3	5.8	2	7.6	1.3	0.9	4.1	3.5	70	70	0.4	Scallorn
362-7		A	2 (E Half)	JC	Y	7.6	4.4	15.6	7.6	9.5	3.1	5.6	2.4	6.1	0.7	1.1	4.4	4.5	70	50	0.4	Scallorn
200-1	EU 13		1	?	?	7.7	5.0	16.1	9.2	10.0	2.3	6.3	2.7	9.2	0.9	2.0	4.9	3.0	50	50	0.3	Scallorn/Sequoya
342-11	NW Scrape	27		?	?	7.8	5.5	15.4	6.0	9.7	3.7	6.0	2.8	6.0	0.3	0.4	4.4	6.0	120	120	0.4	Scallorn
356-11	NW Scrape	38		?	?	7.9	5.1	13.8	7.9	8.3	3.6	6.0	2.9	7.5	1.0	1.5	3.8	2.7	80	60	0.4	Scallorn
348-2		28	3 (E Half)	JC	N	7.9	6.0	17.2	7.9	12.3	3.1	5.0	2.8	7.3	0.8	0.5	5.3	4.0	110	140	0.5	Scallorn
245-4	EU 18	19	2	B	N	8.0	4.4	18.2	8.1	12.0	3.0	6.0	2.9	8.1	1.7	1.8	3.2	3.8	70	60	0.4	Scallorn
347-1		28	2 (E Half)	?	?	8.0	4.4	12.9	8.0	7.8	3.1	4.9	2.5	5.6	0.6	1.5	4.0	3.6	100	90	0.2	Scallorn
355-8	NW Scrape	38		JC	N	8.1	4.9	19.0	8.1	12.0	2.1	6.3	2.1	6.1	1.2	0.9	4.1	3.7	80	80	0.3	Scallorn
4-1	P II TU 2		2	B	N	8.1	5.1	17.0	8.3	11.5	2.6	5.7	2.0	8.3	1.3	1.4	5.5	4.4	70	70	0.4	Scallorn
342-12	NW Scrape	27		?	?	8.1	5.3	19.7	8.1	13.5	3.2	5.2	3.5	7.1	0.7	1.2	5.3	4.0	80	90	0.5	Scallorn
2-3	P II TU 2		1	B	Y	8.1	5.3	17.3	8.1	11.8	3.1	5.5	2.5	6.2	0.5	0.7	3.2	4.0	80	70	0.5	Scallorn
355-7	NW Scrape	38		JC	Y	8.2	3.6	14.5	8.2	11.0	3.3	3.0	2.6	3.9	0.3	1.3	2.4	3.7	100	80	0.3	Scallorn
229-1	EU 22		3	B	N	8.2	5.3	18.1	8.2	13.3	2.0	5.2	2.4	7.8	1.4	0.8	4.0	4.0	80	60	0.4	Scallorn
1973-1	SE Scrape	33		?	?	8.3	4.2	23.3	8.3	17.5	3.6	5.6	2.5	8.2	1.6	1.8	4.0	5.1	60	70	0.6	Scallorn

Appendix 2. Metric Dimensions of Whole Projectile Points from the Stauffer Site (continued).

Catalog Number	Location	Feature	Zone, Level, Half	Material	TA	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
230-256	NW Scrape			B	N	8.3	5.4	17.9	8.3	12.3	2.8	5.1	2.2	6.5	0.3	0.7	2.5	3.6	60	50	0.4	Scallorn
1163	NE Scrape			JC	N	8.3	5.7	24.1	9.6	18.0	3.6	6.1	2.6	9.6	1.9	2.3	7.0	6.0	70.0	80.0	0.7	Scallorn
287-3	EU 25	19	4	B	Y	8.3	7.6	15.1	8.3	10.1	3.0	4.4	2.5	7.8	ND	ND	ND	ND	ND	ND	0.4	Non-ID arrow point
337-102	SW Rise			B	Y	8.4	3.8	24.2	8.4	20.1	4.9	4.1	3.3	4.3	0.8	0.1	3.6	3.6	70	40	0.8	Scallorn
2506-5	NW Scrape	38		?	?	8.4	4.7	16.8	8.4	11.9	1.9	4.1	2.2	4.9	1.3	0.8	2.7	4.9	100	100	0.3	Scallorn
338-27	SE Scrape			JC	N	8.5	4.8	20.6	8.5	15.0	3.5	5.5	2.5	5.9	1.5	ND	3.1	3.0	ND	50	0.5	Scallorn
247-2	EU 18	19	3a	B	Y	8.5	5.0	14.6	8.5	9.0	3.0	6.1	2.4	8.5	1.7	1.8	5.8	4.9	90	90	0.3	Scallorn, red chert
1633-2	NW Scrape	25		B	N	8.5	6.1	21.8	10.0	13.9	3.7	7.0	3.3	10.0	1.7	0.5	5.1	6.4	100	120	0.7	Scallorn
286-3	EU 21		4	B	N	8.5	6.7	18.1	8.5	12.6	2.8	4.8	2.8	4.8	0.1	0.2	4.6	4.7	150	150	0.3	Scallorn
337-104	SW Rise			B	Y	8.6	6.2	16.5	8.6	12.9	1.8	4.0	2.2	7.1	0.9	0.2	3.0	2.0	ND	50	0.3	Scallorn
307-2	EU 26		2	JC	Y	8.8	5.0	16.9	8.8	11.2	3.1	5.4	2.8	7.9	1.4	1.3	3.6	3.3	60	40	0.5	Scallorn
230-276	NW Scrape			?	?	9.0	4.5	12.4	9.0	7.8	2.6	4.4	2.7	7.4	1.5	1.5	4.7	4.7	50	60	0.3	Scallorn, tip missing
4-2	P II TU 2		2	B	N	9.0	4.9	18.3	9.0	15.6	3.0	2.3	2.4	5.1	0.3	0.2	2.3	2.1	100	100	0.5	Scallorn base missing
291-2	EU 24	19	4b	B	?	9.0	5.3	20.8	9.0	11.3	4.0	8.7	3.1	8.3	1.1	2.2	7.8	7.8	90	80	0.7	Scallorn
355-9	NW Scrape	38		JC	N	9.0	5.6	18.2	9.0	12.1	3.1	5.7	2.8	9.0	0.5	2.3	4.9	2.4	70	70	0.4	Scallorn
338-25	SE Scrape			?	?	9.3	9.2	21.4	10.4	14.5	2.9	6.8	2.5	10.5	0.2	0.7	4.2	1.6	ND	50	0.7	Scallorn
225-4	EU 16		2	B	N	9.6	4.2	17.3	9.6	10.9	1.8	5.3	1.7	6.2	1.8	1.8	5.8	4.5	60	70	0.3	Scallorn
306-3	EU 24		5	B	Y	9.9	8.0	18.1	9.9	10.6	3.6	6.1	3.2	9.5	0.2	1.3	2.3	4.2	60	70	0.8	Non-ID arrow point
273-2	EU 24		3b	B	N	10.1	6.0	24.9	10.1	17.5	3.5	6.6	2.5	3.8	1.7	ND	5.7	ND	ND	70	0.6	Scallorn
1800	SE Scrape			B	N	10.4	ND	17.6	10.4	ND	3.5	ND	2.0	7.9	ND	ND	ND	ND	ND	ND	0.5	Scallorn
208-4	EU 13		4	B	?	10.5	ND	18.2	10.5	18.2	2.3	ND	2.1	10.3	ND	ND	ND	ND	ND	ND	0.5	Madison (small)
208-2	EU 13		4	JC	N	10.8	6.0	23.3	10.8	16.1	4.0	7.1	2.6	9.9	1.9	2.3	4.9	3.7	60	50	0.8	Scallorn
244-4	EU 19		2	?	?	10.9	8.2	23.2	10.9	17.7	2.6	4.4	3.0	4.4	0.8	ND	4.1	ND	ND	120	0.9	Non-ID arrow point
245-1	EU 18		2	B	Y	10.9	8.7	26.9	10.9	19.4	3.5	7.4	3.1	2.3	ND	ND	ND	ND	ND	ND	1.0	Non-ID arrow point
337-103	SW Rise			JC	N	12.0	7.6	22.4	12.0	18.7	3.3	5.9	3.2	8.9	0.3	0.8	3.5	3.7	ND	70	0.9	Non-ID arrow point
230-257	NW Scrape			B	Y	12.0	10.2	20.4	12.0	15.7	2.9	4.0	2.1	8.7	0.1	0.1	4.0	3.1	140	130	0.9	Non-ID arrow point
337-181	SW Rise			B	N	12.3	10.9	23.6	12.3	16.7	2.6	6.2	3.4	11.5	0.3	ND	3.6	ND	ND	60	1.1	Non-ID arrow point
337-109	SW Rise			?	?	12.5	8.5	26.8	12.5	18.8	2.9	5.3	2.3	7.1	0.3	0.4	3.3	6.4	ND	ND	1.1	Non-ID arrow point
1823-76	SE Scrape	28		JC	N	13.0	6.0	19.2	13.0	12.8	4.0	6.4	3.4	10.3	2.0	2.5	6.1	6.1	70	80	0.8	Scallorn/Kings Corner Notched (small)
50-1	P II TU 7		1	?	?	14.4	9.8	26.0	14.4	19.9	5.8	6.4	4.7	12.1	1.0	1.4	5.4	6.1	80	80	2.2	Non ID arrow point

Appendix 2. Metric Dimensions of Whole Projectile Points from the Stauffer Site (continued)

Catalog Number	Location	Feature	Zone, Level, Half	Material	TA	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
360-5		A	W Half	B	Y	14.9	5.3	17.8	14.9	12.2	2.4	6.3	2	9.3	3.8	3.9	4.2	4.2	30	30	0.6	Snyders miniature, like 296-101
336-566	NW Scrape II			B	Y	15.8	14.6	54.7	17.5	43.8	7.4	11.2	4.5	17.5	0.7	0.2	6.5	7.7	120	110	6.5	Non-ID spike shaped point
231-491	NE Scrape			?	?	18.1	15.1	34.6	19.4	27.9	7.7	6.7	4.3	19.4	2.0	2.1	4.9	6.0	70.0	60.0	4.6	Big Sandy
248-1	EU 19		3	Keokuk	Y	20.6	12.6	38.9	20.6	27.9	6.2	12.2	5.8	17.5	3.7	1.1	12.1	4.5	70.0	70	4.8	Big Sandy?
1392	NE Scrape			?	?	21.4	20.9	57.7	21.5	40.8	5.8	15.7	5.2	21.5	ND	ND	14.2	14.2	ND	ND	5.9	Dalton, ground base (now drill)
1951	SE Scrape			B	Y	22.7	20.6	69.2	22.7	55.6	7.6	12.9	6.6	21.4	0.6	0.4	14.3	13.6	ND	ND	14.1	Rice Sdie Notched
336-529	NW Scrape II			JC	N	24.6	11.9	82.7	24.8	68.0	6.6	12.9	5.7	18.7	5.6	3.9	10.9	9.0	60	60	14.8	Motley
230-1	NW Scrape			?	?	25.0	18.1	65.7	25.0	48.4	8.9	17.3	8.8	22.3	1.9	3.4	18.0	20.5	130.0	130.0	14.4	Steuben
355-3	NW Scrape	38		JC	N	25.0	19.2	55.0	25.3	40.3	8.0	14.7	5.0	25.3	3.3	2.8	12.8	13.4	110	80	12.4	Steuben Expanding Stemmed
1848	SE Scrape			JC	N	25.9	24.7	66.2	31.4	50.1	7.9	15.3	5.5	31.4	1.2	1.5	14.6	15.2	ND	ND	14.1	Rice Side Notched
360-6		A	W Half	B	Y	26.2	16.0	34.2	26.2	23.2	6.5	9.2	4.0	20.7	4.0	2.7	8.6	7.8	80	60	4.9	Kings Corner Notched
946	NE Scrape			JC	N	26.4	21.3	75.1	27.7	60.0	6.2	14.5	5.9	27.7	2.4	2.6	10.3	13.2	80	80	12.9	Etley
48-1	P II TU 6		5	JC	N	26.8	17.9	100.2	30.6	84.5	10.9	16.3	9.9	22.8	3.2	2.6	14.0	10.9	110	120	31.2	Etley
338-23	SE Scrape			B	Y	27.4	19.5	73.3	27.4	60.5	8.5	13.7	7.8	22.9	3.2	2.3	8.7	11.8	ND	60	16.6	Matanza
1069	NE Scrape			JC	N	28.1	20.0	78.6	28.1	65.4	9.0	14.6	7.8	22.2	2.8	2.0	12.4	13.0	110	110	13.0	Etley (now a drill)
231-386	NE Scrape			JC	N	28.1	21.7	70.6	28.1	55.1	11.6	13.3	8.5	25.7	2.1	1.8	10.8	13.8	110	110	20.9	Rice Side Notched
230-280	NW Scrape			JC	N	28.2	22.0	46.0	28.2	31.2	6.4	12.8	6.4	28.0	1.5	2.5	11.4	8.6	80	80	9.8	Big Sandy
338-30	SE Scrape			?	N	28.3	25.0	55.9	31.7	43.6	7.1	12.3	6.3	31.7	2.3	2.4	8.0	7.5	70.0	70.0	14.5	Rice Lobed
264-1	EU 24		1	B	N	28.5	25.6	58.3	30.5	42.3	8.2	17.9	7.2	30.5	1.8	1.9	10.7	10.6	100	130	14.7	Rice Side Notched
2045	SE Scrape			?	?	29.1	11.7	106.9	29.1	81.8	9.0	18.9	5.3	9.0	0.8	1.7	23.2	16.7	160	130	35.0	Etley, base fractured
231-293	NE Scrape			?	N	29.1	17.1	88.1	29.1	73.4	10.7	14.7	9.3	21.3	3.7	3.8	13.9	14.3	110.0	110.0	28.0	Etley
1258	NE Scrape			B	N	29.2	18.9	92.0	30.1	79.0	10.8	13.0	5.0	21.8	3.2	3.3	6.5	10.7	70	60	34.5	Etley
231-292	NE Scrape			B	N	31.1	19.0	90.0	30.9	74.2	10.9	15.8	12.1	27.0	2.5	5.7	16.2	14.0	90.0	60.0	31.1	Etley
231-298	NE Scrape			JC	N	31.1	20.3	62.1	31.1	47.8	6.8	14.1	5.8	14.4	3.5	0.4	12.6	9.8	150	100	13.7	Gary Contracting Stemmed
2021	SE Scrape			B	N	31.4	23.0	65.2	31.4	48.8	9.8	15.0	6.7	27.6	3.1	3.1	13.7	12.4	70	60	21.0	Etley
2064	SE Scrape			?	?	31.6	23.8	54.8	31.6	42.4	7.7	10.4	5.8	25.9	0.7	3.2	5.9	10.5	70	60	13.1	Big Sandy
1965	SE Scrape			JC	N	31.9	21.6	60.9	31.9	47.1	7.5	13.1	6.9	25.6	2.4	3.2	9.2	9.2	70	70	15.3	Big Sandy
550	NW Scrape			B	Y	33.5	17.2	57.6	33.5	41.8	8.0	15.7	5.6	27.3	5.4	7.7	13.5	8.7	60	40	13.7	Non Id
368-5	General Collection			JC	N	34.5	19.8	80.4	34.5	64.7	9.7	14.7	5.6	23.2	3.0	6.1	14.2	15.9	80	80	24.3	Etley
271-1	EU 25		2	B	N	35.2	18.1	44.7	35.2	30.3	7.3	12.9	4.1	18.5	3.9	4.5	8.0	12.8	50	60	10.9	Snyders like? Stream rolled

Appendix 2. Metric Dimensions of Whole Projectile Points from the Stauffer Site (continued)

Catalog Number	Location	Feature	Zone, Level, Half	Material	TA	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
337-108	SW Rise			JC	N	35.9	24.5	32.2	35.9	17.8	8.2	14.8	4.9	28.6	4.6	2.7	14.5	13.4	60	60	9.3	Etley, now a scraper
360-7		A	W Half	JC	N	36.1	23.1	67.4	36.1	52.0	10.5	14.5	5.6	27.3	1.7	4.2	12.3	7.6	ND	50	25.7	Etley
621	NW Scrape			JC	N	36.2	22.5	78.5	36.2	61.6	7.0	14.5	4.8	29.8	5.5	5.8	11.5	13.5	70	70	24.6	Etley
1656	NW Scrape II			JC	N	36.3	24.6	67.0	36.3	53.1	9.8	12.3	6.1	28.3	4.3	3.8	9.0	7.7	50	50	23.1	Etley
629	NW Scrape			JC	N	37.8	21.9	55.8	37.8	40.2	6.9	15.8	7.3	19.2	2.1	2.7	18.7	14.2	140	110	15.1	Non ID
1652-2	NW Scrape	27		B	N	37.8	24.6	83.7	38.1	67.4	9.0	17.2	6.6	32.2	5.7	4.9	13.5	15.1	60.0	70.0	35.1	Etley
1155	NE Scrape			JC	N	37.9	23.8	62.9	37.9	50.7	7.6	11.9	5.8	27.4	5.2	4.0	11.2	7.9	40.0	50.0	19.7	Etley
338-22	SE Scrape			B	N	38.5	24.8	99.0	38.5	83.2	9.0	15.8	8.7	21.3	2.5	3.5	18.1	20.5	120.0	130.0	34.1	Etley
338-31	SE Scrape			JC	N	39.1	23.3	84.4	39.1	70.4	11.9	14.0	10.8	23.9	5.6	3.8	10.1	15.9	80.0	80.0	24.5	Etley, reworked into drill
230-273	NW Scrape			JC	N	39.6	25.0	64.3	39.6	45.9	9.1	16.1	9.3	30.0	3.8	3.4	15.9	13.6	80.0	80.0	26.6	Etley
338-24	SE Scrape			JC	N	41.5	18.4	93.6	41.2	79.1	9.7	14.5	6.6	21.1	8.4	6.8	9.7	8.4	40.0	40.0	36.8	Etley
633	NW Scrape			JC	N	42.7	22.2	79.0	42.7	65.4	7.2	12.3	5.5	8.2	2.6	3.7	7.1	10.8	80.0	60.0	25.9	Etley
2057	SE Scrape			JC	N	43.1	34.8	91.3	43.1	ND	7.6	ND	7.5	31.4	ND	ND	ND	ND	ND	ND	36.5	Etley preform
230-2	NW Scrape			B	N	ND	ND	18.8	9.5	18.8	2.7	ND	2.7	9.5	ND	ND	ND	ND	ND	ND	0.4	Scallorn, Missing base

* EU = Excavation Unit, JC = Jefferson City, B = Burlington, N = No, Y = Yes, ? = Do Not Know, ND = No Data

APPENDIX 3. Metric Dimensions of Projectile Point Fragments from the Stauffer Site.

Catalog Number	Location	Feature	Zone, Level, Half	Complete or portion*	Material **	Thermal Alteration	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
362-2		A	2 (E Half)	T	?	?	4.2	ND	14.2	9.7	10.8	3	5.9	3.6	9.7	1.5	1	4.6	4.7	90	80	0.8	Non-ID arrow point
1823-56	SE Scrape	28		B	?	?	7	4.5	8.3	7.2	8.2	3.9	6.7	4	5.4	0.9	1	6.8	6.4	120	110	0.4	Scallorn
219-2	EU 14		3	B/M	?	?	7.2	4.3	14.6	40.1	25.8	10.4	15.4	8	36	2.6	2.7	12.2	10.9	70	70	21	Scallorn
226-7	EU 16		3	M	?	?	7.3	ND	9.2	30.7	50.4	12.4	16.1	9.7	17.9	4	3.7	13.5	13.3	90	90	22.2	Scallorn
228-2	EU 22		2	M	B	N	7.3	ND	10.3	7.6	15.1	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	Scallorn
226-1	EU 16		3	M/T	?	?	7.7	ND	20.9	7.7	20.9	2.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	Scallorn-Sequoya
288-1	EU 23	19	4	B	B	Y	7.8	4.7	9.7	7.3	9.2	2.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	Scallorn
1823-10	SE Scrape	28		M/T	?	?	7.8	6.4	13.9	9	15.6	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	Non-ID arrow point
356-10	NW Scrape	38		B	?	?	8	4.2	8.5	10.3	15.7	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	Scallorn
361-1		A	E Half	M/T	?	?	8.1	ND	18	37.7	ND	ND	27.2	5.1	37.7	ND	ND	ND	ND	ND	ND	4.6	Scallorn
1633-3	NW Scrape	25		M/T	B	N	8.3	5.3	15	8.7	9.1	4.9	7.3	3.9	6.4	1.4	ND	6.2	ND	ND	100	0.8	Scallorn
13-1	P II TU 2	19	3	T	?	?	8.3	ND	13	8.9	10.4	4.1	3.9	1.8	ND	0.5	ND	1.3	ND	ND	70	0.4	Non-ID arrow point
72-1	P II TU10/L2		2	B	B	N	8.4	4.5	9.3	6.8	ND	ND	7.7	3.2	6	1.2	ND	3.5	ND	ND	80	0.2	Scallorn
337-107	SW Rise			B	B	N	8.4	5.2	11.6	8.7	15.7	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	Scallorn
243-1	EU 17		2	B/M	?	?	8.7	5.9	17.8	7.3	10.3	2.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	Scallorn
252-1	EU 20		1	T	B	N	8.7	ND	15.7	10.2	11.2	2.7	8.3	4.1	7.6	0.4	0.2	7.3	8.7	120	120	0.8	Non-ID arrow point fragment
245-7	EU 18		2	M/T	JC	N	8.9	4.8	15.2	29.2	13	10	13.1	7.3	24.2	2.9	2.8	7.7	7.5	70	80	6.5	Scallorn
254-2	EU 18	19	3b	M	B	Y	8.9	4.8	8.3	39.9	28	7.7	12.2	4.8	22.1	6.4	ND	10.4	ND	ND	60	12.9	Non-ID arrow point fragment
226-11	EU16/L3		3	T	?	?	8.9	ND	15.8	15.4	12.5	3	3.6	2.9	ND	1.8	ND	2.6	ND	ND	40	0.7	Non-ID arrow point fragment
243-2	EU 17		2	T	?	?	9	ND	15.6	8.9	15.8	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	Non-ID arrow point
963	NE Scrape			B/M	?	?	9.2	5.2	13.2	21.8	10.9	6.4	9.6	4.1	21.8	1.4	2.5	10.3	6.9	40	60	2.5	Scallorn fragment
206-3	EU 13		3	B/M	?	?	9.2	6.4	17.3	41.5	23.5	12.2	13.7	9.4	26.7	7.4	3.7	11.2	13.7	70	60	20.8	Scallorn
247-3	EU 18	19	3a	T	B	N	9.2	ND	16.8	9.2	7.9	2.7	4.4	2.1	8.5	2.2	1.5	3.4	2.7	30	50	0.3	Scallorn
338-26	SE Scrape			B	?	?	9.4	6.3	15.2	26.4	15.4	9	9.7	8.3	17.6	2.6	ND	9.9	ND	ND	80	8.1	Scallorn
342-10	NW Scrape	27		M/T	?	?	9.4	6.3	17.5	23	17.3	6.3	10.4	4.6	17.3	2.3	3.6	11.2	9.6	60	80	4.9	Non-ID arrow point
81-1	P II TU 9		6	M	?	?	9.4	ND	13.1	21.1	30.3	6.9	10.8	4.2	9.9	5.1	ND	10.2	ND	ND	50	6.6	Non-ID arrow point
337-106	SW Rise			B	?	?	9.5	8.8	19.6	39.2	22.4	10.1	2.3	8.9	ND	2.9	0.4	4.5	8.4	40	50	14.5	Non-ID

Appendix 3. Metric Dimensions of Projectile Point Fragments from the Stauffer Site (continued).

Catalog Number	Location	Feature	Zone, Level, Half	Complete or portion*	Material **	Thermal Alteration	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
336-541	NW Scrape II			B/Side	JC	N	9.7	5.6	14	38.1	43.78	10.9	17.2	9.4	22.9	3.4	1.8	12.2	12	80	80	27.1	Non-ID
287-1	EU 25	19	4	B/M	B	Y	9.7	5.9	15.6	39.6	10.6	10.6	7.8	10.6	ND	2.4	ND	7	ND	ND	50	9.9	Scallorn
266-3	EU 24		2	B	?	?	10.2	7.6	20.3	28.6	21	9.7	15.8	8.2	22.4	1.7	2.5	15.6	16.8	130	140	12.4	Scallorn
241-1	EU 17		1	T	?	?	10.3	ND	15.7	30.6	ND	7.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	14.2	Non-ID arrow point fragment
246-1	EU 17	19	3	T	B	N	11	ND	16.1	34.1	21.3	8.5	13.3	6.9	4.5	0.8	ND	26	ND	ND	160	9.3	Non-ID arrow point fragment
360-11		A	W Half	M	JC	N	11.7	ND	22.2	12.7	14.3	3.6	6.5	2.8	11.1	1.9	2.2	4	5.4	60	40	1	Non-ID arrow point
336-546	NW Scrape II			B	?	?	11.8	5.1	12.9	25.9	29.8	7.6	16.3	7.2	25.9	2.2	ND	15.7	ND	ND	80	11.3	Non-ID arrow point
5-2	P II TU 1		3	M	B	N	11.8	ND	16.4	36.9	21.3	10.6	16.4	7.3	28.2	4	5.6	14.4	15	70	70	14.3	Non-ID arrow point
231-490	NE Scrape			B/M	B	N	12.7	6.3	21.9	37.8	18.2	7.3	10.7	5.2	24.5	3.8	2.9	12.7	6.6	60	50	10.4	Scallorn
338-190	SE Scrape			B	JC	N	14.8	14.4	22.5	26.8	30.6	8.1	14.5	6.4	23.7	2.5	2.3	11.6	9.1	80	70	13.6	Madison
231-228	NE Scrape			B/Side	JC	Y	15	6.3	42.3	31.5	10.8	6.6	21.5	5.5	26.1	2.4	1.5	20	14.1	110	130	7.8	Motley
296-101	EU 27		1	M/T	B	Y	15.4	7.1	16.5	29.2	11.4	6.4	12.7	4.5	21.9	2.1	4.9	11.3	9.5	70	80	5.4	Snyders miniature
360-8		A	W Half	M/Side	?	Y	17.7	3.5	34.8	26.8	15.4	8	16.6	5.9	26.8	2	ND	12.5	ND	ND	80	8.6	Non-ID
336-559	NW Scrape II			B	B	N	17.9	9.7	25.7	17.9	12.1	6.8	12.8	4.8	11.5	5.9	ND	10.9	ND	ND	50	3.4	Motley
369-10	General Collection			B	B	Y	19	15.3	19.7	44.6	29.3	10.6	11.8	7.1	25.3	5.8	5.7	13.5	14.7	80	50	16.4	Non-ID
336-528	NW Scrape II			B	JC	Y	19.8	15.8	32.9	39.5	13.2	11.7	13.7	6.5	24.8	2.2	2.7	10.3	9.5	70	60	11.9	Steuben Expanding stemmed
2504	NW Scrape II			B	B	Y	20.1	14.2	29.5	33.6	46.3	7.7	7.1	5.5	ND	2.9	1.2	7.8	5.8	60	60	17.1	Non-ID
1039	NE Scrape			B/M	B	Y	21.9	14.8	28.4	20.1	18.5	6.6	9.4	5	18.7	2.1	1.8	6.8	6.6	60	50	4.8	Etley
2018	SE Scrape			B	B	Y	22.6	14.2	40.4	19.8	21.9	6.9	10.8	5.7	19.3	1.3	1.3	7.1	7.4	80	80	6	Non-ID
1156	NE Scrape			B/Side	B	N	22.7	21.8	46	43.7	41.4	9.7	9.3	6.3	ND	3	3.4	11.4	11.8	80	60	24.3	Steuben Expanding stemmed
355-5	NW Scrape	38		B/M	B	N	22.9	12.9	35	9.7	7.9	3.4	5	4.1	ND	0.8	ND	4.8	ND	ND	80	0.5	Non-ID
1557	NW Scrape II			B	JC	N	23.1	21.7	26.9	26.6	11.7	10.9	14.5	5.9	26.6	1.2	0.1	10.4	8.7	ND	80	6	Etley
533	NW Scrape			B	B	Y	23.8	22.1	32.8	35.7	17.4	9.7	14.7	5.5	ND	1.5	ND	10.5	ND	ND	100	12.7	Rice Side Notched
338-28	SE Scrape			B	B	Y	24.5	10.8	26.2	11.8	7.9	2.9	4.2	1.7	5.1	0.5	1	5.6	4.7	100	100	0.4	Kings Corner Notched
1550	NW Scrape II			B	JC	N	24.5	20.9	18.6	26.3	ND	ND	24.7	5.7	11.8	0.2	0.1	19.1	24.2	ND	ND	3.7	Non-ID
336-520	NW Scrape II			B	JC	N	26.3	19.4	24.7	40.1	ND	ND	17.3	5	40.1	ND	ND	ND	ND	ND	ND	3.7	Non-ID, contracting stem
231-235	NE Scrape			B	B	N	26.4	18.1	28.1	26.6	3.9	8	12.9	5.8	26.6	1.9	1.2	9.7	10.7	60	60	5	Non-ID

Appendix 3. Metric Dimensions of Projectile Point Fragments from the Stauffer Site (continued).

Catalog Number	Location	Feature	Zone, Level, Half	Complete or portion*	Material **	Thermal Alteration	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
1815	SE Scrape			B	JC	N	26.6	21.8	35.8	27.3	20.3	6	7.1	3.4	12.6	4.4	4.5	6.7	6.6	50	60	4	Non-ID
230-274	NW Scrape			B	B	N	26.8	19.3	48.1	39	25.1	7.6	13	7.3	23.9	3.5	4.8	13.5	11.7	60	80	16	Non-ID
1559	NW Scrape II			B	JC	N	27.3	10.5	29.5	11.8	16.4	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	Non-ID
343-11	NW Scrape	27		B	B	N	28	21.6	30.4	19.2	ND	ND	13.3	8.4	19.2	ND	ND	ND	ND	ND	ND	1.8	Non-ID
1370	NE Scrape			B	JC		28.6	20.4	38	36.7	21.1	9.6	15.6	6.7	28.6	5.4	4.4	13.1	14.8	70	80	15.8	Etley
561	NW Scrape			B/M	JC	N	28.6	23.3	44.6	12	17.6	3.8	3	2.5	ND	ND	ND	ND	ND	ND	ND	0.8	Non-ID
2077	SE Scrape			B/Side	JC	N	28.7	16.9	53.4	9.4	13.1	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	Gary Contracting Stemmed
230-4	NW Scrape			B	?	?	29.2	17.8	26	8.6	6.5	2.8	2.2	2.4	8.6	1.8	1.9	5.5	5.6	70	60	0.2	Etley
266-4	EU 24		2	B	B	Y	29.2	20.6	26.9	15.7	15.4	4.5	6.4	4.6	15.6	ND	ND	6.5	6.9	ND	ND	1.6	Non-ID
340-1	NW Scrape	27		M	?	Y	29.9	15.6	38.4	24.5	19.3	5.6	7.7	4.3	12.4	4.4	3.6	8.3	8.7	60	60	3.7	Non-ID
231-281	NE Scrape			M/T	B	Y	30	ND	50.3	33.9	4.6	8.5	13.2	5.6	21.7	1.2	3.9	13.2	2.8	ND	50	6.3	Non-ID
234-1	EU 16		5	B/M	B	N	30.7	15.5	66.9	32.7	18.1	9.7	13.5	7.2	26.4	5.9	4.7	11.8	11.8	50	60	11.5	Etley
230-3	NW Scrape			B	JC	N	31.5	23.6	33.3	35.7	18.8	8.4	11.7	5.1	30.2	2.4	2.4	8.7	10.7	80	60	13.1	Non-ID
337-371	SW Rise			B	JC	N	31.8	22.9	22.2	28.4	18.3	7.8	15.7	4.7	28.4	2.6	1.5	7.8	8.5	70	60	7.2	Non-ID
2049	SE Scrape			B	JC	Y	32.7	18.8	33.7	36.7	18.4	9.7	5.1	5.6	ND	1.5	1.5	9.1	7.9	70	70	9.5	Etley
1566	NW Scrape II			B/M	JC	N	33.6	16.1	55.8	26.5	ND	ND	19.8	6.7	26.5	ND	ND	ND	ND	ND	ND	3.5	Etley base
338-29	SE Scrape			B	B	Y	33.9	19.9	22.2	24.5	28.9	8.6	11.4	7.2	16.5	3.4	1.4	10.5	10.1	80	70	9.6	Non-ID, red Burlington
231-147	NE Scrape			B/Side	B	Y	34.1	15.8	39	36.7	24.9	9.4	17	7	18.3	4.8	3.1	17.4	20.6	80	80	20	Rice Side Notched
1638	NW Scrape II			B	JC	N	35.7	26.2	33.8	28.7	27.7	10.2	18.8	9	16.4	1.5	ND	19.8	ND	ND	140	13.5	Non-ID
2078	SE Scrape			B	JC	N	35.7	28.5	32.3	9.4	7.1	2.8	5.7	2.8	7.1	0.4	ND	4	4.2	ND	60	0.5	Non-ID
2029	SE Scrape			B	JC	N	36.7	20.4	46.3	27.6	ND	ND	15	6.3	27.6	ND	ND	ND	ND	ND	ND	3.4	Non-ID
2056	SE Scrape			M	B	N	36.7	21.7	23.7	31.8	5.5	6.5	11.9	5	28.6	2.9	3	8.3	8.3	70	60	4.5	Non-ID
87-5	P II TU 11		4	B	JC	N	36.7	23.1	37	13.8	11.3	5.4	9	4.8	13.8	2.7	5	4.7	ND	ND	50	1.1	Etley
1144	NE Scrape			B	JC	Y	36.9	22.6	38.9	9	5.3	3.1	5.3	3	9	1.2	1.2	2.8	3.7	50	50	0.3	Etley
549	NW Scrape			B	JC	N	37.8	24.8	30	11	16.1	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	Non-ID
231-294	NE Scrape			B/M	JC	N	38.1	22.3	59.4	8.9	8	1.7	0.3	1.7	ND	ND	ND	ND	ND	ND	ND	0.2	Etley
1574	NW Scrape II			B	JC	N	39	21.7	39.8	9.2	16.8	2.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	Etley

Appendix 3. Metric Dimensions of Projectile Point Fragments from the Stauffer Site (continued).

Catalog Number	Location	Feature	Zone, Level, Half	Complete or portion*	Material **	Thermal Alteration	Shoulder Width	Stem Width	Max. Length	Max. Width	Blade Length	Blade Thick	Stem Length	Stem Thick	Base Width	Notch Depth 1	Notch Depth 2	Notch Width 1	Notch Width 2	Notch Angle 1	Notch Angle 2	Weight	Type, Comments
231-225	NE Scrape			B/M	B	?	39.2	19.6	26.1	7.9	3	2.5	6.1	2.8	7.9	2.1	1	3.1	3	70	60	0.2	Non-ID
1642	NW Scrape II			B	JC	N	39.5	23.5	30.3	30.6	ND	ND	26.6	7.4	30.6	ND	ND	ND	ND	ND	ND	6.5	Non-ID
1063	NE Scrape			M	JC	N	39.6	29.5	17.1	9.7	8.9	4.3	6.3	3.6	8.8	1.4	1.7	4.3	5.9	70	70	0.8	Non-ID
287-2	EU 25		4	B/M	?	?	39.9	19.5	39.5	8.3	13	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	Non-ID
222-1	EU 14		5	B	JC	N	40.1	29.3	41.3	8.3	13.7	2.2	0.8	1.9	ND	ND	ND	ND	ND	ND	ND	0.3	Etley
368-4	General Collection	B	N	B	B	N	41.2	23.5	33.5	29.9	33.6	5.6	3.8	3.5	ND	ND	ND	ND	ND	ND	ND	7.4	Snyders-like
1273	NE Scrape			B	B	N	41.5	22	39.5	28	18.7	8.9	12.5	5.8	25.2	1.4	3.7	9.7	7.9	110	70	9.9	Etley
1555	NW Scrape II			B/M	JC	N	43.7	17.6	54.8	9.4	14.5	3.6	2	4.6	ND	ND	ND	ND	ND	ND	ND	0.7	Non-ID
230-278	NW Scrape			B	JC	N	44.6	24.5	43.4	7.8	10.1	2.2	2.9	2	7	0.6	ND	2.4	ND	ND	80	0.3	Etley-reworked
240-2	EU 19		1	B	?	Y	ND	6.8	7.7	7.8	3.3	2.2	5.4	2.4	7.8	0.9	1.2	3.9	4	60	60	0.1	Scallorn
71-2	P II TU 10		1	B	B	N	ND	12.9	13.3	8	4.1	2.2	3.2	2.2	6.5	1.2	1.3	3.3	3	50	50	0.1	Non-ID
1849	SE Scrape			B	JC	N	ND	22.1	19.8	22.9	25.7	8.3	9.3	5.7	15	2.9	1.8	10.6	7.5	60	90	7	Non-ID
338-174	SE Scrape			B	B	N	ND	23.4	14.7	12	22.2	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.1	Non-ID
291-211	EU 24	19	4b	B	JC	?	ND	26.1	26.6	17.7	25.8	6.1	6.7	5.1	ND	3.8	ND	10.8	ND	ND	70	3.5	Non-ID
218-3	EU 14		2	T	B	Y	ND	ND	15.1	11	15.3	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	Non-ID arrow point
241-101	EU 17		1	B	B	Y	ND	ND	27.2	8.1	18	3.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	Non-ID
1564	NW Scrape II			B	JC	Y	ND	ND	17.3	41.2	21.7	8.6	13.4	5.8	32	7	7.1	9.1	9.3	50	50	12.3	Non-ID
361-2		A	1 (E Half)	T	?	?	ND	ND	10.6	4.2	14.2	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	Non-ID arrow point tip
360-10		A	W Half	T	?	?	ND	ND	15.3	6.1	10.6	2.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	Non-ID arrow point

C = Complete, T = Tip, M = Medial, B = Base
* EU = Excavation Unit, JC = Jefferson City, B = Burlington, N = No, Y = Yes, ? = Do Not Know, ND = No Dat

APPENDIX 4. Cores from Features.

Catalog Number	Excavation Unit	Feature	Count	Weight	Material	Comments
1249		12	1	24.4	Jefferson City	Thermally altered
1256A		12	1	62.6	Jefferson City	
1259A		12	1	188	Jefferson City	
1240		12	1	210.1	Jefferson City	
1262		12	1	760	Not Designated	Utilized/retouched
1261		12	1	236.7	Unknown	
1269.1		13	1	249.2	Jefferson City	
287.9	25	19	1	59.9	Burlington	
287.211	25	19	1	90.8	Burlington	Thermally altered
311.2	18	19	1	98.4	Burlington	
321.8	18	19	1	22.7	Burlington	
258.2	18	19	1	21.9	Jefferson City	
278.4	18	19	1	36.6	Jefferson City	Possible retouch
288.3	23	19	1	50.3	Jefferson City	
288.205	23	19	1	53.2	Jefferson City	
288.207	23	19	1	65.8	Jefferson City	
288.213	23	19	1	57.1	Jefferson City	
268.1	24	19	1	36.1	Jefferson City	
268.6	24	19	1	27.5	Jefferson City	
268.7	24	19	1	25.4	Jefferson City	
273.107	24	19	1	102.5	Jefferson City	
273.12	24	19	1	46.3	Jefferson City	Thermally altered
283.203	24	19	1	80.6	Jefferson City	
274.1	25	19	1	60.3	Jefferson City	
274.2	25	19	1	24.6	Jefferson City	
274.3	25	19	1	22.1	Jefferson City	
280.2	25	19	1	50.1	Jefferson City	
280.107	25	19	1	84.2	Jefferson City	
287.5	25	19	1	31.3	Jefferson City	
287.6	25	19	1	16.2	Jefferson City	
287.213	25	19	1	212.6	Jefferson City	
287.218	25	19	1	89.5	Jefferson City	
287.219	25	19	1	0	Jefferson City	Lost
297.1	18	19	1	39.5	Jefferson City	
297.2	18	19	1	28.8	Jefferson City	
272.102	18 & 23	19	1	188.7	Jefferson City	
272.111	18 & 23	19	1	74	Jefferson City	
272.122	18 & 23	19	1	36	Jefferson City	
272.123	18 & 23	19	1	173.5	Jefferson City	
272.154	18 & 23	19	1	170.1	Jefferson City	
272.166	18 & 23	19	1	88.7	Jefferson City	
297.22	18	19	1	175.2	Jefferson City	
271.2	18	19	1	63.8	Jefferson City	
277.3	18	19	1	44.4	Jefferson City	
301.2	18	19	1	50.7	Jefferson City	Utilized/retouched
321.9	18	19	1	155.1	Jefferson City	
323.3	18	19	1	44.3	Jefferson City	
317.3	18	19	1	55	Maynes Creek	
272.174	18 & 23	19	1	38.9	Not Designated	
273.3	24	19	1	13.2	Unknown	
298.1	18	19	1	18.2	Unknown	
272.164	18 & 23	19	1	272.5	Unknown	
311.4	18	19	1	57	Unknown	
315.6	26	23	1	148.2	Burlington	
335.3	28	23	1	13.9	Burlington	Thermally altered
324.1	26	23	1	57.8	Jefferson City	
315.7	26	23	1	70.8	Jefferson City	

Appendix 4. Cores from Features (continued)

Catalog Number	Excavation Unit	Feature	Count	Weight	Material	Comments
335.1	28	23	1	75.8	Jefferson City	
335.2	28	23	1	27	Jefferson City	
1633.6		25	1	22.8	Not Designated	
1652.95		27	1	108.6	Burlington	
1652.96		27	1	68.3	Burlington	
1652.115		27	1	22.9	Burlington	Thermally altered
1652.122		27	1	3.1	Burlington	Thermally altered
1652.123		27	1	2.4	Burlington	
342.3		27	1	7	Jefferson City	
1652.2		27	1	22.6	Jefferson City	
1652.92		27	1	382	Jefferson City	
1652.93		27	1	169.2	Jefferson City	
1652.94		27	1	142.1	Jefferson City	
1652.97		27	1	56.7	Jefferson City	
1652.98		27	1	71.6	Jefferson City	
1652.99		27	1	55	Jefferson City	
1652.1		27	1	49.6	Jefferson City	
1652.101		27	1	39.3	Jefferson City	
1652.102		27	1	39.1	Jefferson City	
1652.103		27	1	31.1	Jefferson City	
1652.104		27	1	26.3	Jefferson City	Thermally altered
1652.105		27	1	30	Jefferson City	
1652.106		27	1	42.1	Jefferson City	
1652.107		27	1	40.9	Jefferson City	
1652.108		27	1	33.1	Jefferson City	
1652.109		27	1	27.6	Jefferson City	
1652.11		27	1	27.8	Jefferson City	
1652.111		27	1	21.5	Jefferson City	
1652.113		27	1	30	Jefferson City	
1652.114		27	1	28.6	Jefferson City	
1652.116		27	1	25.9	Jefferson City	Thermally altered
1652.117		27	1	9.7	Jefferson City	
1652.118		27	1	10.4	Jefferson City	Thermally altered
1652.119		27	1	10.9	Jefferson City	
1652.12		27	1	5.9	Jefferson City	
1652.121		27	1	6.7	Jefferson City	
343.2		27	1	43.3	Jefferson City	
343.9		27	1	26.9	Jefferson City	
343.12		27	1	25.6	Jefferson City	
343.15		27	1	10.2	Jefferson City	
341.6		27	1	3.1	Jefferson City	Thermally altered
339.4		27	1	91.3	Jefferson City	
339.5		27	1	100.1	Jefferson City	
343.1		27	1	23.6	Roubidoux Quartzite	
342.4		27	1	7.2	Unknown	
1652.112		27	1	19.5	Unknown	
343.8		27	1	84.3	Unknown	
343.13		27	1	2.7	Unknown	
343.14		27	1	3.9	Unknown	
341.5		27	1	6.7	Unknown	
341.7		27	1	15.5	Unknown	Thermally altered
341.8		27	1	48	Unknown	
1823.25		28	1	12.2	Burlington	Thermally altered
1823.46		28	1	28.6	Burlington	
1823.59		28	1	41.6	Burlington	
344.11		28	1	28.9	Burlington	
344.12		28	1	22.9	Burlington	
344.29		28	1	23	Burlington	
347.1		28	1	37.6	Burlington	

Appendix 4. Cores from Features (continued).

Catalog Number	Excavation Unit	Feature	Count	Weight	Material	Comments
349.4		28	1	9.1	Burlington	
1823.13		28	1	217.9	Jefferson City	
1823.14		28	1	186.4	Jefferson City	
1823.15		28	1	134.2	Jefferson City	
1823.16		28	1	88.9	Jefferson City	
1823.18		28	1	54.4	Jefferson City	
1823.19		28	1	36	Jefferson City	
1823.2		28	1	31.5	Jefferson City	
1823.21		28	1	27.1	Jefferson City	
1823.23		28	1	15.6	Jefferson City	
1823.26		28	1	4.8	Jefferson City	
1823.27		28	1	1.7	Jefferson City	
1823.28		28	1	1.2	Jefferson City	
1823.52		28	1	11.5	Jefferson City	
1823.58		28	1	232.7	Jefferson City	
1823.61		28	1	29.3	Jefferson City	
1823.62		28	1	11.4	Jefferson City	
1823.63		28	1	6.5	Jefferson City	
1823.64		28	1	0.6	Jefferson City	
340.2		28	1	112.4	Jefferson City	
344.1		28	1	212.4	Jefferson City	
344.2		28	1	123.4	Jefferson City	
344.3		28	1	124.5	Jefferson City	
344.4		28	1	85.2	Jefferson City	
344.5		28	1	52.4	Jefferson City	
344.6		28	1	48.9	Jefferson City	
344.7		28	1	33.5	Jefferson City	
344.8		28	1	33.8	Jefferson City	
344.9		28	1	36.5	Jefferson City	
344.1		28	1	32.9	Jefferson City	
344.25		28	1	39.6	Jefferson City	
344.27		28	1	191	Jefferson City	
344.28		28	1	41.6	Jefferson City	
344.3		28	1	12.6	Jefferson City	
344.31		28	1	7.3	Jefferson City	
344.35		28	1	51.1	Jefferson City	
347.8		28	1	16	Jefferson City	
347.9		28	1	30.1	Jefferson City	
347.11		28	1	41	Jefferson City	
347.12		28	1	42.5	Jefferson City	
347.13		28	1	315.5	Jefferson City	
348.4		28	1	106.4	Jefferson City	Thermally altered
348.9		28	1	11.3	Jefferson City	
349.2		28	1	59.7	Jefferson City	
1823.22		28	1	16.9	Roubidoux Quartzite	
1823.17		28	1	84.8	Unknown	
1823.24		28	1	15.7	Unknown	
1823.6		28	1	33.6	Unknown	
1847.1		30	1	27.1	Jefferson City	
1853.1		31	1	191	Jefferson City	
1973.14		33	1	44.3	Jefferson City	
1973.15		33	1	42.1	Jefferson City	Thermally altered
1973.16		33	1	32.4	Jefferson City	
1973.17		33	1	41.6	Jefferson City	
1956.2		34	1	39.3	Burlington	
2506.21		38	1	134.6	Burlington	Thermally altered
355.26		38	1	910	Burlington	Also a hammerstone
2506.2		38	1	168.3	Jefferson City	
2506.22		38	1	75	Jefferson City	

Appendix 4. Cores from Features (continued).

Catalog Number	Excavation Unit	Feature	Count	Weight	Material	Comments
2506.23		38	1	35.4	Jefferson City	
2506.25		38	1	20.4	Jefferson City	
354.1		38	1	25.6	Jefferson City	Thermally altered
354.11		38	1	37.4	Jefferson City	
354.12		38	1	107.8	Jefferson City	
354.13		38	1	148.5	Jefferson City	
355.23		38	1	27.1	Jefferson City	
355.24		38	1	26.2	Jefferson City	
355.25		38	1	38.5	Jefferson City	
356.24		38	1	34.9	Jefferson City	
356.25		38	1	14.8	Jefferson City	
2506.24		38	1	40	Roubidoux Quartzite	
2106.1		41	1	29.4	Jefferson City	Thermally altered
2106.101		41	1	29.1	Jefferson City	
362.33		A	1	14.3	Burlington	
360.56		A	1	23	Jefferson City	
360.57		A	1	33.5	Jefferson City	
360.58		A	1	30.3	Jefferson City	
360.59		A	1	34.1	Jefferson City	
360.6		A	1	36.5	Jefferson City	
360.61		A	1	54.6	Jefferson City	
360.62		A	1	34.8	Jefferson City	
360.63		A	1	90.6	Jefferson City	
360.64		A	1	81.4	Jefferson City	
360.65		A	1	48.7	Jefferson City	
360.66		A	1	118.1	Jefferson City	
360.67		A	1	122.2	Jefferson City	
361.8		A	1	17.4	Jefferson City	
361.9		A	1	17.9	Jefferson City	Thermally altered
362.1		A	1	46.5	Jefferson City	
362.12		A	1	108.1	Jefferson City	
362.13		A	1	32.2	Jefferson City	
362.14		A	1	45.8	Jefferson City	
362.31		A	1	77.8	Jefferson City	Thermally altered
362.39		A	1	22.6	Jefferson City	
365.1		A	1	45.2	Jefferson City	
365.2		A	1	20.3	Jefferson City	
365.3		A	1	17.7	Jefferson City	
362.3		A	1	82.1	Maynes Creek	
362.19		A	1	8.5	Maynes Creek	
362.8		A	1	80.2	Not Designated	
362.11		A	1	102.9	Not Designated	
			217	14637.1		
67.45	Mean	96.46	SD pop			

3APPENDIX 5. Whole Bifacial Tools.

Catalog Number	Excavation Unit	Feature	Half/ zone	Zone/ level	Scrape	Weight	Length	Width	Thick	Material	Comment
1243		12			NE	214.8	121.6	53.8	38.7	B	Adze: large, thick, triangular in outline and cross section.
1245		12			NE	696.0	135.3	92.6	60.7	B	Chopping tool made by removing a few flakes from a large cobble
321.6	18	19	SW 1/4	5		17.7	60.5	22.2	12.8	B	Gouge
343.1		27	E 1/2	Zone E	NW	40.7	61.5	36.0	17.6	JC	Adze
1823.65		28	W 1/2			35.7	71.3	40.4	15.4	B	Thick, irregular
349.1		28	E 1/2	Zone 4		99.4	98.1	46.4	20.7	B	Adze
1823.4		28	W1/2		SE	12.1	39.9	27.7	11.9	B	Little adze or wedge, thermally altered
1973.2		33	E 1/2		SE	83.3	89.7	42.2	23.1	B	Outline, cross section triangular
2506.2		38	W 1/2		NW	48.2	75.3	39.9	16.8	B	Irregular, crude
360.9		A	W 1/2			84.3	68.1	38.8	30.3	B	Very thick
362.1		A	E 1/2	Zone 2		17.3	56.9	29.9	7.7	JC	Crude, thin, backed?, thermally altered
201.1	14			1		50.6	80.2	36.8	18.8	B	Thick knife
218.1	14			2		10.9	53.3	25.1	8.1	B	Thin knife, thermally altered
225.1	16			2		18.4	64.1	21.2	12.2	JC	Gouge
225.2	16			2		20.4	61.6	23.6	13.2	JC	Gouge
234.4	16			5		25.8	47.9	39.0	14	UNK	Ovate
240.1	19			1		7.0	37.0	18.3	11.7	B	Irregular, heat treated
279.1	21			1		63.1	62.7	53.5	19.6	JC	Irregular, very crude
279.2	21			1		26.9	44.0	43.8	19.7	JC	Irregular
1151					NE	103.1	98.4	45.1	20.2	B	Adze
1218					NE	232.5	124.4	60.5	34.3	B	
1329					NE	66.7	71.3	44.4	22.4	B	Irregular, almost unifacial
870					NE	24.3	89.6	21.6	13.4	B	Gouge
1356					NE	86.4	73.8	52.8	20.4	B	Adze
913					NE	78.3	73.8	44.5	20	B	Adze
1243					NE	214.8	120.0	54.1	38.6	B	Triangular outline and cross section
860					NE	70.3	84.2	38.0	20.7	B	Nearly unifacial, crude, thick, triangular cross section
1245					NE	696.0	133.0	92.8	60.8	B	Chopping tool made from stream cobble
1323					NE	34.3	60.3	28.5	20	JC	
1374					NE	31.8	74.8	42.9	8.9	JC	Thin, missing part of lateral edge
1378					NE	22.4	45.5	32.1	15	JC	
828					NE	34.0	53.3	46.3	14.3	JC	Irregular
1265					NE	148.1	82.5	76.8	19.3	UNK	
816					NE	38.7	64.5	43.6	15	UNK	Irregular
501					NW	84.5	75.9	42.5	24.9	B	
609					NW	64.3	100.7	36.8	15.8	B	
520					NW	42.5	64.7	38.3	17.8	B	Adze
505					NW	35.7	62.6	33.9	19.5	JC	Thermally altered
604					NW	45.3	72.1	47.6	13.3	JC	Thin triangular knife
1610					NW 2	44.4	66.8	35.4	20.4	B	
1590					NW 2	47.2	66.7	35.5	17.9	JC	
2108					NW 2	144.6	94.5	46.6	27.9	JC	Nearly unifacial, crude, thick, triangular cross section
2024					SE	108.5	72.1	64.3	19.2	B	Polished digging tool
2062					SE	79.4	77.4	47.4	20.1	B	Corner broken
2034					SE	52.0	68.3	43.2	14.1	B	
1824					SE	32.2	67.9	29.2	14.8	B	Gouge
1971					SE	35.9	66.1	32.7	14.6	B	
1822					SE	214.9	132.2	70.3	26	B	
2007					SE	113.5	106.7	38.7	23.3	JC	Thick, irregular
2032					SE	18.5	60.1	22.4	13	JC	Gouge
2033					SE	133.0	101.1	56.4	20.6	JC	Big, irregular
2060					SE	43.5	71.5	39.3	17.7	JC	Triangular outline
1817					SE	43.2	81.9	33.0	16.3	JC	Slender, thick, long biface
1985					SE	13.3	44.2	31.4	11.2	JC	
2059					SE	13.0	43.2	23.7	14.4	JC	Tip missing

Material Types: JC = Jefferson City, B = Burlington, RQ = Roubidoux Quartzite, UNK = Unknown

APPENDIX 6. Biface Fragments.

Catalog Number	Excavation Unit	Feature	Half/ zone	Zone/ level	Scrape	Weight	Material
1238		12			NE	10.8	UNK
1235		12			NE	10.5	UNK
1260		12			NE	128.9	UNK
1269.2		13			NE	2.1	UNK
1405		14			NE	24.2	UNK
318.5	18	19		5			UNK
320.1	18	19	SE 1/4	6A		0.3	UNK
292.223	18	19	NE	4		12.0	UNK
319.3	18	19	NE 1/4	6		0.4	UNK
311.7	18	19	SE 1/4	5		2.3	UNK
311.8	18	19	SE 1/4	5		1.1	UNK
323.7	18	19	SW 1/4	6		5.1	UNK
325.3	26	23	SW 1/4	1		0.5	UNK
1633.5		25	W 1/2		NW II	0.4	UNK
342.1		27	E 1/2	Zone D	NW	0.7	UNK
341.1		27	E 1/2	Zone C	NW	0.2	UNK
341.3		27	E 1/2	Zone C	NW	10.7	UNK
343.4		27	E 1/2	Zone E	NW	51.8	UNK
341.2		27	E 1/2	Zone C	NW	14.5	UNK
343.3		27	E 1/2	Zone E	NW	54.5	UNK
1652.19		27	W 1/2		NW II	12.6	UNK
1652.14		27	W 1/2		NW II	10.8	UNK
1652.15		27	W 1/2		NW II	1.2	UNK
1652.1		27	W 1/2		NW II	2.6	UNK
1652.17		27	W 1/2		NW II	0.4	UNK
1652.21		27	W 1/2		NW II	2.4	UNK
1652.12		27	W 1/2		NW II	11.5	UNK
1652.13		27	W 1/2		NW II	10.9	UNK
1652.11		27	W 1/2		NW II	1.1	UNK
1652.16		27	W 1/2		NW II	0.6	UNK
1652.18		27	W 1/2		NW II	0.3	UNK
347.3		28	E 1/2	Zone 2		0.5	UNK
344.13		28	E 1/2	Zone 1		24.8	UNK
348.3		28	E 1/2	Zone 3		10.1	UNK
344.32		28	E 1/2	Zone 1		3.4	UNK
344.14		28	E 1/2	Zone 1		5.5	UNK
1823.2		28	W1/2		SE	22.5	UNK
1823.55		28	W 1/2		SE	4.1	UNK
1823.5		28	W1/2		SE	1.9	UNK
1823.11		28	W1/2		SE	0.3	UNK
1823.8		28	W1/2		SE	2.8	UNK
1823.5		28	W 1/2		SE	1.9	UNK
1823.7		28	W 1/2		SE	1.0	UNK
1823.7		28	W1/2		SE	1.0	UNK
1823.1		28	W 1/2		SE	0.3	UNK
1823.9		28	W1/2		SE	7.1	UNK
1823.66		28	W 1/2		SE	2.1	UNK
1823.49		28	W 1/2		SE	1.0	UNK
1823.6		28	W1/2		SE	3.7	UNK
1823.67		28	W 1/2		SE	0.4	UNK
1823.4		28	W 1/2		SE	12.1	UNK
1823.6		28	W 1/2		SE	3.7	UNK
1823.3		28	W 1/2		SE	36.3	UNK
1823.11		28	W 1/2		SE	0.2	UNK
1823.3		28	W1/2		SE	36.3	UNK
1823.9		28	W 1/2		SE	7.1	UNK
1823.8		28	W 1/2		SE	2.8	UNK
1973.3		33	E 1/2		SE	9.3	UNK
2047.1		36			SE	2.3	UNK
356.13		38	E 1/2	Zone C	NW	4.9	UNK
356.9		38	E 1/2	Zone C	NW	12.5	UNK
2506.3		38	W 1/2		NW	41.9	UNK
354.7		38	E 1/2	Zone A	NW	0.1	UNK
355.1		38	E 1/2	Zone B	NW	0.3	UNK
2506.4		38	W 1/2		NW	1.0	UNK

Appendix 6. Biface Fragments (continued).

Catalog Number	Excavation Unit	Feature	Half/ zone	Zone/ level	Scrape	Weight	Material
2079.4		40	SE 1/4		SE	5.1	UNK
352.1		42			NW	5.7	UNK
360.13		A	W 1/2			7.3	UNK
361.3		A	E 1/2	Zone 1		0.3	UNK
362.9		A	E 1/2	Zone 2		32.9	UNK
362.15		A	E 1/2	Zone 2		23.7	UNK
360.14		A	W 1/2			0.5	UNK
362.5		A	E 1/2	Zone 2		4.3	UNK
360.12		A	W 1/2			0.7	UNK
360.15		A	W 1/2			34.8	UNK
363.1		A	E 1/2	Zone 3		0.3	UNK
203.4	13			2		0.1	UNK
208.5	13			4		2.3	UNK
203.3	13			2		1.9	UNK
208.6	13			4		8.4	UNK
206.4	13			3		0.3	UNK
206.1	13			3		2.8	UNK
203.2	13			2		0.2	UNK
208.11	13			4		0.4	UNK
206.2	13			3		6.6	UNK
219.3	14			3		6.0	UNK
219.6	14			3		0.5	UNK
218.2	14			2		3.2	UNK
219.5	14			3		1.5	UNK
220.4	14			4		0.3	UNK
209.1	15			5		0.2	UNK
234.1	16			5		5.2	UNK
226.13	16			3		1.6	UNK
233.12	16			4		19.6	UNK
233.14	16			4		2.2	UNK
225.1	16			16		3.8	UNK
225.3	16			16		17.4	UNK
233.9	16			4		0.8	UNK
228.8	16			16		0.6	UNK
224.4	16			1		2.4	UNK
224.2	16			1		0.6	UNK
224.3	16			1		0.7	UNK
224.1	16			1		4.8	UNK
234.2	16			5		16.3	UNK
233.17	16			4		8.8	UNK
226.1	16			3		6.0	UNK
226.9	16			3		5.6	UNK
226.12	16			3		2.9	UNK
226.7	16			3		0.2	UNK
226.4	16			3		76.5	UNK
226.6	16			3		1.5	UNK
225.6	16			16		47.2	UNK
226.5	16			3		23.6	UNK
241.2	17			1		0.8	UNK
243.3	17			2		9.3	UNK
256.5	17		N1/2	3B		9.4	UNK
247.1	18			3A		12.4	UNK
245.8	18			2		0.9	UNK
245.9	18			2		0.5	UNK
245.6	18			2		9.2	UNK
245.15	18			2		14.2	UNK
245.17	18			2		2.5	UNK
278.2	18		SW1/4	4		0.2	UNK
245.16	18			2		0.8	UNK
244.8	19			2		1.4	UNK
244.5	19			2		5.6	UNK
248.2	19			3		10.5	UNK
244.12	19			2		1.1	UNK
248.4	19			3		5.2	UNK
248.5	19			3		5.4	UNK
279.3	21			1		7.7	UNK

Appendix 6. Biface Fragments (continued).

Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
282.18	21			2		0.8	UNK
285.4	21			3		14.6	UNK
282.5	21			2		1.6	UNK
282.2	21			2		41.8	UNK
282.11	21			2		0.3	UNK
285.14	21			3		5.6	UNK
285.15	21			3		2.5	UNK
285.5	21			3		15.0	UNK
282.3	21			2		2.3	UNK
286.7	21			4		5.7	UNK
282.16	21			2		3.6	UNK
286.5	21			4		40.0	UNK
282.17	21			2		0.9	UNK
285.16	21			3		0.2	UNK
232.3	22			4		2.2	UNK
229.2	22			3		1.4	UNK
227.1	22			1		3.2	UNK
229.4	22			3		13.8	UNK
263.6	23			2		0.3	UNK
267.1	23			3A		1.4	UNK
310.1	23			5		11.2	UNK
267.3	23			3A		2.0	UNK
267.2	23			3A		0.8	UNK
268.3	24			3A		4.7	UNK
268.9	24			3A		6.7	UNK
264.2	24			1		0.2	UNK
266.2	24			2		22.2	UNK
291.5	24			4B		0.5	UNK
306.6	24			5		0.3	UNK
306.7	24			5		5.7	UNK
266.26	24			2		4.4	UNK
266.27	24			2		9.4	UNK
306.1	24			5		49.6	UNK
268.4	24			3A		9.9	UNK
300.2	25			5		0.6	UNK
280.1	25			3B		6.7	UNK
287.8	25			4		0.1	UNK
280.3	25			3B		0.5	UNK
307.7	26		S1/2	2		46.1	UNK
276.2	26			1		8.0	UNK
296.1	27			1		5.5	UNK
296.2	27			1		1.9	UNK
334.1	28			1		0.5	UNK
1356					NE	86.4	UNK
1330					NE	18.1	UNK
1067					NE	182.3	UNK
958					NE	45.9	UNK
1372					NE	52.7	UNK
910					NE	16.8	UNK
2024					SE	108.5	B
1997					SE	35.9	JC
2027					SE	103.5	JC

Material Types: JC = Jefferson City, B = Burlington, RQ = Roubidoux Quartzite, UNK = Unknown

APPENDIX 7. Drills

Catalog Number	Excavation Unit	Feature	Scrape	Count	Weight	Length	Width	Thickness	Material	Comments
338.186			SE	1	2				JC	Medial fragment
548			NW	1	2.7				JC	
336.588			NW 2	1	3.8				JC	Medial fragment
1852			SW	1	13.5				B	Tip missing, thermally altered
338.187			SE	1	2.7				JC	Medial fragment
1804			SE	1	1.1	25.8	10.8	4.1	JC	Micro drill, thermally altered
338.13			SE	1	3.8				JC	Tip missing
338.131			SE	1	4.6				ND	Tip missing
1392			NE	1	5.9				ND	Reworked Dalton point
338.31			SE	1	24.5				ND	Reworked point
226.2	16			1	4.2				B	Missing base
242.3	18			1	1.7	24.7	12.1	5.6	JC	Micro drill
248.3	19			1	1.3				JC	Tip
255.1	19			1	4.6				JC	Tip
282.1	21			1	9.9	47.9	28	10.2	JC	
285.12	21			1	1.3	24.5	9	5.8	JC	Micro drill
268.8	24	19		1	0.9	23.7	9.9	4.3	JC	Micro drill
1823.75		28	SE	1	5.9	44.4	24.5	7.4	B	Thermally altered
355.4		38	NW	1	0.8	26.1	9.1	4.3	JC	Micro drill, thermally altered

APPENDIX 8. Gravers

Catalog Number	Scrape	Weight	Material	Comments
336.501	NW 2	25.8	B	
336.369	NW 2	3	JC	
1276	NE	10.1	JC	
336.368	NW 2	14.5	JC	
231.468	NE	17	JC	
336.366	NW 2	20.1	JC	
336.367	NW 2	14	JC	
337.212	SW	20.4	JC	
337.164	SW	3	JC	Thermally altered
338.509	SE	16.1	JC	
231.414	NE	1.5	JC	
338.15	SE	21.9	JC	
338.19	SE	24.9	JC	Utilized/retouched
231.242	NE	5.1	B	Thermally altered
337.16	SW	72.7	JC	
233.2		7.1	JC	Burned
233.1		11.6	ND	
245.2		2	JC	Thermally altered
276.1		11.7	JC	Burned
274.5		7.4	ND	Fragment
1652.4	NW II	9.4	RQ	
344.22		17.2	JC	Thermally altered
1823.2	SE	22.5	ND	
1973.13	SE	7.6	ND	
360.19		3.5	UNK	

APPENDIX 9. Scrapers

Catalog Number	EU	Feature	Zone/ level	Scrape	Weight	Length	Width	Thickness	Material	Comments
565				NW	1.2				ND	
231.198				NE	11.5				ND	
231.207				NE	16.5				ND	
2012				SE	38.5				ND	
859				NE	20				ND	Fragment
1621				NW 2	40.1				ND	
338.192				SE	34.1				ND	
2072				SE	57.8				JC	Side scraper
336.396				NW 2	20.2				JC	
516				NW	29.4	58.1	44	10.3	JC	
337.157				SW	46.2				JC	
231.224				NE	19.1				JC	
337.194				SW	18.3				JC	
337.279				SW	34.8				JC	
1568				NW 2	48.9				JC	Missing lateral edge
337.158				SW	35.1				JC	
2034				SE	52	68.3	43.2	14.1	JC	Large, triangular
338.193				SE	9.6				ND	Fragment
1593				NW 2	58.8				JC	
231.404				NE	28.6				ND	Side, snub end scraper, spoke shave
231.333				NE	8.6				ND	
231.29				NE	47.8				JC	
854				NE	47.7				JC	
891				NE	5.9				ND	
230.185				NW	54.7				ND	Fragment
503				NW	28.9				JC	
231.358				NE	74				JC	Side scraper
231.335				NE	13.1				JC	
208.7	13		4		7.6	36.2	23.6	9	JC	Heat treated
220.1	14		4		27.9	54.6	39	9.9	JC	
219.4	14		3		7.8	36.6	33.2	6	JC	
278.5	18		4		21	33.7	36.7	17.2	JC	
245.3	18		2		29	49.8	32.7	16.5	JC	Side scraper
261.1	23		1		11	40.1	28.9	10.9	JC	
291.21	24		4B		21.5	45.5	30.9	16.7	JC	
309.3	26		3		11.4	43.2	44.6	4.9	JC	
1652.7		27		NW II	3.6				ND	Missing lateral edge
1652.6		27		NW II	4.1				JC	Crude
1652.5		27		NW II	3.8	35.1	20.9	4.6	JC	Thumbnail scraper, missing lateral edge
1652.8		27		NW II	0.7				ND	Incomplete
343.5		27	Zone E	NW	15.9				JC	
344.15		28	Zone 1		24				ND	
1823.12		28		SE	7.8	34.3	25.4	7.5	ND	
1973.4		33		SE	103.2	83.5	42.2	27.2	ND	Side scraper
354.2		38	Zone A	NW	6.6				ND	Edge fragment
360.16		A			6.8	30	29.2	7.7	JC	Snub nosed
362.18		A	Zone 2		11.1	32.5	32	13.1	JC	
362.17		A	Zone 2		8.7				ND	
360.18		A			7.2				JC	Edge fragment
360.17		A			15.5	55.2	29	10.6	JC	Side scraper

APPENDIX 10. Unifaces

Cat. No.	EU	Feature	Zone/ level	Scrape	Weight	Length	Width	Thickness	Material	Comments
1160				NE	32.5	58.7	44.7	12.2	JC	Adze/wedge/gouge
231.45				NE	1.9				ND	
231.241				NE	5.1				ND	
231.326				NE	51.7				JC	
1836				SE	9.9				ND	
1159				NE	21.6				ND	
231.446				NE	24.2				ND	
878				NE	7.4				JC	Spoke shave
338.192				SE	34.1				ND	
338.191				SE	8.9				ND	Medial fragment
338.193				SE	9.6				ND	End fragment
244.7	19		2		3.4				ND	
244.6	19		2		6.9				ND	Fragment
228.1	22		2		25.6	45.5	37.3	13.3	JC	
306.2	24		5		19.2	44.4	29.1	13.3	JC	Spoke shave
341.4		27	C	NW	0.5				ND	Edge fragment
1652.9		27		NW II	0.4				JC	Fragment
344.34		28	1		2				ND	Fragment
1823.45		28		SE	39.9	54.7	41.4	20.3	JC	Spokeshave
351.1		37		NW II	0.2				ND	Fragment
365.6		A	5		1.8	21.8	15.9	7.1	ND	

Material Types: JC = Jefferson City, B = Burlington, RQ = Robidoux Quartzite, UNK = Unknown

APPENDIX 11. Amorphous Ground Stone.

Cat. No.	EU	Feature	Half/ quarter	Level/ Zone	Scrape	Count	Weight	Material	Comments
242.1	18			1		1	13	Hematite	
278.6	18		SW 1/4	4		1	47.5	ND	
285.21	21			3		1	7.6	ND	
274.11	25			3A		1	1	ND	
276.7	26			1		1	24.4	ND	
1134					NE	1	78.7	Sandstone	Puck sized fragment
1355					NE	1	272.8	ND	
1357					NE	2	215.6	ND	
336.604					NW 2	1	101	Sandstone	
336.606					NW 2	1	19.3	Sandstone	
336.607					NW 2	1	18.5	Sandstone	
336.614					NW 2	1	52.8	ND	
338.14					SE	1	4.7	Hematite	
338.201					SE	1	314.3	Glacial till	Basalt
338.208					SE	1	7.4	ND	
338.2					SE	1	143.6	ND	
1983					SE	1	57.7	Hematite	
1986					SE	1	1752	Hematite	
1991					SE	1	59.9	Hematite	Amorphous
2002					SE	1	97.3	Hematite	
2008					SE	1	847	Glacial till	Also nutting stone
1252		12			NE	1	564.5	ND	
1823.47		28	W 1/2		SE	1	66.7	Hematite	

APPENDIX 12. Grinding Slabs and Grinding Slab Fragments.

Cat. No.	EU	Feature	Half/ quarter	Zone/ level	Scrape	Material	Weight	Comments
219.7	14			3		Sandstone	87.9	
226.22	16			3		Sandstone	111.1	
226.23	16			3		Sandstone	42.4	
226.24	16			3		Sandstone	19.1	
226.25	16			3		Sandstone	11.6	
226.26	16			3		Sandstone	67.9	
234.17	16			5		Sandstone	17.9	
245.3	18			2		Sandstone	7.2	
245.31	18			2		Sandstone	7.1	
245.32	18			2		Sandstone	1.7	
313.1	18		NW 1/4	8		Sandstone	59.5	
248.8	19			3		Sandstone	20	
248.9	19			3		Sandstone	1.4	
279.8	21			1		Sandstone	16.9	
285.1	21			3		Sandstone	66.4	
285.2	21			3		Sandstone	107.4	
285.22	21			3		Sandstone	2	
267.4	23			3A		Sandstone	1.5	
288.4	23			4		Sandstone	360.6	
266.13	24			2		Sandstone	46.8	
266.15	24			2		Sandstone	36.8	
266.17	24			2		Sandstone	12.3	
266.18	24			2		Sandstone	23.4	
268.1	24			3A		Sandstone	15	
268.11	24			3A		Sandstone	3.1	
273.8	24			3B		Sandstone	139.2	
273.1	24			3B		Sandstone	30.2	
291.6	24			4B		Sandstone	17.8	
274.1	25			3A		Sandstone	1.9	
287.205	25			4		Winterset	356.7	
307.12	26		S 1/2	2		Sandstone	52.5	
231.4					NE	Sandstone	50.8	
231.7					NE	Sandstone	78.9	
231.9					NE	Sandstone	148	
231.1					NE	Sandstone	120.9	
231.11					NE	Sandstone	57.4	
231.485					NE	Sandstone	125.1	
1355					NE	Sandstone	272.8	
1357					NE	Sandstone	215.6	
835					NE	Sandstone	20.2	
851					NE	Sandstone	791	
940					NE	Sandstone	75.9	Fragment
1090					NE	Sandstone	131.1	
1128					NE	Limestone/dolomite	558.8	
1231					NE	Sandstone	489.3	
1232					NE	Sandstone	233	
336.597					NW 2	Glacial till	3355	Big, basalt
336.598					NW 2	Not Designated	164.8	
336.599					NW 2	Sandstone	87.9	
336.603					NW 2	Glacial till	56.5	
336.61					NW 2	Sandstone	436.1	Has hematite smears

Appendix 12. Grinding Slabs and Grinding Slab Fragments (Continued)

Cat. No.	EU	Feature	Half/ quarter	Zone/ level	Scrape	Material	Weight	Comments
1613					NW 2	Glacial till	297.3	
338.198					SE	Sandstone	253.9	
338.2					SE	Sandstone	143.6	
338.202					SE	Sandstone	154.6	
338.206					SE	Sandstone	81.8	
338.207					SE	Sandstone	39.6	
1969					SE	Limestone/dolomite	216.1	Fragment
2001					SE	Limestone/dolomite	249.8	
337.96					SW	Sandstone	62	
337.23					SW	Sandstone	151	
337.231					SW	Sandstone	48.9	
337.232					SW	Sandstone	32.4	
272.301	23	19		3		Sandstone	195.2	
292.3	18	19	NE	4		Sandstone	78.7	Fragment
297.301	18	19	SW	4		Sandstone	41.5	Fragment
311.6	18	19	SE 1/4	5		Sandstone	1.9	
295.1	23	21		4		Sandstone	158.1	Ground sandstone
295.2	23	21		4		Sandstone	202.4	Ground sandstone
1652.124		27	W 1/2		NW II	Sandstone	1278	
1652.125		27	W 1/2		NW II	Sandstone	171.1	
1652.126		27	W 1/2		NW II	Sandstone	2.7	
1652.127		27	W 1/2		NW II	Sandstone	276.7	Nutting stone
1823.48		28	W 1/2		SE	Sandstone	79.3	
1823.57		28	W 1/2		SE	Sandstone	168.9	
340.3		28	E 1/2	B	NW	Sandstone	7.1	
340.4		28	E 1/2	B	NW	Sandstone	3.7	
338.206					SE	Sandstone	81.8	
272.4		19		3b		Sandstone	112.2	Fragments
272.5		19		3b		Sandstone	45.7	Fragments
							13850.4	Total Weight

APPENDIX 13. Manos

Material	Cat. No.	EU	Level/ zone	Scrape	Count	Weight	Comments
Chert cobble	256.6	17	3B		1	89.2	
Glacial till	1277			NE	1	184.9	
Chert cobble	949			NE	1	295.8	
Chert cobble	1252			NE	1	564.5	
Glacial till	610			NW	1	382.2	Edges show hammering
Glacial till	336.6			NW 2	1	63.3	Fragment
Glacial till	336.609			NW 2	1	579.9	Nutting stone
Glacial till	1589			NW 2	1	365.5	Ovate mano battered edge
Glacial till	1600			NW 2	1	63.4	Groundstone fragment
Glacial till	1976			SE	1	153	
Sandstone	2028			SE	1	280.2	
Sandstone	337.93			SW	1	27.1	
Limestone\dolomite	337.94			SW	1	37.3	
Sandstone	337.95			SW	1	265	
Glacial till	368.13				1	216.6	
Glacial till	368.14				1	196	
Glacial till	368.16				1	852	
					1	1202	Nutting stone/mano/hammerstone
					18	5817.9	Total manos and combination tools

APPENDIX 14. Hoes, Celts, Pestles.

Cat. No.	Scrape	Count	Weight	Material	Comments
577	NW	1	94.8	Limestone/dolomite	Hoe, limestone
338.208	SE	1	7.4	Glacial till	Celt fragment, porphyritic andesite
1820	SE	1	109.8	Glacial till	Celt, porphyritic andesite
2009	SE	1	34.5	Glacial till	Celt, porphyritic andesite
1837	SE	1	180.9	Glacial till	Pestle end, basalt
		5	427.4		Totals

APPENDIX 15. Abraders.

Cat. No.	EU	Feature	Half/ Quarter	Level/ zone	Scrape	Count	Weight	Material	Comment
231.334					NE	1	382	ND	
1150					NE	1	104.5	Sandstone	
1373					NE	1	152.4	Sandstone	
337.92					SW	1	42.3	Sandstone	
368.11						1	130.4	ND	
311.5	18	19	SE 1/4	5		1	31.6	ND	Fragment
						1	700		Also nutting stone
						7	1543.2		Total abraders, including combination tools

APPENDIX 16. Hematite.

Cat. No.	EU	Feature	Half/ quarter	Level/ zone	Scrape	Weight	Comments
1154					NE	26.2	
1246					NE	61.4	Burned, utilized?
230					NW	91.3	
606					NW	21.5	
336					NW 2	13	Contains limonite
336.37					NW 2	28.4	Utilized
337					SW	53.1	
200	13			1		0.4	
206	13			3		0.4	
208	13			4		0.6	
218	14			2		1.7	
219	14			3		209.5	
221	14			5		0.3	
209	15			5		0.6	
225	16			16		4.2	
226	16			3		2.8	
233	16			4		0.2	
234	16			5		1.9	
234.5	16			5		16	Reduction Flake
241	17			1		12.8	
243	17			2		0.5	
246	17			3		1.9	
251	17		S 1/2	3B		1.2	
242	18			1		1.6	
245	18			2		6.2	
247	18			3A		3.1	
258	18		E 1/2	3B		0.9	
281	18		SE 1/4	4		0.4	
303	18		NW 1/4	5		0.2	
240	19			1		1.2	
244	19			2		0.2	
248	19			3		0.9	
255	19			3B		0.3	
252	20			1		0.5	
282	21			2		0.6	
285	21			3		0.6	
286	21			4		1	
227	22			1		0.9	
228	22			2		4.2	
229	22			3		0.6	
232	22			4		0.6	
263	23			2		2.2	
288	23			4		8.9	
310	23			5		0.6	
266	24			2		2	
268	24			3A		0.3	
269	25			1		1	
274	25			3A		0.5	
280	25			3B		0.3	
287	25			4		3.7	
276	26			1		1.3	

Appendix 16. Hematite (Continued).

Cat. No.	EU	Feature	Half/ quarter	Level/ zone	Scrape	Weight	Comments
307	26		S 1/2	2		1.6	
309.4	26			3		1.4	
296	27			1		0.6	
322	27			2		8.2	
1246		12			NE	61.4	Thermally altered, utilized?
281	18	19	SE 1/4	4		5.7	
271	18	19	NW 1/4	4		0.2	
311	18	19	SE 1/4	5		0.7	
321	18	19	SW 1/4	5		0.7	Hematite/limonite
319	18	19	NE 1/4	6		2	
317	18	19	SE 1/4	6		0.9	
						678.1 g	
323	18	19	SW 1/4	6		1.2	
272.163	ERR	19		3		30.4	
325	26	23	SW 1/4	1		1	hematite and limonite
315	26	23	N 1/2	2		1.3	
315.5	26	23	N 1/2	2		47.1	utilized
309.4	26	23		3		1.4	
1645		26				0.5	
342		27	E 1/2	Zone D	NW	1.8	
1652		27	W 1/2		NW II	21.3	
342		27	E 1/2	Zone D	NW	1.8	
341		27	E 1/2	Zone C	NW	1	
339		27	E 1/2	Zone A	NW	9.2	hematite/limonite
1823		28	W 1/2		SE	2.2	
1823		28	W 1/2		SE	2.2	
344		28	E 1/2	Zone 1		39	
347		28	E 1/2	Zone 2		3.3	
348		28	E 1/2	Zone 3		1.2	
357		33	N 1/2	Zone 1		1.3	hematite/limonite
1973		33	E 1/2		SE	3.2	hematite/limonite
2506		38	W 1/2		NW	2.2	
354		38	E 1/2	Zone A	NW	1.5	
355		38	E 1/2	Zone B	NW	5.3	Including some thermally altered pieces
2106.104		41			SE	44.4	Burned
360		A	W 1/2			20.2	
361		A	E 1/2	Zone 1		0.6	

APPENDIX 17. Hammer Stones.

Material	Cat. No.	EU	Feature	Zone/ level	Scrape	Count	Weight	Comments
Chert cobble	1104				NE	1	490.1	
Chert cobble	1130				NE	1	162.3	
Chert cobble	1138				NE	1	298.9	
Glacial till	1257				NE	1	489.5	
Unknown	1351				NE	1	205.7	
Chert cobble	1401				NE	1	307	
Chert cobble	558				NW	1	545.8	
Glacial till	336.612				NW 2	1	230.5	
Chert cobble	336.613				NW 2	1	100.7	
Glacial till	1579				NW 2	1	198	
Glacial till	1594				NW 2	1	141.1	
Chert cobble	338.197				SE	1	239.3	
Chert cobble	338.506				SE	1	102.7	
Chert cobble	247.6	18		3A		1	106.8	
Unknown	1823.1		28		SE	1	151.5	
Unknown	1257		12		NE	1	489.5	
						3	747.8	
						16	4259.4	
						1	1202	Nutting stone/mano/hammerstone 368-17
						1	382.2	Mano/hammerstone 610
						1	365.5	Mano/hammerstone 1589
						19	6209.1	
						19	6209.1	Total hammer stones including combination tools

APPENDIX 18. Nutting Stones.

Material	Cat. No.	Scrape	Count	Weight	Comments
Sandstone	1268	NE	1	721	Both sides used
Sandstone	1023	NE	1	700	Also abrader
Glacial till	230.258	NW	1	163.9	
Chert cobble	618	NW	1	651	
Glacial till	336.611	NW 2	1	174.8	
Chert cobble	337.229	SW	1	563.6	
Glacial till	368.17		1	1202	Also mano & hammerstone
			1	276.7	Also grinding slab
			1	579.9	Also mano & nutting stone
			9	5032.9	Total nutting stones including combination tools

APPENDIX 19. Tabulation of Charcoal Fragments.

	Fea. 2 7 liters		Fea. 10 15 liters		Fea. 18 Level 3 15 liters		Fea. 19 Level 5 15 liters		Fea. 19 Level 6 15 liters		Fea. 23 Level 1 10 liters		Fea. 25 10 liters	
	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt
>2.0 mm Remains:														
Wood	103	0.71	3	0.02	81	0.6	221	4.56	505	3.78	84	1.34	69	0.75
Bark					1	0.02								
Nutshell:														
Juglandaceae	5	0.04			p		13	0.19	3	0.03	4	0.02	p	
Juglans														
Juglans nigra														
Carya							7	0.22	4	0.05	2	0.05	2	0.04
Quercus														
Cucurbit Rind														
Fungal Tissue					3	0.02								
Grass Stem														
Unidentified														
Total >2.0 mm Remains	108	0.75	3	0.02	85	0.64	241	4.97	512	3.86	90	1.41	71	0.79
Wood Identification:														
Acer					1	0.02	1	0.01			2	0.02		
Carya														
Apocarya					1	0.01								
Eucarya	1	t			4	0.03	2	0.06	2	0.06	3	0.06	2	0.03
Indeterminant							1	0.02	2	0.02				
Celtis/Ulmus					2	0.01	1	0.03			2	0.03		
Fraxinus					1	0.02	2	0.02						
Glenditsia/Gymnocladus	1	0.02							1	0.01			1	0.03
Juglans														
Platanus occidentalis													3	0.02
Populus/Salix	3	0.04					1	0.04						
Quercus														
Erythrobalanus							1	0.01	2	0.06	2	0.05	2	0.01
Leucobalanus	4	0.09			3	0.03	6	0.24	4	0.12	7	0.17	5	0.12
Indeterminant	2	0.01	2	0.01	5	0.04	1	0.01	3	0.02	3	0.02	3	0.02
Vitis														
Diffuse Porous														
Ring Porous	3	0.01	1	0.01	3	0.02	2	0.04	4	0.02	1	t	1	0.02
Semi-Ring Porous							1	0.01					2	0.01
Unidentified	6	0.03					1	t	2	0.01			1	t
Total Wood:	20	0.2	3	0.02	20	0.18	20	0.49	20	0.32	20	0.35	20	0.26
Seeds:														
Chenopodium														
C. berlandieri							1							
Compositea														
Euphorbia														
Galium														
Helianthus annuus														
Hordeum pusillum														
Ipomoea														
Iva annua														
Panicum														
Phalaris caroliniana							1		1					
Poaceae														
Polygonum									1					
P. erectum														
Rhus														
Vitis														
Unidentified									1					
Total (MNI) Seeds:	0		0		0		2		3		0		0	

Appendix 19. Tabulation of Charcoal Fragments (continued).

	Fea. 27 Zone A 10 liters		Fea. 27 Zone B 10 liters		Fea. 27 Zone C 10 liters		Fea. 27 Zone D 10 liters		Fea. 27 Zone E 10 liters		Fea. 28 Zone 1 10 liters		Fea. 28 Zone 2 10 liters	
	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt
>2.0 mm Remains:														
Wood	131	1.85	353	5.92	2394	36.28	3410	58.65	1325	14.9	390	3.52	990	9.22
Bark	1	t			8	0.65								
Nutshell:														
Juglandaceae	12	0.1	6	0.07	30	0.33	11	0.21	5	0.04	17	0.1	9	0.05
Juglans											2	0.04		
Juglans nigra					9	0.33								
Carya					10	0.35	12	0.42			16	0.44	7	0.29
Quercus					p		p							
Cucurbit Rind														
Fungal Tissue							p							
Grass Stem							p							
Unidentified														
Total >2.0 mm Remains	144	1.95	359	5.99	2451	37.94	3433	59.28	1330	14.94	425	4.1	1006	9.56
Wood Identification:														
Acer														
Carya														
Apocarya	2	0.01									2	0.02		
Eucarya	1	0.01	1	0.03	4	0.48	3	0.15	3	0.22	1	0.04		
Indeterminant	1	0.02	1	0.02									1	0.01
Celtis/Ulmus					1	0.04								
Fraxinus			2	0.03	2	0.08	1	0.04	2	0.02	5	0.05		
Glenditsia/Gymnocladus														
Juglans	1	0.03	1	0.04	1	0.05	1	0.01						
Platanus occidentalis					1	0.03			1	0.04				
Populus/Salix	1	0.01											1	0.02
Quercus														
Erythrobalanus			1	0.02	5	0.53	5	0.47	4	0.13	2	0.03	6	0.16
Leucobalanus	5	0.17	5	0.55	4	0.56	7	0.46	6	0.34	6	0.14	8	1.1
Indeterminant	5	0.06	5	0.06	2	0.03	1	0.01	2	0.29	3	0.18	3	0.02
Vitis			1	0.01										
Diffuse Porous														
Ring Porous	3	0.02	2	0.01			1	0.01	1	0.01				
Semi-Ring Porous														
Unidentified	1	t	1	0.07			1	t	1	t	1	t	1	t
Total Wood:	20	0.33	20	0.84	20	1.8	20	1.15	20	1.05	20	0.46	20	1.31
Seeds:														
Chenopodium	3		3		11		64		4				2	
C. berlandieri	1		1		9		39		1					
Compositea	1													
Euphorbia														
Galium														
Helianthus annuus	1						3							
Hordeum pusillum	5		1		4		16						1	
Ipomoea														
Iva annua					3		20							
Panicum	4				11		8		1					
Phalaris caroliniana	5		24		398		253		10				12	
Poaceae														
Polygonum	1		1						6					
P. erectum	21				14		41						4	
Rhus			1											
Vitis									1					
Unidentified	8				5		11		1				1	
Total (MNI) Seeds:	50		31		455		455		24		0		20	

Appendix 19. Tabulation of Charcoal Fragments (continued).

	Fea. 28 Zone 3 10 liters		Fea. 28 Zone 4 10 liters		Fea. 33 Zone 1 10 liters		Fea. 33 Zone 3 10 liters		Fea. 35 10 liters		Fea. 37 10 liters		Fea. 38 Zone A 10 liters	
	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt
>2.0 mm Remains:														
Wood	1651	27.79	1190	11	198	2.02	91	1.23	10	0.05	68	0.88	304	4.56
Bark														
Nutshell:														
Juglandaceae	25	0.11	19	0.12	p		p				p		24	0.35
Juglans														
Juglans nigra													2	0.06
Carya	12	0.5	23	0.56									20	0.55
Quercus														
Cucurbit Rind														
Fungal Tissue			p											
Grass Stem														
Unidentified														
Total >2.0 mm Remains	1688	28.4	1232	11.68	198	2.02	91	1.23	10	0.05	68	0.88	350	5.52
Wood Identification:														
Acer			1	0.05									1	0.01
Carya														
Apocarya									1	t	1	0.02		
Eucarya	5	0.28	2	0.09	1	0.02	2	0.03			1	0.01	1	0.01
Indeterminant			1	0.01										
Celtis/Ulmus									1	0.01			1	0.02
Fraxinus	1	0.02			2	0.02					1	0.01		
Glenditsia/Gymnocladus														
Juglans					1	0.03	1	0.01	1	t				
Platanus occidentalis														
Populus/Salix	1	0.03			1	0.02	1	0.02			2	0.04		
Quercus														
Erythrobalanus	4	0.1	3	0.16	3	0.14	1	0.01			1	0.02	3	0.08
Leucobalanus	7	0.53	3	0.08	2	0.04	11	0.4			3	0.07	11	0.37
Indeterminant	2	0.02	5	0.04	4	0.05	2	0.01	2	0.01	7	0.07		
Vitis					2	0.08							1	0.02
Diffuse Porous			1	t										
Ring Porous			1	t	4	0.02	1	0.01			2	0.01	2	0.02
Semi-Ring Porous			2	0.01							1	0.01		
Unidentified			1	t			1	t	5	0.02	1	t		
Total Wood:	20	0.98	20	0.44	20	0.42	20	0.49	10	0.04	20	0.26	20	0.53
Seeds:														
Chenopodium	2										1		3	
C. berlandieri														
Compositea														
Euphorbia														
Galium					1									
Helianthus annuus														
Hordeum pusillum	1				1		2						1	
Ipomoea														
Iva annua													2	
Panicum													2	
Phalaris caroliniana			2		2		2						7	
Poaceae			1											
Polygonum													12	
P. erectum													34	
Rhus														
Vitis														
Unidentified													1	
Total (MNI) Seeds:	3		3		4		4		0		1		62	

Appendix 19. Tabulation of Charcoal Fragments (continued).

	Fea. 38 Zone B 10 liters		Fea. 38 Zone C 10 liters		Fea. 42 Float 1 10 liters		Fea. 42 Float 2 10 liters		Fea. A Zone 1 10 liters		Fea. A Zone 2 10 liters		Fea. A Zone 3 10 liters	
	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt
>2.0 mm Remains:														
Wood	1674	22.76	1290	13.98	65	1.47	32	0.56	444	3.57	1740	15.12	406	5.61
Bark											4	0.15		
Nutshell:														
Juglandaceae	6	0.05	13	0.08					p		3	0.04	3	0.02
Juglans														
Juglans nigra			3	0.05										
Carya	5	0.13	7	0.29							2	0.08		
Quercus	p													
Cucurbit Rind									p					
Fungal Tissue														
Grass Stem														
Unidentified														
Total >2.0 mm Remains	1685	22.94	1313	14.4	65	1.47	32	0.56	444	3.57	1749	15.39	409	5.63
Wood Identification:														
Acer	1	0.04					1	t						
Carya														
Apocarya	1	0.02												
Eucarya	4	0.34	5	0.71							5	0.07	8	0.68
Indeterminant					1	0.01							1	t
Celtis/Ulmus							3	0.1	1	0.01				
Fraxinus	3	0.19	1	0.02			1	0.01			3	0.07	1	0.02
Glenditsia/Gymnocladus							4	0.09						
Juglans									1	0.01				
Platanus occidentalis														
Populus/Salix														
Quercus														
Erythrobalanus	1	0.03	3	0.07	7	0.28			5	0.13			2	0.27
Leucobalanus	6	0.21	8	0.35	6	0.16	6	0.1	4	0.24	10	1.02	4	0.32
Indeterminant			1	t	4	0.02			4	0.07	2	0.06		
Vitis														
Diffuse Porous														
Ring Porous	2	0.01	2	0.01	1	0.02	1	0.01	3	0.02			1	t
Semi-Ring Porous							2	0.01					1	t
Unidentified	2	t			1	t	2	t	1	t			2	0.01
Total Wood:	20	0.84	20	1.16	20	0.49	20	0.32	19	0.48	20	1.22	20	1.3
Seeds:														
Chenopodium	7		7								3			
C. berlandieri	5		6											
Compositea														
Euphorbia	2													
Galium	1								2					
Helianthus annuus														
Hordeum pusillum														
Ipomoea														
Iva annua														
Panicum													3	
Phalaris caroliniana									3		16		6	
Poaceae														
Polygonum	4		1						2					
P. erectum			2								4		1	
Rhus														
Vitis														
Unidentified											2			
Total (MNI) Seeds:	19		16		0		0		7		25		10	

Appendix 19. Tabulation of Charcoal Fragments (continued).

	Fea. A Zone 4 10 liters		Fea. A Zone 5 10 liters		Fea. B 90-95 cm 10 liters		T.U. 2 50-60 cm 7 liters		J5S0352 15 liters		TOTALS			
	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	ct	wt	% ct	% wt
>2.0 mm Remains:														
Wood	2010	12.3	2260	16.2	30	0.23	106	1.2	77	1.18	23705	283.81	98	97
Bark	3	0.02	2	0.03							19	0.87	1	t
Nutshell:													t	t
Juglandaceae	4	0.02	5	0.05	6	0.05			p		223	2.07	1	1
Juglans											2	0.04	t	t
Juglans nigra											14	0.44	t	t
Carya	2	0.02	2	0.03	4	0.2					137	4.22	t	2
Quercus											p		t	t
Cucurbit Rind											p		t	t
Fungal Tissue											3	0.02	t	t
Grass Stem											p		t	t
Unidentified											0		0	0
Total >2.0 mm Remains	2019	12.36	2269	16.31	40	0.48	106	1.2	77	1.18	24103	291.47	100	100
Wood Identification:														
Acer							2	0.01			10	0.16	2	1
Carya														
Apocarya									1	0.02	9	0.1	2	1
Eucarya	5	0.44	3	0.1	2	0.03	5	0.03	1	0.01	77	4.02	12	19
Indeterminant							1	0.03			10	0.14	2	1
Celtis/Ulmus			2	0.1							14	0.35	2	2
Fraxinus			1	0.01	4	0.02	1	0.01			34	0.66	5	3
Glenditsia/Gymnocladus											7	0.15	1	1
Juglans							1	t			9	0.18	2	1
Platanus occidentalis	1	0.01									6	0.1	1	t
Populus/Salix			1	0.03							12	0.25	2	1
Quercus													0	
Erythrobalanus	2	0.17	3	0.11	1	0.01			1	0.04	70	3.09	11	15
Leucobalanus	6	0.41	7	0.74	3	0.07	4	0.05	7	0.27	178	9.52	28	46
Indeterminant	2	0.01			4	0.02	3	0.08	2	0.01	84	1.25	13	6
Vitis											4	0.11	1	t
Diffuse Porous											1	t	t	t
Ring Porous	2	0.02	2	0.02	3	0.02	1	t	5	0.03	55	0.39	9	2
Semi-Ring Porous					2	0.01	2	0.01			13	0.07	2	t
Unidentified	2	0.01	1	t					3	0.01	38	0.16	6	1
Total Wood:	20	1.07	20	1.11	19	0.18	20	0.22	20	0.39	631	20.7	99	100
Seeds:														
Chenopodium			3								113		9	
C. berlandieri	2										65		5	
Compositea											1		t	
Euphorbia			1								3		t	
Galium											4		t	
Helianthus annuus											4		t	
Hordeum pusillum											32		3	
Ipomoea			1								1		t	
Iva annua											25		2	
Panicum	2										31		3	
Phalaris caroliniana	18		8								768		62	
Poaceae			1								2		t	
Polygonum	1		3								32		3	
P. erectum	3										124		10	
Rhus			1								2		t	
Vitis											1		t	
Unidentified	3		2								35		3	
Total (MNI) Seeds:	29		20		0		0		0		1243		100	

APPENDIX 20. Modified Bone.

Type	Catalog Number	Length	Width	Thickness	Description
Bead Manufacturing Debris					
	321	*-18.1*	*-6.4*	4.9	Compact mammal or bird bone which has been grooved/snapped on both ends and is now split.
	347	11.8	10.9	7.2	Bird leg bone which has been grooved/snapped on both ends.
	1652	15.4	6.8	-2.4	Bird bone which has been grooved/snapped on both ends and is now split.
Cut Turkey Bone					
	278	29.2	*-17.6*	11.4	Grooved and snapped distal tarsometatarsus.
	362	54	13.6	*-5.3*	Cut, polished, and striated turkey long bone shaft (possibly an awl).
	1652	48.2	11.9	*-11.2*	Grooved and snapped distal tibiotarsus.
Cut Turtle Bone					
	323	*-22.9*	*-18.5*	2.5	Plastron fragment with polish, smoothing and striations.
	344	*-32.4*	*-10.9*	2.5	Carapace fragment with polish and striations.
Cut/Striated Bone					
	311	-13.2	*-6.4*	*-2.5*	Compact burned mammal bone with striations and heavy polish.
	319	-14.8	*-8.4*	*-1.8*	Compact mammal bone with striations and heavy polish.
	320	-26	6.4	1.8	Compact mammal bone with heavy polish.
	344	*-16.1*	*-7.9*	4.1	Compact burned mammal bone with striations and heavy polish.
	348	*-21.7*	*-10.1*	2.4	Compact mammal bone with striations and heavy polish.
	362	*-65.4*	*-13.8*	*-7.9*	Compact burned mammal bone with striations.
	1652	*-24.4*	*-11.1*	*-2.2*	Compact burned mammal bone with striations and deep scoring.
	1652	*-17.7*	*-7.9*	*-3.1*	Compact burned mammal bone with striations and deep scoring.
	2079	*-10.1*	*-7.4*	*-1.4*	Compact burned bone with striations and cut marks.
	298.201	*-55.4*	*-5.6*	*-2.3*	Compact burned bird bone with polish.
Deer Ulna Awl					
	360.2	*-89.6*	37	21.6	Diaphysis cut and ground to sharp point; extensive striations and polish on all surfaces.
Expediant Tool					
	251	*-61.1*	18.6	8.2	Large mammal long bone splinter with occassional polished edges.
Fishhook					
	1651	*-14.4*	*-4.6*	1.8	Compact mammal or bird bone which has been cut, ground and smoothed into a "J" shape.

Appendix 20. Modified Bone (Continued).

Type	Catalog Number	Length	Width	Thickness	Description
Metapodial Awl Debris					
	360	*-93.5*	31.8	18.4	Distal metatarsal and diaphysis pair which has been grooved and snapped (2 pieces).
	360	*-129*	26.2	19.5	Burned proximal metacarpal and diaphysis with longitudinal scoring on all surfaces.
	1652	*-33.9*	*-11.6*	*-4.6*	Metatarsal diaphysis fragment with numerous striations and cuts.
	368.1	*-36.1*	14.2	*-9.4*	Metatarsal diaphysis fragment with numerous striations and cuts.
	293.165	*-42.8*	15.9	*-11.1*	Metatarsal diaphysis fragment with numerous striations and cuts.
Punch					
	258	*-22.4*	6.4	3.6	Compact mammal bone splinter cut, ground, and tapered to a blunt working end.
Scored Mammal Bone					
	18	*-15*	*-11.4*	7.1	Burned compact bone with three deep parallel cuts.
Splinter Awl					
	360	*-60.2*	8.1	4.4	Bird bone splinter which has been cut, ground and tapered to a point.
	1823	*-33.1*	8.9	3.5	Mammal or bird bone diaphysis which has been cut, ground and tapered to a sharp point.