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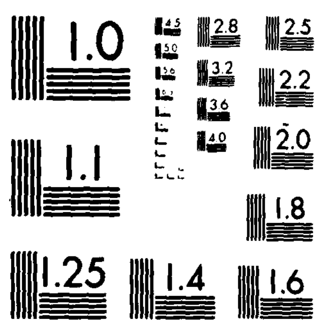

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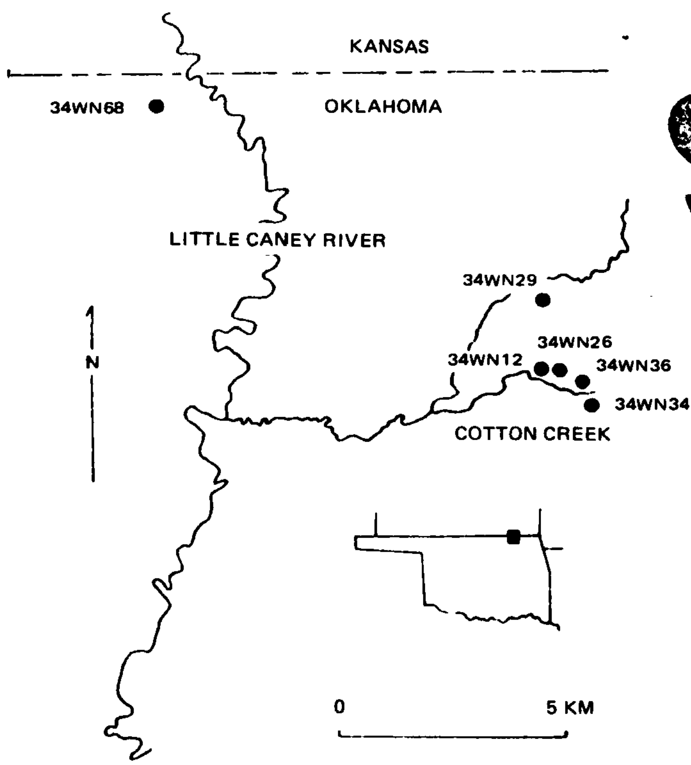
1981

LITTLE CANEY RIVER PREHISTORY: 1979 FIELD SEASON



MARVIN KAY

Prepared for the Tulsa District Corps of Engineers
Copan Lake Project DAC–77–C–0228

(12)

Little Caney River Prehistory: 1979 Field Season

by

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DACW56-77-C-0228

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ABSTRACT

Six archaeological sites or prospective site areas were excavated, and limited shoreline areas and cutbank exposures were inspected as part of the 1979 Phase III investigations of the Copan Archeological Project under Contract No. DACW56-77-C-0228 with the U.S. Army Corps of Engineers. One prospective site, 34WN34, was found to be incorrectly located by previous investigators and excavation had negative results. Two sites (34WN26 and 34WN68) are Late Woodland burned rock middens; and three others (34WN12, 34WN29, 34WN36) are Late Woodland open encampments. 34WN29 had charcoal sufficient for radiocarbon dating and four dates allow an accurate assessment of the age of the Copan paleosol at this site as between 1650-1000 B.P. Whether or not the sites were coeval could not be determined, but it is clear that they have variable material contents which suggest differences in use, residential groups, seasonal habitation or combinations of all of these factors. Although our data are insufficient to model Late Woodland settlement practices in a more inclusive fashion, they do point out directions for future settlement study. The Phase III discovery of Middle Archaic artifacts in a Cotton Creek cutbank marks a significant addition to knowledge of the earlier prehistory of the Little Caney River and its tributaries. The positive results of shoreline inspections north of the dam indicate that other archaeological remains or sites will be discovered, disturbed or destroyed as project construction continues and the lake is impounded.

Table of Contents

Table of Contents (continued)

List of Figures

List of Figures (continued)

List of Tables

CHAPTER 1.

INTRODUCTION

During the summer, 1979, Phase III of the mitigation program for Copan Lake was completed. This entailed excavation of archaeological sites that will be directly affected by this impoundment. These investigations were conducted under the direction of Terry Prewitt, University of Tulsa. Prewitt's investigations included extensive excavation of a single site, 34WN68, with smaller sized excavation of five other sites or prospective site areas, inspections of bank cuts along Cotton Creek, and re-survey of shoreline areas near the dam which had been cleared of vegetation. This report discusses the history of Copan Lake investigations and the results of the Phase III program. Recommendations are also made about the status of the investigated sites and subsequent mitigation needs.

Research History

The first professional archaeological research within the project area (Figure 1) was a three week site survey conducted for the Tulsa District, Corps of Engineers in December, 1971 and January, 1972 by Arthur H. Rohn and Miriam R. Smith. Rohn and Smith 1) described this as a "hasty survey of archaeological remains...undertaken...when conditions did not favor the discovery of archaeological sites or the recovery of artifacts from the ground surface." Due to the unfavorable survey conditions and limited time of the investigations, Rohn and Smith (1972:1-2) "sought the assistance of local residents in identifying probable site locations. In addition, certain areas, such as Cotton Creek and portions of the bluffs along the Little Caney River, were combed intensively, while others such as the wet bottomlands of the river, were merely spot checked. Several areas were not investigated because of very difficult access, unwillingness of landowners, or unsuitable ground cover. Thus while we recorded some 58 sites...there are certainly additional sites within this area that were not discovered." The site sample includes the location of historic Indian usage, a 19th century town site, and two river fords, a total of eight sites.

Three additional sites (34WN96, 34WN-97, 14MY502) were subsequently located by other researchers (see Vehik and Pailes 1979), representing an almost negligible addition to the Copan Lake site inventory. Thus, almost all of our data on archaeological site locations stem from the initial survey of Rohn and Smith. This sample of recorded sites is not representative of quantitative differences in site location or the numbers and kinds of potential buried site loci (Rohn and Smith 1972:50). Nevertheless, it has served for subsequent investigations as a qualitative, or categorical, index of site location and type relative to land form and drainage. In addition, many of Rohn and Smith's recommendations have been considered in the design of later investigations.

Rohn and Smith (1972:47-54) identified sites according to four kinds of surface appearance (actual or historical evidence of a standing structure, artificial mounds, concentrations of cultural debris on open ground, and sandstone bluff overhangs) cross referenced by site situations, or land form settings such as bluff-top, bluff-edge, rockshelter, stream bank, natural floodplain levee, ridgetoe, terrace edge, and hill top. The greatest number of prehistoric sites, 33, recorded by Rohn and Smith represent stream bank, natural levee, ridgetoe or terrace edge loci. These are all alluvial contexts, and sites are described as often containing stratified deposits, including both Archaic and later Woodland components. Mound (n=7) and bluff top (n=5) sites are in the uplands overlooking the Little Caney River and its tributaries. Five rockshelters line the valley

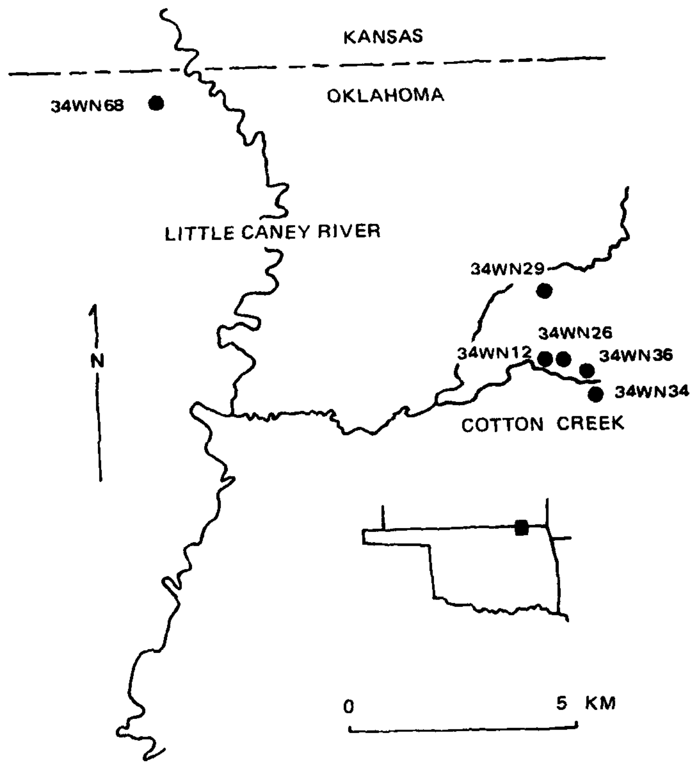

Figure 1. Copan lake project area and Phase III investigated sites.

walls of vaulted sandstone.

Concerning these and the historic period sites, Rohn and Smith (1972:55-56) made seven enumerated recommendations. First, all sites affected by the project should be, at least, intensively surface collected or test excavated to determine which sites should then receive more detailed investigation. Second, several threatened sites should be excavated completely or extensively, including: mounds 34WN38 and 34WN55; the rockshelter 34WN32, stream bank sites 34WN6, 34WN30 and 34-WN42; and floodplain sites 34WN36, and 14MY501. Third, other archaeological sites not directly threatened should be protected from vandals or public use. A mound site, 34WN45, was recommended as possibly appropriate for development as an exhibit-in-place. During construction, an archaeologist should be available to evaluate endangered archaeological remains. The final two recommendations dealt with preservation and interpretation of Delaware Indian sites.

In the fall, 1973, the National Park Service supported a twelve week investigation by Sheila Vaughan (1975) of 15 sites, of which five were "extensively excavated." Considering that Vaughan's crew averaged four people, her investigation was truly an ambitious undertaking. Excavation of two sites, 34WN5 and 34WN6, was continued the following year and is summarized by Vehik and Pailes (1979). Vaughan's work was done under the overall supervision of Richard A. Pailes, who served as Principal Investigator of the contract. Selection of sites investigated followed his research design for Copan Lake dealing with "the problem of differential adaptation to a changing environment" (Vaughan 1975:6), and considered the seven site environmental settings of Rohn and Smith. A major criterion for selecting sites for excavation, however, was their location near the dam construction site in the southern part of the reservoir, an area that would be adversely affected first. Excavation proceeded in 5-foot grid squares, with sediments removed in 4-inch intervals. Vaughan's (1975) report makes no mention of how excavated matrix was further processed or artifacts removed.

As previously recommended, larger excavations were conducted at the two mound sites, 34WN38 (Quail Patch) and 34WN55 (Weber Mounds), and initiated at stream bank site 34WN6. Other large excavations were conducted at a third mound site, 34WN65, the D-Bar-D mounds, which included a 5-foot square test excavation in a rockshelter some 120 feet north of Mound 4 in the east facing Little Caney River bluff; and investigation of the Little Caney Shelter, 34WN62. Smaller test excavations were also conducted at 10 other sites.

Of the test excavations, the site identified (Vaughan 1975:35) as the Ahlden Shelter, 34WN63, is grossly inconsistent with Rohn and Smith's (1972:30) description. Probably Vaughan's excavation was not within 34WN-63 but involved a previously unrecorded location that, on excavation, proved devoid of cultural remains. In any event, Vaughan's other site descriptions correspond with Rohn and Smith's.

A second field season, again supported by a National Park Service constract, was conducted by Pailes in 1974 (Vehik and Pailes 1979). Three sites were excavated, including the two where investigations had begun the previous year, and limited surveys were conducted, resulting in the location of two sites, 34WN96 and 34WN97. A third site, 14MY501, was surface collected and recommended for subsequent work as it was in a scheduled barrow pit. Continued excavation of 34WN6, the Thomas site, was predicated by two factors. First, the site was believed to represent a village with structural remains inferred from daub recovered in 1973. Second, there was a potential relationship between 34WN6, a Little Caney River floodplain site, and the upland mound site 34WN65, which is directly opposite and had been test excavated the previous year. Although excavation in 1973 of 34WN5, the Mills site, showed it to be heavily disturbed, it was selected for excavation by the Oklahoma Anthropological Society. Its excavation in the spring of 1974 was not done as part of the 1974 contract. Lastly, 34WN45, Copperhead Mounds, another upland mound site on the west bluff of the Little Caney River down stream from 34WN6, was excavated as part of the contract. The mounds' excavation was based upon their relatively undisturbed condition, insuring possible interpretable stratigraphy—a prerequisite to understanding their development and function(s). Excavation of each site utilized English grid systems oriented north, with matrix generally removed in arbitrary 4-inch levels and passed through ¼-inch wire mesh. Results of these excavations include the following. First, the Thomas site, 34WN6, is assigned on a typological basis to a Middle Woodland component. Apparently it is not related to the upland mound site 34-WN65. A variety of domestic activities suggestive of sedentary use are inferred, but no structures were defined although daub is present. Second, the Copperhead Mounds, 34WN45, include both naturally formed and artificial tumuli, the latter seemingly date to the Late Plains Woodland or Early Plains Village periods and are judged as special purpose camps. Third, the completed analyses of 34WN5, the Mills site, confirm its poor integrity and disturbed character that has mixed debris of Archaic and subsequent periods; some daub is present.

Investigations resumed in January, 1976, again sponsored by a National Park Service contract with Donald O. Henry (1977b) serving as Principal Investigator. Excavation of three sites (34WN66, 34WN71, 34WN75) and smaller ("test") excavation of two others (34WN28 and 34WN39) were done concurrently with a geomorphic and palynological study. The latter represented a new research orientation, although pollen samples were collected in the course of previous investigations. Henry's research differed from previous studies within the reservoir in both concept and methodology, and they represent an initial attempt at interdisciplinary study of prehistoric settlement and environment in the project area. Subsequent study has utilized much of the methodology Henry employed and has taken advantage of environmental data he and his associates developed here and elsewhere (c.f., Henry 1977a,b).

Henry's field methodology, in part, consisted of excavation within a north or magnetic north oriented metric system grid of 1 m^2 units subdivided into quadrants. Matrix was generally removed separately from each quadrant within arbitrary 10 cm thick levels, and then field screened through 3 mm wire mesh. Essentially these same recording and recovery operations have been used since.

The main difference in concept between this and previous investigations is in its integration of radiometric, geomorphic, and environmental data with those obtained from site excavation. Rough but reasonable age assessments were made for the five sites excavated by cross comparisons with dated alluvial sections within the Little Caney River Valley (Hall 1977:17, Figure 3). In addition, a master pollen profile for approximately the past two millennia (Hall 1977:27, Figure 5) was developed from both on-site and off-site sediment samples, allowing for a pilot model of vegetational succession within this Cross Timbers locale. Finally, a sequence of buried soils, some first recognized by Rohn and Smith, were formally described. Of these, the Copan paleosol is most conspicuous and contains many sites of Late Woodland (i.e., Plains Woodland) age. Of the five sites excavated, none predate this paleosol, two (34WN28, WN75) are within it, one (34WN71) is directly above and two others (34WN39, 34WN66) are within the overlying sediments.

Excavation of 34WN66, Long Shelter, marked a continuation of work first begun by Vaughan, as did the test excavations of 34WN 28 and 34WN39. Excavation of sites 34WN71, Two Goats site, and 34WN75, Cellar Hole site, represented new investigations. Beyond describing the design of the excavations as attempts "to generate as much information, as possible, on the physical configurations of the sites... and to elucidate certain intra- and inter-site patterns within the recovered artifacts" (Henry 1977b:42), there is no explicit statement of why any of these sites was selected for review. Nonetheless, Henry did develop information concerning variable site usage keyed to differences in site setting, geomorphology, and duration or intensity of settlement as well as specific and general recommendations for future study. These recommendations and other considerations were subsequently enacted by a multiyear, multiphase mitigation program (of which the present study is a part) contracted by the Tulsa District, Corps of Engineers.

Phase I of the subsequent mitigation program involved the excavation of six sites, including more extensive excavation of 34WN 71, the Two Goats site, during the summer, 1977 (Farley and Keyser 1979). In addition to the Two Goats site, sites 34WN42 (Jackson Fall-Leaf site) and 14MY501 (Caney Levee site) were the subjects of more extensive excavation; test excavations were conducted at sites 34WN44, (Oil Field site), 34WN61 (Squirrelpatch site) and 34WN67 (Mullendore Mansion site). Among the results of these investigations were that five sites proved to be prehistoric, dating to Plains Woodland and/or later periods; site 34WN44 was determined to be historic. A C-14 date was obtained on charcoal from the upper levels of the Copan paleosol at the Jackson Fall-Leaf site of 1250±80 B.P. (I-10, 234), considered by Farley and Keyser (1979:26) to be anomalous insofar as it was presumed to date a Plains Village component. This C-14 date is the first from a project area archaeological site. Whether or not the date is consistent with Plains Village habitation, it seems reasonable as an additional date for the Copan paleosol.

During the summer, 1978, Phase II of the mitigation program was initiated with excavation of four sites; with more extensive excavation of sites 34WN30, 34WN64, and 68 and test excavation of 34WN32 (Prewitt 1980). Test excavation of 34WN69 was deferred because of logistic problems, and was slated for investigation during Phase III. Five charcoal samples were submitted for radiocarbon dating from the Cotton Creek Shelter, 34WN 32, but as yet the assays on these samples have not been received. Cotton Creek Shelter represents one of the few sites having faunal and carbonized floral debris sufficient for limited analysis of site subsistence pracatices and radiocarbon dating. Excavation of 34WN64, the Ahlden Mound, marked a continuation of investigation begun by Vaughan and had the objectives of understanding its formation and use; the meager inventory of cultural remains, however, still makes its interpretation questionable. A more impressive return of debris was forthcoming from excavation of 34WN68, an extensive burned sandstone midden within the Little Caney River valley. Debris densities for primarily lithic debitage were high and the few diagnostic implements were suggestive of possibly an Archaic period component as well as later habitation. Recommendations were made for extensive excavation of this site during Phase III, as it potentially related to the Archaic period and the context of habitation debris suggested that intra-site patterning of activities might be definable in larger block excavations. Excavation of 34WN30, on a cutbank of Cotton Creek, was inconclusive because virtually no material remains were recovered.

Radiocarbon Dating

Hall (1977:13-19) describes five radiocarbon assays for units of Little Caney River alluvium. (All dates cited are reported in radiocarbon years, with t½=5568 yrs.) None occurs in the basal alluvium, Unit C. For Unit B, upon which the Copan paleosol developed, there is a single assay on charcoal of 1981± 75 B.P. (SMU-357), providing a maximum age for the Copan paleosol. One date on humic acids from the upper portions of the Copan soil (3-16 cm) is 1330±100 B.P. (SMU-390). This compares favorably with the Copan paleosol date of 1250±80 B.P. (I-10, 234) on charcoal from Jackson Fall-Leaf. From Unit A which overlies the Copan soil are two dates, including a near basal date on charcoal of 848±62 B.P. (SMU-365) and an upper date of 69±66 B.P. (SMU-350) that is either on modern materials or has been contaminated. A second weakly developed soil is described as within Unit A above the 848±62 B.P. date. A final date on charcoal is 655±56 B.P. (SMU-364) and is from an isolated exposure (Section C-11). Although this date is illustrated (Hall 1977:17, Figure 3) as being from the Copan soil, Hall (1877:18) states that it "cannot for certain be assigned to the Copan palesosol." Perhaps SMU-364 is from the Unit A buried soil. In any event, a plausible and conservative estimate of the age of development for the Copan paleosol is between 1900 and 900 years before present, as described by Hall.

Phase III excavation of 34WN29 produced charcoal samples sufficient for dating from several grid units or architectural features, as described later. Four charcoal samples were dated from this excavation from units within the Copan paleosol. All four dates are within the range Hall suggests for this paleosol. Three of the dates are in close agreement with their stratigraphic and artifact associations and are: 980±75 B.P. (BETA-1248), 1075±65 B.P. TA-1249) and 1185±75 B.P. (BETA-1251). The fourth date of 1620±90 B.P. (BETA-1250) is from a hearth 10cm above (30-40 cm B. S.) but in a different grid unit than Beta 1251. This final date appears discrepant but further excavation, planned for Phase IV, will be needed to fully assess its meaning.

Environmental Setting

Although the environmental setting has been discussed in many of the previously cited investigations, it will be helpful to again touch upon its aspects, especially as these apply to our understanding of landscape and vegetation changes of the past two millennia and the availablility of abiotic resources such as chert.

The Little Caney River and its tributaries are second-order or smaller affluents of the Verdigris River, which lies to the east. The Copan Lake impoundment is west and northwest of Copan, Oklahoma with headwaters near Caney, Kansas, at the Oklahoma border. Within the project area its main tributary is Cotton Creek whose valley, although smaller, resembles in most details that of the Little Caney. The Little Caney joins the Caney River about 4 km south of Copan, flowing north to south through the Osage Plains (Barker 1969), a series of east-facing sandstone bedded escarpments or cuestas to the west of the Ozark Highland. The Little Caney is a sluggish, silty meandering stream with a capacity largely determined by annual precipitation. Cotton Creek during times of drought ceases to be free-flowing, though water usually can be found trapped in deeper pools at all times of the year. The floor of both streams is a sandy silt underlain by sandstone bedrock; gravel bars composed of locally derived sandstone are also common.

The most conspicuous feature of the alluvial fills of either the Little Caney or Cotton Creek is the Copan paleosol. Hall (1977) and Prewitt (1980) have extensively mapped this buried soil in the impoundment area; and Prewitt's work indicates it is most prevalent in exposures of Cotton Creek. On Cotton Creek this soil is a very dark brown or black A-horizon of massive structure and approximately 1 m in thickness above an oxidized C-horizon composed of Unit B alluvium. Its appearance is that of a prairie soil, although one with an overly thick A-horizon. Presumably the thickness of the A-horizon reflects additions of organic-laden alluvium or colluvium or both; colluvial aprons drape the valley walls along Cotton Creek. By 900 B.P. formation of the Copan soil ceased, and the floodplain was downcut and then filled by Unit A alluvium.

Although a second minor buried soil is within the Unit A alluvium (Hall 1977), the reasonably well dated and readily apparent Copan soil provides the primary geomorphic baseline for archaeological study. Until the 1979 investigations, summarized later, no archaeological remains were known for depositional units beneath this paleosol. Thus, by inference, archaeological sites within the project area have been assumed to be either coeval with or later in time than the Copan paleosol, with the exception of 34WN68 as described by Prewitt (1980). In sum, the past 2000 years have been the prime interval of study. And, as mainly determined from Hall's (1977) palynological study, contemporary vegetative conditions for the Cross Timbers (Blair and Hubbell 1938) are applicable for much of this archaeological record. Hall's study indicates a potential increase in oak and later hickory pollen after about 1000 years ago accompanied by a similar increase in chenopodium-type pollen; ambrosia-type pollen is essentially unchanged for the 2000 year record. Each of these four types comprises the dominant pollen today, and one may assume that the contemporary Cross Timbers vegetation was established at least as early as 1000 years ago. Prior to that time, Hall's data show a dominance of Graminae pollen, indicative of grassland or prairie vegetation, and reduced percentages of oak and hickory pollen. When compared with the radiometric and pedogenic data on the Copan paleosol, these data are consistent with the interpretation of the Copan paleosol as representative of soil development beneath a prairie. These data, however, are insufficient to further model climatic parameters which may or may not have resulted in the recorded geomorphic and vegetative changes. Non-climatic factors such as burning or changes in prehistoric land use may also have played a role.

A second area where knowledge of the local environment is important is in the identification of abiotic resources, especially of stone used in the manufacture of chipped or ground stone tools. There are several varieties of iron-rich sandstone in the project area (Prewitt 1980), most of which were used for simple ground-stone implements or, in an unmodified form, as a lining for hearths or burned pavements seen at many Copan Lake sites. Sandstone outcrops near many alluvial site loci, generally at distances of less than 1 km, and its presence may have been a factor in site selection. This would seem to be true for many of the burned rock middens such as 34WN68 or 14MY501, the Caney Levee site. Although these sites are reasonably close to a source or sources, the amounts of sandstone transported often are nevertheless impressive and offer silent testimony to large expenditures of energy, either concentrated into a single construction phase or spread out over time. Incorporated either within the sandstone bedrock or the bedrock residuum are the minerals hematite or limonite, two iron oxides found on Copan Lake sites in both modified and unmodified forms. The modified pieces are similar in color and hardness to the unmodified hematite or limonite and consist of soft (hardness less than 5 on Moh's hardness scale), small chunks with ground, grooved or striated surfaces. All modifications would have resulted in a powder, usable as a pigment. It seems reasonable to assume that sandstone and the minerals hematite and limonite found on archaeological sites are derived from local, and ubiquitous sources.

Thus, if we may logically assume local sources for much of the ground stone implements, "building" materials and mineral pigments, this stands in sharp contrast with sources of chipped stone. For there are no known sources of chert either as bedrock or stream gravel inclusions in the study locality. Major bedrock chert sources, however, occur both to the east (Keokuk) and west (Florence-Neva-Foraker) of the project area. All the previous studies have identified cherts of both east and west derivation, as they are reasonably distinctive on a macroscope level. Assuming the Little Caney River served as a transportation artery, then a likely hypothesis would be that the Keokuk cherts that occur east of the Verdigris should occur with greater frequency than the western chert series. Past studies as well as this investigation, however, indicate this not to be the case. The most prevalent cherts are from the west, from what are now the areas around Shidler and Ponca City, Oklahoma. The possibility that this represents an instance of a non-local exchange system with the project area serving as an eastern terminal node will be addressed in the conclusions of this report.

CHAPTER 2. THE PHASE III PROGRAM

Phase III investigations encompassed a ten-week field season (June through August, 1979) during which excavation and limited reconnaissance of site areas were conducted. Prewitt was assisted by two graduate students, Roger Moore and Dan Prikryl, and had a crew of field laborers of about nine or ten. Dori Penny served as field laboratory technician. In addition, a group of Explorer Scouts from Tulsa volunteered to assist in the excavations of several sites. During July, I visited the project twice on a consultant basis prior to assuming responsibilities, in August, as Principal Investigator. I did make technical suggestions about data recovery procedures at these times but I was not further involved in the planning or execution of Prewitt's fieldwork.

Excavation of sites began with 34WN68, then proceeded to 34WN26, 34WN12, 34WN 34WN36 and, lastly, 34WN29. The site area of 34WN69 was checked and, after discussion with former landowners, it was determined that 34WN69 apparently had been destroyed by a shift in the channel of the Little Caney River. Excavation of 34WN34 demonstrated that the location described by Rohn and Smith (1972:10) was in error, and that it actually existed outside of Copan Lake property. The prospective excavation of 34 WN34 is near the bank of Cotton Creek but delineated no archeological remains. The cutbank to the northeast, however, did contain artifacts buried in alluvium some 3 m to 4 m below the surface, and these will be described.

Excavation of these sites was as specified by the contract's scope-of-work. The 34WN68 investigations followed Prewitt's (1980) recommendations for a more extensive block exposure of sectors of the burned rock midden, so that potential architectural features or activity areas might be delineated. Other larger scale excavation was called for at sites 34WN 29, 34WN34, and 34WN36; and small, test excavation of sites 34WN12, 34WN26, and 34 WN69. The main difference in planning these excavations was that, on the one hand, the original site descriptions of Rohn and Smith (1972) were believed to be adequate justification for a larger scale excavation (34WN29, 34WN34, 34WN36) or, on the other hand, they were considered inadequate (34WN12, 34WN26, 34WN69). It was further believed that these sites represented either differences in periods of occupation, seasons of use, or function; and their excavation, or test excavation, would expand the data base of prehistoric settlement practices.

Roughly five weeks were invested in the excavation of 34WN68. The remaining excavations of five site areas (34WN12, 34WN26, 34WN29, 34WN34, 34WN36) were accomplished in the latter half of the field season, beginning in mid-July; an average of a week was spent at each site. Contour mapping of site areas was completed for a few of these sites after the excavations ended.

Excavation controls and recovery procedures were, with few exceptions, similar to practices established by Henry (1977c). A primary difference was that grid unit designation was with reference to the northwest corner, enumerated in meters south and east (i.e., 500SE900). Excavation data were recorded using standardized level forms completed by individual excavators. Summary information was also kept in daily logs prepared by Prewitt or his site assistants. One meter squares subdivided into quadrants were excavated in arbitrary 10 cm thick levels, measured from the ground surface. Hand tools, especially trowels, were used in the removal of matrix and there was little breakage or damage of specimens due to excavation. For the most part, matrix removed from each quadrant was separately placed in plastic bags and tags identified the quadrant, its depth and the site from which it came.

Larger blocks of sandstone were often removed from the matrix prior to its being bagged. Other samples of sandstone were collected systematically from 1 m^2 grid units subdivided by orthagonally intersecting string lines placed 10 cm apart, with samples taken from the points of intersection. These *sandstone samples* were collected to provide data on potential variations in heating temperatures that might prove useful in identifying hearths (see Prewitt 1980). However, the collections would have had to have come from virtually all excavation units on sites such as 34WN68 *to have been* potentially usable; the sheer quantities of materials needed to be collected made this an impractical option. Nevertheless, these samples have been retained and are available for future study.

Mechanical earth moving equipment was *also used in trenching* selected areas of 29 and 34WN68.

Processing of excavated matrix was partially done at individual sites, especially 34 WN68 and 34WN29. In the former instance, water collected in backhoe trenches was used in a waterscreening operation through 3 mm mesh for a negligible amount of matrix; in the latter case, dry screening through ¼-inch wire mesh was attempted for matrix from exploratory trenches on the site's peripheries. With these exceptions, virtually all excavated matrix was transported to Tulsa for waterscreening. Subsequent processing of the uncounted but large number (somewhere in excess of 3000 bags of 4 to 6 liter volume) of bagged matrix was completed over a three month period (September through November) by a laboratory staff of two, each working 40-hour work weeks.

Matrix waterscreened was first allowed to air dry, and then was immersed for a few hours in a solution of water and trisodium phosphate (TSP), a clay dispersive that does not contaminate radiocarbon samples. The matrix solution was then screened through 1.6 mm wire mesh, air dried again, size graded through a series of nested screens (1-inch .5-inch, .25-inch, .125-inch, less than .125-inch), and sorted into debris classes. Materials smaller than .125-inch were retained but not further sorted or characterized.

Debris Classification

After sizing, the debris was separated into two sample types, a random group of .25-inch and .125-inch samples from about 20 quadrants from each site (Group A) and a remaining group of site quadrant samples (Group B). Group A samples were then retained for more detailed characterization, as described below.

Group B samples were then sorted as being, first, either stone, mineral, botanical, faunal, ceramic, or other debris (to include historic materials such as glass and nails, and burned clay or daub). Then the unmodified stone, almost all burned sandstone, was discarded for all size grades including and above .125-inch (3.2 mm). Stone, mineral and ceramic artifacts were next sorted into tool and non-tool elements, and set aside for later analysis. The botanical, faunal and "other debris" groups were sorted as either probable modern contamination or products of prehistoric activity. Most of the botanical remains were uncarbonized; some were still green and leafy. These materials would not survive for long periods on these open, wet sites and undoubtedly are modern. They were discarded. Carbonized plant remains were almost entirely charcoal, and have been retained either for future identification or radiocarbon dating. Four charcoal samples from 34WN29, the only site producing datable quantities, were submitted for radiocarbon dating, as described previously. All vertebrate faunal debris was retained for future analysis; but much of this material consists of small fragments of unidentifiable calcined bone. A few fresh gastropod shells were noted but no subfossil invertebrate remains were encountered. Soil chemistry on all sites other than (possibly) 34WN29 precludes good preservation of faunal remains. The "other debris" group materials were all retained for further tabulation. Group A (random) samples were similarly sorted, with a notable exception. The unmodified stone was retained in the .25-inch fraction, subsequently weighed to the nearest 0.1 gm and then discarded.

Tabulation of debris was designed for electronic data processing using statistical subroutines as described by Nie **et al.** (1975).

Data coding formats for lithic debitage, tool elements and other debris are included in the Appendix. Provenience, sample type data and weight to the nearest 0.1 gm were recorded for all debris classes. For the debitage, counts and weights were noted for each Group A sample and for the .5-inch and .25-inch fractions of the Group B samples (there is no debitage in the 1.0-inch fraction). Weight was recorded for the .125-inch fraction Group B samples also. No attempt was made to identify chert types represented by the debitage because the samples were almost entirely of too small a size for reliable identification using macroscopic techniques. For the other debris category, the material was identified and the weight and number were taken as well. Tool element coding involved differentiation into an artifact class, a product group, manufacture and/or maintenance attributes, wear or evidence of use, tool geometry, optional manufacture or maintenance, material type, weight, length, width and thickness (all to nearest mm), and blank type. The tool element coding involved a number of different steps, concepts or definitions which are described as follows.

Analytical Definitions for Debris

The tool elements consist of all artifacts showing evidence of use and/or manufacture going beyond the simple detachment of waste products (flakes and shatter) in the manufacturing process of stone or other kinds of tools. As such, some "tool elements" probably were not utilitarian implements but, in fact, might be artifacts of the manufacturing process. This would be the case, for instance, with chipped stone cores and biface preforms which were discarded either because they were exhausted remnants or for one reason or another they were unsuited for final shaping into a desired tool form. Thus, in coding these data our objective is to document meaningful differences in either tool use or manufacture.

An analytical model first suggested by Collins (1975) for bifacially flaked artifacts was modified to include all tool element debris. Procedures, represented by the tool element coding, were then operationalized for this general model. Although I did not employ the general model explicitly in the lithic debitage and other debris coding, it could easily be applied to these classes of debris as well.

The essential elements of this general debris model are illustrated in Figure 2. In its simplest form, materials are first acquired from a natural setting, go through a series of modifications in artifact manufacture, use, recycling as either similar or different artifacts, and in certain cases as with mortuary accoutrements are disposed of in specialized ways. This is a reasonable explanation of how artifacts come into being; that is, of their evolution within a dynamic cultural system operating within a larger systemic natural environment and interacting social network or networks. In addition to this, however, are an equally important series of natural and cultural filters, or transformations (Schiffer 1972), that ultimately result in the **archaeological context** of these artifacts. Assuming that we may control for these cultural and natural transformations, then we may also classify the artifacts themselves into **product groups**, or the end products we observe in archaeological contexts, by observation of key if not dichotomous attributes. For our purposes, the definition of product groups serves as a prime means of organizing artifact assemblages that are further divided into techno-functional groups or classes.

Product Group 1 relates to the acquisition phase of artifact manufacture or to the simplest of waste products associated with artifact manufacture. Included are discarded flaking debris, heat shatter, cores; ground stone materials, ground hematite; bits of broken or discarded bone; clay, etc.

Product Group 2 incorporates utilitarian items of simple manufacture or that require no manufacture other than selection of a suitable material and form. Examples include hammerstones, unmodified and unifacially flaked spalls or pieces of sharp stone, ground

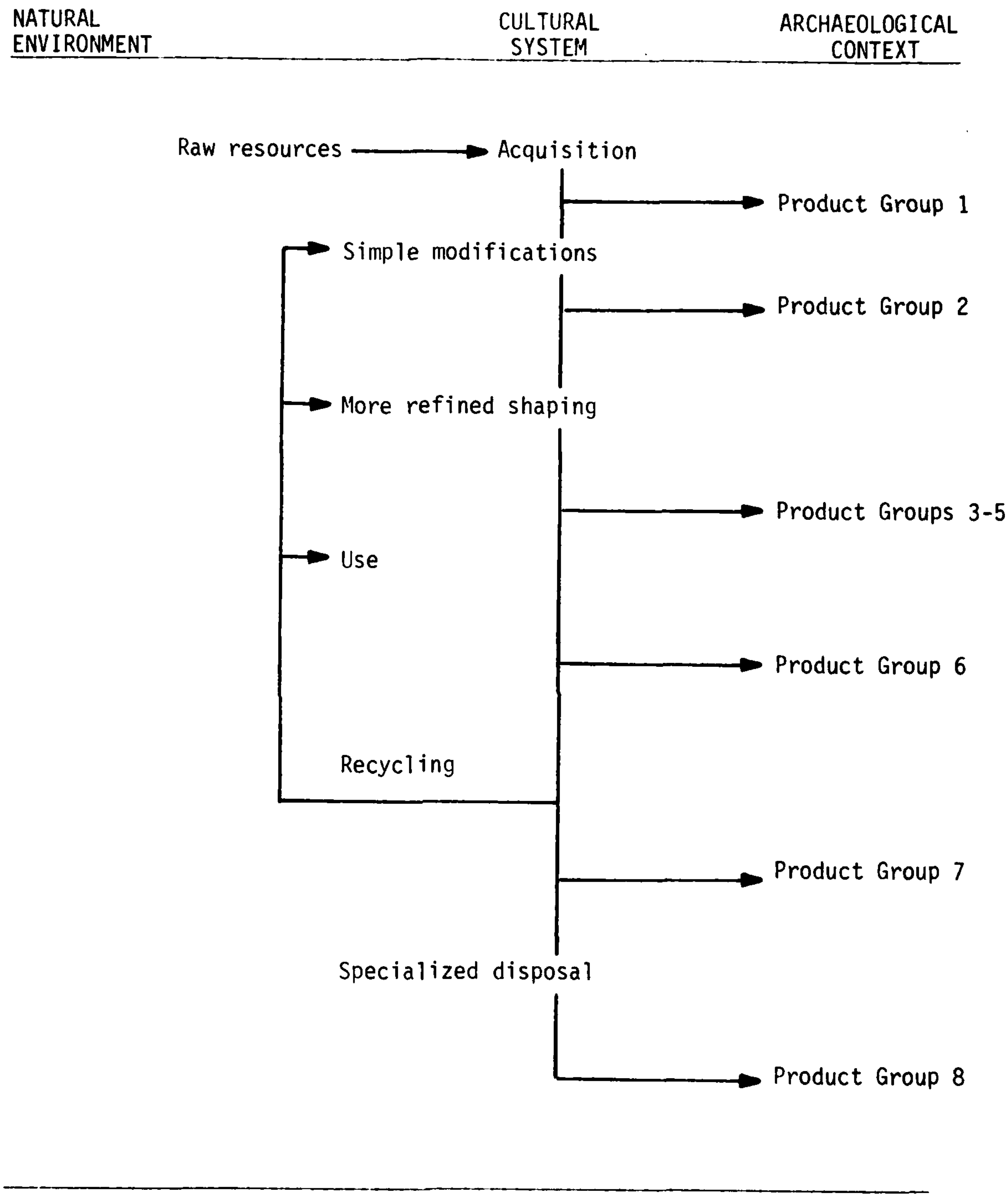

Figure 2. General Systems Model of Archaeological Artifact Debris

stone items such as whetstones or simple abraders and anvils, pointed bone implements or bone tools created by simple breakage of diaphyses or edge grinding.

Product Group 3 embodies the products of more controlled tool manufacture such as crudely percussion flaked biface preforms, the beginning stages of bone fishhook blanks, etc.

Product Group 4 encompasses tool manufacture products of more advanced stages represented by bifacially thinned chipped stone preforms, secondary stages of fishhook manufacture leading to an easily recognized tool form, etc.

Product Group 5 expresses tool preforms clearly associated with recognized tool types Included are finely shaped bifaces having controlled percussion and/or pressure flaking that is, in general, easily associated with a usable tool, fishhook blanks at a final stage of manufacture, etc. Product Group 5 artifacts are often found as broken specimens and, as such, record final flaws in material, manufacturing technique or performance.

Product Group 6 refers to finished ornaments, tools and tool use of forms requiring one or more preforming steps or stages (i.e., Product Groups 3-5). Included are bifacial implements such as hafted knives, projectile points, multipurpose cutting tools; ground stone axes or other pecked-and-ground tools; pottery vessels; fishhooks; engraved placques, etc.

Product Group 7 concerns recycling of finished artifacts including the entire range found in Product Group 6 but also those of Product Group 2. Recycling may be accomplished by optional manufacture or maintenance behaviors (such as resharpening a dulled tool edge or face) leading to continued use along the same lines as previouly or allowing for diferent usage.

Product Group 8, specialized disposal, is defined by the archaeological context of an artifact and refers to those cases whereby raw materials and artifacts are held out from further use or modification by an acquiring, manufacturing, or user group for some specialized purpose or purposes. Some of the more obvious cases of Product Group 8 artifacts include burial furniture, and exotic items or materials of relative scarcity that are either cached or employed as traceable elements of exchange programs.

Occasionally Product Groups 3-5 will be cached (i.e., Product Group 8) for later consumption in a manufacturing program or will be elements within local or regional exchange networks. Examples are caches of biface disks of Dongola and Harrison County chert from southern Illinois and southwest Indiana found in Middle Woodland sites in central Illinois and in the Scioto River Valley of Ohio (Struever and Houart 1972). We have no evidence of similar caches for the Copan Lake area but the probability that an exchange network or networks existed is seemingly enhanced in looking at the excavation assemblages as a whole.

Encoded techno-functional groups or classes for Phase III excavated site or surface collections include 61 artifact types (Table1). Numbers 1-13 are ground stone items of either Product Groups2or 6. Numbers 14-22, 26, 57, 58 and 61 are simple unifacially chipped stone implements, or manufacture by-products of Product Groups 1 and 2. Numbers 27-33 are bifacially flaked preforms of Product Groups 3-5 or consist of biface fragments which are not further differentiated into a product group. Numbers 24, 53, 54 are recycled chipped stone implements of Product Group 7. Numbers 23, 34-52, 55, 59 and 60 are utilitarian items of Product Groups 6 and 7 and include both chipped stone tools, pottery, and a single piece of cut copper. These enumerated groups are further discussed in the individual site summaries that follow, and selectively are depicted in Figures 3-7.

Observations of artifacts were mainly macroscopic. For whole or fragmentary specimens the objective was to record material selection, and critical aspects of manufacture, use, recycling and in some cases, breakage of artifacts for product group and/or techno-functional classification. These observations further allow statistical comparison of nominal, ordinal and interval scale data within individual site assemblages and between site assemblages of artifacts; and, thereby facilitate our understanding of similarities in the life cycles of these artifacts. Such approaches support the definition of certain aspects of site function and require little extra effort in the artifact analysis.

Tool Manufacture and/or Maintenance was coded into 22 values. (One value refers to the not applicable case.) These observations deal with stone tool manufacture; for ground stone artifacts the encoded values of 1-6 apply; for chipped stone artifacts, values 7-21. For ground stone three processes account for all of the variation in tool manufacture or maintenance, either singly or in combinations. These are grinding, pecking, or polishing. Artifacts that exhibit grinding only are the simplest and most common and are classed as Product Group 2. In some cases the grinding is a result of tool use. Pecking, when the only obvious modification of a ground-stone tool face, is generally part of the maintenance process of resharpening a ground face. Pecking is also a prime manufacturing process involved in artifact pitting, grooving or removal of mass, where the end product has a regular or geometric shape. Polishing as part of the manufacture process is associated on Copan Lake site with only a few highly stylized artifacts including an axe bit from 34WN 26. Chipped-stone tool manufacture is a subtractive process involving the removal of conchoidal fractured pieces (flakes and shatter). Manufacture is described in terms of flake scar observations beginning with percussion, combinations of percussion and pressure flaking, and pressure flaking alone. Bipolar flaking, where an object is placed on an anvil and is struck by a hammer from above, also occurs and was recorded, as were intentional burin faceting or burin manufacture.

Tool Wear or Evidence of Use required a maximum of 32 values. Values 1-21 refer to ground-stone tool wear or use but, as before, only the first seven values represent unique wear or use characters; and the remainder are combinations of these seven. These groundstone wear characters are described by Robinson (1980). Chipped stone tool wear or use characters include values 22-32. I have previously described these (Kay 1981) features which largely are of forms of chipped stone tool breakage or edge resharpening.

Tool Geometry is described with reference to overall shape, shape in long and cross sections. In each case, if a specimen was too fragmented to be accurately classed, this was noted. Sectional shapes were recorded as a simple method of evaluating the form of the tool and its working edge(s) or surface(s) without resorting to a more involved system of recording edge angles. Functional study of tool working edge angles was not considered appropriate at this time because: (1) in general, the sample sizes of individual tool types are too small for statistical comparisons; (2) in the case of projectile points (where numbers approach statistically meaningful levels) the differences in size and shape, edge wear or use features are sufficiently distinct for functional and stylistic differentiation.

Optional Manufacture or Maintenance refers to one primary optional process, heat treatment or thermal alteration of chipped stone artifacts (Purdy and Brooks 1971). This is a well known optional manufacturing procedure but one that is often difficult or impossible to judge on the basis of macroscopic features. Using macroscopic features of heat alteration such as particular kinds of fracture, changes of luster, and/or color of flake scars (Collins and Fenwick 1975) allowed for classification of some artifacts as being heated. However, chi square cross-tabulations of all cherts by three heat treatment values (heating apparent, not heated and heating uncertain) show no significant differences. Either our ability to discriminate among the three by macroscopic means is poor or heat treatment is not an important technique in chipped stone tool manufacture at the investigated sites. My guess is that the former process is the more evident.

Material Type coding involved 22 values, not all of which apply to the tool elements.

TABLE 1. ARTIFACT CLASSIFICATION

Code	Name	Description	Figure
1	Axe bit	Distal fragment of ground stone axe	3g
2	Loaf shaped mano	Handheld grinding stone fragment, pecked into a loaf shape and pitted on one face; the alternate face is also ground	3d
3	Loaf shaped mano	Similar to 2, but a fragment of a single face; no pit apparent on ground face	
4	Airfoil mano	Handheld grinding stone fragments, pecked-and-ground into an airfoil cross-sectional shape	3a
5	Two-faced ground stone slab	Stationary tabular sandstone slab ground on opposing faces	3c
6	Ground stone slab	Similar to 5 but ground on one face only	
7	Hematite impregnated groundstone slab	Similar to 5 but covered with a residue of ground hematite	
8	Two-faced ground stone slab fragment	Similar to 5 but fragmented specimen	
9	Groundstone slab fragment	Similar to 6 but fragmented specimen	3b
10	Hematite impregnated	Similar to either 8 or 9 and having a residue of ground hematite	
11	Abrader	Sandstone object with one or more prepared grooves or slots of variable length, width and depth. Striations within the grooves parallel their longitudinal axis.	3f
12	Groundstone slab/abrader	Combination sandstone tool, see 6 and 11	3e
13	Anvil	Sandstone tool consisting of a ground face that is either pitted due to use or has a prepared pit and surface wear giving a marred and battered appearance	3h-j
14	Core fragment	A chipped stone fragment of a core - see 61	

TABLE 1. continued

Code	Name	Description	Figure
15	Biface fragment core	Core made from a biface fragment, using the broken surface as a striking platform and with flakes dislodged usually from an edge	4l-m
16	Unifacially flaked tool	Simple chipped stone tool fashioned from a flake blank and exhibiting use wear only; may have served for a variety of light-duty cutting and scraping tasks	
17	Unclassified unifacial tool fragment	Similar to 16 but too fragmentary for further functional description	
18	Side scraper	Flake tool unifacially retouched on one or both lateral margins and exhibiting wear indicative of scraping in one or more directions	4a,d
19	End scraper	Flake tool similar to 16 but with working edge being either on the proximal or distal end	4b-c
20	Other scraper	Flake scraper similar to either 17 or 18 but with the working edge, or edges, not defined as to blank location	4e-f
21	Perforator or graver	Unifacially flaked pointed or spurred tool used for puncturing soft materials, incising bone or skins	4o-t
22	Cutting tool	A purposefully modified flake tool with working edge or edges created by unifacial flaking; a light-duty cutting tool that could be used in a variety of cutting or scraping tasks	4g
23	Adze	A unifacially or bifacially flaked wood-working implement	5n-p
24	Burin	A chipped stone slotting tool produced by detaching one or more flakes, or burin facets, in a longitudinal direction along the edge of a tool blank	4j-k
25	Impact or resharpening tool	A flake by-product of either tool use (impact) or maintenance (resharpening) having properties similar to burin facets; impact flakes often include the distal end, or tip, of a projectile point, whereas resharpening flakes have a bifacial edge either at the striking platform, on a lateral or distal edge	

TABLE 1. continued

Code	Name	Description	Figure
26	Outre Passe	Similar to resharpening flakes insofar as this flake by-product is part of either the manufacture or maintenance process of chipped stone tool production. These flakes usually span the width of a biface, hinging inward through it near the distal end, and expand from the proximal to distal ends. The distal edge of complete specimens encompasses a bifacial edge.	4h-i
27	Biface preform Product Group 3	A crudely fashioned irregularly shaped preform roughed out by hard hammer percussion or poorly executed soft hammer percussion	5a-c
28	Biface preform Product Group 4	A more regularly shaped biface fashioned by soft hammer percussion bifacial thinning. Flake scar orientation may or may not be random but in either case the result is a much thinner and well executed preform	5d-g
29	Biface preform Product Group 5	A finely shaped and thinned biface produced by well controlled soft hammer percussion and/or pressure flaking that tends to obliterate bifacial thinning scars (see 28). These are recognizeable as preforms of specific tools and usually were broken in this final stage of manufacture	
30	Undifferentiated proximal biface fragment	Too fragmentary for further classification other than location on the whole specimen and cannot be assigned with certainty to a product group	
31	Undifferentiated biface midsection	Similar to 30 but a midsection	5q
32	Undifferentiated biface distal segment	Similar to 30 but from distal end	
33	Scallorm preform proximal fragment	Product Group 5 preform fragment of Scallorn projectile point	5h-j
34	Point midsection	Identifiable biface midsection of a chipped stone point	
35	Distal point segment	Identifiable tip of chipped stone point	

TABLE 1. continued

Code	Name	Description	Figure
36	Biface drill midsection	Midsection having a lenticular cross section and evidence of rotary tool wear	
37	point segment	Lateral segment from a chipped stone point, as determined by care in bifacial flaking, thickness, barbs or notches	
38	Biface segment	Undifferentiated lateral segment of biface; not further classified into a product group	
39	Unidentifiable point proximal fragment	Chipped stone point base not classified into a recognized or recognizable type	7c
40	Side notched triangular arrow point	Small projectile point not further classified into a type	6s-w
41	Scallorn variant A	Small corner notched projectile (arrow) point having a straight base, extensive pressure flaking and often serrated blade edges	6a-k
42	Scallorn variant B	Similar to 41 but with rounded base	6l-m
43	Scallorn variant C	Haphazardly fashioned Scallorn point with little pressure flaking beyond unifacial edge preparation and notching	6n-r
44	Corner notched point	Medium to large size point having a convex base and open U-shaped corner notches, no barbs; one reworked into a hafted scraper	7j-k
45	Bifurcate base point	All proximal fragments of what appears to be a medium size, truncated lanceolate with a bifurcate base, perhaps similar to a Duncan point. One specimen is basally ground, two others are not	7g-i
46	Square stem point	A small to medium size square shouldered, straight stem point	6x
47	Expanding stem point	A medium to large size triangular point with barbed shoulders open V-or U-shaped notches, expanding stem and straight to convex base	7l-q

TABLE 1. continued

Code	Name	Description	Figure
48	Table Rock	A small to medium size triangular point with a ground, slightly expanding stem, square shoulders and straight base	5s-t
49	Gary	A medium size triangular point with pointed but not barbed shoulders, a contracting stem and straight or slightly concave base	7e-f
50	Williams	A large corner notched point with a triangular blade, barbed shoulders, large open U-shaped notches and straight to slightly convex base	7a-b
51	Basal notched point	A large size triangular point with straight stem prepared by vertical notching of the base, producing long projecting barbs	7d
52	Cupp	A medium size symmetrical corner notched point with barbed shoulders resembling an oversized Scallorn point	
53	Hafted perforator	Bifacial flaked, tear drop or squared base pointed implement with a lenticular blade element cross-section. Major differences between this and 16 are that the facility for easy hafting is present and the perforating tips are longer and more carefully prepared	5k-m
54	Pieces escuillees	A wedge shaped bi-pointed cutting tool produced by bipolar percussion flaking of chipped stone tool fragments	5r, v-x
55	Copper item	A small triangular piece of beaten copper cut on all three sides, of unkown function	5u
56	Scallorn blade element	Undifferentiated blade element of the three Scallorn variants, 41-43	
57	Other lithic debitage	Flakes and shatter showing edge abrasion perhaps caused by use	
58	Worked hematite	Hematite chunks with ground, faceted, striated and grooved surfaces indicative of grinding into a powder	

TABLE 1. concluded

Code	Name	Description	Figure
59	Bifacial cutting tool	Undifferentiated as other than a Product Group 6 light duty cutting implement usable in a variety of cutting or scraping tasks	
60	Pottery fragment	Body sherd	
61	Amorphous core	A chipped stone core having one or more striking platforms and of irregular shape	4n, u

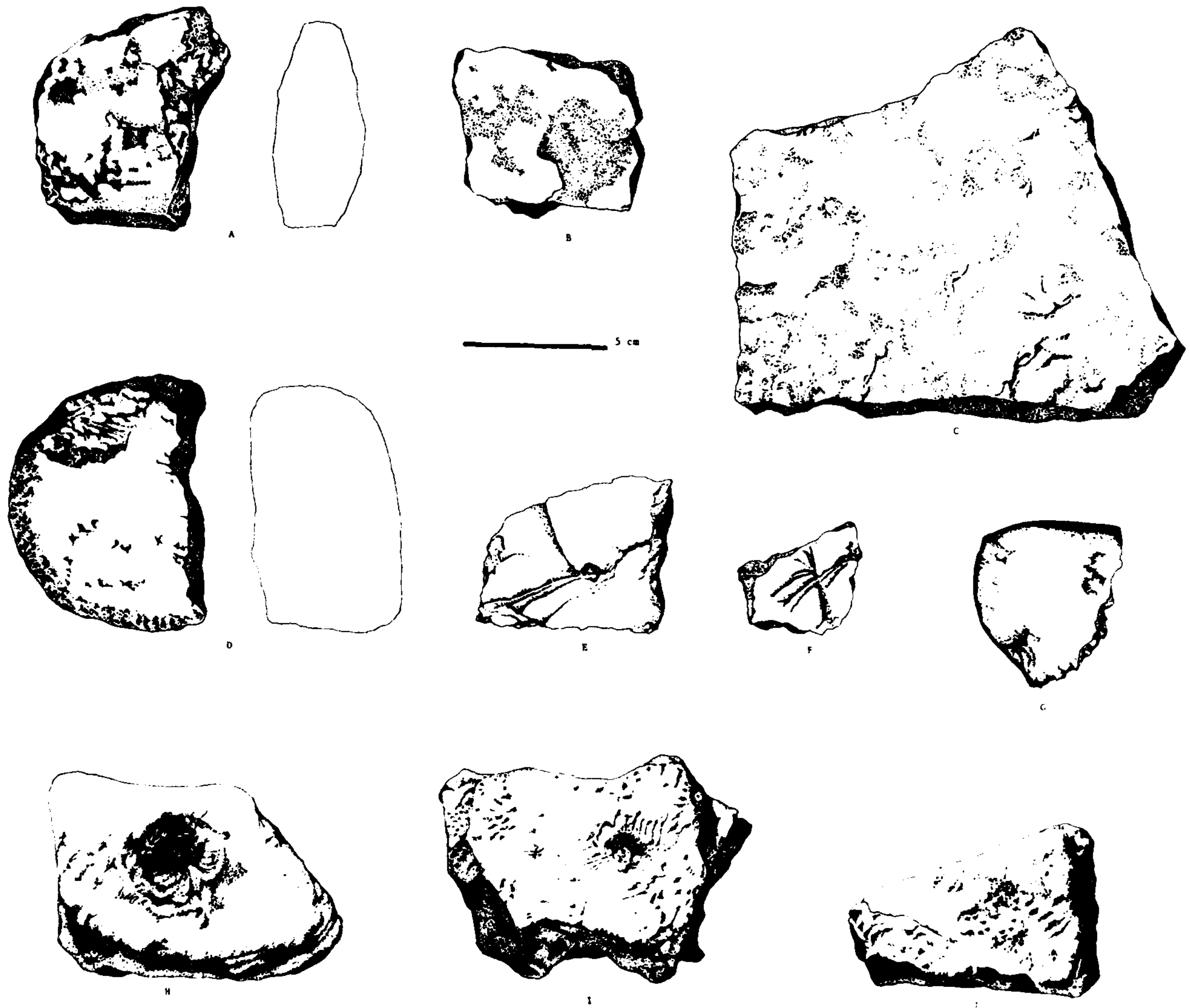

Figure 3. Selected ground stone artifacts, Phase III investigations. (a. airfoil mano fragment; b. ground stone slab fragment; c. two-faced ground stone slab; d. loaf-shaped pitted mano fragment; e. ground stone slab/abrader; f. abrader; g. axe fragment; h-j. anvils; a.-b. 34WN68; c., d.,i.,j., 34WN29; e.-h. 34WN26.) All are of sandstone with exception of g. Scale in cm.

Figure 4. Selected chert cores and unifacial chipped stone artifacts, Phase III investigations. (a., d. side scrapers; b.-c. end scrapers; e.-f. other scrapers; g. cutting tool on outre passe blank; h.-i. outre passe flakes; j.-k. burins; l-m . biface fragment cores; n., u. amorphous core; o.-s. gravers; t. perforator; a., b., d. 34WN26; c., e.-n., p., q., t. 34WN68; o., r., s., u. 34WN29.) Scale in cm.

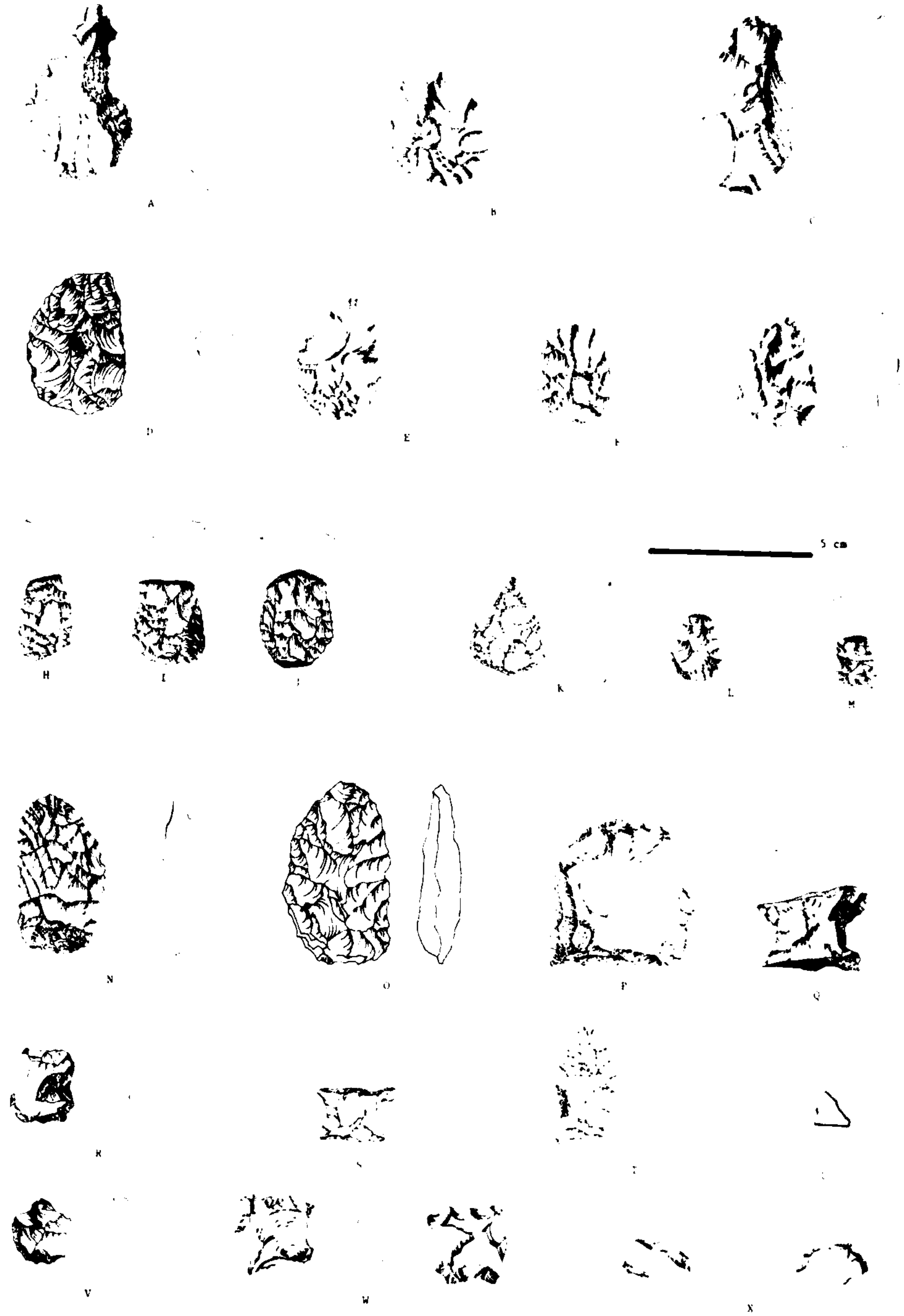

Figure 5. Selected chert bifacial and bi-polar chipped stone artifacts and copper item, Phase III investigations. (a.-c. Product Group 3 preforms; d.-g. Product Group 4 preforms; h.-j. Product Group 5 Scallorn preforms; k.-m. hafted preforators; n.-p. adzes; q. undifferentiated biface midsection; r., v.-x. pieces escuillees; s.-t. Table Rock points; u. cut copper. a.-k., p., s., t., w., x. 34WN68; l.-n., q. 34WN26; r., u., v. 34WN29; o. shoreline survey.) Scale in cm.

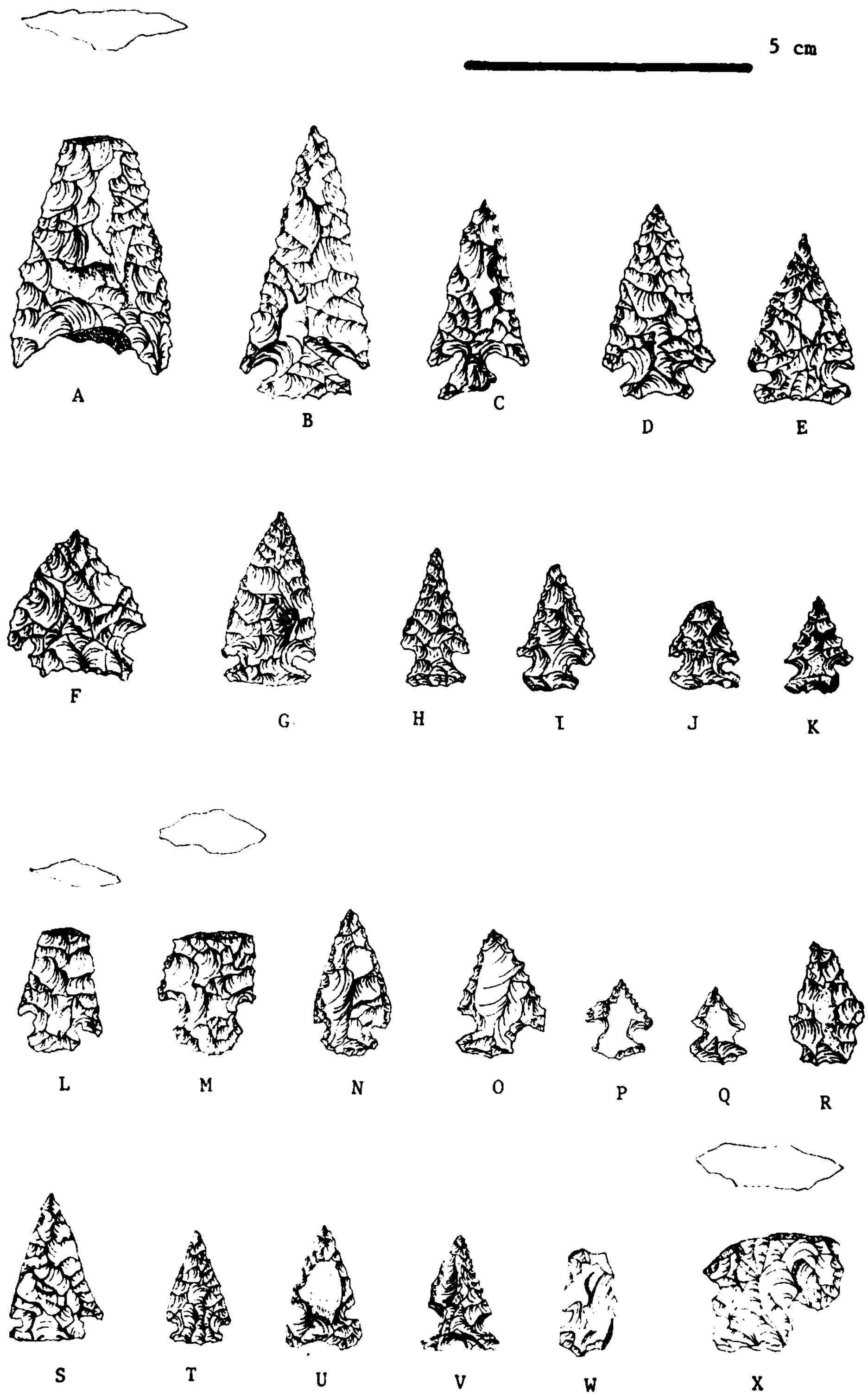

Figure 6. Small point series, Phase III investigations. (a.-k. Scallorn variant-A; l., m. Scallorn variant-B; n.-r. Scallorn variant-C; s.-w. side notched triangular arrow points; x. square stem point. a.-g., l.-n., w., x 34WN68; h.-j., o.-r. 34WN29; k., t., v. 34WN26; s., u. 34WN12.) Scale in cm.

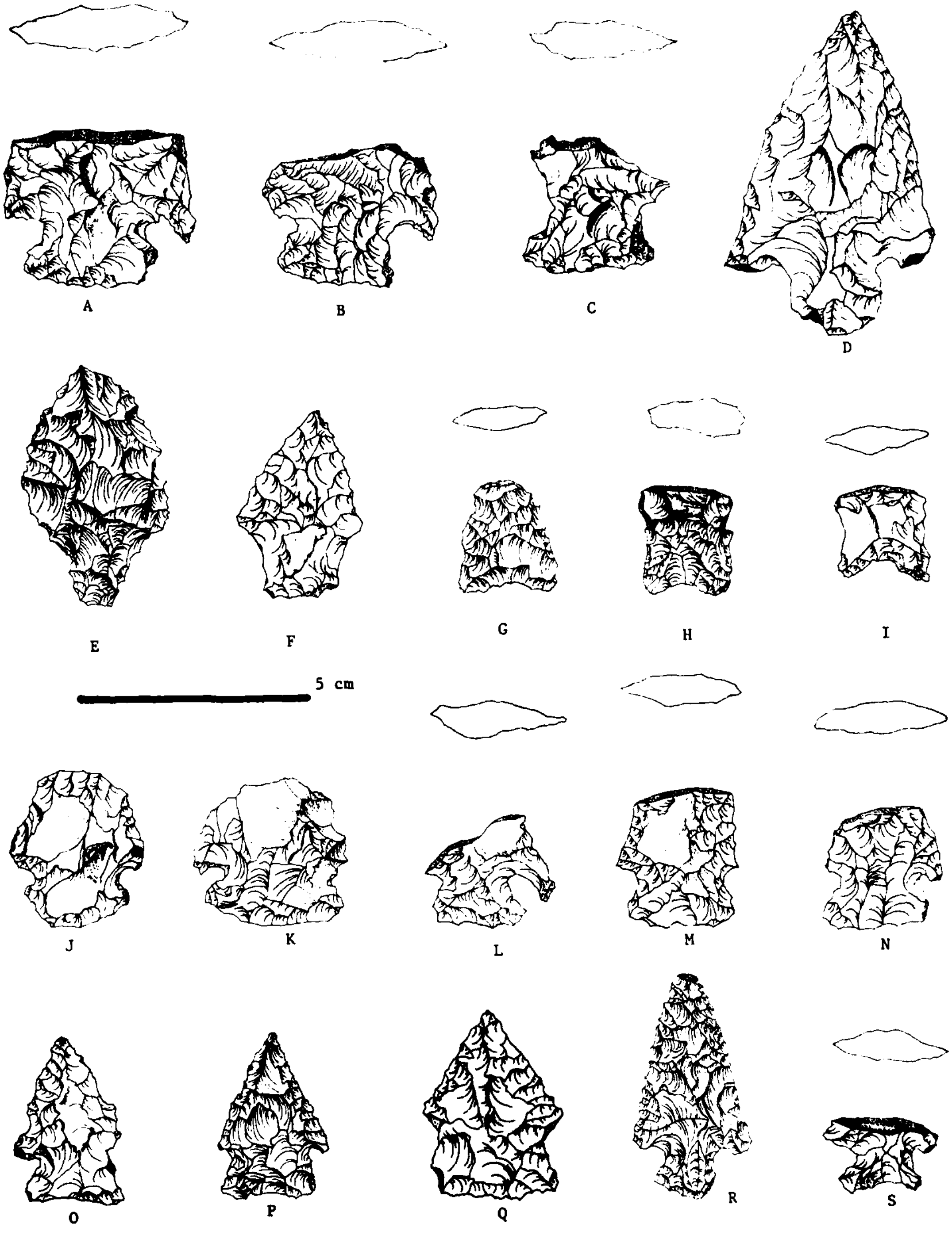

Figure 7. Large point series, Phase III investigations. (a., b. Williams; c. unidentified but probably Williams; d. basal notched point; e., f. Gary; g.-i. bifurcate base points; j., k. corner notched point; l.-q. expanding stem points; r., s. Cupp. a.-d. stream cut-bank near 34WN34; e. 34WN29; f. 34WN36; g., h., p., r. 34WN26; i.-n. 34WN68; o., s. 34WN12. q. shoreline survey.) Scale in cm.

Values 1, 2, 6, 12, 14-22 were encoded tool element materials. These are sandstone, diorite, copper, hematite or limonite, and nine chert types. The sandstone and hematite or limonite are presumed to be of local derivation, as discussed previously. Diorite, represented by a single specimen fashioned into an axe bit fragment, is from an unidentifed but non-local igneous source. The copper, also a solitary specimen from a seemingly undisturbed site context, is believed to be of non-local origin. Identification of its source may be possible in the future.

Chert represents the most frequently used material and as mentioned earlier comes from nonlocal sources. Differentiation between the major chert series, the Florence-Neva-Foraker and the Keokuk, is possible in most cases, given comparative collections available at the Universities of Tulsa and Oklahoma. Minor occurrences of black chert, which outcrops south of the Arkansas River in several different locations and formations, accord another broad source area identification; but one that contributed little to the inventories of investigated sites. In practice, material typing was often ambiguous due to small specimen size, a lack of diagnostic chert "landmarks", or uncertainty due to alteration in heat treatment. Where ambiguity existed, a choice such as "Florence or Neva" or "Neva or Keokuk" was made; or, if this was impossible, the specimen was listed as being of an unidentified chert.

As a theoretical issue the differentiation of these chert series is of major importance. At present this is not entirely practical, and it may prove impossible for some specimens regardless. What is significant now is recognition that the two primary series are not mutually exclusive, that there are both parallels in color and structure among, at least, Neva and some Keokuk cherts. Exacerbating this problem further is often the small size of many chert artifacts. While it is often possible to easily identify chert occurring as a nodule or large block, or even as a core, it becomes much more difficult or even impossible to macroscopically identify the smaller chert artifacts.

Weight and metrical observations of maximum length, width and thickness, recorded to the nearest mm, were taken whenever possible. Due to breakage or the fragmentary nature of many specimens, it was impossible to record all dimensions—maximum length being the one most often not observable. For complete or nearly complete symmetrical specimens the maximum dimensions of length and width were taken at right angles to one another; for similar nonsymmetrical specimens length and width were defined as dimensions of a binding rectangle superimposed on the artifact. For fragmentary specimens the maximum width would be recorded as would its thickness, unless these proved impossible to accurately measure. In other respects, measurement of fragmentary specimens followed procedures for complete specimens.

Blank Type, the final observation on tool elements, consisted of 9 coded values. Values 1-4 and 6 all referred to flake blanks from which a chipped-stone artifact was subsequently fashioned. Value 5 is for a core blank; value 7, to either a flake or core blank; value 8, to a heat spall or potlid; and value 9, a biface subsequently recycled into another form (Product 7). Blank type of ground stone tools were not recorded because, with only one notable exception, they are all from tabular sandstone blocks or slabs and none shows evidence of recycling. Recording of the blank types was done as an additional rank-order, or ordinal scale, measure of chipped-stone material availability and technological selectivity in the manufacture process of chipped-stone artifacts.

Analysis Objectives

Analysis of these data has three main goals. Directed to the intrasite level are the first two. One, is the context of the material remains meaningful in terms of cultural and/or natural stratigraphy; that is, is there site integrity? Two, is there patterning within the sets of debris and, possibly, their spatial configurations such that an assessment of site function or functions can be attempted? The third goal addresses the mutual questions of relative or absolute age assignments among the investigated sites and asks the additional question: do these data support, refute or modify hypotheses of settlement patterning within the Cross Timbers region?

CHAPTER 3. PHASE III INVESTIGATIONS

1. Little Caney River Site Excavation

34WN68

Site Description

34WN68 is a burned rock midden on a low terrace on the west bank of the Little Caney River. Its maximum elevation is 223 m (732 feet) above mean sea level and it is in extreme northern Washington County, Oklahoma less than .4 km south of the state line with Kansas in Section 13, Township 29 North, Range 13 East. To the east the site overlooks the nearly 2.5 km wide floodplain of the Little Caney; almost immediately west of 34WN68 is a rolling upland underlain by sandstone that terminates about 2.5 km west in an east-facing escarpment. The site has been cultivated and, in 1979, was planted in corn. Burned sandstone is present at the surface and extends outward from the terrace crest to about the 30cm contour on Figure 8. The site appears to be within the Copan paleosol.

History of Investigations

The site was first recorded by Rohn and Smith (1972:35), who recommended extensive tests or larger scale excavation. In 1978, initial excavation was begun by Keyser and completed by Prewitt (Prewitt 1980). The 1978 excavation includes the isolated one square meter units TP1, TP2, M3, M11, M30, L7, L15, and backhoe trenches 1 and 2 (Figure 8). Refer to Prewitt (1980) for artifact descriptions and illustrations of backhoe trench stratigraphy from the Phase II investigation. The Phase III excavations were based on recommendations of the Phase II excavation results, and included hand excavation of Blocks 1 and 2 (both approximately 6 m x 6 m squares of contiguous 1 m^2 grid units) and further mechanical excavation of backhoe trenches 3 and 4. The graded area adjacent to trench 3 was not further excavated.

Examination of the backhoe trenches was impeded by a high water table in both 1978 and 1979. It also proved impossible to excavate with a backhoe more than a meter below the surface due to ground water problems. Within the hand excavated units, a maximum depth of 40 cm was reached in 1979.

Stratigraphy

The stratigraphy observed in 1979 essentially duplicates that previously described by Prewitt (1980). Within Blocks 1 and 2 the excavation terminated in undisturbed rock midden deposits beneath an approximately 25 cm thick plow zone of disturbed rock midden. These excavations did not fully penetrate the extensive rock midden which, based on the hand excavations of 1978 and the backhoe trenching, ends about 45 cm below the surface. The east end of the rock midden, exposed in Trenches 2 and 4, pitches steeply onto the floodplain and is at least 1 m in thickness. Elsewhere the rock midden is of variable thickness, generally terminating between 35 cm and 45 cm below the surface. Cultivation may be responsible for the extreme thickness of the midden in its eastern exposures.

The rock midden sections recorded in both 1978 or 1979 consist of unsorted tabular burned sandstone fragments in a black clayey silt matrix, or what is essentially the culturally disturbed A-horizon of the Copan paleosol. No architectural features are present and the one mended projectile point is of two fragments from the same level and adjacent 1 m^2 units. Prewitt (1980) reports three tools found at depths greater than 45 cm; that is, the base of the burned rock midden. These occur at depths of 47 cm and between 45-55 cm. Their deposition in units slightly below the rock midden, however, does not automatically equate with a putative earlier archaeological component. A second possibility is that these artifacts are in a secondary context, the result of pedoturbational processes such as vertical cracking or rodent burrowing. Whichever is the case, the cultural and natural stratigraphy of 34WN68 present a relatively

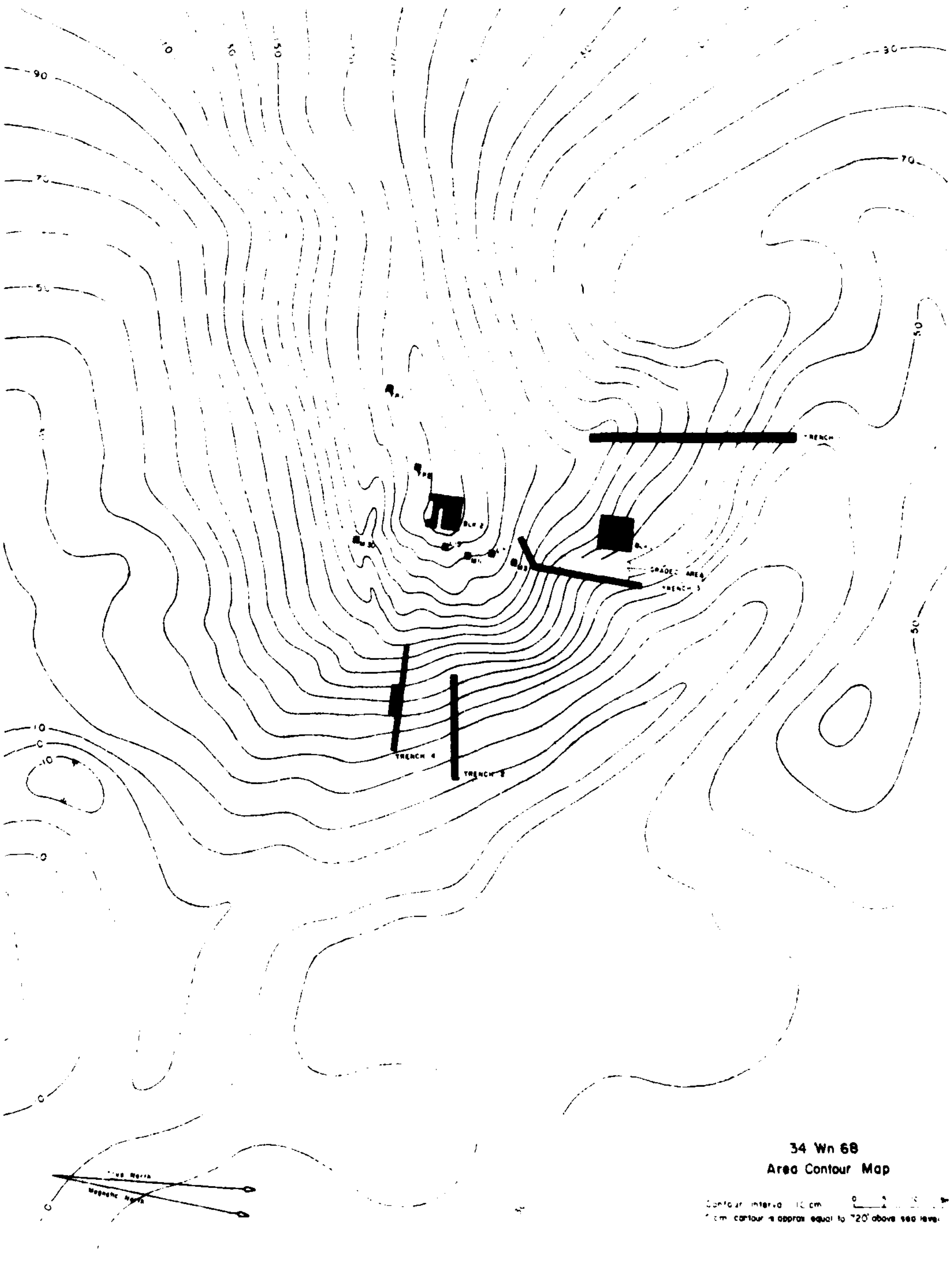

Figure 8. Site Map 34WN68

simple illustration of a surface expression of the Copan paleosol A-horizon that incorporates, and is disturbed or altered by, the burned rock midden. Although Prewitt (1980) speculates on the possibility of earlier soil development at this site occurring beneath the paleosol, this has no bearing on the age and soil-stratigraphic relationship of the burned rock midden. No radiocarbon samples were secured.

Other, independent age assessments of the burned rock midden are contingent on relative dating of diagnostic chipped stone artifacts, described later, and whether or not there is some recognizable microstratigraphy within the rock midden. Contingency testing (Table 2) shows that there is no observed microstratigraphy and that the rock midden is essentially homogeneous. Based on the available data, my best estimate is that the rock midden developed over a relatively short time span and equates with the Plains Woodland Period.

Material Remains

Of the Phase III sites investigated, 34WN 68 produced the largest quantities if not greatest diversity of cultural debris. Part of this was due to the larger scale of the excavation but, more important, is the higher debris densities of individual 50 cm squares of 10 cm thickness when compared to the other sites.

Differential preservation or site activity has undoubtedly had its impact on cultural materials. This is most notable in the scarcity of charcoal, a paradox in that the sandstone appears to be almost entirely burned. Calcined bone fragments, none identifiable, also occur in numbers below what one might hope and are most frequent in the water saturated zones exposed on the east by trenches 2 and 4. There is no pottery and, indeed, little has been recovered from any Copan Lake sites. At least for 34WN68 I think the case may be made that soil chemistry is largely responsible for the absence of ceramics and poor bone preservation.

The most conspicuous site activity is the burning of sandstone. Although we should not overlook the possibility of large scale fires rather than more easily regulated smaller hearths, the lack of the smaller hearths appears to be the product of midden churning by the original occupants. Perhaps previously burned sandstone was gathered for use in a new hearth or stone hearths were dismantled either as part of the cooking process or heat treatment of chert. The net effect is that much of the sandstone is randomly scattered in a secondary context.

Chi square comparisons assess the relationships between tool elements and depth below surface (Table 2), and the horizontal distributions of tool element product groups (Table 3). The tool elements are randomly distributed with respect to depth (Table 2:X^2 = 110. 79303, d.f. = 102, p = 0.26. Tool element product groups (Table 3a-i) have statistically significant (non-random) chi squares and associated probabilities for Product Groups 1 (X^2 = 211.02785; d.f. = 49; p = 0.0000), 2 (X^2 = 109.70563; d.f. = 48; p ≐ 0.0000), 6 (X^2 = 51.33313; d.f. = 24; p = 0.00096), 7 (X^2 = 14.99999; d.f. = 6; P = 0.02026), 6 or 7 (X^2 = 170.71626; d.f. = 49; P = 0.00000), and tool elements of undetermined product groups (X^2 = 239.61322; d.f. = 48; P = 0.00000) when compared by horizontal provenience only. These results suggest that although vertical differences in debris distributions are unimportant, horizontal debris configurations may be theoretically valuable in assessing intrasite activity. The present analyses, however, are insufficient to further differentiate intrasite activity areas. One must caution as well against a more sophisticated pattern seeking approach, given the secondary contexts of much of the remains.

Even with these caveats, the material culture of 34WN68 accords an opportunity for meaningful, albeit preliminary, comparison of both intra- and intersite usage and Late Woodland settlement practices. What follows is a description and interpretations.

The sample of material remains includes tool and non-tool elements, as previously described. The lithic debitage has been weighed and, in selected cases, counted for each size

Table 2. Crosstabulation of artifact class with surface depth, 34WN68.

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 09/13/83 PAGE 76
CROSSTABULATIONS OF DESCRIPTIVE DATA, COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE: 09/13/83) ELEMENTS, COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN68

* * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * *
VAR007 ARTIFACT CLASS BY VAR005 SURFACE DEPTH
* PAGE 1 OF 1

VAR007 (COUNT)	VAR005: 0-10 CM (10)	10-20 CM (20)	20-30 CM (30)	30-40 CM (40)	ROW TOTAL
8 OS SLAB	0	0	0	1	1 .29
9 OS FRAG	6	8	18	10	42 12.28
10 HEMATITE OS FRAG	0	1	0	0	1 .29
14 CORE FRAG	0	0	1	0	1 .29
15 BIF-CORE FRAG	0	1	0	1	2 .58
16 FLAKETOOL	0	17	6	8	31 9.06
17 UNI-TOOL FRAG	1	13	2	5	21 6.14
18 SIDE SCRAPER	1	0	4	8	10 2.92
19 END SCRAPER	0	2	4	2	8 2.34
20 OTHER SCRAPER	0	3	2	4	9 2.63
21 UNI-PERF	0	3	0	0	3 .88
22 UNI-CUT	0	0	1	1	2 .58
23 ADZE	0	1	0	1	2 .58
24 BURIN	0	0	0	2	2 .58
25 IMPACTD FLAKE	0	0	2	0	2 .58
26 OUTRE PASSE	0	8	6	5	19 5.56
27 PREFORM PD 3	0	0	0	1	1 .29
28 PREFORMPD 4	0	1	2	0	3 .88
30 UNIC PRX BIFACE	1	7	6	8	15 4.39
31 UNIC MID BIFACE	0	0	1	0	1 .29
32 UNIC DIS BIFACE	1	1	4	1	7 2.05
33 SCALLORN PRE-FRG	1	0	1	1	3 .88
34 PT MID SECTION	1	6	9	3	19 5.56
35 DISTAL PT FRAG	2	8	5	4	19 5.56
36 DRILL MID SEC.	0	0	2	0	2 .58
37 POINT SEGMENT	0	0	0	1	1 .29
38 BIFACE SEGMENT	6	31	34	18	89 26.02
39 UNIC PT PR-FRAG	0	2	2	0	4 1.17
41 SCALLORNVAR-A	0	3	3	4	10 2.92
42 SCALLORN VAR-B	0	1	3	0	4 1.17
43 SCALLORN VAR-C	0	0	1	0	1 .29
47 EXP-STEM POINT	0	3	0	0	3 .88
48 TABLE ROCK PT	0	0	0	1	1 .29
60 PIECES ESQUILL.	0	1	0	1	2 .58
61 AMORPH CORE	0	1	0	0	1 .29
COLUMN TOTAL	20 5.85	118 34.50	119 34.80	85 24.85	342 100.00

RAW CHI SQUARE = 110.79303 WITH 102 DEG OF FREEDOM SIGNIFICANCE = .26159

NUMBER OF MISSING OBSERVATIONS = 88

Table 3a. Horizontal distributions of tool element product groups, 34WN68 (Product Group 1).

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 04/12/83 PAGE 2
CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE TOOL (CREATION DATE 03/12/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN68

* * * * * C R O S S T A B U L A T I O N O F * * * * *
VAR003 SOUTH GRIDCOORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR..
VAR008 PRODUCT GROUP VALUE: 1 PG 1
PAGE 1 OF 1

VAR003 (COUNT)		169.0E (1)	170.0E (2)	172.0E (3)	174.0E (4)	177.0E (6)	200.0E (7)	211.0E (9)	SURFACE (10)	ROW TOTAL
64.0S	1	4	11	9	2	0	0	0	0	26 / 17.81
66.0S	2	5	5	5	1	2	0	0	0	18 / 12.33
68.0S	3	2	14	5	6	0	0	0	1	28 / 19.18
70.0S	4	0	2	0	0	0	0	0	0	2 / 1.37
75.0S	8	4	5	4	0	0	1	0	0	14 / 9.59
77.0S	9	2	6	6	4	0	0	0	0	18 / 12.33
79.0S	10	3	1	2	0	0	0	1	0	7 / 4.79
SURFACE	11	0	0	0	0	0	0	0	33	33 / 22.60
COLUMN TOTAL		20 / 13.70	44 / 30.14	31 / 21.23	13 / 8.90	2 / 1.37	1 / .68	1 / .68	34 / 23.29	146 / 100.00

RAW CHI SQUARE = 211.02735 WITH 49 DEG OF FREEDOM
SIGNIFICANCE = .00000

Table 3b. Horizontal distributions of tool elements product groups, 34WN68 (Product Group 2).

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 04/12/83 PAGE 3
CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE TOOL (CREATION DATE 03/12/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN68

* * * * * C R O S S T A B U L A T I O N O F * * * * *
VAR003 SOUTH GRIDCOORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR..
VAR008 PRODUCT GROUP VALUE: 2 PG 2
PAGE 1 OF 1

VAR003 (COUNT)		169.0E (1)	170.0E (2)	172.0E (3)	174.0E (4)	177.0E (5)	179.0E (6)	SURFACE (10)	ROW TOTAL
64.0S	1	0	2	7	1	0	0	0	10 / 21.74
66.0S	2	4	2	2	0	0	0	0	8 / 17.39
68.0S	3	0	2	1	1	0	0	0	4 / 8.70
72.0S	5	0	0	0	0	3	2	0	5 / 10.87
73.0S	7	0	1	0	0	0	0	0	1 / 2.17
75.0S	8	2	4	3	0	0	0	0	9 / 19.57
77.0S	9	1	2	0	0	0	0	0	3 / 6.52
79.0S	10	0	0	1	1	0	0	0	2 / 4.35
SURFACE	11	1	0	0	0	0	0	3	4 / 8.70
COLUMN TOTAL		8 / 17.39	13 / 28.26	14 / 30.43	3 / 6.52	3 / 6.52	2 / 4.35	3 / 6.52	46 / 100.00

RAW CHI SQUARE = 109.70561 WITH 48 DEG OF FREEDOM
SIGNIFICANCE = .00000

Table 3c. Horizontal distributions of tool element product groups, 34WN68 (Product Group 3).

CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE TOOL (CREATION DATE: 05/12/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN68

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR..
VAR008 PRODUCT GROUP VALUE = 3. PG 3
PAGE 1 OF 1

VAR003 \ VAR004 (COUNT)	170.0E (2)	SURFACE (10)	ROW TOTAL
3 — 46.0S	1	0	1 (14.29)
11 — SURFACE	0	6	6 (85.71)
COLUMN TOTAL	1 (14.29)	6 (85.71)	7 (100.00)

FISHER'S EXACT TEST = .14286

Table 3d. Horizontal distributions of tool element product groups, 34WN68 (Product Group 4).

CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE TOOL (CREATION DATE: 05/12/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN68

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR..
VAR008 PRODUCT GROUP VALUE = 4. PG 4
PAGE 1 OF 1

VAR003 \ VAR004 (COUNT)	169.0E (1)	170.0E (2)	174.0E (4)	SURFACE (10)	ROW TOTAL
1 — 44.0S	1	0	0	0	1 (20.00)
2 — 46.0S	0	0	1	0	1 (20.00)
9 — 77.0S	0	1	0	0	1 (20.00)
11 — SURFACE	0	0	0	2	2 (40.00)
COLUMN TOTAL	1 (20.00)	1 (20.00)	1 (20.00)	2 (40.00)	5 (100.00)

RAW CHI SQUARE = 14.99999 WITH 9 DEG OF FREEDOM SIGNIFICANCE = .09094

Table 3e. Horizontal distributions of tool element product groups, 34WN68 (Product Group 5).

CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE TOOL (CREATION DATE: 05/12/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN68

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 GRID COORDINATE
CONTROLLING FOR..
VAR008 PRODUCT GROUP VALUE = 5. PG 5
PAGE 1 OF 1

VAR003 \ VAR004 (COUNT)	172.0E (3)	177.0E (9)	ROW TOTAL
2 — 46.0S	1	1	2 (66.67)
3 — 48.0S	1	0	1 (33.33)
COLUMN TOTAL	2 (66.67)	1 (33.33)	3 (100.00)

FISHER'S EXACT TEST = .66667

Table 3f. Horizontal distributions of tool elements product groups, 34WN68

(Product Group 6).

```
CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS                              09/12/83     PAGE 7
CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE   TOOL     (CREATION DATE = 09/12/83)   ELEMENTS, COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE:   WN68

* * * * * * * * * * * * * * * * *   C R O S S T A B U L A T I O N   O F   * * * * * * * * * * * * * * * * *
    VAR003    SOUTH GRIDCOORDINATE                             BY  VAR004    EAST GRID COORDINATE
CONTROLLING FOR..
    VAR008    PRODUCT GROUP                                    VALUE =     6   PG 6
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE  1 OF  1
```

VAR003	COUNT (VAR004)	169.0E (1)	170.0E (2)	172.0E (3)	174.0E (4)	SURFACE (10)	ROW TOTAL
44.0S	1	0	1	0	1	0	2 9.09
46.0S	2	1	1	1	0	0	3 13.64
48.0S	3	0	0	1	0	0	1 4.55
75.0S	8	0	3	0	0	0	3 13.64
77.0S	9	0	1	0	0	0	1 4.55
79.0S	10	0	1	0	0	0	1 4.55
SURFACE	11	0	0	0	0	11	11 50.00
	COLUMN TOTAL	1 4.55	7 31.82	2 9.09	1 4.55	11 50.00	22 100.00

```
RAW CHI SQUARE                 = 51.33333  WITH 24 DEG OF FREEDOM
                                      SIGNIFICANCE = .00096
```

Table 3g. Horizontal distributions of tool element product groups, 34WN68

(Product group 7).

```
CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS                              09/12/83     PAGE 8
CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE   TOOL     (CREATION DATE = 09/12/83)   ELEMENTS, COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE:   WN68

* * * * * * * * * * * * * * * * *   C R O S S T A B U L A T I O N   O F   * * * * * * * * * * * * * * * * *
    VAR003    SOUTH GRIDCOORDINATE                             BY  VAR004    EAST GRID COORDINATE
CONTROLLING FOR..
    VAR008    PRODUCT GROUP                                    VALUE =     7   PG 7
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE  1 OF  1
```

VAR003	COUNT (VAR004)	170.0E (2)	172.0E (3)	174.0E (4)	SURFACE (10)	ROW TOTAL
48.0S	3	1	1	0	0	2 20.00
75.0S	8	0	1	1	0	2 20.00
SURFACE	11	0	0	0	6	6 60.00
	COLUMN TOTAL	1 10.00	2 20.00	1 10.00	6 60.00	10 100.00

```
RAW CHI SQUARE                 = 14.99999  WITH 6 DEG OF FREEDOM
                                      SIGNIFICANCE = .02026
```

Table 3h. Horizontal distribution of tool element product groups, 34WN68

(Product Groups 6 or 7).

```
CROSSTABULATIONS CORAN LAKE SITE[illegible] TOOL ELEMENTS                    04/12/83    PAGE 9
CROSSTABULATION OF [illegible]
FILE   TOOL    (CREATION DATE [illegible]) [illegible] CORAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE:  WN68

* * * * * * * * * * * * * * * * *  C R O S S T A B U L A T I O N   O F  * * * * * * * * * * * * * * * * *
   VAR003   SOUTH GRID COORDINATE                       BY  VAR004   EAST GRID COORDINATE
CONTROLLING FOR..
   VAR008   PRODUCT GROUP                               VALUE..   10   PG 6 OR PG 7
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE 1 OF 1
```

VAR003 (COUNT)	VAR004: 165.0E (1)	170.0E (2)	172.0E (3)	174.0E (4)	177.0E (5)	178.0E (6)	204.0E (8)	SURFACE (11)	ROW TOTAL
1 44.0S	3	4	2	1	2	0	0	0	12 17.91
2 46.0S	6	2	1	0	0	0	0	0	9 13.43
3 48.0S	2	5	2	0	0	0	0	0	9 13.43
5 52.0S	0	0	0	0	0	1	0	0	1 1.49
8 75.0S	1	4	3	0	0	0	1	0	9 13.43
9 77.0S	1	4	3	1	0	0	0	0	9 13.43
10 79.0S	1	5	0	0	0	0	0	0	6 8.96
11 SURFACE	0	0	0	0	0	0	0	12	12 17.91
COLUMN TOTAL	14 20.90	24 35.82	11 16.42	2 2.99	2 2.99	1 1.49	1 1.49	12 17.91	67 100.00

RAW CHI SQUARE = 170.71626 WITH 49 DEG OF FREEDOM
SIGNIFICANCE = .0000

Table 3i. Horizontal distribution of tool element product groups, 34WN68

(Product group undetermined).

```
CROSSTABULATIONS CORAN LAKE SITE[illegible] TOOL ELEMENTS                    04/12/83    PAGE 10
CROSSTABULATION OF [illegible] PRODUCT GROUPS
FILE   TOOL    (CREATION DATE [illegible]) [illegible] CORAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE:  WN68

* * * * * * * * * * * * * * * * *  C R O S S T A B U L A T I O N   O F  * * * * * * * * * * * * * * * * *
   VAR003   SOUTH GRID COORDINATE                       BY  VAR004   EAST GRID COORDINATE
CONTROLLING FOR..
   VAR008   PRODUCT GROUP                               VALUE..   11   UNDET. PG
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  PAGE 1 OF 1
```

VAR003 (COUNT)	VAR004: 165.0E (1)	170.0E (2)	172.0E (3)	174.0E (4)	177.0E (5)	178.0E (6)	SURFACE (10)	ROW TOTAL
1 44.0S	2	13	10	2	1	0	0	28 22.58
2 46.0S	3	4	3	0	1	0	0	11 8.87
3 48.0S	3	9	11	5	1	0	0	29 23.39
5 52.0S	0	0	0	0	2	3	0	5 4.03
6 68.0S	0	1	0	0	0	0	0	1 .81
8 75.0S	1	7	1	0	0	0	0	9 7.26
9 77.0S	5	6	6	1	0	0	0	18 14.52
10 79.0S	3	3	4	1	0	0	0	11 8.87
11 SURFACE	0	0	0	0	0	0	12	12 9.68
COLUMN TOTAL	17 13.71	43 34.68	35 28.23	9 7.26	5 4.03	3 2.42	12 9.68	124 100.00

RAW CHI SQUARE = 233.61322 WITH 48 DEG OF FREEDOM
SIGNIFICANCE = .0000

grade for the 50 cm squares of 10 cm thickness; a comparison of weights by counts is presented as a means of fingerprinting chipped-stone tool manufacture programs for this and other excavated sites, and will be discussed in detail after the summary of tool element debris. With respect to tool elements from 34 WN68 there are ground-and chipped-stone artifacts from the excavation and surface of the site, a total of 430 specimens. Of these, 88 (20.46%) are surface finds and the rest are from the excavation. Forty-eight (11.16%) items are of ground sandstone. Chipped stone artifacts compose the remaining 88.84 percent of the sample, consisting of 382 chert items.

Ground-Stone Artifacts

The 48 specimens are of five tool types: two airfoil mano fragments, one ground-stone slab, one hematite impregnated ground-stone slab, 43 ground-stone slab fragments and one hematite impregnated ground-stone slab fragment. With the exception of the airfoil manos (Figure 3a), a Product Group 6 artifact, all other ground–stone implements are Product Group 2 implements and are of rudimentary construction or form. The two airfoil manos present a distinct style which, in terms of the Phase III investigations, is unique Their manufacture was by intentional grinding-and-pecking. Of the other ground-stone tools only one, the hematite impregnated ground-stone slab is similarly ground-and-pecked. Nine ground-stone slab fragments and the one fragment of a hematite impregnated slab are pecked. The remaining 35 artifacts show no evidence of intentional manufacture but rather exhibit ground surfaces due to use or wear.

Beyond the fact that all of these to 's were used in some kind of grinding activity, the presence of hematite residues on two specimens is indicative of hematite grinding into a powder. The other simple slab or slab fragments might similarly have been employed, or they could have been used to grind vegetal products. Neither use would have excluded the other. The presence of the two mano fragments from two tools suggests a more systematic program of vegetal product reduction probably used in conjunction with a stationary ground stone slab or metate; however, only one implement of this kind was recovered in the site excavation. The ground stone tool inventory does not contain items used in chipped stone tool fabrication and, as a whole, represents grinding activities associated with hematite and vegetal product reduction, or a combination of mainly extractive tasks (Binford and Binford 1966) associated with domestic encampments.

Chipped-Stone Artifacts

The 382 chipped stone artifacts represent our most comprehensive sample of chert tool elements. Included are 37 of the artifact types listed in Table 1. Of these, Product Group 1 accounts for 14 types of simple core and core fragments (Figure 4 l-n), unifacial tools (Figure 4 e-g, j, k, p, q, t), and tool manufacture by-products (Figure 4 h, i), a total of 146 artifacts (38.21% of the chipped-stone tool elements). Bifacially flaked artifacts include Product Group 3 preforms (Figure 5 a-c), Product Group 4 preforms (Figure 5 d-g), Product Group 5 Scallorn preforms (Figure 5 h-j), a total of 15 artifacts (3.92%). There is also an assortment of biface fragments not further differentiated, represented by four artifact types (Table 1, numbers 30-32, 38) and a total of 124 items (32.46%) of which the majority (n = 97) are biface segments. Fragments of recognizable tools include point proximal (n= 5), midsection (n=25), and distal elements (n = 22), a point segment and two drill midsections; a total of 55 fragments (14.39%). Culturally diagnostic tools, comprising the rest of the subsample, include a total of 36 tools (9.42%) and 10 tool types (Tables 1 numbers 40-48, 53).

Although the diagnostic implements account for slightly less than 10 percent of the chipped stone tool elements, they are our most important data respective to the chronological placement of this site. The most frequent of these implements are Scallorn points (Figure 6 a-g, 1-n) of three subtypes, or variants (A,B, C). The major differences amo. , the three variants are basal shape and extent of pressure flaking as shown in Figure 6. The majority are variant A with 16 specimens; variant B has 6 and there is one variant C. The Scallorn specimens range in length from 22-46 mm, in width from 13-27 mm and in thickness from 3-6 mm. These 23 artifacts comprise almost 64 percent of the diagnostic tools, and are horizon markers of the Late Woodland period. Bell (1960:84) describes Scallorn points as commonly found in Oklahoma on Gibson and Fulton Aspect sites as well as the Washita River Focus.

The second most frequent point is an unnamed medium-size expanding stem type (Table 1 number 47), having five specimens which range in width 21-24 mm and in thickness 5-7 mm. All are fragmentary and length could not be determined. Examples are illustrated in Figure 7l-n.

Represented by two specimens each are two medium-size types, a corner notched point (Table 1, number 44; Figure 7j-k) and Table Rock point (Table 1, number 38; Figure 5s-t). The corner-notched type has a length of 32 mm (one specimen), a width of 27 mm (one specimen), and thickness 6-9 mm. The Table Rock points include one specimen of 36 mm length, 19 mm width and 5 mm thickness; the other has a measurable thickness of 7 mm. Table Rock is generally considered to be Late Archaic in age (Perino 1968:96; Kay 1980) and should of course predate the Scallorn points that dominate the assemblage from 34 WN68. One of the specimens was a surface find and the other (Figure 5s) was between 30-40 cm below the surface. Scallorn points are also found throughout the midden (Table 2) and the presence of the one Table Rock near the base of the excavations cannot be taken as stratigraphically meaningful.

Represented by one specimen each are point numbers (Table 1) 40 (side notched arrow point, Figure 6w), 45 (bifurcate basal fragment of what may have been a lanceolate, Figure 7i), 46 (small square stem point, Figure 6x), and a hafted drill (Figure 5k). The side-notched arrow point is incomplete but has a width of 9 mm and 3 mm thickness. The Bifurcate base is 19 mm in width and 6 mm thick; Prewitt (1980) reports a similar specimen from the Phase II work.

A reasonable interpretation of these data is that the assemblage of diagnostic tools and other tool forms comprises a diversified Late Woodland component or components. Although attention is rightfully focused on the temporally diagnostic tools, one would expect that these implements denote only a limited number of specialized activities, mainly related to extractive tasks such as hunting or game butchering or to defense. The other artifacts may have been used in some of these activities and also in other maintenance tasks, or they are by-products of chipped stone tool production. In addition to this, the inventory of chipped-stone implements illustrates a conservatism on the part of the site's inhabitants and a tendency to recycle broken implements into new lines. Some of these observations need further clarification and it will be useful to selectively review a portion of the other chipped stone artifacts.

Material selection for the chipped stone artifacts shows a preponderance of western source cherts, even given the fact that 132 (34.55%) specimens could not be specifically identified. Florence (Kay County chert, see Prewitt 1980) accounts for 121 (31.67%), Neva for 68 (17.80%), Florence or Neva for 31 (8.11%), and Foraker for 5 (1.30%). Thus, a minimum total for the western chert series is 225 (58.90%) tool elements. This completely overshadows the 22 specimens that possibly are from an eastern source (Keokuk) or the 3 from south of the Arkansas River. As determined from the debitage, core or core fragments and bifacial artifacts, much of this material came to the site as small, noncortical chunks or bifacial preforms requiring further thinning. There is no evidence of use of patinated chert nodules such as are common in stream gravels.

Maintenance activities that express chipped stone tool production are seemingly defined by the assemblage of temporally nondiagnostic artifacts and lithic debitage. The final phases in tool fabrication are better represented than are the initial ones of material acquisi tion and crude bifacial (hard hammer percussion) roughing-out of preforms. There are no hammerstones in the assemblage, which would have been used in initial bifacial reduction or flake production from cores. Nor is there much evidence of primary core reduction (i.e., one core only) though large flake blanks and unifacial implements do occur. The debitage includes whole or fragmentary flakes having narrow, flat or faceted striking platforms, ventral lipping and diffuse bulbar surfaces—all attributes of soft hammer percussion work using a wood, bone, or antler baton. The fact that no percussive tools occur appears to be a function of soil chemistry or selective disposal (Product Group 8) insofar as evidence of their use is abundant. The latter phases of bifacial reduction are observable from the Product Groups 3-5 artifacts and, probably, much of the fragmentary bifacial debris as well as the debitage, which consists mainly of biface thinning elements such as overshot flakes. From inspection of Figures 4 and 5 it is clear (and not surprising) that the general process of biface reduction is linear and resulted in smaller, thinner and more carefully flaked preforms; that, when used, were best suited to light-duty cutting and scraping tasks.

An optional manufacture or maintenance procedure was heat treatment, or thermal alteration, of chert. Although it was not possible to systematically differentiate between all heated and unheated specimens, the fact that fractures and changes in flake scar luster found with heating are common is evidence that, if anything, I have underestimated the degree to which heat treatment occurred. Possibly heat treatment of cherts required burning or heating of sandstone as either a heat retainer or insulator. And this, in part, might explain why substantial quantities of sandstone were transported a short distance (i.e., perhaps .25 km) to the site.

Bipolar percussion work is apparent on two tools, or **pieces esquillees** (Figure 5X, W), and represents a minor but distinctive technology. One of the tools (Figure 5x) is a bipolar flake, the other (Figure 5W) was recycled from a broken biface (possibly a drill). In both instances the end products are wedge-shaped in cross section and may well have served to split wood, bone or antler.

Other light duty wood, bone or antler slotting is indicated by the presence of two burins (Figure 4j-k) made on thick flake blanks. Incising of similar materials may have been accomplished also by use of flake gravers having single spurs (Figure 4p, q). Perforations in soft materials also could have been accomplished through use of unifacial (Figure 4t) or bifacial (Figure 5k) tools. Wood and other vegetal products and animal hides probably also were further processed through use of light duty scraping (Figure 4c, e-f) and cutting (Figure 4g) tools. More heavy duty woodworking is indicated by the presence of adzes (Figure 5p).

Debitage Bulk Density Analysis

As noted above, the chipped-stone debitage consists of flakes and shatter from the final stages of biface reduction. Group A samples of .25-inch and .125-inch flaking debris as well as Group B samples of .5-inch flaking debris were tabulated for weight and number from individual 50 cm squares of 10 cm thickness for this and the other Phase III sites. Linear regression was used as a measure of sample homogeneity among these bulk density samples: That is, if weight is highly correlated to number for the sample units, then one may conclude that (1) the intrasite samples are all drawn from the same statistical population and (2) that the regression line closely fits a general lithic reduction program observed within selected size grades. In addition, the data displayed as a scatterplot are directly comparable from site to site as absolute measures of 50 cm square bulk densities. Thus, the linear regression analysis can be seen to be an economical yet highly productive means to evaluating parameters of chipped stone reduction programs, intra and intersite bulk density relationships as well as whether or not the debitage is representative of one or

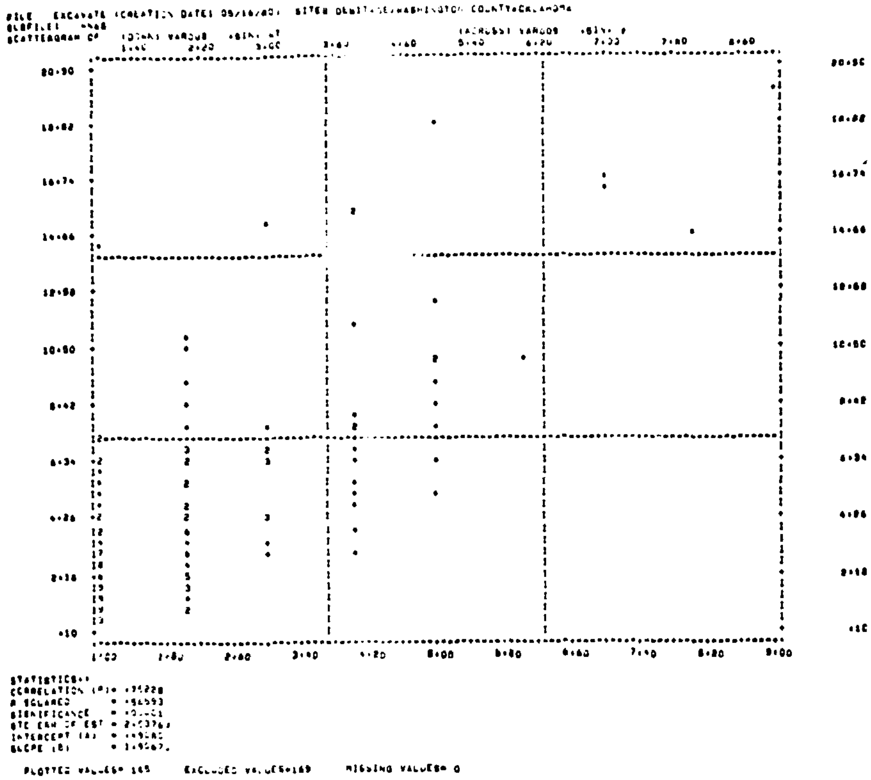

Figure 9. Scattergram of .5-inch debitage, 34WN68.

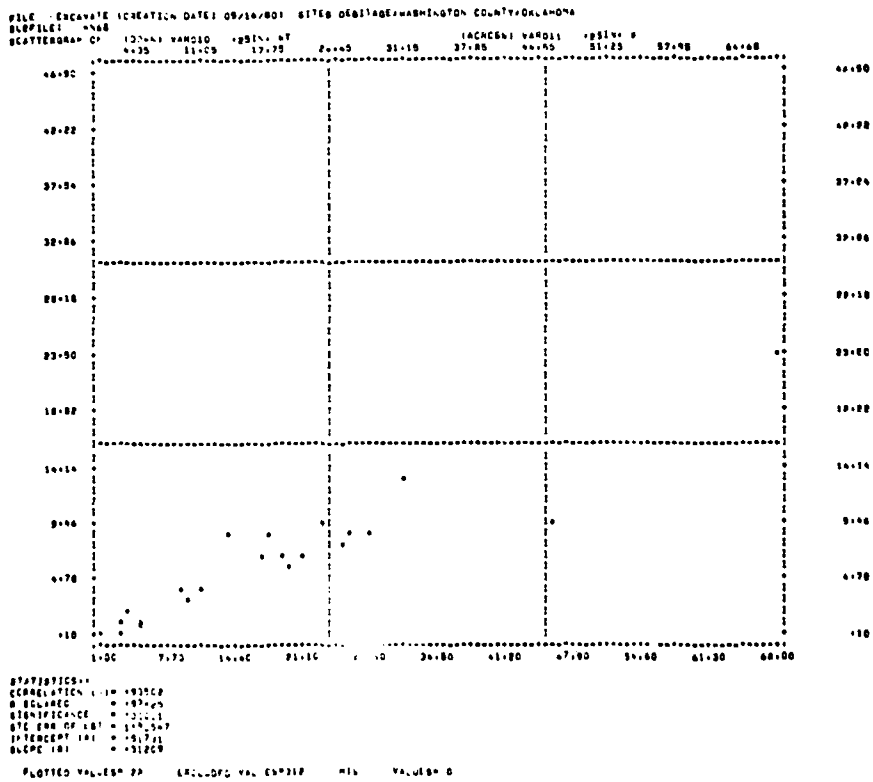

Figure 10. Scattergram of .25-inch debitage, 34WN68.

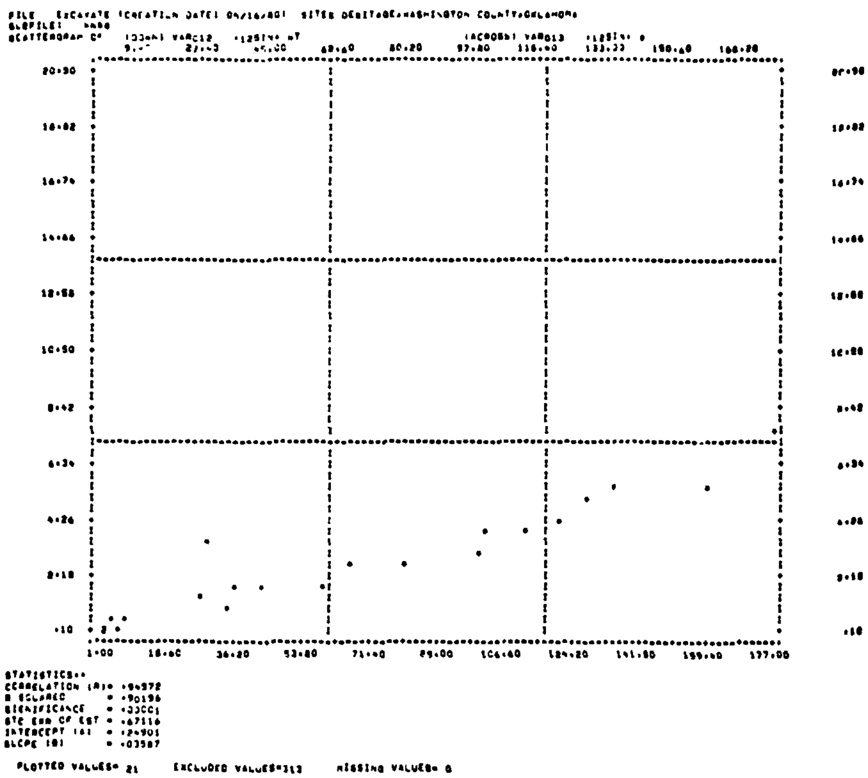

Figure 11. Scattergram of .125-inch debitage, 34WN68.

more components (i.e., fabricating groups) at any one site or between sites. The results are discussed below for the intrasite analysis of 34WN68; intersite comparisons will follow descriptions of the other investigated sites.

Half-inch flaking debris is present within 165 of the 334 excavated 50 cm squares of 10 cm thickness. Figure 9 is a scatterplot of their weight by number together with the summary statistics. The correlation (Pearson's product moment, or r) between the two is a positive .75, a reasonably high correlation and one that would not occur due to chance alone ($p = 0.00001$). The least squares regression estimate (r^2) is 0.56, which indicates there is dispersion about the regression line defined by intercept (A) and slope (B). Thus, the results suggest that the sample of almost 50 percent of the investigated units is composed of reasonably homogenous .5-inch flaking debris, an argument in favor of manufacture by a single group of flintworkers.

A more emphatic case is presented in the comparison of Group A .25-inch and .125-inch subsamples. The .25-inch Group A subsample consists of 22 randomly drawn 50 cm units (6.58% of the population). The scatterplot (Figure 10) shows a nearly linear arrangement with little dispersion about the regression line. Expressed is a highly significant regression ($r^2 = .87, p = 0.0001$) having extremely high correlation between weight and number ($r = .93$). Even more impressive is the regression ($r^2 = .90$, $r = .94$; $p = 0.00001$) of the 21 Group A .125-inch units (6.28%; Figure 11). Thus, it seems most probable that the debitage is the result of bifacial manufacture activities of a single group over a short time.

Summary and Conclusions

Central and southern plains rock middens are generally enigmatic sites. Their interpretation is often hampered by a scarcity of structural or material remains other than burned rock debris, by the secondary context of much of this debris, and by a paucity of datable organics and refuse indicative of subsistence activities. To a degree the interpretation of 34WN68 is similarly constrained but we are fortunate in having sufficiently large samples of tool and nontool elements. These allow for chronological placement in the Late Wood-Land, or Plains Woodland period, and some insight into the activities conducted here.

The debitage analysis and the preponderance of diagnostic Scallorn points are evidence in favor of usage of 34WN68 by one primary group over a short span. This is not to say that the site locality was neither previously used by Late Archaic peoples who made Table Rock points nor was subsequently revisited by other Late Woodland Communities. The evidence as far as Late Archaic habitation goes is tenuous at best, however. The Table Rock specimens may well have been collected, or "curated", by later peoples responsible for development of the burned rock midden, or perhaps were lost by their makers well before either the Copan paleosol or the rock midden came into being. Should the presence of the solitary side-notched triangular arrow point bespeak a later phase of site usage, then this subsequent phase can be dismissed similarly as being unimportant to the construction of the rock midden.

The Late Woodland community responsible for the rock midden drew much of its chipped stone tool materials from an area to the west, including the Flint Hils of southern Kansas and north central Oklahoma near Ponca City and Shidler, Oklahoma. Although the Little Caney River is a tributary of the Verdigris and seemingly may have served as a transportation artery to the east, there is scant evidence that this was important to the community using 34WN68. Interfluvial travel or exchange with western groups is indicated for this site. The dynamics of these relationships remain unknown.

Community activity is imperfectly represented by the material remains and their contexts. The most tangible result was the accumu- of the thick yet structureless burned rock midden. The fact that no structures, not even simple rock-lined hearths, were delineated in the relatively extensive excavations is just as important an indicator of site use as would be the presence of architectural features. The vertical and horizontal debris configurations are seemingly witness to a reuse of space and sandstone materials, or periodic removal or dumping of debris from what may have been domestic areas to what became an unsorted sheet midden of burned rock. Thus, as to the function of this burned rock midden, one may argue that the midden **per se** was more a by-product of a variety of community activities than it was an integral part of those activities.

What then **did** occur at this site? As a heuristic device for this and the other Phase III sites activity can be divided into two general categories, maintenance and extractive. Usage of these categories follows Binford and Binford (1966). Among the maintenance activities are ground and chipped stone tool production, recycling and modification of these implements over their entire life cycles, fire maintenance for cooking of vertebrates and undoubtedly of vegetal products as well. Extractive tasks involved the use of hunting-butchering and wood working tools, and ground stone slabs used in the powdering of hematite. Thus, as a general assessment, what we can observe of site usage are activities typical of an encampment of peoples. Whether or not this encampment occurred with some seasonal regularity or was repeated over a several year interval is unknown. But we can state that those responsible for the midden and its remains are identifiable as a single integrated community having ill-defined social and/or physical ties with similarly structured Late Woodland groups in the Flint Hills to the west.

2. COTTON CREEK SITE EXCAVATIONS

34WN12

Site Description

34WN12 is an open site on the north bank of Cotton Creek in Section 34, Township 29 North, Range 14 East, Washington County, Oklahoma. The site borders a former channel of Cotton Creek which may have been active when the site was occupied and is within a relatively narrow valley approximately .7 km in width. Maximum site elevation is 225.5 m (740 feet) above mean sea level. The site is about .4 km west of 34WN26, also on the north bank of Cotton Creek and excavated during Phase III. The site appears to be entirely contained within the Copan paleosol/modern soil, at the surface. The site was in pasture in 1979.

History of Investigations

Rohn and Smith (1972:5) report 34WN 12 as the Tank Battery site, described as "a concentration of stone chips, tools and fire-reddened sandstone covering approximately one-half acre . . . and has been disturbed to an undetermined extent by the installation of the oiltank battery." Materials on file with the Oklahoma Archaeological Survey "suggest the site is late but the specific cultural affiliation is undetermined" (Rohn and Smith 1972:5). Rohn and Smith recommended extensive test excavation because the site is about 100 m from the edge of the flood control pool.

Four 1 m^2 units (Figure 12) were excavated in 1979 as part of the Phase III investigations, to a maximum depth of 60 cm below surface. These excavations showed that the site had been almost completely disturbed by cultivation and construction activities and that in any event the majority of the cultural debris was within the upper 20 - 25 cm of sediment.

Stratigraphy

Three stratigraphic zones were recognized in the four excavation units. The upper zone (zone 1), from the surface to a depth of about 15 cm is a hard or compact light grayish brown silt having some burned sandstone and chert debris. Zone 1 is disturbed by both cultivation and construction activities. Beneath this is Zone 2 extending in depth below surface from about 15 cm to 25 cm. Zone 2 is a dis-

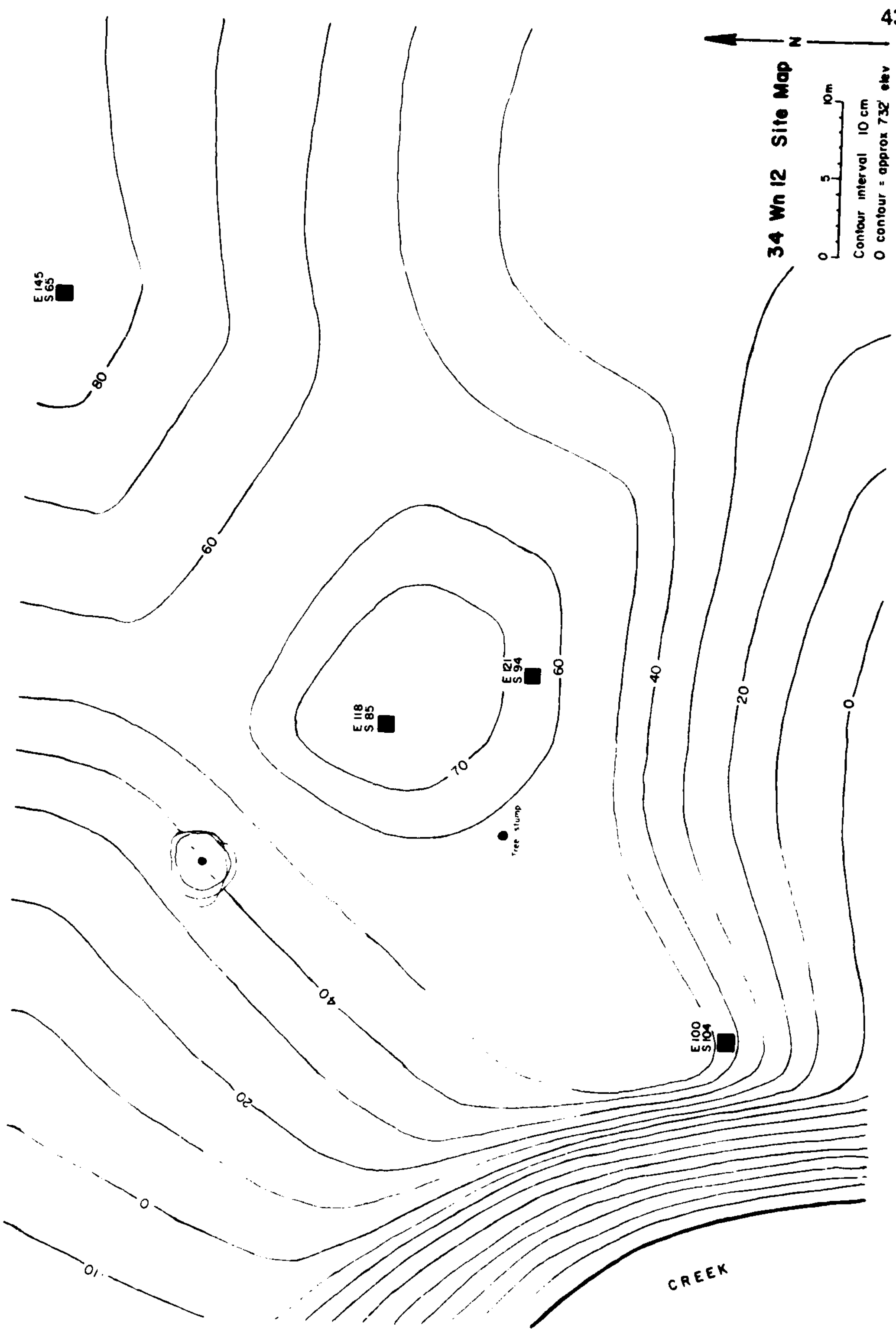

Figure 12. 34WN12 site map showing 1 m^2 test units.

Table 4. Crosstabulation of artifact class by surface depth, 34WN12.

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 05/13/83 PAGE 8
CROSSTABULATIONS OF DESCRIPTIVE DATA: COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE: 05/13/80) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN12

C R O S S T A B U L A T I O N O F
VAR007 ARTIFACT CLASS BY VAR008 SURFACE DEPTH
PAGE 1 OF 1

VAR007 (COUNT)		VAR008: 0-10 CM (10)	20-30 CM (30)	ROW TOTAL
BS FRAG	9	0	1	1 9.09
FLAKETOOL	16	0	1	1 9.09
OUTRE PASSE	26	1	0	1 9.09
LATE ... BIFACE	30	1	0	1 9.09
BIFACE SEGMENT	38	2	2	4 36.36
GN ARROW POINT	40	0	1	1 9.09
EXP-STEM POINT	47	1	0	1 9.09
GROUND HEMATITE	58	0	1	1 9.09
COLUMN TOTAL		5 45.45	6 54.55	11 100.00

RAW CHI SQUARE = 6.96666 WITH 7 DEG OF FREEDOM
SIGNIFICANCE = .43236

NUMBER OF MISSING OBSERVATIONS = 16

Table 5. Crosstabulation of Material Type by Surface Depth for 34WN12

		0-10 CM	10-20 CM	20-30 CM	30-40 CM	40-50 CM	50-60 CM	ROW TOTAL
Glass	0	0	0	1	0	0	0	1 1.75
China	0	0	1	0	0	0	0	1 1.75
Asphalt or Oil	0	3	1	0	1	1	0	6 10.53
Daub	0	0	1	0	0	0	0	1 1.75
Charred Bone	0	1	0	2	0	0	0	3 5.26
Hematite	0	0	3	0	0	0	0	3 5.26
Charcoal	3	5	7	11	9	6	1	42 73.68
Column Total	3 5.26	9 15.79	13 22.81	14 24.56	10 17.54	7 12.28	1 1.75	57 100.00

Chi Square = 33.08772 with 36 deg of freedom significance = .60785

Table 6. Crosstabulation of artifact class by product group, 34WN12.

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 05/13/83 PAGE 8
CROSSTABULATIONS OF DESCRIPTIVE DATA: COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE: 05/13/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN12

CROSSTABULATION OF VAR007 ARTIFACT CLASS BY VAR008 PRODUCT GROUP — PAGE 1 OF 1

VAR007 (COUNT) \ VAR008	PG 1 (1)	PG 2 (2)	PG 6 (6)	PG 7 (7)	PG 6 OR PG 7 (10)	UNCERT. PG (11)	ROW TOTAL
9 BS FRAG	0	1	0	0	0	0	1 5.88
16 FLAKETOOL	0	1	0	0	0	0	1 5.88
26 OUTRE PASSE	1	0	0	0	0	0	1 5.88
30 UNIC PRI BIFACE	0	0	0	0	0	1	1 5.88
32 UNIC DIS BIFACE	0	0	0	0	0	1	1 5.88
35 DISTAL PT. FRAG	0	0	1	0	0	0	1 5.88
38 BIFACE SEGMENT	0	0	0	0	0	4	4 23.53
40 BR ARCH POINT	0	0	2	0	0	0	2 11.76
47 EXP.STEM POINT	0	0	0	1	0	0	1 5.88
52 CLPP	0	0	0	0	1	0	1 5.88
57 OTHER LITHICS	2	0	0	0	0	0	2 11.76
58 RUBBED HEMATITE	0	1	0	0	0	0	1 5.88
COLUMN TOTAL	3 17.65	3 17.65	3 17.65	1 5.88	1 5.88	6 35.29	17 100.00

RAW CHI SQUARE = 69.99976 WITH 55 DEG OF FREEDOM
SIGNIFICANCE = .08583

NUMBER OF MISSING OBSERVATIONS = 9

Table 7. Crosstabulation of artifact class by material type, 34WN12.

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 05/13/83 PAGE 6
CROSSTABULATIONS OF DESCRIPTIVE DATA: COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE: 05/13/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN12

CROSSTABULATION OF VAR007 ARTIFACT CLASS BY VAR015 MATERIAL TYPE — PAGE 1 OF 1

VAR007 (COUNT) \ VAR015	SAND-STONE (1)	FLORENCE CHERT (14)	FORAKER CHERT (15)	NEVA CHERT (16)	FLORENCE GRNEVA (17)	OTHER KEOKUK (20)	BLACKCHE AT (21)	UNID. CHERT (22)	ROW TOTAL
9 GS FRAG	1	0	0	0	0	0	0	0	1 6.25
16 FLAKETOOL	0	0	0	0	0	0	0	1	1 6.25
26 OUTRE PASSE	0	0	0	0	0	0	0	1	1 6.25
30 UNIC PRI BIFACE	0	0	0	1	0	0	0	0	1 6.25
32 UNIC DIS BIFACE	0	0	0	0	0	1	0	0	1 6.25
35 DISTAL PT. FRAG	0	0	1	0	0	0	0	0	1 6.25
38 BIFACE SEGMENT	0	1	0	2	1	0	0	0	4 25.00
40 BR ARCH POINT	0	1	0	1	0	0	0	0	2 12.50
47 EXP.STEM POINT	0	1	0	0	0	0	0	0	1 6.25
52 CLPP	0	0	0	0	0	0	1	0	1 6.25
57 OTHER LITHICS	1	0	0	0	0	0	0	1	2 12.50
COLUMN TOTAL	2 12.50	3 18.75	1 6.25	4 25.00	1 6.25	1 6.25	1 6.25	3 18.75	16 100.00

RAW CHI SQUARE = 80.66667 WITH 70 DEG OF FREEDOM
SIGNIFICANCE = .18052

NUMBER OF MISSING OBSERVATIONS = 10

turbed but still recognizable cultural zone. In some ways this zone is similar to the second zone at 34WN.'6 but contains less burned sandstone and cultural debris. Zone 2 is a very hard or compact dark grayish brown clayey silt. Beneath Zone 2 is Zone 3 that extends to the base of the excavations, a minimum of 60 cm below surface. This is a tannish brown silty clay and contains little if any cultural debris. In sum, the stratigraphic information imparted from these four 1 m^2 excavation units provides a consistent picture of a disturbed surface consisting of the A-horizon of the Copan paleosol (Zones 1 and 2) above a Cox-horizon (Zone 3). A similar profile is exposed at 34WN26.

The distribution of cultural materials is restricted to the first three 10 cm levels, or a maximum depth of 30 cm below surface that incorporates Zones 1 and 2. With respect to tool elements, there is no significant difference in their vertical distribution (Table 4; x^2 = 6.96, d.f. = 7, p = 0.43), suggesting that Zones 1 and 2 are homogeneous. A more serious interpretative problem is presented in the analysis of both modern and arcaeological materials with depth (Table 5, x^2 = 33.08, d.f. = 36, p = 0.60). Historic materials including glass and china occur at depths below surface of 20 cm and 30 cm; oil or asphalt chunks at depths of 10 cm, 20 cm, 40 cm and 50 cm. Thus, the site appears to have been adversely affected by modern contamination that is a product of both construction or cultivation and saturation of petroleum well below the level of cultural-bearing sediments.

Material Remains

The material inventory consists of 17 tool elements (Table 6), six of which are surface finds. In addition there is a meager amount of chipped stone debitage, discussed later in terms of the bulk density analysis; a piece of burned daub; three pieces of calcined bone; three pieces of unmodified hematite; and 73 small chunks of charcoal. The tool elements include ground and chipped stone and a piece of rubbed hematite. Selected examples are illustrated (Figures 6s, u and 7o, s).

Ground-Stone and Rubbed Hematite

One ground stone slab fragment was recovered from the 20 cm to 30 cm level of 50 cm quadrant 85SE119. The specimen exhibits surface wear only, and has a single ground face.

A piece of rubbed hematite was also excavated from the 20 cm to 30 cm level of 50 cm quadrant 94.5SE121.5.

Chipped-Stone

The 15 chipped-stone artifacts include 4 diagnostic items. Two are side notched arrow points (Table 1 no. 40; Figure 6s, u) with lengths of 20 mm and 25 mm, widths of 11 mm and 15 mm, and thicknesses of 3 mm. The smaller of the two (Figure 6s) is from the 20 cm to 30 cm level of 50 cm quadrant 85SE118; the other (Figure 6u) is a surface find. An expanding stem point (Table 1 No.47; Figure 7 o) with a length of 35 mm and thickness of 7 mm (width not recordable) was found in the 0 cm to 10 cm level of 50 cm quadrant 94SE 121. A basal fragment of what appears to be a Cupp point (Table 1 No.52; Figure 7s) came from the surface and has a width of 25 mm and thickness of 6 mm. However, it should be mentioned that Cupp points usually have a convex base as opposed to the concave base of this specimen (see Perino 1971:20-21, Plate 10); Cupp points are found in both Late Woodland and later contexts (Perino 1971:20), and the other specimens, especially the two arrow points, also are found in similar contexts. Thus, a tentative conclusion about the age of this site is that it is Late Woodland or possibly later in age.

The remainder of eleven chipped-stone items includes 6 biface segments (Table 1, No.'s 30, 32, 38) not further differentiated into a techno-functional class, 3 bifacial thinning elements (Table 1, No.'s 26, 57), a distal point fragment (Table 1, No. 35) and a single unifacial flake cutting tool. These data are insufficient to further characterize site functions.

Material selection for the chert and ground stone tool elements, but not the rubbed hematite, are presented in Table 7. Material

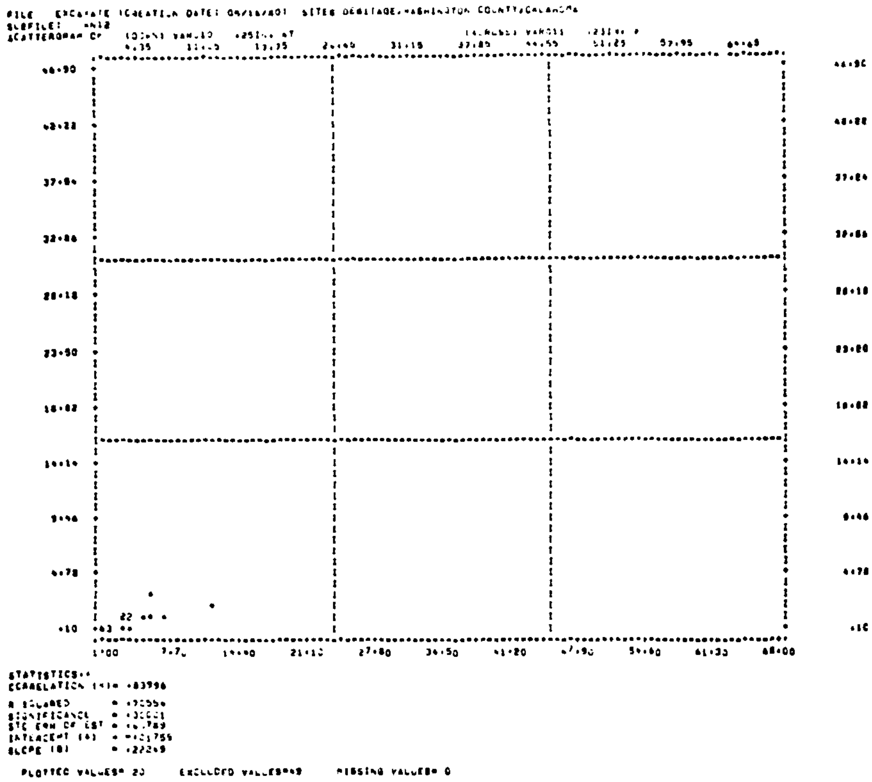

Figure 13. Scattergram of .25-inch debitage, 34WN12.

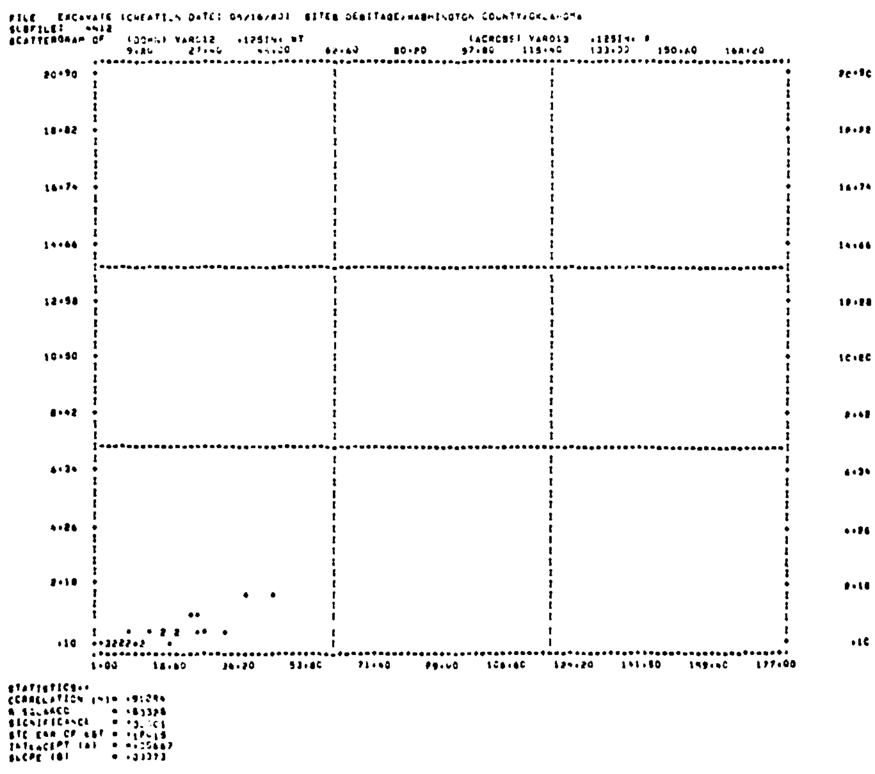

Figure 14. Scattergram of .125-inch debitage, 34WN12.

usage shows no special pattern by artifact type but it does clearly show an emphasis on the western chert group with a combined total percentage of 56.26 (9 tool elements). Three chert specimens could not be further identified and only 2 specimens were either Keokuk or black chert.

Lithic Debitage Bulk Density Analysis

From the 69 sample quadrants excavated only five produced .5-inch debitage; in each case only a single flake occurred with weights ranging from a little more than 0.1 gm to almost 2.0 gm.

Twenty (28.98% of sample) Group A sample quadrants for .25-inch flakes are plotted in Figure 13; and 27 (39.13%) Group A sample quadrants for .125-inch flakes, in Figure 14. The .25-inch fraction is a coherent sample having regression value (r^2) of 0.70, correlation (r) of 0.83 and a significant associated probability of 0.00001. The .125-inch fraction is similarly drawn from a homogeneous population (r^2 = 0.83, r = 0.91, p = 0.00001). Thus, we may view the debitage as having been produced most probably by a single group of flintknappers.

Summary And Conclusions

34WN12 is a small Late Woodland or possibly later encampment adjacent to a relict channel of Cotton Creek. The site is highly disturbed and/or contaminated by modern cultivation, construction activity and oil pollution. Depth of cultural-bearing sediments is about 30 cm in the four sample test units excavated to depths between 40 and 60 cm below surface. Material selection of chert emphasized the western series of Florence-Neva-Foraker. The meager inventory of 17 tool elements is insufficient to further document activity or variation in site function. Bulk debris densities, when compared to other Phase III sites, are low. To the degree ascertainable by the debitage analysis, it appears most probable that the material remains were the product of a single group. It seems doubtful that larger scale excavation would produce data sufficient for more precise relative or radiometric dating or information on activity area definition, given the chemical pollution and secondary context of site materials.

34WN26

Site Description

34WN26 is a burned rock midden on the north bank of Cotton Creek about .4 km east of 34WN12 in Section 35, Township 29 North, Range 14 East, Washington County, Oklahoma. Sandstone outcrops are less than .2 km away and provide a ready source for much of the debris found. The site is within the Copan paleosol/modern soil at the ground surface. Maximum elevatic., of 34WN26 is 225.5m (740 feet) above mean sea level and it is situated to the northeast of the same relict channel of Cotton Creek that is adjacent to 34 WN12. Its topographic position and material inventory are similar to 34WN12. The site is provisionally assigned to either the Late Woodland or a later period and it is probably coeval with 34WN12, which may have been an associated activity center at the western end of the terrace. The site is eroding on its south side and has been irreparably damaged by emplacement of three oil tanks and an outbuilding and by oil pollution due to these facilities.

History of Investigations

Rohn and Smith (1972:5-6) recorded the site as "a surface scatter of stone chips, broken tools, and fire-reddened sandstone" of probably late but undetermined cultural affiliation. They recommended the site be slated for extensive testing or even larger scale excavation.

The 1979 Phase III excavations (Figure 15) consisted of six 1 m^2 units. One unit (235 SE136) was taken to a depth of 110 cm below surface; one (199SE168) to 60 cm; three to 50 cm, and one (194SE200) to 30 cm. No architectural features were delineated in any of these units and two units (235SE136 and 184SE210) did not intersect the rock midden and are thus considered as outside the site area. The rock midden is roughly defined by the 320 cm contour interval and higher elevations depicted in Figure 15.

Stratigraphy

Three stratigraphic zones are described for the site and a fourth is drawn on profiles as a base zone but without other description. Depth or thickness of Zone 1 varies from 10 cm to 85 cm and, in part, it is differentiated into two substrata. Zone 1a occurs at the ground surface to 60 cm and is a dark brown silt, the A-horizon of the Copan paleosol. Beneath this is Zone 1b (to a maximum depth of 85 cm) which is a light grayish brown silt, probably the lower part of the A-horizon. In areas where the rock midden (Zone 2) does not occur Zone 1 rests conformably above Zone 3, a mottled tan-brown clay, or oxidized C-horizon. Zone 2 is the densely packed cultural zone of unsorted burned sandstone. In places it is almost entirely sandstone but dark brown silt-size particles form a matrix around the individual pieces of sandstone. Thus, Zone 2 may be viewed as a cultural modification of Zone 1. In part the extreme thickness of Zone 1 is due to construction activity but in some areas Zone 2 is probably buried by subsequent soil development. Zone 2 is anywhere from 10 - 30 cm in thickness.

The distribution of tool elements with depth (Table 8) is random for the 40 cm (Zones 1 and 2) from which tool elements occur (X^2 = 68.87, d.f. = 63, p = 0.28). A similar random distribution is apparent for other nonartifactual debris that extends to a depth of 60 cm (Table 9: X^2 = 56.50, d.f. = 45; p = 0.11). Note as well that historic items and oil or asphalt occur at depths of 40 cm and 50 cm respectively, a clear indication of the disturbed nature of the deposits.

In sum, the stratigraphic analyses indicate the rock midden represents a disturbed deposit of randomly distributed archaeological debris. The context of the material remains is secondary and there is considerable chemical pollution due to construction and use of oil storage facilities.

Material Remains

The inventory of cultural debris is surprisingly large when one considers that only 6 1 m^2 units were excavated. Included are 90 tool elements, 2 pieces of burned daub, 25

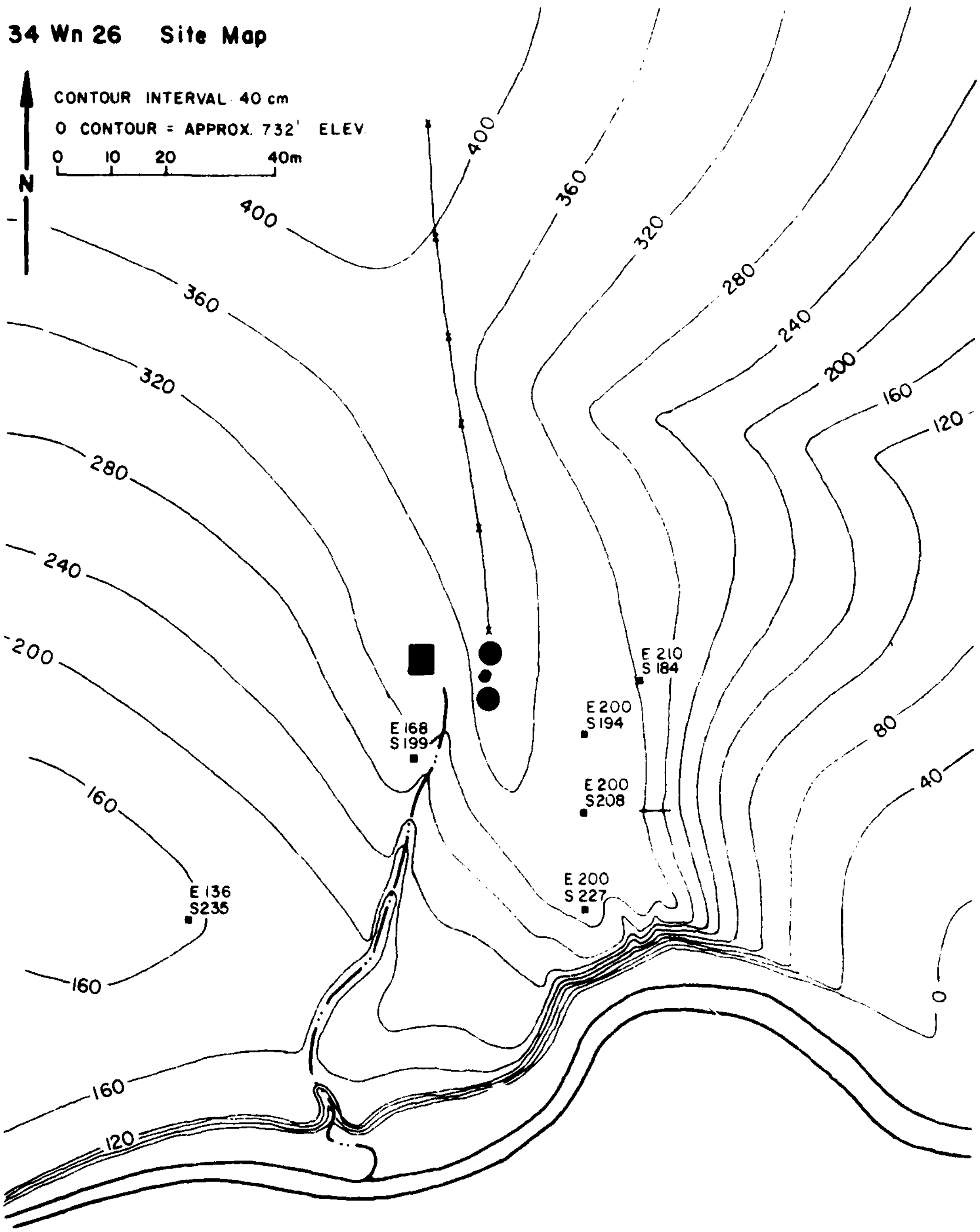

Figure 15. 34WN26 site map showing the six 1 m^2 Phase III test excavations and oil facility structures (large rectangle is a building, three circles are storage tanks for oil, a surface pipe line for the oil is north of the storage tanks). The site area is approximated by the 320 cm contour interval and higher elevations; units 235SE136 and 184SE210 are off the site.

Table 8. Crosstabulation of artifact class by surface depth, 34WN26

CROSSTABULATIONS COPAN LAKE SITES' TOOL ELEMENTS 08/13/83 PAGE 84
CROSSTABULATIONS OF DESCRIPTIVE DATA: COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE: 08/13/83) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN26

CROSSTABULATION OF VAR007 ARTIFACT CLASS BY VAR008 SURFACE DEPTH PAGE 1

VAR007 (COUNT)	VAR008 0-10 CM (10)	10-20 CM (20)	20-30 CM (30)	30-40 CM (40)	ROW TOTAL
1 AXE FRAG	0	1	0	0	1 (1.47)
9 GS FRAG	13	2	4	2	21 (30.88)
10 HEMATITE GS FRAG	1	1	1	0	3 (4.41)
11 ABRADER	1	0	0	0	1 (1.47)
12 GS SLAB-ABRADER	0	1	0	0	1 (1.47)
14 CORE FRAG	1	0	0	0	1 (1.47)
16 FLAKETOOL	1	2	1	0	4 (5.88)
19 END SCRAPER	1	0	0	0	1 (1.47)
20 OTHER SCRAPER	0	0	1	0	1 (1.47)
30 UNID PRX BIFACE	0	1	0	0	1 (1.47)
31 UNID MID BIFACE	0	2	0	0	2 (2.94)
32 UNID DIS BIFACE	1	1	0	0	2 (2.94)
34 PT MID SECTION	0	0	1	0	1 (1.47)
35 DISTAL PT FRAG	1	1	4	1	7 (10.29)
36 BIFACE SEGMENT	2	0	3	2	7 (10.29)
39 UNID PT PRO-FRAG	0	1	1	0	2 (2.94)
41 SCALLCRNVARNA	2	1	0	0	3 (4.41)
45 BIFASE LANCEOL	0	0	1	2	3 (4.41)
52 CLPP	0	1	0	0	1 (1.47)
53 HAFTED DRILL	1	0	0	1	2 (2.94)
60 SCEV SHERD	1	0	1	0	2 (2.94)
61 APCRPH CORE	0	0	1	0	1 (1.47)
COLUMN TOTAL	26 (38.24)	15 (22.06)	19 (27.94)	8 (11.76)	68 (100.00)

RAW CHI SQUARE = 68.87668 WITH 63 DEG OF FREEDOM SIGNIFICANCE = .28862

NUMBER OF MISSING OBSERVATIONS = 27

Table 9 . Crosstabulation of Material Type by Surface Depth for 34WN26

		0-10 CM	10-20 CM	20-30 CM	30-40 CM	40-50 CM	50-60 CM	ROW TOTAL
Sandstone	1.	0	1	0	0	0	0	1 .83
Glass	3.	4	2	2	0	0	0	8 6.67
China	4.	3	0	1	1	0	0	5 4.17
Iron	5.	2	6	2	0	0	0	10 8.33
Asphalt or Oil	7.	0	2	0	0	1	0	3 2.50
Daub	8.	0	2	0	0	0	0	2 1.67
Charred Bone	10.	8	14	3	0	0	0	25 20.83
Hematite	12.	0	0	5	2	1	0	8 6.67
Charcoal	13.	8	18	19	8	3	1	57 47.50
Foraker	15.	0	0	1	0	0	0	1 .83
	Column Total	25 20.83	45 37.50	33 27.50	11 9.17	5 4.17	1 .83	120 100.00

Chi Square = 56.50996 with 45 Deg of Freedom   Significance = .11665

Table 10. Crosstabulationof artifact class by product group, 34WN26.

CROSSTABULATIONS COPAN LAKE SITES' TOOL ELEMENTS 05/13/83 PAGE 10
CROSSTABULATIONS OF DESCRIPTIVE DATA: COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE: 05/13/80) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN26

CROSSTABULATION OF VAR007 ARTIFACT CLASS BY VAR008 PRODUCT GROUP PAGE 1 OF 9

VAR007 (COUNT)	PG 1 (1)	PG 2 (2)	PG 6 (6)	PG 7 (7)	PG 6 OR PG 7 (10)	UNDET. PG (11)	ROW TOTAL
1 AXE FRAG	0	0	1	0	0	0	1 1.11
9 GS FRAG	0	21	0	0	0	0	21 23.33
10 HEMATITE GS FRAG	0	3	0	0	0	0	3 3.33
11 ABRADER	0	1	0	0	0	0	1 1.11
12 GS SLAB-ABRADER	0	1	0	0	0	0	1 1.11
13 ANVIL	0	1	0	0	0	0	1 1.11
14 CORE FRAG	1	0	0	0	0	0	1 1.11
16 FLAKETOOL	0	13	0	0	0	0	13 14.44
18 SIDE SCRAPER	0	1	0	0	0	0	1 1.11
19 END SCRAPER	0	2	0	0	0	0	2 2.22
20 OTHER SCRAPER	0	1	0	0	0	0	1 1.11
23 ADZE	0	0	1	0	0	0	1 1.11
30 UNIC PR. BIFACE	0	0	0	0	0	1	1 1.11
31 UNIC MID BIFACE	0	0	0	0	1	1	2 2.22
32 UNIC DIS BIFACE	0	0	0	0	0	3	3 3.33
34 PT. MID SECTION	0	0	1	0	0	0	1 1.11
35 DISTAL PT. FRAG	0	0	5	0	3	0	8 8.89
38 BIFACE SEGMENT	0	0	1	0	0	9	10 11.11
39 UNIC PT PR-FRAG	0	0	0	0	3	0	3 3.33
40 SM ARROW POINT	0	0	2	0	0	0	2 2.22
41 SCALLORNVARPA	0	0	3	0	0	0	3 3.33
45 BIFBASE LANCEOL	0	0	1	1	1	0	3 3.33
47 EXP.STEM POINT	0	0	1	0	0	0	1 1.11
52 CUPP	0	0	1	0	0	0	1 1.11
53 HAFTED DRILL	0	0	0	0	2	0	2 2.22
60 BODY SHERD	0	0	2	0	0	0	2 2.22
61 AMORPH CORE	1	0	0	0	0	0	1 1.11
COLUMN TOTAL	2 2.22	44 48.89	19 21.11	1 1.11	10 11.11	14 15.56	90 100.00

RAW CHI SQUARE = 337.31860 WITH 130 DEG OF FREEDOM SIGNIFICANCE = .00000

NUMBER OF MISSING OBSERVATIONS = 5

calcined bone fragments, 57 pieces of charcoal, and the chipped stone debitage. The tool elements are tabulated by product group in Table 10 and by depth in Table 8. Of the specimens, 68 (75.55%) are from the excavations and 22 (24.45%) are surface finds. Ground stone tools, with 28 specimens, represent 31 percent of the total tool inventory. Ground–stone from the comparable rock midden, 34WN68, is represented by 48 items, or 11.16 percent of the total tool elements, even though the excavation is much larger (334 50 cm squares of 10 cm thickness as opposed to 107 comparable units from 34WN 26). The ratios of ground-stone and chipped-stone tool elements to 50 cm excavation units are, respectively, 0.25 and 0.36 for 34WN26 and 0.13 and 0.89 for 34WN68. Thus, the two rock midden sites contrast in debris ratios in absolute values as well as among ground as opposed to chipped-stone tool elements. There are differences in artifact type also. The presence of a single potsherd (and one questionable burned clay specimen) from 34WN26 however, is not regarded as representing more than variation in soil chemistry.

Viewed as simple horizontal distributions (see Appendix 2), Product Group 2 tools (simple ground stone and unifacially chipped stone tools) have a statistically significant distribution (X^2 = 175.18, d.f. = 60; p = 0.00000) as do product Group 6 (mainly points X^2= 67.55 d.f. = 40, p = 0.00416) and chipped stone of undetermined product group (X^2 = 43.99 d.f. = 24, p = 0.00763). Tools classed as either Product Group 6 and 7 are essentially random in distribution (X^2 = 26.11, d.f. = 18, p = 0.09725).

When product groups are divided by 10 cm levels and plotted horizontally (see Appendix), Product Group 2 (17 tools) is nonrandom (X^2 = 69.51, d.f. = 35, p = 0.00046) for the 0 - 10 cm level. All other product groups are random or sample size is too small for contingency testing. None of the product groups, including Product Group 2, has statistically significant distributions in the 10-20 cm, the 20-30 cm, or the 30-40 cm levels. These analyses again emphasize the secondary context of much of the material remains. Activity area definition is limited by these constraints to, at most, aggregation of materials into single horizontal distributions. Nonetheless, the pottery, ground, and chipped-stone tool inventory does contain information about a variety of site activities and material usage.

Descriptions of tool elements and debitage follow.

Pottery

A single potsherd and one piece of burned clay were found in the excavation. The potsherd is from 50 cm unit 194.5SE200 from the 20-30 cm level and is a buff colored plain body fragment. It is not identifiable as to a ware group. The specimen is 6 mm thick, roughly 40 mm by 25 mm in overall proportions. Temper is fired clay or perhaps grog. In cross-section the interior is reduced and the exterior is oxidized but inasmuch as the oxidation follows an old break it is probably post-depositional; the exterior and interior faces are eroded and pockmarked also. The fresh break used to view the cross section separated on what appears to be a single coil, flattened on the interior and with clay paddled around it. Thus, this inspection suggests manufacture was by a combination of coiling and paddle-and-anvil techniques, and firing was in a reducing atmosphere.

Ground-Stone

Ground-stone implements include the five techno-functional classes, axe fragment (1 specimen), ground stone slab fragment (21 specimens), hematite impregnated ground stone slab fragment (3 specimens), abrader (1 specimen), ground stone slab/abrader (1 specimen), and anvil (1 specimen). Illustrated are the ground stone slab-abrader (Figure 3e), the abrader (Figure 3f), the axe fragment (Figure 3g), and the anvil (Figure 3h). All are Product Group 2 sandstone items with the exception of the diorite axe fragment (Product Group 6).

Fourteen of the ground stone slab fragments and all 3 of the hematite impregnated slab fragments show intentional manufacture by pecking-and-grinding; 7 slab fragments have surface wear by grinding only. It is possible that the pecked-and-ground fragments, including the hematite impregnated ones, are evidence of tool maintenance in the form of pecking to "resharpen" a smooth face. It is likely as well that pecked-and-ground fragments may all have been used in hematite processing. Thus, these two fragmentary ground stone classes appear to be integrally related as industrial (extractive) hematite processing tools, or perhaps whetstones used in part in hematite grinding. They do not seem to be food processing equipment. No singular stationary grinding slabs that may have been suitable for vegetal processing were recovered.

A second potential group of maintenance tools is defined on the basis of the abrader, the ground stone slab/abrader and the anvil. These all are plausible flintworking tools, and also may have been used to resharpen the axe.

A third extractive tool group is heavy woodworking, documented both by the axe fragment and a chipped-stone adze (Figure 5n). The axe fragment is the bit of the tool. Its manufacture was by pecking-and-grinding and final polishing. There is no evidence of a groove but the fragment is too far removed from the hafted portion to determine whether or not the specimen was grooved or ungrooved. Inasmuch as no other diorite was recovered, the axe fragment appears to have been manufactured elsewhere and brought to the site as a finished tool; it may represent an exchange item of some scarcity and status—no other diorite axes have been recovered in the Copan Lake investigations.

Chipped Stone

The 60 chipped stone tool elements represent 66.66 percent of the assemblage. Of these 19 (31.66%) are unifacially flaked items. Representative specimens are illustrated (Figure 4a, b, d). The bifacially worked specimens include 16 fragments or segments, of which 2 (3.33%) are identifiable as tool fragments and 14 (23.33%) are unassigned to a product group. Figure 5q is one of the two biface fragments assigned to a product group, in this case Product Group 7 due to the fact that it was bifacially notched after breakage. This specimen does not appear to have been a spokeshave and is of unknown function. There are no biface preforms among the tool elements. Twelve (20%) are of chipped stone points, of which the majority (8 or 13.33%) are distal fragments, one of which is clearly fractured due to impact. Ten (16.66%) are diagnostic Late Woodland or later points (Figure 6k, t, v; Figure 7g, h, p, r), typologically similar to those found on other Phase III sites. Two (3.33%) are bifacially worked hafted perforators (Figure 51, m).

The diagnostic points include 3 Scallorn variant A (Figure 6k) and 2 sidenotched arrow points (Figure 6v). Dimensions for the one measureable Scallorn point are 25 mm in length, 13mm in width and 4mm in thickness, for the side-notched arrows, 20mm in length (both specimens), 10mm to 13mm in width and 2mm to 3mm in thickness. The rest of the points are of the large series and include 3 bifurcate base (Table 1 No. 45) fragments (Figure 7g, h), with widths varying from 20 to 21mm and thicknesses of 5mm, 6mm and 8mm. Figure 7h was recycled as a burin and has burin facets on either side of the break. The single expanding stem point (Table 1No. 47;) (Figure 7p) has dimensions of 35mm length, 24mm width and 4mm thickness The Cupp point (Figure 7r) is 50mm in length, 25mm in width and 6mm in thickness.

Light duty cutting, scraping and perforating are indicated by the majority of the chipped stone implements. Tool usages of these kinds probably were associated with domestic maintenance activities such as hide scraping, meat cutting or wood, bone or antler work. In contrast to this tool group are the points and point fragments which are extractive hunting or defense tools; at least one of which was recycled, upon breakage, as a burin.

Chert used in tool element manufacture includes 23 specimens (38.33%) of the western series (Florence, Neva, Florence-or -Neva) 8 (13.33%) specimens of what are potential eastern sources (Neva-or-Keokuk, Peoria, other

Keokuk), 8 (13.33%) of black chert from south of the Arkansas River and 21 (35%) that are unidentified. The core and core fragment represent the two largest pieces of chert and are either Neva or Neva-or-Keokuk; they appear to be from a nodular or tabular source. Much of the inventory was fashioned from what are clearly flake blanks (26 specimens, or 44.06%) or small core or flake blanks (26 specimens, or 49.15%) that could have been easily transported; none of the tool elements show evidence of patinated surfaces which might indicate use of chert stream gravel as a source.

These data again suggest the relative importance of the western, or Flint Hills, chert sources as compared to the other possibilities. In any case, chert acquisition appears to have involved distant sources which constrained both the amounts and forms of chert brought to the site. Favored overall were easily carried small core or flake blanks subsequently made into chipped stone tools or small light-duty cutting, scraping and perforating tools already fashioned.

Lithic Debitage Bulk Density Analysis

Debitage from 34WN26 is predominantly composed of bifacial thinning elements, best represented in the .25-inch and .125-inch fractions; debitage also occurs in the .5-inch fraction. The .5-inch fraction is represented in 20 (18.69%) of the 107 50 cm units, only 6 of which have 2 flakes and 1 has 3 flakes. Individual .5-inch fraction flakes range in weight from less than 1 gm to about 6 gm. The scatterplot and associated linear regression do not document a meaningful relationship between weight and number, due to the fact that most of the 20 sample units had but single flakes with a considerable range in weight. The regression results for the .25-inch (Figure 16) and .125-inch (Figure 17 debitage each based on 20 (18.69%) Group A sample units are statistically significant and emphatically support the hypothesis that the debitage is the result of a single flintknapping group.

Summary and Conclusions

34WN26 is a disturbed, Late Woodland or later burned rock midden, probably the result of a single group. Excavation defined cultural-bearing sediments to a depth of 40 cm below surface, and these materials were randomly distributed for the most part both vertically and horizontally. Their context is secondary and oil pollution would make radiocarbon dating of charcoal a dubious process. The tool element inventory is more heavily weighted toward ground stone implements, especially hematite processing tools, than is the burned rock midden 34WN68. There are also important differences among the chipped stone tool element inventories for these two rock middens, chief contrasts being the absence of bifacial preforms and wedge-like wood working tools at 34WN26. Similarities in material inventories and the geographic proximity of 34WN12 suggest that the two sites were closely aligned socially and in time.

34WN26 has been irreparably damaged by cultivation and - more decisively - by construction of oil tanks and associated facilities. It is also eroding and undoubtedly will be subject to additional damage or destruction by mechanical wave action from Copan Lake or vandalism. Although the context of materials is not good, the artifacts themselves accord an opportunity for additional study of a rock midden having relatively high debris densities.

34WN29

Site Description

34WN29 is minimally a Late Woodland open camp site on the North Fork of Cotton Creek in Section 27, Township 29 North, Range 14 East, Washington County, Oklahoma. The site is within the Copan paleosol/modern soil on an alluvial terrace on the south side of the creek and there is a relict channel that separates it from the nearby 34WN30 excavation. Maximum elevation is 225.5 m (740 feet) above mean sea level, and the valley is .8 km or more in width near the site. Sandstone outcrops just south of the site margin. The site was in grass and weedy brush in 1979.

Radiocarbon dating, previously described, indicates a major interval of occupation between 1200 and 1000 radiocarbon years B.P. and there are possibilities of an earlier

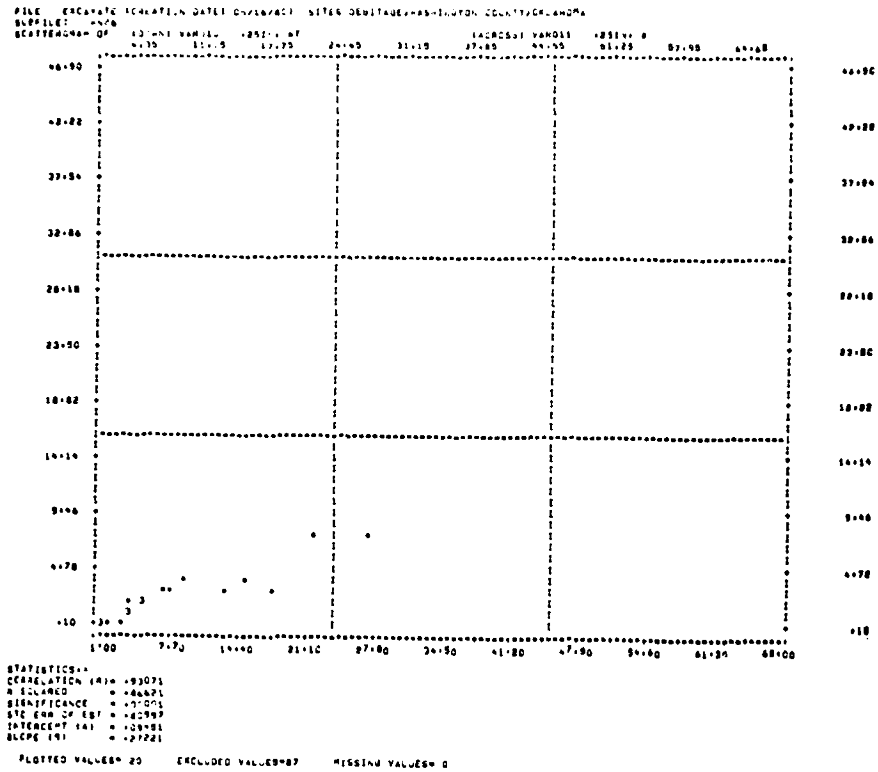

Figure 16. Scattergram of .25-inch debitage, 34WN26.

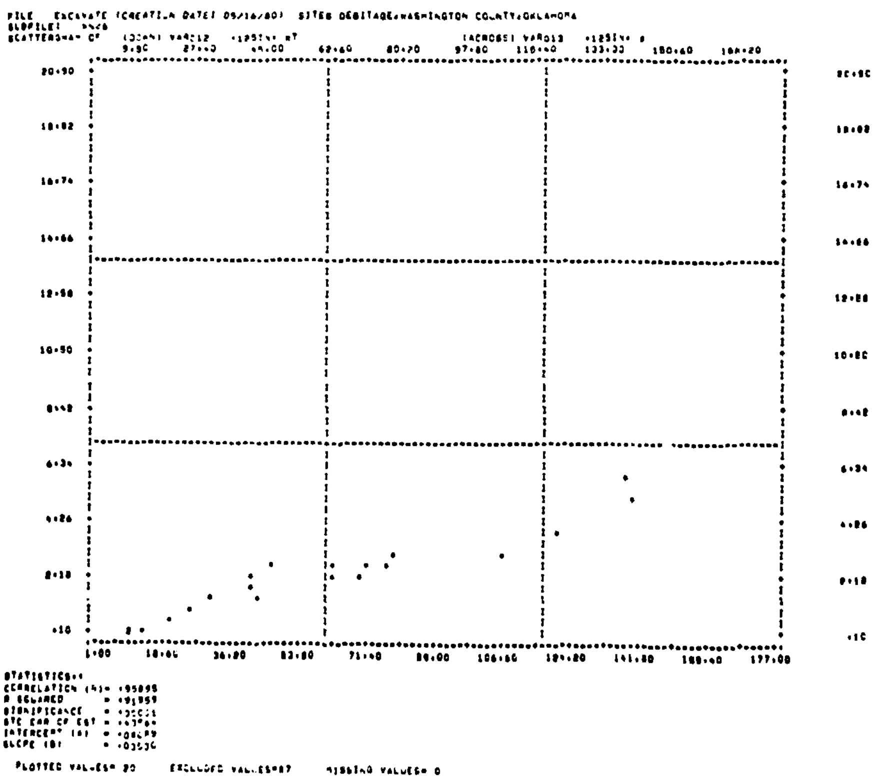

Figure 17. Scattergram of .125-inch debitage, 34WN26.

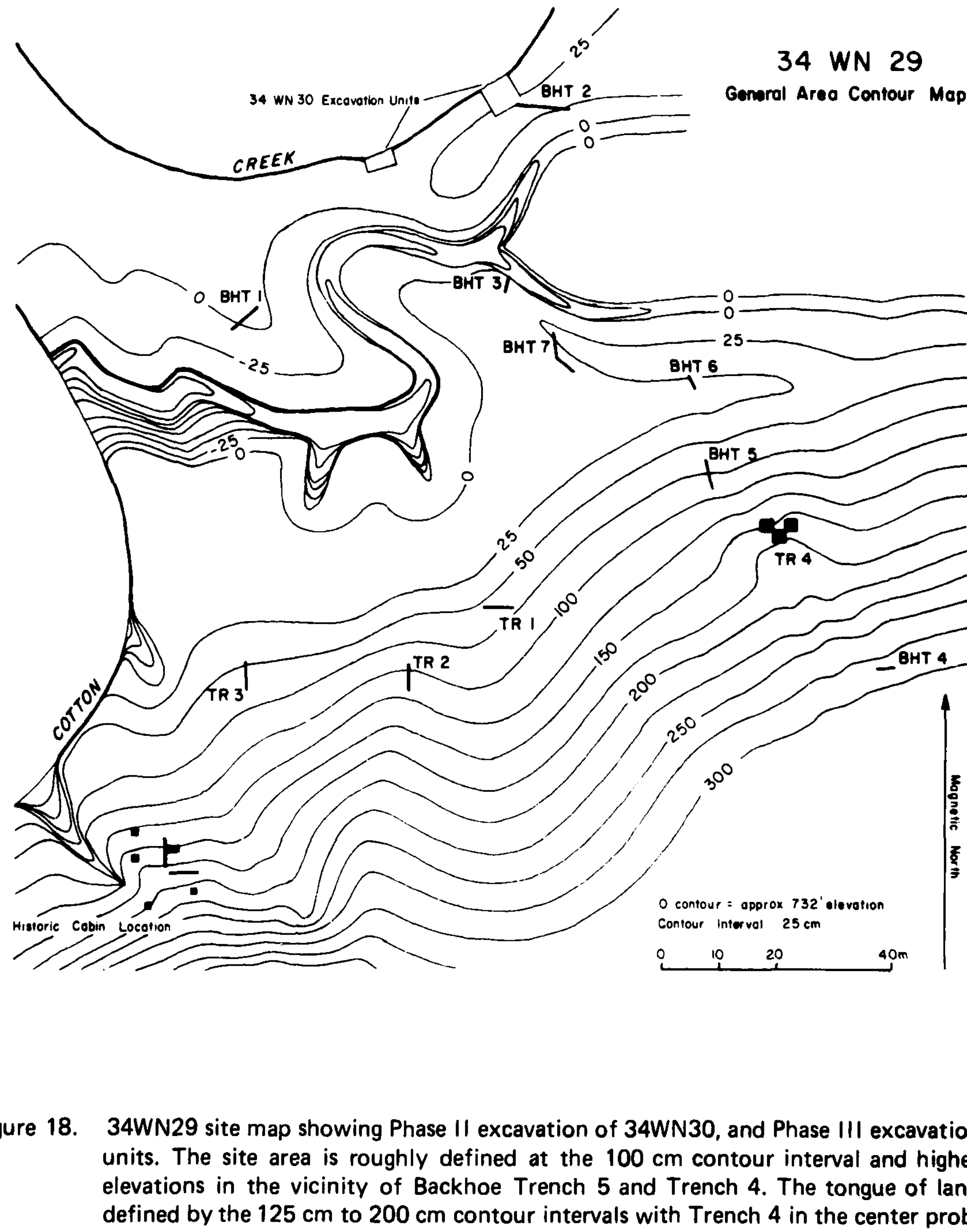

Figure 18. 34WN29 site map showing Phase II excavation of 34WN30, and Phase III excavation units. The site area is roughly defined at the 100 cm contour interval and higher elevations in the vicinity of Backhoe Trench 5 and Trench 4. The tongue of land defined by the 125 cm to 200 cm contour intervals with Trench 4 in the center probably represents the main site area. Not shown is Trench 5, a 50 cm (N-S) by 2 m (E-W) unit hand excavated 20 m east of Trench 4.

occupation at 1620±90 B.P. as well as buried living floors of unknown age beneath the Copan paleosol. The Late Woodland component contains at least two prepared rock-lined hearths. There is every indication that this site has debris in a primary context. Larger scale excavation will be required to understand the stratigraphic and radiometric relationships of features exposed during Phase III.

History of Investigations

Rohn and Smith (1972:7) described the site as being a 3 or 4 acre scatter of "dark soil, fire-reddened sandstone, stone chips and broken tools. A broken basin metate and several grinding stone and handstone fragments were observed on the surface. 24 points and end scrapers from this site indicate an Archaic component along with possible Woodland and Sedentary Plains components." They recommended the site for extensive excavation. Rohn and Smith (1972:50) further observed that stream bank sites such as 34WN30 "may also be exposed on the ground surface near the edge of the floodplain. Site 34WN29 could be such a manifestation of the 34WN30, although we surveyed them as two separate sites."

Results of the Phase II excavation of 34 WN30 (Prewitt 1980) and of Phase III for 34 WN29 do show continuity between the two areas since we have demonstated them to be within the Copan paleosol. At 34WN30 the Copan paleosol is buried and exposed in the Cotton Creek cut bank, whereas the Copan paleosol at 34WN29 is on the surface. For now, if only for historical reasons, the two excavations will be separately designated as being from two different sites.

Phase III investigations are shown on Figure 18. These include 7 backhoe trenches of variable length cut to expose terrace stratigraphy, 3 50 cm wide trenches hand excavated, a fourth excavation (Trench 4) ultimately expanded into 3 2 m squares, a fifth 2 m by 50 cm trench 20 m east of Trench 4 (not shown in Figure 18) and several test units placed on the location of a historic cabin site. The latter excavations are described by Prewitt and will not be further discussed. Backhoe trenches 1-4, 6 and 7 and hand excavated trenches 1 - 3 and 5 produced no relevant archaeological information and are from off-site areas. However, backhoe trenches 4, 5, 6, 7, 3, and 2 do form a useful south to north transect of terrace sediments. This transect shows the Copan paleosol is deeply buried near the creek (adjacent to the 34WN30 excavation), is much nearer the surface in backhoe trench 7, and is at the surface in backhoe trenches 6, 5 and 4. In addition the north end of backhoe trench 5 intersected a rock-lined hearth about 60 cm below the Copan paleosol, a clear indication of the stratigraphic potential of the site.

Stratigraphy

Terrace stratigraphy as defined in the backhoe trenches mainly concerns the geomorphic position of the buried and surface expressions of the Copan paleosol. In backhoe trench 2, at the cutbank, the Copan soil is buried and its top is 115 cm below the surface. Farther south in backhoe trench 3 the soil is still buried but its top is only 90 cm below surface. Immediately to the south in backhoe trench 7 the Copan soil is slightly below the surface at the north end and is at the surface at the south end; south of this trench the Copan paleosol is entirely a surface soil and is indistinct from the modern soil. The hearth exposed at the north end of backhoe trench 5 is 1 m beneath the surface and is 60 cm beneath the base of the Copan soil A-horizon.

Within the 3 2 m squares that comprise Trench 4 the stratigraphic profile was recognized as two zones. Zone 1 is the surface expression of the Copan paleosol A-horizon extending in depth 30 to 40 cm. Beneath this is Zone 2, a gummy or sticky tan clay silt which, in backhoe trench 5, extends to a minimum depth of 220 cm below surface. The three rock-lined hearths and much of the archaeology was contained within the lower 30 cm to 40 cm of the Copan soil A-horizon in Trench 4.

Features

Three rock-lined hearths were partially defined in two 2 m squares. Grid unit 470.5 SE560.5 (the southernmost trench 4 unit) had two, Features 1 and 2. Feature 3 is in grid unit 468.5SE562.5 (the easternmost trench 4 unit). Each of the three continues into adjacent grid walls, and features 2 and 3 were left in place for later excavation.

Feature 1 was intersected in the 50 cm quadrant 471.5SE560.5 and continues into the adjacent west and south walls. The fill of burned sandstone extended below surface from 26 cm to 38 cm, and it was noted as being just below the plow zone. A radiocarbon date of 1620±90 B.P. (BETA-1250) was obtained from Feature 1 charcoal.

Feature 2 is exposed at the north end of the same 2 m grid square in 50 cm quadrants 470.5SE560.5 and 470.5SE561. The rock-lined hearth occurs at a depth below surface of 30 cm to 40 cm. A dated charcoal sample from the adjacent east quadrant (470. 5SE561.5) from a depth below surface of 40-50 cm is 1185±75 B.P. (BETA-1251) and one from the same level as the hearth but from 50 cm quadrant 469.5SE559.5 is 1075± B.P. (BETA-1249); either or both radiocarbon assays appear reasonable for this feature as well as Feature 3.

Feature 3 is exposed in the south wall of the adjacent 2 m grid unit, and is within 50 cm quadrants 470.0SE562.5 and 470.0SE563, at the 30 cm to 40 cm level. A date on charcoal from the 10 cm level 20 cm to 30 cm, above the hearth, is 908±75 B.P. (BETA-1248). Distance between Features 2 and 3 is 120 cm and they are from either the same living surface or two that are separated by only a short hiatus.

Assuming that the radiocarbon assays are reasonable, then the stratigraphic information imparted by them and associated hearths are a strong argument for a minimum of two components at the base of the Copan paleosol and probably an even older cultural unit exposed beneath the paleosol at the north end of backhoe trench 5.

Vertical Debris Distributions

Tool elements occur to the base of the trench 4 excavations, or 50 cm below the surface. Their vertical distribution (Table 11) is random (X^2 = 107.48, d.f. = 104, p = 0.39 188) and so, too, are the horizontal distributions of tool element product groups by 10 cm level. Thus, treatment of the tool elements may be as a unitary, homogeneous assemblage without respect to potential stratigraphic differences recorded by the feature data. Nevertheless the vertical distribution of other archaeological debris (Table 12) shows a patterned relationship with depth (X^2 = 41.14, d.f. = 28, p = .05214) similar in many respects to that of the feature distribution. The presence of 1 piece of china and 2 pieces of iron from the 30 cm to 40 cm level (Table 12) does not negate this interpretation though caution should be exercised in inferring clear-cut stratigraphic differences. Even so, it is encouraging to note the absolute increases in frequencies with depth for the clearly prehistoric remains such as daub, uncarbonized and calcined bone fragments and especially charcoal. It may prove notable that these remains cluster in the 20-30 cm and 30-40 cm levels.

Material Remains

In addition to those just cited, the material inventory includes 133 tool elements (Table 13) and chipped stone debitage. The tool elements are three (2.25%) small potsherds, 31 (23.30%) ground stone artifacts, 18 (13.53%) core or unifacially flaked items, 75 (56.39%) bifacially worked specimens, one piece of cut copper and five (3.75%) pieces of rubbed hematite. Only three tool elements are from the surface. The ratios of ground-and chipped-stone tools to the 162 excavated 50 cm squares of 10 cm thickness are, respectively, 0.185 and 0.561.

Pottery

The three body sherds are all minute fragments of variable thickness. Two are decorated or have simple surface treatment. None is identifiable to a ware group. One sherd is

Table 11. Crosstabulation of artifact class by surface depth, 34WN29.

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 08/13/83 PAGE 61
CROSSTABULATIONS OF DESCRIPTIVE DATA: COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE 08/13/80) ELEMENTS: COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: WN29

* * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * *
VAR007 ARTIFACT CLASS BY VAR008 SURFACE DEPTH
* PAGE 1 OF 1

VAR007 (COUNT) / VAR008	0-10 CM (10)	10-20 CM (20)	20-30 CM (30)	30-40 CM (40)	40-50 CM (50)	ROW TOTAL
2 TYPE 1 PANO FRG	0	0	0	1	0	1 .77
3 TYPE 2 PANO FRG	0	0	0	1	0	1 .77
5 FACED 3S SLAB	0	0	0	1	0	1 .77
8 2-FACED 0S FRAG	0	0	1	2	0	3 2.31
9 0S FRAG	0	0	6	11	2	19 14.62
10 HEMATITE 0S FRAG	0	1	0	0	2	3 2.31
12 0S SLAB-ABRADER	0	0	1	0	0	1 .77
13 ANVIL	0	0	1	0	0	1 .77
14 CORE FRAG	1	1	0	0	0	2 1.54
16 FLAKETOOL	2	1	2	2	0	7 5.38
17 UNI-TOOL FRAG	0	1	0	0	0	1 .77
21 UNI-PERF	0	1	1	1	0	3 2.31
22 UNI-CUT	0	0	0	1	0	1 .77
23 PREFORM PG 3	0	0	1	1	0	2 1.54
30 UNID PR. BIFACE	0	1	1	2	0	4 3.08
34 PT. MID SECTION	1	0	0	0	0	1 .77
35 DISTAL PT. FRAG	3	3	9	6	0	21 16.15
38 BIFACE SEGMENT	3	1	6	7	2	19 14.62
41 SCALLORNVAR-A	3	5	1	3	1	13 10.00
42 SCALLORN VAR-B	0	0	1	0	0	1 .77
43 SCALLORN VAR-C	0	1	3	4	0	8 6.15
54 PIECES ESQUILL.	0	0	1	1	0	2 1.54
55 CUT COPPER	0	0	1	0	0	1 .77
56 SCALLORN MID-SEC	2	0	2	0	0	4 3.08
58 RUBBED HEMATITE	0	0	2	3	0	5 3.85
60 ACCY SHERD	1	0	0	2	0	3 2.31
61 APCRPH CORE	0	0	1	1	0	2 1.54
COLUMN TOTAL	16 12.31	16 12.31	41 31.54	50 38.46	7 5.38	130 100.00

RAW CHI SQUARE = 107.48213 WITH 104 DEG OF FREEDOM
SIGNIFICANCE = .39188

NUMBER OF MISSING OBSERVATIONS = 3

Table 12. Crosstabulation of Material Type by Surface Depth for 34WN29

		0-10 CM	10-20 CM	20-30 CM	30-40 CM	40-50 CM	ROW TOTAL
China	4.	0	0	0	1	0	1 .45
Iron	5.	0	0	0	2	0	2 .89
Daub	8.	0	2	3	6	8	19 8.48
Bone	9.	0	0	1	1	0	2 .89
Charred Bone	10.	5	3	20	12	7	47 20.98
Hematite	12.	2	4	4	7	1	18 8.04
Charcoal	13.	14	14	48	50	7	133 59.38
Florence	14.	0	0	1	1	0	2 .89
	Column Total	21 9.38	23 10.27	77 34.38	80 35.71	23 10.27	224 100.00

Chi Square = 41.14017 with 28 Deg of Freedom   Significance = .05214

Table 13. Crosstablulation of artifact class by product group, 34WN29

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 05/13/83 PAGE 97
CROSSTABULATIONS OF DESCRIPTIVE DATA, COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE: 04/13/80) ELEMENTS, COPAN LAKE 1979 EXCAVATIONS & SURFACE FINDS
SUBFILE: WN29

CROSSTABULATION OF VAR007 ARTIFACT CLASS BY VAR008 PRODUCT GROUP

PAGE 1 OF 2

VAR007 (COUNT) / VAR008	PG 1 (1)	PG 2 (2)	PG 3 (3)	PG 6 (6)	PG 7 (7)	PG 6 OR PG 7 (10)	UNDET. PG (11)	ROW TOTAL
2 TYPE 1 HAND FRG	0	0	0	1	0	0	0	1 .75
3 TYPE 2 HAND FRG	0	0	0	1	0	0	0	1 .75
5 BIFACED GS BLAD	0	1	0	0	0	0	0	1 .75
8 BIFACED GS FRAG	0	3	0	0	0	0	0	3 2.26
9 GS FRAG	0	19	0	0	0	0	0	19 14.29
10 HEMATITE GS FRAG	0	3	0	0	0	0	0	3 2.26
12 GS SLAB-ABRADER	0	1	0	0	0	0	0	1 .75
13 ANVIL	0	2	0	0	0	0	0	2 1.50
14 CORE FRAG	2	0	0	0	0	0	0	2 1.50
16 FLAKETOOL	0	7	0	0	0	0	0	7 5.26
17 UNI-TOOL FRAG	0	1	0	0	0	0	0	1 .75
21 UNI-PERF	0	3	0	0	0	0	0	3 2.26
22 UNI-CUT	0	1	0	0	0	0	0	1 .75
27 PREFORM PG 3	0	0	2	0	0	0	0	2 1.50
30 UNIC PR. BIFACE	0	0	0	0	0	0	4	4 3.01
34 PT. MID SECTION	0	0	0	0	0	1	0	1 .75
35 DISTAL PT. FRAG	0	0	0	0	0	21	0	21 15.79
38 BIFACE SEGMENT	0	0	0	0	0	0	20	20 15.04
41 SCALLORN VAR-A	0	0	0	13	0	0	0	13 9.77
42 SCALLORN VAR-B	0	0	0	1	0	0	0	1 .75
43 SCALLORN VAR-C	0	0	0	8	0	0	0	8 6.02
45 EARY PT	0	0	0	1	0	0	0	1 .75
54 PIECES ESQUILL.	0	1	0	0	1	0	0	2 1.50
55 CUT COPPER	0	0	0	0	0	0	1	1 .75
56 SCALLORN MIC-SEC	0	0	0	4	0	0	0	4 3.01
58 RUBBED HEMATITE	0	5	0	0	0	0	0	5 3.76
60 SCCY SHERD	0	0	0	3	0	0	0	3 2.26
61 AMORPH CORE	2	0	0	0	0	0	0	2 1.50
COLUMN TOTAL	4 3.01	47 35.34	2 1.50	32 24.06	1 .75	22 16.54	25 18.80	133 100.00

RAW CHI SQUARE = 730.07129 WITH 162 DEG OF FREEDOM SIGNIFICANCE = .00000 from the 0-10 cm level of 50 cm square 472 SE561.5 and is sand tempered with a trailed surface treatment on the exterior; thickness is 8 mm, color is dark brown to black. The second decorated sherd is also sand tempered and is simple stamped or linearly incised on the exterior and possibly trailed on the interior. This sherd is from the 30-40 cm level of 50 cm unit 469.5SE563.5 and is adjacent to Feature 3. Its thickness is 9 mm and it has a buff interior and a gray exterior. The third sherd is clay or grog tempered, black in color and only 4 mm thick. It is from the 30-40 cm level of 50 cm unit 472SE561.5 and is from Feature 1 matrix.

Cut Copper

A triangular piece of cut copper (Figure 5u) with dimensions of 9 m x 10 m x 1mm and a weight of 0.1 gm came from the 20-30 cm level of 50 cm quadrant 469.5SE558.5. I assume that this is a piece of native copper but it is also plausible that it is a historic item. Its depth indicates it was from the transitional level between the plow zone and undisturbed sediments.

Ground-Stone and Rubbed Hematite

Eight artifact classes are recognized for the ground-stone tools. Of these, one (Table 1, No.3) is just a small fragment of a Product Group 6 loaf-shaped mano (Figure 3d), which is stylistically distinctive. The mano fragment illustrated is pitted on one face and was manufactured by pecking-and-grinding; it is from the 30-40 cm level of 50 cm quadrant 469SE 564, just to the west of Feature 3. The other mano fragment is from the same level of nearby 50 cm quadrant 468.5SE562.5; the Product Group 2 stationary two-faced grinding slab (Figure 3c) is also from this level and quadrant and it was maintained by pecking. The three two-faced ground stone slab fragments are all pecked-and-ground and are from the 50 cm quadrants 469SE563 (20-30 cm), 471.5SE 561 (30-40 cm) and 469.5SE559.5 (30-40 cm). The majority of the ground stone is Product Group 2 ground stone slab fragments (n=19 or 61.12%). Ten of these are ground-and-pecked, and the remainder exhibit only surface wear by grinding. The hematite impregnated ground stone fragments are ground-and-pecked. The ground stone slab/abrader is ground-and-marred and is from 50 cm quadrant 468.5SE562.5 (20-30 cm). The anvils (Figure 3i, j) are ground-and-pecked and are marred by use. One of the anvils (Figure 3i) is from the surface, the other is from 50 cm quadrant 470.5SE561 (20-30 cm).

The five pieces of rubbed hematite are ground and randomly striated or ground-and-marred. Two are from the 20-30 cm levels of 50 cm quadrants 469SE558.5 and 471SE561; three are from the 30-40 cm levels of 50 cm quadrants 470SE563.5 (2) and 470SE560.

The ground stone and rubbed hematite artifacts seemingly comprise three prime activity indicators. The first is extractive and deals with the reduction of hematite; included would be the rubbed hematite, the hematite impregnated slab fragments and-possibly-the other slab fragments. The final two are maintenance activities dealing with chipped stone tool manufacture and vegetal food processing. The anvils and the ground stone slab/abrader would be flintworking tools; the manos and stationary two-faced ground stone slab, vegetal food processing tools. It is also probable that certain of the implements such as the manos or anvils might have been used for more than a single maintenance task, or could have been employed in both flintworking and vegetal processing.

Chipped-Stone

Product Group I is represented by 2 cores (Figure 4u) and 2 core fragments. The cores have patinated cortical surfaces and appear to have been made from chert stream gravel. This is the only instance of stream gravel usage for the Phase III investigations and opens to question where the source or sources for these materials are. Three of the core and core fragments are Neva chert and the fourth is unidentified.

Simple unifacial tools are represented by the Product Group 2 subsample (n=13 or

13.97%). Included are nine (Table 1 No.'s 16, 17, 22) light duty cutting tools, three flake gravers (Figure 4o, r, s), and one (Figure 5r) bipolar flake wedge, or **pieces esquillee** (a second **pieces esquillee** is illustrated in Figure 5v and is a Product Group 7 biface fragment). Usage of these implements, respectively, may have been in game butchering or hide scraping, engraving of soft materials, and wood and-bone -or-antler splitting.

The bifacial artifacts are divided into Product Group 3 preforms (n=2), 24 (25.80%) fragments or segments not further differentiated (Table 1 No.'s 30, 38), 27 (29.03%) Product Group 6 points or point fragments, the single Product Group 7 pieces esquillees (Figure 5v), and 22 (23.65%) point midsections or tips that are either Product Group 6 or 7. What is perhaps surprising about this is that chipped-stone points and point fragments comprise 52.68 percent of the chipped-stone artifacts. Of the completed or finished bifacial tools, almost all are weapons used for defense or hunting.

Diagnostic tool elements are the previously described loaf-shaped mano and the classifiable chipped-stone points (n=23 or 24.73%). All but one of the points are one or the other of the three Scallorn variants and there are four Scallorn mid-sections that could not be further classed. The one exception is a contracting stem Gary point (Figure 7e) from the surface. Dimensions of the Gary point are: length, 50 mm; width, 29 mm; thickness, 10 mm and it weighs 12.6 gm. Gary points are commonly found on Woodland sites and Bell (1958:28) notes they are found in Oklahoma on pre-Gibson Aspect sites. The Scallorn variant A points (Figure 6h-j) are represented by 13 specimens (13.97%) and have size ranges of: length, 14-23 mm; width 10-14 mm; thickness, 2-4 mm. Scallorn variant B is represented by a single broken specimen 10 mm wide and 3 mm thick. The eight (8.60%) Scallorn Variant C point have size ranges of: length, 14-21 mm; width, 5-14 mm; thickness, 2-4 mm. The widths of the distal point segments are measurable for 16 of 21; only one is above the width range of the Scallorn points and it is 19 mm. This specimen is from the 30-40 cm level of 50 cm quadrant 472SE562; potentially it is an association of the prospective early component defined by Feature 1.

Chert usage and artifact size again suggest that reliance was placed on distant sources and that only small chunks (some of which include chert stream gravel), finished tools, or flakes were transported. The western series (Florence, Neva, Florence-or-Neva) accounts for 36 specimens (38.70%); only two are potential eastern series cherts (Neva-or-Keokuk, Peoria?), five specimens are the black chert (south of the Arkansas River), and 50 (53.75%) are not identified.

Lithic Debitage Bulk Analysis

Flaking debris includes all three size grades. The .5-inch debitage is present in 39 of the 162 50 cm sample quadrants but the majority (27 units) contain only single .5-inch flakes which range in weight from about 0.1 gm to over 6 gm. The .5-inch data are sufficient for calculation of a linear regression ($r^2 = .14$) which, although statistically significant ($p = .00810$), is inadequate for practical application or interpretation. The scatterplots and associated regressions for the 43 Group A .25-inch sample units (Figure 19) and 45 Group A .125-inch sample units (Figure 20), however, are more meaningful. The .25-inch debitage has $r^2 = .74$, $r = .86$; and the .125-inch debitage has $r^2 = .57$; $r = .76$. Both regressions are highly significant (each with $p = .00001$) but, surprisingly, the .25-inch debitage comprises the more coherent (or homogeneous) sample. My preliminary interpretation is that the debitage largely reflects the flintworking activities (mainly final bifacial tool thinning and shaping, some cobble reduction, and tool resharpening) of a single group but that either the activities were varied or a second group may also have been involved.

Summary And Conclusions

34WN29 is a stratified site having a well-defined Late Woodland encampment dating

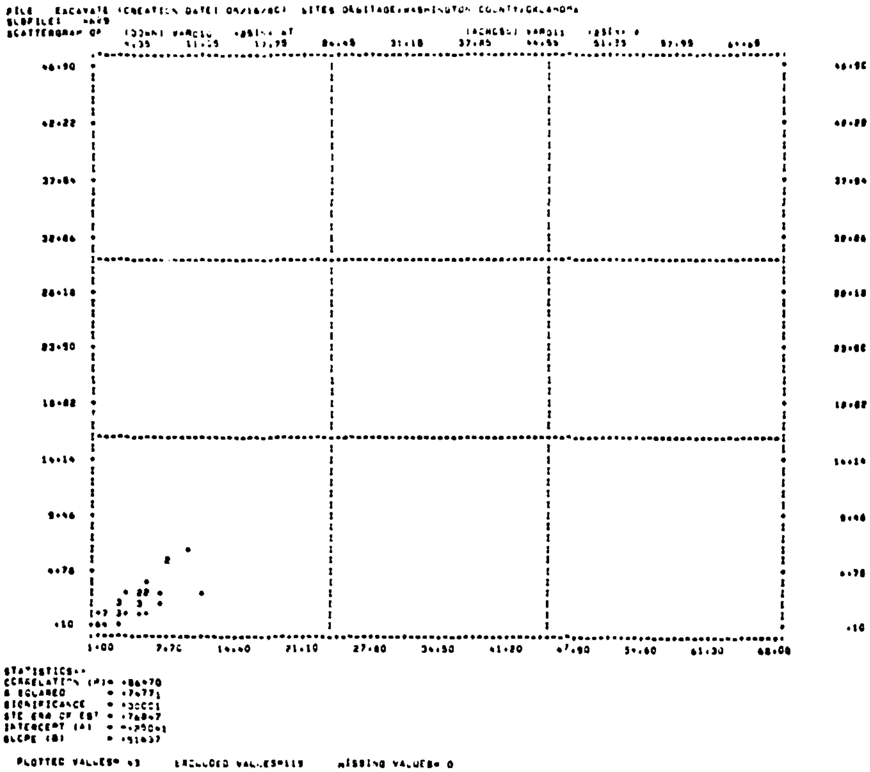

Figure 19. Scattergram of .125-inch debitage, 34WN29.

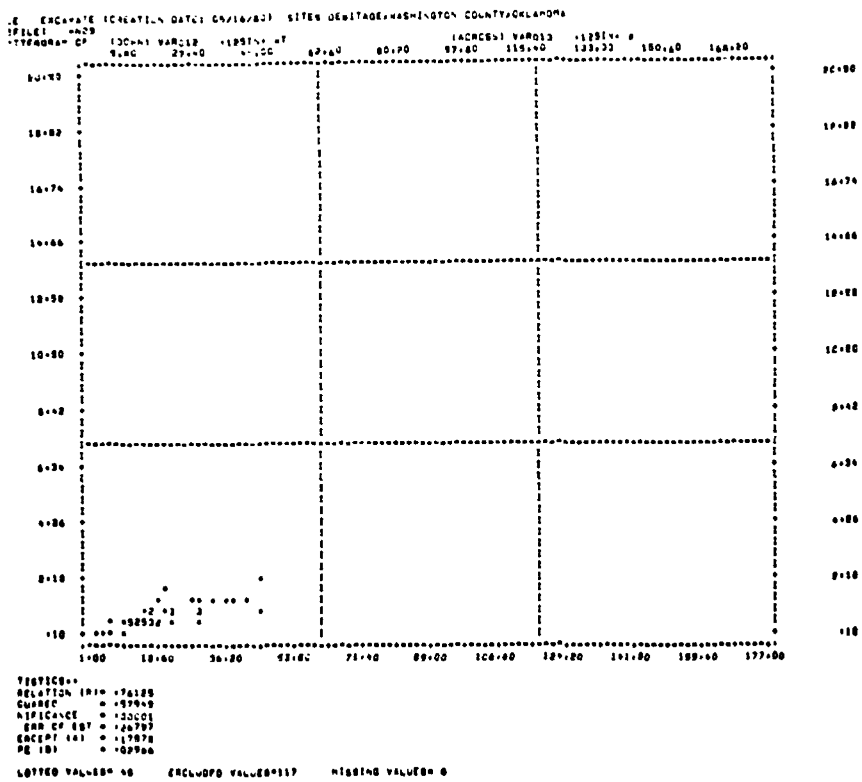

Figure 20. Scattergram of .125-inch debitage, 34WN29.

between 1200 and 1000 years ago. Beneath this unit is probably a second Woodland component having a single radiocarbon assay of 1620±90 B.P. Both of these units comprise the base of the Copan paleosol which occurs at the surface. Some 60 cm beneath this paleosol, a third archaeological component is apparently defined by a rock-lined hearth (sectioned at the north end of backhoe trench 5). The presence of 3 prepared, rock-lined hearths and nonrandom vertical debris distributions are evidence of the primary context of the site's material remains. The integrity of the site, radiocarbon dating, its stratification, features and material contents make it one of the more significant sites excavated in Copan Lake. Larger scale excavation is needed to delineate vertical and horizontal relationships among the features and components. The site may prove to be, along with Cotton Creek Shelter (34WN32), of sufficient depth and complexity to establish a local chronology. Of potentially great interpretative value is the fact that the site appears to have relatively intact and discrete living floors. These may afford an opportunity, essentially unique for this project area, to establish the community layouts of several stratified encampments.

34WN34

Site Description

34WN34 is recorded by Rohn and Smith (1972:10) as the Bellmyer site. The Phase III excavations (Figure 21) demonstrate the site not to be where it was located by Rohn and Smith, inasmuch as nothing was found in any of the excavation units nor on the surface in the area for which Rohn and Smith provide the legal description SE¼ SE¼ SW¼ Section 35 Township 28 North Range 13 East (I should point out as well that it is Range 14 East rather than 13 East). A site area, presumably the Bellmyer site, was located in the plowed field to the west but outside of the Copan Lake project boundaries. Its legal description is NE¼ NE¼ SE½ SW¼ Section 35, Township 29 North, Range 14 East.

34WN36

Site Description

34WN36 is a surface site on the north bank of Cotton Creek in Section 35, Township 29 North, Range 14 East. Its maximum elevation is 225.5 m (740 feet) above mean sea level. To the south the site faces a steep valley wall with sandstone outcrops; the valley is about .8 km in width near the site. Within the site area are several ponded depressions, the largest of which is shown in Figure 22. The site had been plowed but beyond an occasional piece of burned sandstone there was little surface evidence of archaeological debris. The site appears to be within the Copan paleosol/modern soil.

History of Investigations

Rohn and Smith (1972:11) described the site as "a concentration of fire-reddened sandstone, stone chips and tools, bone fragments, potsherds, and burned adobe covering approximately two acres. Three sandstone abrader fragments and one broken sandstone were observed on the surface. A **local** collection of 28 sherds and numerous stone tools indicate Caddoan and Sedentary Plains components" (emphasis added). They illustrated some of the pottery as well (Rohn and Smith 1972:44, Figure 14; 45, Figure 15), and recommended extensive excavation.

Given that there was virtually nothing on the surface in 1979, it seems odd to me that so much material was apparently observed by Rohn and Smith either on the site or in private collections. In any case, the Phase III excavations of five 1 m^2 or larger units produced little in the way of material remains and but a single diagnostic tool (Figure 7f). This was so even though placement of the test units was with respect to both prominent topography and observable surface debris scatters.

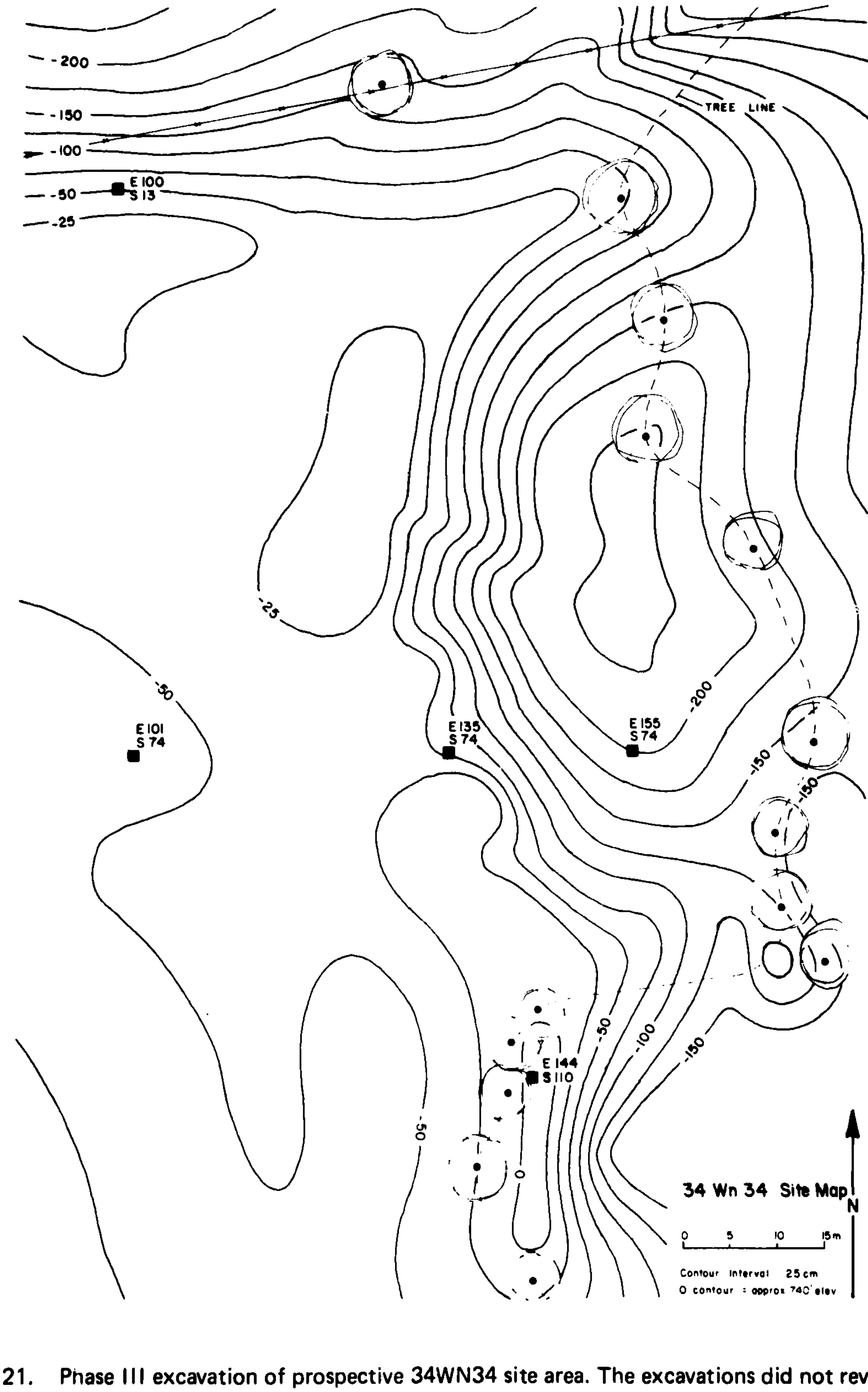

Figure 21. Phase III excavation of prospective 34WN34 site area. The excavations did not reveal any archaeological remains nor were any present on the surface; the site area is apparently outside of the Copan Lake Project boundaries approximately 200 meters west of these excavations.

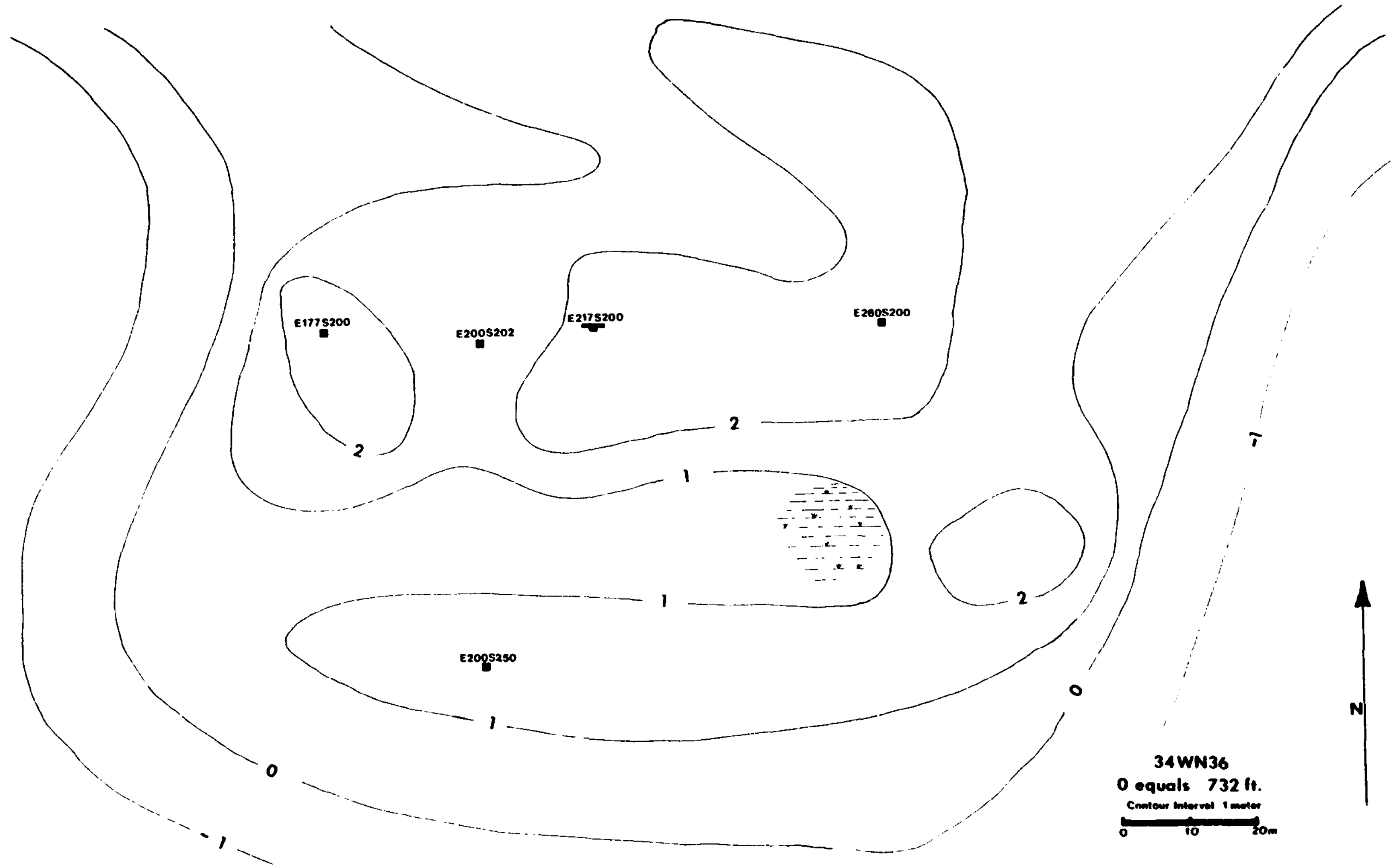

Figure 22. 34WN36 site map and Phase III excavations.

Perhaps previous collection has removed most of the material remains and it is a very thin site indeed.

Phase III excavation procedures were variable depending on the extent of the deposits and depth of the plow zone (generally about 20 cm). The general excavation approach entailed: (1) excavation of 20 cm levels until aboriginal remains were recognized (2) For all units once the plow zone has been removed the northwest 50 cm quadrant was saved for waterscreening. Matrix from the three remaining 50 cm quadrants was to be discarded but care would be taken to observe and collect any artifacts and/or sandstone. The first bag from the northwest quadrant was to be floated (this was not followed in the laboratory because the waterscreened sediments once pretreated with trisodium phosphate allowed for fine scale recovery of organics). (3) In units with sandstone or artifacts below the plow zone excavation was to proceed in 10 cm levels. The following describes how these procedures were enacted for the five excavation units.

One m^2 202SE200: Sandstone was confined to the upper 10 cm of the 20 cm thick plow zone. Excavation beneath plow zone continued in 10 cm thick levels to a depth of 60 cm.

One m^2 200SE177: No artifacts or sandstone found in plow zone or next 20-40 cm level. Excavation continued in 20 cm thick levels to depth of 60 cm.

One m^2 200SE260: Small amount of sandstone noted in plow zone. Excavation of succeeding levels completed in 10 cm increments to depth of 60 cm.

One m^2 250SE200: Small amount of sandstone observed in plow zone. Excavation proceeded for one 10 cm level to a depth of 30 cm.

One m^2 200SE217: Material noted in plow zone and subsequent excavation was in two 10 cm thick levels. At a depth of 28-30 cm a dark midden stain having burned sandstone, burned and unburned bone, chert and burned clay was encountered. A 50 cm wide trench bisected by this unit was placed on its northern side for additional exposure of the midden deposit.

Stratigraphy

Field stratigraphic observations mainly specified the depth of the plow zone at roughly 20 cm below surface. Individual excavators used different color terminology for sediments (ranging from dark brown to colored soil) for all levels up to the maximum of 60 cm depth. This precludes a more precise stratigraphic description. Even so, the field notes and Roger Moore's journal make two things clear. First, cultural debris is largely confined to the plow zone. Second, a thin midden is defined at a depth of 28-30 cm in the 1 m^2 200SE217 and adjacent 50 cm wide trench.

With respect to the vertical distribution of potential archaeological debris, chi square continency testing (Table 14) shows a random distribution for below plow zone sediments to a depth of 60 cm (X^2 = 1.056; d.f. = 6; p = .98340.) Only two tool elements were recovered; one a proximal biface fragment of undetermined product group in the 20-30 cm level of 50 cm quadrant 200SE217; the other a complete Product Group 6 Gary point in the 40-50 cm level of 50 cm quadrant 208.5SE 217.5. The Gary point (Figure 7f) is 42 mm in length, 25 mm wide, and 8 mm thick and is made of Neva-or-Keokuk chert.

Material Remains

Lithic Debitage Bulk Density Analysis

The most conspicuous debris from these excavations is the lithic debitage. Included are four .5-inch flakes from four 50-cm quadrants with weights ranging between 0.1 gm and 2.18 gm, 5 Group A samples of .25-inch debitage (Figure 23) and 8 Group A samples of .125-inch debitage (Figure 24). Although the sample sizes are small, the linear regression for the .125-inch Group A samples are among the highest for any of the sites; r^2 is .94 and the associated probability is 0.00003. r^2 for the .25-inch debitage is a not unexpected .50 and the associated probability of 0.08847 would

TABLE 14. CROSSTABULATION OF MATERIAL TYPE BY SURFACE DEPTH FOR 34WN36

		20-30 CM	30-40 CM	40-50 CM	50-60 CM	Row Total
Charred Bone	10.	1	4	2	0	7 19.44
Hematite	12.	0	1	0	0	1 2.78
Charcoal	13.	3	16	8	1	28 77.78
	Column Total	4 11.11	21 27.78	10 27.78	1 2.78	36 100.00

Chi Square = 1.05612 with 6 Deg of Freedom   Significance = .98340

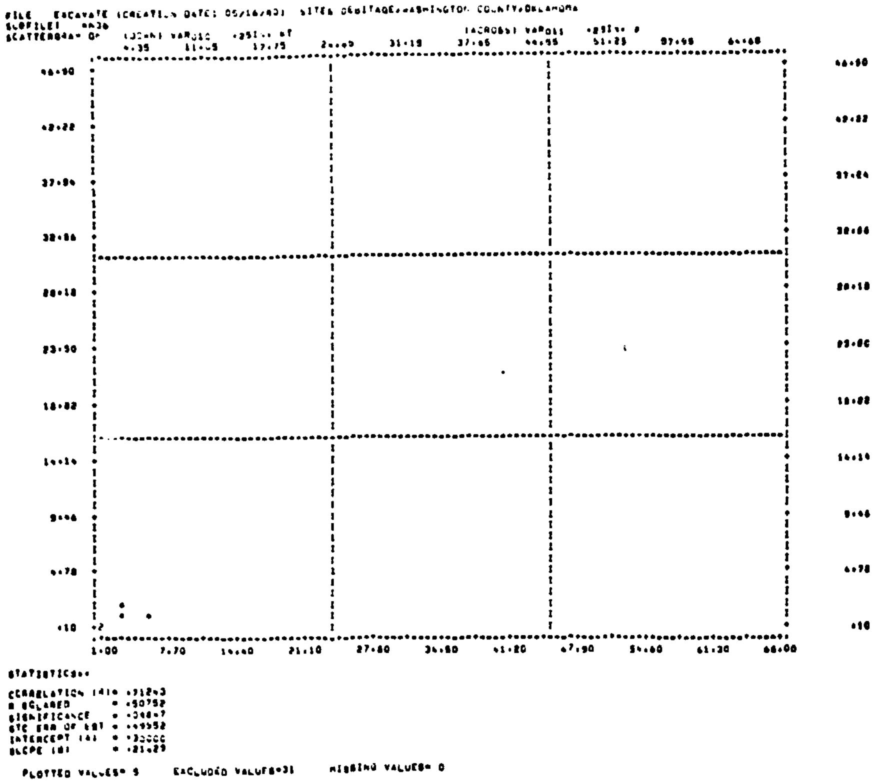

Figure 23. Scattergram of .25-inch debitage, 34WN36.

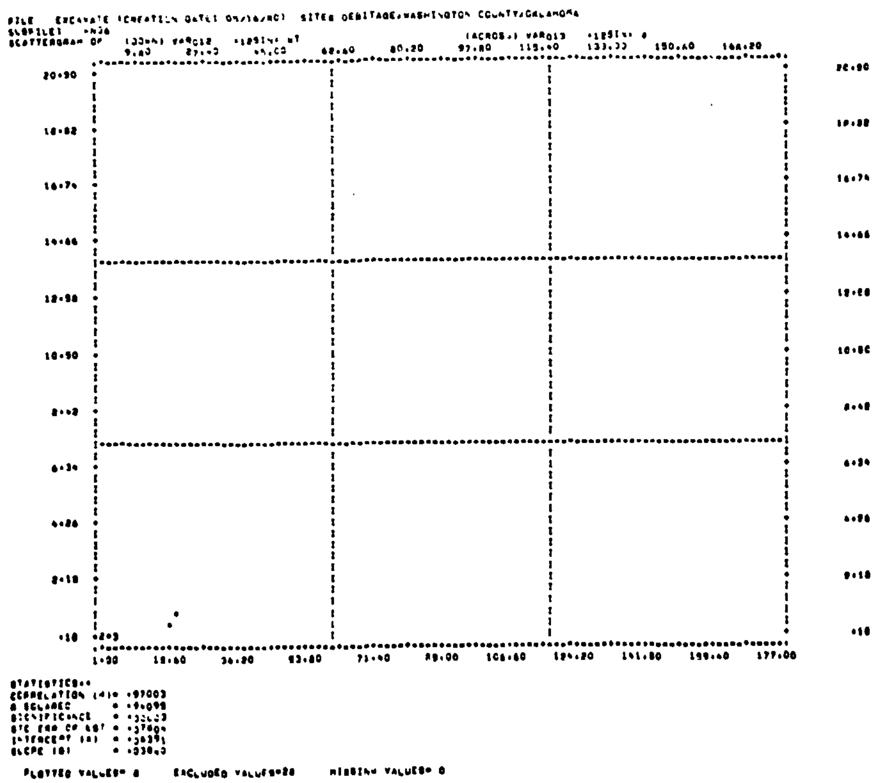

Figure 24. Scattergram of .125-inch debitage, 34WN36.

lead one to accept the null hypothesis of no significance at the level of confidence of 0.05

Summary and Conclusions

34WN36 is an open site seemingly of little depth, although a culturally diagnostic Gary point came from a surface depth of 40-50 cm. Previous descriptions of Rohn and Smith about the quantities and kinds of debris are not supported by the Phase III investigations. Perhaps the site in the intervening years since 1972 has been subjected to massive erosion or to intensive collection of archaeological materials. In either case, we are left with a contrast in results and expectations. Based on the excavation results, larger scale excavation is not anticipated to produce more substantial findings. if it was a site of heuristic potential in 1972, it is not so today.

3. Intersite Comparison

Data from all but 34WN34 and 34WN36 are sufficient for meaningful, albeit preliminary comparisons among the Phase III sites. The physical structure of the four remaining sites allows for separation into two general groups of open encampments. First, are the two rockmiddens, 34WN26 and 34WN68; second are the encampments 34WN12 and 34WN29. Of these four only 34WN29 has material remains in primary, undisturbed contexts, well-expressed architectural features and multiple occupations within stratified units. The other sites are disturbed to one degree or another. In comparing all of the sites, the attempt will be to review information that is largely independent of site context or, in the case of disturbed sites, for which site context is not a major concern. Thus, our discussion will consider: (a) stylistic and radiometric evidence for an intersite chronology; (b) tool element ratios for 50 cm squares of 10 cm thickness; elements of the manufacture and maintenance programs of ground and chipped-stone tools; (c) metrical data on Scallorn points for sites 34WN68 and 34WN 29; and (d) the lithic debitage bulk density analyses. These four sets of information will provide an empirical basis for further generalization about settlement distributions in the Cross Timbers region.

Intersite Chronology

The best data are radiometric and include the four C^{14} dates for 34WN29, the corresponding date from the Jackson-Fall Leaf site (34WN71) and the dates anticipated from Cotton Creek Shelter (34WN32). The assays for 34WN29 afford a baseline for age assessments derived from stylistic comparison of Scallorn points. Assuming everything else is equal, Scallorn points from project area sites should date between 1200 and 1000 years ago. Their presence at the other Phase III sites 34 WN26 and 34WN68 is as part of larger assemblages of diagnostic points such as the side-notched arrows, the Cupp points, medium-size expanding stem points, and bifurcate base points. This does not prove that all of these point forms are coeval but at the least it raises the question. For now, my interpretation of the sites' chronologies is that they may or may not have been inhabited all at one time but probably they all were inhabited during a part of the Late Woodland period, or perhaps later.

Tool Element Ratios and Other Technological Considerations

Table 15 compares tool element ratios (empirically derived probabilities of occurrence) for 50 cm squares of 10 cm thickness of ground stone artifacts, all chipped stone artifacts and projectile points. The lowest probabilities for all three categories occur at 34WN12.

Table 15. Tool Element Ratios for 50 cm Squares

Site	Number of Squares	Ground Stone	Chipped Stone	Projectile Points
34WN12	69	.03	.13	.03
34WN26	107	.25	.36	.16
34WN29	162	.19	.56	.30
34WN68	342	.13	.89	.18

Ground-stone implements have their highest probabilities of occurrence at 34WN 26 (.25) and 34WN29 (.19). Chipped-stone tool elements have the highest probability at 34WN68 (.89) but with a comparatively low independent probability of projectile points (.18). In contrast is 34WN29 where the probabilities for chipped-stone and projectiles are, respectively, .56 and .30. These data indicate that (1) the four sites may have had different functions; (2) functional separation of the rock middens 34WN26 and 34WN68 is most apparent in terms of ground-stone and total chipped-stone but not projectiles; (3) the encampment(s) at 34WN29 is especially conspicuous due to projectile points; (4) 34WN12 had the most limited usage and consequent buildup of debris.

A seemingly notable difference in the manufacture and maintenance programs for ground-stone implements is apparent also for the three sites 34WN26, 34WN29 and 34 WN 68, all of which had roughly similar ground-stone tool frequencies. Pecking-and-grinding of ground slabs, slab fragments or hematite impregnated slabs or slab fragments is apparent for only 34WN26 and 34WN29. This suggests some technological segregation within the project area as the two sites are on Cotton Creek or its north fork, whereas 34 WN68 is on the Little Caney. Another possibility is that ground-stone tool use was, for whatever reasons, more consistent within as opposed to between tributary drainages.

Scallorn Point Size Comparison

Sites 34WN29 and 34WN68 have reasonably large numbers of Scallorn points measurable for width and thickness. Figures 25 and 26 are, respectively, the scatterplots of these data for 34WN29 and 34WN68. Inspection of the two figures shows clearly that there is little overlap in either width or thickness among Scallorn points from the two and that those from 34WN68 are consistently the larger. These data, again, support the idea that those responsible for the manufacture of the Scallorn points were from two resident populations; one on the Little Caney, the other on Cotton Creek.

Lithic Debitage Analyses

Figure 27 shows the linear regression lines for the .25-inch fraction lithic debitage for sites 34WN12, 34WN26, 34WN29, and 34WN 68. Similar regressions are recorded for the .125-inch fractions but, with the exception of the 34WN29 regression line their separation one from another is not as clear as it is in Figure 25. (A second difference is that 34WN 29's .125-inch regression line has the least weight per number rather than the most, as shown in Figure 25). From this figure one can see that each of the four sites has an identifiable "signature" or "fingerprint" expressed by the regression line. Second, the chipped-

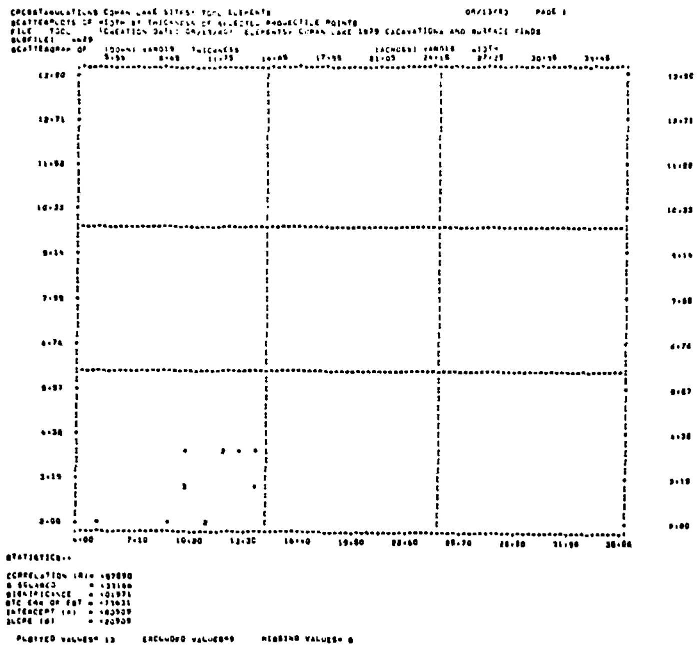

Figure 25. Scattergram of Scallorn points thickness by width, 34WN29.

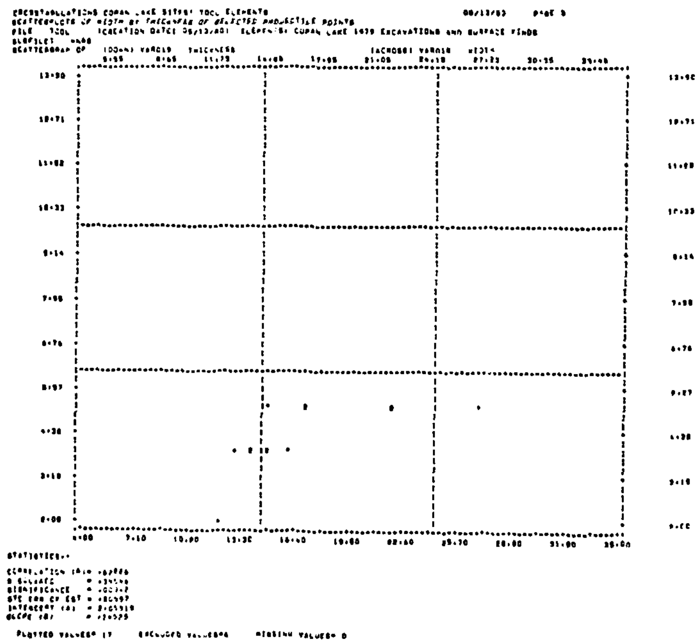

Figure 26. Scattergram of Scallorn points thickness by width, 34WN68.

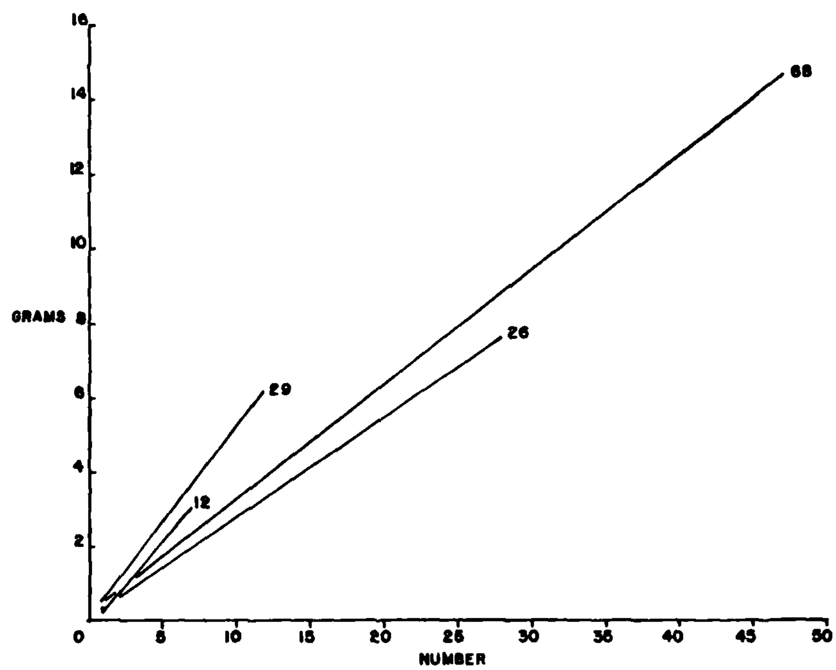

Figure 27. Linear regression lines for the .25-inch fraction lithic debitage Displayed are regressions for sites 34WN12, 34WN26, 34WN29 and 34WN68.

Table 16. Crosstabulation of artifact class by product group, Cutbank

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 05/13/83 PAGE 80
CROSSTABULATIONS OF DESCRIPTIVE DATA, COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE = 05/13/83) ELEMENTS, COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: CUTBANK

* * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * *
VAR007 ARTIFACT CLASS BY VAR008 PRODUCT GROUP
* PAGE 1 OF 1

VAR007 (COUNT)		PG 1 (1)	PG 2 (2)	PG 4 (4)	PG 6 OR PG 7 (10)	UNDET. PG (11)	ROW TOTAL
CORE FRAG	14	1	0	0	0	0	1 7.69
FLAKETOOL	16	0	2	0	0	0	2 15.38
SIDE SCRAPER	18	0	1	0	0	0	1 7.69
PT. MID SECTION	34	0	0	0	1	0	1 7.69
BIFACE SEGMENT	38	0	0	0	0	2	2 15.38
UNIC PT PR-FRAG	39	0	0	0	1	0	1 7.69
WILLIAMS ON PT	50	0	0	2	0	0	2 15.38
BASAL WT POINT	51	0	0	1	0	0	1 7.69
OTHER LITHICS	57	1	0	0	0	0	1 7.69
AMORPH CORE	61	1	0	0	0	0	1 7.69
COLUMN TOTAL		3 23.08	3 23.08	3 23.08	2 15.38	2 15.38	13 100.00

RAW CHI SQUARE = 51.99973 WITH 36 DEG OF FREEDOM
SIGNIFICANCE = .04111

Table 17. Crosstabulation of artifact class by product group, Shoreline Survey.

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 05/13/83 PAGE 88
CROSSTABULATIONS OF DESCRIPTIVE DATA, COPAN SITES TOOL ELEMENTS
FILE TOOL (CREATION DATE = 05/13/83) ELEMENTS, COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: SHORELIN

* * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * *
VAR007 ARTIFACT CLASS BY VAR008 PRODUCT GROUP
* PAGE 1 OF 1

VAR007 (COUNT)		PG 1 (1)	PG 2 (2)	PG 4 (4)	PG 7 (7)	PG 6 OR PG 7 (10)	ROW TOTAL
FLAKETOOL	16	0	1	0	0	0	1 11.11
ADZE	23	0	0	0	0	2	2 22.22
PREFORMS 4	28	0	0	1	0	0	1 11.11
UNIC PT PR-FRAG	39	0	0	0	0	1	1 11.11
EXP.STEM POINT	47	0	0	0	1	0	1 11.11
OTHER LITHICS	57	2	0	0	0	0	2 22.22
BIFACE CUTTING	59	0	0	0	1	0	1 11.11
COLUMN TOTAL		2 22.22	1 11.11	1 11.11	2 22.22	3 33.33	9 100.00

RAW CHI SQUARE = 35.99979 WITH 24 DEG OF FREEDOM
SIGNIFICANCE = .05469

NUMBER OF MISSING OBSERVATIONS = 0

stone reduction programs appear to divide into two general sets of curves: one is for the two rock middens 34WN26 and 34WN68; the other, the two encampments 34WN12 and 34 WN29. The fact that each site has a discrete regression line suggests separate residential populations; that the regression lines fall into two sets, or groups, suggests similarities in chipped-stone tool manufacture or maintenance seemingly associated with overall site morphologies. The burned rock middens have more inclusive bifacial tool reduction programs than do the other encampments.

4. Cotton Creek Cut Bank Discovery

To the east of the 34WN34 excavations near the base of a 4 m Cotton Creek cutbank are a series of sorted but angular sandstone gravels, fluvially transported. These gravels probably represent an episode of hillslope erosion or flash flooding and are within oxidized clayey sandy silts unlike the alluvium beneath the Copan paleosol. Perhaps this sediment corresponds to Hall's (1977:17) alluvial Unit C. Whether it does or not, it is probably the oldest Holocene alluvium exposed by the Cotton Creek channel. I estimate its age to be greater than 5000 years.

From the basal gravels (a secondary context) came 13 artifacts (Table 16) including 3 diagnostic Middle Archaic points (Figure 7a, b, d) and a fourth point (Figure 7c) which has not been classified. Descriptions follow.

Three of the points (Figure 7a-c) are large corner-notched specimens, the first two of which are similar to Williams points from the Middle Archaic units of Rodgers Shelter (Kay 1980); the third specimen is too fragmentary for accurate description but it too is probably similar to Williams points. Figure 7a is of an unidentified chert, weights 12.4 gm, is 40 mm wide and 9 mm thick. Figure 7b is of Florence chert, weighs 8.7 gm, is 38 mm wide and 7 mm thick. Figure 7c is a white chert (Peoria or Keokuk), weighs 7.2 gm and has a measured thickness of 9 mm.

Figure 7d is a similarly large but basally notched specimen of an unidentified chert. It weighs 25.3 gm, is 69 mm in length, 45 mm wide and 12 mm thick. In appearance it is most similar to Calf Creek points (Perino 1968:14 and Plate 7), identified in excavations as a Middle Archaic type.

5. Shoreline Survey

Nine other artifacts (Table 17) were found in a surface reconnaissance of shoreline areas cleared of vegetation on the west bank of the Little Caney just north of the dam. No discrete concentrations were noted. All of the materials were in contexts disturbed by construction activity. Representative examples are illustrated (Figures 5o, 7q).

CHAPTER 4. SUMMARY AND CONCLUSIONS

Phase III investigations entailed the excavation of six site or prospective site areas within the Copan Lake Project area, the discovery of a potentially important site location on Cotton Creek, and additional although limited shoreline survey near the dam. Subject to the most extensive excavation was the burned rockmidden 34WN68 on the Little Caney River terrace; smaller sized excavations were conducted at five Cotton Creek locations. Of the latter, surface inspection and excavation demonstrated site 34WN34 had been incorrectly located by previous investigators. Cotton Creek sites 34WN12, 34WN29 and 34 WN36 all had indentifiable prehistoric components. 34WN26 is a second burned rock midden; the others are all open encampments within the restricted Cotton Creek valley.

A summary of important conclusions are enumerated as follows:

1. All Phase III site excavations sectioned portions of the Copan paleosol. Dating of the paleosol at 34WN29 is reasonably consistent with previous estimates but may support a later initial development about 1650 years ago. A period of development of about 650 years (1650 to 1000 B.P.) is hypothesized for this soil.
2. Chronological placement of all excavated Phase III sites is within the Plains Woodland, or Late Woodland Period. Based on the radiometric dating of Scallorn points from 34WN29, the other Phase III sites are also estimated to have been used during the interval 1200-1000 B.P.
3. There are no relative or absolute chronological data to indicate whether or not any of the sites are coeval or, if they are not coeval, which was occupied first.
4. Of the excavated site only 34WN29 is stratified, has architectural features, and statistically significant (i.e., nonrandom) vertical debris distributions. The archaeological contexts of materials from 34 WN29 are mainly primary, in contrast to the secondary contexts of the remains at the other excavated sites.
5. There are important differences in the material contents of each excavated site. These differences may be explained as being the results of variation in (a) site function or usage, (b) residence groups, (c) seasonal habitation, or (d) all of the above. Thus, at present we do not have sufficient control for a more inclusive Late Woodland model of settlement.
6. Chipped stone acquisition entailed usage of mainly the western chert series. However, the presence of chert stream gravels at 34WN29 calls to question whether or not these cherts are from primary bedrock sources or are from secondary sources in the project area.
7. Earlier occupation is evident from the stratified unit sectioned at 34WN29 and the Middle Archaic chipped stone artifacts (including diagnostic points) discovered in old Holocene alluvium of Cotton Creek.
8. The shoreline survey demonstrates that other archaeological remains or sites will be discovered, disturbed or destroyed as project construction is finalized and the lake is impounded. Survey data are insufficient to predict where the greatest adverse impact to cultural resources will appear.

CHAPTER 5. RECOMMENDATIONS

1. Site 34WN29 is recommended for large scale excavation. This site represents a nearly unique opportunity to define the community layouts of several Late Woodland and probably earlier encampments.
2. Mapping of the Cotton Creek cutbank where the Middle Archaic artifacts were found should be done prior to impoundment.
3. Shoreline sites 34WN12, 34WN26, 34 WN36 and 34WN68 should be monitored as the lake fills and afterwards by periodic inspection to assess their conditions.
4. Cotton Creek Shelter (34WN32) should be excavated. This site seemingly overlaps in time with 34WN29, has sufficient charcoal for radiocarbon dating and at least some bone debris which can be used in subsistence studies. The site is prominent and will be a magnet for visitors, at least some of whom may be expected to vandalize the site.

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APPENDICES

APPENDIX 1
LITHIC DEBITAGE COMPUTER CODING

COLUMNS:	INFORMATION DESIRED
1-6	Catalog number, if any
8-12	S grid coordinate with decimal point in column 11
15-19	E grid coordinate with decimal point in column 18
21-22	Basal depth (i.e., 10-20 cm would be coded "20"; 20-30- "30", (etc.)
24	if random, code a "1"; if not, code, "0"
26	No. of tags recorded on original inventory sheets, if more than 9, list as "9"
28	size grade, follow this code: If: 1", 1/2" 1/4", 1/8" = "1" 1/2", 1/4", 1/8" = "2" 1/4", 1/8" = "3" 1/8" = "4" 1/2", 1/8" = "5" 1/2", 1/4" = "6"
30-34	Weight, 1" size grade
36-38	Number, 1" size grade
40-44	Weight, 1/2" size grade
46-48	Number, 1/2" size grade
50-54	Weight, 1/4" size grade
56-58	Number, 1/4" size grade only if from random sample unit
60-64	Weight, 1/8" size grade
66-68	Number, 1/8" size grade only if from random sample unit
70-74	Weight, 1/4" hematite
76-80	Weight, 1/4" unmodified rock debris from random samples

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
1-3	Specimen number (consecutive____________)
3-6	Field catalog number, if any
8-12	South grid coordinate, decimal in column 11
15-19	East grid coordinate, decimal in column 18
21-22	Depth below surface, (i.e., 10-20 cm would be coded "20", 20-30: "30", etc.)
24	Find type: (50 cm grid unit, code "1"; in situ, code "2"; surface collection, code "3"; profile clean up or undifferentiated from wall, code "4", code "5")
26-27	**Artifact Class:**

Handheld:

1. Axe (fragments)
2. Loaf shaped pitted________________(fragments)
3. Loaf shaped____________________(fragments)
4. Air foil mano (fragments)

Stationary:

5. Two-faced ground stone slab Thirteen anvil
6. Single-face ground stone slab
7. Hematite impregnated, two-faced ground stone slab

Stationary Fragments:

8. Two-faced ground stone slab fragments
9. Single face ground stone slab fragments
10. Hematite impregnated ground stone slab
11. Abrader

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
26-27	**Artifact Class Continued:**
	Stationary Fragments:
	12. Ground stone slab/abrader
	13. Unprepared, amorphous core
	14. Core fragment
	15. Bifacial fragment core
	16. Unifacially flaked tool - use wear only
	17. Unclassified unifacial tool fragment
	18. Side scraper
	19. End scraper
	20. Other scraper
	21. Perforator or graver (unifacial)
	22. Cutting tool - (unifacial)
	23. Adze
	24. Burin
	25. Impact or resharpening flake
	26. Outre passe
	27. Biface preform, P.G. 3
	28. Biface preform, P.G.4
	29. Biface preform, P.G. 5
	30. Undifferentiated proximal biface fragment
	31. Undifferentiated biface midsection
	32. Undiffferentiated biface distal section

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
26-27	**Artifact Class Continued:**
	Stationary Fragments:
	33. Basal fragment **scallorn** preform
	34. Mid section of point
	35. Distal point fragment
	36. Mid section of bifacially flaked drill
	37. Point segment
	38. Biface segment
	39. Unidentifiable point proximal fragment
	40. Side notched triangular arrow point (No. 382)
	41. Scallorn variant A – (No. 398-414) – straight base - pressure flaking extensive
	42. Scallorn variant B – (No. 415-421) – rounded base - pressure flaking extensive
	43. Scallorn variant C – irregular base -marginal pressure flaking
	44. Large corner notched point, convex base (No. 384-385)
	45. Bifurcated base lanceolate (No. 386)
	46. Small square stemmed point (No. 387)
	47. Expanding stem point, barbed shoulders (391-395)
	48. Table rock stemmed (No. 396, 397)
	49. Contracting stem - gary

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
26-27	**Artifact Class Continued:**
	Stationary Fragments:
	50. Williams - Corner notched
	51. Basal notched, straight stemmed point
	52. CUPP
	53. Bifacial perforator, hafted
	54. Pieces esquillees
	55. Cut copper
	56. Undifferentiated scallorn point blade element
	57. Other lithic debitage (flakes, chips, etc.)
	58. Rubbed or worked hematite
	59. Bifacially flaked cutting tool, undifferentiated otherwise
	60. Pottery (body sherd)
	61. Amorphous core
	70. Lithic debitage flakes
	71. Shatter and other chipped stone debris
	73. Unmodified rock debris
	74. Daub
	75. Ocher
	76. Botanical remains
	77. Faunal remains (count)
	78. Modern contaminants other than Flora

AD-A109 520 TULSA UNIV OK LAB OF ARCHAEOLOGY F/G 5/6
LITTLE CANEY RIVER PREHISTORY. 1979 FIELD SEASON,(U)
1981 M KAY DACW56-77-C-0228

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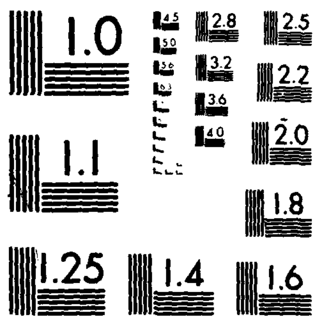


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
29-30	**Product Group:**

Code:

0 – not applicable

1 – Product Group 1 – (discarded flake debris, heat shatter, cores; g.s. materials, ground hematite, etc.)

2 – Product Group 2 – (flake or other unifacial flaked tools and simple g.s. bone tools)

3 – Product Group 3 – (crude flaked preforms)

4 – Product Group 4 – medium flaked preforms

5 – Product Group 5 – (identifiable preforms)

6 – Product Group 6 – (finished tool, no recycling, include bifaces, pottery, g.s.)

7 – Product Group 7 – (tool, w/recycling into similar or different utilitarian role)

8 – Product Group 8 – (tool recycled or specifically designed for nonutilitarian role)

9 – Bifacial chipped stone, too fragmentary for classification as either preform or finished tool.

10 – Either Product Group 6 or 7.

11 – Bifacial frag, Product Group undetermined.

32-33	**Tool Manufacture and/or maintenance:**

Code:

0 – not applicable

1 – ground

2 – pecked

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
32-33	**Tool Manufacture and/or maintenance (Continued):**
	3 – polished
	4 – ground and pecked
	5 – ground and polished and pecked
	6 – pecked and polished
	7 – marginal pressure retouch
	8 – crude percussion flaking, cortex present on one or both faces (P.G. 3)
	9 – crude percussion flaking, no cortex (P.G. 3)
	10 – percussion bifacial thinning (P.G. 4)
	11 – controlled percussion flaking (P.G. 5)
	12 – controlled percussion and/or pressure flaking (P.G. 4, 5)
	13 – striking platform grinding w/flaking Code No. 8
	14 – striking platform grinding w/flaking Code No.9
	15 – striking platform grinding w/flaking Code No.10
	16 – striking platform grinding w/flaking Code No.11
	17 – striking platform grinding w/flaking Code No.12
	18 – bipolar flaking
	19 – burin facet on edge
	20 – burin facet on a break
	21 – dihedral angle burin

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
35-36	**Tool Wear or Evidence of Use:**

Code:

1 – marred – see Robinson

2 – ground

3 – striated – in one direction

4 – striated – random

5 – battering

6 – polished

7 – mineral (hematite) residues present on ground and pecked surface

8 – residues with Code No.1

9 – residues with Code No.2

10 – residues with Code No.3

11 – residues with Code No.4

12 – residues with Code No.5

13 – residues with Code No.6

14 – all wear types present (Codes No.1-6)

15 – ground and polished

16 – ground, polished, striated

17 – ground and marred

18 – marred and striated

19 – marred and battered

20 – battered and ground

21 – marred and pecked

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED
35-36	**Tool Wear or Evidence of Use (Continued):**
	22 – impact fracture
	23 – transverse fracture
	24 – oblique fracture
	25 – heat fracture
	26 – angular, multiple fractures
	27 – irregular fracture
	28 – edge retouch only
	29 – end shock fracture
	30 – outre passe
	31 – reworked as scraper
	32 – used as a burin
38	**Overall Shape:**
	Code:
	1 – ovate
	2 – amorphous
	3 – subtriangular
	4 – circular
	5 – subrectangular
	6 – squared
	7 – triangular
	8 – too fragmentary

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED:
40	**Shape in Long Section:**
	Code:
	1 — plano-convex
	2 — bi-convex
	3 — bi-plano
	4 — concave - convex
	5 — plano-concave
	6 — airfoil
	7 — bi-concave
	8 — too fragmentary or irregular
42	**Shape in Cross Section:**
	Code:
	1 — bi-convex
	2 — bi-plano
	3 — plano-convex
	4 — concave-convex
	5 — airfoil
	6 — plano-concave
	7 — bi-concave
	8 — too fragmentary or irregular
44	**Optional Manufacture of Maintenance:**
	Code:
	1 — heat treatment apparent
	2 — not heated
	3 — heat treatment uncertain

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED:
46-471	**Material:**

Code:

1 – sandstone

2 – diorite (greenstone)

3 – glass

4 – china

5 – iron

6 – copper

7 —asphalt or oil tar

8 – daub

9 – uncarbonized bone

10 – carbonized bone

11 – pumice or scoria

12 – hematite or limonite

13 – charcoal

14 – florence chert

15 – foraker

16 – neva

17 – florence or neva

18 – neva or keokuk

19 – Peoria or white keokuk

20 – other keokuk

21 – black chert (multi-sources)

22 – unidentified chert

TOOL ELEMENT CODING

COLUMNS:	INFORMATION DESIRED:
49-54	Weight to nearest o.1 gm, decima' in Column 53
56-58	Length to nearest mm
60-62	Width to nearest mm
64-66	Thickness to nearest mm
72	**Blank Type**
	1 – primary flake
	2 – secondary flake
	3 – tertiary flake
	4 – bifacial thinning flake
	5 – core
	6 – undetermined flake
	7 – undetermined between flake or core
	8 – heat spall or potlid
	9 – biface

PREVIOUSLY UNTABULATED DEBRIS

COLUMNS:	INFORMATION DESIRED:
1-6	catalog number, if any
8-12	south grid coordinate, decimal in Column 11
15-19	east grid coordinate, decimal in Column 18
21-22	surface depth, as previously
24	**Find type**:
	Code:
	1 – 50 cm grid unit
	2 – **in situ**
	3 – surface collection
	4 – profile cleanup
	5 – unknown or not specified
28	*Size grade: (as before if mixed size)*
	Code:
	7 – 1/4"
	8 – 1/2"
	9 – 1"
	4 – 1/8"
30	Product Group: enter a "1"
46-47	**Material**
	Code:
	1 – sandstone, 2 – diorite
Modern contamination:	3 – glass
Codes 3 - 4 -5	4 – china or crockery
6 and 7	5 – iron or steel

PREVIOUSLY UNTABULATED DEBRIS

COLUMNS:	INFORMATION DESIRED:
46-47	**Material (Continued)**
	6 — copper
	7 — asphalt or oil tar
	8 — daub (clay)
	9 — uncarbonized bone
	10 — carbonized bone, burned
	11 — pumice or scoria
	12 — hematite
	13 — charcoal — (weigh only; do not count)
	14 — dolomite-limestone
	15 — quartz
49-54	Weight to nearest 0.1 gm (decimal in 53)
68-70	Number

APPENDIX 2.

CROSSTABULATIONS COPAN LAKE SITES: TOOL ELEMENTS 05/30/83
CROSSTABULATION OF GRID COORDINATES FOR PRODUCT GROUPS
FILE TOOL (CREATION DATE = 05/05/80) ELEMENTS, COPAN LAKE 1979 EXCAVATIONS AND SURFACE FINDS
SUBFILE: ...26

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR.. VAR308 PRODUCT GROUP VALUE = 8. PG 8

VAR003 \ VAR004 (COUNT)	SURFACE 0.	121.	168.	169.	200.	201.	210.	ROW TOTAL
SURFACE 0.	12	0	0	0	0	0	0	12 / 27.27
184.	0	1	0	0	0	0	2	3 / 6.82
185.	0	0	0	0	0	0	4	4 / 9.09
194.	0	0	0	0	0	1	0	1 / 2.27
198.	0	0	0	0	2	0	0	2 / 4.55
199.	0	0	3	1	0	0	0	4 / 9.09
200.	0	0	2	4	0	0	0	6 / 13.64
208.	0	0	0	0	1	0	0	1 / 2.27
209.	0	0	0	0	2	1	0	3 / 6.82
227.	0	0	0	0	3	0	0	3 / 6.82
228.	0	0	0	0	1	4	0	5 / 11.36
COLUMN TOTAL	12 / 27.27	1 / 2.27	5 / 11.36	5 / 11.36	9 / 20.45	6 / 13.64	6 / 13.64	44 / 100.00

CHI SQUARE = 178.18457 WITH 60 DEG OF FREEDOM
SIGNIFICANCE = .00000

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR.. VAR308 PRODUCT GROUP VALUE = 10. PG 6 OR PG 7

VAR003 \ VAR004 (COUNT)	168.	200.	201.	210.	ROW TOTAL
185.	0	0	0	1	1 / 10.00
195.	0	1	2	0	3 / 30.00
199.	2	0	0	0	2 / 20.00
208.	0	0	1	0	1 / 10.00
209.	0	1	0	0	1 / 10.00
227.	0	1	0	0	1 / 10.00
228.	0	0	1	0	1 / 10.00
COLUMN TOTAL	2 / 20.00	3 / 30.00	4 / 40.00	1 / 10.00	10 / 100.00

CHI SQUARE = 26.11098 WITH 18 DEG OF FREEDOM
SIGNIFICANCE = .09725

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR.. VAR308 PRODUCT GROUP VALUE = 6. PG 6

VAR003 \ VAR004 (COUNT)	SURFACE 0.	168.	169.	200.	201.	211.	ROW TOTAL
SURFACE 0.	6	0	0	0	0	0	6 / 31.58
184.	0	0	0	0	0	1	1 / 5.26
185.	0	0	0	0	0	2	2 / 10.53
194.	0	0	0	1	2	0	3 / 15.79
195.	0	0	0	1	0	0	1 / 5.26
200.	0	1	1	0	0	0	2 / 10.53
209.	0	0	0	0	2	0	2 / 10.53
227.	0	0	0	0	1	0	1 / 5.26
228.	0	0	0	0	1	0	1 / 5.26
COLUMN TOTAL	6 / 31.58	1 / 5.26	1 / 5.26	2 / 10.53	6 / 31.58	3 / 15.79	19 / 100.00

CHI SQUARE = 67.55527 WITH 40 DEG OF FREEDOM
SIGNIFICANCE = .00016

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR.. VAR308 PRODUCT GROUP VALUE = 11. UNDET. PG

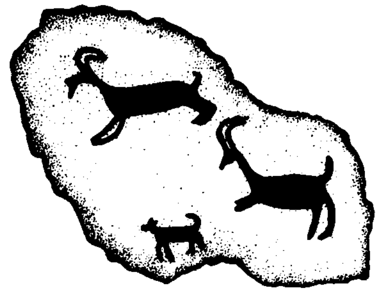
VAR003 \ VAR004 (COUNT)	SURFACE 0.	168.	200.	201.	211.	ROW TOTAL
SURFACE 0.	3	0	0	0	0	3 / 21.43
185.	0	0	0	0	1	1 / 7.14
194.	0	0	4	2	0	6 / 42.86
199.	0	1	0	0	0	1 / 7.14
208.	0	0	1	0	0	1 / 7.14
227.	0	0	1	0	0	1 / 7.14
228.	0	0	1	0	0	1 / 7.14
COLUMN TOTAL	3 / 21.43	1 / 7.14	7 / 50.00	2 / 14.29	1 / 7.14	14 / 100.00

CHI SQUARE = 42.99988 WITH 24 DEG OF FREEDOM
SIGNIFICANCE = .00763

CROSSTABULATION OF VAR003 SOUTH GRID COORDINATE BY VAR004 EAST GRID COORDINATE
CONTROLLING FOR.. VAR308 PRODUCT GROUP VALUE = 2. PG 2
BY VAR005 SURFACE DEPTH VALUE = 10. 0-10 CM

VAR003 \ VAR004 (COUNT)	121.	168.	169.	200.	201.	210.	ROW TOTAL
184.	1	0	0	0	0	0	1 / 5.88
185.	0	0	0	0	0	3	3 / 17.65
195.	0	0	0	1	0	0	1 / 5.88
199.	0	2	1	0	0	0	3 / 17.65
200.	0	0	4	0	0	0	4 / 23.53
208.	0	0	0	1	0	0	1 / 5.88
209.	0	0	0	0	1	0	1 / 5.88
228.	0	0	0	1	2	0	3 / 17.65
COLUMN TOTAL	1 / 5.88	2 / 11.76	5 / 29.41	3 / 17.65	3 / 17.65	3 / 17.65	17 / 100.00

CHI SQUARE = 69.51088 WITH 35 DEG OF FREEDOM
SIGNIFICANCE = .00046



LABORATORY OF ARCHAEOLOGY
UNIVERSITY OF TULSA
CONTRIBUTIONS IN ARCHAEOLOGY
($6.50 each)

1. *The Prehistory of the Little Caney River, 1976 Field Season. Donald O. Henry, editor, 1977.*

2. *The Prehistory and Paleoenvironment of Hominy Creek Valley. Donald O. Henry, editor, 1977.*

3. *The Prehistory of Birch Creek Valley. Donald O. Henry, editor, 1977.*

4. *The Prehistory and Paleoenvironment of Hominy Creek Valley, 1977 Field Season. Donald O. Henry, editor, 1978.*

5. *Little Caney River Prehistory, 1977 Field Season. James D. Keyser and James A. Farley, 1979.*

6. *The Prehistory and Paleoenvironment of Hominy Creek Valley, 1978 Field Season. Donald O. Henry, 1980.*

7. *Little Caney River Prehistory (Copan Lake): 1978 Field Season. Terry J. Prewitt, 1980.*

8. *Little Caney River Prehistory: 1979 Field Season. Marvin Kay, 1981.*

9. *An Ethnohistoric Overview of Historic Settlement in the Area of the Little Caney Valley (Copan Lake Area), Washington County, Oklahoma. Terry J. Prewitt, 1981.*

10. *Archaeological Survey of the Upper Salt Creek Basin, Osage County, Oklahoma. Foster E. Kirby and Anne B. Justen, 1981. In preparation.*

11. *The Prehistory and Paleoenvironment of Hominy Creek Valley: 1979 Field Season. Donald O. Henry, 1981. In preparation.*

12. *Archaeological Investigations of the Waterfall-Gilford Creeks Watershed, McCurtain County, Oklahoma. Foster E. Kirby, Terry J. Prewitt, and Dorothy J. Gaston, 1981. In preparation.*

13. *The Prehistory and Paleoenvironment of the Black Mesa Locality, Cimarron County, Oklahoma: 1981 Field Season. Cherie E. Haury. In preparation.*

14. *The Prehistory and Paleoenvironments of the Little Caney Basin: 1980-81 Field Seasons. Kenneth C. Reid and Joe Alen Artz. In preparation.*

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