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An Analysis of Unifacial Stone Tools From the Hardaway Site, North Carolina

by

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INTRODUCTION

This report presents the results of an analysis conducted on a previously unstudied sample of unifacial stone tools recovered by Joffre Coe (1964) from the Hardaway site in Stanly County, North Carolina. A lithic analysis strategy which integrates a traditional techno-functional study with the theoretical concepts of the organization of hunter-gatherer technologies is employed. New data are interpreted within the context of an ethno-archaeological model that views the Hardaway unifacial tool typology as reflecting differences between long and short term tool usage as well as different stages of tool reduction. In addition, speculations concerning interassemblage variability and site function are also presented.

SITE SETTING

The Hardaway site is located in the Carolina Piedmont atop a hill along a steep ridge, 280 feet above the western bank of the Yadkin River (Figure 1). The site, covering about one acre, is situated on a truncated area at the northern edge of the ridge (Coe 1964:56).

Physiographically, the Hardaway site is positioned at the southern tip of the Yadkin River basin, which covers approximately 4500 square miles. Moreover, the site is situated at a point where the river flows through a topographical constriction called the "Narrows." Coe (1964:9) hypothesized that if prehistoric groups traveled along the river valley, the Narrows would have served as a funnel for group movement, thereby concentrating prehistoric occupations in a relatively small area.

A variety of potential economic resources made Hardaway an attractive location for occupation. In addition to being near the river and its associated flora and fauna, it offered a commanding view of the valley. Numerous outcrops of lithic raw material, including rhyolite, quartz, and slate, were also readily available (Coe 1964:56–57). Coe believes that a spring, located just south of the site, would have served as a convenient water source.

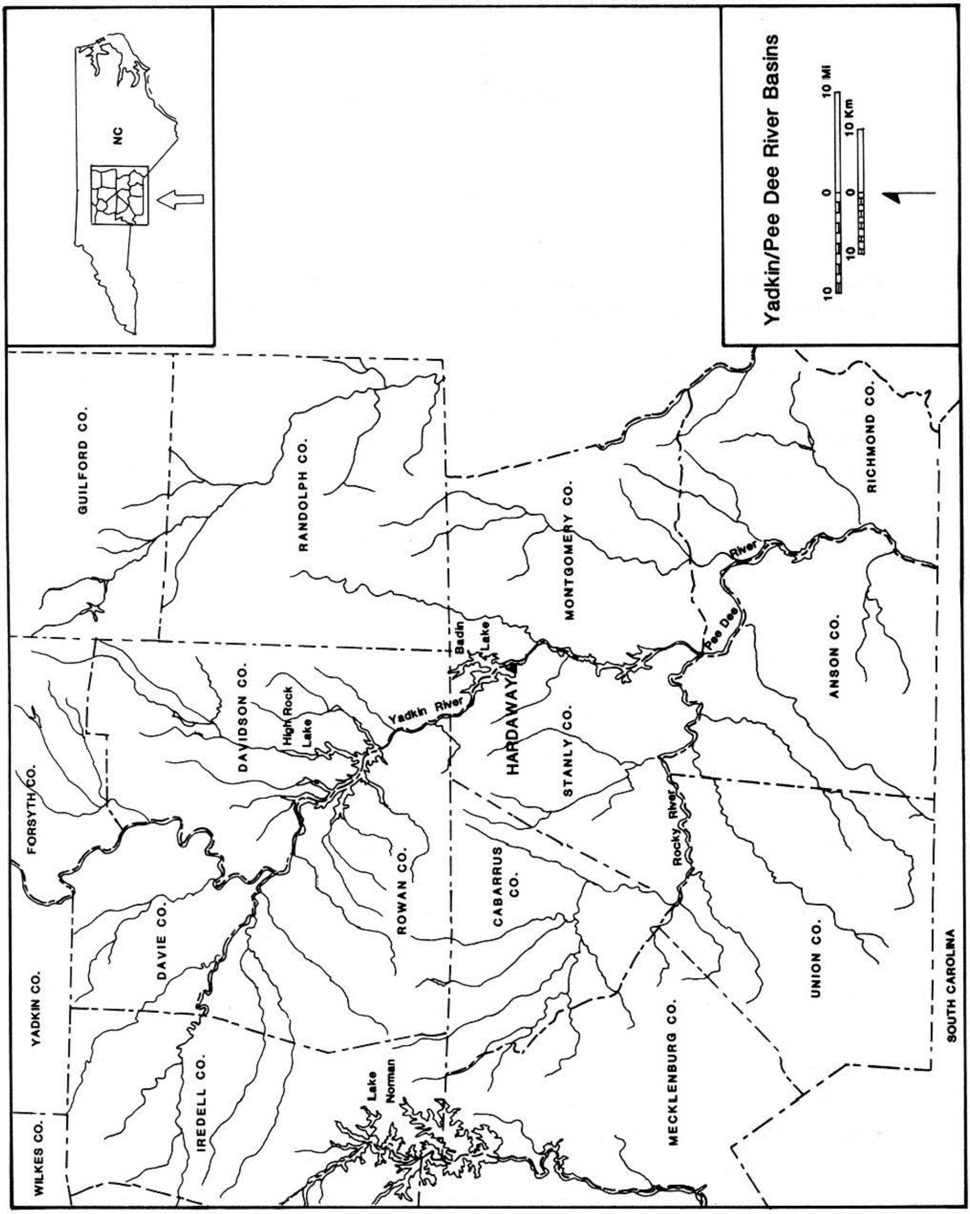

Figure 1.

Map Locating the Hardaway Site.

PREVIOUS WORK

The earliest excavations at the Hardaway site consisted of single 5x5-ft test pits dug in 1948 and 1951. These initial test excavations revealed the presence of a 28-inch deep midden that was later assigned to the Kirk period. This stratum was underlain by a thin humic layer which also contained cultural material and proved to pre-date the Kirk occupation.

More extensive excavations were conducted from 1955–1957. During this period, 23 5x5-ft squares forming five-foot wide trenches were excavated in six-inch arbitrary levels. This phase of work resulted in a better understanding of the site's stratigraphy. Based on the results of this work, Coe (1964:60) concluded that "any further excavation by arbitrary levels and in single isolated units was a waste of time and a destruction of potential data."

Consequently, subsequent excavations in 1958 were conducted by natural zones and more attention was given to separating intrusions. This resulted in a clearer definition of the early stratigraphic sequence represented by the Kirk, Palmer, and Hardaway components. A final phase of work at the Hardaway site, conducted by the Research Laboratories of Anthropology between 1975 and 1979, was largely limited to mitigating the damage suffered by the site due to pothunting (H. Trawick Ward, personal communication).

In addition to these investigations, a study of unifacial stone tool variability was recently performed on a portion of the Hardaway collection (Hall 1983). Hall's study, which examined 502 unifaces from the 1955–57 excavations, dealt primarily with tool function. Portions of her research relevant to this analysis are discussed below.

THE HARDAWAY SEQUENCE

As noted by Smith (1986), the excavation of an undisturbed Early Holocene stratigraphic sequence in the Southeast was first accomplished at the Hardaway site. Although no radiocarbon dates were obtained from Hardaway, Coe (1964:120) originally suggested that the Hardaway and Palmer complexes occurred prior to 7000 B.C. This age assessment was based on available radiocarbon dates from Kirk assemblages elsewhere in the East. More recently, Coe (personal communication) has commented that the Hardaway zone is equivalent in time to the Clovis occupations of the East.

Several additional radiocarbon dates have become available since Coe's excavations and dates for Kirk occupations in the East are now fairly well established (e.g., Broyles 1971; Chapman 1976, 1977). Chapman's work in the lower Little Tennessee River Valley dated a Kirk Corner Notched Cluster of projectile point types which is comparable to the Kirk Corner Notched and Palmer point types from Hardaway (Chapman 1985). The Kirk Corner

Notched Cluster is divided into Upper Kirk (7400–6800 B.C.) and Lower Kirk (8000–7300 B.C.) types. This evidence indicates that the Hardaway complex dates prior to 8000 B.C. By comparing radiocarbon-dated Paleo-Indian and notched Early Archaic assemblages in the East, Goodyear (1982a) has made a well-supported argument for dating Dalton and related projectile points (e.g., Hardaway-Dalton) between 8500–7900 B.C.

Four stratigraphic zones were identified by Coe at the Hardaway site. Zone I is a plow zone that ranges from eight to ten inches below surface and contains Middle Archaic, Late Archaic, Woodland, and Historic period artifacts. Zone II is a thick black-to-dark-brown midden that varies in depth from 1.0 to 1.5 feet below surface. It is associated with the Kirk component. A thin layer of humus, which is divided into two zones, underlies the midden. The upper zone—Zone III—is five-to-six inches thick and contains the Palmer component. Zone IV, the bottom part of the humus that overlies the clay, is only two-to-three inches thick and is associated with the Hardaway component. Moreover, the underlying residual clay also contains some cultural material (Coe 1964:57–59).

As stated earlier, excavations at Hardaway (prior to 1958) did not follow the natural stratigraphy. Thus, the unifacial tool tabulations originally presented by Coe (1964:73) are from arbitrary excavation levels which only roughly correlate with the natural zones. The present analysis, by utilizing collections from the 1958 excavations, provides an opportunity to examine uniface assemblage composition by zone.

Because the specimen catalog from the 1958 excavations lists artifacts recovered from five zones instead of the four zones previously described, a clarification of zone association was needed in order to obtain component associations comparable to the sequence described above. After a careful examination of profile drawings and field notes, it was determined that the Kirk midden was excavated as two separate zones (Zones II and III) in 1958. Consequently, the Zone II (Kirk) midden described by Coe (1964) correlates with Zones II and III discussed here. Likewise, the Palmer-associated Zone III and Hardaway-associated Zone IV described above are Zones IV and V, respectively.

CONCEPTUAL FRAMEWORK: AN ETHNOARCHAEOLOGICAL MODEL OF TECHNOLOGICAL ORGANIZATION

Much of Lewis Binford's ethnoarchaeological work has been concerned with the idea that technologies, like cultural systems, are internally differentiated with respect to the design, manufacture, use, maintenance, and discard of tools in response to their intended role in the technology (Binford 1977, 1979, 1984). Binford (1979:261) has defined technological organization in terms of how groups view their gear "with regard to the planned execution of their adaptive strategies." The concept of technological organization has important implications for stone tool analysis. Of particular importance is the idea that

> The distribution, association between, and relative frequencies of tools are greatly affected by the character of the technological organisation. No simple equation between tool and task, or frequency and popularity is possible. Before one can make meaningful statements as to the significance of patterns of observed variability in the archaeological record, one must consider the causal determinants of the patterning. Processes vary as organisations vary, forms of patterning vary as processes vary. Organisational variability is one of the major characteristics of cultural variation in general (Binford 1977:36).

Binford's search for these causal determinants has been discussed primarily with reference to his ethnoarchaeological research with the Nunamiut Eskimo and the Alayara aborigines of Australia. Much of the discussion here will rely on his work with the Nunamiut. The Nunamiut organize their gear into three basic classes: personal gear, site furniture, and situational gear.

Personal gear includes that part of the Nunamiut technology carried by each individual in anticipation of future conditions or activities. When an expedition away from the village is planned, personal gear is organized to anticipate the goals of the expedition, the need for food and warmth, and any possible misfortunes or mishaps. A list of such gear for the men includes: bone cutters for slotting antler or bone, crooked knives, radial or discoidal cores, ice chisels, axes, flints for fires, men's cutting boards, a bow and arrow quiver, a bow case, extra sinew for sewing and making animal snares, needles, extra skin patches, pressure flakers, flake knives, and large flakes for butchering (Binford 1979:262–263).

Items regarded as personal gear may vary, depending upon the purpose of the trip and the season. Nunamiut personal gear is heavily curated. Implements are recycled, reused, and many maintenance expenditures are made on them (Binford 1977:33–34). Such gear is always inspected before going into the field and is either repaired or replaced when necessary. Consequently, Binford has asserted that the discarding of personal gear is related to its use-life and that worn out items are generally discarded in a residential camp, not in the field where the activity took place.

The second category, site furniture, is considered part of the site and is generally available for use by any inhabitants of the site. The items in this category exhibit limited evidence of use and usually are cached at the site. The most common examples are hearth-stones, anvils, tent weights, support sticks, worn wooden meat dishes and old cooking buckets, and lithic raw material (Binford 1979:264). One common characteristic of these items is that many are laterally recycled (i.e., previously used in a different context). For example, worn out items such as pots may be removed from a household context at a residential site to be used as site furniture at a hunting stand.

The final category consists of situational gear put together to carry out specific and frequently unanticipated activities. Situational gear is expedient in nature (as opposed to curated) and usually is limited by the available raw material (Binford 1977). Raw material may come from caches, personal gear modified for reuse, material resources from the immediate environment, or material scavenged from previous occupations. Expedient tools are manufactured with "a full knowledge of tool needs and replacement potential which is characteristic of the situation" (Binford 1979:268).

Binford also has suggested that functionally similar tools may display different designs and reduction strategies, depending upon their intended technological roles. This refers to "tools of very different design being used for identical tasks; but this is not to say that they are functionally isomorphic, since they are clearly designed for very different *intended roles* within the technology" (Binford 1979:269, emphasis in original).

Thus, long versus short term usage may have significant influence upon tool design. Personal gear may exhibit more design features related to hafting, whereas situational items used for similar functions may exhibit minimal and perhaps technically different hafting modifications. The design characteristics of situational gear, intended for short term usage, may be specific or limited. Generally, there is only a small investment in the manufacture of situational gear. "Edges are used if appropriate, minimal investment is made in modifications, and replacement rates are very high if material is readily available" (Binford 1979:267).

Basic tool classification in the following lithic analysis is structured around the above discussion. Although the technology of modern-day Eskimo may not be a proper analog for that of the prehistoric inhabitants of the Hardaway site, the organizing principles of Binford's scheme should be applicable to any technology. Because all hunter-gatherers must organize their technology in order to anticipate future conditions in their subsistence-settlement strategies, Binford's model can be used as a heuristic device to provide insights into the behavior of early man.

TECHNOLOGICAL ORGANIZATION AND SETTLEMENT ADAPTATION: AN ARCHAEOLOGICAL HYPOTHESIS

In order to determine how and why human societies created technologies to solve their various adaptive problems, it is necessary to understand the organizing principles that underlie those technologies. Research questions concerning the organization of technologies can be studied effectively through technological analysis.

> Within the discipline, most lithic analysts have pursued thus far two basic lines of inquiry. One is the technological approach, often with replication, where the techniques related to the manufacture of a chipped stone tool are reconstructed (e.g., Crabtree 1966). The other approach concerns establishing the uses of stone tools through use-wear analysis (e.g., Hayden 1980). Both of these avenues of research are necessary but not sufficient in themselves to allow an understanding of how and why prehistoric adaptations took place. The study of why certain tool designs were created and how these designs were implemented and manipulated within the total settlement system refers to the organization of the technology (Goodyear 1982b:25–26).

This third approach—the investigation of the role of the lithic assemblage in the overall adaptation—has seen limited but important use in the analysis of some early Southeastern sites (e.g., Anderson and Schuldenrein 1983; Claggett and Cable 1982; Daniel and Wisenbaker 1987) as well as in general cultural studies (Goodyear 1979; Goodyear et al. 1983). Goodyear (1979), for example, has postulated that Paleo-Indian groups used high-quality cryptocrystalline material to create portable and flexible technologies to offset geographical incongruities between resources and consumers. Although proposed as a general hypothesis, he claims that this statement is particularly applicable to the North American Paleo-Indian tradition. Certain technological adaptations are required in a highly mobile lifeway, and by viewing the Paleo-Indian stone tool assemblage from this perspective a better understanding of prehistoric adaptations can be obtained.

Goodyear has argued that evidence for the high mobility of Paleo-Indian groups can be seen in the geographic distribution of exotic or non-local raw material used in the manufacture of stone tools. This phenomenon represents embedded strategies of raw material procurement. As groups move seasonally to different locales, they gather lithic raw material indigenous to that region. Only in emergencies were special trips made to get raw material. In other words,

> the presence of exotic cherts may be a fair measure of the mobility scale of the adaptation appearing as a consequence of the normal functioning of the system, with no extra effort expended in their procurement (Binford 1979:261).

Based on this type of argument, Goodyear has claimed that most of the exotic lithic remains in Paleo-Indian sites in the Eastern United States are the result of mobility.

Given high mobility, the procurement of needed resources can sometimes present problems. Because lithic raw materials and biotic resources do not occur evenly over the landscape, spatial or temporal incongruences will occur between the natural locations of raw material for stone tools and the places where such tools would be used for extracting and processing biotic resources. This logistical problem is solved by the creation of a portable technology.

The second major problem of a highly mobile lifeway is the need to adapt to the different events that can arise on a daily basis. This problem, which Goodyear refers to as "situational contingencies," is best handled by flexibility.

> Another major constraint as well as source of variation in the situational response is the condition of the chipped stone tool kit from pose to pose. If the problem of geographic incongruencies can be solved through portable technologies, the problem of situational contingencies can be alleviated through flexible technologies. Flexibility means creating tools with lifespans long enough to be used on a number of occasions if necessary. With chipped stone tools this means designing tools which can be continuously and reliably rejuvenated. Flexibility also means the capability for redesigning tools as other tools and otherwise re-casting the raw material of the tool kit into wholly new tools or cores for the derivation of tools if necessary. If we place such requirements for flexibility as just defined within the additional and prior stricture of portability, I believe the form and variable condition of North American Paleo-Indian technologies become potentially more understandable (Goodyear 1979:4).

The use of high-quality cryptocrystalline stone helps solve these adaptive problems because of the ease and precision with which it can be worked. Reliable flaking qualities allow tools to be fashioned for extended life spans and to be efficiently and reliably maintained. Furthermore, such material can be transformed from one tool form to another as the need arises.

To summarize Goodyear's hypothesis, the use of high-quality lithic raw material is an adaptative strategy for making both portable and flexible tools that are necessary in a lifestyle characterized by high mobility.

ANALYSIS AND RESULTS

The analysis was performed on unifacial stone tools recovered from 12 adjacent 5x5-ft excavation units at the Hardaway site. These units were chosen arbitrarily from the 1958 excavations (see Appendix A). A total of 382 specimens from both feature and zone contexts was examined; however, only the results of the zone analysis, involving 306 specimens, are reported here. Basically, the analysis consisted of measuring a series of attributes on typed unifaces following Coe's (1964) typology. Attribute definitions are provided in Appendix B. Although all of these attributes were used in the analysis, the results of the measurements of striking platform width and thickness, amount of cortex, and type of retouch are not discussed here.

End Scrapers (Type I)

Coe (1964:76) described three types of end scrapers from the Hardaway site. Type I end scrapers are similar to those usually associated with the Paleo-Indian and Early Archaic periods in the Eastern United States (Figure 2). They were made on a triangular or trapezoidal prismatic flake, many of which retain their bulb of percussion. Two sub-types were also defined. End scrapers of the first sub-type exhibit retouch along the lateral and distal edges but not across the dorsal surface. The second sub-type is similar to the first except that these end scrapers were flaked across the dorsal surface, giving "the whole upper surface a smooth rounded contour" (Coe 1964:75). Modifications of these tools included notching of the lateral edges for hafting and the creation of graver spurs at one or both ends of the distal edge.

Small end scrapers from early assemblages traditionally have been interpreted as being hafted (see Wilmsen 1970) and those from the Hardaway site also appear to fit this description. The presence of retouched and tapered lateral edges, the occurrence of "hafting" notches on some specimens, relatively small tool size, and regularized form all qualify as characteristics of hafted tools (see Keeley 1982). As such, these end scrapers probably were curated items as well. Although present throughout the Hardaway sequence, Coe (1964:73) noted that Type I end scrapers were associated primarily with the Palmer component but also occurred within the earlier Hardaway zone. Their presence in the Kirk stratum was largely discounted due to disturbance (Coe 1964:83).

Twenty-three Type I end scrapers were present in the analyzed sample (Tables 1 and 2). Given this small number, no primary association with any component could be determined. Moreover, a plot of tool length versus width by zone (Figure 3) fails to indicate any stratigraphic trends. Mean lengths, widths, and thicknesses for Type I end scrapers, calculated for each zone, also indicate little tool size difference among the three cultural components (Table 1). The similarity of mean tool thicknesses, one tool attribute which is largely unaffected by marginal retouching, suggests that most of these end scrapers were manufactured from morphologically similar blanks. Also, mean tool lengths for each zone are virtually identical despite length loss due to cumulative use and resharpening. This similarity indicates that these tools were discarded at the same point in their use-life. Discard may have been a function of hafting with the haft acting as a boundary

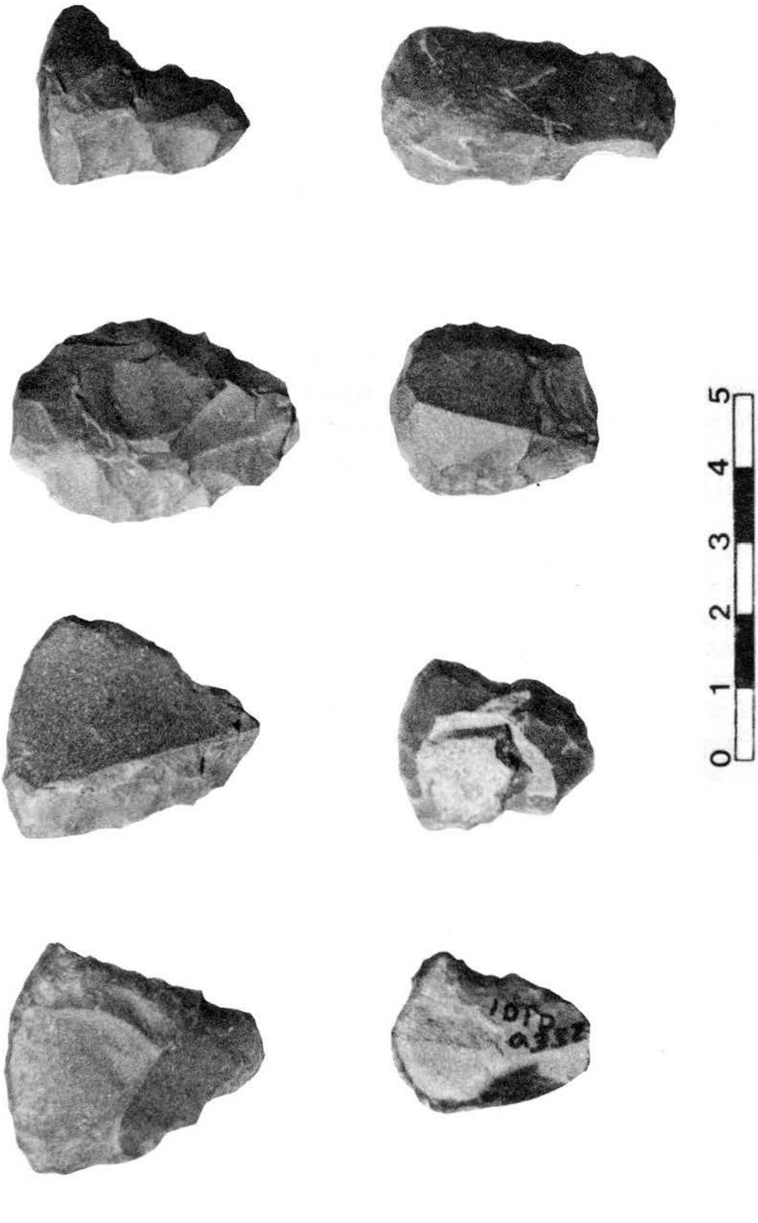

Figure 2.

Type I End Scrapers.

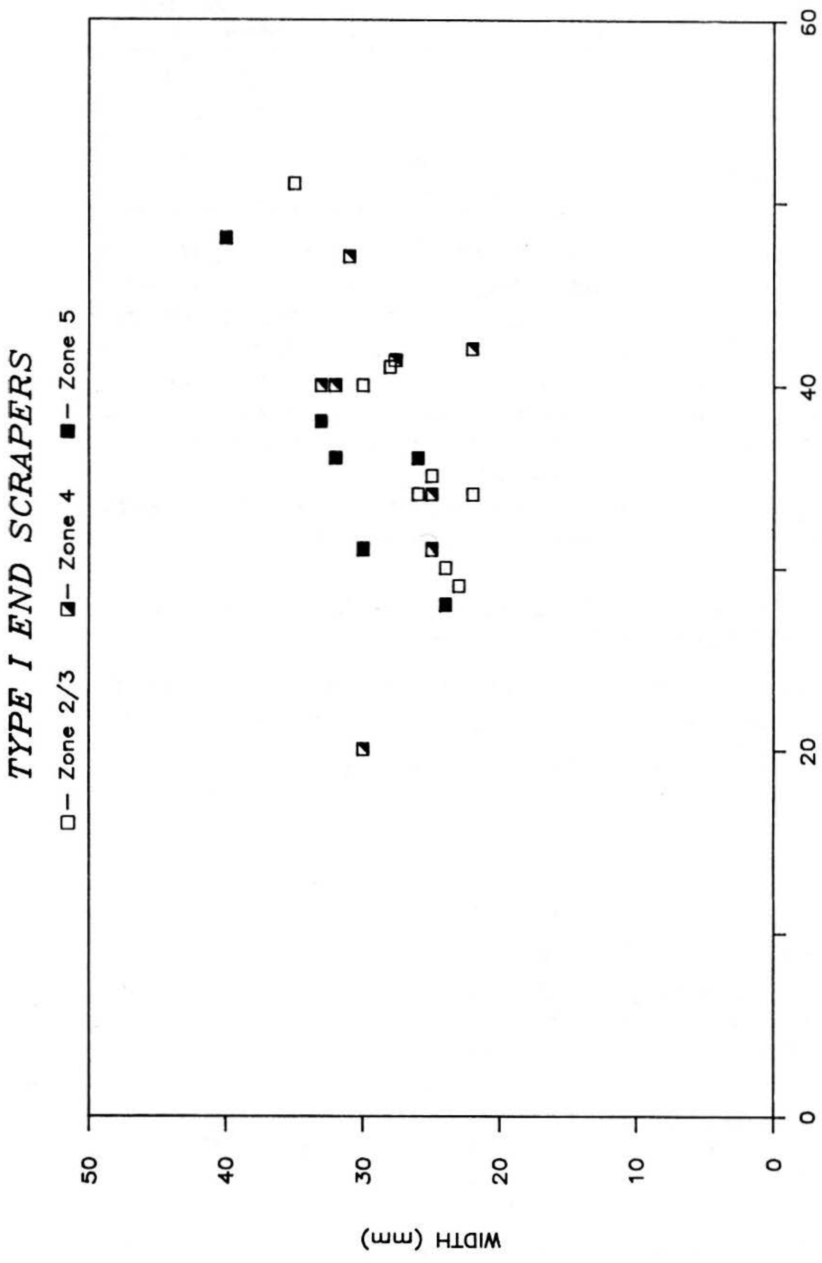

Figure 3. Length-Width Distribution by Zone for Type I End Scrapers.

Table 1. Summary measurements for Type I End Scrapers.

	Length			Width			Thickness		
Context	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**
Zone II	37.1	7.6	7	26.9	4.3	8	8.6	2.8	8
Zone III	32.0	—	1	26.0	—	1	9.0	—	1
Zone IV	37.8	8.4	8	28.2	3.9	8	8.2	2.7	8
Zone V	36.3	6.3	7	30.8	5.7	6	6.6	0.8	7
Total	36.6	7.0	23	28.3	4.5	23	7.9	2.4	24

against further resharpening (see Keeley 1982:807). Assuming that this assessment is correct, the maximum length measured on an archaeological specimen reflects the minimum usable length of the tool in the systemic context. It is interesting to note that Hall's (1983:42) end scraper sample had the same mean length (37 mm). Mean end scraper widths are also similar between zones in the present study, and probably reflect constraints of both hafting and resharpening. Spurs are present on seven (29%) of the specimens, whereas hafting notches are present on eight (33%) (Table 2). Although both lateral edges on most specimens were retouched, some were retouched only along one lateral edge (Table 2).

Table 2. Summary of retouch characteristics and edge angles for Type I End Scrapers (N=No. of specimens).

	Retouch Location		Edge Angle		No. of Spurs		No. of Notches	
Context	**Edge(s)**	**N**	**degrees**	**N**	**No.**	**N**	**No.**	**N**
Zone II	Bilateral/Distal	4	60	1	1	2	3	2
	Lateral/Distal	2	65	1				
	Distal	1	70	2				
	Indeterminate	1	80	2				
			85	1				
Zone III	Other	1	50	1	1	1	—	—
Zone IV	Bilateral/Distal	5	60	1	2	1	1	2
	Lateral/Distal	2	70	2	2	1	1	1
	Distal	1	75	3				
			80	2				
Zone V	Bilateral/Distal	5	55	1	2	1	2	2
	Lateral/Distal	1	60	1	1	2	1	1
	Distal	1	65	4				
			70	1				
Total	Bilateral/Distal	14	69.1	(Mean)	4	1	6	2
	Lateral/Distal	5	8.9	(s.d.)	3	2	2	1
	Distal	3						

Edge angles of Type I end scrapers are generally greater than 60 degrees with a mean of 69 degrees (Table 2). This is virtually identical to Hall's (1983:42) primary edge angle of 70 degrees. Such a steep angle may reflect in part the point of exhaustion of the tool and thus explain its discard. Wilmsen (1970:70–73) has proposed a bone and woodworking function for these steep-edged end scrapers. The presence of a graver spur is consistent with the idea of use on hard materials (e.g., slotting bone or wood). Coe (1964:76), noting a distinct rounding on the working edge of many of the Hardaway specimens, proposed a hide-working function. A cursory examination of tool edges on the analyzed specimens revealed similar distinct edge rounding on many tools. Edge rounding has long been noted as a characteristic of use on softer materials such as hide (e.g., Hayden 1980). It appears likely that some of these hafted end scrapers served multiple functions (see Hall 1983:43; Wilmsen 1970:73), a view which is also consistent with the idea of a portable tool with flexible uses.

End Scrapers (Type II)

Type II end scapers were defined by Coe (1964:76) as being made on "flakes of random shapes and sizes" with retouch primarily restricted to the distal end (Figure 4). Two sub-types were also distinguished. Most were made on a "large, thick, irregular flake that was rather casually shaped at one end." Some were made from a "thin, narrow, prismatic flake" (Coe 1964:76). Although Coe did not note the presence of hafting notches or graver spurs on Type II end scrapers, Hall (1983:45) observed spurs on 25% of her sample of the large thick variety and 35% of the thin narrow variety. No hafting notches were noted by Hall. These end scrapers occurred throughout all levels at the Hardaway site but were associated mainly with the plow zone and Level II (Kirk component) (Coe 1964:76, 83).

Fifty-eight Type II end scrapers were present in the analyzed sample (Tables 3 and 4). A comparison of their length versus width distribution by zone is given in Figure 5. As in the case of Type I end scrapers, no stratigraphic trend in tool size is recognizable for these end scrapers. Overall, Type II end scrapers tend to be approximately 50% longer and wider than Type I end scrapers and about twice as thick. Tool length tends to vary more than tool width (see Figure 5 and Table 3). These observations are not entirely consistent with Coe's statement that this type of end scraper was made on a flake of "random size."

The relative lack of variability in tool width may reflect hafting restrictions, but in this case, hafting may not imply curation. As noted earlier, Binford has stated that situational gear may have minimal and technically different hafting characteristics. Furthermore, Keeley (1982:798–799) has noted that hafting does not necessarily require curation. Curated tools are items that are transported between sites in anticipation of future use. This results in the tool being spatially removed (and lost or discarded) from

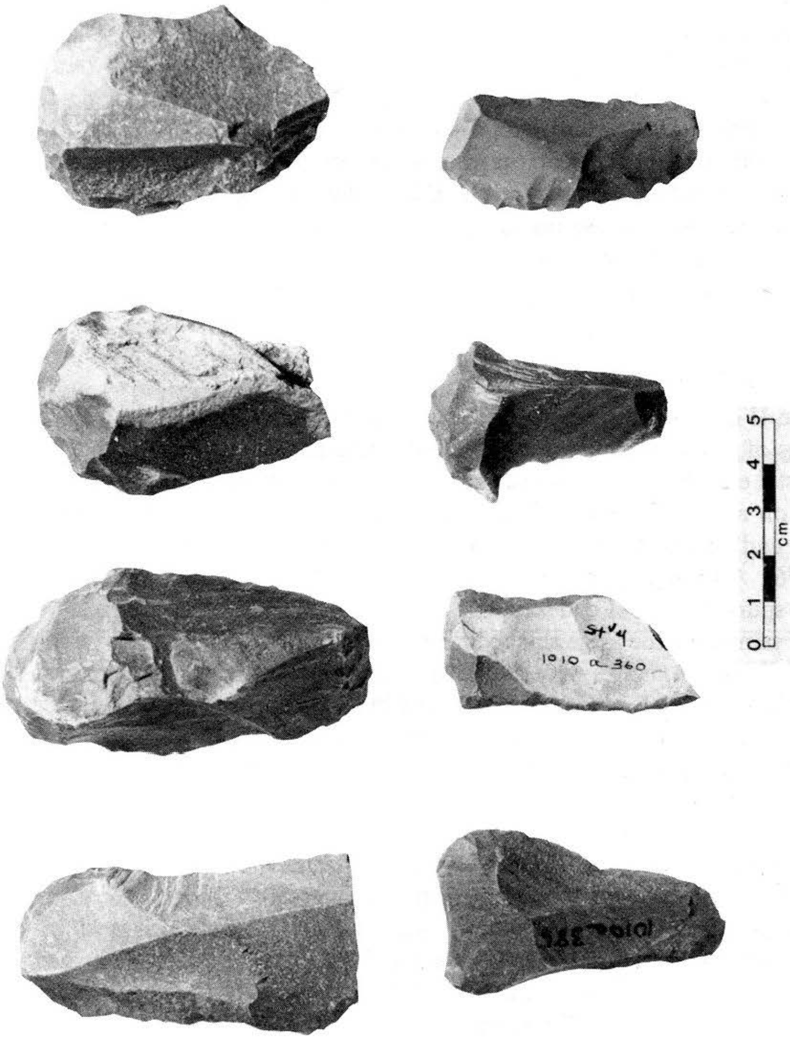

Figure 4.

Type II End Scrapers.

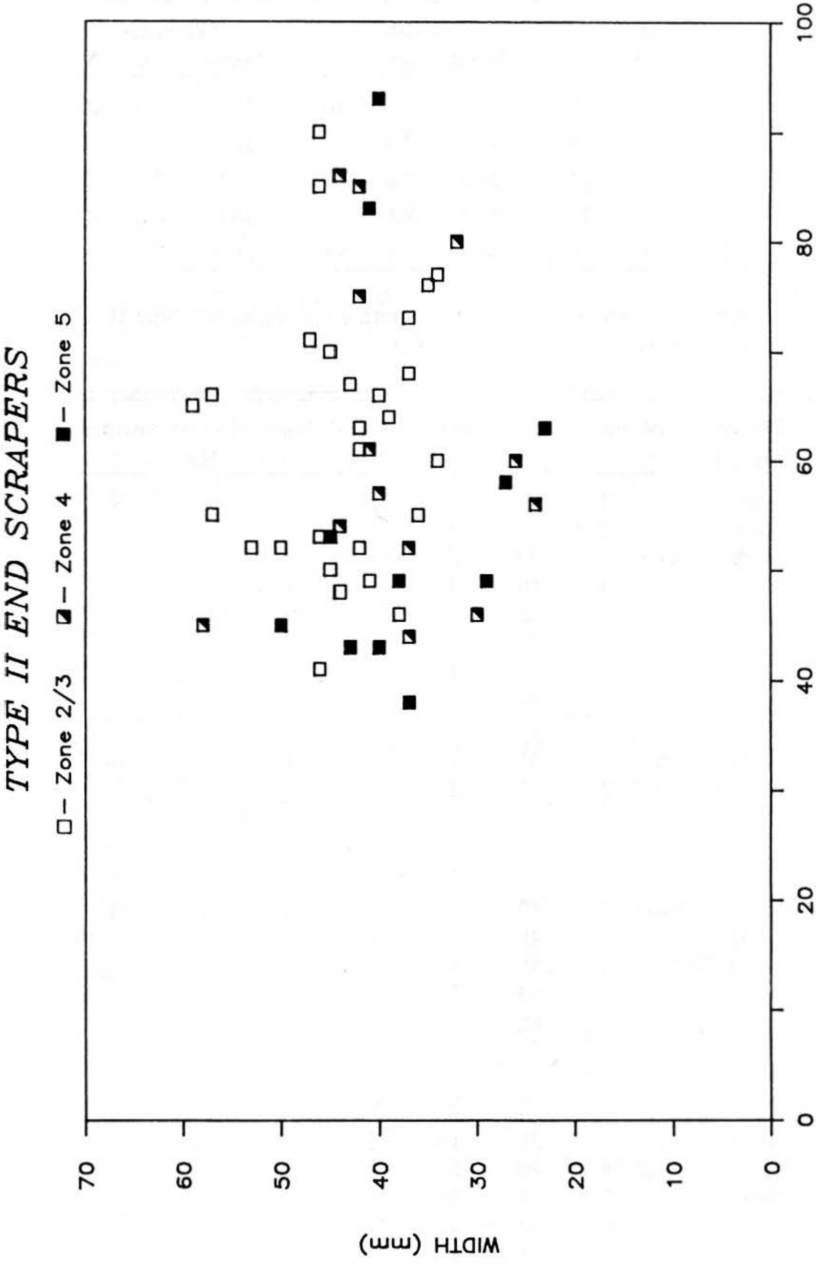

Figure 5.

Length-Width Distribution by Zone for Type II End Scrapers.

Table 3. Summary measurements for Type II End Scrapers.

Context	Length			Width			Thickness		
	Mean	s.d.	N	Mean	s.d.	N	Mean	s.d.	N
Zone II	60.4	11.4	22	43.1	6.4	26	15.3	6.5	26
Zone III	68.8	12.3	6	45.0	7.9	6	20.5	10.2	6
Zone IV	61.6	15.0	13	38.8	9.0	15	15.5	7.7	15
Zone V	56.1	17.4	11	37.5	8.1	11	10.1	4.8	11
Total	60.7	13.9	52	41.1	7.9	58	14.9	7.3	58

Table 4. Summary of retouch characteristics and edge angles for Type II End Scrapers (N=No. of specimens).

Context	Retouch Location		Edge Angle		No. of Spurs		No. of Notches	
	Edge(s)	N	degrees	N	No.	N	No.	N
Zone II	Distal	12	30	2	2	1	—	—
	Lateral	8	45	1				
	Bilateral/Distal	5	50	2				
	Other	1	60	7				
			65	6				
			70	3				
			75	1				
			80	1				
			85	3				
Zone III	Lateral/Distal	3	45	1	1	1	—	—
	Bilateral/Distal	2	50	2				
	Distal	1	65	1				
			75	1				
			80	1				
Zone IV	Bilateral/Distal	6	40	1	1	2	1	1
	Distal	5	45	3				
	Lateral/Distal	4	55	1				
			60	3				
			65	1				
			70	1				
			75	3				
			80	2				
Zone V	Lateral/Distal	6	25	1	1	1	—	—
	Bilateral/Distal	4	40	2				
	Distal	1	55	2				
			60	4				
			75	1				
			90	1				
Total	Lateral/Distal	21	61.4	(Mean)	4	1	—	—
	Distal	19	14.8	(s.d.)				
	Bilateral/Distal	17						

the location of its manufacture. Some hafted tools, however, may never leave their location of manufacture. According to Keeley (1982:799),

> hafted tools may often have "life histories" which take place within a single area of a site. At sites that had long occupation spans, many of the hafted tools recovered may never have left the site. Further, hafted tools that are particularly prone to breakage or rapid wear, or otherwise have brief use-lives, are unlikely to be curated.

Consequently, Type II end scrapers may have been hafted for use in more robust activities like rough scraping.

Conversely, the larger size of the Type II end scrapers may simply be a product of their being used as hand-held tools (cf. Gould 1980:127–129). In fact, they may represent a larger, hand-held version of the small Type I end scrapers. In either case, this end scraper type is interpreted as an expedient tool.

The relatively steep edge angles (ca. 60 degrees) of Type II end scrapers may partially reflect exhaustion but are also consistent with Coe's (1964:81) assignment of a wood and bone function (also see Wilmsen 1970:71). Moreover, the relatively high degree of angle variability (Range=25–90 degrees) suggests that relying too heavily on the mean angle masks potentially significant edge angle variability that could indicate a variety of tool uses. This variability is also suggestive of situational tool production and use.

End Scrapers (Type III)

Coe (1964:76) described the Type III end scraper as a "large and rough duplication of the more finely made type I variety." They were roughly chipped into an oval shape with the working edge across the broad end. Implicit in Coe's description is the fact that these tools are roughly the size of the thick variety of Type II end scraper but display more of the retouch seen on Type I end scrapers.

Only six tools of this type were described by Coe (1964:76) and only one was observed in the present analysis (Tables 5 and 6). This scarcity may be due in part to the fact that this type is perhaps better viewed as a large, thick variety of a Type II end scraper which happens to display more dorsal surface and marginal edge retouch. As such, it may simply represent a tool blank that needed more modification to fit hafting or hand-held requirements.

Partial support for combining Type II and Type III categories can be seen in Hall's data. Although Hall (1983:46–48) described 23 Type II as opposed to 22 Type III end scrapers, comparisons of mean length, width, and thickness reveal very little, if any, significant differences. Therefore, as far as the present analysis is concerned, Type III end scrapers are viewed as an expedient tool in the same manner as Type II end scrapers.

Table 5. Summary measurements for Type III End Scrapers.

	Length			Width			Thickness		
Context	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**
Zone II	58.0	—	1	41.0	—	1	21.0	—	1
Zone III	—	—	0	—	—	0	—	—	0
Zone IV	—	—	0	—	—	0	—	—	0
Zone V	—	—	0	—	—	0	—	—	0
Total	58.0	—	1	41.0	—	1	21.0	—	1

Table 6. Summary of retouch characteristics and edge angles for Type III End Scrapers (N=No. of specimens).

	Retouch Location		Edge Angle		No. of Spurs		No. of Notches	
Context	**Edge(s)**	**N**	**degrees**	**N**	**No.**	**N**	**No.**	**N**
Zone II	Lateral/Distal	1	65	1	—	—	—	—
Zone III	—	—	—	—	—	—	—	—
Zone IV	—	—	—	—	—	—	—	—
Zone V	—	—	—	—	—	—	—	—
Total	Lateral/Distal	1	65	1	—	—	—	—

Side Scrapers

As with end scrapers, Coe defined three types of side scrapers. Type I side scrapers were made on large wedge-shaped flakes and have a "rounded or crescent shaped working edge" with "either one or both ends... rounded and curved back" (Coe 1964:77) (Figure 6). Most of these tools still retain evidence of a striking platform and bulb of percussion. Type II side scrapers were made on "large irregular flake[s]" and possess a retouched edge that displays "no attempt to shape the working edge into any other form than what existed" (Coe 1964:79) (Figure 7). Some specimens also display more than one retouched edge. For Coe (personal communication), the primary difference between Type I and Type II side scrapers is that the retouched edge of Type I tends to be more rounded or curved back than Type II. He also believes that this is more a difference of degree than kind. The final side scraper form, Type III, is distinguished from the previous two types by being manufactured on a relatively thin, narrow flake (Figure 8).

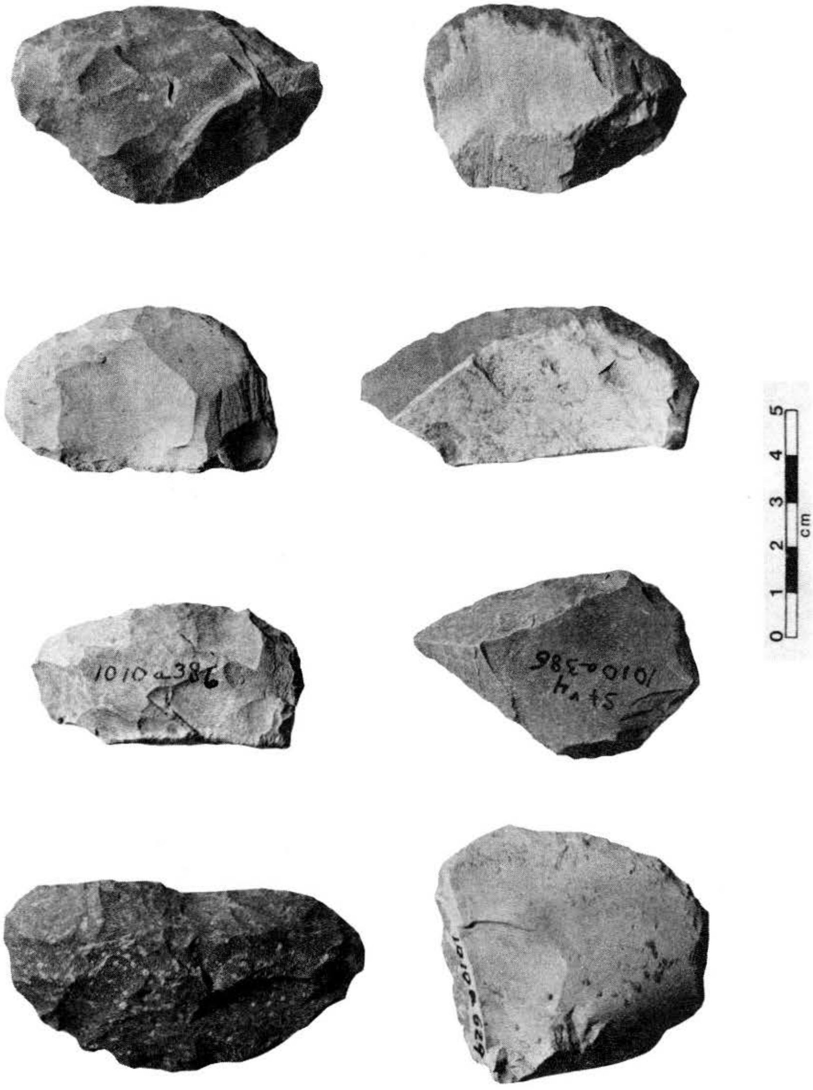

Figure 6.

Type I Side Scrapers.

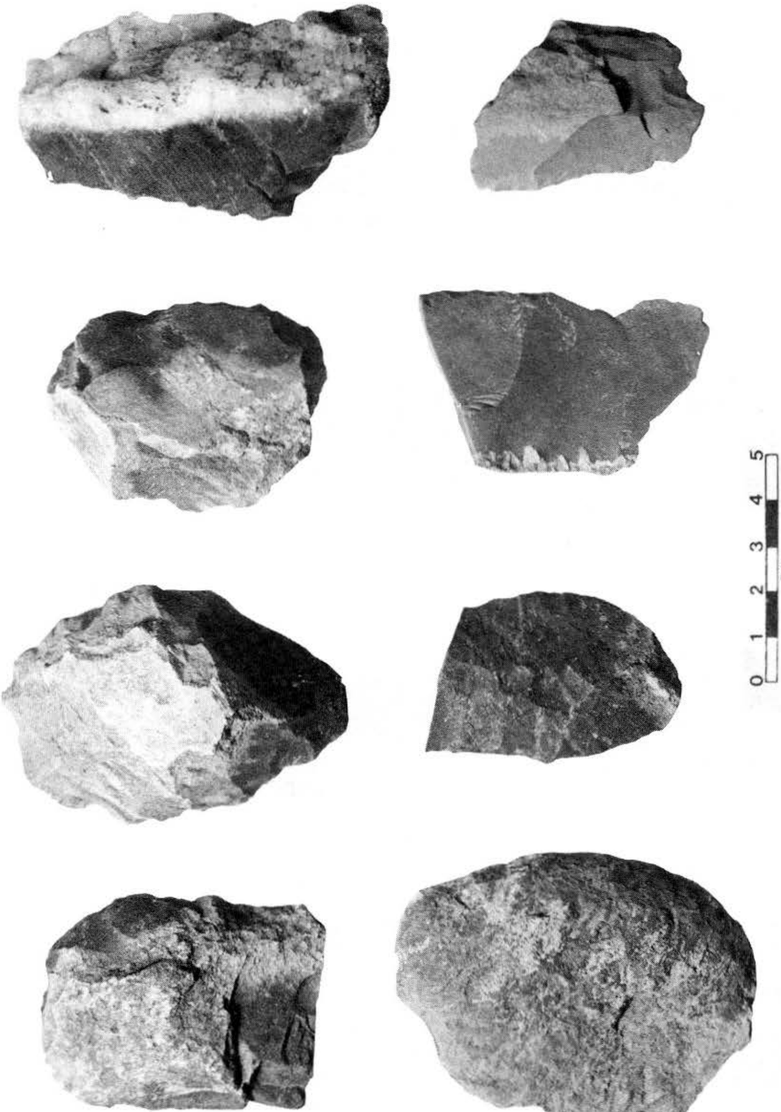

Figure 7.

Type II Side Scrapers.

Figure 8.
Type III Side Scrapers.

These three types were present in all excavation levels examined by Coe (1964:73); however, he noted that Type I and Type II scrapers were associated particularly with the Hardaway and Palmer components. A shift toward the use of Type II and Type III side scrapers during the Kirk period also was recognized (Coe 1964:81–83).

Comparisons of length versus width for Type I and Type II side scrapers by zone are shown in Figures 9 and 10. Mean lengths, widths, thicknesses, and other attribute summaries are given in Tables 7–10. As with end scrapers, no particular association by zone can be seen. Rather, similarity and overlap characterize the distribution of Type I and Type II lengths and widths, and mean thicknesses are within one millimeter of each other (Tables 7 and 9).

These results strongly suggest that there is no significant morphological difference between Type I and Type II side scrapers. Furthermore, these results indicate that tool length and width vary independently, suggesting that a relatively large flake was being chosen as a blank form and that retouch was not intended to modify the flake to any particular size. As Coe (1964:79) observed for Type II side scrapers, "these large flakes were simply picked up, sharpened, and used." Taken together, these results suggest that both Type I and II side scrapers were tools of expedient manufacture and use.

Edge retouch for both types occurred predominately along a single lateral edge and to a lesser extent along lateral-distal or bilateral edges (Tables 8 and 10). In addition to the unifacially retouched edges, some of these side scrapers also displayed deliberate attempts at bifacially retouching one edge of the tool. No mention of this characteristic was made by either Coe or Hall. Although the exact nature of this trait awaits further study, a tentative explanation can be presented here. If these were predominately expedient tools, then they may represent *ad hoc* modifications that arose out of situational needs not satisfied by unifacial edges.

The data in Tables 11 and 12 (illustrated in Figure 11) indicate a much different length-width distribution for Type III side scrapers than for Type I and Type II scrapers. Specifically, it appears that the lengths of Type III side scrapers vary significantly more than their widths. This variability is implicit in Coe's definition of Type III side scrapers as being made on thin, narrow flakes. Figure 11 also suggests that this type of scraper was made on a blade-like flake.

The consistency in tool width for Type III side scrapers is interesting since the lateral (i.e., retouched) edges were also the working edges of the tool. Apparently the lateral edges were retouched until a certain minimum width was attained, at which point the tool was discarded. If this is the case, it was not the number of retouched edges but the width to which the tool was reduced that was the significant factor in determining its use-life. This presumably was related to either hafting or grasping requirements.

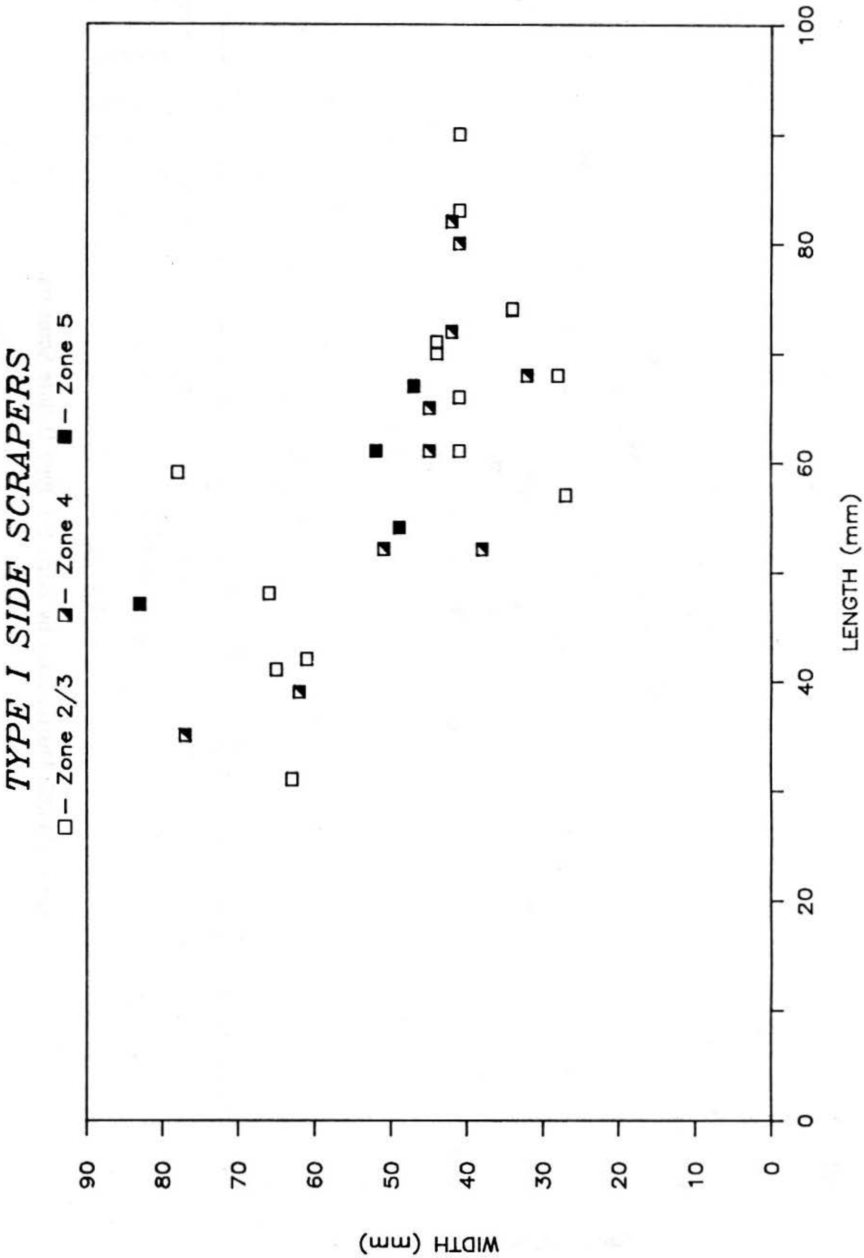

Figure 9.

Length-Width Distribution by Zone for Type I Side Scrapers.

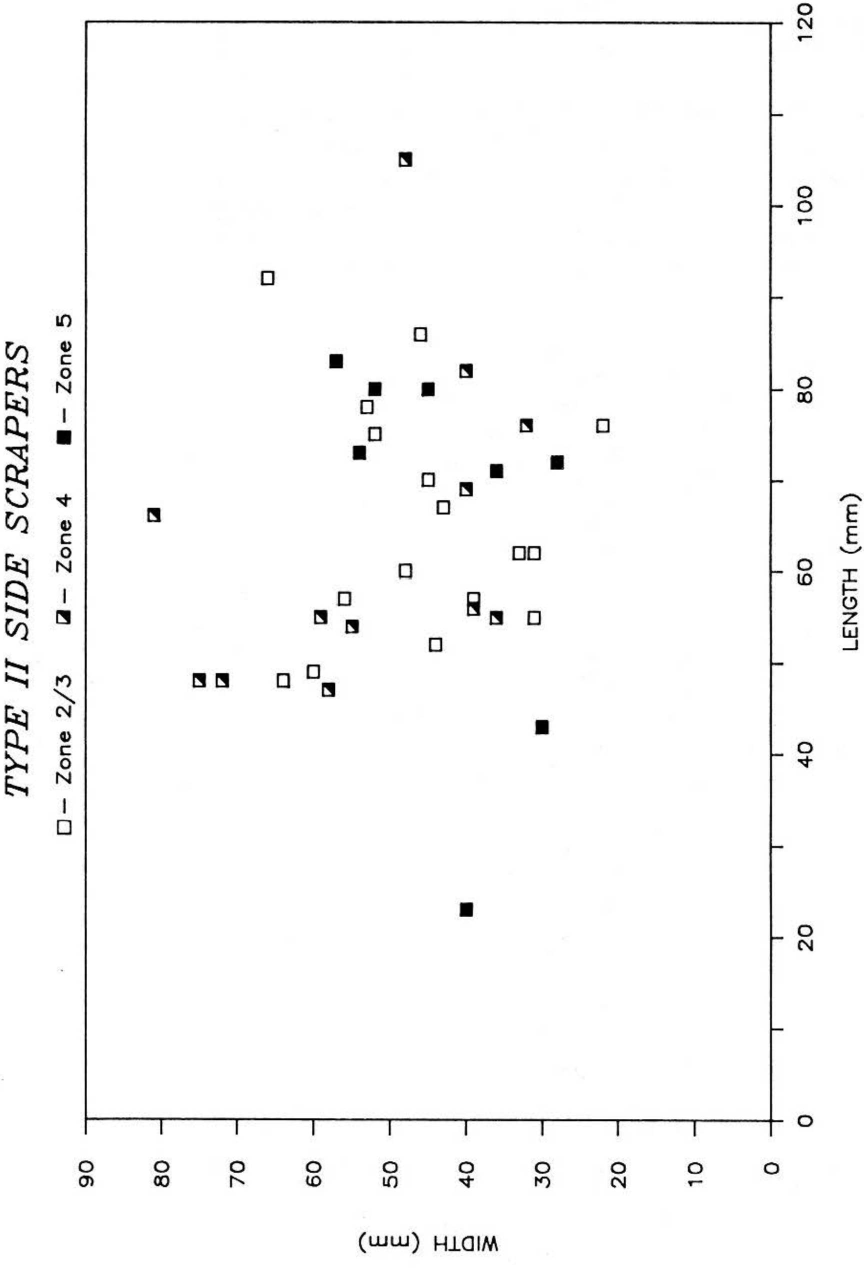

Figure 10.

Length-Width Distribution by Zone for Type II Side Scrapers.

Table 7. Summary measurements for Type I Side Scrapers.

Context	Length Mean	Length s.d.	Length N	Width Mean	Width s.d.	Width N	Thickness Mean	Thickness s.d.	Thickness N
Zone II	56.7	13.9	4	53.0	12.3	4	13.2	4.8	4
Zone III	62.7	20.3	8	51.2	18.9	8	15.5	5.2	9
Zone IV	60.6	16.0	10	47.5	13.1	10	12.7	4.7	10
Zone V	62.5	14.1	9	46.7	13.5	10	10.8	10.8	7
Total	61.4	15.6	29	49.8	14.8	29	13.5	4.7	30

Table 8. Summary of retouch characteristics and edge angles for Type I Side Scrapers (N=No. of specimens).

Context	Retouch Location Edge(s)	N	Edge Angle degrees	N	No. of Spurs No.	N	No. of Notches No.	N
Zone II	Lateral	1	60	2	—	—	—	—
	Bilateral	1	65	1				
	Bilateral/Distal	1	70	1				
	Lateral/Distal	1						
Zone III	Lateral	4	45	1	—	—	—	—
	Lateral/Distal	3	50	2				
	Bilateral	1	55	2				
	Distal	1	60	1				
			65	1				
			75	2				
Zone IV	Lateral	4	45	1	—	—	—	—
	Lateral/Distal	4	50	3				
	Bilateral	1	55	3				
	Distal	1	65	3				
Zone V	Lateral	4	40	1	—	—	—	—
	Lateral/Distal	2	45	1				
	Bilateral	1	50	2				
			55	2				
			65	1				
Total	Lateral	13	56.6	(Mean)	—	—	—	—
	Lateral/Distal	10	8.9	(s.d.)				
	Bilateral	4						
	Distal	2						
	Bilateral/Distal	1						

Table 9. Summary measurements for Type II Side Scrapers.

	Length			Width			Thickness		
Context	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**
Zone II	62.5	14.1	9	46.7	13.5	10	15.5	4.9	10
Zone III	67.9	11.2	8	44.0	10.8	7	13.4	5.8	8
Zone IV	63.4	17.3	12	52.3	16.6	14	13.9	5.6	15
Zone V	65.6	21.3	8	42.7	10.3	9	14.0	5.6	9
Total	64.6	15.9	37	47.3	13.8	40	14.2	5.4	42

Table 10. Summary of retouch characteristics and edge angles for Type II Side Scrapers (N=No. of specimens).

	Retouch Location		Edge Angle		No. of Spurs		No. of Notches	
Context	**Edge(s)**	**N**	**degrees**	**N**	**No.**	**N**	**No.**	**N**
Zone II	Lateral	6	45	1	—	—	—	—
	Bilateral	2	50	2				
	Lateral/Distal	1	55	1				
	Distal	1	60	3				
			65	1				
			80	2				
Zone III	Lateral	6	45	1	—	—	—	—
	Bilateral	2	50	1				
			60	4				
			65	1				
			70	1				
Zone IV	Lateral	11	30	1	—	—	—	—
	Bilateral	2	35	3				
	Lateral/Distal	1	50	2				
	Distal	1	55	2				
			60	2				
			65	3				
			70	1				
			80	1				
Zone V	Lateral	6	30	1	—	—	—	—
	Bilateral	3	35	1				
			50	1				
			55	2				
			60	2				
			65	1				
			70	1				
Total	Lateral	29	56.3	(Mean)	—	—	—	—
	Bilateral	9	12.6	(s.d.)				
	Distal	2						
	Lateral/Distal	2						

Table 11. Summary measurements for Type III Side Scrapers.

	Length			Width			Thickness		
Context	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**
Zone II	66.2	13.1	5	29.2	5.6	5	8.0	1.9	5
Zone III	62.7	17.9	3	32.7	6.8	4	8.5	3.8	4
Zone IV	57.2	12.2	20	31.0	5.5	23	6.0	1.5	23
Zone V	55.6	5.7	8	32.7	4.4	9	5.9	2.0	9
Total	58.5	11.7	36	31.3	5.3	41	6.5	2.1	41

Table 12. Summary of retouch characteristics and edge angles for Type III Side Scrapers (N=No. of specimens).

	Retouch Location		Edge Angle		No. of Spurs		No. of Notches	
Context	**Edge(s)**	**N**	**degrees**	**N**	**No.**	**N**	**No.**	**N**
Zone II	Lateral	4	30	1	—	—	—	—
	Bilateral	1	40	1				
			50	1				
			55	2				
Zone III	Bilateral	2	35	1	—	—	—	—
	Bilateral/Distal	1	55	2				
	Lateral	1	70	1				
Zone IV	Lateral	16	25	1	—	—	—	—
	Bilateral	6	30	8				
	Lateral/Distal	1	35	3				
			40	3				
			45	4				
			55	1				
			60	1				
			65	2				
Zone V	Lateral	5	25	1	—	—	—	—
	Bilateral	4	30	1				
			35	2				
			50	2				
			55	1				
			60	1				
			65	1				
Total	Lateral	26	43.0	(Mean)	—	—	—	—
	Bilateral	13	12.8	(s.d.)				
	Bilateral/Distal	1						
	Lateral/Distal	1						

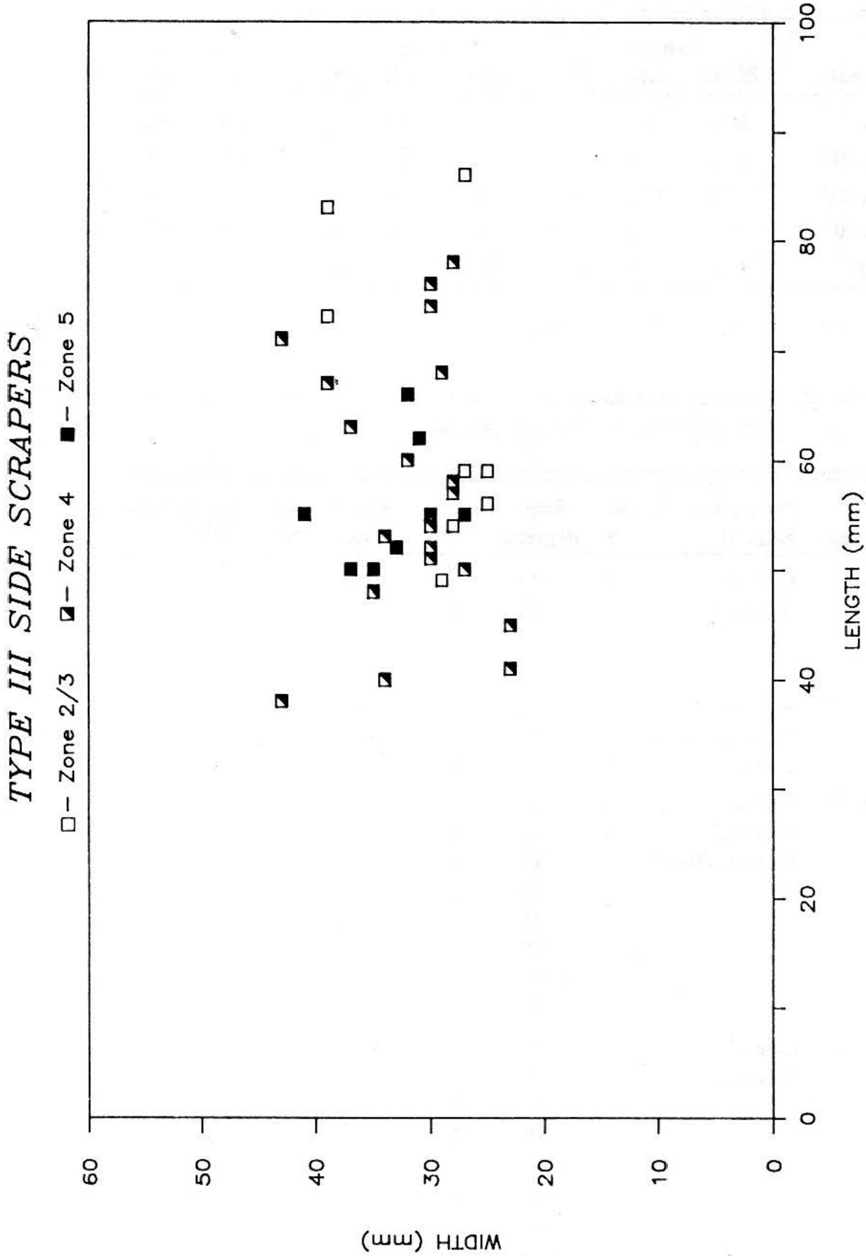

Figure 11.

Length-Width Distribution by Zone for Type III Side Scrapers.

It is not possible with the present data to determine which. Although Hall (1983:53) noted relatively "high frequencies of hafting notches" in her sample of Type III side scrapers, only one instance of notching was noted in the present sample and it appeared more related to multiple use as a spokeshave.

Edge angles (Mean=43 degrees) are much lower for Type III side scrapers than either Type I or Type II side scrapers. The majority of these tools have edge angles that range from 30 to 40 degrees. Hall (1983:51), on the other hand, reported a higher mean angle of 58 degrees for this tool type. Wilmsen (1970:70) has suggested that tools with edge angles below 35 degrees were associated with meat and skin cutting whereas those in the 46–55 degree range were associated with a variety of functions (e.g., skinning and hide scraping, plant shredding, woodcutting, bone and antler working, etc.).

The small size and somewhat formal shape of the Type III scraper suggest that it was a curated tool. Hall (1983:53–54) has also proposed this and, based on her recording of similar widths and thicknesses, postulates that Type I end scrapers and Type III side scrapers were produced on blanks of similar morphology. Furthermore, she suggests that "Type I endscrapers were derived from the longer side scrapers after the sides became difficult to rejuvenate" (Hall 1983:54). While this study also indicates that these two tool types could have been produced from similar blanks (i.e., blade-like flakes), the present data neither support or disprove Hall's suggestion that end scrapers were manufactured from exhausted side scrapers.

Pointed Scrapers

Coe (1964:79) defined a pointed scraper as an "adaptation of the type II side scraper," produced "from a thick flake with two sides shaped to form a definite point" (Figure 12). He also noted that this type was not associated with any particular time period.

Only a few pointed scrapers were identified in this study (Tables 13 and 14). Some of these tools were made from a thin (i.e., <10 mm) rather than a thick flake and, therefore, do not strictly fit Coe's definition. Nevertheless, they display retouched edges that form a point and are included here based on that criterion. Following Coe, it can be concluded that these pointed scrapers were an "adaptation" of the Type II and Type III side scraper. This type might be viewed best as a Type II or Type III side scraper in a more complete stage of reduction. That is, a pointed scraper represents a bilateral side scraper that was reduced to the stage where both its lateral edges converged to a point. A variation on this theme was exhibited by some specimens which had one lateral edge that was retouched at a transverse angle (across the distal end) until it reached the opposite lateral edge of the tool to form a point.

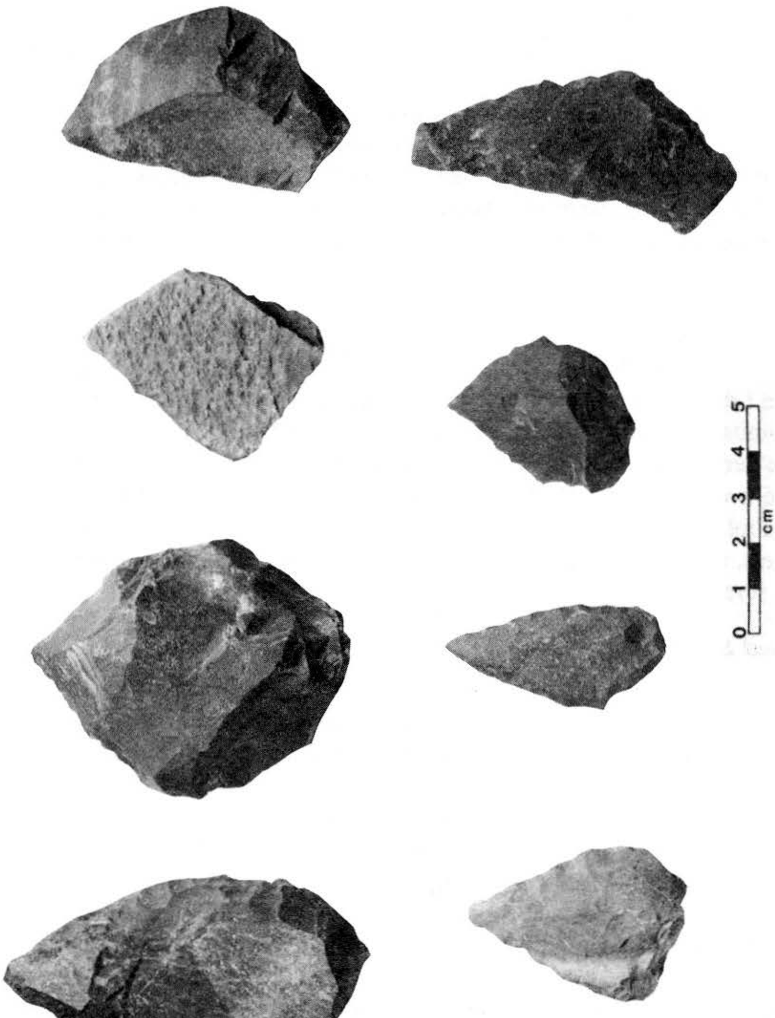

Figure 12.

Pointed Scrapers.

Table 13. Summary measurements for Pointed Scrapers.

	Length			Width			Thickness		
Context	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**
Zone II	58.2	8.8	5	31.0	8.7	6	8.5	3.1	6
Zone III	72.7	8.0	3	47.0	12.8	3	13.7	6.5	3
Zone IV	68.0	23.4	3	30.0	11.3	3	8.0	1.7	3
Zone V	50.5	10.6	2	46.5	10.6	2	9.0	2.8	2
Total	62.6	14.2	13	38.6	11.3	14	9.6	4.0	14

Table 14. Summary of retouch characteristics and edge angles for Pointed Scrapers (N = No. of specimens).

	Retouch Location		Edge Angle		No. of Spurs		No. of Notches	
Context	**Edge(s)**	**N**	**degrees**	**N**	**No.**	**N**	**No.**	**N**
Zone II	Bilateral	5	30	2	1	1	—	—
	Lateral/Distal	1	45	1				
			50	1				
			55	1				
			70	1				
Zone III	Bilateral	3	55	3	—	—	—	—
Zone IV	Bilateral	3	45	1	—	—	—	—
			60	1				
			65	1				
Zone V	Bilateral	2	45	1	—	—	—	—
			70	1				
Total	Bilateral	13	52.1	(Mean)	—	—	—	—
	Lateral/Distal	1	12.5	(s.d.)				

Consequently, it may be more meaningful in a behavioral sense to view pointed scrapers as representing a final stage in a morphological continuum that resulted from tool use and resharpening. The variation in the length-width distribution of pointed scrapers, shown in Figure 13, can perhaps be better understood by viewing the relatively larger and thicker pointed scrapers as exhausted Type I or Type II side scrapers, and viewing the long, narrow and thin pointed scrapers as exhausted Type III side scrapers.

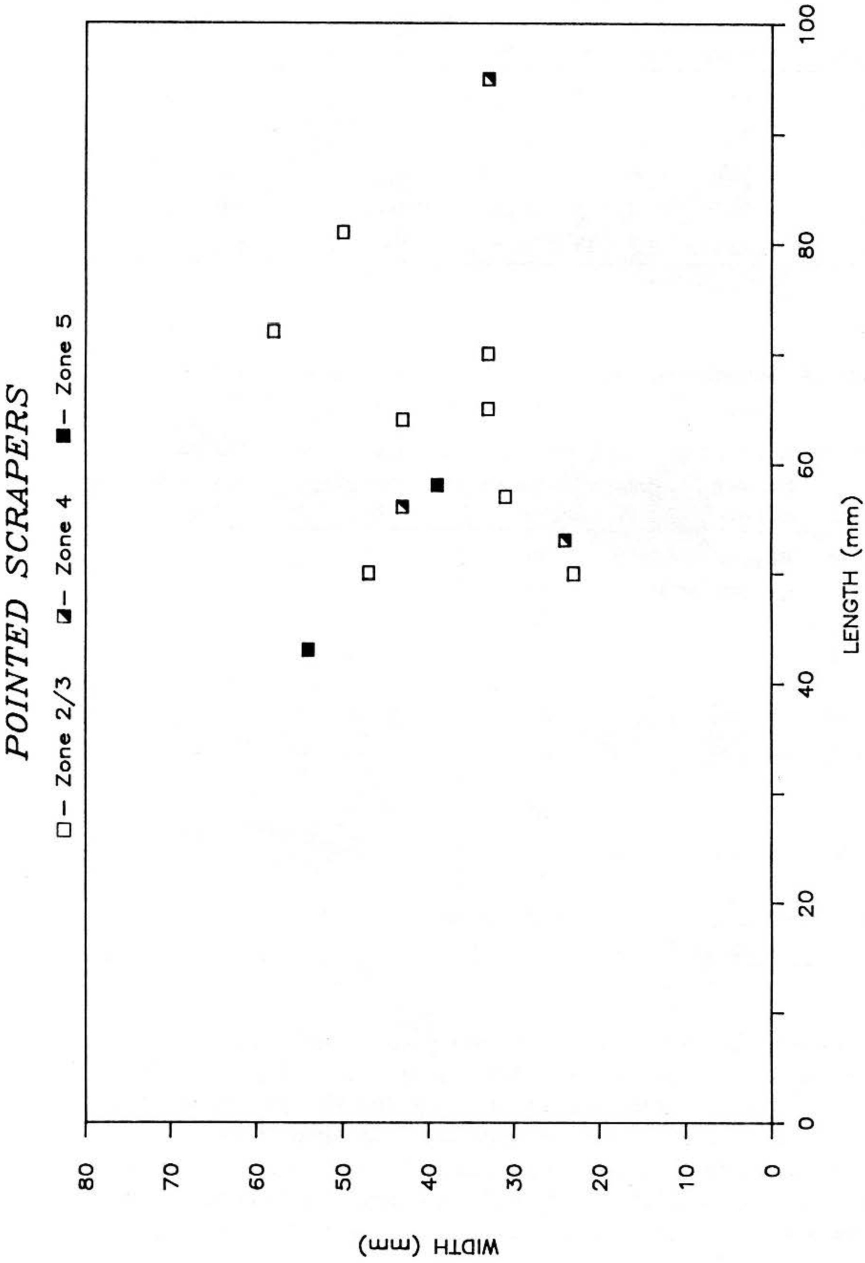

Figure 13.

Length-Width Distribution by Zone for Pointed Scrapers.

Oval Scrapers

As the name implies, these unifaces display retouch in a roughly circular shape around the circumference of the tool (Figure 14). Coe (1964:79) divided this type into two varieties. The first was made from a broad, thin flake whereas the other was made from a thick flake that often retained much cortex. Oval scrapers were found in all zones of the excavation.

Summary measurements for this tool type are given in Tables 15 and 16. The few specimens present in this study were roughly circular in shape and usually were retouched around the entire tool edge except for the striking platform. Edge angles range from 40 to 60 degrees and, as outlined above for the other tool classes, indicate a wide variety of activities. Although Coe proposed no specific function for this type, Hall (1983:59) suggested a variety of activities including woodworking, bone working, and heavy shredding.

Other Unifacial Tools

Although the vast majority of the examined unifaces in this study fit relatively easily into Coe's typology, a few items exhibited sufficient variability to prevent them from being assigned to an existing tool type (see Table 17).

Most of these specimens were classified as unidentified and consist mainly of broken or fragmented unifaces. They probably represent incomplete portions of one of the above described types. A few specimens were complete enough to be classified as either side or end scrapers but could not be more specifically identified. In addition to these artifacts, some whole specimens were also present in this group; however, they lacked sufficient patterning to place them into any of the categories described above. Some of these may also represent rejected early production pieces. Finally, five other tool types—chopper, adze, core/uniface, denticulate, and graver—represented in the study sample are briefly discussed below (Figures 14 and 15).

A large chopper, made on a large flake that still retained cortex, was recovered from Zone III. The working edge was bifacially chipped whereas one lateral edge was unifacially retouched, probably to straighten the edge. This appears to be an expedient tool that perhaps was used as site furniture (cf. Binford 1979).

Two relatively large tools have been tentatively identified as adzes, although they could conceivably be variations of Type II or Type III end scrapers. Cortex is present on the dorsal surface of both tools and they have long shallow constrictions or notches near their butt ends. One of these notches appears to have been slightly ground. One specimen also displays flaking on its ventral surface. Technically, this would qualify the tool as a biface but the nature of the ventral flaking appears to be related primarily to thinning that surface.

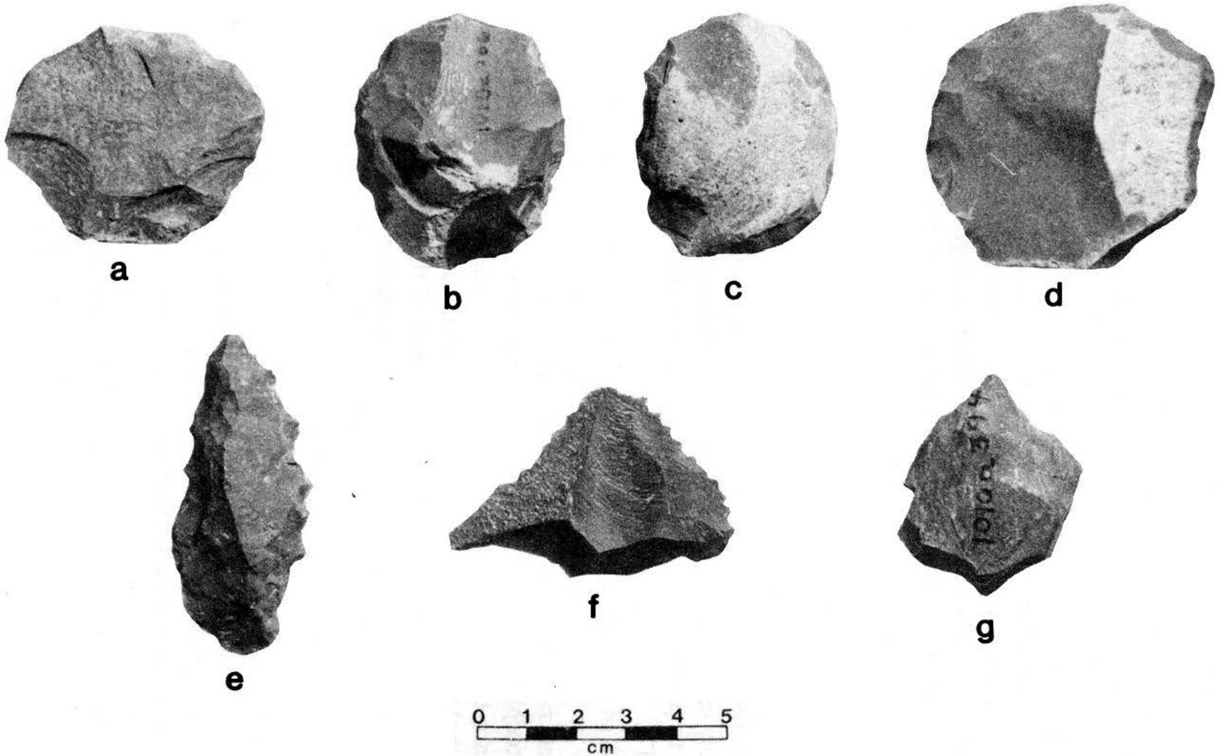

Figure 14.

Oval Scrapers (a–d), Denticulates (e–f), and Graver (g).

Table 15. Summary measurements for Oval Scrapers.

	Length			Width			Thickness		
Context	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**	**Mean**	**s.d.**	**N**
Zone II	52.2	6.9	4	56.5	7.8	4	15.2	5.0	4
Zone III	54.5	0.7	2	47.5	6.4	2	14.0	2.8	2
Zone IV	47.3	12.5	3	52.0	11.5	3	11.7	2.3	3
Zone V	—	—	0	—	—	0	—	—	0

Table 16. Summary of retouch characteristics and edge angles for Oval Scrapers (N=No. of specimens).

	Retouch Location		Edge Angle		No. of Spurs		No. of Notches	
Context	**Edge(s)**	**N**	**degrees**	**N**	**No.**	**N**	**No.**	**N**
Zone II	Circumference	4	35	1	—	—	—	—
			50	1				
			60	2				
Zone III	Circumference	2	60	1	—	—	—	—
			70	1				
Zone IV	Bilateral/Distal	2	30	1	—	—	—	—
	Circumference	1	55	1				
			60	1				
Zone V	—	—	—	—	—	—	—	—
Total	Circumference	7	53.33	(Mean)	—	—	—	—
	Bilateral/Distal	2	12.99	(s.d.)				

A few specimens exhibited fine, regularly-spaced retouch that resulted in a series of small, sharp projections along the working edge. The size and shape of these tools suggest that they were made on relatively thin and sometimes narrow flakes. Although these tools could be viewed as a variation of the Type III side scraper, the denticulate edge suggests that they were used in a sawing or cutting action, probably on soft material such as meat or plant matter. Another small flake tool, interpreted as a graver, had a single retouched projection.

The final class of artifacts was represented by eight specimens believed to represent cores rather than tools. They generally exhibit prepared, flat tops (the striking platform), and have a cone or dome shape resulting from the unidirectional removal of blade-like flakes. Some of these, by using the striking platform edge as the working edge, could have served as scrapers

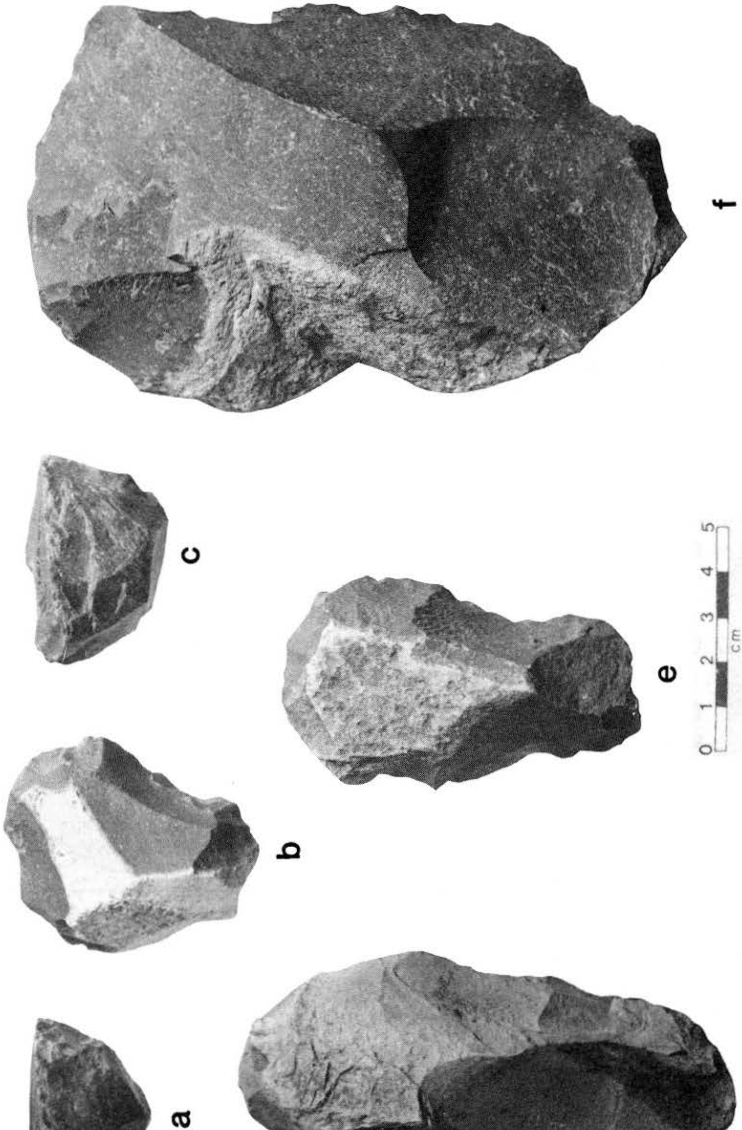

Figure 15.

Core/Unifaces (a–c), Adzes (d–e), and Chopper (f).

after they were no longer suited to be cores. This type of core, many of which were also used as scrapers, has been reported from other early Southeastern sites such as Wells Creek (Dragoo 1973:39–42) and Harney Flats (Daniel and Wisenbaker 1987:82).

Summary

Based on the present analysis, it is likely that some of the unifacial tool types defined by Coe reflect, at least to some degree, differences between long and short term usage (i.e., curated vs. expedient tools) as well as different stages of tool reduction.

It is suggested here that the smaller and more formally shaped Type I end scrapers and Type III side scrapers represent curated tools manufactured from blade-like flake blanks that were produced from specialized cores (i.e., the core/uniface type identified in this study). It is also suggested that pointed scrapers represent a final stage in a morphological continuum that resulted from use and resharpening of Type II and Type III side scrapers. In addition, the larger, less regularized unifaces (i.e., Type I and Type II side scrapers, and Type II and Type III end scrapers) most likely represent more expediently produced and used tools where less attention was paid to blank production.

If edge angles indicate tool function, then considerable overlap in tool use appears to be present among these tool types. This observation is consistent with both Hall's (1983) and Coe's (1964) proposed tool functions and is also in agreement with the proposed curated/expedient dichotomy. As noted earlier, the presence of functionally equivalent forms of curated and expedient tools in the same assemblage can be expected (Binford 1979).

In addition, there are indications among the postulated curated tools for the portable and flexible aspects of technology proposed by Goodyear. The curated tools reflect a general purpose toolkit containing multifunctional tools. This technological organization is consistent with the tool needs of mobile groups.

> Due to the relatively high mobility of most hunter-gatherer groups, the gross number of artifacts which can be carried between residences is ultimately limited. Given this constraint, the degree to which specialization of tools can take place is restricted. Generalized assemblages will be expected in cases where tools are needed for a wide range of jobs (Torrence 1983:13).

No evidence was found for significant temporal differences in uniface morphology as manifested by tool size, shape, and retouch placement among the three components. It should be kept in mind, however, that the sample size was small and the present analysis may not have monitored sufficiently tool attributes that are temporally sensitive. On the other hand, there may be some reality to the lack of "stylistic" differences among the uniface types of late Pleistocene/early Holocene assemblages. As some (e.g., Goodyear 1982a; Smith 1986) have noted, there has been perhaps an overemphasis in the East on the differences between Dalton and Early Archaic lithic complexes, excluding projectile point forms. Significant "stylistic" differences within unifacial tool types may not as readily manifest themselves among the Hardaway, Palmer, and Kirk components as with Middle and Late Archaic assemblages. In short, these unifacial tools may not be as sensitive to temporal changes as the more diagnostic projectile points upon which stratigraphic sequences are traditionally based.

INTERASSEMBLAGE VARIABILITY

Given these results, a preliminary attempt was made to examine unifacial stone tool varaibility between the three assemblages at the Hardaway site. Assemblage totals by zone are presented in Table 17. To determine if any statistically significant differences exist between the three components, a Chi-square test of association was conducted for Type I, Type II, and Type III side scrapers, and Type I and Type II end scrapers. The remaining tool types, with the exception of the unidentified category, were omitted because of low total counts. The unidentified category was omitted since it consisted mostly of tool fragments. The results of this analysis, summarized in Tables 18 and 19, fail to indicate any significant dissimilarity in uniface assemblage composition between the Hardaway, Palmer, and Kirk components. In short, there appears to be no statistically significant differences in tool type frequencies between the three assemblages.

This result was somewhat surprising, but should only be regarded as tentative. It is possible that this apparent between-zone assemblage homogeneity is simply a product of disturbance and mixing that is likely to occur on a multi-component site due to deliberate scavenging and reuse of materials from earlier occupations by later inhabitants (cf. Baker 1978; Binford 1979:274). Coe (1964:60, 83) noted the problem of disturbance at Hardaway, particularly within the Kirk midden. Although beyond the scope of this study, the question of possible component mixing can be addressed in the future by examining the projectile point distribution within these zones.

However, assuming that the above sample is representative and the degree of inter-component mixing is minor, then the apparent lack of interassemblage uniface variability needs explaining. Perhaps the most likely explanation is related to a relatively stable site function through time. Although Coe's excavations were designed more for understanding the temporal sequence than site function at Hardaway, it is apparent that a wide range of activities took place at the site. The economic potential of the site location, including readily available quantities of lithic raw material in the vicinity, also should be considered as a contributing factor to understanding site function. Hall (1983:31) believes that site function may have changed little through time and that Hardaway can be "characterized as a base camp or habitation site where a wide variety of maintenance and production activities took place, with more emphasis on the use of stone during the Kirk occupation." The function of the site as a quarry-related base camp is also consistent with the occurrence of other tool categories at Hardaway such as drills, hammerstones, and quarry blanks.

Table 17. Distribution of unifacial tool types by zone.

	Kirk				Palmer		Hardaway	
	Zone	Zone	Total		Zone IV		Zone V	
Tool Type	II	III	N	%	N	%	N	%
End Scraper (Type I)	8	1	9	6.43	8	7.55	7	11.66
End Scraper (Type II)	26	6	32	22.86	15	14.15	11	18.33
End Scraper (Type III)	1	—	1	0.71	—	—	—	—
End Scraper (Unid.)	—	1	1	0.71	—	—	—	—
Side Scraper (Type I)	4	9	13	9.28	10	9.43	7	11.66
Side Scraper (Type II)	10	8	18	12.86	15	14.15	9	15.00
Side Scraper (Type III)	5	5	10	7.14	23	21.70	9	15.00
Side Scraper (Unid.)	6	2	8	5.71	2	1.89	5	8.33
Pointed Scraper	6	3	9	6.43	3	2.83	2	3.33
Oval Scraper	4	2	6	4.28	3	2.83	—	—
Chopper	—	1	1	0.71	—	—	—	—
Adze	1	—	1	0.71	—	—	1	1.66
Core/Uniface	1	2	3	2.14	3	2.83	2	3.33
Denticulate	4	—	4	2.86	2	1.89	—	—
Graver	—	—	—	—	1	0.94	—	—
Unidentified	12	12	24	17.14	21	19.81	7	11.66
TOTAL	88	52	140		106		60	

Table 18. Chi-square test of association for end scrapers.

	Zones II/III		Zone IV		Zone V		
Type	o_i	e_i	o_i	e_i	o_i	e_i	Total
Type I	9	12.0	8	6.7	7	5.3	24
Type II	32	29.0	15	16.3	11	12.7	58
Total	41		23		18		82

$X^2=2.02$, df=2, $p>.25$

Table 19. Chi-square test of association for side scrapers.

	Zones II/III		Zone IV		Zone V		
Type	o_i	e_i	o_i	e_i	o_i	e_i	**Total**
Type I	13	10.8	10	12.6	7	6.6	30
Type II	18	15.1	15	17.7	9	9.2	42
Type III	10	15.1	23	17.7	9	9.2	42
Total	41		48		25		114

$X^2=5.32$, df=4, $p>.25$

If site function was primarily related to tool replacement and remained relatively stable through time, then both curated and expedient tool forms would be expected. The presence of curated tools at the site does not necessarily mean that they were used there, but rather that they were simply discarded and replaced by newly manufactured tools. Indeed, the evidence of actual tool use at the site is probably best reflected in the expedient unifaces.

The relatively high frequency of expedient unifaces at Hardaway is consistent with the model of expedient tools being used at sites near sources of lithic raw material, whereas curated tools are conserved for use elsewhere (cf. Keeley 1982:803–804). The implication is that sites away from lithic sources (habitation or special purpose sites) should contain curated unifaces as opposed to expedient forms. However, as Binford (1977) has argued, the presence of a curated tool in the archaeological record is correlated more with its "life-span" or utility than with its place of use. Thus, curated tools are not always found at the sites where they are used. Curated tools "broken in the context of use are frequently transported to residential locations where they may be recycled or repaired for future use" (Binford 1977:34).

The presence of numerous curated tools at sites near quarries may be viewed as evidence for the discarding of exhausted tools and their replacement by newly manufactured forms. A group about to leave a site near a lithic source may have retooled in anticipation of future travel in areas containing little or no suitable stone (see Gramly 1980; Keeley 1982:803–804). Consequently, curated/hafted forms would be deposited at sites near lithic sources where they were replaced, and repaired or recycled at habitation sites where fresh raw material was not readily available.

> For example, if a group is occupying a site near a source of lithic raw material, they may prefer to employ expedient implements while conserving or even ignoring hafted tools. The assemblage at such a site would contain large amounts of waste and a relatively large number

> of big, minimally retouched tools. This same group occupying another location where raw material was more difficult to obtain may preferentially employ its hafted implements so that the assemblage deposited would contain little waste and a high proportion of small, intensely worked tools. Although the assemblages from these two sites would be quite dissimilar, they might nevertheless be the remains of the same group and could even be of the same suite of activities. In addition, a group about to leave a site with abundant lithic raw material may extensively retool in anticipation of future shortages of suitable stone at sites occupied next in their seasonal round. . . . Since the retooling of hafted tools is one of the principal maintenance activities of stone-using peoples, we can expect that longer-term occupation sites in any particular settlement system would yield assemblages with high frequencies of once-hafted tools (Keeley 1982:803–804).

The above description is postulated to be an appropriate model of site use at Hardaway. Moreover, it is believed that assemblage composition at the site was influenced by the readily available quantities of lithic raw material. The unifacial tool assemblage appears to reflect a similar pattern between the three components for the manufacture and use of large expedient tools and the discard and presumed manufacture of curated tools to be used elsewhere. Because of their economic potential, some sites remain functionally stable through time. A good lithic procurement area would be expected to retain its potential regardless of changes in the cultural systems occupying the area (Binford 1982:19). Thus, a working hypothesis can be proposed that includes the Hardaway location as an integral part of the settlement system of the Yadkin River basin where retooling was a principal activity (also see Hall 1983).

It also should be emphasized that this functional stability does not imply an absence of interassemblage variability between the three components at Hardaway. Some differences are known to be present, including a higher ratio of lithic debitage to tools in the Kirk component (Coe, personal communication) as well as variability in tool raw material sources (Ward, personal communication). These examples—and undoubtedly others—are in need of explanation. Furthermore, given Binford's proposal that technologies are internally differentiated, looking at interassemblage variability at only one site may not provide an accurate picture of the degree or total range of variability present within the settlement system.

CONCLUSIONS

Although the results presented here can only be considered very preliminary, they do suggest further avenues for research. First, additional analysis is needed to explore the possibility that some of the morphological variability reflected in Coe's uniface typology is related to tool reduction. Also, investigation is needed to better address the question of "stylistic" differentiation among the unifaces present in the three components. Variation in raw material type and quality, intensity of tool use, and differences in tool reduction are all factors that could help clarify this issue. To what extent can the assemblages of each of the three components be characterized as being principally "expedient" or "curated"? Answers to questions such as these are needed if the issue of interassemblage variability at Hardaway is to be resolved. It is also necessary to employ strategies of lithic analysis that integrate studies of tool production and use with theoretical concepts about the organization of hunter-gatherer technologies. For example, once an understanding of how stone tool technologies are integrated into settlement systems is gained, then other aspects of human behavior that are of wider anthropological interest can be studied. Finally, this study clearly indicates that a vast potential for contributing to our understanding of the formative cultures of the Carolina Piedmont still exists in the Hardaway data.

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Appendix A. Inventory of analyzed unifacial tools.

Location No.	Tool Type
Sq.–20L0, Zone II	
1	Adze
1	End Scraper (Type Ib)
1	Oval Scraper (Type I)
1	Oval Scraper (Type II)
1	Pointed Scraper
1	Side Scraper
1	Side Scraper (Type I)
2	Side Scraper (Type II)
2	Side Scraper (Type III)
1	Unidentified Uniface
Sq.–20L0, Zone IV	
2	End Scraper (Type IIa)
1	End Scraper (Type IIb)
3	Side Scraper (Type I)
2	Side Scraper (Type III)
1	Unidentified Uniface
Sq.–20L0, Zone V	
1	End Scraper (Type Ia)
1	End Scraper (Type IIb)
1	Side Scraper (Type I)
1	Unidentified Uniface
Sq.–20L5, Zone II	
3	End Scraper (Type Ia)
1	End Scraper (Type Ib)
4	End Scraper (Type IIa)
3	Pointed Scraper
2	Side Scraper (Type II)
2	Unidentified Uniface
Sq.–20L5, Zone III	
1	Side Scraper
1	Side Scraper (Type II)
Sq.–20L5, Zone IV	
1	Denticulate
1	End Scraper (Type IIa)
1	Pointed Scraper
1	Side Scraper
1	Side Scraper (Type I)
1	Side Scraper (Type II)
1	Side Scraper (Type III)
Sq.–20L5, Zone V	
2	Core/Uniface
1	End Scraper (Type Ia)
1	End Scraper (Type IIb)
2	Pointed Scraper
3	Side Scraper
3	Side Scraper (Type I)
2	Unidentified Uniface
Sq.–25L0, Zone II	
1	End Scraper (Type Ia)
1	End Scraper (Type IIa)
Sq.–25L0, Zone IV	
1	End Scraper (Type IIa)
2	Oval Scraper
1	Side Scraper (Type I)
1	Side Scraper (Type II)
Sq.–25L0, Zone V	
2	End Scraper (Type Ia)
2	Side Scraper (Type III)
2	Side Scraper (Type II)
1	Unidentified Uniface
Sq.–25L5, Zone II	
1	Denticulate
2	End Scraper (Type IIa)
2	Pointed Scraper
1	Side Scraper
1	Side Scraper (Type III)
2	Unidentified Uniface

Appendix A Continued.

Location No.	Tool Type	Location No.	Tool Type
Sq.–25L5, Zone III		Sq.–30L5, Zone III	
1	Core/Uniface	1	End Scraper
1	End Scraper (Type Ia)	2	End Scraper (Type IIa)
1	End Scraper (Type IIa)	1	Pointed Scraper
1	End Scraper (Type IIb)	1	Side Scraper
1	Oval Scraper (Type II)	1	Side Scraper (Type I)
1	Pointed Scraper	3	Side Scraper (Type II)
5	Side Scraper (Type I)	1	Side Scraper (Type III)
2	Side Scraper (Type II)	2	Unidentified Uniface
2	Side Scraper (Type III)		
4	Unidentified Uniface	Sq.–30L5, Zone IV	
		1	Core/Uniface
Sq.–25L5, Zone IV		1	End Scraper (Type Ia)
1	Graver	3	End Scraper (Type IIa)
2	Side Scraper (Type II)	1	End Scraper (Type IIb)
5	Side Scraper (Type III)	1	Side Scraper
6	Unidentified Uniface	3	Side Scraper (Type II)
		3	Side Scraper (Type III)
Sq.–25L5, Zone V		4	Unidentified Uniface
1	End Scraper (Type Ia)		
1	Side Scraper (Type I)	Sq.–30L5, Zone V	
1	Side Scraper (Type III)	1	End Scraper (Type IIa)
		1	End Scraper (Type IIb)
Sq.–30L0, Zone II		1	Side Scraper (Type III)
1	Core/Uniface		
1	Denticulate	Sq.–35L0, Zone II	
1	End Scraper (Type Ib)	1	End Scraper (Type Ia)
5	End Scraper (Type IIa)	4	End Scraper (Type IIa)
2	Side Scraper	1	End Scraper (Type IIb)
1	Side Scraper (Type I)	1	Oval Scraper
2	Side Scraper (Type II)	1	Side Scraper (Type I)
1	Side Scraper (Type III)	1	Side Scraper (Type II)
2	Unidentified Uniface	1	Unidentified Uniface
Sq.–30L5, Zone II		Sq.–35L0, Zone IV	
1	End Scraper (Type IIa)	1	Core/Uniface
1	End Scraper (Type IIb)	2	End Scraper (Type IIa)
1	Side Scraper (Type III)	1	Pointed Scraper
		2	Side Scraper (Type I)
		5	Side Scraper (Type II)
		1	Side Scraper (Type III)
		2	Unidentified Uniface

Appendix A Continued.

Location No.	Tool Type
Sq.-35L0, Zone V	
1	End Scraper (Type Ib)
1	End Scraper (Type IIa)
2	Side Scraper (Type II)
1	Side Scraper (Type III)
Sq.-35L5, Zone II	
3	End Scraper (Type IIa)
1	End Scraper (Type III?)
1	Oval Scraper
1	Side Scrapter (Type I?)
1	Side Scraper (Type II)
1	Unidentified Uniface
Sq.-35L5, Zone III	
1	Core/Uniface
2	End Scraper (Type IIa)
1	Side Scraper (Type I)
2	Side Scraper (Type II)
1	Side Scraper (Type III)
4	Unidentified Uniface
Sq.-35L5, Zone IV	
1	End Scraper (Type Ia)
1	End Scraper (Type Ib)
1	Side Scraper (Type I)
4	Side Scraper (Type III)
5	Unidentified Uniface
Sq.-35L5, Zone V	
1	Side Scraper (Type I)
1	Side Scraper (Type III)
Sq.-40L0, Zone II	
2	Denticulate
2	Side Scraper
1	Unidentified Uniface
Sq.-40L0, Zone IV	
1	Denticulate
1	End Scraper (Type Ib)
3	End Scraper (Type IIa)
1	Side Scraper
2	Side Scraper (Type I)
2	Side Scraper (Type II)
1	Side Scraper (Type III)
1	Unidentified Uniface
Sq.-40L0, Zone V	
1	End Scraper (Type Ia)
1	Side Scraper
1	Side Scraper (Type I)
1	Side Scraper (Type III)
2	Unidentified Uniface
Sq.-40L5, Zone III	
1	Side Scraper (Type I)
1	Unidentified Uniface
Sq.-40L5, Zone IV	
1	End Scraper (Type Ib)
3	Side Scraper (Type III)
Sq.-40L5, Zone V	
1	Adze
2	End Scraper (Type IIa)
1	Side Scraper (Type II)
2	Side Scraper (Type III)
Sq.-42.5, Zone II	
1	End Scraper (Type IIa)
Sq.-45L0, Zone IV	
1	End Scraper (Type IIa)
1	Side Scraper (Type II)

Appendix A Continued.

Location No.	Tool Type
Sq.–45L0, Zone V	
1	End Scraper (Type IIa)
1	End Scraper (Type IIb)
1	Side Scraper
2	Side Scraper (Type II)
Sq.–45L5, Zone II	
3	End Scraper (Type IIa)
2	Side Scraper (Type II)
2	Unidentified Uniface
Sq.–45L5, Zone III	
1	Chopper
1	Oval Scraper (Type II)
1	Pointed Scraper
1	Side Scraper (Type I)
1	Unidentified Uniface
Sq.–45L5, Zone IV	
1	Core/Uniface
2	End Scraper (Type Ia)
1	End Scraper (Type Ib)
1	Oval Scraper (Type I)
1	Pointed Scraper
3	Side Scraper (Type III)
2	Unidentified Uniface
Sq.–45L5, Zone V	
1	End Scraper (Type IIa)
Fea. 1 (Sq.–45L5)	
1	Side Scraper (Type I)
Fea. 13 (Sq.–45L0)	
1	End Scraper (Type IIa)
2	Unidentified Uniface
Fea. 18 (Sq.–35L0)	
2	End Scraper (Type IIb)
3	Pointed Scraper
1	Side Scraper (Type I)
2	Side Scraper (Type II)
Fea. 19 (Sq.–25L0)	
1	End Scraper (Type I)
1	End Scraper (Type III)
1	Unidentified Uniface
Fea. 19 (Sq.–30L0)	
2	Chopper
1	End Scraper (Type IIa)
1	End Scraper (Type IIb)
1	Graver
1	Side Scraper
1	Side Scraper (Type I)
1	Side Scraper (Type II)
2	Side Scraper (Type III)
3	Unidentified Uniface
Fea. 19 (Sq.–35L0)	
1	Core/Uniface
2	End Scraper (Type IIa)
1	Side Scraper (Type II)
3	Unidentified Uniface
Fea. 19 (Area under Fea.)	
1	End Scraper (Type IIa)
2	Side Scraper (Type II)
2	Unidentified Uniface
Fea. 21 (Sq.–40L0)	
1	Adze
2	End Scraper (Type Ia)
1	End Scraper (Type IIa)
4	Side Scraper
2	Side Scraper (Type I)
7	Side Scraper (Type II)
1	Side Scraper (Type III)
Fea. 23 (Sq.–35L0)	
1	End Scraper (Type Ib)
1	Side Scraper (Type I)
1	Side Scraper (Type III)

Appendix A Continued.

Location No.	Tool Type
Fea. 26 (Sq.–45L5)	
1	Core/Uniface
1	Oval Scraper (Type II)
Fea. 28 (Sq.–35L5)	
1	End Scraper (Type IIa)
1	Graver
1	Side Scraper (Type III)
1	Unidentified Uniface
Fea. 29 (Sq.–35L5)	
1	Core Rejuvenation Flake
1	Core/Uniface
1	End Scraper (Type IIb)
1	Pointed Scraper
1	Side Scraper (Type II)
Fea. 34 (Sq.–30L5)	
1	Core/Uniface
1	Oval Scraper
2	Pointed Scraper
1	Side Scraper (Type I)
3	Unidentified Uniface

APPENDIX B

Attribute Definitions

Tool Condition: This category indicates if the artifact is complete (or nearly complete), broken, or indeterminate.

Tool Type: Based on the unifacial stone tool typology defined by Coe (1964). In a few cases, types not defined by Coe were used in this study and are described in the text.

Maximum Length: Measurement of the maximum length (to the nearest mm) was taken on the longest dimension of the artifact which usually corresponded to the bulbar axis (cf. Movius et al. 1968:33). In a few cases, however, maximum length corresponded to the working axis (cf. Movius et al. 1968:33) in order to preserve the consistency of measurement within a type.

Maximum Width: Maximum width was measured (to the nearest mm) at a right angle to maximum length.

Maximum Thickness: This dimension was measured (to the nearest mm) at the maximum point of thickness of the tool, other than at the bulb of percussion.

Striking Platform Thickness: The maximum distance on the striking platform from the dorsal face to the ventral face of a flake (measured to the nearest mm).

Striking Platform Width: The maximum distance on the striking platform perpendicular to its maximum thickness (measured to the nearest mm).

Cortex: An approximation of the percentage of the artifact surface that is covered by cortex (i.e., None, 1–25%, 26–50%, 51–75%, 76–100%).

Retouch: Following Movius et al. (1968:15), this attribute was selected to monitor the "patterning of retouch [as] a measure of the degree to which the extremity of the blank has been modified for use." Retouch intensity was scaled as follows (after Dibble 1987:110):

> *Light/Discontinous* — Retouch with only one row of flake scars extending no more than 2–3 mm from the tool edge.
>
> *Medium or "Normal"* — One or two rows of retouch scars that are moderately invasive (3–5 mm) from the tool edge.
>
> *Heavy* — Steep and very invasive scalar (deep with feather termination) flake scars. These scars are generally greater than 5 mm in length and also tend to be relatively wide.
>
> *Stepped* — Heavy retouch that contains a predominance of stepped (hinged terminated) flake scars.

Retouch Location: This attribute records the edge or edges where retouch occurs on the tool in relation to the striking platform or working axis of the artifact.

Edge Angle: Following Wilmsen (1970), the edge (spine plane) angle of each tool was measured with a goniometer to the nearest five degrees. Specifically, this is the angle between the dorsal and ventral surfaces of an artifact at a retouched edge (cf. Tringham et al. 1974:179). In cases where edge angles varied along an edge, the most modal angle was recorded. In cases where the goniometer could not properly measure the edge angle, polar coordinate grid paper was used for measuring the edge angle.

In the absence of extensive lithic microwear analysis, edge angle measurements represent the primary evidence upon which tool use was interpreted in this study. This follows Wilmsen's (1970) suggested activity functions for each of several distinct groups of angle size ranges based on his study of tools from several Paleo-Indian sites. Ethnoarchaeological observations have tended to support this postulated relationship (e.g., Gould et al. 1971; White and Thomas 1972).

Spurs: The presence or absence and location of possible projections were recorded.

Notches: The presence or absence and placement of "notches," generally presumed to facilitate tool hafting, were recorded.